

Peak Poison

The elite energy crisis and environmental justice



ground  work

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the groundWork Report 2007

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Top picture: Stephen Coburn

Bottom picture: Findhorn Foundation. This picture was chosen because the Findhorn Foundation ecovillage in Moray pictured here has recorded the lowest ecological footprint ever recorded in the developed world. The village is demonstrating how it is possible for communities to have a low environmental impact while also retaining a high quality of life. See www.findhorn.org.

Foreword

Governments and corporations will gather in Bali, Indonesia, in December 2007, to plot a way forward on climate change. Peoples' movements, and even main stream civil society organisations, are increasingly sceptical that they have the political will, imagination or wisdom to put people and the future of the planet ahead of corporate profits and economic growth. People's movements fear that it will be less than too little too late, that it will follow the expedient path already opened by the false solution of carbon trading and so provide for a thoroughly 'regressive way forward'.

Building upon the struggles of women's movements in Nigeria and the U'Wa nation in Columbia, African and South American people have called for oil to stay in the ground. This call is now echoed also in the decision of Ecuador's political leadership to halt the development of heavy oil extraction from the Yasuni National Park in the Amazon. Ecuador is a poor country. It has contributed little to the problem of climate change but will bear a heavy cost from its consequences. In deciding to forgo income from oil, it has also opened up the question of ecological debt. How it, and other Southern countries, should be compensated is a debate for another publication, but the principle we need to accept is that a credible response to climate change lies in these bold calls by peoples' movement in both South America and Africa.

The fact that this call has emerged from these continents is not a fluke. The people of these these continents have been confronted with the violence and destruction of capitalist production and it is here that we may hope to see the emergence of new societies created by people who are still connected to mother earth. Thus far, the 'global powers' have shown little inclination to respect their call. As this report is published, the price of crude oil is hovering at just under US\$100 per barrel while the United States has set up Africom, a new military command intended to ensure US control of African oil and other resources into the future. This push for energy security for profligate US consumption is supported by an African elite eager for profit but will be bought at the cost of yet more death and destruction of people and their environments.

This push for energy security is not going uncontested. The groundWork Report 2005, titled *Whose Energy Future?*, called for 'another energy future'. In 2006, a global

Foreword

collective of NGOs gathered in Abuja under the auspices of Friends of the Earth International and said 'Another Energy Future Is Necessary – Alternatives Exist'. They went on to call for a stop to all new oil and gas exploration. At the World Social Forum in Nairobi, Kenya, 2007, community people from Nigeria and South Africa, together with global NGOs, called for Energy Sovereignty in Africa. This position was adopted by the World Social Forum in their final position statement following the week long event. People's sovereignty is a set of social relations of equity and solidarity between people. It is the basis for another world, one in which systems of production and consumption are founded on economic, social and environmental justice.

What is critical about a world based upon relationships of people's sovereignty is that it might be the only process that saves the planet from destruction. In the meantime, the global elite, and those who have grown used to profligate consumption, will soon face the distinct issue of peak oil and the decline of global energy production. This means that they will have to confront, in some measure, the hard choices that they have refused to confront in climate change negotiations. They must either choose to 'power down' and consume less or to visit unprecedented violence on others in an effort to hog what's left of the global resource. This second strategy will lead to their own destruction. Already the costs of violence are rising while the returns are falling fast. Powering down presents them with an alternative. It involves recognising that things have to be done differently, and that it can be done.

South Africa is one of the most unequal countries in the world. It is no coincidence that it also has one of the most energy intensive economies in the world and the dubious distinction of being one of the top global greenhouse gas emitters. But, rather than recognising the challenge and necessity of finding a new path enabling people to define a future that satisfies their needs, government remains determined to capitalise on cheap energy. Recently, the Deputy President even called for polluting industry from China to be relocated to South Africa.

Finally, the solution lies not in technocratic fixes, but in the hard yards of mobilising – being part of a global movement that challenges corporate power. Through this process of mobilisation, resistance and transforming society we will create another world! It is our hope that this publication will feed into that process.

Bobby Peek
Director
groundWork

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South Africa is now planning a massive programme of building new power stations based on coal and nuclear energy. The success of activists resisting new coal fired power stations in the Philippines is therefore most inspiring. Many thanks to Romana de los Reyes for generously sharing something of that experience with us.

The failure of South Africa's only nuclear generator plunged Cape Town into an eight month long energy crisis. This was one of the inspirations for this study. Many thanks to the people in Cape Town and the Western Cape who shared their insights with us when we visited in April this year. They include: Maya Aberman and Liz McDaid of Earthlife Africa; Leila Mohamed and Audrey Dobbins of Sustainable Energy Africa, Mike Louw of Cosatu; Lenny Gentle of the International Labour Research and Information Group, David Nicol of the Cape Town Partnership; Jeremy Wakeford of the Association for the Study of Peak Oil, South Africa; Wendy Annecke of Gender and Energy Research and Training; independent researcher Ntabiseng Mohlakoana; Lisa Thompson-Smeddle of the Sustainability Institute; Jess Schulschenk of Backsberg; and Carl Opperman of AgriWes-Kaap. They are, of course, in no way responsible for our mistakes or our interpretation of the information that they shared.

We have drawn on the work of many activists in South Africa and across the world. Their struggles reveal the many fronts of environmental injustice created by the elite energy regime and their investigations constantly reveal what the elite would keep hidden or would simply ignore. It is their work which creates the possibility of other energy futures and which inspires the groundWork Report and generates much of its content.

Finally, thanks to the team at groundWork who were, as always, a pleasure to work with and have fed us information and commented on drafts. Particular thanks to Jane Harley for her support in editing the final text.

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Prologue: Imperial famine

In 1876-78, a series of droughts devastated large parts of Africa, Latin America, Indonesia, India and China. Famine stalked the world and was followed by cholera, plague and other epidemic diseases. Millions of people died in each region. The stock animals used by peasants both as a store of wealth and for ploughing also died. When the rains returned, the majority of those who survived had been displaced or were in debt to money lenders and without the seed or draught animals necessary to rebuild their lives. Many of the same regions were hit again in 1896 through to 1902. All told, between 30 and 60 million people are estimated to have died in these two periods of famine. In some of the drought stricken areas, the population did not recover until the 1950s.

The coincidence of the droughts around the world was observed for the first time in 1877 through the global network of weather stations established by the imperial powers. Previously, drought had been thought of as discrete regional events unconnected with weather patterns elsewhere. The observation of what is now known as ‘teleconnections’ between events on different sides of the world marked the beginning of a lengthy scientific enquiry into the dynamics of the world’s climate.¹ The enquiry led up many blind alleys, including the confident assertion by leading scientists that drought was caused by heightened solar activity observed as sun-spots. The matter was finally resolved only in 1969. Building on the work of earlier meteorologists, Jacob Bjerknes was able to describe the El Nino Southern Oscillation (ENSO) and the manner in which the atmosphere and oceans interact to exchange heat and drive teleconnected weather events around the world, particularly in tropical and sub-tropical zones.²

¹ Teleconnected events are those that are distant in space, and so have no immediately obvious causal links, but which respond to the same set of stimuli or form part of a common pattern.

² There are still many unanswered questions about ENSO which includes La Nina as well as El Nino events. It appears that there are long cycles in which events are stronger or weaker and ENSO interacts with many other climatic systems – such as the North Pacific Oscillation – and influences which have their own dynamic independent of ENSO. The interaction of ENSO with these other systems makes each El Nino event unique although there are common characteristics. Global warming is now also influencing the patterning of these interactions.

Prologue: Imperial Famine

In his history of these famines, Mike Davis observes that as the science became more systematic it also became more reductive, attributing famine exclusively to drought. Earlier observers were less inclined to make this assumption. William Roxburgh, a 19th Century naturalist, “discovered evidence of a comparable drought in 1685-87” but denounced the British East India Company “for aggravating drought through profligate deforestation and intensifying famine through denial of ryots’ [Indian peasants] permanent title to their land” [Davis 2002: 217]. Other contemporary observers saw imperial Britain’s ‘free’ market policies combined with a miserly programme of relief as the prime causes of famine. Food security was already eroded as the market trashed traditional institutions and systems of food storage. The new railways, advertised as providing the transport infrastructure for preventing famines, allowed merchants to transport what grain was produced in drought areas to central stores while “the telegraph ensured that price hikes were coordinated in a thousand towns at once, regardless of local supply trends”. Famine spread even into areas where rain had fallen while large quantities of grain were exported to Britain. “Londoners were in effect eating India’s bread” as the market supplied those best able to pay [26].

India’s bread was not all that was eaten. Imperial Britain appropriated the entire surplus of the Indian economy, greatly enhancing its own capacity to act as the banker of the world and to direct global investments to its own advantage. India was made to pay Britain’s debts, to cover its trade deficit and to finance the costs of ‘protection’, the imperial wars and policing necessary to enforce free trade and market disciplines – including the discipline of labour – in the interests of British capital.

On the principle that India should pay for itself – that is, for the costs of imperial administration – land taxes were rigorously imposed on the Indian peasantry in much the same way that arbitrary hut taxes and poll taxes were imposed on African people in colonial South Africa. While administration of the reluctant relief programmes of the 1870s was chaotic and corrupt, tax collection was ruthlessly efficient both during and after the drought when “a militarised campaign to collect the tax arrears accumulated during the drought” further impoverished the destitute [Davis 2002: 50]. In the late 1890s, financing imperial wars in South Africa and China – as well as building an extravagant monument for Queen Victoria’s diamond jubilee – took precedence. Drought, famine and penury were no excuse for evading the obligation of taxes. To pay, peasants were forced to sell the very means of subsistence: what little was left in their grain stores, the animals that still stood, their ploughs and hoes, their pots and

pans and, finally, their land. All went at fire sale prices, with land fetching just a few pounds of grain in many drought areas.

In 1878-79 and again in 1899-1900, the British Viceroy in India overruled the initiatives of local officials to provide relief. On the argument that ‘the market’ would provide and should not be ‘distorted’, even private charity was discouraged. As Lord Curzon, who presided over the second great famine, put it, “alms-giving weakened the fibre and demoralised the self-reliance of the population” [quoted in Davis 2002: 162]. When relief programmes became inevitable, if only to manage the dispossessed, they were punitive. Famished peasants were crowded into camps and required to do heavy labour in return for starvation rations. Being reduced to skin and bone, they invariably failed to meet work targets and their rations were then further diminished while camp officers stole and sold rations. The camps also became centres of contagion for dysentery, cholera and malaria, the latter ironically associated with the first rains that broke the drought. Those who did not succumb to starvation fell to disease.

The Viceroys who presided over successive famines censored information. In the North West provinces of India, according to a dissident British officer, “Strict orders were given to civilians under no circumstances to countenance the pretence of the natives that they were dying of hunger” [quoted in Davis 2002: 53]. At the same time, Viceroys claimed that peasants were cunningly concealing their wealth, that they were getting fat sponging off relief, or that their despair merely displayed their want of ‘fibre’.

Similar scenes played out around the world as other colonial administrations and independent countries alike took their cue from the British Government of India to prioritise market over humanitarian imperatives. Indeed, famine was intrinsic to the making of markets. In India, land was forced onto the market and so contributed to the concentration of holdings in the hands of richer peasants and money lenders. All the while, the market – its agents of merchant and money lender and its infrastructure of grain stores, loading depots and transport – was given the protection of the state against the riots provoked by its own policies.

Withering southern Africa

In southern Africa too, drought was made a weapon of capitalist expansion. The Cape was initially something of an imperial backwater, occupied first by the Dutch and then taken by the British because of its strategic location on trade routes to the East. The region was slowly and unevenly incorporated into the circuits of imperial capital through trade in animal products, particularly ivory, and subsequently through wool production in the Cape. Conflict between settlers and African polities for land, control of labour and access to markets intensified during the first half of the 19th Century, spreading from the eastern Cape frontier to the wider region. Africans were dispossessed of much of their land but, as Duncan Innes argues, still produced most of what they needed and many managed a good surplus.

This was particularly true of the Basotho who, in the period 1830-65, had produced large surpluses for trade with other African communities and with the colonists. But in 1865 the colonists of the Orange Free State responded to the rising productivity of the Basotho by waging war against them ... [1984: 25]

The discovery of diamonds (1867) and gold (1886) stimulated a different order of imperial interest, not least because Britain's use of the gold standard to set currency values was critical to its global economic dominance. The imperatives of state were now to secure the stability of the region, ultimately by extending territorial control; to secure private property relations; to draft people into cheap labour firstly for mines and secondly for settler farms; and to retain white loyalty to empire in the common project of subordinating the black population. These strategies were often contradictory but were largely carried through in the bloody imperial wars that paved the way for the creation of the new state, the Union of South Africa, in 1910.

Drought had a withering effect on the capacity of Boers and Africans alike to resist the imperial takeover, prompting Cetshwayo, the Zulu king, to think that "the English chiefs have stopped the rain" [quoted in Davis 2002: 102]. The semi-functional Boer republics in the Transvaal and Orange Free State were defeated in the South African War but the Boers themselves were then politically accommodated within the new state. African polities were also defeated in a series of wars and their capacity for autonomous action destroyed but African people were ruthlessly excluded from political participation in the new state. Even the Basotho, who secured nominal independence

as a British protectorate, were deprived of their best crop land, disarmed and finally subjected to 'hut taxes' designed to force them into the migrant labour regime.

Nevertheless, war and natural disasters had uneven effects. Even as they lost the land, African share-croppers retained considerable control over production by virtue of their control of family labour and ox ploughing teams. The rinderpest cattle plague, introduced to Africa with the Italian invasion of Eritrea, swept across the continent and reached South Africa in the late 1890s. The epidemic devastated the cattle herds of black and white farmers alike and compounded the impoverishing impact of war on Boer farmers. Many lost their land to speculators and were forced to seek work in the cities. African share-croppers proved more resilient being "able to plug into networks of kindred reciprocity which enabled them to maintain productive independence far more effectively" [Keegan 1986: 60]. This advantage was eroded over time as whites used their political power to further restrict African land holding and to exclude Africans from competing for agricultural markets. Finally, the subsidised mechanisation of agriculture enabled white farmers to take production from the hands of the share-croppers.

In the 'native reserves', however, the rinderpest disaster helped drive ever more people into the migrant labour system. The reserves were intended to preserve 'traditional' non-capitalist relations of production specifically to subsidise the costs of labour to the mines. As the Chamber of Mines acknowledged in 1944:

The maintenance of the system under which the mines are able to obtain unskilled labour at a rate less than ordinarily paid in industry depends upon this, for otherwise the subsidiary means of subsistence would disappear and the labourer would tend to become a permanent resident upon the Witwatersrand, with increased requirements. [Quoted in Wolpe 1972: 434]

The supposedly autonomous economy of the reserves was thus subordinated to the needs of capital and not allowed to develop beyond subsistence for fear that workers might escape the necessity of labour on the mines and farms. The stress imposed on the reserves was already evident in declining production, extreme poverty and malnutrition in the 1920s. In the apartheid era, production collapsed entirely and much of the land was ruined as increasing numbers of people removed from 'white' areas were crammed into growing rural slums.

Prologue: Imperial Famine

Introduction

This groundWork Report is about energy in the 21st Century. In the 19th Century, fossil fuels were on the rise. Britain was the first properly industrial power and was driven by coal. In the 20th Century, the USA took the industrial lead and oil was, and still is, the fuel of choice. The growth of industrial and economic power throughout these two centuries has been staggering and the world is now made to work on the assumption that growth is never ending. This growth depends on ever growing energy supplies. Within the next few years, however, global oil production will be in decline and there is no alternative energy source available to compensate for that loss. This is the meaning of 'peak oil'. The theory of peak oil is explained below and Chapter 2 gives a run down on the evidence that it will happen soon. The primary concern of this report, however, is to explore the implications of peak oil for environmental justice.

If coal, oil and gas fuel industrial growth, food remains the fundamental source of energy for people. Opening this groundWork Report, the Prologue shows famine and hunger at the heart of imperial capitalism. Food then became linked to fossil energy through the steam trains and ships that brought it to market. Industrial energy now saturates the food chain, providing fuel or feed stocks for everything from farm to plate: agricultural machinery, fertilizers, pesticides and herbicides, processing and packaging, transport and refrigeration. Food will be one thread followed through this report.

The groundWork Reports have identified three ways in which environmental injustice is imposed on people:

- By polluting them, degrading their environments and coercing labour to work for less than it costs to live. This is called **externalisation** because corporations get a free ride by off-loading costs onto communities, workers, the public purse and the environment.
- By dispossessing them and by privatising common or public goods. This is called **enclosure** because it eliminates or subordinates non-capitalist systems of production, so ensuring that all escape routes are closed and people cannot survive without capitalism.
- By **excluding** them from the political and economic decisions that lead to their being polluted or dispossessed.

Introduction

These processes are central to the larger process of accumulation that defines capitalist development. This is a highly unequal process as is evident from the growing inequality of people globally and in South Africa. Those who control development do very well out of it and argue that it is for the benefit of all. The evidence does not support this. Rather, as the rich are made richer, the poor are made poorer. The claim that all will benefit offers false hope and provides cover for more brutal means of keeping the poor in their place.

The world's oil elite promises a future of abundant, cheap and clean energy. The groundWork Report 2005 showed the meaning of 'clean'. The stench of blood and oil affronts the sky all along the production chain. The cheap price of oil was always at the cost of the people who live on the fenceline of production. In September this year (2007), there was yet another reminder of this when a series of explosions ripped through the Island View chemical storage tanks at Durban docks. Flames fed by a toxic mix of chemicals leapt high in the night sky and melted eight tanks. Residents living across the road were evacuated in a chaotic operation. The very next morning, industry and government officials claimed that there was minimal environmental impact. Three days later, dead fish floated to the surface of the bay and reporters at the scene said the air was still thick with the smell of chemicals. The authorities have thus far refused to say exactly what was in the tanks, claiming that this information is secret in terms of the notorious Key Points Act introduced during apartheid's state of emergency and never rescinded.

Oil is no longer cheap. Prices are now high and volatile while the big oil corporations rake in record profits. Oil in particular and fossil energy in general has indeed been extravagantly abundant for the world's rich nations and people. Even the poor in most countries have come to rely on what trickles down from this abundance: paraffin or coal for cooking and often dangerous transport affordable to some. Growing abundance has a limited future as declining oil production will not only overturn the cheap energy regime, but will provoke a crisis of energy in general.

The approaching energy crisis is one of three dimensions of a larger crisis that haunts the world of plenty. The second is that the US is rapidly losing the authority to lead the global regime of accumulation. Third, climate change is gathering momentum and is just one aspect of a broader environmental crisis.

The three dimensions of the crisis are profoundly interlinked: The extravagant use of

fossil energy has been essential to, and driven by, economic growth and accumulation that is the foundation of capitalist and imperial power. This use of fossil energy is also the primary cause of the increased concentration of greenhouse gases in the earth's atmosphere. The effects of climate change and peak oil will rebound in very powerful ways on the economy. At the same time, each of the three dimensions of crisis has its own logic. The 'internal' crisis of imperial capital is happening irrespective of climate change and peak oil. Similarly, the coincidence of peak oil and accelerating climate change is arbitrary. Even while the use of fossil fuels drives climate change, the logic of peak oil works independently of the effect of carbon emissions on the climate.

Energy in crisis

The British regime of accumulation was the first to develop an industrial production base and to do so it depended on a massive supply of cheap energy which it found in coal. As one 19th Century economist remarked, coal stands "entirely above all other commodities. It is ... the universal aid, the factor in everything we do" [Jevons quoted in Yergin 1991: 543]. For the American regime of accumulation, oil is the 'universal aid'. The oil industry is the largest in the world and, for most countries, it is the biggest single import item. Power within the industry is highly concentrated. Throughout the 20th Century it was dominated by a handful of 'majors' and, following a series of mergers, there are now just six 'super-majors'. As well as energy, oil also provides the basis for the massive chemicals and plastics industries – the products of petroleum are all around us.

As an energy source, petroleum has unique qualities. As Richard Heinberg [2005: 138] summarises: it is easier and cheaper to transport – by pipeline, ship or road tanker – than any other energy source; it has a very high energy density, meaning that a little does a lot of work; it can be refined into different fuels – gas, petrol, diesel, paraffin etc.; and these fuels can be put to a range of uses, providing energy for transport, industrial processes, generating electricity, cooking and heating.

Peak oil

Oil is a finite resource. Peak oil is the moment when half of what can be pumped from the earth has been used. It is, more importantly, also the point of maximum production. Through most of the 20th Century, the consumption of oil increased by leaps and bounds but potential production from the discovery of new oil fields

Introduction

grew even faster. In other words, the potential supply was mostly far greater than the demand. At present, the potential supply is very little more than demand and demand is still rising rapidly. After the peak, production will decline so that potential demand on a rising market becomes greater than the supply. Consumption must then be forcibly reduced.

Any individual oil field goes through a typical pattern of production from discovery to final closure. First, the rate of oil extraction from the well accelerates, then the well reaches its maximum – or peak – production, after which production starts to decline until no more oil can be extracted and the well is closed. The same pattern applies to any oil producing region and finally to the world as a whole. When the peak is reached, half the recoverable oil is used up and half remains. The pattern, shown in Figure 1, is known as a Hubbert curve after the person who first described it. In real life, the actual production curve is much more jagged and less symmetrical as producers have reduced or increased the rate of production in response to demand or because wars, sanctions or local resistance have interrupted production.

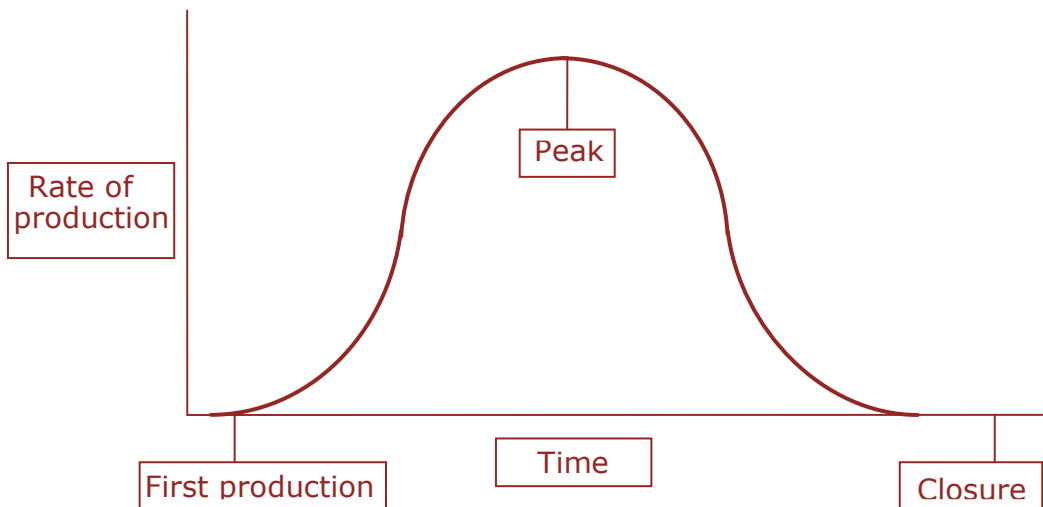


Figure 1: A standard Hubbert curve.

M. King Hubbert was one of the top US oil geologists working at the Shell laboratory in Texas. He developed his model from an intensive study of geological and production data and, in 1956, used it to predict that oil production in the mainland US would

peak in 1971. In fact, he was one year out. It peaked in 1970. Until then, his conclusion was not welcome. Shell attempted to silence him and the US Geological Survey, under pressure from the Department of Energy, ran a long campaign to discredit him. At one level, previous predictions of scarcity had proved unfounded but generated panic in the oil markets. The notion of peak oil thus suggested unwelcome instability. It also threatened the industry's power by indicating a limit to its ability to deliver cheap and reliable energy into the future.

At another level, the dispute reflected an argument between geologists and economists.³ For the former, physical constraints were the bottom line reality. Oil can only be found in specific geological formations and, once those are exploited, there is no more. For the latter, the only admissible constraint was the level of investment driven by anticipation of profit. Any shortage on the market would raise prices and so drive investment. This would inevitably result in new finds and better recovery from existing fields. However, in a paper for the US Department of Energy, Hirsch et al note that very substantial investments in the US following the US peak yielded very modest returns and did not reverse the overall pattern of declining production. They conclude that, once world oil production peaks, "higher prices and improved technology are unlikely to yield dramatically higher conventional oil production" [2005: 17].⁴

The theory of peak oil is no longer in dispute. What is now disputed is when it will happen and whether it matters. Economists, along with the industry establishment, argue that investment will secure a plentiful supply for decades and the market will find alternatives when needed. Thus, the World Petroleum Congress (WPC) dismisses any notion of limits to the supply of energy. This position is well summarised by Euan Baird of the Schlumberger oil services corporation:

Fossil fuels are the only credible candidate for cheap, clean energy, in the required quantities, over the next 50 years. This will buy valuable time for the world to move cost effectively to alternative energies as they become competitive and as the cost of exploiting depleting reserves of oil and gas increases. [Baird 2003: 40]

³ This is not, of course, a hard and fast divide. Some economists follow the conclusions of the geologists while some geologists take the industry position.

⁴ Hirsch et al do not give a date for peak oil because of the uncertainties of global reserves data. They do, however, note that the decline in North American gas production around 2002 was preceded by confident assertions of increased production that are now echoed in equally confident projections for increased world oil production.

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Oil geologists working in Hubbert's tradition formed the Association for the Study of Peak Oil (ASPO) in 2001 and argue that peak oil is already upon us. There is little time to develop alternatives and, because oil is the world's largest source of energy, the peak will create a more generalised energy crisis. This will be reflected first in further steep increases in the price of oil which will drag up the price of gas, coal and other energy sources. The argument of the mid 20th Century is thus repeated in the early 21st Century. Now, however, the stakes are higher since it concerns the global peak and not just the US peak.

Imperial crisis

The global regime of accumulation presided over by the US is looking shaky for both political and economic reasons. Politically, the legitimacy of its global leadership is eroding in the face of the naked self-interest of its actions. The proclaimed 'war on terror' – an open ended declaration of perpetual war asserting the right of the US to use force in any place or situation where it declares a terrorist threat – was supposed to replace the Cold War as a means of legitimating US imperialism. Instead, the invasion of Iraq is widely and rightly seen as an oil grab. But it is much more than this. As the anti-war *Retort* group argues [2005], big oil is articulated with other 'centres of capital' with interests in war, most immediately the 'military-industrial' complex, the giants of construction given corrupt contracts – largely paid for with Iraqi money – for 'reconstruction' and, "not least, financial services and banking capital" looking for a flood of petrodollars from high priced oil. War provided an

... 'extra-economic' restructuring of the conditions necessary for expanded profitability – paving the way for new rounds of American-led dispossession and capital accumulation. ... It was intended as the prototype for a new form of military neo-liberalism. [Retort 2005: 71, 72].

Disaster capitalism

Activist academic Naomi Klein calls it 'disaster capitalism'. Iraq is not alone, nor was it the first to be 'reconstructed' as a neo-liberal economy with a client government tricked out in the rags of democracy. The same prescriptions are applied both to 'post-conflict' societies and to countries hit by natural disasters: "disaster capitalism really hit its stride with Hurricane Mitch" which devastated Central America in 1998. The International Monetary Fund and World Bank aggressively pushed the radical 'opening' of the domestic economies to foreign capital and, according to the Wall Street Journal,

made privatisation “a condition for release of roughly \$47 million in aid annually over three years and linking it to about \$4.4 billion in foreign debt relief for Nicaragua” [quoted in Klein 2005]. Reconstruction following the Asian tsunami was similarly used to appropriate local people’s beach front sites and fisheries and turn them over to transnational corporations. Shalmali Guttal of Focus on the Global South argues that ‘failed states’ are now a structural requirement of capitalism. ‘Poor governance’ is used to justify privatisation and the contracting out of ‘reconstruction’ to transnational corporations. The structural and historical causes of failure – the collusion of the imperial powers and their agencies with dictatorships and the “draining of national wealth through colonial structures of production, debilitating debt repayment burdens and the structural adjustment programmes” – are ignored [Guttal 2005].

Indeed, the conflict within failed states is frequently manufactured by the imperial powers. Haiti’s elected president, Jean-Bertrand Aristide, was deposed following US sponsored agitation. A similar coup, plotted by the same US groups, against Venezuela’s anti-imperialist president, Hugo Chavez, failed in 2002 when the poor flooded onto the streets in support of him. Haiti provides a kind of history of what might have been on a much larger scale in Venezuela. A client government, “hand-picked by an eight person ‘Council of Eminent Persons’ backed by the US”, was installed and adopted a social and economic reconstruction plan drawn up “behind closed doors” under direction from the World Bank and US [Guttal 2005]. According to the World Bank, “The Transitional Government provide[s] a window of opportunity for implementing economic governance reforms...that may be hard for a future government to undo” [quoted in Klein 2005]. UN troops now occupy Haiti and provide a multilateral cover for US interests. They have systematically attacked the poor in the slums of Cité Soleil and Bel Air, centres of support for Aristide and of opposition to the occupation and the client government.

Capitalism is famously flexible. It is not merely that it has the capacity to adapt to crisis but that it both creates and feeds off crisis. Disaster capitalism appears as one of the ways that capital is able to respond to climate change, feeding from a crisis it cannot address. It perpetrates enclosure – or what geographer David Harvey [2005] calls accumulation by dispossession. This, says Harvey, now provides the largest part of corporate profits as returns from actual production have diminished.

Despite its overwhelming military superiority, the US has been unable to impose order in Iraq. Resistance, from all quarters, has confined the client Iraqi government to the

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'green zone' enclave surrounding the US Embassy, but has itself disintegrated into civil war. Iraq is a failed state in the making. In itself, this may be compatible with US interests but the 'coalition of the willing' is crumbling along with US domestic support for the war. The image of the final chaotic retreat from Vietnam now haunts US commanders in Iraq.

The US is also beefing up its military capacity in Africa. It recently established a dedicated African Command, a move widely linked to its expectation of getting a quarter of its future oil supply from the region and to competition for oil and other resources particularly from China.⁵ Global rivalry is overlaid on local contestation. The violence that accompanies the oil industry has provoked resistance around the world. As reported in *The groundWork Report 2005*, local resistance in the Niger Delta has repeatedly shut down production of millions of barrels. Companies providing oil services, including drilling and construction, are now refusing contracts offered by oil majors to work in the area.⁶

The great consumer

Apart from its sheer military power, the US retains immense power by virtue of its economic dominance. In particular, it is the world's premier market – the great consumer – and producers everywhere, most notably China, rely on it to buy their goods. This dominance looks increasingly fragile, however. Thus far, the US has managed a series of 'bubbles' by passing them off onto foreigners and onto domestic consumer debt. According to sociologist Giovanni Arrighi, its economy now requires \$2.5 billion per day from the rest of the world to keep afloat.⁷ In 2003, this figure was \$1 billion a day. The bulk has come from China, anxious to keep the consumption pump going. As Walden Bello puts it, the US and China are chained together in an unsustainable relationship:

China's breakneck growth has increasingly depended on the ability of American consumers to continue their consumption of much of the output of China's production brought about by excessive investment. On the other

⁵ See for example, Conn Hallinan, *Into Africa*, *Foreign Policy in Focus*, March 15, 2007

⁶ Yakubu Lawal, *Oil firms reject contracts in Niger Delta*, *The Guardian* (Nigeria), March 19, 2007.

⁷ Seminar given at Rhodes University, *From Washington consensus to Beijing consensus*, May 2, 2007. This figure represents state borrowing. It does not include equity investments in US stocks, profits and royalties returned to US corporations from foreign investments, never ending debt repayment or the corrupt collusion of Northern banks and Southern elites by which capital flight from the South is organised to the benefit of global finance capital.

hand, America's high consumption rate depends on Beijing's lending the US private and public sectors a significant portion of the trillion-plus dollars it has accumulated from its yawning trade surplus with Washington. [2006]

China's production is subsidised by cheap labour supplied from an enormous pool of dispossessed peasants and large scale trashing of environments. Yet, while China tries to create the jobs that will soak up those it has dispossessed, Bello cites estimates that "75% of China's industries are currently plagued by overcapacity" – they are producing more than they can sell. Investments in over-producing industries now account for "40-50% of China's GDP growth" and much of it comes from US and other transnational corporations searching for higher profits. America's consumers, on the other hand, have paid for the goods by mortgaging their mortgages.⁸ This was sustained by rising house prices and hard sell tactics by money lenders who were themselves encouraged by the US central bank. The housing market is now in decline leaving people stranded in houses that are worth less than their debt. The poor in the US have been the first to feel the heat but they are joined by the "refugees of the middle class, drowning in debt, and frequently wondering how they fell so far so fast."⁹

The subsidy to America is now supplemented by the windfall of petrodollars created by high crude prices. Yet this merely compounds the problem for the root of the crisis lies in the logic of over-accumulation of capital – there is more money than there are safe and profitable locations to invest in – resulting in declining profits. Since the 1970s this has resulted in 'financialisation': a shift of power within global capital from production to finance capital accompanied by a growing volatility of global markets. In this context, production capital itself turned increasingly to financial instruments to show profit. The collapse of US energy giant Enron was a symptom of this shift. It could not make enough profit from producing energy to attract the investment from finance capital necessary to keep it in the top rank of corporations. Instead, with the collusion of the world's top finance houses, it conjured profits – mostly illusory – from financial dealing and trading. It got real money from California where it engineered a series of blackouts and so created an energy crisis which boosted profits from trading energy. It then blamed the California State regulators for the blackouts and called for total 'deregulation' – meaning total power to regulate the market in its own interest,

⁸ Last year, we reported that they were spending \$1.22 for every \$1.00 that they earn.

⁹ Yale economist Jacob Hacker quoted by Ambrose Evans-Pritchard, *Spending spree over as Americans walk tightrope without safety net*, The Telegraph, London, February 6, 2007

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provided that it could maintain its position as the dominant energy corporation. Controlling information was critical to its dominance. For the most part, Enron's spin was what the financial press wanted to believe – Enron embodied the virtues of privatised 'wealth creation'. Once it lost control of information, it collapsed in a matter of weeks.¹⁰

Terminal crisis

The US regime is the latest in a line of four global regimes of accumulation that link territorial dominance with the economic power of capital. Arrighi [1994] shows that, thus far, these regimes have followed a similar pattern of growth and decline. In each case, a 'golden period' of growth is interrupted by a 'signal crisis' which is the first symptom of over-accumulation. The economic power of the centre is then revived through financialisation during what he calls the 'belle epoch', a period of extravagant concentration of wealth in the hands of the rich and growing inequality. Financialisation, however, merely masks the underlying problem of over-accumulation and the regime is confronted with growing political and economic instability which leads into a 'terminal crisis'.

Britain's terminal crisis came in the form of the two world wars. It won both but lost the world to its key ally, the US. The signal crisis of the US regime came with its defeat in Vietnam and the economic stagflation of the 1970s that ended the golden age of post-war growth. The adoption of neo-liberal policies – the 'Washington consensus' – in the early 1980s restored US power. It did so by engineering a recession on the principle pronounced by banker Andrew Mellon earlier in the 20th Century: "In a depression, property returns to its rightful owner." For Mellon, the rightful owner was finance capital.

Chris Sanders suggests another version of this business principle: "Making the other guy pay."¹¹ The IMF and World Bank were turned into enforcers of the new policies acting as the global arm of the US Treasury Department.¹² Those made to pay were labour and the countries of the global South. The fabulous concentration of wealth now in the hands of finance capital is matched by growing inequality in the world

¹⁰ Video: *Enron: The smartest guys in the room*, directed by Alex Gibney, HDNet Films, 2005.

¹¹ Presentation on 'Finance and investment factors' to International Forum on Globalisation: Global economic transitions project seminar, February 23-25, 2007, London.

¹² See Manuel Castells [2000: 141] for evidence that these institutions were taking orders directly from the US Treasury.

and in all countries, including the US and China. At the dawn of the 21st Century, the resurgence of opposition at all levels to imperial capitalism is contesting 'rightful ownership' while the crisis of over-accumulation deepens.

For the moment, however, it is the bubble that seems to be returning to where it belongs. In July 2007, several hedge funds dealing in dodgy housing loans were revealed to be empty. These funds are operated by major US finance houses and are at the heart of deals spun across the world of high finance and tangled in such complexity that no-one knows who owns what or who owes who. By August, banks in Europe and the Far East were draining money. The financiers and dealers who have conjured vast fortunes from the tangle at the expense of others, and who have insisted on the rights of 'the market', then ran to the state central banks to bail them out. The central banks did indeed come to their rescue with billions of dollars, pounds, euros and yen. But this is a stopgap measure that does not address a crisis that is just beginning.

Environmental crisis

Climate change is just one dimension of global ecological change forced by the massive scale of fossil fuelled industrialisation. The scale of change is such that Steffen et al conclude that "a new geological era, the *Anthropocene*, has begun" [2004: 6]. That is, it is an era in which the basic functioning of earth's ecological systems is decisively influenced by human actions.

Troubled skies

Global warming and climate change are driven by the increasing concentration of carbon dioxide in the atmosphere. Earth's climate has never been stable. Over the last million odd years, it has fluctuated between cold ice-ages and warmer temperate periods that have defined the previous geological eras. The difference in average global temperatures between an ice age and a temperate age has been around 5°C. These fluctuations in temperature have been accompanied by the fluctuation of carbon dioxide concentrations in the atmosphere ranging from 180 parts per million (ppm) during the cold periods to about 280 ppm in the warm periods. Concentrations are now at 380 ppm, well outside earth's normal operating range, and have been rising by 2 ppm a year. The most recent research indicates an accelerated rate of increase at 2.5 ppm per year [Levin and Pershing 2007: 2]. Temperature rise lags behind the rise in carbon dioxide concentrations. The earth is now 0.76°C warmer than in 1900 and the pace of warming is accelerating. It now averages about 0.2°C every decade.

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The effects are already evident. The melting of glaciers and polar ice is beginning to raise sea levels and, once it gets going, ice melt can raise sea levels by “one metre every twenty years for centuries” [Hansen 2006].¹³ More extreme weather events are experienced across the world and some areas, including much of Africa, are becoming dryer overall while others become wetter. “By 2020, between 75 and 250 million people [in Africa] are projected to be exposed to an increase of water stress” while agriculture and food security “in many African countries and regions is projected to be severely compromised,” according to the Intergovernmental Panel on Climate Change [IPCC 2007b: 10]. There is also a strong probability that environmental systems will ‘flip’: the environment absorbs a variety of pressures until a threshold is reached at which point very abrupt change takes place. In this case, rainfall patterns are likely to change dramatically.

The ‘greenhouse gases’ are accompanied by a cocktail of industrial emissions to the atmosphere. The impacts of sulphur dioxide, nitrogen oxides, hydrogen sulphide, particulates, metals and the exotic mix of volatile organic compounds on local people and their environments have been documented in successive groundWork Reports. At the regional scale, acid fall out acidifies seas, rivers and land, and “soil acidification is a non-reversible change over anything other than very long time scales” [Steffen et al 2004: 163]. Even where the direct effects of pollution remain regional, as in the case of sulphates, Ulrike Lohmann shows that they can precipitate a “cascade [of effects] through the earth system” [in Steffen et al 2004: 169]. Thus, high sulphur dioxide emissions in Europe and North America during the 1960s and 70s produced regional cooling¹⁴ sufficient to change atmospheric circulation patterns and is likely to have contributed to drought in the African Sahel during those decades with severe consequences for peasant agriculture.

Ruin on earth

Land change has a long history throughout the world. By the 16th Century, Europe was largely deforested for naval timber as well as clearance for cultivation. Imperial expansion drove deforestation throughout the colonies. It also displaced indigenous environmental management and production systems that relied on a diversity of

¹³ This suggests a much more rapid rise in sea levels than indicated by the Intergovernmental Panel on Climate Change 4th Assessment Report [IPCC 2007]. McKibben [2007] points out that the latest findings are not included in the IPCC report because the politics of its production keep it some years behind current research.

¹⁴ Sulphur dioxide aerosols reflect heat outwards and so reduce warming. Particulates visible as ‘brown haze’, on the other hand, absorb heat and so increase warming.

biological resources with capitalist production technologies and food crops favoured in European markets. The scale of change increased dramatically in the 20th Century: “in little more than a century the amount of forest that fell was equivalent to the entire previous historical conversion of forests over thousands of years” [Steffen et al 2004: 96]. Grasslands were ploughed up even faster, soils were de-structured through mechanisation and massive chemical inputs, and water resources were sucked out for irrigation while being polluted by chemical run-off. During the 20th Century cities also began to sprawl across ever more land, particularly in coastal areas, and the process is now accelerating with the development of mega-cities. The scale of land disturbance by the extractive industries – mining and oil – is increasingly significant.

Fresh water hydrology has been modified on an equal scale. Land conversion affects the rate of evaporation sufficiently to affect local climates and rainfall. Groundwater aquifers have been depleted and wetlands, together with the ‘eco-service’ they provide in filtering and cleaning water, are everywhere threatened. 45,000 large dams interrupt the flow of rivers and of sediments and nutrients formerly deposited in estuaries, deltas and coasts. Two islands formed from the sediment flow of the Ganges have been lost to the rising sea, creating 6,000 refugees.¹⁵ The loss of sediments to the Niger Delta has reduced the fecundity of its fisheries and increased its vulnerability to sea level rise. Niger Delta fish, and marine fish that have their nurseries in the Delta, are also poisoned by the appalling pollution of the oil industry. In South Africa, the industrial pollution of rivers, making them unfit even for industrial consumption, is part of the motivation for building more dams upstream to capture clean water and transfer it across watersheds.¹⁶

Species extinction has accelerated rapidly during the industrial period, to the point that “the earth is now in the middle of the sixth major extinction event in its history” [Steffen et al 2004: 118]. The previous five extinctions were caused by natural events such as major volcanic eruptions and ice-ages. This is the first to be caused by the actions of a living species. Historically, the main cause was loss of habitat as people turned more land over to cultivation. More recently, industrial fishing has driven a number of marine species to the edge of extinction.

Climate change is now the most serious threat to species. On land, species are migrating towards the poles to keep ahead of rising temperatures, but the pace of change is

¹⁵ Roger Harrabin, *How climate change hits India's poor*, BBC, February 1, 2007.

¹⁶ See The groundWork Reports, 2005 for the Niger Delta and 2006 for South Africa.

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so rapid that plants in particular cannot keep up. Others are running out of space. The Western Cape fynbos, an entire floral kingdom, has nowhere to go. At sea, the warming of the oceans is compounded by the fact that the oceans have absorbed a large proportion of carbon dioxide emissions, making them more acid. Corals which act as marine nurseries are gravely threatened and some populations of plankton species at the bottom of the food chain are in decline. Consequently, whole ocean food chains may collapse, thus wiping out fisheries.

Enclosure

People are not all equally responsible for this planetary scale environmental destruction. To the contrary, people have been dispossessed across the world even as their environments are despoiled and their resources plundered. Capitalism grew up alongside imperialism. Its development depended on appropriating the resources of other people and other systems of production. In the first place, the imperial powers took people's land and labour. People were forced to work – either through being captured and sold as slaves or because they were dispossessed of any other means of survival. In most cases, those who were not killed defending their resources then had to take work that paid them less than the cost of living. The process of plunder continues today, mostly through economic impositions but always backed by physical force where necessary.

Whose Energy Future?

Imperial capitalism has entrained the whole world in crisis. The global energy elite, meeting at the 18th World Petroleum Congress in Sandton, proclaimed that they would 'shape the energy future' based on cheap and plentiful supplies. The groundWork Report 2005 responded that 'another energy future is necessary'. It showed the devastation of people's lives created by the corporate and state energy elite at every point in the oil production chain and asked, '*Whose energy future?*' Peak oil makes another energy future inevitable but this report shows that the question is made more urgent than ever.

This groundWork Report explores the three dimensions of crisis through the lens of peak oil and energy crisis. It asks what people can expect from the elite energy future as fossil supplies contract and climate impacts escalate: what are the implications for environmental, social and economic justice? But while it asks the question of the future, it does not try to paint the future or conjure with scenarios. The actual future

is likely to be a messy and uneven process full of contradiction and with very different dynamics in different countries and localities. This report looks at actual energy crises in various localities to explore how they are shaped by social power relations and also how the crises may reshape those relations, and it explores the wider crisis as it unfolds in the present.

Most of South Africa's energy comes from coal, ahead of oil, which is used to drive the electric power system as well as to produce around a quarter of the country's liquid fuel. South Africa's most recent energy crisis was in the power sector. Chapter 1 opens with a brief review of the history of electric power and its central role in driving industrial growth. It then explores what happened when the power went down in Cape Town, creating an energy shortage in the city and the Western Cape province for some eight months.

Peak oil is a global phenomenon so Chapters 2 and 3 take a global view. The world we live in is profoundly shaped by the abundance of oil and Chapter 2 looks first at how corporations and states managed the 20th Century glut of oil and money to expand consumption and create oil-dependent production regimes and life-styles. It then considers the current debate on peak oil and when it will happen. The final section considers the increasingly frantic search for new sources of oil and other energy to keep the global economy fired up for growth. The chapter provides a critique of the official future as it is represented by the International Energy Agency and describes the implications for environmental justice mainly in terms of climate change.

The promise of modernising development was that everyone would get richer even if some got richer than others but it has actually created spectacular wealth on the one side and desperate poverty on the other and is now more brutal than ever. The first section of Chapter 3 considers the dynamic behind rising oil prices and the distribution of the benefits of energy. This is part of a wider commodities boom that is part symptom and part cause of shifting global relations of power. The second section looks at the impact of high prices in countries where people's dreams of a better life are dying. The final section considers the logic of the elite future after peak.

Chapter 4 returns to South Africa to give an overview of its energy policy. The global commodity boom has given a turbo charge to the 'minerals and energy complex' which is at the centre of the country's economy. The chapter shows that the state is playing to its energy 'strengths' regardless of the cost to people and their environments and despite being very vulnerable to climate change.

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The elite energy agenda creates resistance everywhere and everywhere people create the possibilities of new life. Chapter 5 tries to convey something of the creativity of people's responses to crisis. It recounts people's calls for food and energy 'sovereignty' – the demand that people must control the resources necessary for life and must make a future fundamentally different to that planned by the elites. How they respond is different in different places. In Cuba the state followed and supported the people's lead. Elsewhere, people are consciously anticipating peak oil. In very many places, crisis is visited on people by those who speak in their name but put themselves at the service of elite power. Resistance is then made an immediate necessity of life but it is always accompanied by a vision of another world.

Chapter 1: Cheap power at the limit

Most of South Africa's energy comes from coal, ahead of oil, which is used to drive the electric power system as well as to produce around a quarter of the country's liquid fuel. South Africa's most recent energy crisis was in the power sector. This chapter explores the politics that shape the sector, opening with a brief review of the history of electric power and its central role in driving industrial growth. It then explores what happened when the power went down in Cape Town and created an energy shortage in the city and the Western Cape province for some eight months. As has been the case with major power outages elsewhere, the crisis shed light (so to speak) on the politics of energy. The economy made possible by abundant energy is also vulnerable to its loss. The chapter considers the vulnerabilities created by present economic policy and looks at the way that intersects with environmental injustice created by those policies.

Cheap and abundant power

In addition to cheap labour, mining the gold required stupendous amounts of water and energy. The electricity, water and railway infrastructure were developed primarily to satisfy this need at low cost to the mine magnates. The Electricity Act of 1922 established the Electricity Supply Commission (Escom, now Eskom¹⁷) as a state owned enterprise and put in place a central principle of all subsequent industrial policy: Eskom's "primary duty was 'to stimulate the provision...of a cheap and abundant supply of electricity'" [Clark 1994: 57]. Eskom was exempt from tax, would not make a profit or a loss, but would be run on 'business lines' independent of direct state control. Electricity historian Renfrew Christie [1984] observes that profits were still made, not within the electricity chain, but by those who got energy cheap – industry and, above all, the gold mines. Cheap electricity in turn depended on cheap coal and ultimately on the appalling working conditions and wages afforded to coal miners.¹⁸

¹⁷ Escom adopted the Afrikaans version of its acronym in the 1980s. For convenience, it is referred to as Eskom throughout.

¹⁸ The groundWork Report 2006: 81.

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In its early years Eskom had to fight for access to markets, in competition with the privately owned Victoria Falls Power Company (VFP), and was boxed in by competing interests. The state wanted power for industrialisation and white job creation but was reluctant to put up the capital. The Randlords were hostile to the creation of a state owned utility and adamantly opposed to its achieving a monopoly. They and state owned railways both wanted cheap power but were suspicious that the other might get it at their cost. Several white municipalities already had their own power plants and all jealously guarded – then as now – their profitable ownership of distribution networks used to supplement revenue from municipal rates. Eskom cut deals all round. The conversion of the railways from steam to electricity created a growing market and justified building base-load capacity and regional power supply systems in the Cape and Natal. And, while excluded from urban distribution, it cut deals with Durban and Cape Town to deliver bulk electricity and to supply power directly to suburban railways. Beyond Cape Town, the corporation also “undertook a major electrification programme, supplying villages and wine farms as far north as Paarl, Wellington, and Malmesbury, as well as major industries like the Somerset West explosive works” [Christie 1984: 92].

In 1948 Eskom finally overcame even the ideological hostility of the Randlords when it showed that the VFP had profiteered from the war at the expense of the mines. With support from Anglo American, the corporation took over the assets of its private rival to establish an effective monopoly and, in return, drastically lowered the price of electricity to the mines. It also keyed into the post-war global order presided over by the US to address its capital constraints, raising money from the World Bank, the US Export-Import Bank and from private US banks to fund an ambitious expansion programme.

Demand for electricity grew rapidly following the war and Eskom built new power stations, mostly atop the eastern Highveld coalfields, and extended its transmission lines to create a single national grid linking up all the major urban centres by 1973. The network was further extended into white rural areas during the 1980s, with the farm electrification programme servicing a powerful political constituency and giving a new thrust to the process of agricultural industrialisation.

Centralising and expanding power

The development of the grid enabled Eskom to rationalise power generation and centralise administration, planning and information systems. It also determined policy, effectively becoming the apartheid government's energy arm and more or less running the power section in the Department of Minerals and Energy. Its own inclination for secrecy was reinforced and protected by security legislation and its monopoly on strategic information prevented any serious challenge to its decisions.

This institutional and technological regime enabled changes to the labour regime. Both black and white workers had periodically demonstrated their power to disrupt production in the first half of the 20th Century and had been brutally suppressed by force of arms. Eskom had long aimed to minimise and isolate its labour force and was now able to do so. The new power stations were capital intensive and, with the grid in place, could be built in remote areas while still subject to centralised management. White workers, bought off with the apartheid privileges that they had demanded, collaborated in the despotic management of the workplace while black migrant workers on contract were made to feel their vulnerability to dismissal and were housed in tightly controlled compounds distant from the urban centres of working class agitation.

The 1980s saw another round of Eskom expansion, driven by apartheid's obsession with energy security as well as by the assumption of continued economic growth. This was, however, apartheid's last and most brutal decade. Resistance intensified within the country under the banners of the unions and the United Democratic Front while the international anti-apartheid movement secured increasingly effective sanctions. Despite continued support from the Northern powers, South Africa was also caught by the neo-liberal strategies used by the US to re-assert its global political and economic dominance. These strategies induced a global recession, forcing up the cost of debt and collapsing international commodity and resource prices – including for oil, coal, steel and even gold. The most severe recessionary effects were visited on Third World economies and South Africa's economy contracted in the early 1980s and remained stagnant even beyond the formal death of apartheid.

Eskom thus mistimed its expansion. Its generating capacity came to exceed peak demand by 62% and it had to mothball a number of power plants [Eberhard and Van Horen 1995: 49]. It also incurred heavy debts and raised tariffs to pay them, provoking industry and the mines to call for tighter government control to force it to operate on 'business principles'. If this sounded contradictory, Eskom then raised the alarm about

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“politicians in the engine room” even as it maintained its occupation of the DME. Its corporate sense that it was a law unto itself was even more sharply revealed as the political transition got under way. According to its then boss, Ian McRae, staff feared that the new ANC government would ‘nationalise’ the corporation [McRae 2006: 78].

In fact, the ANC government’s 1998 policy proposed privatisation on the assumption that ‘the market’ would lead the action to create economic growth and jobs. Eskom then found itself defending against proposals to break up its generating monopoly into supposedly competitive bundles to be sold off to the private sector and to hand the grid over to a separate state entity. This has not happened. The privatisation policy was ‘suspended’ in 2004 as government adopted the rhetoric of the developmental state and a more aggressive strategy of intervention in the economy. It saw its ownership of strategic enterprises – Eskom, transport parastatal Transnet and arms group Denel – as key instruments for driving higher levels of investment in the economy, particularly in infrastructure, on the assumption that private capital would follow the action. In 2004, amid alarms that economic growth was now overtaking the capacity to deliver power, the Minister of Public Enterprises announced that Eskom would invest R87 billion in the next five years, marking the beginning of a new round of expansion. This figure has since been revised upwards twice and now stands at R150 billion, nearly double the number first thought of and still rising. Eskom is thus embarking on a new round of expansion planned against government’s objective of 6% economic growth rather than projections of likely growth rates.

Distributing power

The historic tensions between Eskom and the municipalities have revolved around distribution. White municipalities bought bulk electricity from Eskom but controlled local networks distributing power to end users and used the profits of distribution to supplement income from rates. With the political transition, municipal boundaries have been expanded and they have been given responsibility for the delivery of services to all citizens rather than only to the white and wealthier minority. Demands on revenues have thus expanded faster than income and the profits from electricity are more vital than ever. Eskom itself distributes to the rest of the country including: many black townships and commercial farms now located within the expanded borders of previously white municipalities; most municipalities located in the old homelands

– which do not therefore get the benefit of a supplement to the rates; most, but not all, energy intensive users – big industry and the mines. Industries located in city distribution networks generally complain that they are subsidising the rates and there is some rivalry between Eskom and municipalities for rights of distribution to these users. Overall, Eskom accounts for 40% of customers but 60% of the value of sales.

This history has created a patchwork distribution map. Proposals to rationalise distribution have centred on the creation of six Regional Electricity Distributors (REDs) to serve the whole country. Municipalities were to pool their distribution assets and get shares in each RED proportionate to those assets, while Eskom was to hand over its distribution assets. The corporation resisted this and it is now proposed that it too will take shares in all REDs proportionate to its existing distribution. The formation of the first RED, centred on Cape Town and covering the Western Cape and parts of the Northern Cape, was announced in 2005. As yet, it is still-born. Smaller municipalities fear that they will be swallowed by Cape Town and have refused to buy in. Cape Town fears that the RED will develop distinct institutional interests to the detriment of its notional shareholders and will return diminished profits to municipalities. The conflict was made concrete when the City rejected inflated administration and salary demands by the small RED management team. As yet, there is no indication that Cape Town is ready even to contemplate handing over its Electricity Department and the RED team is managing nothing.

For the anti-apartheid movement, the discriminatory distribution of services was a key issue and providing access to energy, and specifically to electricity, became a political imperative during the transition period. The well lit high consumption suburbs of white South Africa contrasted starkly with the dark and grimy black townships. In 1992, in the majority of formal townships “more than 80% of households did not have access to electricity”, while hardly anyone living in informal settlements, African rural areas or farm worker households had access [Greenberg 2006: 28].

Eskom started an electrification programme in 1991, both to reposition itself politically and to use up some of its excess generating capacity. In 1993, a National Electrification Forum – including the power industry, the political actors in the transition, trade unions and civics – was established and agreed to an accelerated programme. The ANC’s Reconstruction and Development Programme (RDP) set a target for connecting 2.5 million homes between 1994 and 1999 and this was one of the few RDP targets that was met and exceeded. By 2004, the President’s 10 Year Review claimed that 70%

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of the population was provided with electricity compared with only 32% in 1994.¹⁹ Eberhard comments that “doubling access to electricity ... in a matter of years is probably without precedent” [2005: 6].

For poor people, access to the electricity supply has been compromised by the costs of making use of it as electrification was based on a policy of cost recovery. Ahead of local elections in 2000, and responding to people’s demands for affordable access, government announced the free ‘life-line’ provision of 50 kWh per month to households. This provision has been widely criticised as inadequate, particularly for large households. In most distribution areas, the price rises sharply once the free allocation has been used and people end up paying considerably more than industry per unit consumed. By 2000, about 10 million people had experienced periodic electricity cut-offs.²⁰ Many people still face disconnection, whether by energy officials or because they have no money to feed the pre-paid meters. The ‘suspension’ of privatisation has not been accompanied by a suspension of cost recovery on services to the poor. Electrification has also not fulfilled the promise of affordable energy services to poor households. More than 60% of households – electrified or not, urban and rural – still do not use electricity for cooking and heating, partly because of the expense of buying appliances and partly because this far exceeds the basic free electricity allocation.

For Eskom, electrification has certainly brought political dividends. The anticipated economic returns did not materialise, however, as newly electrified households consumed less than expected and so did not generate the scale of returns to cover infrastructure costs. Eskom funded the electrification programme until 2000. When government subjected it to taxation it announced that it would no longer ‘subsidise’ the programme. This implied that the programme was exchanged for its tax exempt status and allowed Eskom to escape what was arguably a miscalculated investment rather than a public interest initiative. Subsequently, the DME has funded the programme through subsidies to Eskom and municipalities. Meanwhile, energy intensive industries have proved a more reliable, and much larger, market than black households. Eskom has been at the centre of mega-project deals since the 1990s, offering the cheapest electricity in the world to new aluminium and steel plants.

¹⁹ The Presidency, 2004. *Towards a ten year review*, p.25.

²⁰ See McDonald 2002. The use of pre-paid meters also has the consequence of removing people from statistics on cut-offs.

Overall, Eskom has retained its strategic grip on the industry: it will remain the dominant generator, keep control of the grid and, assuming that its distribution assets are in fact turned over to the REDs, it will be a major shareholder in each of them. Throughout the transition period it has defended its monopoly on strategic information and planning capacity in the power sector, dominated the Department of Minerals and Energy and held fast to its centralised and secretive corporate culture. This strangle-hold has been weakened, but not broken, with the establishment of the National Energy Regulator of South Africa (NERSA), which has developed some independent capacity, but the utility is still able to exercise disproportionate power in policy.

Since 2001, when Eskom was ‘corporatised’ and restructured as a tax-paying company, its profits have risen steadily: “a comparison with the Fortune 500 top global companies shows that Eskom’s after-tax-profits-to-revenue ratio is nearly twice the median produced by 23 electricity utilities listed, and it would be in second place if it were large enough to get on the list” [Greenberg 2006: 39]. The strategy to minimise employment has also met with success as the corporation shed over half its workforce, reducing the number of workers from over 65,000 in 1985 to 30,000 in 2004.

The sacrifice zone

A remarkable aspect of electric power is that it makes the environmental and health sacrifices of its production invisible at the point of application. Electric trains, for example, replaced steam engines which had spewed ash and bits of coal onto passengers while domestic energy was made smokeless and effortless as electric energy came at the flick of a switch.

With the concentration of coal fired power stations in the Eastern Highveld (now Mpumalanga), this area was made a sacrifice zone. In 1989, climatologist Peter Tyson compared it with notorious heavy industry hot-spots in East Germany and Ohio, USA. The Eastern Highveld was the worst polluted of the three.

Eskom’s pollution management has relied primarily on building high stacks to disperse its pollution over a wide area or, as journalist James Clarke put it, “to use fresh air to dilute bad air” [1991: 34]. Dispersal was limited however. In 1995, air quality specialist Harold Annegarn found that most of Eskom’s pollutants are deposited within 10km of its plants.

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Eskom still vigorously defends its right to pollute. It has installed filter bags to catch particulates on some power stations but argues that the cost of scrubbing gaseous pollutants is too high, that it would drive up prices and so jeopardise South Africa's cheap energy policy. Over the last ten years, its sulphur dioxide emissions have risen in proportion to electricity production, reaching 1.8 million tonnes in 2006. It also produces mountains of ash on the ground – over 33 million tonnes every year – which it damps down with water to prevent it blowing in the wind. The water is taken from its 'zero effluent cycle' once it is too polluted to be used in the power station. This water becomes even more polluted as it leaches contaminants from the ash.

The power generating area in Mpumalanga is scheduled to be declared the next 'air pollution priority area' in South Africa by the Department of Environmental Affairs and Tourism (DEAT). The DEAT, however, seems more likely to protect the cheap power policy than the environment, as will be shown in Chapter 4.

Box 1: Externalised costs of electricity

Clive van Horen [1996] calculated that externality costs amounted to 68.9% of Eskom's 1994 average tariffs. He included injuries and mortalities in coal mining, water consumption in power generation, air pollution in power generation, greenhouse gas emissions and the fiscal subsidy to nuclear power generation. However, he excluded chronic and acute illnesses of workers on coal mines supplying Eskom, air and water pollution by these coal mines, human health and air pollution impacts of power station ash dumps, acid rain damage to health, crops, forests and water supplies in Mpumalanga, visibility and water quality impacts of power stations, and the impacts of nuclear power stations on environmental quality and health. It seems fair to say that South African electricity is produced below cost and there is an urgent need for a more inclusive calculation of externalities.

Cape Town blacks out

Cape Town is supplied through the long transmission lines from Mpumalanga and from the Koeberg nuclear power station in the city. In November 2005, transmission line failures caused a series of electricity blackouts. Then, on Christmas Day, a loose bolt ripped the huge turbine rotor at one of the two Koeberg nuclear generators. The reactor closed down, removing nearly a fifth of the supply and plunging Cape Town and the Western Cape into a prolonged electricity supply crisis marked by repeated

blackouts and load shedding over the next eight months. The crisis was declared over when Koeberg was restored to full power in August 2006.

The blackouts caused chaos. Trains stopped and workers were stuck on – or between – platforms and arrived late for work, if at all. Businesses closed whether or not their workers arrived. Food rotted in fridges in supermarkets, restaurants and people's homes. Computers crashed and the city was abruptly taken off line. Cape Town's garment industry, already under pressure from cheap Chinese imports, stopped in mid-stitch. Fruit and grape harvests halted. Water pumps stopped and sewerage works overflowed into Cape Town's already polluted streams. And, as the streets went dark at night, they were felt to be unsafe.

While the Western Cape has had the most severe power crisis, blackouts are increasingly experienced across the country. According to Eskom, the margin of supply over peak demand is dangerously narrow and will remain so until it brings the first of its new and very big coal fired power stations into operation in 2011.

Mother City

Cape Town was established in the sixteenth century by the Dutch East India Company as a supply depot on the way to its Indonesian empire. The "world's first multinational", as Nick Robbins [2006] describes it, started by trading natural resources – such as wood, rubber and spices – and enslaved people. It quickly turned to military force to cut out its Indonesian business partners by colonising land to extract natural resources itself and enslaving those it dispossessed.

Cape Town was not a desirable posting. Its first governor, Jan van Riebeeck, was sent there as a punishment for corruption. A farming community – composed of Dutch settlers and slaves (Africans, Indonesians and local Khoi people) – was established to supply fresh produce to passing ships. The Company could not, however, confine the settlers to this function nor to the borders it decreed. The 'mother city' became the base from which colonists spread out across southern Africa and the market for farm and game products – meat, hides and wool, as well as fresh produce, and ivory and later ostrich feathers. Four hundred years later, it is now at the centre of South Africa's most 'dynamic' agricultural sector.

Cape Town was energy poor from the start. The more spectacular fynbos species contributed to Dutch botanic collections, but the settlers complained of the lack of

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firewood and started growing European species such as oak. The British, who ousted the Dutch in 1806, later planted Australian acacias – notably the invasive Port Jackson Willow – for firewood and to stabilise the sandy soils. As the energy infrastructure was expanded, the Port Jackson was left to the poor, who used it both for firewood and building materials. By the late 20th Century, Port Jacksons were identified as a threat to the fynbos and to the Western Cape's tourism economy and were infected with a gall which is now killing off whole stands of the trees.

Following the discovery of gold, the mother city was thrust aside from the centre of the southern African economy, being geographically remote from the Minerals and Energy Complex that emerged at the heart of South Africa's economy. The Western Cape has no coal deposits, no mining economy and, apart from the Chevron oil refinery, no energy intensive industries. Cape Town's pattern of energy consumption is therefore not typical of South Africa: First, liquid fuel supplies about 60% of final energy – most of it for transport – as compared with 34% nationally, making the region particularly vulnerable to rising oil prices. Second, industry consumes a lesser proportion of energy than is the norm in South Africa. Commerce and industry consume 29% of total energy and 59% of electricity – as compared with 49% of total energy and 73% of electricity nationally. Cape households consume 15% of total energy and 38% of electricity.²¹

The city was connected to the coalfields of the Eastern Highveld, 1,600 kms inland, when Eskom completed the national grid in the 1970s. It was more intimately linked with the minerals and energy complex when the Koeberg nuclear power station opened in 1982. Koeberg was supplied by uranium mined in the former Transvaal and enriched at Pelindaba and was a central link in setting up the nuclear supply chain needed to service apartheid South Africa's military nuclear ambitions. In the 1990s, the supply chain was dismantled as the last apartheid president, FW de Klerk, renounced such ambitions. Analyst David Fig comments:

It is not known whether the decisive argument that convinced de Klerk to dismantle South Africa's nuclear bombs was the alluring prospect of normalising its international nuclear standing, or whether the nuclear and military bureaucracies feared a future in which an ANC government might have access to nuclear weapons. [2005: 70]

Koeberg's fuel has subsequently been supplied by France.

²¹ Figures are taken from Sustainable Energy Africa 2003 and DME's Energy Statistics 2005.

Cape Town's economy has nevertheless grown strongly in the 'new' South Africa. Manufacturing, particularly the textile industry, has declined precipitately but the services sector has grown significantly. Tourism, financial services and real estate have boomed along with a film industry able to make capital out of the dramatic landscape and relatively cheap labour costs. The Western Cape's wine and fruit farms constitute the most 'dynamic' sector of South African agriculture, having been integrated into global production chains supplying European supermarkets. Investment in these sectors has not created jobs. Unemployment is rising while the "distribution of economic activity in the city has been highly skewed towards those with greatest skills and access to resources, with a large majority of the city's population precluded from meaningful participation in the economy" [State of Cape Town 2006: 37].

Rich city, poor city

Apartheid Cape Town was designed to preserve both the economic advantage of white people and their sense of superior western identity within what McDonald and Smith describe as a "mixed economy [with] racial welfarism" [2004: 1461]. Black people were needed for their labour but physically removed from the urban centre to the remote and bleak edges of the Cape Flats and excluded from the high level services afforded to whites. This was a racist variation on what urban specialist Mark Swilling calls the 'consumption city', planned and built around the needs of the rich and catering to

... the need within capitalist economies to create a mass of consumers that provide the markets for the suppliers of the basket of urban goods that are now defined as the basic elements of urban living ... The basic building block of the 'consumption city' is the 'consuming neighbourhood' that, in particular, needs to buy in the necessities for daily living from the outside (often from very distant locales) – energy, water, waste removal services, building materials, food, vehicles, etc. The city's urban infrastructures had to be planned and managed to make sure these goods and services can be supplied, transported, removed, financed, and extended. [Swilling et al 2006: 5]

Consumption, however, is highly unequal. While the richest 16% of households used nearly 60% of all domestic water, 20% of all Capetonians had no piped water supply in 2000. Profligate consumption by the rich – for gardens, swimming pools, deep baths etc – is expected to exhaust Cape Town's limited water supplies in 2025. These richest households also produce over half of Cape Town's 895,000 tonnes of residential waste every year. Half of this is organic (food and garden) waste, and so produces methane

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gas as it rots, but only 6.5% of all waste is recycled. This is one of the highest rates of domestic waste production, and one of the lowest rates of recycling, in the world. The waste is taken to dumps located in poor neighbourhoods on the Cape Flats where it pollutes both the air and the shallow water aquifers.

Electricity use is similarly unequal. According to The State of Energy Report for Cape Town [SEA 2003: 4-3], households consume 15% of all energy and 38% of electricity. 95% of households are now electrified but the poor remain “very dependent” on paraffin. The poor spend up to 25% of their income on energy while medium and high income households spend only up to 5% and “use electricity almost exclusively”. These richer households – about 39% of the population – nevertheless consume four or five times as much energy as the poor and “emit an immense 737kg” of carbon each every month. These figures exclude transport, mostly private vehicles, which consumes 54% of Cape Town’s energy and makes it more dependent on oil than is usual in South Africa.

The disparities in consumption are in fact higher than suggested here, first because there are more people in poor households than in rich ones, and second because electricity and water to a large proportion of poor households is routinely cut off because they cannot pay for it. In Cape Town in 1999 and 2000, 377,000 people “experienced water cut-offs for at least some period of time” according to McDonald and Smith [2004: 1475]. Since then, the free ‘lifeline’ provision of six kilolitres of water and 50 kWh of electricity per month per household has been introduced. The number of cut-offs then appeared to decline “but service disconnections and household evictions continue in the city on a daily basis, supplemented by aggressive efforts to introduce pre-paid water and electricity meters in an attempt to deal with non-payment of services”.

Pre-paid meters have the virtue of ensuring that the poor cut themselves off and that this does not register in official statistics. Sociologist Greg Ruiters [2005] argues that these ‘technologies of delivery’ are also technologies of political and social control, disciplining the poor to know their place in the market, to learn to be frugal consumers living within their meagre means – or to go without. The effects of poverty are removed from the social realm and confined to the household.

While apartheid discriminated on racist grounds, the neo-liberal city aggressively asserts the order of the market. McDonald and Smith show that, as an ideology, neo-

liberalism is embraced by all political parties²² and most city managers and planners and is, indeed, represented as the means of addressing apartheid inequalities. In part, they are responding to fiscal constraints imposed by central government which slashed financial transfers to local government by 85% between 1991 and 1997, and by a further 55% between 1997 and 2000. This financial squeeze was accompanied by the expansion of municipal mandates to deliver services to all citizens rather than just the white minority.

Private-public partnerships, pushed by the World Bank and national government, then appeared as an efficient and cost effective means of serving 'unfunded mandates' while the notion of extending public service delivery was systematically downgraded. Local departments, including Cape Town's Electricity Department, still responsible for delivering services are meanwhile corporatised – meaning that they are fenced off from the rest of local government so that they can be run like businesses.

Since 2004, the cuts in transfers to local government have been reversed. Central government is also investing some R24 billion nationally, up from R15 billion, through its Municipal Infrastructure Grant programme and this is supplemented by additional funding for the 2010 football World Cup. This is big money, although dwarfed by Eskom's R150 billion, but it does not reverse the neo-liberal assumptions that now frame local institutional relations and planning. To the contrary, Cape Town has adopted the 'world class city' slogan, which sounds like a good thing but in fact expresses a commitment to keeping the city within the circuits of global capital. That means creating and servicing the high value locations and infrastructure to attract corporate investors and enable top managers to link with high value locations in other global cities.

Swilling argues that planning assumptions favouring the consumption neighbourhood are deeply rooted in the discipline of urban planning and linked to the priority given to growth. As Cape Town reaches the limits of its water, energy and other environmental resources, it becomes ever more evident that satisfying the demands of capital is possible only at the cost of the poor:

... it is difficult to see how poverty eradication in Cape Town is a realistic goal if scarce financial resources and free services from nature ... are wasted

²² The real difference between the Democratic Alliance and the ANC in Cape Town is that the DA says it out loud while the ANC shrouds its neo-liberal affiliation in euphemisms.

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on maintaining an ecologically unsustainable system that works in financial terms for the middle and high income communities ... but tends to be too costly for those poor households that are lucky enough to be serviced. [Swilling 2007: 38]

Energy analyst Tristen Taylor takes a more caustic view, concluding that “electricity is granted to non-elites in accordance with their ability to serve the elite class” [2007: 6]. The same might be said of other amenities and the war on poverty more often seems like a war on the poor. As the city ‘cleans up’ to present itself to investors, the poor are to be put out of sight at the peripheries. Those resisting removal from shack settlements and from low income but still unaffordable housing have been subjected to armed assault and intensive repression by the state. This in turn has provoked a growing movement of resistance as people struggling to keep their homes have acted in solidarity with each other. In the late 1990s, the Western Cape Anti-eviction Campaign linked local Cape Town groups, and these groups are now linking more widely with people in other South African cities.

Meanwhile, Cape Town’s flagship N2 Gateway Housing Project has run into trouble. It was intended to clean up the shack settlements that are highly visible to foreign visitors on the N2 ‘gateway’ from the international airport to the city centre and the shack dwellers were supposed to be the first ‘beneficiaries’. Cost overruns have resulted in unaffordable rentals and the first houses completed remained empty for some time. Those who have moved in have found shoddy building work and believe they are being made to pay the costs of corrupt profiteering by construction companies linked with the ruling party. Protesting outside parliament in July 2007, tenants demanded that rent be suspended until construction defects are made good. They were rebuffed by Minister of Housing Lindiwe Sisulu who “reportedly advised them to ‘give a month’s notice, pack their bags and make way for people who are willing to pay’”.²³

The people of the Joe Slovo shack settlement know that they will not be able to pay. They were promised housing in the Gateway project in 2005 but are now threatened with forced removal to Delft, on the city periphery, to clear the way for construction of phase 2 of the scheme. They are particularly aggrieved that government expects them to cooperate in their own removal while excluding them from decisions about their own future. Their requests to meet Sisulu have not even been accorded the courtesy of

²³ News24.com, ‘Down with ANC policies!’, July 17, 2007.

a reply. In September, they occupied the N2 highway and blocked rush hour traffic in protest. Veteran historian Martin Legassick witnessed the protest at the invitation of the community:

What I saw even in the dark was a peaceful protest interrupted by a police riot. Contrary to some news reports, no guns were fired at the police. Nor were stones thrown, until the police had wounded some 12 people with rubber bullets. Riotous police behaviour was witnessed by reporters again later in the morning when police opened fire on a crowd including old people, children and women ... As of today the police are still occupying Joe Slovo and arresting people at will. On Tuesday two leaders in Joe Slovo were arrested on charges of 'public violence' for daring to ask the police for permission to hold a general meeting. ... There is a police-state atmosphere of intimidation in Joe Slovo in no way compatible with ... democracy ...²⁴

The power supply system

The national grid and Koeberg together supply the Western Cape's base load electricity. Base load is the backbone of any electricity supply system. It is supplemented by peaking power plants which kick in with additional power during peak demand periods. In the daily cycle, demand peaks on week-day mornings and higher in the evenings when middle class people return from work. Working class people contribute comparatively little to this peak because most of the cooking is done by unemployed women during the day. In the annual cycle, winter demand is highest for both base and peak load. The electricity supply has to be managed to match demand as either an under-supply or an over-supply can blow out distribution systems or even whole sections of the national grid.

Two kinds of peaking plant are used in the Western Cape. Open Cycle Gas Turbines (OCGTs) are something like jet engines and in fact fuelled by oil. They are designed for short runs and are expensive to operate, but get to full power very quickly and so can respond to demand spikes. Continuous operation can damage them. Pumped storage systems consist of two dams, one uphill of the next. Water is pumped uphill in off-peak periods when there is a surplus of power, and released to generate electricity in response to peak demand. Pumped storage systems help balance the grid but, overall,

²⁴ Martin Legassick, *Sisulu's N2 actions lead to conflict*, Cape Argus, September 16, 2007.

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they use more energy than they generate. They can only respond to an emergency if the water is already in the top dam.

The bulk of the supply comes from Eskom, but Cape Town municipality operates two peaking power stations. Its old Athlone plant is mothballed. Table 1 shows the total supply capacity in megawatts (MW) to the Western Cape before the blackouts in 2005.

Table 1: Cape Town's electricity supply.

Source	Operator	Max capacity	Description
Transmission from national grid	Eskom	2,400 – 2,800 MW	High-voltage lines from Mpumalanga; base load.
Koeberg 1 and 2	Eskom	1,800 MW	Nuclear; base load.
Palmiet	Eskom	Max 400 MW	Pumped storage; peak load.
Steenbras	Cape Town	Max 168 MW	Pumped storage; peak load.
Acacia	Eskom	171 MW	OCGT; peak load; required safety backup for Koeberg cooling system.
PetroSA (Mossel Bay)	PetroSA	60 MW	OCGT; peak load.
Roggebaai	Cape Town	40 MW	OCGT; peak load.
Total capacity		Base: 4,600 MW Peak: 839 MW	

Electricity is distributed to end-users both by Eskom and by municipal distributors. Eskom distributes to some industries, usually the largest consumers, to farms, to some of the smaller rural towns and to many township areas historically excluded from municipal distribution systems. Cape Town Electricity Department is the largest municipal distributor, supplying industrial, commercial and residential areas. The physical distribution systems, of wires and sub-stations, create a hidden map of the city. These systems grew over time through a process of additions, driven by the expansion of the city but also by politics and rivalry between the two distributors. The two systems sometimes overlap to serve different categories of consumers in the same area. For the most part, they create their own boundaries rather than following the boundaries of suburbs and in some areas they cross class lines, putting rich and poor on the same circuit. Like other infrastructure in South Africa, both the national grid and the local distribution systems have suffered neglect of maintenance, making them vulnerable to failure.

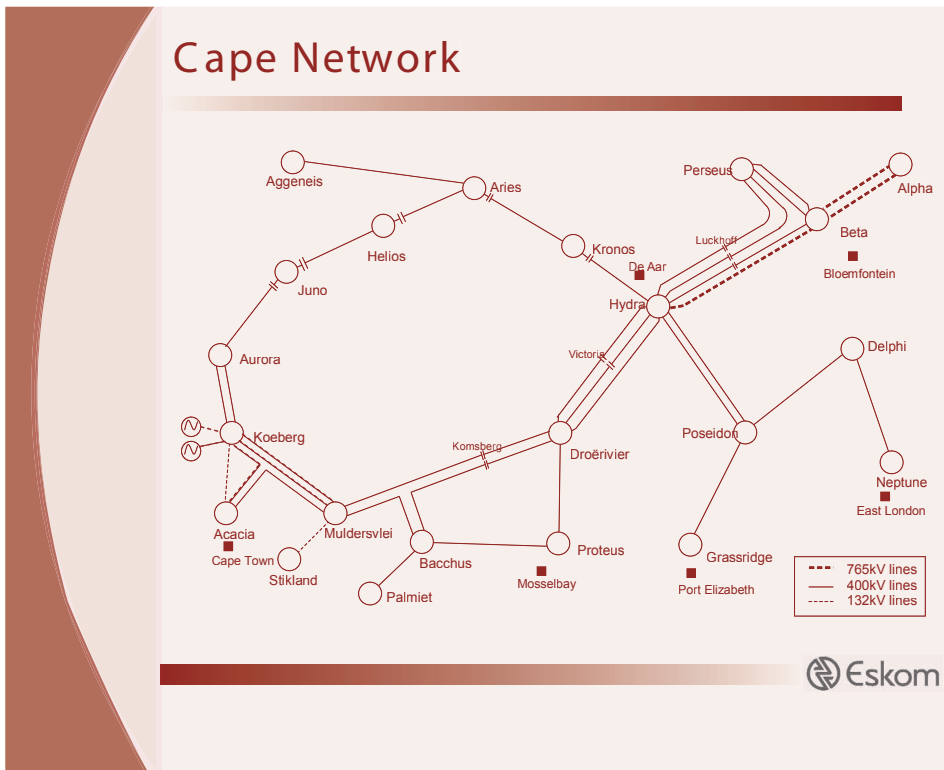


Figure 1: Eskom grid infrastructure

Blackouts

On November 11, 2005, a mechanical failure on Koeberg's electrical switchgear tripped out transmission lines and transformers, cutting Cape Town's power for five hours. This was the first of a series of blackouts during November caused by transmission line failures combined with failures at Koeberg – this time in the Unit 2 reactor which had to be closed down. Eskom's public relations response focused on the technical complexity but also indicated Cape Town's vulnerability at the far end of the national grid: "To make up for the loss of Koeberg, power was fed into the grid from Arcadia gas turbine, Port Rex in Eastern Cape, the Palmiet pumped storage and the Vanderkloof electrical station – but it was not enough. It takes a lot of power to transmit power from Mpumalanga to the Cape. This heats up the transmission lines, and then they trip."²⁵

²⁵ Reported by Melanie Gosling, Cape Argus, November 25, 2005.

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When the bolt hit the rotor at Koeberg Unit 1, on December 25, it removed 900 MW capacity from an already stressed system. The unit remained out of action until May 17, 2006, when a replacement rotor, obtained from France's nuclear utility, was installed.

Two major blackouts followed in February 2006 when the failure of the national grid supply had the further effect of shutting down Koeberg Unit 2. Each event resulted in extended unplanned blackouts of several days duration for large parts of the Western Cape.

While Unit 1 was down, a scheduled refuelling shutdown for Koeberg Unit 2 was delayed until May 22. The unit started up again on July 24 and was brought to full power in August.

During the entire period from December 2005 through to August 2006, scheduled 'load shedding' – a euphemism for planned rolling blackouts – was used to prevent overload on the available electricity supply and hence more general blackouts. As Eskom explained the process, its managers "usually take the load off in 50 MW blocks, so they might look at an area like Table View, Blouberg and Melkbos and see that together they make up 50MW and then cut the power there for 30 minutes." The media reported load shedding plans but residents discovered that their suburban address did not necessarily coincide with their address on the distribution circuits. Load shedding revealed the hidden electrical map of the city.

Explaining the blackouts

Explaining the unplanned blackouts, Eskom tended to emphasise external technical causes, including fires under the lines, high pollution levels and misty conditions, causing 'flash-overs' which tripped the transmission lines. The National Energy Regulator (NERSA), however, subsequently found that Eskom's maintenance and commissioning procedures were inadequate and that there was "a trend that indicated ill-discipline in certain areas and non-conformance to procedures". It concluded that Eskom had "transgressed its licensing conditions and was negligent".²⁶

The Minister of Public Enterprises, Alec Erwin, looked for a more political outside cause when he tried to blame the bolt in the rotor on sabotage. Somewhat lamely,

²⁶ NERSA Newsletter, August 2006. The finding did not refer to the bolt in the rotor incidents which, according to NERSA, was subject to another government enquiry.

he later denied saying what he said. Anti-nuclear activists saw this in the context of earlier government pronouncements threatening to silence them in the name of public order. The allegation carried the threat of redefining dissent as terrorism. Opposition political parties saw it as a ploy to divert attention from government mismanagement ahead of local government elections, indicating their sense that political legitimacy is now reduced to technical competence. Eskom has subsequently noted that it was prevented from making critical investments following 1998 when the Energy White Paper pronounced in favour of privatisation, a policy strongly supported by the political opposition.

This was a crisis foretold, says Leila Mahomed of Sustainable Energy Africa (SEA). In early 2005, SEA wrote to Eskom warning that demand was rising and the transmission lines appeared vulnerable. It concluded that ‘all eggs are in the one Koeberg basket’. Eskom responded that Koeberg was a very safe basket. This response was not merely complacent: it entirely missed the point that highly centralised energy systems reliant on large scale generators are inherently vulnerable to a major loss of power. It is a point that Eskom keeps on missing because localised small scale production is not compatible with its corporate culture or its interests.

Box 2: The French Connection

A replacement for the 200 tonne rotor, supplied by Electricite de France (EdF), arrived on a South African warship in Cape Town on April 5. At a press conference on board the ship, the French ambassador revealed that the replacement had been the subject of high level negotiation, including discussion between presidents Mbeki and Chirac. The swirl of diplomacy, however, seems more like pomp than substance in the light of the very close connections between the South African and French nuclear establishments.

Like Eskom, EdF is a state-owned electricity monopoly. It produces 70% of its electricity from nuclear power and is a central player in the global nuclear industry's current push for expansion. It is closely tied to Areva, France's state owned nuclear construction and supply corporation. Areva executive Anne Lauvergeon represents the energy sector on President Mbeki's International Investment Committee and “gives her utmost attention to South African projects in the nuclear energy field”. Areva was formed from a merger between Framatome and Cogema. Framatome built Koeberg, completed in defiance of the anti-apartheid campaign in 1982. From

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1976, Cogema bought uranium from South Africa's Nuclear Fuel Corporation and financed the uranium concentration factory at Randfontein. Areva (as Comurhex) also provided part of the uranium conversion technology and stored depleted uranium for South Africa.

The French connection is now tighter than ever. The Areva University trains the staff of the South African National Nuclear Regulator (NNR) and advises the Nuclear Energy Corporation of South Africa (NECSA) on options for deep geological storage of radioactive waste. Areva plays a role in all stages of the nuclear fuel cycle in South Africa, generating revenues of €30-50 million in South Africa each year. It holds contracts with Eskom for maintenance, services, technical assistance and fuel supply and it seconded 50 to 60 technicians to Koeberg during maintenance outages. It holds a 49% financial stake in two local engineering and maintenance companies. Its subsidiary, Canberra Eurisys, sells nuclear instrumentation to Eskom. It even sold Eskom its first wind turbine for the Klipheuwel experimental plant near Cape Town. Not surprisingly, Areva is positioning itself as a frontrunner in the bids to build South Africa's next conventional nuclear power station.

The pomp and ceremony that attends the French connection does not hide the fragility of the nuclear chain as plants age and breakdowns increase and as qualified nuclear engineers also age and are not replaced. When it comes to decommissioning, there may not be enough skills left. Retaining a core of nuclear expertise is one reason for government's backing of the PBMR – a very expensive strategy. It underlines the urgency of rethinking how electricity is generated in the Cape.

Source: Areva press kit on the occasion of the SA government reception for the first group of engineers returning from training with AREVA, dated 2 July 2003.

Managing participation

The public reaction to the crisis was intense and highly critical of Eskom and government, creating a forceful dynamic for some form of participation in decision making. Given the centralised power of Eskom, there was no readily available institutionalised forum for participation and the demand found its own outlet. In February and March, a

series of meetings of the bureaucratically named Energy Risk Management Committee (ERMC) were convened. The ERMC effectively emerged with the crisis and quickly evolved from a discrete stakeholders' forum to a more or less open forum with increasing numbers of people at each successive meeting. The original stakeholders were Eskom, the provincial government, the City of Cape Town, business and labour, with labour calling in environmental and other civil society interest groups.

Eskom apparently believed that its assurance that it was in control of the crisis was enough. It brought no serious information and no plan for recovery to the meetings. The February blackouts shredded its credibility – clearly it had no plan beyond fixing Koeberg and load shedding. Government's credibility was also on the line but provincial and city governments also had no plan – beyond relying on Eskom. Not being 'in the engine room' suddenly seemed hazardous as business loudly announced the threat to economic growth. Even Cape Town's Electricity Department found itself without control of its own domain as Eskom ignored agreed load shedding schedules and left the Department to catch the blame from consumers.

The politics of energy was suddenly centre stage and open to question. The questioning, however, was effectively contained within two parameters: holding Eskom accountable but not otherwise challenging its institutional power; and managing the crisis until Koeberg was back on line. Thus, the provincial Member of the Executive Committee (MEC) responsible for energy, Tasneem Essop, demanded a 90 day plan from Eskom but prevented civil society representatives from presenting a set of proposals to the ERMC. She also proposed that the ERMC appoint a more orderly and restricted stakeholder body.

This body came to call itself the Provincial Monitoring Team (PMT) and held its first meeting on April 1. Chaired by a representative of business and including representation from civil society, it defined its primary role as "to monitor the Western Cape Integrated Recovery Plan on behalf of the EMRC" and it did indeed act to hold the central actors to account and enable a freer flow of information. However, its closing report, written as the dust of crisis settled in August, was addressed to the provincial MEC and not to the ERMC. This chaotic but more open forum had simply evaporated. Back in February, it was dominated by government and business interests but it had also briefly created a semi-public space for debate. Ultimately it served to enable a reconfiguration of the stakeholders who ended up on the PMT.

The working class view

Outside of this quasi-official process, Cosatu's Western Cape region attempted to broaden public participation through a public meeting early in March. This meeting was predominantly working class, drawing in trade unionists, social movements and environmental activists but also included some business representatives. Eskom and the Western Cape Premier were invited but did not attend.

A participant²⁷ described the meeting as “angry and militant” with people commenting on the “fat cat salary” of Eskom’s boss and noting that “government and Eskom had consulted business ... and kept citizens in the dark”. Poorer citizens were also kept literally in the dark for longer with unscheduled and unacknowledged load shedding. “It was very clear that many people understood this issue as one that did not affect all citizens equally ...”

The meeting issued a declaration which accused Eskom and all three spheres of government of avoiding “the real causes of the problems” while attempting to manage the crisis through public relations. When government belatedly admitted “that the problem is both structural and systemic” its response was less than adequate. “Even now the official attempts at communicating a strategy have been confined to an engagement between business, Eskom and government, effectively excluding workers, consumers and citizens of the Western Cape in general.”

The declaration identified the causes of the crisis in government’s earlier commitment to privatisation and the consequent “under-funding of the generation and transmission capacity”, in the “age and servicing levels” of Koeberg, and in the labour regime of outsourced and casualised work. In consequence of the blackouts, the declaration said, industry had lost production, workers had lost wages, food had gone to waste and investor confidence in the Western Cape was undermined.

The declaration highlighted Cape Town’s vulnerability to a nuclear disaster at Koeberg, noting that there was “no emergency evacuation plan for that West Coast area”. The incident indicated poor safety standards at Koeberg “compounded by the lack of adequate safety regulations from the national nuclear regulator”.

It further denounced “the entire electricity restructuring process” as “inadequate at best, downright dangerous at the worst”. Inequity was built into the system as domestic

²⁷ Peter Dwyer from AIDC, reporting on the DEBATE e-list

consumers subsidised energy intensive industries. Saldanha Steel, for example, used “more electricity than a major city”. Inequity was also evident in the response to the crisis as “load shedding has been applied unevenly with some areas being preferred above others in the absence of any clear [and] agreed to objective criteria”.

Finally, the declaration proposed that a power sector strategy should focus on “introducing a range of renewable energy sources” including a roll out of wind turbines and “immediate incentivisation” of solar water heating. “The capacity to manufacture the solar heating systems should be supported by government with a clear industrial development strategy.” In the short term, the declaration called for the subsidised use of gas for cooking and supported official proposals for energy efficient lights and the insulation of geysers.

This meeting thus began the work of creating a new politics of energy, providing a trenchant criticism of the current order and proposing practical responses that went beyond the immediacy of crisis. The forcefulness of the declaration showed the strength of networked relations in Cape Town’s civil society. The follow up showed civil society’s weakness: the meeting proposed action – but nothing happened.

It may be that provincial and local labour organisations simply did not have the capacity to maintain the momentum. In the view of some participants, there were also direct pressures to demobilise working class engagement. The ANC was preparing for the local government election in March and did not want popular mobilisation on the issue of energy and electricity. Cosatu’s Western Cape region was also coming under pressure for its role in the ‘Campaign for Work’. This was represented in the media as a revival of the United Democratic Front (UDF), which had organised the grass-roots internal resistance to apartheid during the 1980s, and a challenge to the ANC. It raised the ghosts of people’s power to haunt the centralising managers of state power.

One follow up was made. Cosatu set up a help line for workers sent home without pay as a result of blackouts. No-one called. Either the word did not get out or few unionised workers were in fact penalised by their employers. Yet the workers most vulnerable to losing pay would be casual workers, who would simply not be employed, piece workers who would not be able to produce and most particularly home workers.²⁸ Labour scholars Edward Webster and Karl von Holdt [2005] show that the unions have been singularly unsuccessful in organising informal workers although they

²⁸ It is also, of course, a limitation of this research that we could not talk to such workers.

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constitute a growing proportion of the workforce. Indeed, many workers lose their union membership when they are outsourced or lose their jobs.

Labour and civil society representatives duly took their seats on the PMT. Some believe that they were able to play an important defensive role there but the opening created by the crisis for a more radical engagement was quickly closed down and the voice of the working class was muted after this single expression. PMT proceedings were dominated by Eskom staff through sheer weight of numbers, regularly constituting half or more of those present at the meetings.

Help us share the load

On March 31, Eskom produced the “recovery plan for the winter of 2006” demanded by Essop and the ERM. It anticipated peak demand exceeding the available supply and envisaged a multi-stakeholder process accompanied by an intense communications strategy aimed at:

- managing load shedding combined with information enabling consumers to anticipate cut-offs (i.e. schedules published in newspapers, a website and phone-in centre);
- minimising load shedding by ‘demand management’, with TV coverage of peak hour electricity status and a range of other measures aimed to reduce demand by between 400 and 500 MW equivalent to 10% of the Western Cape’s consumption (see Table 2 below);
- restoring public confidence in ‘the industry’, that is, in Eskom.

One voice

The plan was launched despite protests, particularly from civil society participants on the PMT, that they had had no opportunity to scrutinise or comment on it. It nevertheless required public and stakeholder cooperation to meet its targets. Eskom managed to fold the participation process into the communications strategy. At a mundane level, communication around the available supply and load shedding schedules required that stakeholders ‘speak with one voice’ to avoid sending out contradictory information about whose supply would be cut and when. This level of communication was then folded into public relations as Eskom centralised control of information more broadly to ‘restore confidence’. Eskom’s planning said: “Central to the communication and engagement plan will be the concept of partnership with the different stakeholder categories with the view to elevate what seems to be an ‘electricity industry’ [problem]

to a ‘National Challenge’”. In short, the sense of crisis would justify Eskom’s national plans for new coal fired and nuclear generation and be used to override criticism.

More immediately, stakeholder participation drew in and silenced Eskom’s fiercest critics. According to Maya Aberman, who represented environmental group Earthlife Africa on the PMT, “There was an explicit understanding that while we were part of the team we would not criticise it from the inside. I now think that we should have been on the outside, criticising and mobilising people so that the flaws of the current energy system would become more apparent.”

Government and business stakeholders in particular were more concerned to restore a reliable supply of cheap and abundant electricity. That meant rallying around Eskom because its centralised control of the power sector as a whole gives it command over strategic information and technical resources. The City of Cape Town briefly defended its autonomy as an electricity distributor but soon acknowledged Eskom’s overall control and even handed over control of its own generators. Organised business quietly dropped threats to sue for compensation in favour of cooperating to limit the damage. In return, stakeholders got an unprecedented view of Eskom’s control room but what most of them found there was their common interest with Eskom.

Load shedding

The plan included a set of ‘common principles’ governing load shedding, including that customers should be treated equitably, that areas would not be cut off for more than two hours at a time “where possible”, and that schedules would be published giving 48 hours notice of where the cuts would fall. The common principles also gave priority to “strategic products and services (fuel, transport, steel)” and to “critical and sensitive loads (hospitals, pension pay out points, sewerage points etc.)” In some areas, however, it was not possible to separate residential and industrial users and, particularly in rural towns, hospitals were cut off along with the rest of the town.

A further principle was added in April stating that, “Economic hubs, such as the CBD, will not be shed if they meet their allotted savings targets, where practical.” Cape Town’s Central Business District did not in fact meet its targets but nor was it shed.

Demand Side Management

The Demand Side Management (DSM) component exceeded expectations. Table 2 outlines the plan and the central columns show planned savings and the actual savings

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on peak hour consumption made by the end of July 2006. It shows that the best performer was the roll-out of energy efficient lights, followed by the energy efficiency campaign aimed at households and relying largely on public co-operation. Customer self-generation refers to businesses and industry using their own backup generators during peak periods and produced a little above expectations. Switching domestic consumers to gas for cooking saved less than expected. Although they are the largest consumers, business and industry failed dismally to reach a low target for savings from energy efficiency.

Table 2: Short Term Demand Side Management (savings in Megawatt):

Order of savings	Means	Planned saving (MW)	Realised as peak saving	Detail
1.	Efficient lighting	150	229	Residential retrofits, subsidy programmes and promotion campaign – roll out of 5 million Compact Fluorescent Lights (CFLs).
2	Energy efficiency campaign	80-160	80-160	Promotional and advertising campaign. Specific appeals: Pool pump switch off in winter, gas rather than electricity.
3	Customer self generation	50	58	Awareness programme. Customer visits. Promotional campaign.
4	Switch load to gas	50	22	Campaign to replace electric cooking with gas.
5	Industrial and commercial efficiency and curtailment	40	12	Including schools, hotels, malls, office blocks. Lighting, dual fuel systems, building management. Eskom buildings retrofit.
	Total	400	418-498	

Source: PMT Final report, August 2006

Public energy

The blackouts revealed the social nature of electricity consumption. People went from individualised consumers who simply assumed the availability of cheap and abundant electricity at the flick of a switch, to understanding their consumption in the context of the city's functioning – including the possibility that their own consumption might contribute to tripping out whole areas. It thus created a sense of common crisis and vulnerability. It even seemed that this crossed Cape Town's rigid class divide as business and labour shared a number of platforms, but this larger solidarity was illusory. The middle classes could enjoy the camaraderie of crisis as they checked the load shedding schedules and went to eat in restaurants where the supply was on. Lacking such easy mobility and free spending power, the working classes justifiably felt a strong sense of their class-specific vulnerability.

Prior to the blackouts, Eskom's demand side management programme was remarkable only for its invisibility. The energy efficiency campaign was now made highly visible through TV and radio power alerts as well as extensive press coverage and appealed directly to the emergent sense of social solidarity with the slogan 'sharing the load'. Substantial savings of around 100MW were made simply by turning things off. This was backed up by efficiency subsidies available for geyser blankets and low flow shower heads. Households adopting electronic 'ripple' control – which enables electricity managers to switch off their geysers from a central control – could also claim subsidies.

In contrast, support for solar water heaters was excluded despite strong arguments from civil society that water heating in richer households is the largest component of residential consumption. Eskom claimed that, given the limited solar industry capacity in Cape Town, they could not be installed fast enough to realise savings within the three months crisis period.

Twenty energy and environmental organisations responded in a letter addressed to the Department of Minerals and Energy, the National Energy Regulator, Eskom, the Central Energy Fund and the directors of city electricity departments. The letter argued that immediate action was needed in launching a huge drive for solar water heating and energy efficiency. It noted that research demonstrating the benefits had gathered dust at the Department of Minerals and Energy (DME) for over ten years and suggested that efficiency should not be left to those with a vested interest in expanding electricity sales.

Old lamps for new!

The efficient lighting campaign worked through free swaps of incandescent bulbs for compact fluorescent lights (CFLs). The savings are remarkable given that lights are the smallest users of electricity, at least in middle class homes. Even more remarkable, the bulk of these savings were made by households with the lowest electricity consumption. Altogether, 5.3 million CFLs were distributed. In a door-to-door campaign, 3.2 million (61%) were distributed to homes in the poorer areas of Cape Town: Khayelitsha, Table View, Mitchell's Plain, Mfuleni, Gugulethu and Greater Athlone. In middle class areas, swaps were organised through retailers who distributed 2 million CFLs (39%).

The poor were similarly targeted for the less successful switch over to liquid petroleum gas (LPG) for cooking and heating. While richer households could get a discount on gas appliances, poor households could swap electric hotplates for gas hotplates, including a gas bottle and two refills. Those of the poor who made the swap soon ran into trouble. First, rising crude oil prices and the new demand for gas started driving up the price in mid 2006. Second, gas supplies ran short because it is largely produced as a refinery by-product. The PMT urged the DME to ensure that the LPG industry had sufficient storage and transport capacity and that its strategic stockpiling levels were adequate to ensure continuity of supply, as well as to engage with the LPG industry to agree on an approach and pricing structure which would retain the benefits of the savings drive, as well as protect lower income households. They also suggested regulating the price of LPG to de-link it from crude oil prices.

Short of expensively importing gas, however, there is limited room for manoeuvre. According to energy analyst Herman Scheer [2002], LPG typically constitutes about 3.5% of an oil refinery's output and this proportion can be increased only within a limited range. Refineries actively shape the market to fit demand to the ratio of their product streams so the market was already calibrated to the supply. With additional demand driven by the managers of the electricity crisis, the LPG supply could not simply be increased – and was not.

It is supposed to be possible for poor people to switch back again, swapping their new gas appliance for their old electric hotplate. There does not appear to be an active campaign to enable this and it is not clear if it is happening.

Box 3: Mercury

Each CFL contains a minute quantity of mercury – as Sustainable Energy Africa pointed out in 2000.²⁹ Dumping millions of CFLs when they burn out thus creates a potential for groundwater pollution. Environmentalists again raised this issue as the 5 million CFL roll out got into gear. The PMT responded by recommending a comprehensive disposal plan including a R5 million mercury recycling plant. This plan relies on voluntary recycling from households in a context where municipal waste managers do not provide the infrastructure for recycling. Bringing these lamps to a mercury capturing plant is thus highly unlikely but, if it does happen, it may just shift the problem. Mercury recycling plants have a wretched history. At Thor Chemicals near Pietermaritzburg, workers suffered mercury poisoning and a stream used by local people for drinking and bathing was contaminated. Some organisations are now looking at more costly but even more efficient light emitting diodes (LEDs) to avoid the mercury problem.

Coal fired power generation also results in mercury pollution. Trace elements of mercury in coal are minute but, because massive quantities of coal are burnt, mercury emissions are significant. If CFLs have the effect of reducing the amount of coal burnt, it might be argued that there is an overall reduction in mercury pollution. Regrettably, this does not follow. Eskom is building new power plants as fast as it can. Demand side management is really an effort to prevent demand growing faster than Eskom can increase the supply.

Business and industry

Exempted from load shedding, the business community in Cape Town's CBD effectively exempted itself from 'sharing the load'. Eighty eight businesses in the CBD were approached to undertake voluntary electricity conservation. Twenty five were not interested, 51 expressed interest, only 12 pledged to efficiency measures and achieved just 4 MW saving. In the Western Cape beyond the CBD, 20 industrial and commercial customers took advantage of the 100% subsidy for energy efficiency projects. Projects with a combined impact of 17 MW were approved but only 6 MW savings was achieved by the end July 2006. Implementation of the rest of the projects would extend over several months. Eskom's rule that only interventions yielding short term gains should be considered was thus not applied to business.

²⁹ The US EPA standard is 5 milligrams, so 5 million bulbs contain 25 kg of mercury. However, poor quality CFLs contain more. Mercury is an excellent conductor of electricity and has found many applications but has also caused severe health problems for workers. See D'Itri and D'Itri 1997.

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More broadly, it is evident that voluntary measures did not work. It seems equally evident that learning from this will be avoided. The CBD did not come close to meeting the agreed targets. It was vigorously defended from the consequence of sharing the load shedding by the Cape Town Partnership – a non-profit company set up by local government and business to promote the CBD.³⁰ The Partnership argued that its energy saving campaign was making good progress and would be undermined if load shedding was implemented. The unspoken assumption here is that business would cooperate only if it was afforded privileged treatment.

Middle and working class Capetonians were incensed to see whole office blocks lit up at night. Many of these buildings are hard wired for profligate consumption because they operate on a single switch meaning that the whole building is either on or off. Rental buildings are particularly problematic because tenants pick up the electricity bills but landlords decide on any retrofit. The effect is that the costs of high energy buildings are transferred from landlords to tenants but, in the context of cheap electricity, business tenants did not notice. The Cape Town Partnership is now working to develop a model to ‘incentivise’ energy efficiency projects in multi-tenant buildings.³¹ The real effect of this will be to protect the principle of voluntary measures which will come at a considerable price in public subsidies.

Business did much better when they could see the money. Eskom paid premium rates – thought to be some 10 times higher than normal industry electricity tariffs – to 33 customers who used their own back-up generators during peak hours and so substituted about 58 MW. A number of companies have since bought generators to protect against future outages. Most run on diesel and are indeed expensive to operate. They may substitute for grid electricity but at the cost of an overall increase in energy consumption and carbon emissions.

Economic outage

Conservation in the townships contrasts starkly with the profligacy of the CBD. It is part of the broader structure of discourse that defends cheap energy for industry and business in the name of national economic competitiveness and uses the need for conservation to justify pre-paid meters and trickle feed technologies for the poor.

³⁰ The Cape Town Partnership’s advocacy on behalf of CBD businesses is evident in an email from CEO Alex Borraine to the PMT, June 9, 2006.

³¹ Interview with David Nicol, April 18, 2007.

These technologies are designed to restrict consumption with the result that the urban poor are frequently short of energy for basic necessities of life such as cooking and warmth.

Considerable attention was focused on the poor during the crisis. Following the adoption of the ‘common principles’ on load shedding in April, it would seem that poor areas were not disproportionately shed. Households may also benefit from lower bills resulting from using CFLs – or find it easier to live within the limits of the free lifeline supply – assuming that they are available at prices that match incandescent bulbs in the future. The gas swap out, however, indicates an underlying hypocrisy. While more efficient for cooking in energy terms, gas is more expensive to use at current prices than electricity. It seems that the discourse of ‘pro-poor’ development made it easier to target programmes at the poor. And it may be that this discourse will, in times of crisis, be used to shed the poor from the grid altogether.

Government recently proclaimed that its housing programme would shift from focusing on the number of houses built to creating ‘sustainable settlements’. As yet, there is little evidence of this shift on the ground. Low cost housing remains exactly that, often badly built and invariably neglecting even the basics of environmental design. Whatever is saved by this means, the cost of the saving is passed onto the ‘beneficiaries’ who must pay high energy costs or endure extreme cold or heat.

The City authorities have stated their commitment to the dual priorities of economic growth driven by global competitiveness on the one hand and pro-poor development on the other. Keeping the CBD switched on may have defended Cape Town’s world class city ambitions, but these ambitions have the effect of concentrating both public and private investment in wealthy areas. The pro-poor strategy is meanwhile failing. Urbanist Charlotte Lemanski comments that “the two goals appear mutually incompatible.”³² This dual development strategy is replicated at national level in the Accelerated and Shared Growth Initiative (Asgisa), which aims for 6% growth in the energy intensive ‘first economy’ and claims that it will support ‘second economy’ entrepreneurs by bridging the gap between the two economies.³³

³² *Towards 2010: Going global leaves poor further behind*, Cape Argus, May 23, 2007.

³³ See The groundWork Report 2006 for a critique of Asgisa.

Box 4: The poor pay the price

Energy researcher Wendy Annecke concludes:

It wouldn't be an exaggeration to say that the Electricity Supply Industry has failed women in Africa. ... Women are often among the poorest of the poor, and we know that it is women who are largely responsible for acquiring energy on a daily basis to keep members of the household fed, clean and comfortable. To do this women juggle with multiple polluting and inefficient fuels: mostly wood, biomass and dung, but also kerosene. [2006: 38]

Kerosene, or paraffin, is dangerous, smells bad and gives food a bad taste – yet it remains the fuel of necessity for around two million South African households who cannot afford anything more expensive. They pay the price of massive externalities resulting from an energy policy and practice that does not address the needs of the poor.

A Paraffin Users' Household Energy Summit, in June 2007, estimated “costs to households and to the economy due to paraffin related incidents ... in the region of R100 billion per year”. A 2001 report to the Paraffin Safety Association of South Africa concluded that in 2000:

- At least 143,000 children drank paraffin, at least 55,000 children contracted pneumonia after drinking paraffin, and at least 4,000 children died from paraffin-induced chemical pneumonia.
- There were at least 46,000 paraffin related fires and 50,000 paraffin related burns, and 31,000 of these burns were the result of paraffin stoves exploding.

In densely packed shack settlements, fire spreads within minutes. Lives are lost, people are injured and meagre possessions are destroyed. These include documentation like ID books, leading to problems in accessing pensions, health and other services. Recently, a safer paraffin stove was developed. But it sells for around R200 in Cape Town – four to five times the price of an unsafe stove. The DME has failed to control the paraffin trade and the price more than doubles from leaving the factory gate to being retailed to poor households in unsuitable containers. Electrification does not necessarily solve the problem, as cooking and heating requires more energy than the basic free energy allowance provides.

Sources: Paraffin Users' Household Energy Summit in June 2007, Final Declaration; 2001 Report to Paraffin Safety Association of South Africa in Energy Management News, vol. 8 no. 2. at www.eri.uct.ac.za.

The Western Cape Regional Chamber of Business claimed that, by the end of March 2006, the power failures may have cost the provincial economy as much as R8.9 billion, with businesses losing R5.6 billion and spending an additional R3.3 billion on generators and other equipment to help them manage the blackouts.³⁴ Beyond this, large and small businesses reported lost production and damage to equipment. The Chevron oil refinery in Cape Town lost 12 days of production and a host of small businesses, from hair dressers to internet cafes, closed during blackouts.³⁵

In a context where investment in capital and knowledge intensive industries is more likely to destroy jobs than to create them, government identifies small businesses as the primary source of new job creation. These are the businesses that appear to have lost most in proportion to their turnover. Business researcher Alison von Ketelholdt comments, “Small and medium businesses are extremely vulnerable to instability in their macro environment. They do not have the human or financial capacity to monitor their environment, process signals received, weigh up the alternatives and respond appropriately” [2006: 3]. They also do not have the power to change any of these conditions.

Organised business initially called for compensation but was rebuffed by President Thabo Mbeki who indicated that insurance was the business of the market. Having long campaigned for market mechanisms and weak state regulation, business claims for compensation were unlikely to attract support from other sectors. Indeed, this agenda substantially created the conditions that business now complains of. The state, however, has been a willing accomplice to this business agenda.

Electric Agriculture

Reliable electricity is a central input in the increasingly high-value export-orientated Western Cape agricultural sector. Cape farms were first electrified in the 1930s, since when industrial agriculture has integrated electricity into farming. In the 1980s and 90s, Eskom renewed the drive to electrify agriculture as it tried to expand markets to soak up its excess generating capacity. Its agricultural arm, Agrelek, gave technical advice on how to electrify ever more farming processes.

³⁴ Reported in the Cape Times March 31, 2006. The chamber had conducted a survey among its 4,600 members and received 225 responses. It said many businesses were reluctant to provide figures for “competitive” reasons. The total figure of R5.6 billion was calculated on the basis of there being 20,000 active businesses in the province. This figure did not reflect the long term costs, such as damage to the reputation of Western Cape businesses as reliable suppliers.

³⁵ Cape Business News quoted in Von Ketelholdt [2006: 15].

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With the political transition and the opening of international markets, this proved to be a considerable advantage. State regulations protecting farmers were dismantled from the late 1980s onwards. In 1996, the new government announced the macro-economic policy that it advertised as creating the conditions for Growth, Employment and Redistribution (GEAR). The policy in fact declared South Africa's alignment with the Washington consensus which required that developing countries open up to global capital investment in order to finance export led growth.

The prior electrification of agriculture put the leading Cape wine and fruit farms in a good position to respond, in exemplary fashion, to the policy of export oriented production.³⁶ From 1998 to 2002 they experienced booming exports to Europe and rising profits as they linked into global production networks. Thereafter, their profit margins were squeezed as the Rand strengthened; global competition for access to the Northern markets intensified; competition from imports arrived on their home turf as the state stripped out protective tariffs; global over-production of wine created a glut on the markets; and input costs rose.³⁷ In short, their vulnerability at the subordinate end of the production network became more evident.

As reported in the groundWork Report 2003, the wine and fruit producers were positioned within 'buyer-driven' global production networks orchestrated by Northern supermarket corporations and increasingly regulated through a proliferation of privatised labour and environmental codes – fair trade, ethical sourcing, ISO 14,000³⁸ etc. Lead corporations tightened quality and pricing requirements and appropriated the public relations benefits of the 'ethics effect' but passed the cost of ethical compliance to producers. Caught by the consequent price squeeze, farmers saw post-apartheid labour and tenant rights as threatening both their autonomy of action and economic viability. Most have managed to pass the costs on to labour. Within this most 'dynamic' region of post-apartheid agriculture, farming enterprises have collectively shed some 20% of permanent labour. With few exceptions, they have retained a core of 'empowered' permanent labour and replaced the rest with casual labour – frequently women paid at a lower rate than men – and largely procured through labour contractors. Redundant

³⁶ These farms and cellars are a minority but represent the most profitable leading edge of the industry. Bulk wine producers have struggled to adapt to the new order and are now feeling the competition from imports.

³⁷ Willemse, power point presentation: Economic Position of Agriculture in Western Cape, 2006

³⁸ The International Standards Organisation 14,000 series concerns environmental management systems but does not require any standard relating to actual pollution.

farm workers have similarly lost farm housing entitlements, many of them finding harsh refuge in informal peri-urban settlements.³⁹

Energy is critical to creating the ‘cold chain’ that carries fresh produce from across the world to the refrigerated display shelves of Northern supermarkets. The entire process is on a tight schedule defined by just-in-time delivery systems and, for fruit, the time from tree to ship is no more than 48 hours. Fruit is picked by casual workers in the heat of summer and taken to packing sheds where it is washed and rapidly cooled, packed and loaded onto refrigerated trucks. The trucks must meet refrigerated ships which are on tight turn around times. Any delay incurs additional docking fees which are billed to the producer, not the buyer. The ships must also meet the trucks at the other end, with time penalties again imposed on producers. A thermometer inserted in each fruit box records its temperature throughout the journey and the box is rejected if it has exceeded the temperature limits at any stage. Finally, the supermarket may summarily cancel the whole contract if time or quality criteria are missed.

Timing is also critical to the wine farm harvest. White wines in particular are now drunk in the year they are produced, speed to market being critical to profitability within the global markets structured by the Northern buyers. For quality, precision in production compensates for the time previously allowed for the wine to mature. Grapes must be picked when the acid balance is right, rapidly cooled in the cellar and the temperature precisely controlled by computerised systems throughout the production process.

Wine and fruit production are large scale industrial operations of which the farms are but one component. Scale and the necessity for speed now dictate that a large pool of unemployed people should be available for seasonal work.⁴⁰ On a single Cape farm, something like 700 pickers may be employed while anything between 200 and 1,000 casual workers are employed in the packing sheds.

Blackouts brought the whole system to a halt. Without the cooling plant in cellars and packing sheds, harvesting had to be stopped. In the account of farmer organisation Agri-Weskaap, farmers had to pay workers for the day without getting the harvest.

³⁹ See also Du Toit and Ewart 2002.

⁴⁰ Ewart and Du Toit [2005] report increasing use of mechanised harvesting, with each machine replacing 70 pickers and enabling quicker harvesting when sugar levels are right. However, this advantage is off set because mechanical harvesting cannot discriminate for grape quality and also results in foreign matter in the harvest.

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This may have been the case on some farms. However, “most seasonal workers work on a piecework basis and are paid by the ‘basket’”, according to agricultural researchers Ewart and Du Toit [2005: 120]. It seems unlikely that they would have been paid for more than they picked. Farmers also lost sensitive equipment. Winemakers, for example, reported that electricity interruptions fried their costly computer process-control systems. The larger threat, however, was that of losing market access.

In the event, the impact of the electricity crisis on farms was largely contained. Agri-Weskaap, according to CEO Carl Opperman,⁴¹ anticipated further supply problems following the November 2005 blackouts and responded early and proactively. It administered a survey of the Western Cape’s 6,000 farms to establish at what times – daily and seasonal – the power supply was most critical to the farming operation and when it was least critical. The responses were given to Eskom staff who analysed them and planned load shedding on that basis. The unplanned blackouts, when the whole system crashed in February, were thus the most threatening interruptions.

In Opperman’s view, farmers understand that they are tied to Eskom for the foreseeable future. Like other businesses in the Western Cape, they have abandoned plans to sue Eskom but many are exploring ways to reduce their dependency. Some have opted for conventional back-up generators. In response to climate change as well as energy security, a small minority of the leading estates are looking at their overall energy and carbon flows, seriously addressing energy efficiency and developing on-farm energy systems using low carbon or renewable technologies.

These responses are motivated both by sensitivities in their export markets and by a real concern about climate change, not least because Western Cape agriculture will be severely affected by it [see Box 5 below]. Thus, the Backsberg wine estate is now declared ‘carbon neutral approved’ according to ‘The Carbon Standard’, having reduced its energy consumption and off set its outstanding emissions by planting trees in a nearby township in partnership with the NGO Food and Trees for Africa (FTFA).

The Carbon Standard sounds both official and universal but was actually established by FTFA and is implemented in a partnership between the NGO and transnational corporate auditors PricewaterhouseCoopers (PwC). PwC’s South African office is “the first African company accredited to do carbon auditing” according to FTFA.⁴²

⁴¹ Interview with Carl Opperman, CEO Agri-Weskaap, April 20, 2007.

⁴² See FTFA web site at www.trees.co.za. PwC’s own website is silent on its accreditation.

Its accreditation is based on the International Standard Organisation's (ISO) newly developed standard for greenhouse gas reporting. This standard is one of several such initiatives, most notably the 'Voluntary Carbon Standard' established by the International Emissions Trading Association, The Climate Group, the World Business Council for Sustainable Development, and the World Economic Forum with the primary purpose of facilitating carbon trading. FTFA's Carbon Standard may be similarly used and PwC is actively engaged in facilitating the carbon market brought into being by the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC).

For Southern countries, trading is possible under Kyoto's Clean Development Mechanism (CDM). The rules require that a Northern organisation or business must invest in a Southern CDM project which results in lower carbon emissions than a business-as-usual project. The Northern organisation is then credited with the carbon emissions which are held to have been saved. It can either sell the carbon credits or, if it is in danger of exceeding its own emission allowance, it can subtract the presumed saving in the South from its actual emissions in the North.

Backsberg has rejected trading on these terms because it means that South African carbon rights are alienated to the North. It does nevertheless expect to improve its brand position particularly in Northern markets. It is thus pioneering the addition of climate change concerns to ethical trading etc., at the producer end of global production networks. In the North, the supermarkets are already onto the management of these concerns. Not frying the planet is offered as one more consumer choice, mainly aimed upmarket, in a basket of ethical, quality and brand choices. Overall food energy costs are rising, however. In Britain, the production, processing, distribution and preparation of food now consumes one fifth of total energy. Lucas et al [2006] show that half the energy for transport is used within exporting countries and between exporters and Britain, and one third of the energy used for production, processing and packaging is expended in exporting countries.

Irrespective of the sincerity of individual initiatives, it is this larger dynamic driven by global capital that both creates poverty, as workers are outsourced, casualised or simply made redundant, and degrades local and global environments. And it is in the interests of global capital that the voluntary codes and standards are brought into being. Tree planting may bring its own benefits in particular cases, but off setting carbon emissions just from agriculture would require more land than the planet has

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to offer. The question then arises as to whose land will be appropriated as the carbon market clamours for offsets.

Box 5: Climate Change in the Cape

Wine farmers in the Western Cape have had several meetings with climate scientists and are well aware of the threats. They expect that as the climate dries out they will grow varieties now suited to the dry margins of the winelands. Agri-Weskaap's Opperman thinks there should be more active agricultural research to help farmers deal with the coming changes but notes that national research capacity has been run down. His vision for responding to climate change is not limited to the Western Cape. He sees South African farmers expanding into the rest of Africa as the next option. It seems unlikely that African peasants will welcome this. Regulars at a Kalk Bay coffee shop are less sanguine about climate change as they contemplate the possibility that the railway line running along the coast will disappear under the water. Residents of the low lying Cape Flats have even more reason for concern. Many settlements already experience regular flooding in storms and the intensity of storms is likely to increase.

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The world we live in is profoundly shaped by the abundance of oil. This was not an entirely spontaneous process. The first part of this chapter looks at how corporations and states intervened to manipulate the flow of oil and money and to expand consumption to create oil dependent production regimes and life-styles. The second section looks at the current debate on peak oil and when it will happen. The margin between production and consumption is already very narrow. The final section of this chapter considers the increasingly frantic search for new sources to keep the global economy fired up for growth. It provides a critique of the official future as it is represented by the International Energy Agency. It describes the implications for environmental justice in terms of climate change and shows that peak oil is also peak poison for people living on the production fenceline.

Managing glut

Outside of war, the problem for big oil during most of the 20th Century was that there was too much of it. Up to the 1960s, ever larger discoveries were made and the oil gushed from vast underground lakes under its own pressure. As a result, oil prices and profits were constantly threatened with collapse. Big oil developed two main strategies for managing the glut: restricting supply and expanding demand.

Restricting supply

The first big oil corporation, John Rockefeller's Standard Oil, played dirty to build a monopoly in the US with the power to control supply but failed to destroy the rival Shell Company and so secure a global monopoly. The US government subsequently introduced anti-trust (anti-monopoly) legislation and used it to break up Standard Oil. Thereafter the big oil corporations, including several of Standard's successor corporations, attempted at various times to establish cartels to agree production rates and dictate prices. Such agreements, however, were only partially successful. In the US, which was both the world's biggest producer and consumer of oil, a collapse of prices in the 1920s prompted corporations to turn to the state to regulate production. First,

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the US imposed a high tariff on oil imports and second, it introduced production quotas on domestic oil.

The problem of glut was then confined to the rest of the world market. The notorious ‘seven sisters’⁴³ attempted to restrict access by smaller corporations to new oil fields outside the US but with only temporary success. Nevertheless, they did control the enormous oil reserves of the Middle East and used them, Saudi Arabia in particular, as ‘swing’ producers – opening or closing the taps to try and balance supply and demand. The revenues of the Middle Eastern states were thus subject to the convenience of the seven sisters. These states were newly created by imperial fiat at the end of the Second World War but, two decades later, were beginning to react to their subordination to the oil corporations and to assert nationalist agendas.

In the 1960s, Venezuela and the major Middle Eastern producer countries formed the Organisation of Petroleum Exporting Countries (OPEC) in an effort to expand the US system of regulation to the global scale. The US spurned the initiative, however, and OPEC got off to a rocky start. It came into its own during the 1970s when, following its defeat in Vietnam, the US grip on global political and economic power was shaken. Moreover, US production peaked in 1970 while consumption kept on rising. Increasingly dependent on imports, the US abandoned regulation in 1973. In the same year, US backing of Israel in its war on Egypt prompted Middle Eastern and North African producer countries to cut production by 5%, enough to create a global supply crisis, and embargo sales to the US. This first ‘oil shock’ was followed by two more. First, the US client regime in Iran was deposed in the revolution of 1978 and then, at the behest of the US, Iraq invaded Iran in 1980. During this decade most OPEC countries nationalised their oil industries. Indignant as they were at their loss of property, the corporations nevertheless made windfall profits from oil shock prices and developed what *Retort* calls an “easy complicity” with OPEC [2005: 68].

The impact of the third shock on the oil supply was short lived. A global recession induced by the US and Britain, associated with the names of Reagan and Thatcher, drastically reduced demand, while new oil fields in the North Sea, Alaska and sub-Saharan Africa, financed by windfall corporate profits and vast public subsidies coordinated by the World Bank, were brought into production. At the same time, the US restored economic global dominance, tightening the supply of money and driving

⁴³ The seven sisters were: Standard of New Jersey (later called Exxon), Socony-Vacuum (also a Standard Oil successor, later Mobil), Standard of California (Chevron), Texaco, Royal Dutch Shell, British Petroleum and Total.

up interest rates. The neo-liberal order was explicitly aimed at restoring the order of imperial capital. In the North, workers were intentionally provoked into striking and were then crushed. In the South, countries that had been induced by Western banks, the IMF and the World Bank to borrow from the glut of petrodollars in the 1970s found themselves burdened with escalating interest charges, payable in dollars, while the value of their currencies collapsed. In many cases, the lenders knew from the start that the projects so funded were white elephants. As documented by John Perkins [2004], it was the task of their agents – the ‘economic hit men’ – to fabricate figures to show that the benefits would exceed the costs.

In this context, OPEC countries began to break ranks. Several countries produced beyond their quotas to meet growing debt burdens while others did so to defend market shares. Saudi Arabia was left alone to defend the price by restricting production. When it finally abandoned this position in 1985, the price crashed from around \$30 to \$10 a barrel. Desperation then drove the OPEC members back to negotiating quotas while several non-OPEC producers supported the move with cuts of their own. In 1986, the price was restored to \$18 but remained volatile. It rose to \$35 in 1990 when Iraq invaded Kuwait but retreated along with the Iraqi troops as the US restored imperial order.

Discipline was imposed on the South through ‘structural adjustment programmes’ (SAPs) and the forced opening of their economies to Northern capital and transnational corporations on the terms of the ‘Washington consensus’. Countries that baulked at these terms were subjected to severe economic crises as the “withdrawal of the IMF’s confidence” gave the signal for a flight of global capital from the offending country [Castells 2000a: 141]. In 1997, the booming ‘newly industrialised’ Asian economies were collectively subjected to just such a manipulated recession. The ‘Asian crisis’ forced the devaluation of their industries which were then made available to global investors at fire-sale prices in “the biggest peacetime transfer of assets from domestic to foreign owners in the past fifty years anywhere in the world” [Wade and Venerosa 1998: 150].⁴⁴ The recession also caused a slump in demand for oil. By the end of 1998, the price had crashed to around \$10. For indebted oil producers, the neo-liberal recession appeared interminable. In many of them, Andrew Mellon’s point was proved: oil fields were privatised and returned to the corporations.

⁴⁴ The groundWork Report 2003 gives a more detailed account [23 ff].

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The Asian economies, albeit under new management, recovered fairly quickly. From the end of 1999, prices have been driven up as rising demand has stretched production capacity while the US invasion of Iraq interrupted production from that country and also created more general uncertainty about the security of supplies. As *Retort* argues, war itself is used as part of big oil's armoury for restricting supplies and raising prices:

When profits fell to what the industry called a 'danger zone', oil men turned hawkish. Each descent into the 'danger zone' preceded an energy conflict, and was in turn followed by a dramatic reversal of economic fortune. [2005: 70]

OPEC countries that have shared in the fortune have completed the circle with massive arms purchases alongside the exhibitionist building programmes that have kept Northern construction corporations busy in places like Dubai.

Expanding demand

War has also been significant in expanding demand. World War I confirmed that modern warfare would run on oil and provoked speedy technological development: the combatants replaced coal with oil powered ships, realised the advantages of motorised troop transport, developed armoured vehicles, took war into the air and used oil derived chemicals to make explosives and poison gasses. In both world wars, securing oil while denying it to the enemy was of critical strategic concern and, in both cases, the victory of the Allied powers was more or less assured when Germany and its allies ran out of fuel. The US military remains the single most extravagant consumer of fuel on the planet – at 340,000 barrels a day⁴⁵ – with the obvious strategic implication that control of oil supplies remains an imperial imperative.

During both world wars, civilian demand was restricted even as production was ramped up to meet military requirements. Following the wars, demand exploded and rapidly absorbed the increased flow of oil as people took to the roads, particularly in America.

Already, Ford's production line had dramatically reduced the costs of cars while also creating the model for centralised 'vertically integrated' production and marketing

⁴⁵ Michael Klare, *The Pentagon V Peak Oil*, at TomDispatch.com, June 14, 2007.

that would be followed by all industries through most of the 20th Century. Famously, Ford also raised wages on the logic that its workers would then be able to buy the product, thus expanding the market. As Richard Heinberg points out, however, cars were still too expensive for most Americans. The industry responded with advertising and credit, constructing the culture of debt financing for household consumption along with the car culture. During the 1920s, “car companies nearly tripled their advertising budgets [and] went into the financing business, making car loans ever easier to obtain. By 1927, nearly three-quarters of all car purchases were made on credit ...” Record levels of debt directly exposed households to the impact of the crash of 1928, contributing “in no small way to the ensuing bankruptcies, bank failures, and layoffs” [Heinberg 2005: 68].

Car makers and big oil were natural allies in expanding the market in the US. In the early years of the 20th Century, they lobbied for a massive expansion of paved roads, which themselves consumed vast quantities of tar derived from oil. By the 1920s, cities were being re-engineered for traffic. Suburbs were already stretching out along the routes of public transport rail and tramways, but “the motorcar blew the idea of city limits apart” as property speculators rushed to convert farm land into suburbs [Yeomans 2004: 42]. In the 1930s, US car and oil corporations accelerated the process by buying up city tram systems and dismantling them. At the same time, the ‘New Deal’ promised work to the millions of Americans made redundant by the great depression sparked off by the stock market crash of 1928. Road building was made the central feature of a massive public works programme and accounted for 80% of New Deal spending. This was followed in the 1950s by the building of the Interstate Highway System at a cost of \$25 billion – which compared with the \$17 billion cost of the Marshall Plan for the reconstruction of Europe after World War 2. These road expenditures at public expense represented an enormous subsidy to the car and oil industries and drove rail transport into decline.

The oil economy transformed the country as well as the cities. Much of the chemicals capacity developed for wartime was vigorously peddled to farmers, tractors replaced animal draft and human labour and greatly expanded the land put to the plough and pumped irrigation appropriated ever more water. The industrialisation of agriculture was heavily subsidised by governments claiming to defend the interests of farmers but in fact empowering agribusiness at the farmers’ expense. Large corporations took control of agricultural supply chains and markets, dictated agricultural innovation and sucked up the better part of the value of subsidies. Farmers and peasants were

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“sandwiched into a ‘sequential capital-technology package’ at the beck and call of corporate strategists deciding what will be produced, when, and how, and establishing the quality and price terms for the products” [Armstrong and McGee 1985: 64].

In the US, industrialisation forced a concentration of land ownership, with each successive wave of corporate innovation driving smaller farmers as well as workers off the land. The ‘green revolution’, supported by development aid, extended these dynamics to the Third World. In India, the cycle of peasant dispossession and debt inaugurated under the British regime was given new impetus and again benefited landlords and moneylenders. South Africa confined black peasants to 13% of the land where subsistence agriculture was forced to subsidise the wages of migrant industrial workers. On white commercial farms, subsidised mechanisation enabled farmers to dispense with share-croppers who had previously controlled the ox teams and family labour necessary for cultivation. Thereafter, they enjoyed an additional subsidy from labour as wages were forcibly depressed. The world market for chemicals and fertilisers supported by these subsidies grew dramatically. Between 1950 and 2000, fertiliser sales rose from 14 million to 141 million tons according to the Food and Agriculture Organisation (FAO).⁴⁶

Following World War 2, the US appropriated control of the global regime of accumulation from the faltering hands of the British. The old European empires dissolved under fire from national liberation struggles, but the US found the means of disciplining the newly independent nations in the Cold War. It presided over a rapid expansion of consumption, supported by state expenditures on welfare as well as warfare. It held out the promise of full employment with high wages while its corporations spread the model of Fordist industrial production around the globe. The Third World, however, got more promise than substance. Workers were divided as the high wages were reserved for an elite minority because multinational corporations preferred to repatriate profits rather than to expand local markets and political opposition and union organisation was ruthlessly suppressed.

The post-war expansion, focused on the frontiers of the Cold War in Europe and East Asia, was increasingly fuelled by oil. In Europe, road transport expanded, but at a more modest pace than in the US and without dismantling public transport,

⁴⁶ Cited in Steffen et al 2004: 87. See also Krebs, A. 1992. *The Corporate Reapers: The book of agribusiness*, Essential Books. P.81.

while cheap and plentiful oil began to substitute for coal as an industrial and heating fuel. “In 1955, coal provided 75 percent of total energy use in Western Europe, and petroleum just 23 percent. By 1972, coal’s share had shrunk to 22 percent, while oil’s had risen to 60 percent – almost a complete flip-flop” [Yergin 1991: 545]. Richard Barnet observes that the flip-flop was initially financed by the Marshall Plan with the specific aim of undermining the power of communist coal miners’ unions:

A highly labour-intensive industry, coal was ... a weak link in a strategy to keep Europe from going Left In its first two and a half years, the Marshall Plan subsidized \$384 million of American produced oil for the factories of Europe. When the factories of France and Germany were going full blast again, they were fired by oil instead of coal. [1980: 49]

The recessions of the 1970s and 80s, combined with oil shock prices, dropped demand for oil and provoked another round of energy substitutions, this time from oil to gas with a smattering of renewables and efficiency measures on the side and, in apartheid South Africa, the expansion of Sasol’s coal-to-liquid capacity. Demand for oil and gas combined recovered to the previous highpoint of 1979 by the mid 1980s while demand for oil alone only recovered in the mid 1990s. Again, the alliance of oil and auto was significant in expanding demand. The world’s car makers found their most profitable line in luxury 4x4 SUVs. The US industry, with their backs to the wall of declining profits, lobbied hard to exempt these gas guzzlers from fuel economy standards applied to other family cars. Around the world, in Johannesburg as in New York and London, aggressive marketing and the marketing of aggression has made SUVs the elite suburban vehicle of choice.

More broadly, transport as a whole received massive support from the neo-liberal enforcement of open markets, privileging transnational corporate (TNC) investment, and export led development. While the World Bank secured cut-rate commodities for the global market from Africa, the globalisation of production secured the cheapest location for the manufacture of products or the component parts of products. This fuelled a massive increase in trade, most of it internal to the TNCs or to the global production networks over which they preside.⁴⁷ Air and sea transport have grown exponentially in this context while ‘just-in-time’ delivery systems have created ‘warehouses on wheels’ to reduce storage costs. Significantly, air and sea transport

⁴⁷ See The groundWork Report 2003 [17 ff] for a discussion of the globalisation of production.

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are excluded from national carbon accounts. With supreme hypocrisy, the British government claims it will cut carbon emissions by 60% by 2050 even as it instructs its airports to double capacity by 2030.⁴⁸ Likewise, Europe as a whole has committed to a 20% carbon reduction by 2020 while signing an ‘open skies’ agreement with the US designed to increase trans-Atlantic flights by 50% in the next five years.⁴⁹

Peaking production

The controversy on the timing of peak oil is fed by unreliable data. Whereas Hubbert worked with reasonably reliable figures, oil corporations and producing countries now tend to lie about how big their reserves are.⁵⁰ In 2004, for example, Shell was forced to admit that its oil fields had 25% less oil than it had claimed. It had inflated its reserve figure in order to keep its share price up and it is likely that other big oil corporations have similarly massaged their figures. For their part, the OPEC countries treat their technical production data as state secrets. They have a vested interest in inflating their reserve figures because OPEC production quotas are linked to reserves. Despite pumping millions of barrels of oil every day, and without finding new oil fields, most OPEC countries reported increases in their reserves in the late 1980s. This was really a bidding war for quotas. OPEC was then trying to restrict production to defend the price, but many individual OPEC countries were in financial trouble and desperate to export more to compensate for the low price. Jeremy Leggett [2005] cites evidence that OPEC reserves are over-stated by about 300 billion barrels – ten years worth of production at current rates.

Hirsch [2007] lists a growing number of credible oil experts, inside and outside of ASPO, who put peak oil within the next decade.⁵¹ Several of them believe that peak has already occurred or is now occurring. Several factors explain why this might be possible without world markets noticing. Firstly, “experience from oil fields and large oil producing regions demonstrates that maximum oil production is sometimes

⁴⁸ George Monbiot, *An audit of the government's planned carbon cuts shows they will achieve only half of what it claims*, The Guardian UK, March 05, 2007; Richard Sadler, *Flight Attendant*, The Guardian UK, February 28, 2007

⁴⁹ David Teather, *Open skies deal will undo curbs on CO2, say Greens*, The Guardian UK, March 24, 2007.

⁵⁰ The reserve is the total amount of oil that it is possible to pump from the ground. The resource is the total amount of oil calculated to be in the ground. Typically, less than 40% of the resource can be extracted.

⁵¹ The list includes geologists, academics, investors, retired Middle Eastern officials, and even Volvo Trucks. Most have spent a life-time in the field.

characterised by a few-year-long gentle rollover” [2007]. Secondly, Hirsch et al note that “geological realities are clearest after the fact” [2005: 36]. This was the case when natural gas production in North America peaked in the early 2000s.⁵² In 2001 industry optimists, including the US Energy Information Agency (US EIA), were predicting expanding gas production into the future but, by 2004, it was evident that production was in permanent decline. Thirdly, there is a great deal of ‘noise’ in the evidence. For example, peak oil is expected to be heralded by volatile prices, but this volatility cannot be separated out from that caused by the broader context of political and economic instability.⁵³ Finally, production information may be smoke screened. Thus, some commentators believe that OPEC announced a cut back in October 2006 to cover for its inability to maintain production. Saudi Arabia had in fact already cut production from 9.5 to 9.1 mb/d, most of the reduction being in very low quality crude.⁵⁴ The implication is that the Saudis are scraping the bottom of the barrel even at a level of production which is well below their nominal capacity of 12.5 mb/d.

ASPO analysts have used various techniques to correct the data but remain open to revising their projections as new information becomes available. Colin Campbell [2007], the doyen of peak oil studies, puts the peaking of ‘regular’ oil in 2005. Regular oil excludes very deep sea reserves, extra heavy oils, tar sands and other sources where production is very expensive and the energy return on energy invested (EROEI) is low [see Box 6].

Box 6: EROEI

EROEI is the acronym for ‘energy return on energy invested’. It is the measure of how much energy is used in the production process as against how much energy is contained in the product. Thus, a very high EROEI of 100 means that one unit of energy is used to produce 100 units. An EROEI of 1 would mean that the product contains only as much energy as was used to produce it. An EROEI of 0.5 means that the product contains only half the energy used to produce it. By extension, if production is based on non-renewables, a diminishing EROEI means higher carbon emissions.

⁵² A more precise dating is obscured by the brief recession and reduced demand following the dot.com bubble popping in 2001.

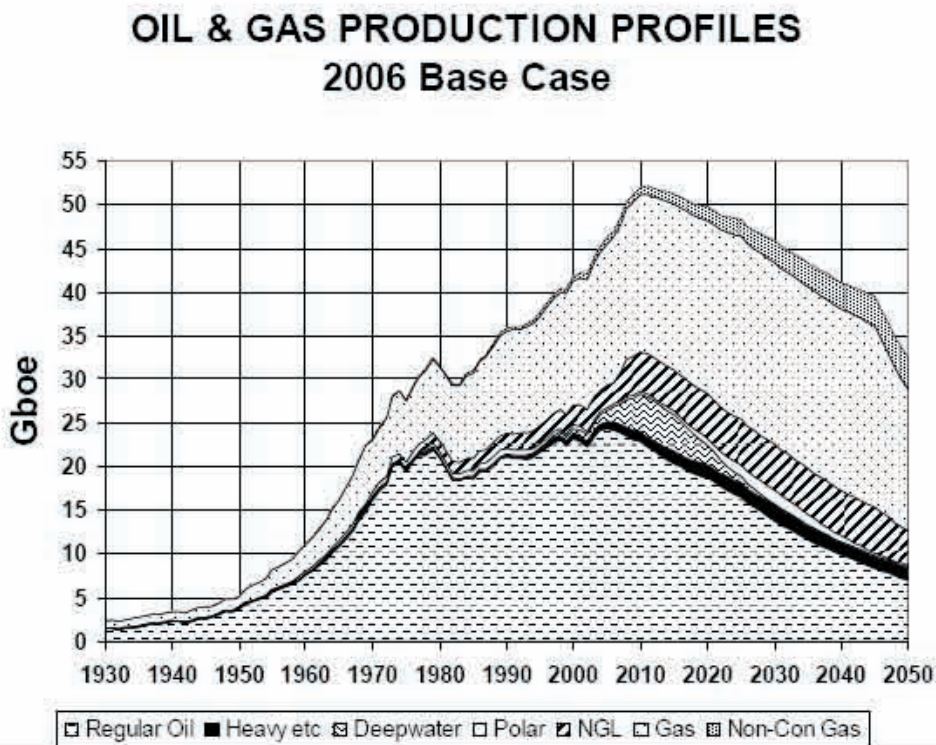
⁵³ In general, oil analysts tend to privilege oil as the key driver of the broader economy. Rising or falling oil prices are thus seen as dictating economic health rather than as symptoms of broader political and economic relations. This view may become more convincing after peak.

⁵⁴ Steven Mufson, *OPEC says it will cut 1.2 million barrels a day*, Washington Post, October 20, 2006. Oil tycoon T. Boone Pickens describes Saudi surplus capacity as “good for asphalt”.

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Campbell now predicts the peak of all oil production, including from non-conventional sources, in 2011. And while gas production will continue to expand until about 2045, this will not compensate for the decline in oil production. Thus, he shows the peak of oil and gas combined also at 2011 as shown in Figure 2. Andrew McKillop [2006], however, sees peak gas production riding hard on the heels of peak oil. In this case, the impacts of peak oil will be even more dramatic as the ‘gas bridge’ to a post-oil energy future collapses. In October 2007, the German based Energy Watch Group [EWG 2007] released a detailed study putting peak oil last year, in 2006.⁵⁵

Figure 2: ASPO production profiles – history and projections



Source: Campbell [2007]

In this figure, the declines in production in the mid and late 1970s reflect temporary declines in consumption resulting from economic recession as well as a modicum of energy conservation in the 1980s. A recession now would delay peak oil and probably crash the price.

⁵⁵ This study was released as the groundWork Report was going to print. They base their findings on production figures, arguing that they are more reliable than reserve figures.

Until recently, the industry establishment has held a common position that there are three or more decades to go before peak oil. This remains the position of the International Energy Agency (IEA) which serves a membership of rich (OECD) countries. Nevertheless, its World Energy Outlook (WEO) 2006 warns that massive energy investments – in oil, gas, coal, nuclear and renewables – will be needed to avert an energy supply crisis. IEA boss Claude Mandil opens the report with the words:

The energy future we are creating is unsustainable. If we continue as before, the energy supply to meet the needs of the next twenty five years is too vulnerable to failure from under-investment, environmental catastrophe or sudden supply interruption. [IEA WEO 2006: 3]

The IEA echoes similar calls from the US Energy Information Agency (US EIA) for a massive increase in investment. Subsequent IEA pronouncements have been less and less confident. In June 2007, chief economist Fatih Birol said that unless Iraqi production rises “exponentially by 2015, we have a very big problem, even if Saudi Arabia fulfils all its promises”.⁵⁶ Saudi Arabia’s promise is to invest \$55 billion to raise production capacity from about 12.5 to 15 million barrels a day. ASPO analysts do not believe they can do it and Birol’s phrasing hints that the IEA itself is becoming more sceptical.

The super-majors are now making conflicting statements. In 2005, Chevron ran an advertising campaign announcing the end of the cheap oil era. In January 2006, Shell boss Jeroen van der Veer said that “‘easy’ oil has probably passed its peak”.⁵⁷ In June 2006, Total gave 2020 as the likely date for peak oil.⁵⁸ A couple of months earlier, Total had said there was enough oil in the ground but that the demand forecast by the IEA to 2030 could not be met because the human and technical resources could not be developed to keep up with the increase in demand.⁵⁹ These statements can, of course, be interpreted as attempts to justify high prices and record corporate profits. Thus *Retort*, who are sceptical of peak oil, note the history of “organised scarcity” which attempted to “keep prices low enough for capitalist growth ... but high enough for corporate profitability ...” [2005: 60]. On the other hand, BP and Exxon maintain

⁵⁶ Interview with Le Monde reported in *The Oil Drum: Europe*, June 28, 2007.

⁵⁷ *Financial Times*, 24 January 2006.

⁵⁸ See Hirsch 2007.

⁵⁹ *The Times* (London), *World ‘cannot meet oil demand’*, 8 April 2006.

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the position that there is plenty of oil – virtually unlimited in Exxon’s view. These statements are also positioned by interest, being calculated to increase political pressure for corporate access to reserves under national management. Either way, the consensus of the establishment is breaking up.

The official future

The global elite are clearly nervous. The IEA’s WEO 2006 responds to a mandate from the imperial club of G8 countries to “map a new energy future”. The stated concerns are energy security and climate change. The IEA argues that the responses to these concerns are mutually reinforcing: energy efficiency and diversification of energy sources. Its representation, however, shows them to be deeply contradictory, at least in the context of ‘unending accumulation’ required by capitalism. Its central message is that the world must invest \$20 trillion between now and 2030: \$11 trillion in electricity generation, transmission and distribution; \$4.3 trillion in oil, mostly upstream; \$3.9 trillion in gas; and \$560 billion in coal. According to Mandil, “The energy future ... is doomed to failure [because of] underinvestment in basic energy infrastructure ... In short, we are on course for an energy system that will evolve from crisis to crisis” [quoted in Hirsh 2007].

The WEO develops two energy future scenarios for the period to 2030. The ‘Reference Scenario’ is based on national policies, in both developed and developing countries, that have been adopted and it assumes that they will be fully implemented. The ‘Alternative Policy Scenario’ takes account of additional policies aimed at enhancing energy security and/or addressing climate change. These are policies that are now being considered in each country and which, in the IEA’s view, they “might reasonably be expected” to adopt [WEO 2006: 54]. Table 3 shows global energy consumption and carbon dioxide emissions for each scenario.

Table 3: Annual global energy consumption and CO₂ emissions.

	2004 (actual)		2015		2030	
	Btoe	CO ₂ Gt	Btoe	CO ₂ Gt	Btoe	CO ₂ Gt
Reference	11.2	26	14.1	33	17.1	40
Alternative	11.2	26	13.5	32	15.4	34

Adapted from IEA 2006a.

Energy consumption is in billions of tonnes of oil equivalent. 1 tonne of oil equals 7.33 barrels.

Carbon dioxide emissions are in giga (billion) tonnes.

Both scenarios thus project massive increases in energy consumption and carbon emissions although demand rises less steeply in the alternative case as a result of increased energy efficiency. Assuming immediate implementation of the alternative policies, total emissions from 2005 to 2030 would be 8% less (820 Gt) compared with the reference case (890 Gt).⁶⁰ If alternative policies are implemented only in 2015, cumulative emissions for the whole period are only 2% less than in the reference case. Implementation would also be considerably more costly.

In both scenarios, fossil fuels remain dominant. In the Reference Scenario, their share of total energy consumption actually increases marginally from 80% to 81%. In the Alternative Scenario, the share decreases only to 77% but consumption of fossil fuels still grows overall. Supposedly ‘non-carbon’ energies grow at a faster rate in this scenario. Regrettably, with the exception of ‘other renewables’, the alternatives are of dubious value. Table 4 shows global energy sources in both scenarios.

Table 4: Energy sources (million tonnes of oil equivalent per year).

Source	2004 (actual)	Scenario	2015	2030	2030 share of energy
Coal	2,773	Reference	3,666	4,441	25.9%
		Alternative	3,431	3,512	22.7%
Oil	3,940	Reference	4,750	5,575	32.6%
		Alternative	4,534	4,955	32.1%
Gas	2,302	Reference	3,017	3,869	22.6%
		Alternative	2,877	3,370	21.8%
Nuclear	714	Reference	810	861	5.0%
		Alternative	852	1,070	6.9%
Hydro	242	Reference	317	408	2.3%
		Alternative	321	422	2.7%
Biomass & waste	1,176	Reference	1,375	1,645	9.6%
		Alternative	1,374	1,703	11.0%
Other renewable	57	Reference	136	296	1.7%
		Alternative	148	373	2.4%

Adapted from IEA 2006a.

In a final section, the IEA considers ‘going beyond the alternative policy scenario’. It proposes reducing annual carbon dioxide emissions to the 2004 level of 26 Gt by 2030. As well as intensifying energy efficiency and the conversion to ‘non-carbon’ energies, it gives a very substantial role to carbon capture and storage (CCS) to achieve this. Even if CCS does work, which is not proven, this best case IEA target does not provide a credible response to climate change [see Box 7].

Box 7: Required CO₂e emissions reduction

Taking account of all greenhouse gasses, concentrations in the atmosphere are now equivalent to 430 ppm of carbon dioxide (CO₂ equivalent or CO₂e), according to the Stern Report [2006: 3]. If the concentration is stabilised at this level – in other words, carbon emissions are almost shut off – “there is up to a one-in-five chance that the world would experience a warming in excess of 3°C above pre-industrial [levels]” [9]. Predicted temperature increases at 430 ppm CO₂e, based on modelling undertaken in 11 separate studies, range from 0.8°C to 6.4°C above pre-industrial levels. The lower end of this range is effectively already overtaken. The world is already 0.76°C warmer than in 1900 and temperature increase lags behind increased carbon concentrations. Thus, present temperatures result from carbon concentrations reached some time ago.

According to Stern, “If annual emissions continued at today’s levels, greenhouse gas levels would be close to double pre-industrial levels by the middle of the century.” This is about 550 ppm. If CO₂e concentrations are stabilised at this level, “temperatures are projected to eventually rise by 2 – 5°C or even higher,” [2006: 12]. The full range given in the 11 studies is 1.2 – 9.1°C. Again, the lower end of this range is effectively already overtaken, even if carbon emissions are completely shut down tomorrow, because of the lag effect.

The European Union now defines 2°C above pre-industrial temperatures as ‘dangerous’. The most recent research suggests “that warming greater than 1°C will constitute a ‘dangerous’ level of warming” [Levin and Pershing 2007: 3]. Indeed, millions of people around the world, and particularly in Africa, are already faced with dangerous consequences of climate change. The report of the IPCC’s working group on mitigation, meanwhile, indicates that avoiding temperature increases beyond the 2 – 2.4°C range requires that overall emissions peak between 2000 and 2015 and are then sharply reduced by between 50% and 85% by 2050. Thus, the window period for reversing emission trends is half over. To the contrary, however, the pace of carbon dioxide emissions has accelerated since 2000, growing faster than predicted in “the most fossil-fuel intensive of the Intergovernmental Panel on Climate Change emissions scenarios developed in the late 1990s” [Raupach et al 2007: 1].

The IPCC's findings exclude consideration of natural feed-back loops induced by global warming. Such feed-backs include: the melting of snow and ice means that less heat is reflected away from the earth by the white surface and more heat absorbed by the darker surface; the melting of permafrost peat bogs in northern Russia and Canada could release 70 billion tonnes of methane into the atmosphere – equivalent to 1.6 trillion tonnes of carbon dioxide; warming oceans could release even greater quantities of methane from methane-hydrates⁶¹; and the reversal of carbon absorption by soils which will turn a very significant carbon 'sink' into an equally significant carbon source. These feed-backs have long been predicted in the literature. They are now being observed. In consequence, temperature rises of "5 or 6°C or higher are plausible" [Stern 2006: 59]. The implication is obvious: emissions should peak earlier rather than later within the IPCC's 2000 to 2015 date range and it is more likely that an 85% reduction is necessary by 2050.

That said, there will never be a point at which giving up on mitigation makes sense. Even if a CO₂e concentration of 590 to 710 ppm – implying an average temperature rise of 3 to 4°C – begins to look inevitable, adding more carbon will simply make things even worse.

Meeting oil demand – or not

In this decade, annual demand has been growing by about 2 million barrels a day (mb/d) but high prices constricted the increase to around 1 million in 2005 and 2006. In these two years, demand for fuel for transport kept growing but many applications using oil, such as electricity generation and heating, switched to coal or gas. Most of the options for switching are now used up while transport demand is still increasing. The IEA therefore sees higher growth in 2007, amounting to an additional 1.5 mb/d, despite higher prices.⁶² It puts average demand in 2007 at 86 mb/d which adds up to over 31 billion barrels for the year (bb/y).

At the same time, production from older wells around the world is declining. This means that producers must compensate for about 4 mb/d – and rising – in declining

⁶¹ Hydrates are a bit like ice but form under pressure at some depth. These formations are regarded as unstable and it is somewhat alarming that the US Department of Energy is experimenting with drilling them as a source of 'unconventional gas'. See Leggett 2005: 76; 118.

⁶² IEA, Oil Market Report, 13 February 2007.

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production as well as producing more to meet the increased demand. That makes over 2 billion barrels a year (bb/y) of new production. By 2015, according to ExxonMobil, “we will need to find, develop and produce a volume of new oil and gas that is equal to eight out of every 10 barrels being produced today” [quoted by Aleklett 2006].

On current trends (the Reference Scenario), WEO 2006 sees demand at over 116 mb/d (42 bb/y) in 2030 and says production can meet this demand.⁶³ In contrast, the Energy Watch Group sees production falling to 39 mb/d by 2030 and comments that the difference “could hardly be more dramatic” [2007: 69]. Campbell puts production in 2030 at 65 mb/d. In claiming that the demand can be met, the WEO makes three assumptions: **technology investments** will get more oil from existing wells; sufficient **new oil** will be discovered; production of **unconventional oil** will increase substantially.

Technology investments

Most oil fields yield only about 35% of the oil that is actually in the ground. A raft of new technologies for ‘enhanced oil recovery’ was developed in the US once its mainland production passed peak. These technologies get more oil out of old fields. In newer fields, the technology is built in from the start. The potential of enhanced recovery is already accounted for and so does not add to reserves.

According to the IEA, investment in existing fields will substantially off set the ‘natural’ rate of decline. The decline rate is different for different regions: “For OPEC they range from 2% to 7%. They are highest in mature OECD producing areas, where they average 11%” [96]. For the world, the IEA estimates the average ‘natural’ decline rate at 8% per year for the entire period to 2030 but says the actual decline is much lower because of new technology investments. However, Hirsch et al [2005] show that major investments on the US mainland following the oil shocks of the 1970s – in enhanced recovery and exploration – moderated the overall decline rate of US production only for brief periods.

Enhanced recovery is also designed to increase production rates. The result is that the newer fields have a shorter life while the final decline in all fields is much more rapid. Indeed, the attempt to maintain or increase production from old declining fields risks collapsing production altogether, leaving ‘trapped oil’ in the ground. In

⁶³ This is revised down from the IEA’s 2005 projection of demand reaching over 120 mb/d in 2030.

April 2006, the Saudis admitted having difficulty keeping up with demand and made an unprecedented call for energy conservation, particularly in the US. One official observed, “When you have this kind of demand, you’re forced to supply beyond the optimal rate.”⁶⁴

Leggett concludes that, “Enhanced recovery made precious little difference to the inexorable decline of US oil production, and it will be no different globally” [2005: 68]. Rather, it will sharpen the crisis of depletion when it hits because the rapidity of decline will leave little time to develop alternatives. The Energy Watch Group uses a 3% decline rate to calculate future supply but notes that this is based on a “moderate assumption” and a far steeper decline should be expected [2007: 68].

New oil discoveries

Second, the WEO assumes that there are still very large fields to be discovered, particularly in the Middle East and North Africa. However, the only evidence it gives for this is that Western oil corporations have not been free to explore these areas since the 1970s. This echoes the argument, led by ExxonMobil and the US, that there is plenty of oil to be discovered but it is locked in by ‘resource nationalism’ and the inefficiency of state corporations. As with OPEC reserves, it is a story designed for political ends – to create pressure in support of big oil’s bid to regain effective control of the world’s largest reserves, irrespective of whether there is more oil to be found, while leaving OPEC with the blame for any short fall.

The scale of discovery has long since diminished. The biggest discoveries were made in the 1950s and 60s. Since then, many more wells have been found but, despite increasingly sophisticated exploration technologies, there has been a consistent downward trend in the amount of new oil discovered. The last time discovery matched production was in the early 1980s and the gap has been widening since.

In 2006, according to WEO, just less than 10 billion barrels of new oil was discovered. This compares with over 57 billion discovered in 1965. By recent standards, 2006 was a good year. In 2003, no major fields were discovered. ASPO geologists, as well as a number of their colleagues still active in the industry, dispute that oil will be found in quantities necessary to offset production declines. The geological conditions necessary for major oil finds are now well understood and have been comprehensively mapped

⁶⁴ Associated Press, *Rising demand may outpace Saudi output capacity*, Gulfnews.com, April 5, 2006.

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and explored. There may be some ‘giants’ left to find, but this is small comfort. The two biggest fields ever are Burgan in Kuwait, discovered in 1938, and Ghawar in Saudi Arabia (1948), each supposed to hold about 87 billion barrels at discovery. The third (1961) and fourth (1951) largest held 20 billion each. These are ‘super-giants’ holding more than 10 billion barrels of recoverable oil. Only around 50 have been found. Giants hold between 500 million and 10 billion. Leggett [2005] notes that 500 million barrels is less than a week’s supply at current consumption rates.

Box 8: US writes Iraq oil law

The US agenda of opening the Middle East to foreign investment – meaning US corporations – was articulated in 2001 by an energy task group led by Vice President Dick Cheney. The Middle East will keep pumping longer than anyone else and its already critical strategic significance will therefore grow over time. The invasion of Iraq was, amongst other things, an oil grab and this is now manifest in a new oil law put before the Iraqi parliament in March 2007. Drafted by the US administration in consultation with US oil corporations, it retained a fig leaf of national ownership but went much further than opening access to US corporations. It was to create a Federal Oil and Gas Council to control policy and planning as well as exploration and production contracts and it gives seats on the council to foreign investors. Big oil were thus to be given seats at the table that decides Iraq’s oil policy and adjudicates oil contracts.⁶⁵ In September, the legislative process collapsed as Iraqi parliamentarians fought over how to share the revenues that would remain to Iraq. But the agenda is carried through by other means. Oil corporations are now doing discrete deals with Iraqi factions signalling, in economist Paul Krugman’s view, the effective break up of Iraq.⁶⁶

Moreover, new discoveries are smaller in size, contain lower quality oil and are more often located in extreme environments than the earlier fields. Thus, Chad’s oil, brought on stream in 2004, still makes it into the category of ‘easy oil’ but is of such low quality that only two or three refineries in the world can process it.⁶⁷ The implication is higher costs and dirtier production at both wells and refineries while the EROEI is lowered

⁶⁵ See Juan Gonzalez, *Oil truth emerges in Iraq*, New York Daily News, February 21, 2007; Antonia Juhasz, *Whose Oil Is It, Anyway?* New York Times, March 13, 2007.

⁶⁶ Paul Krugman, *A surge, and then a stab*, New York Times, September 14, 2007.

⁶⁷ Low quality oil is more dense (thicker) and has a higher sulphur content. Refineries must ‘crack’ high density oils to make petrol and diesel, a process that is both energy intensive and highly polluting. A high sulphur content produces high SO₂ emissions at refineries or, if the sulphur is removed in compliance with environmental regulations, ever growing mountains of waste sulphur. Despite efforts to find new uses for sulphur, the market is already glutted.

all along the production line. In 1996, according to Heinberg, imported oil in the US had an EROEI of 8.4 compared with 30 in the 1970s and 100 for US produced oil before 1950 [2005: 138].

Unconventional oil

Third, the IEA sees production from unconventional oil growing from 2% to 8% of global production in 2030. This in itself is an indication of the peaking of regular oil and of the poor state of reserves under control of Western oil corporations. In contrast, the 1970s oil shock resulted in interest in unconventional resources, but very little production.

The oil deposits in Canada's tar sands and Venezuela's extra heavy oils are truly enormous. The problem is getting it out. Canada's tar sands have seen huge investments in the last five years and it is now producing 1 million barrels a day. Only 600,000 barrels of this is a low quality 'syncrude', the other 400,000 being bitumen. On current trends, the IEA sees this rising to 4.8 mb/d in 2030. To date, most of the extraction has been done by open cast mining of tar sands, creating pits some 80 metres deep and 7 kilometres wide, which is then 'washed' to separate the oil. Getting to the deeper reserves requires injection of super-heated steam to make the tar more liquid, separate it from the sand and then pump it up. Both processes are very energy intensive, yielding an EROEI as low as 1.5 in Heinberg's calculation [2005: 128].

The energy used for the process comes from Canada's rapidly declining gas reserves which are thus diverted from the future supply to heat houses and fuel electric generators. The Canadian Centre for Policy Alternatives (CCPA) notes that households in Alberta, where the tar sands are located, are already turning to dirtier coal for heating. In principle, the natural gas can be replaced by gasification of the tar sands themselves, but this further reduces the EROEI, is more expensive and more polluting. Substituting coal or nuclear power for gas is also being considered, according to Hirsch et al [2005], but will similarly increase the energy costs. South Africa's Pebble Bed Modular Reactor (PBMR) corporation is eyeing this market for its yet to be proven 'fourth generation' nuclear plant.

As it is, the pollution is intense. Carbon emissions of around 125 million tonnes threaten to break Canada's Kyoto commitments and are accompanied by severe sulphur emissions. Energy intensity is matched by the intensity of water use and waste. The water is drawn from an environment which is already drying out under the influence

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of climate change. The effluent and tailings ponds⁶⁸, up to 15 square kilometres and 50 metres deep, litter the landscape and “no one knows where [the toxics] go after that” [CCPA 2006: 31]. Scaling up production by five times does not present a pretty prospect.

Box 9: Third Worlding Alberta

CCPA sees Canada being turned into a peripheral energy province of the US. Both oil and gas are pumped south in ever greater quantities while North American Free Trade Area (NAFTA) rules subordinate domestic energy security and conservation to the demands of the larger US market. More specifically, the US sees Canada as a secure source of fuel for its imperial war machine. At the same time, the aggressive neo-liberalism of Alberta’s provincial government seems calculated to make a Third World enclave in the tar sands area: the oil corporations have been given major subsidies in tax and royalty breaks while labour unions are purposely subverted, environmental regulation trashed and local government is starved for funds for social services or even to maintain the infrastructure in the oil boomtown of Fort McMurray.

Venezuela’s sulphurous extra heavy oils are only marginally easier to extract. Existing projects, hitherto managed by big oil corporations, have recovered only 5% to 10% of the resource and production rates are slow. Technology developments could improve this but gains would be off set as the more accessible reserves are extracted. The IEA sees little development by 2030, with production rising from 100 to 400 thousand barrels a day [WEO 2006: 93]. This view is clearly informed by Venezuela’s inversion of the usual relationship between oil and social investment: in place of society subsidising oil production, oil is made to subsidise social investment. The IEA’s view was no doubt reinforced in February 2007 when President Hugo Chavez decreed that PdVSA, the state petroleum corporation, would take a majority stake in the heavy oil projects. In May, PdVSA took operational control as well.

Slow development obviously retards both social and environmental impacts although it is not clear that this is part of Venezuelan thinking. In 2006, Chavez requested that the heavy oils be included in OPEC’s official reserves. This would have lifted Venezuela from fifth place, based on its ‘regular’ oil reserves, to top of the OPEC

⁶⁸ The solid wastes settle out in the ponds.

reserve rankings ahead of Saudi Arabia. The request was refused but Venezuela is undertaking a certification process with the aim of securing the second ranking in 2008 and so boosting its OPEC production quota.⁶⁹ Heavy oils may secure the larger quota but seem unlikely to contribute much to filling it.

Box 10: Challenging empire

In stark contrast to Canada, Venezuela has articulated an explicitly anti-imperialist agenda and is loosening the ties of dependency. The US is still its largest market but it is cutting back exports to the US while expanding exports to China. In Chavez's view, "The United States as a power is on the way down, but China is on the way up. China is the market of the future."⁷⁰ Venezuela is also pursuing Latin American integration under the banner of the Bolivian Alternatives for the Americas (ALBA) as a direct challenge to the failing US agenda for an all American free trade zone.⁷¹

At the same time, Venezuela is loosening big oil's grip on its petroleum industry. ExxonMobil, BP, Total, Chevron and ConocoPhillips are now minority partners in existing Orinoco projects while PdVSA is entering new partnerships with state owned oil corporations, mostly from other Southern countries. Partnership deals with the China National Petroleum Corporation, Brazil's Petrobras, Cuba's CUPET, Iran's Petropars and Russia's Lukoil variously cover the certification of Orinoco reserves as well as exploration and extraction.

These South-South partnerships may yet upset the IEA's estimate of what is technologically possible in the absence of the traditional big oil corporations. Indeed, they reflect a deeper shift in the meaning of what constitutes big oil. Nine of the biggest 15 oil corporations are now state owned with Saudi Aramco topping the list ahead of ExxonMobil, according to Taylor [2007].⁷²

⁶⁹ Prensa Latina, 3 March 2007, at www.plenglish.com.

⁷⁰ Quoted in David Luhnow and Peter Millard, *How Chávez Aims to Weaken U.S.*, Wall Street Journal, May 1, 2007.

⁷¹ See the groundWork Report 2006.

⁷² The rankings may reflect exaggerated official information but the overall shift is real.

Gas

Gas is closely linked to oil. As noted above, it has replaced oil in applications such as heating and electricity generation and thus moderated oil demand in 2005 and 2006. It is also found in the same places and ‘associated’ gas is a by-product of oil production. Further, natural gas liquids (NGL), otherwise known as condensates, are produced from what McKillop calls hot greasy gas. In the US, such gas represents the tail end of production from otherwise depleted oil wells. NGLs now contribute over 11% of oil production (3.3 bb/y) and will rise to 13% (5.7 bb/y) in 2030 on the IEA’s figures.

Several big oil corporations are also constructing gas-to-liquid (GTL) plants using ordinary natural gas and the IEA sees annual production rising from just 50 million barrels to 1.2 billion in 2030. However, “much of the gas used by GTL plants is for the conversion process, which is extremely energy intensive” [WEO 2006: 113]. The EROEI, in other words, is dismal. In February, escalating development costs prompted ExxonMobil and Qatar Petroleum to abandon a joint GTL project. The partnership will instead supply gas to the domestic Qatar market.

Overall, on current trends, the IEA forecasts gas demand (excluding NGL) rising from 17 billion barrels of oil equivalent to over 29 billion⁷³ in 2030, with electricity generation accounting for the largest part of the growth. North America and Europe remain the largest consumers, with the US by far the largest single consumer. Most of it will be transported by lengthening pipelines as supplies close to the main markets are depleted. As the network expands across Europe and Asia, China will increasingly compete with Europe for Russian gas.

Piped gas is increasingly supplemented by liquefied natural gas (LNG) which can be shipped – although at a major cost in energy as LNG must be refrigerated to minus 176°C. Despite evidence that North American natural gas has already peaked, the IEA asserts that production will continue to expand although not enough to meet demand. Being isolated from the expanding pipe network in Eurasia, it assumes that US imports of LNG will “make good ... the shortfall” [WEO 2006: 120]. The US is now building five new terminals and has approved 12 more. Hirsch et al note that these plans, along with plans for other energy projects, are increasingly resisted by local organisations: “Public fears about LNG safety were heightened by an explosion

⁷³ WEO’s figures for gas are given in billion cubic metres. They are converted here to enable comparison with oil.

at an LNG liquefaction plant in Algeria that killed 27 people in January 2004” [2005: 35]. Meanwhile, the IEA itself remarks that “some productive activities have stopped or been shifted overseas, where gas prices and overall production costs are lower. The US chemicals industry, which relies heavily on natural gas feedstock, has contracted sharply in recent years” [WEO 2006: 293]. This seems something short of ‘making good the shortfall’. It also indicates the movement of energy intensive dirty industries to locations where the energy is available, mostly in the global South.

According to the IEA, the growing global demand for gas can be met by existing reserves, not including new discoveries, for 40 years. It also remarks that gas is preferred on environmental grounds because it has a lower carbon intensity than oil.

Both these conclusions are contested by McKillop [2006]. First, gas reserves are overstated in the same way that oil reserves are. Russia, supposed to have the largest reserves, is having difficulty maintaining production. Second, peak oil is provoking a sharp increase in gas-based oil production. Third, “the loss rate is increasing much faster than production.” As long as oil is more valuable than gas, ‘associated’ gas will be vented, flared or re-injected into the well unless there is an infrastructure to gather it. Gas is also a by-product of NGL production and is similarly vented or flared in the absence of a gas infrastructure. In both cases, the proportion of gas to oil increases as the oil reserve is depleted. On the World Bank’s estimate, gas equivalent to 943 million barrels of oil is currently flared every year. Constructing the infrastructure to gather this gas takes time and money and oil production will wait for neither because investors want their return. Finally, natural gas is prone to leaking and the scale of losses will grow faster than the infrastructure. Larger storage at the market end will leak more as will the lengthening pipelines tapping ever smaller reserves in increasingly harsh environments. Meanwhile, the costs of maintaining production and infrastructure will spiral.

McKillop concludes that gas depletion is happening much faster than assumed and those who hope that gas will provide a ‘bridge’ to a clean energy future will find the bridge collapsing. And while gas burns cleaner than oil, the scale of losses undermines the environmental claims. Flaring releases millions of tonnes of carbon dioxide while venting and leaks release methane which is twenty times more powerful as a greenhouse gas.

Coal

Overall, the IEA puts global coal demand in 2004 at 5.5 billion tonnes, equivalent to 20 billion barrels of oil, and rising to 8.8 billion tonnes, over 32 billion barrels of oil equivalent, in 2030.

As with gas, coal prices are dragged up by the high oil price. ‘Steam’ coal competes with both oil and gas for electric power generation and for industrial process heat. In addition, coal-to-liquid (CTL) and coal gasification for chemical production or for use as gas becomes more competitive at higher oil and gas prices. As with unconventional oils, the 1970s oil shocks provoked interest in CTL but projects collapsed as crude oil prices crashed in the 1980s. The exception was Sasol’s construction of the Secunda CTL plants which was driven by apartheid South Africa’s increasing international isolation.

The IEA does not see major growth in CTL. Rising coal prices off set rising oil prices and the plant cannot be viable unless it sits on top of a very large cheap coal reserve. Capital costs are exorbitant, at about \$5 billion (without CCS), compared with \$2 billion for GTL, for a plant producing 80,000 barrels a day. The process is even more energy intensive than GTL and carbon emissions are astronomical. The IEA does not mention the intensity of pollution from other emissions such as sulphur dioxide or the intensity of water use and pollution.

Farrell and Brandt [2006] believe the IEA underestimates the likely use of all synfuels including CTL, GTL and syncrude from oil sands and extra heavy oils. Hirsch et al [2005] positively advocate a major CTL building programme in the US in anticipation of peak oil. Sunita Dubey of groundWork reports that at least nine CTL plants are now being planned in the US and the industry, including Sasol, is lobbying hard for subsidies to support building the industry to produce around 2.6 million b/d by 2025. Sasol says it is waiting for subsidies to be legislated before developing plans. Its plans in China are further advanced with two 80,000 b/d plants on the cards.

Electricity generation is the biggest consumer of coal. On current trends, the IEA sees electricity consumption doubling between now and 2030 and coal increasing its share of production from 40 to 44%. In the Alternative Scenario, electricity consumption rises less steeply and coal’s share is reduced to 37%. This accounts for most of the reduction in coal use as compared with the Reference Scenario – but there is still an absolute increase in the amount of coal burnt for electricity. Energy efficiency in

buildings and appliances accounts for the slowdown in demand growth but is partially off set by increased use of electricity in transport – either public transport or electric / hybrid cars. Peak oil would certainly accelerate such a shift. Public transport is in itself desirable to reduce overall energy use in transport. If it is powered by electricity from coal, however, the benefit will be compromised. High coal demand also reflects high demand for commodities in general. Demand for coking coal, used mostly in steel making, thus rises alongside steam coal.

Despite massive coal reserves, enough for 155 years at current production according to the IEA, supply lines are stretched and new coal is harder to mine. The US holds the largest reserves but has started importing because of increasingly high mining and transport costs. China has now overtaken the US as the biggest producer and consumer. The IEA sees its substantial exports growing but admits some doubt that its production will keep pace with its own consumption. In that case, it too will become an importer. This appears to have already happened. India, the third largest consumer, similarly holds major reserves but is already importing large amounts of coal. World trade goes from 619 to 975 million tonnes in 2030, implying very large infrastructure construction. Major exporters, including South Africa, are expanding railways and ports to handle bulk exports.

Coal is the dirtiest of the fossil fuels and has the highest carbon density. ‘Clean coal technologies’ are now being promoted to justify the continuation of the industry in the context of climate change. Carbon capture and sequestration (CCS) is the main hope. This involves separating carbon from the emissions stream – leaving other pollutants to go their way unless separately scrubbed – and injecting it into deep geological strata or the ocean. The ocean has already absorbed an overload of carbon dioxide and is consequently becoming more acid. This is already affecting the reproduction of krill, the foundation of the ocean food chain, and so threatens to collapse fisheries. Risking accelerated acidification through ocean sequestration thus seems like a really bad idea.

That carbon dioxide will stay where it’s put in geological strata is also uncertain and is possible only in particular geological formations. Initial mapping by the IPCC [2005] indicates that such formations do not necessarily coincide with the location of power plants and other big industrial emitters. In South Africa, for example, the best prospects are on the west coast, the other side of the country from the carbon intensive power and CTL plants. Wakeford bluntly asserts that “South Africa does

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not have the requisite geological conditions for subterranean carbon storage” [2007: 7]. Many other industrial regions would need to construct 300 kilometre pipelines to take the carbon dioxide to suitable locations. A peculiarity of the CTL process is that it already separates out carbon and so makes capture relatively easy. Adopting CCS, whether or not it actually works, therefore requires the additional costs of injecting it. Power stations would, in addition, have to separate the carbon dioxide which is very costly both in terms of energy and money and so produces even more carbon to be sequestered.

CCS technology is derived from the oil industry. Injecting carbon dioxide into declining wells is part of the established technology of enhanced oil recovery. In Australia, Anglo American is planning a 200 kilometre pipeline to pump carbon dioxide from a synfuel and power project into a depleting oil field. Sequestration was necessary to get regulatory approval for the project which is based on very dirty and carbon intensive brown coal.⁷⁴ Most of this carbon dioxide will come back out with the additional oil, and that oil will end up as additional carbon which cannot be sequestered if emitted from vehicles.

CCS is not recognised under Kyoto so carbon credits cannot be claimed but the pressure is on to change this. CCS has long been pushed by the US and corporations to avoid cutting fossil fuel use. Europe is likely to join the clamour in order to meet its own unilateral target to cut carbon emissions by 20% by 2020. European power generators anticipate that they will be required to implement CCS. This puts the coal industry in a quandary. On the one hand, it has promoted CCS as a response to climate change. On the other, it is concerned that the cost will wipe out coal's price advantage and generators will turn to nuclear instead.⁷⁵

⁷⁴ See Creamer's Mining Weekly, March 16-22, 2007.

⁷⁵ See Creamer's Mining Weekly, March 16-22, 2007.

Box 11: Clean coal costs

Considering the costs of ‘clean coal’, Anglo American’s Roger Wicks comments:

As a coal company, we are going to need investor support for the pursuit of long-term investment in new technologies that may be more costly and may not deliver early returns. That is going to require an enlightened shareholder body.⁷⁶

As financial capital has become ever more ruthless in pursuit of rapid returns, it seems questionable that such shareholders will be available to any corporation, let alone across the industry. More likely is pressure to create a façade of carbon rectitude while gaming the system.

Nukes

The IEA sees a modest expansion of nuclear power generation in the Reference Scenario and a much greater expansion in its Alternatives Scenario. This is justified both in the name of diversifying supplies and so enhancing energy security and of reducing carbon emissions. The claim of carbon savings is widely disputed, however. Nuclear energy does not emit carbon from the generating plant but the full cycle of production is both energy and carbon intensive. Heinberg [2005] argues that, in energy terms, nuclear has been subsidised by cheap oil just as it has been subsidised economically by governments for (usually unacknowledged) military reasons.

The IEA says uranium deposits are plentiful and widely distributed. At current usage, this may be the case. A world wide turn to nuclear would, however, soon test the limits of supply and production. Again, this is not just about whether or not there is uranium in the ground, but how fast it can be extracted and processed to supply a greatly expanded industry. At present, the world’s 443 nuclear power stations consume 68,000 tonnes. Only 40,000 tonnes comes from mining. The rest is supplied from decommissioned Russian warheads which will be used up by 2013 – or earlier if Russia decides to hang on to the weaponry.

The mining industry has been prone to disaster. In October 2006, the Cigar Lake mine in Canada flooded with groundwater. This is a new mine still under construction

⁷⁶ Quoted in Creamer’s Mining Weekly, March 16-22, 2007.

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by Cameco, the world's leading uranium producer. It was advertised as the world's largest undeveloped uranium deposit and expected to supply 10% of world demand from 2008. Cameco now says it will bring the mine into production in 2010,⁷⁷ but the feasibility of the project is in doubt. The scale of groundwater contamination is as yet unknown but remediation plans involve pumping it out to the surface.⁷⁸ Short of disaster, miners are routinely exposed to radiation while mine tailings leave a radioactive legacy for tens of thousands of years.

In addition to fuel production, nuclear construction is enormously costly in energy, carbon and money – with a history of over-running large budgets by three times or more⁷⁹ – and again in the disposal of waste and in the final decommissioning. Taking account of the full nuclear cycle therefore substantially lowers the EROEI of nuclear and destroys its carbon claims. The Eco-Institute in Darmstadt, Germany, calculates that a 1,250 MW nuclear power station in Germany emits 33 grams of CO₂e per kWh, amounting to 250,000 tonnes per year. Carbon emissions are higher for lower grades of uranium ore: for grades between 0.1% and 1%, CO₂e emissions are 120 grams/kWh.⁸⁰

The last step, decommissioning and disposing of high level nuclear wastes has a particular significance. First, no satisfactory solution has been found for either. Second, in a post-peak oil context, decommissioning will compete with other resource demands and may simply be beyond the capacity of a declining energy system. Nuclear power will then leave an irredeemable toxic legacy to future generations. Economist David Fleming calculates that, by 2020, it will take more energy to clean up nuclear sites and deal with their wastes than the whole nuclear industry will be able to generate from the remaining uranium ore [cited in Heinberg 2007: 7].

Nuclear power claims an above average safety record because it is tightly regulated. This is partly achieved simply by secrecy. Many incidents at nuclear plants have come to light years after the fact. Even if it were true, the claim does not address the real

⁷⁷ See Cameco web site at cameco.com.

⁷⁸ Almost all internet comment is by investment touts who talk up the investment opportunity in uranium created by the disaster. See, for example, Energy and Capital web site.

⁷⁹ A Greenpeace review of nuclear construction shows that 75 US reactors “were predicted to cost \$45bn but the actual cost was closer to \$145bn.” Indian costs have similarly run 300% over budget. See Terry Macalister, *Nuclear power a ‘dangerous distraction’ says Greenpeace*, Guardian UK, May 3, 2007.

⁸⁰ http://www.precaution.org/lib/nuke_ghg_emissions.060224.pdf

issue that a single incident can be catastrophic. The 1986 melt down of the reactor at Chernobyl in Ukraine spread radioactive fallout across Europe. “Over 2,500 people have subsequently died from radiation related diseases, while Ukraine and Belarus health authorities have reported that many thousands of children suffer from leukaemia and genetic disorders” [Fig 2005: 86]. The area surrounding the plant is effectively sacrificed for ever. The multiplication of plants around the world clearly increases the risks of catastrophic failures.

Finally, the proliferation of nuclear power cannot be dissociated from the proliferation of weapons. The Non-Proliferation Treaty (NPT) has been discredited and now appears as a tool for maintaining the military advantage of the great powers and their allies. The US has abrogated its own obligations under the treaty, supported Israel’s nuclear capacity in defiance of the treaty, and used the treaty as a diplomatic weapon against Iran.⁸¹ In this context, it has proposed a Global Nuclear Energy Partnership which is little more than a move to take control of the world’s nuclear supply chain.

Big Hydro

Large dams currently supply about 16% of the world’s electricity, according to the IEA. This share of supply drops to 14% in the Reference Scenario but remains at 16% as more big dams are built to keep pace with the overall increase of power supply in the Alternatives Scenario. The IEA claims that less than one third of potential hydro power has been exploited with most of the potential in developing countries. It shows the largest potential expansion in Africa. It also repeats the common assumption that big hydro has low carbon emissions: “In Brazil ... where more than 80% of electricity is hydropower, the power sector accounts for just 10% of the country’s CO₂ emissions, four times less than the world average” [WEO 2006: 142].

This claim omits the very large carbon emissions associated with dam construction and even larger emissions of methane from rotting submerged vegetation. This is just the beginning of the social and environmental impacts. As noted in the introduction, the 45,000 big dams already built have had a major impact on earth’s fresh water hydrology. They have also forced the removal of over 100 million people worldwide and submerged their most productive river valley fields. Not surprisingly, they have provoked massive resistance and are routinely accompanied by heavy state repression.

⁸¹ See The groundWork Report 2006: 159 ff.

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Big dams are the ‘economic hit man’s’ project of choice. The economic benefits are invariably overstated while the costs understated – even when the cost to those dispossessed is ignored. Thus, the crisis of surplus petrodollars in the 1970s led to a massive round of dam building to the benefit of corrupt Northern banks, construction corporations and Southern elites while the debt burden was mostly imposed on ordinary citizens through such instruments as structural adjustment programmes.

Many of the east and southern African countries now produce most of their electricity from hydro. The supply, however, has proved erratic as the regular droughts in the region cut the flow of water. Climate change will exacerbate this vulnerability. Tanzania relies on hydro for nearly 90% of its electricity. In 2005, drought cut capacity from this source from 559 MW to 120 MW⁸² and resulted in widespread outages. In Uganda, the priority given to power production at the Nalubaale Dam⁸³ has resulted in over-use of water from Lake Victoria and lowered the lake’s level. The World Bank has now approved a \$360 million loan package for the construction of the Bujagali Dam downstream of Nalubaale. Hydrologist Daniel Kull comments that the Bank’s studies ignored the “true damage done to Lake Victoria by the existing dams and follows with a selective and optimistic view of current lake levels and possible climate change impacts”.⁸⁴

Biofuels

There are two basic forms of biofuel: ethanol is an alcohol produced from just about any plant matter to blend with, or substitute for, petrol; biodiesel is produced from vegetable oils. Biofuels are heavily advertised as a renewable fuel source and carbon neutral because the carbon emitted when burnt is supposed to equal the carbon absorbed during the plant’s growth. This may be so where they are produced from recycled cooking oils or, on a small scale, from organic agriculture. It is certainly not so where the agriculture is itself energy and carbon intensive, besides being a major polluter, and the scale of production threatens food security.

Production has more than doubled since 2000, largely driven by high oil prices and concerns over energy security but justified also by the supposed climate benefits.

⁸² Republic of Tanzania web site: The Economic Survey 2005.

⁸³ Originally the Owen Falls Dam on the Nile just below Lake Victoria. British colonial engineers blasted out the lip of Lake Victoria, so turning the whole lake into a reservoir subject to the management regime at the dam.

⁸⁴ International Rivers Network (IRN) press release, April 26, 2007. See also Kull 2006.

Nevertheless, biofuels presently account for less than 1% of liquid fuels for transport (20 Mtoe⁸⁵). By 2030, this will rise to 4% (92.4 Mtoe) in the WEO's Reference Scenario and to 7% (147 Mtoe) in the Alternative Scenario.

Brazil has been the industry leader, developing ethanol production from sugar following the 1970s oil shocks. The subsequent fall in oil prices squeezed the industry but it was maintained through compulsory blending of fuels. Production is now at new highs. Brazil supplies around 14% of domestic fuel from ethanol and is the world's leading exporter. Massive expansion of ethanol production from maize in the US, motivated primarily by national energy security, accounts for most of the growth in world production. The US has recently overtaken Brazil as the largest consumer and producer of biofuels, consuming around 15% of the maize crop but producing only 1% of US liquid fuel demand. Production is set to double by 2008 but, even if the whole maize crop were used, biofuels could provide only 7% of US demand, according to Pimentel et al [2007]. The industry is made viable only by heavy subsidies to ethanol production, on top of the extravagant subsidy of US industrial agriculture, supplemented by tariff protection. Together, the US and Brazil produce 80% of biofuels, prompting the US to propose, in February 2007, a biofuel partnership.

Biodiesel accounts for only about 15% of biofuels. Europe is the main centre of production and consumption. It has more than tripled output since 2000 and also become the largest importer as it chases a European Union target of 20% biofuels in the liquid fuel mix by 2020. The expansion is ostensibly motivated by climate concerns but the timing, as well as the dubious nature of environmental claims, indicates that energy security and agricultural policy are the real drivers. For Britain to meet the EU's target, however, "would consume almost all our cropland" [Monbiot 2006: 158]. The whole of Europe will not do much better so the policy implies a heavy reliance on imports from Southern countries where land and labour are cheap.

The claim that biofuels reduce carbon emissions assumes a positive EROEI: fossil fuel inputs in agriculture and in the production process must be less than the energy content of the biofuel. A study cited by the IEA supports this claim, but Pimentel et al [2007] show that this study⁸⁶ does not take account of the full range of energy inputs. Taking all farming, ethanol production and marketing energy inputs into account, they find that US production of maize ethanol requires "43% more fossil energy than the energy

⁸⁵ Million tonnes of oil equivalent.

⁸⁶ The study in question is Farrel et al 2006 in *Science*, 311: 506-508.

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produced as ethanol”. If wastes can be turned into by-products, this would be reduced to 28%. Tropical sugar has the best EROEI but it is still negative in their view. The IEA notes that Brazil uses bagasse (sugarcane stalks) for ethanol production energy, so lowering the fossil fuel input. This, however, is at the cost of recycling nutrients to the soil and so implies more fertilisers produced from fossil fuels. Biodiesels, according to Pimentel & Patzek [2005], also show negative energy returns.

The carbon equation does not end with the energy equation. Soil is a major carbon ‘sink’ – that is, it absorbs carbon from the atmosphere. Industrial agriculture destroys this function as heavy machines compact soils while agricultural chemicals kill the microbes that give structure and life to soil. The effect will be to reinforce one of the feed-back loops created by global warming. Higher temperatures are expected to convert soil from a major sink to a major source of carbon dioxide. Journalist George Monbiot notes that this reversal “was not supposed to happen for several decades but in 2005 British scientists reported that soils in England and Wales had already become carbon sources” [2006: 10]. Meanwhile, the conversion of land to industrial agriculture results in a massive loss of carbon to the atmosphere. European demand for biodiesel is driving a rush into palm oil production in Malaysia and Indonesia. Natural forests are being cleared and peat bogs drained on a very large scale to make way for industrial palm plantations which scarcely begin to compensate for the carbon losses caused by the clearance.⁸⁷ Brazil claims abundant land for development of biofuel crops to feed 100 more sugar plants by 2010 as well as new biodiesel plants, the expansion being supported by the National Bank for Social and Economic Development.

This conversion of land use is associated with dispossession. The Brazilian land movement, Movimento Sem Terra (MST), notes that it gives new intensity to established patterns of rural dispossession, gross exploitation of labour and environmental destruction associated with sugar throughout its history. In a joint statement with social movements from other Latin American countries, titled *‘Full Tanks at the Cost of Empty Stomachs’*, they denounce the proposed ‘biofuels partnership’ between the US and Brazil as part of a US geopolitical strategy to counter Venezuela’s influence in the region. The proposal also supports the interests of Northern transnational gene and agribusiness corporations. Biofuels have created the basis for novel partnerships between agribusiness, big oil and motor corporations and now “represent an important

⁸⁷ George Monbiot, *The most destructive crop on earth is no solution to the energy crisis*, The Guardian (UK), December 6, 2005.

source for the accumulation of capital”.⁸⁸ Brazil’s role “would be to provide cheap energy to rich countries which would represent a new phase of colonisation”.⁸⁹ Friends of the Earth Brazil similarly comments that the country will have to “choose at some point between feeding its population, or cars and machines worldwide” [2006: 7].

In May 2007, a group of African NGOs responded to Britain’s proposed Renewable Transport Fuel Obligation (RTFO) which sets out biofuel targets.⁹⁰ They note that their response is uninvited because the consultation process is restricted to Britain but that meeting the targets implies large scale land conversion in Africa. Already, the Ugandan government plans to give over 7,000 hectares of the 30,000 hectare Mabira Forest, a reserve area, to sugar corporations interested in ethanol. The forest is part of a people’s commons, contributing to the livelihoods of over a million people who draw on it for water, firewood, honey, mushrooms and materials for making baskets. Ironically, it also conserves the Lake Victoria catchment adjacent to the Nalubaale and proposed Bujagali dams and its preservation was agreed as necessary to optimising the new dam’s performance. Opposition to the give-away is intense and demonstrations in Uganda during April 2007 have been accompanied by a police crackdown and rioting. In October, government reportedly backed down, saying it was committed to conserving Mabira.⁹¹ Elsewhere in Uganda, palm oil plantations are displacing forests while Benin is planning a major expansion of palm oil in peat bogs.

More broadly in Africa, the potential use of cassava for ethanol poses “an especially grave threat to the food security of the world’s poor,” according to agricultural economists C. Ford Runge and Benjamin Senauer [2007]. It is the staple “for over 200 million of Africa’s poorest people ... the food people turn to when they cannot afford anything else” and a reserve against the failure of other crops. Higher cassava prices will certainly be advertised as benefiting peasant producers but, the authors note, “the history of

⁸⁸ Statement by organisations and social movements of Brazil, Bolivia, Costa Rica, Colombia, Guatemala, and the Dominican Republic, gathered at a forum on the expansion of the sugarcane industry in Latin America, February 28, 2007. Available at www.mstbrazil.org.

⁸⁹ Edivan Pinto, Marluce Melo and Maria Luisa Mendonça, *The Myth of Biofuels*, posted at www.viacampesina.org and www.mstbrazil.org, March 13, 2007.

⁹⁰ Response to UK Department for Transport Consultation On the Draft Renewable Transport Fuel Obligation, from: Africa Biodiversity Network, Kenya; Melca Mahiber, Ethiopia: Envirocare, Tanzania; Climate and Development Initiatives, Uganda; Nature Tropicale, Benin. May 2007.

⁹¹ See Hussein Bogere, Emmanuel Gyezaho, Mercy Nalugo & Zurah Nakabugo, *MPs Arrested*, The Monitor (Kampala), April 17, 2007; International Rivers Network, *Fast Facts on Mabira Forest, Uganda*, April 17, 2007; Fred Pearce, *Biofuel plantations fuel strife in Uganda*, New Scientist, April 19, 2007; Xan Rice, *Uganda ‘averts tragedy’ with reversal of decision to clear virgin forest for biofuel*, Guardian, October 29, 2007.

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industrial demand for agricultural crops ... suggests that large producers will be the main beneficiaries.” The African NGO group is similarly concerned that dispossession and the privatisation of common lands, along with environmental degradation, will follow from large scale biofuel mono-cropping. They argue that biofuels will be sustainable only within diverse farming systems controlled by local people and “produced for household, local or domestic use, in order to meet the energy needs of the poor” rather than the demands of export markets constructed “as a quick-fix replacement to fossil fuels”.

Meanwhile, the United Nations Conference on Trade and Development (UNCTAD) has established a Biofuels Initiative, the ‘beneficiaries’ of which include Uganda along with Brazil, India, Mozambique and the Philippines. According to the rationale, biofuels will promote rural development and reduce carbon emissions while financing will be accessible through the Clean Development Mechanism (CDM) of the Kyoto Protocol.⁹²

Environmentalism Lester Brown calculates that, “The grain required to fill a 25-gallon SUV gas tank with ethanol will feed one person for a year.” The expansion of US biofuels in 2006 doubled the price of maize, which in turn dragged up wheat and rice prices and pushed up feed costs to raise meat, dairy and egg prices. Because the US dominates world grain trade by virtue of farm subsidies – which have precisely that intention – US prices set world prices. In Mexico, the price of tortillas went up 60% and millions faced the prospect of empty stomachs. In February 2007, 75,000 workers and peasants took to the streets of Mexico City in protest and extracted a promise of price controls on maize products from the government.⁹³

Journalist John Ross notes the deeper roots of Mexico’s food crisis. The North American Free Trade Agreement (NAFTA), signed in 1994, subjected Mexican peasant farmers to direct competition with US corporate agriculture which receives “up to \$21,000 an acre in subsidies from the US government, enabling them to dump their corn over the border at 80 percent of cost.” In consequence, six million peasant families have been forced from their land and joined the stream of migrant labour. NAFTA also enabled US corporates, in partnership with Mexico’s dominant firm, to take control

⁹² The BioFuels Initiative of UNCTAD at www.unctad.org.

⁹³ Brown, L. *Supermarkets and service stations now competing for grain*, Eco-Economy Update, July 13, 2006, and *Massive Diversion of US Grain to Fuel Cars is Raising World Food Prices*, Eco-Economy Update March 21, 2007 at www.earth-policy.org.

of distribution and retailing. They are now aiming for control of the seed market. Maize originates in Mexico and peasant farmers have developed hundreds of varieties adapted to local environments. The need to protect the genetic resource, combined with passionate resistance founded on the near mythic status of maize, has led to a ban on planting genetically modified seed although there is already widespread contamination from imported grain. The corporations are using the present crisis to press their case for the lifting of the ban on the spurious argument that “bio-tech is the only solution to growing more corn and keeping the tortilla affordable”.⁹⁴ The corporations are in fact developing genetic modifications to enhance biofuel production.

High food prices are not only driven by biofuels. Australia is the second biggest wheat exporter after the US. The longest and worst drought on record has collapsed production in the Murray River basin. Independent of climate change, industrial agriculture is undermining its own resource base, resulting in the global loss of 5 to 7 million hectare every year from land degradation and another 1.5 million hectare from water-logging and salination, according to the Food and Agriculture Organisation (FAO).⁹⁵

Renewables

‘Other’ renewables – wind, solar, ocean, geothermal – are the fastest growing energy sector, according to the IEA, but off a very low base. In 2004, they produced around 0.6% of global energy supplies and by 2030, will produce only 1.7% in the reference scenario or 2.4% in the alternative scenario. Renewables have a greater share of electricity generation: 2% in 2004 and 7% (reference) or 10% (alternative) in 2030. Most of this growth is concentrated in the global North. Overall then, renewables remain a marginal niche market in the official future.

For environmentalists, such forecasts reflect the energy establishment’s intense hostility to renewables. While fossil fuels benefit from immense subsidies from the World Bank and national states [see Box 12 below], renewables have generally been discriminated against. Thus, former World Bank President James Wolfensohn thought them an interesting option but “we also have to remain realistic: renewable energy is expensive” [quoted in Simms et al 2004: 20]. The New Economics Foundation (NEF) responded

⁹⁴ John Ross, *The Plot Against Mexican Maize: Big Biotech Takes Advantage of Corn Crisis to Force Farmers to Buy GM Seeds*, Independent, February 22, 2007.

⁹⁵ Sam Burcher, *FAO promotes organic agriculture*, Institute of Science in Society press release, September 10, 2007, at www.i-sis.org.uk.

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that this view “reflects the interests of the Bank’s major donors’ fossil fuel industries.” Further, oil, coal and gas are used to catch poor countries “in a nexus of dependency relationships with other nations, multilateral donors, and foreign companies” [Simms et al 2004: 23]. Renewables are dangerous to this establishment because they offer poor countries and, more particularly, poor people a potentially autonomous energy supply and the possibility of throwing off the shackles of dependency.

It does not follow from the NEF’s argument that renewables can replace fossil fuels to maintain profligate consumption by industry and the world’s rich. The opinion of environmentalists is sharply divided on this issue. Leggett argues that renewables can produce enough energy to meet the global “demands of 10 billion people wasting energy at the level your average wasteful European does today ...” [201]. This includes not just enough electricity but also enough hydrogen⁹⁶ to replace petroleum fuels for transport.

The more immediate problem, in the perspective of peak oil, is the transition from fossils to renewables. Building a renewable systems and infrastructure will take time and consume vast amounts of energy which is not presently available from renewable sources. In other words, a renewable future needs an energy subsidy from fossil fuels to get started and, past peak, that subsidy will not be easily available. Leggett therefore sees a period of chaos followed by the explosive growth of renewables. A massive programme of energy conservation and efficiency will ease the transition. In the meantime, people should mobilise to persuade governments and corporations to start the switch now. Every new investment in fossil energy is not only a commitment to future carbon emissions but also a misdirection of resources.

Many environmentalists, mostly but not exclusively Northern, share a basic assumption with Leggett: preventing runaway climate change must be achieved within the present order of power – that is, within the context of capitalism and economic growth. Time is now so short that the powers must be persuaded to a heroic international effort, equivalent to war time mobilisation and combining the resources of nation states and corporations. They must be persuaded that renewables can keep the world economy powered up for growth. Alternatively, they must be persuaded of other means to

⁹⁶ Hydrogen, like electricity, is an energy carrier. It can be produced from any energy source but the process is very energy intensive. It can be used to store energy or to drive vehicles. However, it takes up a lot of space and compressing hydrogen incurs further energy costs.

reduce carbon emissions.⁹⁷ Popular mobilisation is necessary, although often neglected in favour of lobbying, to push the powerful to action. But this mobilisation itself is possible only if people believe that the conditions of modernity can be sustained, that the lifestyles they enjoy or aspire to will remain substantially intact.

Against this, many environmentalists and most peak oil analysts do not believe renewables can come close to replacing the flow of energy from fossil fuels. While renewables can be and must be expanded, along with a massive drive for energy conservation, the overall energy supply will contract and it will not be possible to sustain economies based on growth.

Renewables include a very wide range of technologies and energy sources and the definition of what is or isn't renewable is contested. From Britain to South Africa, countries that have adopted renewable energy targets include biofuels, landfill gas and big hydro in their definitions of renewable. South Africa even likes to imply, without quite saying so, that nuclear energy is renewable. Paul Mobbs [2005] distinguishes between low carbon energy, including biofuels, biomass and biogas, and renewables that use natural flows of energy ultimately derived from the sun or from gravity, including solar, wind, hydro, wave, ocean current and tidal energy.

For practical purposes, low carbon technologies are renewable if they are founded on sustainable production systems. In industrial contexts, most are not. As noted above, industrial production of biofuels scarcely qualifies even as low carbon. Similarly, biogas from waste dumps is being heavily promoted by governments and the World Bank. Landfill gas is produced from the accumulation of gasses from rotting organic matter over the life time of the dump and a portion of the gas can be captured by drilling the dump in much the way that energy companies drill for natural gas. The gasses are toxic, so this might qualify as a way of mitigating the consequences of historic unsustainable waste management but is more often used to justify its continuation. In contrast, biodigesters can capture all the gas from sewage and organic matter before it becomes a pollution problem. Burning the gas for energy produces carbon dioxide emissions but saves on the more damaging methane emissions inevitably produced by organic matter as it decomposes. Biodigesters also produce compost (energy in a different form) while water used through the system can easily be recycled using ordinary

⁹⁷ Monbiot [2006] argues for CCS because he does not see renewables satisfying energy needs. In our view, it is questionable that CCS will do the job (see Sasol's CTL scenarios in Chapter Four).

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purification measures. However, they would require a thorough transformation of waste management and scarcely register in the official energy future.⁹⁸ Firewood is the primary fuel for the rural poor in the global South and the carbon account is balanced if new trees are grown to replace what is burnt.

Renewable energy resources are abundant and free but, in contrast to fossil energy which is very dense, renewables are diffuse or 'thin'. This means that only a small fraction of the potential can be used in practice. Some, but not all, renewables are also limited because they are intermittent sources of energy and they therefore need backup from more constant supplies or from storage. Renewables may produce heat energy – as with solar water heaters – or be converted into another usable energy, usually electricity. Given the monetary subsidy to fossil fuels, renewables have competed on unequal terms but, with rising fuel prices, they become more competitive. The costs of a number of technologies are also falling as production is scaled up. Wind energy is now more or less competitive with conventional power in many countries and new innovations are reducing the very high costs of solar photovoltaic (PV) power. In contrast to fossil fuels and nuclear energy, both of which are likely to face rising fuel costs in the future, the costs of production from many renewable systems falls over time because the energy source is free. Nevertheless, if renewables must provide the energy “to make and operate” the renewable system itself – including mining and manufacturing – the EROEI declines and “in some [not all] cases is negative”, according to renewable energy researcher Ross McCluney [2005: 161].

There are also environmental limits to renewables. They do incur environmental costs, starting with mining but also in their operation. Solar PV panels contain metal toxins which will require sophisticated waste management starting with the design of panels to enable safe recovery and re-use. For most other renewables, the issue is one of scale. Small scale and dispersed systems have a negligible impact but, if they are scaled up to replace a major portion of fossil energy, the impacts will be substantial because they draw energy from the natural system. Thus, a large tidal dam has had a severe impact on an estuary in northern France, large wave systems will cause coastal erosion and may affect marine life sensitive to noise, large ocean current systems will slow and may divert the current, very large wind farms have been shown to affect local climates although this impact does not begin to compare with fossil fuel impacts.⁹⁹ In short, concentrated large scale production from most systems will likely become

⁹⁸ Small-scale biodigesters are widely used in rural China and India. There are also a very few large-scale biodigesters. The City of Stockholm, for example, runs its busses and municipal vehicles off the gas.

⁹⁹ Kate Ravilious, *Weather hots up under wind farms*, NewScientist.com, November 4, 2004.

as controversial as big hydro which is, in Mobb's technical definition, also renewable. Yet it is precisely such systems which tend to be favoured by national states and big corporations. The Tyndall Centre, a British climate change think tank, observes that:

The existing regulatory system for electricity distribution operates within the paradigm of centralised generation and one-way flow of electricity from large power plants to users. The 'passive' user has co-evolved with such a supply system. [2005: 73]

The implication is not only that the national grid is designed on the assumption of a few big power sources but, more importantly, the system embodies the concentration of political and economic power. It is also extremely wasteful. Heat losses from central power plants combined with losses from long distance transmission through the grid means that less than 40% of the primary energy used to fuel the generator ends up as useful energy. A growing body of environmentalists therefore advocate decentralised energy systems based on numerous micro-generators producing electricity for localised minigrids and heat where it will be used. In this way, districts and even households would produce a surplus and the surplus from the minigrid would feed into the national grid. In the Tyndall Centre's view, it could also "stimulate new user/consumer identities as awareness of energy per se, and of sustainable energy in particular, rises" [74].

Modelling done for Greenpeace [2006] shows that Britain could decentralise 75% of power generation while meeting projected growth in energy demand. New centralised generation for the grid would come from large wind farms. Most of the new local capacity would come from gas fired combined heat and power (CHP) plants supplemented by local renewables primarily in the form of PV. The model shows reduced costs, reduced fuel consumption and reduced carbon emissions by 2023. It also claims greater security of supply because the system is less vulnerable to the failure of very large generators or sections of the national grid. Renewables would provide 25% of electricity by 2023, compared with 5% now, but the whole system remains heavily dependent on gas. In consequence, as Monbiot [2005] observes, such a system cannot meet the need for radical carbon reductions while still providing for economic growth.

Energy decentralisation relates to a wider set of demands. In the North, a variety of social movements call for 'localisation' and an end to dependency on the plunder from

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the South. Originating in environmental and local democracy movements, they are increasingly energised by peak oil. In the South, movements of resistance to corporate plunder call for local 'resource control'.¹⁰⁰ In the peak oil perspective, localisation is likely to be forced by declining oil production. Renewable energy is then a matter of survival and there can be no assumption of economic growth. Mobbs observes that "when you cut your energy consumption by 75% renewable energy options become far simpler ..." Moreover, the term 'energy poor' will lose its meaning in a future where none are energy rich because "the amounts of energy will not be as relevant as the extent to which people can control and operate their own energy systems" [2005: 172, 173].

The use of small scale and dispersed renewables is thus linked to local and democratic control of production because, unlike fossil and nuclear fuels, they do not require centralised corporate empires to manage them. We will return to this in Chapter Five. In the present, however, the democratic potential associated with renewables does not mean that they cannot or will not be managed by corporate empires. Indeed, several of the oil supermajors, including BP and Shell, are already established as leaders in the renewable energy field. They are widely criticised for co-opting renewables for corporate greenwash because their investments in renewables are dwarfed by their fossil fuel investments. Nevertheless, their deep pockets give them a leading role in defining renewable technology options and business models to centralise profits even from decentralised plant. Nor does local necessarily mean more democratic. Corporate control of local generation may well be accompanied by local despotism in order to secure the returns on investment.

¹⁰⁰ See The groundWork Report 2005 for a description of oil plunder and resistance in Africa.

Chapter 3: Brutal economies

The promise of modernising development was that everyone would get richer even if some got richer than others. The destitution of millions of people in the Third World was then represented as the failure of development rather than its product. The process of creating spectacular wealth on the one side and desperate poverty on the other is now more brutal than ever. The first section of this chapter considers the dynamic behind rising prices and the distribution of the benefits of energy. This is part of the wider commodities boom that is part symptom and part cause of shifting global relations of power. High and volatile prices may herald the approach of peak oil but we are not yet there.¹⁰¹ The second section looks at the impact of high prices in countries where people's dreams of a better life are dying ahead of peak oil. The final section considers the logic of the elite future after peak.

Dynamic dispossession

According to the IEA, high and volatile oil prices are driven by “a decline in spare supply capacity, as the demand for oil products has outpaced increases in crude oil production and refining capacity, as well as supply disruptions and geopolitical tensions” [WEO 2006: 271]. This suggests two dynamics: First, the strictly ‘economic’ dynamic of supply and demand has been remarkably sensitive to factors that, in an oil glut situation, would be insignificant. It has yo-yoed in response to the weather, production plant breakdowns and local insurgencies. Second, ‘supply disruptions and geopolitical tensions’ is a euphemism for the imperial violence and the resistance that it provokes in the Middle East and in Nigeria and other localities where the ‘economics’ of oil extraction is inseparable from violent dispossession.

The IEA estimates that the high price of oil has shaved 0.3% off global economic growth because the higher returns to oil exporters do not balance the costs to importers. Nevertheless, it sees the higher prices as “partly the result” of increased demand caused

¹⁰¹ This statement assumes Campbell's projection for peak oil. Even if geological production has peaked, as argued by the Energy Watch Group, this has not yet registered in the economy.

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by global growth [301]. In so far as the price is driven by demand, then it would seem that the limitation to economic growth is economic growth itself. IEA figures show strong growth in “heavily indebted poor countries” and claims there would be even stronger growth but for the price of oil. In fact, of course, oil exporters have shown the strongest growth followed by exporters of other mineral resources. Oil may be the most significant commodity but, in the present economic situation, it remains one of many commodities which are vital to growth and increasing in price.

Prices, of course, are also responding to imperial aggression – or rather, its failure. From a Southern (or worker) perspective, the distinction between economic and political drivers of price is not at all clear. Whether low or high, the market price is always political. Since the 1980s, oil extraction from Southern countries has been massively subsidised by the World Bank, acting on US instructions, and by Northern countries’ export credit schemes. The justification is always to ‘alleviate poverty’. The real intention is always to get the oil out. China, India and other major Southern consumers are now adding to these subsidies with a range of soft loans and development deals. The most significant subsidy, however, is the enforced dispossession of local people unfortunate enough to find themselves in the way of oil or other extractive industries and the destruction of their environments. The impact on prices of the rebellion in the Niger Delta represents the failures of repression – although it does not follow that those who resist repression are able to take control of the resource or gain from the higher price that results from their action. The profits go elsewhere, including into beefed up repression.

Who gets the energy?

The IEA is careful to highlight that over 70% of the *new* energy required by 2030 is in developing countries. China leads the expansion, raising its share of global energy demand from 15 to 20% in 2030, followed by India. Rich country requirements rise by 25% although their overall share of global energy falls from about 50 to 40%. These Northern countries account for 11% of world population by 2030. The IEA does not draw the obvious conclusion: on a per capita basis, Northern demand still rises faster than Southern demand and Northerners will consume six times as much energy as Southerners in 2030.

Box 12: Corporate profiteers

The IEA says that \$4.3 trillion must be invested in oil, upstream and downstream, between now and 2030. This amounts to \$164 billion every year [IEA WEO 2006: 102]. The super-major corporations all posted record profits for 2005 and again for 2006. In both years, ExxonMobil's profit was the all-time record for any corporation. The corporation nevertheless demands that the global public subsidy to big oil is necessary to encourage further investment. Arguing against proposals to eliminate US tax breaks, CEO Rex Tillerson suggested that this would set a bad example to the rest of the world – where two thirds of its profits are produced.¹⁰²

Table 5: Super-major profits

	2005	2006
ExxonMobil	\$36 billion	\$39.5 billion
Shell	\$25 billion	\$25.4 billion
BP	\$19.3 billion	\$22.2 billion
Total	\$15.7 billion	\$15.8 billion
ChevronTexaco	\$14 billion	\$17.1 billion
ConocoPhillips	\$13.5 billion	\$15.5 billion

The World Bank has been at the centre of the global system of subsidies since the late 1970s when it first invested in the sector on the instructions of the US. A central aim was to open production in new countries and so reduce OPEC control of prices. Additional subsidies are provided directly by Northern countries through export credit agencies (ECAs) which provide guarantees for projects undertaken by 'their' corporations in foreign countries. While these countries sign on the guarantees, however, real risk is passed on to the host countries with the result that the ECAs now own a high proportion of the debt owed by African oil producers. Northern countries also use development aid agencies to subsidise oil. Like the World Bank, the advertised mission of most donor agencies is humanitarian. All told, the New Economics Foundation arrived at a "solid estimate" putting the total value of fossil fuel subsidies at "\$235 billion for every year" between 1995 and 1998 [Simms et al 2004: 13].

¹⁰² Mark Jewell, Associated Press, November 30, 2006.

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Per capita comparison highlights global inequality but masks as much as it reveals. First, given increasing levels of inequality in most countries, as well as the world as a whole, the bulk of the growth in Southern countries will be to the benefit of a small elite whose consumption rises to match that of the North. Second, actual people are not the main consumers of energy – industry is. And energy intensive industries are moving South for cheaper labour, cheaper energy and cheaper pollution. This process has been central to ‘globalisation’ and is a key contributor to the apparent reduction in the ‘energy intensity’ of Northern economies. The peaking of US gas production, and consequent migration of chemicals and other gas guzzling industries, adds a new dimension to the process. Most of these industries remain under direct control of Northern transnational corporations (TNCs) or are subordinate participants in global production networks (GPNs) dominated by such TNCs. For these reasons, much of the profit of production continues to move North while Southern countries compete for foreign investment by lowering labour and environmental standards.

This ‘race for the bottom’ is directly facilitated by the World Bank, explicitly so in its annual Doing Business reports.¹⁰³ And it leads to “immiserizing growth” because the “increased volume of exports may be more than offset by losses due to lower export prices” [UNCTAD 2002: 114]. That is, the Southern host country economy actually makes a loss while the foreign investor (or GPN lead firm) captures more value than is created by the investment but can conceal this value within the final product. Typically, the loss is passed on to Southern workers. China’s cheap production is on the back of the dispossession of the peasantry and pitifully low wages while, on the other side of the world, cheap goods are essential to the low inflation rates supposedly achieved through the wisdom of Northern central bankers. The energy and carbon costs embodied in these goods flows North with them, but the official carbon account stays behind.

Box 13: Carbon debt

The richest 20% of the world’s people “account for 86% of total private consumption expenditure” [UNEP 2002: 35]. They consume “68% of all electricity, 84% of all paper, and own 87% of all automobiles” [Sachs et al 2002: 19]. It follows that they produce a similar proportion of polluting waste. This creates an ecological debt owed by the rich to the poor who carry the heaviest burden of pollution and are ever vulnerable to dispossession in the interests of development. Counting carbon emissions alone, Christian Aid [1999] calculated that this debt is growing by US\$ 13 trillion per year using 1990 figures.

¹⁰³ See The groundWork Report 2006: 125.

Southern countries are keen bidders for the energy intensive projects hawked by transnational corporations. Brazil, China and South Africa were fierce competitors for a new Alcan aluminium smelter, a bid finally won by South Africa through its offering of the cheapest electricity in the world as well as tax exemptions [see Chapter Four]. Security of supply is intrinsic to such deals, effectively transferring the risks of energy shocks from North to South and from the private to the public sector.¹⁰⁴ This project-scale transfer of risk is amplified at the global scale. The world economy is now held to be less vulnerable to energy shocks because energy intensity in relation to GDP has been reduced – in other words, compared with the 1970s, less energy is needed for the same economic output. The IEA notes that developing country economies are more vulnerable on this score but projects a continued decline in energy intensity in all regions, North and South. Unfortunately, this projection appears mistaken. Raupach et al show that the 1990s trend towards reduced energy and carbon intensity was reversed in both developed and developing economies around 2000. Further, “no region is decarbonising its energy supply” [2007: 5]. This may in part be ascribed to the end of ‘easy oil’ because the energy intensity of producing energy itself has increased substantially.

Changing world order

Just as the 1970s oil shocks were an effect, not the cause, of a shock to the global order of power – the ‘crisis signal’ of the US regime of accumulation – so too, the rise in oil prices since 1999 is a symptom of the crisis of power. Yet this crisis – into which the distinct crisis of peak oil is beginning to feed its toxic load – is a deeply contradictory process.

China was not severely affected by the Asian crisis of 1997 and its continued growth created the basis for the rapid economic recovery in the region as well as the growing demand for oil and other mineral resources such as iron and copper. One effect was to reinforce the regional webs of production, with China providing the low value final assembly platform for high value components manufactured elsewhere in the region, most notably in Japan. East Asian specialists Hart-Landsberg and Burkett doubt China’s control of these processes. The regional production networks are dominated by Japanese corporations while, in global terms, “East Asian economies, including China, are being linked and collectively reshaped by broader transnational capitalist

¹⁰⁴ The terms of the South Africa Alcan deal are secret so details of price and penalties for supply failures are not known.

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dynamics, in particular by the establishment and intensification of cross-border production networks by transnational corporations” [2007: 23].

Industry in Africa and Latin America has wilted in the face of this competition. Indeed, following the opening of Asian economies to global capital forced by the 1997 crisis, jobs previously outsourced from the US to Mexico have now been transferred from Mexico to China. Chinese workers are paid only one quarter of what already low paid Mexican workers get. In South Africa, the clothing industry has wilted. Union pressure led to government negotiating an agreement with China to restrict Chinese clothing imports for a period of five years in the hope that the local industry can develop competitive niches. On the other hand, China’s growing influence and resource hunger has put a finger on the scales of power between North and South, firstly because rising resource prices favour exporters, and secondly because China is offering no strings deals and aid paid for from its huge trade surplus with the US. Southern governments thus have more ‘policy room’, a polite UN phrase which means that they have greater bargaining power in their relations with the weakened but still formidably powerful US. Arrighi describes this as a shift from the Washington consensus which prescribed economic policy to subordinated countries to the ‘Beijing consensus’ which allows countries to determine their own development paths.¹⁰⁵

South-South co-operation and trade relations have thus received new impetus in which China is the most influential, but not the only, player. India, Brazil, Malaysia and South Africa have likewise established South-South links proclaiming ‘win-win’ benefits. “Each has also been welcomed as an alternative to the old imperialist powers. And each in its turn has been accused of pursuing its own ‘sub-imperialist’ agenda” [Marks 2006]. This has accompanied a revival of the language of Bandung – the conference that launched the Non-Aligned Movement in the 1970s context of Cold War – as an assertion of growing Southern confidence. Yet what has emerged is a triangular ordering of the global economy and flow of resources. Raw materials from Africa and Latin America are taken to the Asian factory to produce goods consumed in the North. This flow of resources is largely managed by Northern transnational corporations who also determine the technologies of production and control product development. There are, of course, innumerable exceptions but this appears as the typical pattern.

¹⁰⁵ Giovanni Arrighi, Seminar given at Rhodes University, *From Washington consensus to Beijing consensus*, May 2, 2007.

It does not follow from the ‘Beijing consensus’ that Southern people have more bargaining power with their governments or employers. Northern hypocrisy on human and environmental rights and corruption is now off set by Chinese indifference. The claim of ‘non-interference’ is untrue in researcher Ali Askouri’s view: “China interferes deeply in the domestic affairs of its partners, but always to the benefit of the ruling group” [2006]. Moreover, the South-North networks that have enabled civil society to expose the shams and scams of Northern institutions have, as yet, no counterpart in China where civil society is largely inward looking and works under the unloving gaze of the state.

Nor are there real signs of an ‘expansion of reproduction’ in the South – that is, higher wages and welfare for working class people who then become the consumers of expanded production and so create more jobs in a virtuous cycle of growing wealth for all. This was and is the promise of modernisation, even if it is now reduced to the language of poverty alleviation, and it is predicated on economic growth. China, with the lowest population growth rate in the developing world, is unquestionably the world’s most dynamic economy. It has sustained GDP growth above 8% for three decades, generally topping 10% since 2000, and the scale of development is simply awesome. This is widely celebrated by the World Bank and other international agencies as having ‘lifted millions out of poverty’, a judgement that takes it as axiomatic that economic growth benefits the population as a whole. It leaves out of account the scale of dispossession in China. In the country, Yang [2005] shows that peasants are being taxed into penury and stripped of assets by corrupt local elites intent on capital accumulation. This process is driving the migration into cities where a growing proportion of workers are migrants from rural regions and forced to work up to 80 hours a week on, or below, the minimum wage and often not paid in full even on these terms. In the traditional centres of urban production, workers are also being dispossessed of job security as the old state enterprises are broken up and privatised. Overall,

... regular formal wage employment in China’s urban sector actually declined at an annual average rate of 3 percent over the period 1990–2002. Total regular (formal and informal) wage employment remained basically unchanged over this period, registering a zero average rate of growth. Only irregular employment grew, increasing at an annual average rate of 18.5 percent. [Hart-Landsberg and Burkett 2007: 27]

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Hart-Landsberg and Burkett conclude that the labour market in dynamic China is little different from that in economically stagnant Latin America. It also bears a striking resemblance to the pattern of work observed by Webster and Von Holdt [2006] in South Africa – with a shrinking core of formal full time workers, a non-core of outsourced and casualised workers and a growing mass of informal and unemployed workers, abandoned to scavenging half a living in the ruin of the capitalist edge but dispossessed of the possibility of escape from capitalism. The details may be locally specific, but the broad pattern reflects the global operation of capital.

This labour regime is accompanied by growing global inequality, between rich and poor countries and between rich and poor people everywhere, and by profound shifts in the spatial ‘fixing’ of people. Around 2004, the world’s urban population overtook the rural population marking, as Mike Davis puts it, “a watershed in human history” [2004: 5]. A third of these urban people now live in the slums, mostly in the Third World, in old working class areas drained of income as well as shack settlements. Almost all the growth in the world’s population is being absorbed into the ranks of the urban poor while the population in rural and richer urban areas is, or soon will be, declining. UN-Habitat’s *Global Report on Human Settlements 2003* concluded that, “instead of being a focus for growth and prosperity, the cities have become a dumping ground for a surplus population working in unskilled, unprotected and low-wage informal service industries and trade” [quoted in Davis 2004: 23].

The wealth of the world, meanwhile, is concentrated in ever fewer hands and production is controlled by fewer and fewer ‘lead’ corporations who, through mergers and acquisitions, attain the scale needed to compete with each other and return the profits required by finance capital. This concentration of consumption and production finds its spatial expression in enclave development: in the walled off residential developments where the super-rich build fantastical palaces; the creation of parallel high specification and high consumption infrastructures; the development of fast track transport and privileged information networks linking high value locations across the global cities; and in the increasing divorce of production from local economies – except in so far as it is necessary to bulldoze people out of the way.

The most extreme examples of enclave development are associated with extractive industries – mining and particularly oil. The flow of oil money is divorced from the local economy but tightly integrated with the global money centres. It is repatriated to the North in corporate profits, it returns to global finance capital through the endless

repayments on national debt, and it lines the pockets – or international bank accounts – of the corrupt ruling elites. In Angola, GDP growth is now turbo-charged to 19% with windfall oil profits and massive foreign direct investment but no expansion of local jobs or income. As James Ferguson puts it, “The movements of [global] capital cross national borders, but they jump point to point, and huge areas are simply bypassed” [2005: 379].

China is muscling in on what was the supermajors’ oil patch in Africa, offering deals that include soft loans and development aid in the form of infrastructure and other projects which really do get built – by Chinese corporations using mostly Chinese labour. Now second to the US as an oil consumer, China is, like the US, importing a quarter of its oil from Africa along with increasing quantities of base metals and tropical hardwoods.

Social relations of power are embodied in the technologies of the networked enclave economic order. In many industrial processes, labour is being cast off irrespective of low wages. “In fact, given the nature of the output, more labour intensive production processes may not be physically feasible at all” [Hart-Landsberg and Burkett 2007: 33]. Besides lowering costs, automated production yields precision and quality control in sectors as different as electronics, chemicals and textiles. More importantly perhaps, automated production can now be monitored and directed from corporate headquarters across the world in ‘real time’. As observed by South Africa’s parliamentary committee on trade and industry, “it is precisely the application of ICT [information and communication technology] which enables the more effective control by multinationals of operations in different countries.”¹⁰⁶ Even mining is heading for full automation with everything from open cast vehicle fleets to deep level drilling rigs controllable from remote operating rooms. As ‘easy’ ore bodies are depleted, new deposits are more remote, harder to find and harder to mine. According to an industry manager, “To mine these deposits profitably, automation will not just be an option, it will be the only option.”¹⁰⁷ It comes, of course, with the added benefit of next to no contact with local people and reduced political hazards in countries, such as Congo, made turbulent by the history of colonial and neo-colonial appropriation.

¹⁰⁶ Trade and Industry Portfolio Committee and Select Committee on Economic and Foreign Affairs, *Extracts from Report on Public Hearings on Industrial Policy*, in New Agenda, No.7, Third Quarter 2002.

¹⁰⁷ Quoted by Martin Creamer, *Mining from HQ*, Creamer’s Mining Weekly December 15, 2006.

Box 14: Military automaton

The US military was closely involved with the development of ICTs from personal computers to the internet. It is also leading in automation. Pilotless drones fly over the slums of Gaza and Baghdad and driverless armoured vehicles crash through ruins on the ground. The vehicles relay information, constantly mapping and remapping to create the precise virtual simulations of operational areas in real time. The operators, whose informal training includes long hours at Play Stations, are at home in this virtual environment. They are also at home in their bases in the US and go home to the suburbs after a normal work-day shift taking out the digitalised bad guys. Real people's bodies, meanwhile, are left in the real dirt of a shot-up street on the other side of the world.

War games used to be played across open country. The new battle field training grounds are replica Third World slums, built with the assistance of Hollywood set designers and peopled with 'extras', mostly costumed with keffiyehs and given basic scripts of their responses to US troops – hostile, friendly or indifferent. The 100,000 acre site at Fort Polk, Louisiana, contains seven replica Iraqi villages. These battle fields are supplemented by virtual training grounds, the digital simulacra of real places to which the troops will be deployed.

Source: Graham 2007

The bite of high oil prices

According to the UN, one reason why the steep rise in oil prices has not led to global recession is that:

Unlike the two previous oil crises of the 1970s and the 1980s ... there has not been any large-scale curtailment in global oil supply as experienced in those two episodes and, despite the increased fears of supply disruptions, global oil production has thus far continued to grow in recent years. [UN 2007: 18].

Peak Oil will change this. Moreover, where previous shortages were created by politics and could be resolved by war and diplomacy, peak oil creates an absolute limit. It may, however, still be politically manipulated if enough additional failed states can be produced to relieve global demand.

High prices, however, have resulted in shortages in many countries. Of 38 developing countries surveyed in a World Bank study on policy responses to high oil prices, 22 experienced energy shortages of some sort – power blackouts and domestic fuel shortages as well as shortages of petrol and diesel in many countries [Bacon and Kojima 2006]. In stronger states, the shortages were temporary or localised, more nuisance than systemic threat. For poorer countries and failed states, the shortages tend to be more enduring and widespread. Confined to failed states, shortages are easily explained by high prices, corruption, misguided state regulation, labour and civil militancy and other interruptions to the purity of markets.

With peak oil, the bite will become sharper and, because the policies of almost all countries assume energy growth, it will likely cut to the bone. The business-as-usual assumption is evident in the World Bank study. Almost all of the 38 countries surveyed intervened to moderate prices through subsidies, price regulation or reduced fuel taxes, while just 12 countries have introduced energy conservation measures and only one has actually reduced fuel consumption. Twenty three countries are attempting to diversify energy by promoting biofuels but only six are promoting renewables.¹⁰⁸ Northern responses are hardly better. US President George Bush famously declared that high crude prices are an unfair tax imposed by foreigners on Americans – as if his war had nothing to do with it – while Britain assumes expanding future oil supplies but has made no independent study to confirm the IEA's assertion that the oil is there.¹⁰⁹

Price shock

In general, oil price shocks are held to: stoke inflation; increase trade deficits in importing countries; increase budget deficits if fuel is subsidised or fuel taxes reduced to off set price increases; and ultimately cause recessions.

Inflation

First, the inflationary effect follows from the pervasive use of energy in transport and production and because petrochemicals are an input into such a wide range of products. Beyond this, as we have seen, the promotion of biofuel substitutes then amplifies the effect. As yet, however, the impact has been absorbed by global economic

¹⁰⁸ The definition of renewables here is less than rigorous and includes big hydro schemes.

¹⁰⁹ George Monbiot, *Our blind faith in oil growth could bring the economy crashing down*, The Guardian, May 28, 2007.

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growth. Some economists argue that a one-off price rise is not technically inflationary but that it “tends to raise the real return on capital [and] lower the real wage” [Fisher and Marshall 2006: 3]. In other words, wealth is redistributed from poor to rich and it is not just big oil that takes higher profits from higher prices. Other industries do too, as the boom in corporate agriculture’s profits illustrates. Perversely, capital and energy intensive industries do best.

To workers on the other hand, this will certainly feel, smell and taste like inflation as they pay the higher prices without getting higher wages. This may lead to ‘second round effects’ because, in the logic of economists, successful worker demands for higher wages are inflationary. Anticipating this, central banks have indeed raised interest rates to restrict consumption and so preserve the transfer of wealth to capital. If they do not, they risk losing credibility with capital with a consequent loss of business confidence and flight of capital. Poor countries appear to be in a similar position to workers with the global redistribution of wealth manifesting as national inflation.

Trade

Second, trade balances have improved for oil exporters, yielding a substantial surplus for many. Importers have generally lost because oil is the largest item on most countries’ import bill. In 2005, Europe paid \$91 billion more for its oil imports than it had done in 2002, North America paid \$89 billion more, Asia \$49 billion more and sub-Saharan Africa \$7 billion more. Although the African figure is lowest, it is highest as a proportion of GDP. On the IEA’s figures, it is also seven times more than indebted countries saved on lower debt payments following the G8 agreement on debt in 2005.

Jubilee and OilChange [2006] note that Tanzania’s oil import bill rose from “\$190 million in 2002 to about \$480 million in 2006”. The difference of \$290 million a year is more than double the benefit from debt cancellations amounting to \$140 million in 2006. The implication is that Tanzania must divert funds from elsewhere, including social spending made possible by the cancellation of debt. However, according to the United Nations [UN 2007], Tanzania has received higher prices for its own export commodities such as coffee so that its overall economic loss, measured in GDP, is negligible. The costs have been passed on to consumers in sharply higher prices. Zambia might have expected similar benefits from booming copper prices. However, outages at the national refinery combined with a decayed oil transport infrastructure resulted in shortages and rocketing fuel prices. This forced reduced copper production while cancelled cargo flights also disrupted exports of flowers and vegetables.

Several other countries have not received higher export incomes and have cut non-oil imports by forcing reduced consumption – that is, recession – through higher interest rates or other means. Several use heavy oil fired electricity generators and have not been able to pay for oil imports, resulting in blackouts. In Nicaragua, where oil imports account for two thirds of total imports, the power sector has come close to collapse. Following a change in government, Nicaragua struck a deal with Venezuela to ease this situation. Guinea in West Africa fared even worse with constant blackouts. As higher prices bit into its economy, it liberalised its foreign exchange market in the hope that Northern donor funding would follow from playing by the Washington consensus rules. It was rewarded with the collapse of its currency, so adding to the spiralling cost of oil and other imported goods and pushing inflation to 31%.

Debt

Third, increased budget deficits, threatening a new round of debt for poorer countries, have been incurred in countries which either reduce fuel taxes or subsidise fuel to cushion consumers. Fuel taxes in fact buffer oil shocks because the price of crude makes up a smaller proportion of the final fuel price. US consumers thus felt a sharper pinch than Europeans even though they still pay much less for fuel. Nevertheless, in Britain, picketing of oil distribution facilities caused a minor crisis as just-in-time delivery systems fell behind time. George Monbiot suggests that the supposedly popular protests calling for reduced fuel taxes were in fact sponsored by oil corporations.¹¹⁰

The World Bank study argues that subsidies lead to shortages if corporations are compelled to accept losses, or to a potentially catastrophic drain on national finances. This is rather rich coming from the institution at the centre of the global system of subsidies designed to deliver to expanding Northern consumption, particularly since those subsidies have indeed drained national revenues in the South. Further, several countries which use market pricing, such as Kenya, have also experienced shortages. Clearly subsidies are intended to sustain development compatible with an energy intensive global economy and several countries direct subsidies to key industries. The hazards of subsidies really reflect the hazards of the underlying assumptions of development.

Subsidies are most common in oil producing countries. In countries like Nigeria, there is strong popular resistance to price rises because cheap fuel is the only benefit people see from an entirely destructive industry. Carrying the costs of higher prices while big

¹¹⁰ *We're vulnerable because we're unsustainable*, posted at Monbiot.com, September 14, 2000.

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oil and corrupt politicians pocket windfall profits is particularly odious. Government moves to deregulate prices in 2003 were met with a general strike by labour unions. The government has since tried to ban strikes in key sectors. Most of Nigeria's fuel is in fact imported because its refineries are near derelict. Subsidies cost \$2.2 billion in 2005 and are paid out on claims from distributors. The erratic payment of claims, however, has left the national oil company with huge losses while private corporations stopped importing. In consequence, Nigerians face constant shortages and many end up paying higher prices for bootleg fuel.

Guinea has similarly subsidised fuel and run up large debts, which it cannot pay, to Shell and Total. The corporations threatened to cut the supply forcing government to repeatedly raise the regulated price. Following each hike, reports journalist Chip Cummins, "the rusted-out taxis and minibuses that clog Conakry's pot-holed streets would thin out" and many people now walk to work.¹¹¹ Guinea's endemic economic crisis is overlaid on the political crisis of the corrupt regime of President Lansana Conte. Unions have responded to rising inflation with repeated strikes. In January and February 2007, they shut down the country for several weeks demanding Conte's resignation. Conte instead imposed martial law that resulted in the army killing over 130 people. By May, however, the army itself was on the streets demanding unpaid wages. Conte has thus far contained the mutiny by sacking unpopular officers and promising payment but it is not clear that government has the money.¹¹²

Several countries introduced direct subsidies or price regulations in the belief that the high price was a short-term spike. The anticipated costs spiralled as prices stayed high. Thus, Thailand expected a two month spike in early 2004 and calculated on spending \$130 million to smooth it out but actually spent \$2.2 billion before eliminating the subsidy in 2005.

Recession

Finally, while oil analysts tend to attribute the recession of the 1980s to the oil shocks of the 70s, many economists argue that the central banks mistook an oil shock for inflation and so raised interest rates to record highs and that this was what actually caused recession. Both views seem highly reductive. As argued above, the US regime of

¹¹¹ Chip Cummins, *As Fuel Prices Soar, A Country Unravels*, Wall Street Journal, November 18, 2006.

¹¹² See IRIN News, May 11, 14 and 18, 2007, at www/irinnews.org and Human Rights Watch, *Dying for Change: Brutality and Repression by Guinean Security Forces in Response to a Nationwide Strikes*, April 2007.

accumulation was already in trouble, with ‘stagflation’ evident in the early 1970s, and the economic and political weakness of the regime created the conditions for the oil shocks. The recession of the 1980s was indeed caused by the policy response, but it was a political response to political weakness and not merely a technical economic response to the oil shocks. Moreover, it succeeded brilliantly in restoring imperial power and its command of resources – including oil.

A measure of its success was precisely that it installed the technical tools and institutions of neo-liberal economic management and made them appear as part of a natural economic order. Within this order, raising interest rates in response to price pressures is the almost automatic response of central bankers and is expected by capital. Wakeford warns, however, that in the context of peak oil where prices rise in response to declining supplies: “Attempts to adhere to the current inflation target would likely require much higher interest rates and consequent demand destruction [i.e. recession], but would not address the fundamental cause of inflation (rising costs)” [2007: 31].

Failing Zimbabwe

As yet, deep recession has been confined to ‘failed states’ on the peripheries of capitalism such as Guinea and, most spectacularly, Zimbabwe. High oil prices and power outages are not in themselves the cause of recession in either case but have savagely exacerbated its effects. According to the IMF’s Africa chief, Abdoulaye Bio-Tchane, some African countries have lost between 20 and 30% of industrial output and GDP growth for want of power.¹¹³ Ironically, he blames underinvestment in their power sectors which was, at least in part, a consequence of the structural adjustment programmes ordered by the IMF.

Zimbabwe’s collapse is generally attributed to the wilful misrule of President Robert Mugabe. This may be true as far as it goes but neglects the impact of the IMF structural adjustment programme (SAP) in the mid-1990s. Patrick Bond points out that in 1995 Zimbabwe “received the World Bank’s highest possible rating for following the Washington Consensus: ‘highly satisfactory’” [2007: 8]. This rating had nothing to do with Zimbabwe’s democratic credentials. In a pastoral letter on the crisis, Zimbabwe’s Catholic bishops note that, following liberation power and wealth was transferred from a small white elite to an “equally tiny and exclusive black elite”.¹¹⁴

¹¹³ *Africa energy sector needs reform, funds, IMF says*, Creamer’s Engineering News, June 1, 2007.

¹¹⁴ Quoted by Hugh McCallum, *Zimbabwe: Splitting Africa from the West*, at Africa Files, At Issue Forum, June-July 2007.

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White farmers, who produced the better part of Zimbabwe's foreign earnings from cash crop monocultures, were largely undisturbed in their hold on commercial farm land provided they accommodated themselves to the new political reality. And, while deeply authoritarian, the regime managed a growing economy and also delivered one of the most successful educational systems in Africa.

It was precisely these successes that were eroded by adherence to the Washington consensus. The recessionary effects of the SAP – reducing the value of wages, throwing many out of work, eroding state services and corroding the infrastructure – sparked widespread resistance, particularly from labour unions, which culminated in a challenge to Mugabe's authority. Mugabe responded with constitutional proposals designed to entrench his power and, when this was rejected by the electorate in 2000, with escalating repression combined with the chaotic and corrupt land reform programme and anti-colonial rhetoric designed to revive his regime's legitimacy.

Fuel and power shortages in Zimbabwe are, in the first place, a consequence of the economic collapse that has resulted in hyper-inflation running at over 7,600% in early September 2007 and rising fast,¹¹⁵ but the shortages then become powerfully causative in the ongoing downward spiral. Reports from Zimbabwe¹¹⁶ indicate that:

- The fuel shortages do not appear to affect top government officials or security forces.
- Fuel is otherwise distributed largely through the parallel market, controlled by powerful politicians who make windfall profits on the difference between the official regulated price, subsidised by the state, and parallel market prices. This elite similarly profits on the difference between the official monetary exchange rate and parallel market rates. In short, the state is made the vehicle for taking money from the people in taxes and putting it into the pockets of politician-businessmen.

¹¹⁵ The inflation rate itself is inflating. The official rate was 782% in March 2006, 1,281% in February 2007, and 4,500% in late June. Unofficial estimates are far higher and the US ambassador has predicted 1.5 million % inflation by the year end. *Mugabe orders a wage freeze in inflation ravaged Zimbabwe*, Sunday Times, September 2, 2007; Andrew Meldrum, *1,500,000% inflation will put Mugabe out says US envoy*, The Hindu, June 23, 2007.

¹¹⁶ Reports include: *Zimbabwe in fuel crisis*, People's Daily Online (China), May 8, 2005; Basildon Peta, *Zimbabwe turns to ox-wagons to collect rubbish*, Sunday Independent, 6 November 2005; Joseph Chigugu, *Fuel crisis deepens Zimbabwe's troubles*, Institute for War and Peace Reporting, March 14, 2006; Fortius Nhambura, *Noczim to Extend Direct Fuel Import Facility to More Firms*, The Herald (Harare), January 25, 2007; *Zimbabwe heads for dark days as power cuts loom*, Creamer's Engineering News, May 9, 2007; Alec Russell, *Zimbabwe groans amid shortages and spiraling inflation*, Financial Times, May 20, 2007. Donwald Pressly, *Donors will move in when Mugabe finally leaves office*, Business Report SA, June 19, 2007. See also International Crisis Group 2006 and 2007.

- In January 2007, the National Oil Company of Zimbabwe (Noczim) expanded a scheme allowing direct imports for businesses able to deposit US dollars into Noczim's account. Commodity exporters are thus privileged over local businesses and the latter increasingly prefer bartering to payment.
- Zimbabwe's primary source of foreign exchange, however, is from remittances from the increasing number of exiles to their otherwise destitute families. The exiles are well aware of the irony that this is the regime's last economic life line. In October 2006, the Reserve Bank grabbed a slice of the transfers – again playing the difference between regulated and parallel market prices.
- Petrol queues have become a characteristic feature of life and form in response to rumours that a particular outlet has supplies. Similar queues form if it is rumoured that a store has had a delivery of food. 'Fuel queue absenteeism' is now part of the vocabulary, reflecting that the time spent by people and businesses is cutting into productivity.
- Transport for people and goods is increasingly difficult to come by. At the same time, there are fewer goods to transport with many businesses operating at 20% of capacity. Over 100,000 bus crews have been laid off for want of diesel and buses, when available, are beyond most people's pocket. Tourism has stagnated with Zimbabweans unable to afford fuel for holiday trips. In rural areas, people walk for hours to take what little produce they have to market.
- Public services, including power, water and sewage have crumbled "to the point of constituting an acute threat to public health and safety", according to a pastoral letter from Zimbabwe's Catholic bishops. In some municipalities, ox carts have been used for rubbish removals and even as ambulances – a response that is seen as symptomatic of breakdown rather than creative local adaptation.
- Power outages are increasingly common. Zimbabwe's own coal-based power plants have deteriorated for want of foreign exchange necessary to secure equipment and parts for maintenance and upgrades. It has relied on power supplies primarily from South Africa. Additional supplies from Mozambique and the Congo, two of the poorest countries in Africa, were cut off following non-payment of Zimbabwe's mounting debt to them. Mozambique has since restored supplies on the promise of payment. The energy utility is now choosing between different energy priorities. In May 2007, it prioritised electricity for irrigating wheat at the expense of domestic supplies.
- Wood is increasingly used for domestic energy in urban as well as rural areas and there is growing concern that the resource is being stripped out of some areas and at the potential for deforestation.

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For all the anti-colonial rhetoric and defiance of the IMF's 'bookish economics', Mugabe's government has not in fact produced an alternative vision of development, let alone one that might challenge Zimbabwe's neo-colonial place in the global order of the Washington consensus. 'War veterans' have occupied land, often as a preliminary to its appropriation by politicians, but the model of high input commercial agriculture is unchallenged despite the absence of inputs. Informal traders have been 'cleaned' from the streets even as formal sector employment collapses. Unworkable price regulation makes formal business unviable and drives economic activity underground. A wage freeze attempts to pin the costs on labour. Resource exporters are privileged at the expense of local enterprise. The shortage of transport, and rising costs, have provoked no plans for local initiatives that enable people to address their own needs while reducing their dependency on fossil fuelled transport.

Clearly, the regime's response is driven by the determination to hold power at whatever cost. It is barely informed by a wider view of national security and is entirely indifferent to the security of ordinary people. Rather than respond to issues such as growing food shortages, the regime fabricates a reality which simultaneously denies the crisis and blames it on external forces. Thus, for example, official prices are held up as evidence of affordable food when food is not available at those prices, and the scale of impoverishment, malnutrition and premature death is simply denied.¹¹⁷ Even if no-one believes it, the official version overlays this other reality and it is precisely in the difference between the two that those with political power and connections are able to loot the country. Nevertheless, the corrupt business interests that have flourished under the wing of the ruling ZANU-PF party are nervous that even their profits may melt as the economy burns out.

Meanwhile, various international agencies are lining up to restore Zimbabwe to the IMF path of economic rectitude following Mugabe's exit from power, while the Southern African Development Community (SADC) is positioning itself to be the handmaid of that restoration. There is some irony here. In the name of anti-colonialism, SADC has protected Mugabe from Northern diplomatic action while it nevertheless looks for a negotiated settlement to restore Zimbabwe to its properly subordinate place in the global economy. As Mary Ndlovu puts it:

¹¹⁷ Life expectancy has dropped to 36.6 years and just 34 years for women and infant mortality is rising as a consequence of malnutrition, HIV/Aids and the collapse in health and social services. See ICG 2007 and Kebele 2007.

Will Western and Southern African nations intervene to help remove Mugabe himself, enforce compromises in the shape of impunity for perpetrators of human rights abuses, re-establish a safe environment for world and regional capital, and leave the people little better off than before? [2007]

The desperate circumstances created by Mugabe makes bad faith look good. Yet the singular focus on Mugabe conceals the broader dimensions of the crisis. Kebele suggests that the negotiated settlement, involving the ruling party without Mugabe and the more malleable oppositional elements, would provide for “international tutelage” of the new regime while erasing questions of accountability, impunity and “whether the thieves keep their loot” [2007]. Beyond this, Zimbabwe is symptomatic of the global regime of accumulation. The reproduction of failed states on the peripheries is itself one way in which this regime finds scapegoats to carry off both the blame and the evidence of the serial dispossessions required for never ending accumulation. It is there that mass poverty and starvation are confined while the hand of the Northern powers in producing poverty is lost in the glow of philanthropic development aid: Zimbabwe’s official fabrications are merely a parody of IMF and World Bank forgeries.

Such deal making is already contested by formations such as the Zimbabwe Social Forum. Ndlovu observes, however, that those elements “which show a commitment to genuine participatory democracy and an economy of fair distribution of wealth are very weak” [2007]. She warns that change in Zimbabwe will be the “first step in another very long journey” towards a just society.

After Peak

Many of the writers on peak oil see a one-to-one correlation between global energy use and population. The argument is founded on the study of energy flows within the discipline of ecology. This energy is ultimately derived from the sun. Plants do the work of converting it into nutrients, making energy available to insects, birds and animals in the form of food. Animal species are observed to increase in numbers in response to an expanding source of available energy. If the energy source contracts again, so must the population of that species. In some cases this happens because the increasing population ‘overshoots’ the energy source and then depletes it.

The argument continues that the very rapid increase in human population from around the mid-18th Century coincides with the massive energy subsidy provided by

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fossil fuels – first coal and then oil and gas. The decline in fossil energy following peak must therefore be accompanied by a decline of human population.

That human populations cannot expand indefinitely is generally accepted. The energy/population argument, however, obscures more than it reveals. First, 20% of the world's population consumes 80% of energy and other resources. Most of the rest consume within earth's limits (as defined by carbon emissions). Over-consumption of fossil energy is thus an expression of power and wealth. Moreover, the argument implies that population should expand in proportion to energy access – so rich people should reproduce faster than poor people. The reverse is true on the global scale although not always at the local scale.

Rising energy demand was created less by rising numbers than by the twinned powers of capitalism and imperialism. A very large quantity of that energy was, and is, used in expanding the empire of capital – imposing its power over people by dispossessing them and destabilising their cultures, disciplining labour and mechanising production. Through much of this history, enlarging the supply of labour was a specific motive for imperial expansion. The aim was not to create a sufficiency of labour, but a surplus that would ensure that the price of labour was eternally depressed. But this aim is shadowed by the fear of its own creation: that the numerous poor will swamp the halls of privilege and drown the economic engines of accumulation.

For subordinated peoples, capitalism and imperialism were experienced as catastrophic. Increased rates of reproduction are more an effect of destabilisation, particularly where women are exposed to harsher conditions. Many pre-colonial societies were indeed highly patriarchal but destabilisation stripped out often subtle and informal restraints that women could impose on reproduction. Imperial capital itself was fiercely patriarchal. It validated patriarchal values even as it transformed them and worked to subvert women's domains. In South Africa, for example, cultivation was generally a women's domain while cattle were men's business. Missionaries thought the introduction of cattle-drawn ploughs would subvert the institution of polygamy by turning cultivation over to men and reducing their need for women's labour.

The mono-cropping ushered in with the green revolution similarly displaced women while also intensifying the subordination of peasant to market economies. For India, Vandana Shiva [1993] shows that the suppression of diversity in favour of the

marketable commodity, such as rice or wheat grains,¹¹⁸ narrowed household economies particularly in those areas where women had most control and so restricted the scope of women's autonomy. Beyond the household, as in the 19th Century famines, the market privileged urban centres of wealth. Whatever benefits some rural households experienced from an initial increase in revenues were soon erased by rising input costs and falling crop prices.

Policies of dispossession often have the explicit intention of enlarging the urban industrial labour supply – whether in colonial South Africa, the Stalinist Soviet Union or in contemporary China. They create the context of vulnerability to drought, flood and economic crisis. Those dispossessed are forced to follow the money. Whatever hopes people have of finding a better life, most are destined for the growing slums of the Third World cities where they will face the hazards of fire, flood and mudslides that beset the shanty towns.

The logic of an elite future

The likelihood of unprecedented famines in the 21st Century remains more a matter of politics than of the availability of energy. Elmar Altvater comments that while “life on earth remains dependent on the radiation of the sun ... it is impossible to power the machine of capitalist accumulation and growth with thin solar radiation-energy” [2006: 9]. This is because industrial capitalism works by debt financing driven by compound interest. The owners of capital, whether they are lenders or investors, require a profit which increases their capital. The enlarged sum must then be reinvested because the system cannot tolerate ‘idle’ capital: profit itself must make profit and the system as a whole must accelerate. This is achieved through two strategies: increased productivity within the production system or by ‘making the other guy pay’, that is through accumulation by dispossession.

The command of dense energy is essential to increasing productivity. The IEA's projections of energy demand through to 2030 show what is required to maintain economic growth. For capitalism, increased energy efficiency is another form of increased productivity. It increases the work done by energy but the benefit is taken in profit and economic growth ahead of energy saving. Put differently, the priority is

¹¹⁸ The development of ‘dwarf’ varieties reduced the energy required for the stalk and so allowed it to be concentrated in the grain. The stalk, however, had a variety of uses in the rural economy, particularly for cattle feed and bedding which would finally return energy to the soil in the form of compost and manure.

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the efficiency of capital, not energy, and the additional returns to capital must then be reinvested in further economic activity. The logic, as Monbiot argues, is that “in a free market, energy efficiency could increase energy use” [2006: 61]. At the end of the road, Mobbs observes, “energy efficiency is meaningless in the face of actual shortages” – efficient or not, the car will not go without fuel [2005: 143]. In a context of declining energy supplies, the choice is what, or whose, energy use to cut.

Following the point of peak oil, there will still be copious quantities of oil to be had, but declining production will terminate growth in returns from rising productivity for the system as a whole. What is left is accumulation by dispossession. This strategy – enclosing people’s resources and externalising costs onto people and the environment – pre-dates industrial capitalism and provided the initial capital for industrialisation, but did not then disappear. It has always subsidised the ‘internal’ return of profits from the production system, imposing untold misery on people in the colonies, the Third World, the global South. Since the ‘signal crisis’ of the US led regime of accumulation, and with the triumphant turn to neo-liberalism in the 1980s, increasing returns from dispossession have compensated for diminishing rates of return from the production system.

The logic of the crisis of the regime of accumulation thus converges with the logic of the crisis of energy depletion. The dynamic of capitalism post-peak will therefore intensify present processes. It may be expected that the next US election will bring in an administration that adopts a more inclusive rhetoric. It should not be expected that it will abandon accumulation by dispossession or the war on terror¹¹⁹ because it cannot abandon growth. Nor should it be expected that any other nation state will spontaneously abandon growth for this is the foundation of legitimacy within the international state system that brought them into being.

Growth, however, is an impossible strategy in a shrinking energy system. The supposedly common good of abundant energy will therefore be “transformed into a ‘positional’, oligarchical or ‘club’ good” [Altvater 2006: 13] with access regulated by price and violence. In spatial terms, this means it will be expropriated for the ever more exclusive benefit of the elite enclaves brought into being in the past two decades. Even as growth within these enclaves is sustained through the subsidy from dispossession, increasingly pursued in the mode of disaster capitalism, the enclaves of growth themselves will, in

¹¹⁹ All leading US Democratic Party candidates have endorsed the war on terror.

time, inevitably shrink. This, finally, is the lesson of Cape Town. The incompatibility of economic growth with redistributive equity will grow ever more acute but the space of the rich city itself will shrink as energy becomes unaffordable even to the middle classes.

The poor, in Nigeria and elsewhere, are already responding to being priced out of the energy market with organised strikes or spontaneous riots. It is a response to the entrenchment of class power both expressed and facilitated by command of energy. Having no exit from capitalism, the poor will nevertheless see the costs of their increasingly precarious participation rising. Hitherto, mass famine has been represented as a rural phenomenon. Hunger and malnutrition are common urban experiences but urban poverty is growing more acute and pervasive. The prospect of an elite future in the 21st Century raises the spectre of mass famine in the cities.

The war on terror already provides a proxy for great power global rivalry over resources, shaping the diplomatic as much as the military terrain. It justifies violence at any scale including outright invasion, as in Iraq, counter-insurgency as in the Niger Delta, or local actions aimed at containing dissent and protest by workers and citizens. All such actions, even invasion, are represented as policing actions, explicitly or implicitly defining opposition to the empire of capital as criminal. The war on terror is nevertheless accompanied by a growing authoritarianism and state lawlessness, a process led by the US but embraced by many other states. Cooperation between states in carrying out ‘extraordinary renditions’ is but one dimension of this lawlessness.¹²⁰ Individual citizens everywhere, and whole population groups in the global South, may at any time be converted into people without rights.

Oil is not the only resource commodity at issue but the present focus on oil will inevitably intensify post-peak. Command of oil remains essential to military advantage. According to security analyst Michael Klare, a Pentagon study on the strategic implications of future energy scarcity came up with two responses: creating energy efficient weaponry and controlling “foreign sources of supply, notably oil fields and refineries in the Persian Gulf region”.¹²¹ Klare argues that the US military has already been turned into a “global oil protection service for the benefit of US corporations and

¹²⁰ Extraordinary renditions involve the illegal kidnapping of people and their transfer to secret CIA facilities located in countries where torture is condoned.

¹²¹ Michael Klare, *How wars of the future may be fought just to run the machines that fight them*, posted at tomdispatch.com, June 14, 2007.

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consumers”. Given its extraordinary fuel consumption, it may come to fighting wars “just to run its own planes, ships, and tanks”.

Yet the capacity for war draws more broadly on the world’s productive and social resources. The ships, planes and tanks, the energy efficient drones, must still be manufactured and strategic minerals secured from around the world. The military-industrial complex perhaps defines the last enclaves of privileged consumption in a ruined world. At the front, the conventional capacity for war is increasingly privatised as the flexible mercenaries of disaster capitalism create new centres of profit or, more accurately, corrupt profiteering. Journalist Matt Taibbi concludes that “the world has never seen anything like the private contractors George W. Bush summoned to serve in Operation Iraqi Freedom. Collectively, they are the final, polished result of 231 years of natural selection in the crucible of American capitalism: a bureaucrat class capable of stealing the same dollar twice ...”¹²² The protection from prosecution given to these corporations by the administration suggests that the difference between the US and Zimbabwe is simply the scale of loot. The strategies of accumulation within the imperial power at one end and a failed state at the other express the terminal logic of capital.

Finally, however, it does not have to be this way. Other worlds are possible and Chapter Five will explore the way in which such worlds are being constructed.

¹²² Matt Taibbi, *How Bush Allowed an Army of For-Profit Contractors to Invade the U.S.*, Rolling Stone, August 23, 2007.

Box 15: The proposal for an Oil Depletion Protocol

Colin Campbell has proposed an international peak oil protocol which is generally advocated by ASPO.¹²³ Given that there is no official recognition of peak oil, it has no official status and is not even on the official international agenda. The central intention is to regulate the distribution of declining oil reserves and so prevent the escalation of oil wars and global economic chaos. To enable an accurate assessment of the world supply, producing countries would cooperate in providing accurate information subject to external audit. This will be critical to calculating the rate of depletion following peak oil.

In contrast to Kyoto, Campbell's proposal has the virtue of simplicity. The central provision is that all countries will reduce their consumption by at least the rate of depletion. Thus, if production is declining by 4%, then all nations will reduce consumption by that amount. This is intended to prevent profiteering from shortages and prices escalating beyond a reasonable mark up on production costs and so also to enable poor countries to afford their imports. Prompt information on depletion rates would enable all countries to plan coherently with a clear understanding of their allowance and what it will cost. The protocol would thus also have the objective of stimulating energy conservation and alternative energies.

A central problem with the proposal is that it 'grandfathers' rights to oil. The biggest current users would get the largest future entitlement. Heinberg [2006] argues that, although Southern countries might object to this, it would in fact be in their interests to be at the forefront of developing alternative energy systems. This may indeed be the case. The real problem, however, is the relationship between oil and geopolitical power. Given the characteristics of oil, it is the pre-eminent military fuel and is highly efficient in economic terms. In so far as larger rights in oil consumption create an advantage, the protocol will tend to fix the current global hierarchy and so privilege the US and the North in general. This is unlikely to be acceptable to the South and the big 'emerging' economies in particular. Equitable distribution, on the other hand, is unlikely to be acceptable to the North.

¹²³ The protocol is a project of the Post Carbon Institute and is available at www.oildepletionprotocol.org.

Box 16: Kyoto

The United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol were negotiated under the sign of the Washington consensus. Kyoto is based on a proposal put forward by the US under Bill Clinton and sets up emissions trading. This followed an earlier Brazilian proposal, rejected by the US, that Northern countries exceeding their reduction targets should pay a fine into a common pot which could then be used to finance projects in southern countries. The US proposal also displaced European proposals for a carbon tax. It was finally adopted because it appeared that trading was a pre-condition for US agreement. Having imposed its preferred system, the US under George Bush refused to ratify Kyoto.

The Convention recognises that developed and developing countries have ‘common but differentiated responsibilities’. This principle is meant to secure developmental equity between North and South and its inclusion was seen by Southern countries as a major victory. The Convention thus recognises first that Northern countries are better resourced to implement the agreement and second that Southern countries have a priority for development. It then emphasises “sustainable economic development” within an “open international economic system” and allows that all countries will define sustainable development in line with their own development priorities. It also distinguishes between Annex I (developed) countries and ‘non-Annex I’ (developing) countries with the former taking tougher commitments.

Kyoto tightened the obligations of developed countries and specified targets for emission reductions – between 8% below and 10% above emissions levels in the ‘baseline’ year of 1990.¹²⁴ This enshrined the ‘grandfathering’ of emission rights. This means that the right to future emissions is tied to historic emissions: the biggest polluters get the most rights. The reductions were to be achieved during the ‘first commitment period’ from 2008 to 2012 but there is little confidence that they will be met. It was expected that, in the ‘second commitment period’ beginning in 2012, Annex 1 countries would take on tougher targets while non-Annex 1 countries would also take on reduction targets.

Kyoto set up carbon trading through three ‘flexible mechanisms’: Emissions trading allows Annex I countries that exceed their reduction targets to trade their surplus allocation with those that do not meet the targets; Joint Implementation (JI) projects

¹²⁴ The overall reduction for all Annex I countries was to be 5%.

enable investors in one Annex I country to invest in projects that produce less emissions than a business-as-usual project in another Annex I country and to claim 'carbon credits' for the reductions; The Clean Development Mechanism (CDM) works in the same way except that the investors must be from Annex I countries and CDM projects must be located in non-Annex I countries.

The stated objective of CDM was to support sustainable development in Southern countries while reducing the costs to Annex I countries of meeting their reduction targets. Thus, Northern polluters could invest in 'clean development' projects in the South and claim carbon credits known as 'certified emissions reductions' (CERs). Alternatively, they could buy CERs produced from CDM projects on the market. The explicit reasoning behind this was first that the costs of meeting targets would be unaffordable to Northern economies and second that reductions would be cheaper in the South. It is thus founded on unequal development – which is a polite phrase for economic, social and environmental injustice.

The effects of trading are predictably dismal. There is no link between the price of carbon and the costs of climate change or the costs of emissions reduction required to seriously mitigate climate change. There is no necessary link between the number of CERs in circulation and an overall reduction in greenhouse gas emissions. There is not even a credible guarantee that a CER represents anything more than a convenient fiction.

Wolfgang Sachs [2005] observes that negotiators "were charged with protecting economic growth and not the climate" to which end Kyoto embodies three strategies: Northern obligations are transferred to the South and East; obligations are discharged through sinks;¹²⁵ and negotiations are framed to focus on the economic tailpipe and exclude discussion of driving interests in the engine room. The political classes now appear genuinely alarmed at the prospects of climate change but nothing indicates that there is a different agenda for negotiating the 'second commitment period'. Rather, they are entrenching a trading system that has no purchase on the level of actual emissions whatever, but which is already creating a flow of real money for finance capital. Meanwhile, in their use of the principle of 'common but differentiated' responsibilities as a basis for refusing any significant commitments, Southern countries have merely signed over to the North the power to define the global response to climate change in its own interests.

¹²⁵ Sinks such as forests, land, oceans and ice absorb carbon and so prevent it entering the atmosphere. CDM sink projects are focused on tree plantations, begging two questions: Whose land will be taken to create the sink? What confidence can there be that the carbon will stay sunk?

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Chapter 4: Elite energy future in South Africa

The global commodity boom has given a turbo charge to South Africa's minerals and energy complex. This chapter shows that the developmental state is playing to its energy 'strengths' regardless of the cost to people and their environments. It opens with a short discussion of the state's development approach and the vulnerability of this approach to peak oil and economic turmoil. The next section presents an overview of the carbon intensive economy and a brief outline of the country's approach to climate change negotiations. It then looks at the energy future now being created by the state and corporate elite.

Property and the developmental state

In 1996, democratic South Africa adopted a new Constitution. It is widely seen as a very progressive document but it provides two contradictory mandates for development. The Environment Right explicitly mandates sustainable development based on environmental, social and economic justice. The Property Right implicitly mandates capitalist development. Since then, economic policy has scarcely deigned to mention the environment and post-apartheid development policy has been determinedly focused on securing the basis for the accumulation of capital. The central idea of accumulation – that profits must be accumulated and reinvested to make more profits – is the basis of economic growth which is assumed to be a self-evident good. Just as the first priority of every private corporation is to make profit, so the first priority of every government is to 'grow the economy'.

'Growing the economy' now demands unleashing it from regulatory fetters. From the mid 1980s, the apartheid regime was beginning to dismantle the regulatory regime governing racial capitalism in South Africa. The process of deregulation accelerated following the first democratic elections in 1994. In 1996, government announced the neo-liberal GEAR macroeconomic policy and so put its faith in 'the market' to drive economic growth to the target rate of 6% and to create jobs. The market failed to

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come up with the expected investment and, in 2004, government raised the flag of the 'developmental state' with a set of strategies summarised in the Accelerated and Shared Growth Initiative (Asgisa).

Asgisa writes the metaphor of the dual economy, introduced by President Thabo Mbeki in 2003, into policy. The 'first economy' is a developed First World economy and the 'second' a Third World survivalist economy. The problem of the second economy is held to be that it lacks development and policy aims to build a bridge enabling the supposed crowds of entrepreneurs in the second economy to cross to the first. Critics argue that this is a fiction. Making wealth remains very much dependent on paying workers less than a living wage, dispossessing people and externalising environmental costs. The metaphor works to conceal this and justifies a dual development strategy: core development is concerned to promote capital accumulation and economic growth while development-as-delivery ameliorates the real damage to people and serves to legitimate the political elite.

Asgisa assumes key features of GEAR including open financial and currency markets and export oriented production with minimal protection from cheap imports. It differs in that the state has put the brakes on privatisation and is using state owned corporations to take the lead in investing in the economy. The most significant of these corporations are the power utility Eskom, rail and port operator Transnet, and arms manufacturer Denel.

In terms of energy security, South Africa's vulnerability to rising oil prices and peak oil is off set by its considerable coal reserves, the fact that it is home to the only commercial coal-to-liquids (CTL) plant in the world, and by its sizeable reserves of uranium. Nevertheless, imported crude oil still provides close to 70% of fuel for transport and most people and goods are moved by road. With very poor public transport and sprawling cities, the cost of working will escalate dramatically. So too will the cost of shopping at car dependent malls which rely on road transport to bring in the goods. The growing and lucrative international tourist trade will also fall victim to rising fuel prices. South Africa's energy intensive agriculture will see steeply rising input costs despite agricultural chemical production associated with the CTL process.

A modicum of energy security does not however protect it from the economic winds now blowing through the global economy or that may be expected with peak oil. Oil is South Africa's largest import item and the rising cost contributes to a growing gap

Box 17: The uses of the poor

- The poor's fundamental usefulness is the very fact that they are poor. The poor must be poor enough to be willing to do badly paid, arduous, dirty and dangerous work. As British magistrate Patrick Colquhoun put it in 1815, "Poverty is that state ... where the individual has ... no property or means of subsistence but what is derived from the constant exercise of industry in various occupations of life. Poverty is therefore a most necessary and indispensable ingredient in society, without which nations and communities could not exist in a state of civilisation. ... It is the source of wealth, since without poverty, there could be no labour; there could be no riches; no refinement, no comfort, and no benefit to those who may be possessed of wealth."¹²⁶
- The poor provide the justification for economic growth which is supposed to 'lift' people out of poverty by creating more jobs. To do this, the economy must be internationally competitive, which requires increased 'labour productivity', which means more capital (like machinery) employed per worker, which means that fewer workers are needed. South Africa's recent history shows a strong relationship between capital investment and workers redundancy.
- The poor provide legitimacy. With more or less sincerity, alleviating poverty is written into the mission statements of institutions as diverse as the World Bank, international aid agencies and NGOs as well as corporate social responsibility programmes. Ending poverty is an indispensable plank in political election platforms, central to the rhetoric of governments and a core justification for the state as such.
- The poor are held to provide consent through the vote but must be persuaded of some benefit. Development-as-delivery and measures such as free basic water and electricity lifelines, and social grants and public works respond to this. The minimum value of benefits is a matter of debate. Thus the South African government has refused the idea of a universal income grant on the grounds that it would create 'dependency' while the public works programme pays less than the minimum wage to avoid pressure on 'labour market' wages. Finally, the political system assumes consent unless its withdrawal is demonstrated through protest or riot. Managing dissent is a key competence of modern government and coercion is the other side of assumed consent.
- Within neo-liberalism, cost recovery on services to the poor provides the potential for capital accumulation through the privatisation of public goods.

¹²⁶ In *Treatise on the Wealth, Power and Resources of the British Empire*, quoted in Monthly Review Vol.52, No.8, January 2001.

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between the value of imports and exports. This balance of payments deficit is covered by flows of foreign investment into the local share market, but this is 'hot money' that can be withdrawn instantly as happened in 2002-03 when the Rand fell to over 13 to the dollar. It recovered equally dramatically, rising to 6 to the dollar by 2005, and the high Rand has since been supported by the rising price of minerals. A strong Rand off sets the high price of oil imports but comes at the cost of manufacturing, which was assumed to be the major creator of jobs, as South African products were priced out of export markets while cheap imports flooded into the local market. The volatility of the Rand thus marks the vulnerability of South Africa's economy in an increasingly volatile global economy.

The oil price has also fuelled inflation. In response, the Reserve Bank has lifted interest rates several times in the last year but, as Hendler et al [2007] note, this cure may finally provoke a recession and so prove worse than the illness. Having determinedly integrated into the global economy South Africa is very vulnerable to any global recession, whether caused by the declining power of the US or by global energy shortages in the wake of peak oil. Food price inflation is particularly significant and increases have been steepest in poor urban and rural areas. Unregulated trading has created a volatile market in maize, the staple of poor South Africans. In the last two years, the price has risen steeply, from R500 a tonne in October 2005 to R1,300 in 2006 and over R1,900 in 2007.¹²⁷ On September 29, Western Cape farm workers on the minimum wage marched on parliament protesting that there had never been such hunger in the land.

Carbon economy

South Africa positions itself as a victim of climate change and this will indeed prove to be the case. It is also the largest emitter of greenhouse gases in Africa and is currently ranked as the 11th largest emitter in the world¹²⁸ – up from 15th in the mid 1990s. This compares with its global economic ranking in the 29th place.

The National Climate Response Strategy for South Africa, authored by the Department of Environmental Affairs and Tourism (DEAT) in 2004, acknowledges the reality of

¹²⁷ Tumi Makgetla, *Forget Oil, look at food prices*, Mail & Guardian, October 22, 2006; and *Food price inflation under scrutiny*, M&G, May 20, 2007; Neva Makgetla, *Hunger stalks poorer households as maize prices fuel inflation*, Business Day, June 6, 2007; *Farmers expected to plant more maize*, Business Report, September 25, 2007.

¹²⁸ Joanne Yawich, DEAT, Energy Summit September 2007

climate change and emphasises the dangers to South Africa's economy over the next 50 years. Health experts expect increased water-borne diseases including malaria and bilharzia. South Africa is a semi-arid country and water resources will be increasingly stressed through reduced rainfall and increased evaporation, desertification, droughts and flood events. Rangelands will become drier and produce less food. Maize production, which provides 70% of total grains, is expected to decrease by up to 20% while pests and disease are also likely to increase. Biodiversity will be dramatically diminished to the detriment of the tourism industry. The fynbos and karoo biomes as well as large parts of the flagship Kruger National Park will have transformed unrecognisably by 2050 [Joubert, 2006].

The second set of threats that the Response Strategy identifies, is that South Africa's mining and energy industries are particularly vulnerable to climate change mitigation measures. Exports of fossil fuels, especially coal, and carbon intensive products could in future be penalised. Table 6 puts the carbon intensity of the South African economy in perspective.

Table 6: Energy sector carbon dioxide emission intensity in 2002.

	CO ₂ /cap	CO ₂ /GDP	Cumulative energy CO ₂ emissions from 1950 to 2000	
	t/capita	kg/1995	Mt CO ₂	Proportion of world total
South Africa	6.65	1.65	10,165	1.29%
Africa	0.89	1.16	13,867	1.75%
Non-OECD	1.65	1.33	318,117	40.23%
OECD	10.96	0.44	472,635	59.77%
World	3.89	0.68	790,753	100%

Source: Winkler [2005].

Notes: CO₂ includes emissions from fossil fuel use and cement manufacture.

South Africa is by far the largest emitter of carbon dioxide on the African continent – 10,165 Mt out of an all-African total of 13,867. It has the second most carbon intense economy in the world – after oil rich Venezuela – and the dubious distinction of hosting the single largest carbon dioxide emitter in the world, Sasol's coal-to-liquid

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(CTL) plant at Secunda.¹²⁹ Its carbon intensity and high emissions result from two fundamental and related reasons – its reliance on coal as its primary energy source and its cheap electricity policy.

Coal is used in three ways: it is converted into electricity by Eskom; it is converted into liquid fuels and chemicals by Sasol; or it is used directly as ‘final energy’ in industrial processes. The best quality coal is exported. Table 7 shows the latest statistics available from the Department of Minerals and Energy (DME). Coal provided 64% of primary energy in 2002, down from 80% in 2000. Coal sales have since benefited from the rising oil price and the proportion is now likely to be over 70%. Imported crude oil is the next largest source of primary energy and increased its share of the energy supply from 9.7% in 2000 to 22% in 2002. This suggests increased dependence on imported crude oil but rising prices have reduced its share since 2002.¹³⁰ It is mostly converted into liquid fuels by the oil refineries.

Table 7 shows that total primary energy (4,629 PJ) is about double the energy available for use as final energy (2,368 PJ). This is because more than half of primary energy is lost in the process of converting it into electricity and liquid fuels. A large proportion of the lost energy literally goes up in smoke through the chimney stacks at the power stations and refineries.

Table 7: Primary and final energy in South Africa in 2002.

	Primary energy		Final energy	
	PetaJoules	%	PetaJoules	%
Total	4,629	100.0	2,368	100.0
Coal	2,961	64.0	663	28.0
Crude oil	1,019	22.0	n/a	n/a
Renewables	426	9.2	189	8.0
Natural gas	84	1.8	47	2.0
Nuclear	131	2.8	n/a	n/a
Hydro	8	0.2	n/a	n/a
Electricity	n/a	n/a	665	28.0
Liquid Fuels	n/a	n/a	805	34.0

Compiled from The Digest of South African Energy Statistics [DME 2005].

Primary energy is the original source of energy. Final energy is the form in which energy is used.

¹²⁹ Joanne Yawitch, DEAT, Energy Summit September 2007

¹³⁰ According to the IEA, 14% of primary energy was met by oil in 2004 [Hendler et al 2007: 39].

The cheap electricity policy has been central to South Africa's industrial expansion strategies throughout its history and was written into the 1928 law that established Eskom as a state owned power utility. Cheap electricity relies on the abundance of coal in South Africa, cheap labour, extensive externalities [see Box 1 in Chapter 1] and huge additional historical and current subsidies. Until 2000, Eskom did not pay tax or dividends on the capital it was using. Industrial economist Grove Steyn¹³¹ remarks that its existing generation capacity of 40,000 MW is valued at R30 billion which is less than half the price of one new 4,788 MW coal fired station [see Table 11 below]. The subsidies embedded in the old plant translate into a substantial subsidy to energy and capital intensive industries in low prices.

Eskom has consistently resisted installing pollution controls and the results show in Table 8. In absolute terms, Eskom stands out even in the company of South Africa's other world class polluters. Sasol's coal-based processes are largely responsible for the extraordinary intensity of energy use in the petrochemicals sector. In terms of usable energy produced, Sasol is more pollution intensive than Eskom. By any other standard of comparison, the crude oil refineries are also pollution intensive because they use low quality of crude.

Table 8: Pollution from Eskom, Sasol and the Durban refineries measured in tonnes in 2006.

Pollutant	Eskom	Sasol (Global)	Durban refineries
Carbon dioxide (CO ₂ e)	203,700,000	75,448,000	1,908,385
Sulphur dioxide (SO ₂)	1,763,000	223,000	8,603
Nitrogen oxide (NO _x)	877,000	162,000	3,235
Particulate emissions	45,760	7,560	-
Hydrogen Sulphide	-	78,000	-
Volatile Organic Compounds	-	209,000	3,783
Methane	-	252,000	-

Based on industry reporting.

Notes:

Most of Sasol's emissions are in South Africa, from synfuel and chemicals production and crude oil refining at Natref. In 2001, Sasol started reporting methane separately from 'non-methane hydrocarbons'. This cut reported VOC emissions by over half but added to CO₂e emissions. As well as being a greenhouse gas, methane remains part of the local VOC cocktail impacting on health.

The Durban refineries are Sapref and Engen.

The Caltex Refinery in Cape Town gives no public account of its emissions.

Blanks may indicate the absence of data rather than of pollution.

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South Africa's per capita carbon intensity shown in Table 6 above is misleading. Firstly, access to energy and electricity is highly unequal. Table 9 shows that households use 16.4% of all electricity but most of this is used by the richest 40% of households.¹³² A large proportion of the population are 'energy poor', 30% do not have access to electricity and many who do use very little because they can afford electricity only for lights, TV and radio. For many people, access to electricity is intermittent. By 2000, 10 million South Africans had experienced cut-offs and many more are now cut off every month when they run out of money to feed the meter.

Secondly, people are not the main users of energy in South Africa. Residential demand is dwarfed by the electricity use of industry and mining at 62.7% of the total. The cost of electricity to energy intensive industries is the lowest in the world. The cost to households is relatively high and higher still for poor people on 'pre-paid' systems.

Table 9: Total energy and electricity demand by sector in 2002.

	Total Energy	Electricity
Industry	35.5%	62.7%
Mining	7.8%	
Transport	26.9%	3.3%
Residential	18%	16.4%
Agriculture	3%	2.5%
Commerce	6%	10%
Other	1.5%	5.1%
Non-energy	1.3%	-

Compiled from The Digest of South African Energy Statistics [DME 2005].

¹³² The 2006 groundWork Report shows how the residential share of total energy has been statistically inflated from 9% given in earlier official figures.

Box 18: Saving energy in the minister's green house

On 13 February 2006, Environment and Tourism Minister Marthinus Van Schalkwyk invited journalists to celebrate the “greening” of his ministerial residence in Cape Town. The occasion was the first anniversary of the coming into force of the Kyoto Protocol, and the start of Eskom’s Recovery Plan during the Cape Town blackouts. The makeover, by Eskom energy efficiency experts, included the installation of energy efficient lighting, solar water heating, better insulation, and other measures that would also be applied at the residences of other ministers and government leaders.

“Few people realise what it means when a switch is flipped and a light turned on,” said the minister, “The electricity has to be generated – in our case by Eskom. This means that coal needs to be burned, which in turn leads to the emission of greenhouse gasses – a major contributor to climate change.” Overall, the changes at his house would lead to “a 40% saving on the total energy consumed, with more than 80 litres of water, 31kg of coal, and 56 kg of CO₂ emissions saved every day. That’s more than 29,000 litres of water, 11,300 kg of coal, and 20,400 kg of CO₂ in just one year – in just one home.”

On these figures, the profligate use of energy at the ministerial residence amounts to a climate crime even after making these savings. Table 10 compares the carbon entitlements assumed by the minister with extravagant high income homes and cramped poor homes.

Table 10: Comparative carbon emissions, Minister's Residence

Households in Cape Town	Unelectrified, low income	Electrified, low income	Electrified, high income	Minister's residence before savings	Minister's residence after savings
CO ₂ emissions per year	1.75t	2.3t	8.84t	51t	30.6t

Calculated from SEA [2003] and minister's press release.

Calculations for the minister's residence are as follows: if 40% represents 20 400 kg of CO₂ per year (=20.4t), then the total (100%) = 51t, and the remaining 60% = 30.6t

Negotiating climate change

Climate change negotiations are now focused on the 'second commitment period' beginning in 2012 and agreement must be reached in 2009 if a new treaty is to be ratified by 2012. South Africa ratified the Kyoto Protocol covering the 'first commitment period' as a 'non-annex 1' country. As such it had no commitments to reduce emissions but is obliged to collect climate relevant information, to report its plans for mitigation and adaptation, and to raise awareness. Ratifying Kyoto thus cost nothing but barely concealed government hostility to what it made out to be a Northern environmental agenda intended to constrain Southern development and keep the South in its subordinate place. Thus, in the lead up to the 2002 World Summit on Sustainable Development in Johannesburg, South Africa's top environmental official told the parliamentary portfolio committee on environment that "developing countries were 'taken for a ride' in Rio with all the emphasis on environment and no focus on economic and social issues".¹³³

Government now professes to take climate change seriously. In 2005, it paraded six ministers at the first National Climate Change Conference. Speaking at the UN in September 2007, Mbeki berated the US for not taking climate change seriously and managed to sound like an environmental justice activist:

To billions of the poor [the] linkages [between poverty, the environment and the use of natural resources] are real, the combination of their empty bellies, their degraded environment and their exploited natural resources, for which they benefit nothing, defines a hopeless and heart-wrenching existence. Many of these who are the wretched of the earth, know from their bitter experience how their resource-rich areas were transformed into arid, uninhabitable and desolate areas forcing migration to better-endowed regions thus exacerbating conflicts and struggles for scarce resources.... we know very well that climate change, poverty and underdevelopment are not acts of God but human-made.¹³⁴

His government is now working on a new response strategy expected to be completed in 2008. Its priority for economic growth, which it now calls 'sustainable development'

¹³³ A. d'Angelo, Politics stands to undermine effectiveness of world summit, *Business Report*, May 8, 2002. Rio refers to the 1992 United Nations Conference on Environment and Development in Rio de Janeiro.

¹³⁴ Address by the President of South Africa, Thabo Mbeki, at the 62nd session of the United Nations' General Assembly, New York, September 25, 2007.

instead of just ‘development’, remains absolute however. It is participating more vigorously in international climate negotiations with the clear aim of avoiding second period commitments to reduce emissions. This is in continuity with the 2004 Response Strategy which argues the priority for development over environment in terms of global equity:

... international action on climate change issue can be viewed as a significant vehicle to redress the historic, inequitable and unsustainable north/south divide of the world’s economy and prosperity. In support of this objective, South Africa’s national climate change response programme strongly supports the New Partnership for African Development (NEPAD) initiative. [DEAT 2004: iv]

It carries on to suggest the “the relocation of energy intensive industries from annex 1 [developed] to non-annex 1 [developing] countries should be promoted” although it recognises that this “may give rise to negative environmental impacts” and “do little to alleviate the problem of unemployment”. It also argues that South Africa’s export coal markets should be expanded and protected: “Annex I parties ... should initially concentrate on domestic actions that will not negatively impact on the market for fossil fuels from developing countries” [7].

In 2006, South Africa chaired the G77+China negotiating block and said it would push for measures that support economic diversification and ensure that climate change action is aligned with ‘sustainable development’ objectives. Its approach confirmed two central thrusts of its climate change diplomacy: benefiting as much as possible from adaptation measures together with the poorer G77 countries, while pursuing the right to economic expansion and growing greenhouse gas emissions together with the richer developing countries like India, Brazil and Mexico represented in the G20.

The results show in the South African enthusiasm for the Clean Development Mechanism (CDM). CDM is seen as a strategy to attract investment and government bemoans the fact that Africa is not getting its share of CDM investment. The first South African CDM project was an NGO initiative to install solar water heaters for people in Kuyasa, in Cape Town’s Khayelitsha township. But the big money is not in solar water heaters or in energy for poor people. CDM is good business for polluters and the bigger the polluter, the greater the opportunity for carbon credits. Mittal Steel (formerly Iscor), one of South Africa’s most infamous polluters, has major expansion plans and is

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looking at what “could qualify for certified emission reduction certificates”.¹³⁵ Thus far, it has identified three potential CDM projects converting waste gasses and heat into usable energy. Meanwhile, the ‘Green Scorpions’ (the DEAT’s enforcement agency), found substantial breaches of environmental standards at two Mittal plants. Also in the polluted Vaal Triangle, the chemicals company Omnia is planning to earn R60 million per year by reducing its emissions of nitrous oxide by four million tonnes of carbon dioxide equivalents. Similarly, Sasol has registered a nitrous oxide abatement project which is “expected to earn significant income” from carbon credits.¹³⁶ The logic is chilling: companies that have the highest levels of current pollution, and have been allowed those levels of pollution through slack environmental regulation, will now be rewarded.

The perverse rewards created by Kyoto’s trading regime are now also playing into the climate negotiations. Southern countries are coming under heavy Northern pressure to accept commitments. If they do, it is likely that they will follow the Northern example of ‘grandfathering’ emissions rights. This means that future emission reductions are tied to the ‘baseline’ of historic emissions. So those countries with the biggest baseline get the biggest share of rights to emit in the future. If South Africa has a conscious strategy for pushing up its greenhouse gas emissions in anticipation of future reduction commitments, that strategy would look exactly like what it is in fact doing.

Southern countries are clearly justified in treating Northern negotiators with suspicion. Bad faith at the World Trade Organisation negotiations is echoed in the bad faith of Kyoto’s carbon trading regime. Yet the North-South division conceals a common interest in maintaining the present global division of labour. Southern countries compete vigorously for Northern corporate investments as industries move South looking for the cheapest energy, labour and environmental regimes while the North rigs the rules to keep profits, cheap goods and strategic resources flowing North. The North-South struggle is about the distribution of power between elites within that system but both sides have a common determination to preserve it. A dysfunctional climate regime allows each side to use the other as an alibi for inaction or failure.

It also provides an alibi for the world’s middle classes. In the European context, Monbiot observes that politicians “know that inside their electors there is a small but insistent

¹³⁵ *Carbon (Steel) Credits*, Creamers Engineering News, June 1-7, 2007.

¹³⁶ *Sasol clinches world first with emissions reducing project*, Creamers Engineering News Online, July 23, 2007. One tonne of nitrous oxide is equivalent to 310 tonnes of carbon dioxide, so such projects provide cheap credits and have been favoured in the carbon market.

voice asking them to try and to fail. They know that if they have the misfortune to succeed, our lives would have to change. They know that we can contemplate a transformation of anyone's existence but our own" [2006: 213].

Energy boom

In South Africa, a boom in CDM investments is the hoped for supplement to the boom created by high oil, minerals and food prices and the 'competitive advantage' provided by large reserves of coal and uranium. In a grim commitment to ever bigger business as usual, and with the state taking a leading role in directing investments, the electricity, coal, nuclear and petrochemicals industries, industrial agriculture and the missionaries of genetic engineering are planning major expansions.

In this future vision, energy conservation appears as a contingency. Conserving liquid fuels by transforming transport is scarcely on the agenda while, in the power sector, 'demand side management' is driven by the present limitations of Eskom's generating capacity. The utility expects to have restored its reserve margin of supply over peak demand by 2012. A second consideration is to save on the escalating cost of building new plant and a target of saving 8,000 MW by 2025, equivalent to two large power stations, has been set. This, however, goes against the grain of Eskom's history of aggressive marketing to expand electricity sales. Even *Engineering News*, which is seldom provoked to a critical comment, observes the irony of Eskom "having to champion efforts to curb consumption ... In the context of a tight spinning reserve margin of between 7% and 10%, little conflict arises, but there will be a definite conflict of interest when the utility overcomes its supply side constraint and re-establishes a reserve margin of about 15%".¹³⁷

Escalating energy prices are also driving a hoped for renaissance of nuclear power and uranium mining and this is now also given a perverse justification in the name of climate crisis. Similarly, industrial agriculture is advertising biofuels as 'green' energy as it touts for new markets and state subsidies. After years of blocking the development of actual renewables, Eskom has recently announced plans for centralised wind and solar power generation but regards renewables as a minor niche in the supply infrastructure. Plans to double generating capacity by 2025 are firmly founded on coal in the first place and nuclear in the second. Similarly, Sasol is planning to double CTL capacity

¹³⁷ Terence Creamer, *Powering Down*, Creamer's Engineering News, September 7-13, 2007.

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as South Africa looks for a hedge against rising oil prices. As a result of these plans – explored in more detail below – South Africa will surely climb yet higher up the global ranking of carbon emitters.

Coal, more coal!

Government sees coal as the main pillar of South Africa's energy future. The industry's fortunes were boosted during the oil crisis of the 1970s, and it is now benefiting from the rising prices of oil, whether the phenomenon of peak oil is officially recognised or not. The price of coal has risen sharply, topping \$100 a tonne in September, up from \$65 in 2006 and from \$35 in 2003. The 2006 price prompted speculation that coal "may overtake oil as the best performing energy investment."¹³⁸

South Africa exports about 72 million tonnes of coal per year and is expanding the capacity of the Richards Bay terminal and the rail corridor leading to it to nearly 100 million tonnes. At a cost of R4.9 billion, this was the first priority in Transnet's developmental investment budget of R47 billion.

Europe remains the biggest market, but growth in exports is to other developing countries. India plans to expand its electricity supply by 100,000 MW by 2020 and has offered to buy between 15 and 20 million tonnes of coal from South Africa. Indian firms are also looking to participate directly in coal mining in South Africa. China is probably the next big bet, having become a net importer of coal in 2007.

Expansion of coal mining in the Waterberg

South Africa claims ample new coal opportunities, first among them the Waterberg field which straddles the border with Botswana. The estimated South African resource of 75 billion tonnes is 40% of the total remaining coal resource in the country. The coalfield was discovered in the 1940s but only exploited in 1980 when the open pit Grooteegeluk mine was developed to supply the 3,990 MW Matimba power station near Lephalale. Exxaro, a privatised descendant of Iscor's mining division, currently produces 18.8 million tonnes per year from Grooteegeluk, of which 14.6 million goes to Matimba. Plans for the new 4,788 MW Medupi power station have recently been approved and Sasol is also eyeing the area for a new CTL plant.

¹³⁸ Emerging energy heavyweight, Creamer's Mining Weekly, August 11-17, 2006.

CTL is water intensive and Sasol's plans raise a major question around the availability of water. According to Eskom, Matimba is dry-cooled because of "the severe shortage of water in the area".¹³⁹ This reduces water use by 95% but the plant still uses 2,379 megalitres a year. The Mokolo Dam supplies both the Grooteegeluk mine and Matimba and was already fully utilised in the mid 1990s.¹⁴⁰

The field contains various grades of coal but most of it is difficult to access and would have to be gasified underground using such techniques as coal-bed methane extraction, according to *Mining Weekly*.¹⁴¹ This is done by pumping out the groundwater, and so adding to water stress, and then igniting the coal underground. The British coal authority claims that power generators using coal-bed methane can more easily capture the CO₂ and that the coal beds might then be used as carbon storage reservoirs.¹⁴² The Waterberg could thus serve as an experiment for 'clean coal technology'. It may also become the site of uncontrolled fires underground like those that have burnt for decades around Witbank in Mpumalanga.

With rising coal prices, it seems doubtful that climate change diplomacy will in fact penalise coal or energy intensive exports any time soon. Nevertheless, the industry sees its future hanging on the promise of carbon capture and sequestration (CSS). At present, there are 22 CCS projects of which only two are for coal fired power generation – the US FutureGen, expected to start in 2012, and Australia's ZeroGen project in Queensland, expected to be up and running in 2011. South African mining corporations have entered a 'clean coal' alliance with their Queensland counterparts and South Africa will host the 2008 Carbon Sequestration Leadership Forum. AngloCoal is now punting for global support for a CCS demonstration project in South Africa. The geological potential is doubtful, however, and there are no potential sites near the Mpumalanga coalfields where most coal is used. Even if CCS is proved, long distance CO₂ pipeline transport may be prohibitively expensive and probably leaky.

¹³⁹ See Eskom website: www.eskom.co.za.

¹⁴⁰ Basson, M.S., Van Niekerk, P.H. and Van Rooyen, J.A. 1997: Overview of Water Resources Availability and Utilisation in South Africa, DWAF.

¹⁴¹ *Mining Weekly*, June 29, 2007, and *Engineering News*, Oct 5, 2007..

¹⁴² www.coal.gov.uk/resources/boardmeetings/bmdecember1999futurepotentialoftheukcoalresources.cfm

Eskom's New Build programme

After running down its 'spinning margin' – the surplus of generating capacity over peak demand – to less than 8%, Eskom is now in overdrive to double its generation capacity from 40,000 MW to 80,000 MW by 2025. Thereafter, it will need to start replacing old power stations at the end of their working life. It also plans to double the grid transmission capacity particularly on the long lines to Cape Town and to the new demand centres such as Coega [see below].

Table 11 shows Eskom's power plant expansion plans. In the first phase, open cycle gas turbines are being added to boost peak supply; three mothballed coal fired stations in Mpumalanga are being recommissioned; and new coal fired stations are planned, starting with Medupi in the Waterberg and with 'Project Bravo', probably in Witbank, next. A third site in the Vaal Triangle is also being investigated although the big polluters there, led by Sasol, have objected on the grounds that the air is already fully polluted. Finally, Eskom plans on an ambitious expansion of nuclear power with new pressurised water reactor (PWRs) and possibly pebble bed modular reactors (PBMRs) to provide 25% of electricity by 2025. In addition to Eskom's expansion, power generation is being opened up to private corporations with 30% of new generating capacity to be sourced from independent power producers (IPPs).

In 2004, Eskom's capital expansion to 2010 was put at R87 billion. This was subsequently raised to R150 billion. In July 2007, CEO Jacob Maroga said the corporation had approved power generation worth R204 billion, transmission projects worth R15,5 billion and distribution projects worth R25 billion, but did not give the timeframe. By August, Eskom said it had spent R20 billion and was running R4 billion over budget because of rising costs in the global market for electric plant. The price, it seems, just keeps rising.

To pay for the expansion, Eskom is campaigning for an 18% rise in the regulated price of electricity in 2008 and a further hike of similar proportions in 2009-10. In addition to the capital costs of expansion, Maroga says that coal costs are rising too. Eskom is burning more coal than expected to meet increased demand and is buying between 15 and 20% – up from 10% – from mines not tied into long term supply contracts. He argues that the power supply to industry is the cheapest in the world – 74% cheaper than its nearest rival, Canada – and unless increases are granted now by the National Energy Regulator of South Africa (NERSA), a 30% hike will become necessary in 2009. Finance director Bongani Nqwababa explains that the cost of production from

the new coal plants will be 36c/kWh, double the current domestic tariff of 18c/kWh. At these prices, wind energy looks competitive although the cost of wind plant is said to have escalated along with other energy plant.

Table 11: Eskom's new build programme.

Name and location	MWatts	Status	Cost estimates
Peaking power plant			
Ankerlig, Atlantis, Cape Town.	1,325	4 units x 147.17 MW operating since June 2007, 5 more units planned	R2.5 billion for both
Gourikwa, Mossel Bay, Western Cape.	731	3 units x 146.29 MW in operation, 2 units to be built	
Ingula, Van Reenen, KZN / Free State.	1,332	Construction started, operational by 2012	R8.9 billion
Mothballed coal fired plant returned to service			
Camden, Ermelo, Mpumalanga	1,600	5 x 200 MW units operational since July 2005; Unit 6 operational by end 2007.	R20 billion for all three power stations, up from an original R12 billion
Grootvlei, Balfour, Mpumalanga	1,200	Units operational between end 2007 and end 2009.	
Komati, Middelburg / Bethal, Mpumalanga	1,000	Units operational between early 2008 and end 2011.	
New coal fired plant			
Medupi, Lephalale, Limpopo Province	4,788	Environmental clearance: 1 st of 6 units expected early 2011.	R78.6 billion
Project Bravo, probably Witbank, Mpumalanga	4,788	Not specified.	R84.4 billion
Nuclear, Pressurised Water Reactor			
Possible sites: Koeberg, WC. Pearly Beach, WC Thuyaspunt, EC. Port Nolloth, NC. Kleinsee, NC.	4,000	Initial EIA scoping in process. Construction planned to start 2009/10, Production planned for 2016.	R100 billion
Total	20,764		R294.4 billion

Compiled from Eskom website accessed September 2007 and media reports.

Trashing Mpumalanga's Lake District

The Mpumalanga Lake District around Chrissiesmeer lies at the headwaters of three major river catchments – the Vaal, the Olifants and the Komati. The lakes are unique because of their unusually clean water, natural beauty and bird life, and have been disturbed only by cattle farming. The area is a window on an ancient geological past, contains many San rock paintings and is a growing tourism destination.

The area also contains the closest coal resources to the mothballed Mpumalanga power plants. The return to service of these plants, together with increased export opportunities, has resulted in 114 applications for coal mining on farms totalling some 22,000 hectares. The planned open cast coal mining will destroy the water catchment. Within 5 to 10 years after backfilling an opencast mine, acid mine drainage starts – spilling acid water (pH 2.5) onto the surface and bringing with it iron, salts and heavy metals such as manganese, copper and zinc. It will poison the lakes and the soils around them¹⁴³ and turn an irreplaceable resource into a toxic waste.

Government insiders have revealed that some corporations have already started mining without permission. Others have dubious DME permits and are ignoring requirements to obtain permits from the Department of Water Affairs and Forestry (DWAF). As more irregularities come to light, wrangling within and between government departments is intensifying. The province is also concerned about carrying externalised costs. According to the Department of Transport, coal hauliers have caused damage estimated at R3 billion to Mpumalanga's roads of which Eskom has promised to pay R550 million.¹⁴⁴

The Wildlife and Environmental Society of South Africa (WESSA) points out that the DME has “more than 800 unrehabilitated mines already on its database, and an estimated cleanup bill of R100 billion”.¹⁴⁵ The prospect of a clean up following the trashing of the Lake District thus seems remote. Further:

If all the (low grade) coal from all these proposed small mines was given to Eskom, it would only provide power enough for the country for one year.

¹⁴³ Terence McCarthy, Bruce Cairncross, Jan-Marten Huizenga and Allan Batchelor: Conservation of the Mpumalanga Lake District, unpublished paper.

¹⁴⁴ DoT Director General, Mpumi Mpofu, speaking at the Energy Summit, September 2007.

¹⁴⁵ WESSA letter supported by GEAsphere. Undated.

The ... mines ... are mostly small operations with a short lifespan of 4 to 6 years that can at best offer the surrounding communities only 50 or so new short term jobs apiece, mostly as low paid sweepers working a miserable and unhealthy job.

The fight is far from over as environmental justice activists, more traditional conservationists and local landowners have joined together in common protest. They have no doubt about who is responsible. As WESSA puts it:

The destruction of this area is largely driven by Eskom. Many of the companies that have mining applications on these farms already have signed contracts from Eskom without even having embarked on the process of obtaining a mining license or even in some cases a prospecting license! The DME is obediently rubber stamping these through as fast as they can while trying to maintain a façade of legality.

Trashing Marapong

Rising construction costs are pushing up the price of the new Medupi station at Lephalale. It was first said to cost R70 billion but, by August 2007, had climbed to R78.6 billion. Lucky for Eskom – but not so lucky for the neighbours – the corporation is getting away without installing pollution abatement equipment, yet again. The DEAT has issued a Record of Decision on the environmental impact assessment (EIA) which gives Eskom permission not to install flue gas desulphurisation. In July, Maroga told *Engineering News* that Medupi was about R6 billion cheaper than Project Bravo's R84.8 billion because of "the lower air quality safeguards necessary at Medupi, given the relative lack of pollution in Limpopo" compared with Witbank.¹⁴⁶

The Record of Decision tells the story in the cruel poetry of official compromise. First, it quotes the findings of the EIA:

- The proposed power station is approximately 3 km away from the existing Matimba Power Station and the Marapong village.
- The existing Matimba Power Station does not have SO₂ and NO₂ abatement measures in place.

¹⁴⁶ *Engineering News*, July 27, 2007. The comment echoes the notorious internal memo circulated by World Bank official Lawrence Summers, in which he argued that poor countries were under-polluted and "the economic logic behind dumping a load of toxic waste in the lowest-wage country is impeccable ..."

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- The burning of coal in the proposed power station will potentially release significant amounts of air pollutant such as Sulphur Dioxide (SO₂), Nitrogen Oxides (NO_x), Carbon Monoxide (CO), and trace amounts of mercury.
- Ambient SO₂ levels resulting from the new power station are predicted to cause health effects in the Marapong residential area.
- The proposed power station will release significant amounts of greenhouse gases, namely Carbon Dioxide (CO₂) and Nitrous Oxide (N₂O).
- Ambient SO₂ standards are already being exceeded in the area where the new power station is proposed.
- Ambient air quality standards in the Marapong residential area are already being exceeded.

Then, it gives the decision to grant the authorisation:

- the proposed activities may lead to substantial detrimental impact on the environment;
- the need for the project has been adequately demonstrated;
- the activities will result in some socio-economic benefits, not only to the Lephalale area, but to the country as a whole;
- the implementation of the mitigation measures and conditions set out in this Record of Decision, are considered adequate to minimise detrimental impacts to acceptable levels;
- subject to successful implementation of conditions and mitigation measures, the proposed development is likely to be acceptable.

There are three main 'conditions and mitigation measures'. First, Eskom must continuously monitor ambient pollution, including in the village of Marapong. Marapong was established in the 1980s as a hostel for workers at Eskom's Matimba power station and the then Iscor (now Exxaro) Grooteegeluk mine. The hostel is now converted to family dwellings and individual stands have been established. Assuming it is carried out, the monitoring programme will make clear how much the people of Marapong are polluted, an ambiguous benefit in an area where ambient air standards are already, to DEAT's knowledge, regularly exceeded.

Second, Eskom must also institute a wider environmental monitoring programme, appoint an environmental control officer and support an environmental monitoring committee composed of local stakeholders. As part of this, it must initiate a local air quality programme in Marapong which will likely focus on pollution from domestic

sources. This aspect of the decision effectively puts Eskom in the driving seat of managing local responses to its own pollution. The set up is reminiscent of the industry driven Community Awareness and Emergency Response (CAER) committees established by the chemicals industries to manage local participation.

Finally, Eskom will be required to meet the SO₂ abatement measures which are yet to be published in terms of the 2005 National Environmental Management Act: Air Quality.

The Record of Decision itself reflects Eskom's dominance in its relation with the DEAT. The latter has never yet imposed pollution standards on Eskom and this raises the question of what the DEAT will do if the mitigation measures are not fulfilled or are not successful. Will it instruct Eskom to retrofit Medupi or Matimba with air pollution control equipment? That Eskom would agree to a retrofit which would cost more than installing the equipment from the beginning seems improbable. Would the DEAT shut down the power station to force compliance? That government would risk blackouts to enforce environmental laws is even more unlikely. The only credible scenario created by the Record of Decision is that the DEAT will, as it has done in the past, negotiate non-compliance.

Just across the border in Botswana, the Canadian CIC Energy Corporation is planning a third coal fired power station, Mmamabula, of between 4,200 and 4,920 MW. Even if Sasol does not locate its next CTL plant in the area, there can be only one conclusion for the Waterberg: its 'relative lack of pollution', as compared to the truly filthy Mpumalanga or Vaal Triangle hot spots, will soon be corrected. Perhaps the people can then look forward to its being designated a 'pollution priority area' complete with participatory air quality monitoring and multistakeholder processes.

Nuclear power surge

Nuclear energy shows the worst aspects of the electricity industry in concentrated form. According to Debeir et al, with nuclear energy,

... the social appropriation of energy reaches new heights of concentration and state control... the ecosystem's growing fragility takes on previously unknown forms and poses major problems (radioactive waste management, risks of major accidents) with no solution in sight. To this day, the nuclear chain has been inseparable from the technologies of the atomic weapon; the

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latter has proliferated as the former spread to new countries. ... the problems of the nuclear industry suggest that the energy system historically produced by industrial capitalism ... is drawing nearer to its limit. [1991: 167]

Just as nuclear touts have used climate change to proclaim a nuclear renaissance, so too South Africa's state managers have found it convenient to accept that "nuclear energy's contribution to greenhouse gases is negligible compared to fossil fuels", as the Nuclear Energy Policy and Strategy puts it [DME 2007b: 8]. This strategy foresees no problem with waste disposal, merely stating that a Radioactive Waste Management Policy and Strategy was approved by the South African government in 2005. The problem will not vanish at the wave of a strategy, as was dramatically illustrated when the US strategy fell apart in September 2007. The Guardian reports that rock samples from the Yucca Mountain in Nevada, where the US government was planning to store 70,000 tonnes of highly radio-active waste, showed a fault running directly underneath the proposed repository. More than \$8 billion (over R50 billion) out of a budget of \$58 billion has already been spent but the project may have to be abandoned.¹⁴⁷

The South African government also justifies its nuclear ambitions in terms of energy security, capitalising on its uranium deposits and retaining its nuclear skills base. Clearly, there are attractions in remaining part of the exclusive 'nuclear club' of international nuclear scientists and nuclear diplomats. South Africa joined the club because the US and Britain lost their access to sources of uranium on the wrong side of the iron curtain in Europe. It started extracting uranium cheaply from mine dumps where it was left with other wastes from gold mining. The US later donated the Safari research reactor and, in 1982, the French built Koeberg. Uranium enrichment facilities were developed at Pelindaba to supply fuel to Koeberg and to develop the 'apartheid bomb'. This facility was shut down in the early 1990s, relieving Eskom of the cost of subsidising NECSA's enrichment process.¹⁴⁸ Since then, cheaper nuclear fuel for Koeberg has been imported from France.

Pebble beds

Almost immediately, however, the nuclear scientists regrouped within Eskom with the ambition of developing the pebble bed modular reactor (PBMR), an unproven 'fourth generation' nuclear technology abandoned by the Germans. In 1999, PBMR (Pty)

¹⁴⁷ www.guardian.co.uk/usa/story/0,,2176842,00.html

¹⁴⁸ The de-commissioning process took many years. The DME budget for 2001 still shows R15.6 m allocated for closure of the fuel enrichment plant.

Ltd was constituted as a separate company owned by the South African government, the state owned Industrial Development Corporation, state owned Eskom and British Nuclear Fuels.¹⁴⁹ At that time, government planned to unbundle and privatise Eskom and the PBMR project was hardly likely to attract investors.

The estimated costs of constructing just the demonstration model have escalated from R1 billion in 1998, to R10 billion in 2004 and to around R16 billion now. Time frames for completion of the demonstration model have also receded. In 2005, Public Enterprise Minister Alec Erwin said, “Government wants to produce between 4,000 MW – 5,000 MW of power from pebble bed reactors in South Africa. This equates to between 25 and 30 PBMR reactors of 165 MW each. The project is now factored into our future energy planning from about 2010 onwards.”¹⁵⁰

Government claims it can market a further 75 reactors to other countries and evidently hopes to off load it on African and other developing countries, claiming that its small size makes it appropriate to those markets. PBMR is also pushing for niche markets, such as on-site heat and power generation for energy intensive industries, hydrogen production for transport fuel and sea water desalination. However, while the PBMR corporation regularly announces ‘interest’ in the PBMR, there have been no orders and no new investors.

PBMR clearly fits with government’s imagination of development. It is claimed to put South Africa at the leading edge of the global nuclear industry, pushing South Africa’s manufacturing industry up the value chain and creating a base for high-tech innovation and skills development. A key factor in government’s support, according to Erwin, is that PBMR employs more physicists than all South Africa’s universities combined.

Nuclear regurgitation

In October 2006, soon after the Cape Town blackouts, Erwin suddenly announced that the state was “considering” new conventional PWRs to meet electricity demand: “There will be debate around this issue but, as a country with an acute need to improve the lives of millions of our people, we have to take a hard-nosed pragmatic approach to

¹⁴⁹ In other words, three of the owners are the South African government while the fourth was the British government. BNFL has since sold its interest to Westinghouse.

¹⁵⁰ Opening address by the honourable Minister of Public Enterprises, Mr Alec Erwin, at the PBMR Supplier Conference, August 24, 2005.

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the issues of energy.”¹⁵¹ Clearly, the decision had already been taken. There was scarcely time to draw breath for debate before Eskom announced concrete plans for building a new PWR.

The decision adds a second track to South Africa’s nuclear ambitions. At a state Energy Summit in September 2007, Minerals and Energy Minister Buyelwa Sonjica told delegates that Eskom is investigating the construction of up to 20,000 MW of new nuclear capacity by 2027, while NECSA expects nuclear capacity to increase to about 27,000 MW by 2030, “including 12 new large PWR units and an initial set of 24 PBMRs”.

To fuel these plants, along with South Africa’s high tech ambitions, former Eskom CEO Thulani Gcabashe has been tasked with coordinating the rebuilding of the nuclear supply industry from mining to fuel fabrication and transport. A fuel enrichment plant at Pelindaba is expected to be completed by 2010, according to Sonjica. Nuclear engineers are being trained by Lesedi Nuclear Services, a local subsidiary of the French nuclear corporation Areva, while engineering company DCD-Dorbyl has proposed a ‘nuclear manufacturing hub’ at the Coega industrial development zone near Port Elizabeth.

While the official plan for a nuclear future is only expected in March 2008, Eskom is already deciding where to build the first new PWR. The environmental impact assessment is now in process and Eskom says construction will start in 2009 or 2010 and electricity production in 2016. The station is similar to Koeberg – PWR and sea water for cooling – but more than twice the size at 4,000 MW with provision for expansion. The estimated cost is R100 billion but the history of cost overruns on nuclear projects would suggest this figure should be multiplied by three or four.

Potential locations are: Thuyaspunt near Port Elisabeth in the Eastern Cape; Bantamsklip near Pearly Beach in the Western Cape; Duynfontein, the site of Koeberg; Brazil between Kleinsee and Port Nolloth in the Northern Cape; and, not far from Brazil, the farm Schulpfontein near Kleinsee. Eskom says the PWR should be close to the main centres of demand. This suggests that the Eastern and Western Cape sites will be the front runners. On the other hand, the Northern Cape locations might fold into Eskom waste plans if, as is suspected, it intends sending high level nuclear waste to the existing low level waste dump at Vaalputs, near Springbok in the Northern Cape.

¹⁵¹ Cape Argus, October 3, 2006.

Whatever site is chosen, the plans announced by Sonjica suggest that all sites will be lined up on the way to 2030 and local opposition is building as will be described in Chapter Five.

The planned revival comes before the nuclear industry has taken care of the mess it left in apartheid times. In 2005, Earthlife Africa's Nuclear Energy Costs the Earth Campaign was approached by a number of ex-NECSA workers who suspected that they had contracted radiation diseases. The organisation's investigations found that more than half of the workers had likely contracted radiation-related diseases. NECSA then instituted its own enquiry but refused Earthlife's demand for an open, participatory process. The results of this secretive enquiry have not been released to date.

Yellow cake

In the late 1970s, South Africa was the world's largest producer of uranium, with nearly 16 million pounds per year from 17 mines and 21 uranium plants producing 'yellow cake'. Some dedicated uranium mines were opened on the West Rand but most uranium was, and is, a by-product of gold mining and therefore cheaply mined. It seems unlikely that these facilities were ever decontaminated. Mines only became subject to nuclear regulation in the early 1990s, according to the DME [2000], and of 30 contaminated off-mine sites, only 6 had been rehabilitated.

New uranium mining will compound the situation. The World Nuclear Association forecasts rapidly expanding demand, the price is rising and the corporate scramble for Africa is now about uranium as well as oil. Corporations are exploring for new mines in Niger, Namibia and South Africa, which are the traditional producers, as well as in Botswana, Mozambique, Tanzania, Malawi, Madagascar, Central African Republic, Congo, Senegal, Guinea and Morocco. In South Africa and Namibia, *Engineering News* lists production projects at: Uranium One's Dominion Reefs, based on two former uranium and gold mines, near Klerksdorp; First Uranium's Ezulwini on the West Rand; Uramin's Ryst Kuyl in the Karoo near Beaufort West; and Paladin's Langer Heinrich in the Naukluft nature reserve in Namibia which was brought into production in March 2007. Rio Tinto is also looking to expand production at its Rossing mine in Namibia which, three years ago, it was considering closing. South African gold miners, notably AngloGold Ashanti, are also looking at their resources.¹⁵²

¹⁵² See for example Mining Weekly Projects in Progress; *Africa a hotbed of uranium exploration*, Mining Weekly, September 14, 2007.

Box 19: Radioactive river

In 2007 the National Nuclear Regulator (NNR) confirmed local suspicions that uranium and other radio-active elements had accumulated in river sediments and groundwater systems in the Wonderfontein Catchment Area (WCA). The report warned that “the past and present discharges of radio-nuclides into the WCA as a consequence of mining activities can lead to considerable radiological impacts to the public via various exposure pathways, exceeding significantly the natural background level and also the dose limit for the public of 1 milli Sievert per annum, at several sites” [NNR 2007: 11].

Exposure pathways include the use of river water for irrigation, absorption by cattle which drink from the river, and use of land contaminated during floods. It stands to reason that anybody who uses water from the river directly would be at a similar risk. The Wonderfontein flows through the western part of the Witwatersrand gold basin, draining old slimes dams and rock dumps from the gold and uranium mines in a section stretching from Krugersdorp and Kagiso to Carletonville and Khutsong. It then joins the Mooi River which feeds into the Potchefstroom municipal water supply. Local farmers and the Potchefstroom Petitioners have organised themselves to take action on the issue, while the NNR “has been in discussion with various stakeholders such as mining operators, other regulators and local authorities to address the areas of concern” [2007: 14].

The current boom in uranium prices is not in fact a response to new nuclear reactors being built. Very few are under construction and most talk of a nuclear renaissance refers to ‘plans’ and ‘intentions’ – in other words, industry hype. Some analysts conclude that the hype is cover for a different objective: to extend the lifetime of existing reactors.¹⁵³

Hydro and big dams

Not content with coal and nuclear power, Eskom is expanding into Africa via the New Partnership for Africa’s Development (NEPAD), which it co-authored. The central idea is to build a continental African grid which could export electricity to South Africa – or to Europe. Grand Inga, estimated to cost US\$80 billion (R560 billion), is

¹⁵³ Mycle Schneider, personal communication, April 2006

designed to produce 52,750 MW from a series of turbines at the Inga Rapids on the Congo River. The project starts with the rehabilitation of two existing dams – Inga 1 (351 MW) and Inga 2 (1,424 MW). The next phase includes Inga 3 (3,500 MW) and 3,000 kilometres of transmission lines. Terri Hathaway of the International Rivers Network reported in 2005¹⁵⁴ that the 52 turbines will have extensive impacts on the river, that transmission losses will be huge and that the electricity will bypass the local population. Apparently, the Inga Project is applying for CDM funds, despite evidence that dam building results in significant greenhouse gas releases.

South Africa was the host of the World Commission on Dams but seems to ignore its conclusions on the devastating effects of large dams, including the removal and impoverishment of people and the disruption of life-supporting eco-systems. Most easy dam building locations in South Africa are already dammed but, in October 2007, South Africa and Namibia announced that they were considering a joint hydropower project on the lower Orange River. The river system is already heavily dammed. Thirsty Gauteng imports water from the Lesotho Highlands Water Scheme in the upper catchment, with two dams built and three more planned, and the very large Gariep dams the middle river.

Renewable energy

CDM was originally touted as promoting renewable energies. Thus far, it has largely failed to do so. Following intense lobbying from environmental organisations for a renewable energy target, the DME finally obliged but set a ridiculously low target. Renewable energy is to contribute 10,000 GWh to final demand by the year 2013. If this is a ‘per year’ figure, renewable energy will amount to 1.5% of final consumption. But if this is cumulative over ten years, as some DME officials have argued, this will be 0.15% of final consumption, which is less than the natural increase in renewable energy anyway. Either way, this will make very little difference to carbon emissions. The Response Strategy compares the target to the current 67,828 GWh per year of biomass use – more than half of it from using waste in the sugar and timber industries, and the rest from rural wood collection.

Eskom has set itself a miserly target of 1,600 MW capacity of renewable energy by 2025, on condition that these are “multi-Megawatt options for grid supply”.¹⁵⁵ In the

¹⁵⁴ http://www.irn.org/programs/congo/pdf/050907illusions_eng.pdf

¹⁵⁵ Mandy Rhambaros, Eskom, Energy Summit 2007

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meantime, it is planning a 100 MW windfarm on the West Coast and considering a 100 MW solar power plant for which a feasibility study is under way and a decision is to be made at the end of 2007.

Demand Side Management

The Cape Town blackouts in 2006 stirred Eskom into a renewed interest in demand side management (DSM) and it is planning on saving 8,000 MW, the equivalent of two new coal fired power stations, by 2025. Its 2013 target is 3,000 MW against a budget of R10 billion. A third of the savings in this first period – 1,000 MW – is expected from efficient lighting with the “mass roll-out of energy-saving bulbs in public buildings, the outlawing of energy-heavy lighting systems”, automated light switches, and efficient street lights. Further saving will come from installing 1 million solar water heaters by 2013 (with ripple control for their electrical components) and from a “dynamic market participation initiative”.¹⁵⁶

Table 12: Eskom's Demand Side Management

Means	Savings by 2013	Comment
Energy efficient lighting	1,000 MW	CFLs (Compact Fluorescent Lights), with no mercury recycling strategy
Solar water heaters, residential and commercial	650 MW	Increase rate of installation from 7,000 to 200,000 per year, achieve 1 million by 2012
'Dynamic market participation' initiative	1,000 MW	Financial incentives for energy efficiency projects, including new equipment, reducing and shifting consumption
Other	350 MW	

Eskom estimates that 90 million bulbs are used by households nationally. If all were replaced by CFLs, 2,100 MW would be saved. Since each CFL contains at least 5 mg mercury and lasts about three years, this adds up to 150 kg of mercury in the environment every year. Dealing with the mercury problem is integrated in plans to roll out CFLs in other countries but, despite the Cape Town experience, Eskom makes no mention of it.

¹⁵⁶ Engineering News, September 7, 2007

Whose energy demand? The case of Coega

The frenetic expansion of electric power is driven by demand, according to government. Speaking of the supply constraints, Public Enterprise Minister Erwin says “we were caught napping by our own economic success”.¹⁵⁷ Eskom, however, says its planning is now based on Asgisa’s 6% GDP growth target instead of actual growth projections of around 4%, a planning assumption that may inflate future demand. Government policy of leveraging the ‘competitive advantage’ of cheap energy appears calculated to ensure that demand does indeed inflate.

In 2006, after years of negotiation, the state finally landed a deal with Alcan to build an energy intensive aluminium smelter as the anchor tenant at the Coega industrial development zone (IDZ) outside Port Elizabeth. The deal was baited with a hefty energy and tax subsidy. Alcan is the first beneficiary of a Developmental Electricity Pricing Programme (DEPP), announced in the same breath as the closure of the deal, and will use half the cut rate power made available through the programme.

IDZs were conceived in 1996, along with the neo-liberal GEAR policy, as a local version of export processing zones typically used to attract investments with tax cuts, custom cuts and reduced environmental and labour standards. Thus far government has not reduced standards although weak enforcement may have the same effect. Coega was advertised as creating growth and jobs in the impoverished Eastern Cape. Following the controversial arms deal, it was touted as the location of ‘industrial offset’ projects to be carried out by winning arms supply bidders. Coega, however, did not appear to be an attractive destination and successive deals fell through.

The rationality of the Alcan deal is questioned even by South Africa’s growth-happy business press. *Engineering News* questioned whether South Africa should pursue “yet another energy-intensive smelter” when it is struggling to meet power demands and whether “a strategy that seeks to leverage low-cost energy, derived from the burning of carbon-dioxide emitting coal, is acceptable in the context of a world threatened by climate change”.¹⁵⁸ A *Business Day*¹⁵⁹ editorial asked, “How far will the government go to attract foreign direct investment – and at what cost?” It noted that government has spent R5 billion thus far on developing the Coega IDZ while another R14 billion

¹⁵⁷ Alec Erwin, Minister of Public Enterprise: *Generating electricity*, 31 May 2006 at www.dpe.gov.za

¹⁵⁸ Terence Creamer, *Engineering News* editorial, August 31, 2007

¹⁵⁹ June 25, 2007

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is still to be spent on the associated deep water port and container terminals and other infrastructure. This includes R6.4 billion that Eskom is understood to be investing in high-voltage transmission infrastructure to supply the power for the smelter. “As if that was not enough, the government sweetened the deal with a R1.93 bn tax incentive.” Business Day concluded:

Essentially, South Africans will therefore be heavily subsidising the Coega smelter with cheap electricity at a time that they themselves will cough up considerably more for power – if they can get it. It’s a lot to give away to a project that can in no way guarantee that Coega will become the industrial hub its creators dreamed of.

Aluminium smelters are such intense energy users that plant location is largely determined by the price of electricity. Bauxite, the raw material, is one mineral not found in South Africa and is imported while most of the aluminium is exported. Alcan’s smelter will produce 720,000 tonnes of aluminium a year and will require 675 MW electric supply capacity, rising to 1,355 MW in a second phase expansion. Effectively then, South Africa is simply exporting energy and the DEPP will provide it at cut prices over a period of 25 years.

Government, Eskom and Alcan have used the usual alibi of ‘commercial confidentiality’ to conceal just how cut the price is. The activist organisation Earthlife Africa went to court to force Eskom to reveal details of the deal in the public interest but was refused. Nevertheless, Earthlife calculated that “a reasonable estimate of the price of electricity granted to Alcan is around 15% of the price charged to Soweto residents (or about 5 c/kWh). This would be substantively lower than the industry and residential average rates of 16c/kWh and 29c/kWh, respectively”.¹⁶⁰

Local organisations also question the deal, arguing that the environmental and health costs will outweigh the benefits to the local economy [see Chapter 5]. Greg Smith of the Nelson Mandela Bay Municipality Local Environmentalists (Nimble), said decision-makers were “stuck in the poverty versus environment scenario. It doesn’t have to be like that. We don’t have to destroy people’s health to give them jobs.” Alcan will create only 1,000 jobs at a cost of R5 million each and “at least 300 will only be available to highly skilled professionals, probably many from overseas”.¹⁶¹ The

¹⁶⁰ Earthlife Africa (Jhb) press release: National Day of Action against Alcan, May 7, 2007.

¹⁶¹ Letter to The Eastern Cape Herald, June 15, 2007.

pollution, however, will destroy other jobs and opportunities along with the resources of an environmentally sensitive area.

Government has invested its prestige as well as big money in Coega. After a decade of trying to lure an anchor tenant, it evidently saw Alcan as a make or break deal. It now anticipates that this is just the start and others will follow Alcan's lead. The Coega Development Corporation (CDC) is negotiating with Ferrostaal to land a R1.1 billion stainless steel plant to go alongside Alcan in a growing metallurgical cluster. A chemicals cluster is intended next door and CDC is negotiating with several groups for a large new refinery [see below] and with a Singapore group for a R5.8 billion chlorine factory and desalination plant. It is also negotiating with several smaller industries, including local industries which may be attracted to the IDZ for the benefits but at a loss to the local economy. The CDC hype is occasionally comic. Thus, it boasted the prospect of a US investment of R20 billion in a prawn project which, a week later, had become a R7 billion shrimp project. Given the inevitable pollution the questions arise as to who will want to eat these prawns – or shrimps – and whether consumers will be told where they come from.

Coega is not alone. Cheap energy for the capital and energy intensive industries at the heart of South Africa's minerals and energy complex remains central to the state's strategy for growth in the 'first economy' and to Eskom's own growth strategy. Major expansions are either planned or in progress in the Mpumalanga platinum mines, at the Hillside and Mozal aluminium smelters, at Columbus Steel and Mittal, and at Sasol, while Indian conglomerate Tata has started construction on a high-carbon ferrochrome plant at Richards Bay. In each case, the corporations will be haggling over the electricity price and seeking to ensure that increases following from the costs of building new generating capacity are laid at someone else's door. And the net result will be to lock in carbon intensive economic growth for the next twenty years and more.

Liquid fuels

In late 2005, and coinciding with the start of the Cape Town power blackouts, fuel shortages hit several areas of the country. The causes were largely technical, relating to a switch over to tighter fuel standards – 'Cleaner Fuels Phase 1' – and failures of refinery planning. Government was duly alarmed at the prospect of future shortages. A DME study estimated that a complete collapse of supply would cost the country

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close to a billion Rand a day and the Department then developed an Energy Security Master Plan – Liquid Fuels [DME 2007a].

In the plan, the priority for growth is absolute. The document uses ‘affordability’ to link poverty alleviation to growth, emphasising that energy is a “strategic input to a resource-intensive South African economy” [14]. In contrast to most economic planning documents, the Master Plan repeatedly refers to environmental management and climate change. However:

In the short-term, South Africa cannot sacrifice its development at the altar of the environment but in the long-term, unless South Africa, along with the rest of the world, does something about global warming, its own economy is threatened by climate change. [31]

It also sounds a warning on oil depletion: “a transport strategy that is over 90% dependent on oil is guaranteed to land South Africa in serious trouble in a few years time. No form of planning will find South Africa oil, when it has all been mined or acquired by those with more might or insight” [8]. As with global warming, peak oil is effectively treated as a long term issue.

The plan proposes a range of interventions, most of which are already being pursued. Fuel transport and storage infrastructure is to be massively expanded. A proposal for a privately operated pipeline to import refined product through Maputo to Gauteng has recently been given government approval and government itself is planning a major new multi-product pipeline from Durban to Gauteng. Rail transport capacity and port handling capacity is also to be expanded. Finally, the plan calls for an expansion of refining capacity.

Petrochemicals

South Africa’s liquid fuel supply is unique in that around 27% is produced as synfuels, mainly from coal-to-liquids (CTL) but with some gas-to-liquids (GTL). It is a very minor crude oil producer but nearly tripled production between 2003 and 2004 to account for some 7% of its own crude oil use. About 70% of liquid fuels are refined from imported crude oil, mostly low grade crude from Saudi Arabia and Iran.

Table 13: South African Refineries

Refinery	Location	Owned by	Fuel source	Capacity barrels/day
Calref	Cape Town	ChevronTexaco (Caltex)	Crude oil	100,000
Engen	Durban	Petronas 80% & Worldwide Africa Investment Holdings 20%	Crude oil	150,000
Sapref	Durban	Shell 50% & BP 50%	Crude oil	180,000
Natref	Sasolburg	Sasol 64% & Total 36%	Crude oil	108,000
Secunda	Secunda	Sasol	Coal	150,000
Mossgas	Mossel Bay	PetroSA	Gas	45,000

Notes:

Sasol and Mossgas synfuels are given in barrels of oil equivalent.

Engen's technical capacity is 150,000 but its official capacity is given at 125,000 barrels/day.

CTL is the most energy intensive and polluting method of producing liquid fuels thus far devised by the ingenuity of the industry. The low grade of imported crude contributes significantly to the energy and pollution intensity of the refineries. This oil is considerably cheaper than the benchmark Brent crude, thus saving “the country billions of dollars in foreign exchange” [DME 2007: 31] but not saving refinery neighbours from heavy pollution impacts.

From 1992 to 2003, the oil refineries expanded capacity aggressively, satisfying rising demand in South Africa and opening new export markets, mainly in Africa. Responding to intense campaigning, coordinated and sustained over many years by the South Durban Community Environmental Alliance (SDCEA), the south Durban refineries made environmental improvements conditional on such expansions, claiming that they were not otherwise affordable.

SDCEA also pushed government to retrieve some credibility for its collapsed regime of environmental regulation. This resulted in the Durban ‘multi-point plan’ which promised credible monitoring and tighter regulation under new legislation – eventually passed after five more years campaigning as the National Environmental Management Act: Air Quality of 2005. It was an ambiguous victory as the Island View explosions in September indicate. The new regulatory regime essentially provides for ‘end of pipe’ mitigation for an inherently polluting industrial production regime. It

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saves industry rather than people and their environments and, in south Durban, was specifically used to defend government ambitions to create a chemicals cluster centred on expanded refinery production. SDCEA's bolder proposals for rethinking the basis of development were brushed aside. As early as 1998, it argued that peak oil would result in the collapse of the petrochemicals industry within a few decades. Durban was therefore investing in a dying, bankrupt and toxic future that would diminish the future options of its citizens.

Despite the expansions, South Africa has been importing refined product and diesel in particular since 2005. According to the liquid fuels Master Plan, "Current high economic growth rates, although most welcomed, have caught most participants unprepared, resulting in the inability to respond fully to a sudden increase in demand for petroleum products ..." [2007: 19]. The expansion of power generation adds a new dimension to this demand as Open Cycle Gas Turbines, used as peaking plant, are driven by diesel. Depending on the balance of electricity supply and demand, they will require between 296 million and 1.78 billion litres a year.

It may be anticipated that a new round of expansions will accompany 'Cleaner Fuels Phase 2'. Greenfield proposals are also coming in. BEE group Bidevco is investigating a new 200,000 b/d oil refinery, probably to be located at the Coega IDZ, with an eye for exporting refined product ahead of supplying the local market. In late October, state owned PetroSA similarly announced that it was considering a new 200,000 b/d refinery at Coega at an estimated cost of R39 billion. Coega competed with four other sites to 'win' selection as the preferred location. The final decision on the investment will be made around 2010. It is not clear if these are rival bids or if Bidevco will participate in a public-private-partnership with PetroSA. Meanwhile, Sasol says it is convinced of the need for a new inland refinery and is 'fast-tracking' preliminary studies for its proposed new CTL plant. Government has also expressed a preference for a new refinery close to the key market of Gauteng and is encouraging this project.

High tech pin-up

Sasol is the poster boy of South Africa's industrial strategy. Set up by the increasingly isolated apartheid government in the 1950s, it developed the only commercial CTL plant in the world together with a string of heavy chemicals plants. It is now positioned as a global technology leader, active in 35 countries and linked into global production networks through partnerships with a range of leading transnational corporations, including ChevronTexaco, and state owned corporations such as Qatar Petroleum. Its

exports are founded on high value chemical design services as much as on the export of commodities – primarily coal and heavy chemicals.

The corporation is making hay in the global sunshine of high oil prices. It has signed an agreement with China and looks set to develop two 80,000 barrel a day CTL plants in that country, it has joined with US counterparts to lobby for government handouts for new synfuel plants and is looking for a major slice of the action. It is 'in talks' with the Indian government. Sasol is also in a leading position on the development of GTL plants. Its new plant in Qatar, a joint venture with state owned Qatar Petroleum, went into production in late 2006 although it has not yet performed to specification. It is also building a GTL plant in the Niger Delta in partnership with Chevron. Nor has the corporation neglected conventional oil and gas. Its Temane gas field in Mozambique feeds its South African plants and it is active in oil exploration and production in West Africa.

In South Africa, it gained windfall profits on the rising oil price because, while the fuel price is regulated in relation to crude prices, its synfuel production depends on coal which Sasol itself mines. For most of its history, the expensive CTL process has been heavily subsidised by government. In 2006, Finance Minister Trevor Manuel therefore announced an investigation into whether Sasol should be slapped with an additional tax on the windfall. Sasol responded by suggesting that more subsidies might be appropriate, arguing that the international trend was to provide incentives for 'alternative fuels'. The windfall tax was waived and, perhaps, was little more than a negotiating ploy. Government has now agreed that it will focus on facilitating expansion while Sasol is undertaking a pre-feasibility study for 'Project Mafutha', a new greenfield 80,000 barrel a day CTL plant. It is investigating sites in the Free State province and the Waterberg area in Limpopo province where Eskom is already polluting the air. In the meantime, Sasol is already expanding its Secunda synfuels plant to add 20% production capacity over the next 10 years.

Rebranding itself as an environmental leader is perhaps Sasol's greatest innovation. Within the discourse of ecological modernisation – the World Bank's version of sustainable development – it has indeed made significant improvements, but off an appalling base. The essential problem for Sasol is that its processes are inherently energy, carbon and pollution intensive.

For GTL, production is more energy intensive than oil refining but Sasol claims that the superior performance of GTL fuels off sets higher carbon emissions at the plant.

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Over the life cycle of production and consumption, “total [greenhouse gas] emissions of the GTL system may vary between 12% less and 11% more than the refinery system, depending on assumptions about the nature of the operating conditions” [2006: 21]. Sasol claims more significant reductions in sulphur dioxide, nitrogen oxide and volatile organic compound emissions from GTL.

“The case for promoting coal,” according to Sasol, “is strengthened by the development of clean coal technologies and the need for energy security” [2002: 20]. For CTL, ‘clean coal’ comes down to carbon capture and storage (CCS) and a choice of integrated gasification combined cycle (IGCC) or gas to power the plant itself. Regrettably, neither CCS nor coal fired IGCC are proven technologies. Be that as it may, Sasol compares three variations of CTL plants – coal fired plants, IGCC fired plants and gas fired plants – with a standard refinery. It then runs the comparison again using CCS with each type of CTL plant. In Table 14, the numbers¹⁶² are relative to a refinery set at 1.0.

Table 14: CTL CO₂e emissions compared with a conventional refinery = 1.0

CTL	Coal fired	IGCC fired	Gas fired
Without CCS	2.5	1.5	2.0
With CCS	1.5	0.8	1.0

The results of its studies show that a conventional CTL emits 2.5 times as much CO₂e as a conventional refinery. The credibility of this claim seems doubtful. In 2004,¹⁶³ Sasol’s Secunda plant emitted 52 million tonnes of CO₂ while the larger Sapref refinery emitted 1 million tonnes. With CCS, it claims that CO₂e emissions drop to 1.5 times those from a refinery. The combination of IGCC and CCS yields the lowest greenhouse gas emissions, a little below the level of a conventional refinery.

In short, on Sasol’s own information, replacing conventional oil with GTL or CTL, however modified, presents no climate change advantage over the conventional oil system that got us into the climate crisis in the first place. These results should also give pause to those who have advocated, however reluctantly, CCS as a last ditch solution. Even assuming the carbon stays where it is put, CCS does not necessarily reduce greenhouse gas emissions to anywhere near zero.

¹⁶² Sasol presents the information in a bar chart. These numbers are the best reading we can make of it.

¹⁶³ This is the last year that The groundWork Report was able to access figures for local site emissions as opposed to global emissions.

Biofuels

Biofuels were originally part of small scale, sustainable farming methods, before they were hijacked by large scale monoculture with glad-eyed genetic engineers in tow. In India, for example, it was envisaged that village-based technologies would produce ethanol and create an extra market without damaging the locally controlled production regime. Small scale biofuel production for local use remains a viable renewable energy option.

The Citizens United for Renewable Energy and Sustainability (CURES) Southern Africa has developed a set of preconditions for a “pro-poor socially, economically and environmentally just approach to biofuels” which mirror the many concerns about current development.¹⁶⁴ In essence, they aim to prevent the intensification of industrial agriculture, the corporate take over of land, water and forest resources, the displacement of food crops and escalating environmental damage.

The DME’s Draft Biofuels Industrial Strategy [2006] breaches most of the CURES preconditions and effectively aims to expand fuel production via industrial agriculture. It proposes to replace 4.5% of liquid fuels by 2013 through mandatory blending, requiring 8% ethanol in petrol and 2% biodiesel in diesel. The fuel would be blended and sold through the existing oil industry infrastructure.

The target implies production of about one billion litres of biofuels a year. This would, according to *Engineering News*, save R3.7 billion on crude oil imports and go three quarters of the way towards achieving the country’s renewable energy target of 10,000 GWh by 2013. In practice, this implies that the already paltry support for real renewables will be turned into support for the industrial agriculture and transport fuel industries. The strategy expects that the biofuels industry will contribute around 0.12% to economic growth and so contribute to the Asgisa target, and claims that 55,000 new jobs could be produced based on the labour intensity of commercial farming. This is, of course, nonsense. Commercial farmers will simply divert production to the new market while low paid jobs will come at the cost of subsistence in the former homelands.

The strategy does not propose new agricultural subsidies but does propose price supports for biofuels producers when the crude oil price is below \$45 a barrel with a

¹⁶⁴ CURES Southern Africa, (undated brochure) Towards a Southern African NGO Position on Biofuels

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pay back mechanism when oil rises above \$65. This appears to be modelled on the deal made with Sasol in the 1980s. The pricing assumptions, however, are already overtaken as food prices have escalated alongside oil prices. The strategy also proposes that the existing 100% exemption from the fuel levy for biodiesel be extended to ethanol. That is not enough for the Southern African Biofuels Association, who have said that they need between R2 and R5 billion a year from the government to get a capital intensive industry off the ground. Finally, the strategy suggests that biofuels will qualify for carbon credits under the CDM. In its comment on the strategy, the Botanical Society noted that the life cycle carbon balance of biofuels is negative, particularly if it involves the clearance of uncultivated land.

The targeted crops are maize and sugar for ethanol, and soya and sunflower for biodiesel, while the potential for using a range of other crops as well as algae is being investigated. Proposals for genetic engineering to enhance ethanol production are being advanced by the industry which sees biofuels as a way of getting around health concerns relating to genetically modified (GM) food. They include a proposal for modification of thirsty, fast growing Eucalyptus trees which would intensify the pressure exerted on ecosystems by commercial plantations.

A number of projects are being planned or are in the process of start-up, giving an indication of where biofuels activities can be expected. The small towns of Hoedspruit and Ogies in Mpumalanga have been identified by the Industrial Development Corporation (IDC) and the Central Energy Fund (CEF) for a R3.2 billion biofuels project. Three other investment areas identified by the IDC are Cradock and Pondoland in the Eastern Cape, and Makhathini in KwaZulu-Natal. The IDC expects the Hoedspruit plant to produce 100 million litres of biofuel from sugar cane in its first year, and the Ogies plant to produce 150 million litres from maize bought from local farmers and traders. The Cradock plant would produce 90 million litres of biofuel per year from sugar beets, while the Pondoland project would produce 150 million litres from sweet sorghum and sugar cane. The Makhathini plant would produce 100 million litres a year from cassava and sugar cane. The IDC calculates production costs at between US\$50 to 70 a barrel. In these state driven projects, the IDC will take a 49% stake in all the projects while the CEF and outside partners will share a 51% stake. A privately driven project, led by Ethanol Africa, is planning another plant at Bothaville, in the heart of South Africa's maize triangle, with the aim of producing up to half a million litres of ethanol per day at a price of less than \$90 a barrel. The big money is waiting in the wings. Sasol says it is investigating biofuels and the major oil corporations are watching developments closely.

According to the strategy document, an economic modelling exercise found that biofuels production would not compromise food security in South Africa – assuming that all biofuels are produced from local crops and that certain incentives are in place. It calculates that white maize prices would, on average, increase by 7.6% and sugar cane prices by 5.9%, by 2015. This view is, unsurprisingly, supported by the biofuels lobby.

However, maize prices have already increased by more than that, pushed up by international price rises induced by the US biofuels strategy as well as by poor South African production in a dry year. The projected harvest of 7.05 million tonnes for 2006/07 is almost one million tonnes short of annual demand. Agricultural economist Theo Kleynhans, of Stellenbosch University, argues that “maize as the main source of biofuels is not viable” because harvests differ widely from year to year depending on weather and other factors.¹⁶⁵ Climate change will certainly exacerbate the variability of production and the trend will be to more frequent and severe droughts.

Civil society organisations have consistently warned about the threat to food security. Concerned at the impact of food price inflation, Reserve Bank Governor Tito Mboweni has added his voice on this side of the argument. Science and Technology Minister Mosubudi Mangena has also expressed concern, reiterating government’s position that farm subsidies will not be available for biofuel production.

The strategy asserts that there are three-million hectares of “underused, high-potential barren farmland”, mainly in the former homeland areas. A million hectares of this land will be targeted for biofuels. This implies the dislocation of thousands of subsistence farmers. Civil society activists and academics supporting small scale agriculture in the Eastern Cape, like Mark Wells, are worried that the biofuels programme there has been placed in the hands of the Massive Food Production Programme (MFFP). Wells says:

Under the MFFP regional Departments of Agriculture are essentially sponsoring the cultivation of massive tracts of soya or canola which will invariably be genetically modified. The reason for this is that herbicide resistant GM crops have been accepted as a method for no-till conservation agriculture, even though its use is completely destructive to soil life which

¹⁶⁵ Quoted in Engineering News, July 18, 2007.

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is contrary to the original theme behind the FAO's no-till conservation agriculture model which the MFPP is based upon. The MFPP now typically sponsors farmers to cultivate tracts of 50 ha or more of these ... crops which include GM soya, GM maize and GM canola.

Here in the Eastern Cape, and the other provinces, the cultivation of these biofuels crops has been placed directly under the wing of MFPP and Government has effectively already committed over R18,000,000 to subsidize the initial target of 6,000 ha of GM canola. ... They intend to ramp up to 60,000 hectares which will effectively be a sponsorship of over R180 million per year to fund the patented GM seed, fertilizer, pesticides and herbicides. ... All this is to satisfy the demand for oil at the proposed biodiesel plants in East London and Coega. In the past these MFPP subsidies have been paid directly to the corporations like Monsanto who act as implementing agents to roll out the programme.

An aspect of this colonisation of biofuels by industrial agriculture that is entirely missing from the debate is that, as peak oil hits, the costs of fossil fuel inputs in the form of petrol and diesel, fertiliser, pesticides and transport will spiral out of control.

Minerals and energy complex in question

The elite future assumes a relentless expansion of the formal economy, including a reckless growth in energy use, greenhouse gas emissions and other pollution and waste, while worsening the gulf of inequality between rich and poor. It includes the colonization of renewable sources of energy – biomass and biofuels – by fossil fuel interests and its perverse subjugation to the fossil fuel logic. It shows the enclosure of collectively owned land, currently used for subsistence farming, for the production of energy – because that land is 'underutilised', a classic justification for colonisation. It shows the colonisation of water resources in other parts of Africa to produce yet more electricity for the South African industrial economy. It shows the ongoing imposition of externalities on the neighbours of coal fired power stations – as at Medupi – even where the health and environmental costs have been recognised and quantified by government itself. The 'revival' of the nuclear industry and uranium mining goes ahead even though its previous rounds of radioactive contamination have not been cleaned up, and no credible solution for the 'disposal' – actually the permanent storage – of its toxic wastes have been found. It adds up to a scorched earth future of ever more polluted environments and wasteful use of 'cheap energy'.

This future is provoking opposition on all fronts. Farmers and conservationists confronted with coal mining expansion in Mpumalanga have joined with activists dealing with the acid mine drainage and uranium contamination legacies in the West Rand, with anti-nuclear campaigners and with the Vaal Environmental Justice Alliance opposing industrial pollution in the Vaal Triangle. While such alliances are embryonic and uneven, they reach across racial and social divides. Experience in Steel Valley in the Vaal Triangle showed that white and black smallholders as well as farm workers could mount a common challenge to polluters and government when they were placed under severe threat, although finally the community was destroyed and the poisoned land has not been rehabilitated. At the same time, people around the country are protesting government's failure to deliver energy, water and housing. More particularly, they are protesting their exclusion from decision making on their own future. It is estimated that 6,000 such local rebellions have taken place thus far.

Such issues now figure prominently in media debates and the dominance of the minerals and energy complex (MEC) is also being questioned in some policy circles. Thus, the State of Energy in South African Cities report [Eusten-Brown et al 2006] observes that the MEC has done well through the political transition but indicates that the interests of cities are diverging from those of the MEC.

The MEC is a major participant in the growth in total GDP that South Africa is experiencing. Total earnings in the coal mining sector were about R1.8 billion in 1993 and climbed steadily through the decade ... to reach a level of just under R5.5 billion in 2003. From the perspective of earnings, the sector was doing very well. In 1993 this same mining sector had about 61,000 employees in service. This number stayed relatively constant until 1998 when it began a sudden and sharp decline and by 2003 there were about 47,000 employees in service. Over a period when sales and prices were improving, financial earnings were showing strong growth and there was an increase of the order of 29% in total physical production, the coal mining sector cut the number of employees in its service by 23%. This in an environment of extremely high unemployment and negligible social safety net. [2006: 15]

It argues that the MEC's growth agenda "is largely de-linked from the social and economic problems experienced in the South African Second Economy... and stagnation in this sector [is] of little concern in terms of the main MEC agenda." The MEC is largely self-sufficient, "using capital-intensive high-technology and a minimal

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labour input that could be sourced anywhere, to exploit natural energy and mineral resources” and “it is understandable that this combination of sectors (the MEC) might view energy services requirements not directly connected with it as not being central to its interests or responsibilities”. A clear illustration was the government’s acceptance of the argument that Eskom should not subsidise electrification on “the principle that surpluses in the First Economy components of the energy system should be retained in the First Economy energy system and not be used to subsidise components outside the system in the Second Economy, for example support to poor households or to assist areas of economic and social deprivation.”

In contrast, the Energy Summit in September 2007 was, in effect, a summit of the minerals and energy complex and largely excluded dissenting voices. The summit’s focus on the MEC growth agenda was briefly disturbed by heated discussion on the DME’s neglect of poor households. Researcher Wendy Annecke¹⁶⁶ noted that the electrification backlog has grown as the rate of new household connections has slowed down and a decreasing proportion of low income households are getting free basic electricity. Further, policy on free basic alternative energy is still not finalised. Prices for LPG and paraffin are unregulated and rising fast. Safer paraffin stoves are unaffordable to the poor. Despite the fact that 64% of low income households, both urban and rural, use firewood for cooking, wood is not recognised as a fuel source. The DME is not supporting woodlots and nor has it addressed indoor smoke pollution which has severe health impacts particularly for people living with HIV-Aids.

Ambitious expansion plans for coal fired power, dubious decisions about nuclear power, the neglect of the poor, the large scale trashing of people’s environments and disregard of climate change are defining the new terrain of struggle for energy politics in South Africa.

¹⁶⁶ Power point presentation at Energy Summit, September 26, 2007

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It may be tempting to trust that peak oil and economic depression will achieve the necessary reductions in carbon dioxide emissions. That depression is the best hope for credible emission reductions in the elite future is the ultimate expression of the meaning of unsustainable development. The politics of elite power remains inseparable from capitalist growth. As that power begins to fail, it is ever more brutally imposed every day on people and their environments and it will finally cost the earth. Those who are represented as the leaders of the world cannot conceive another way and cannot confront the challenges of the time. Time is short: the world is on the cusp of runaway climate change – the point at which natural feed back loops such as the melting of ice become more significant than industrial emissions. Time is short: the growth machine is running low on fuel while the elites remain determined to suck the last drop of oil to preserve an impossible political order. It is necessary that a different order and logic of politics come into being.

The elite energy agenda creates resistance everywhere and everywhere people create the possibilities of new life. This chapter tries to convey something of the creativity of people's responses to crisis. It recounts people's call for food and energy 'sovereignty' – the demand that people must control the resources necessary for life, that they take the power of decision making and, in so doing, that they make a future fundamentally different to that planned by the elites. How they respond is different in different places. In Cuba the state followed and supported the people's lead. Elsewhere, people are consciously anticipating peak oil. In very many places, crisis is visited on people by those who speak in their name but put themselves at the service of elite power. Resistance is then made an immediate necessity of life but it is always accompanied by a vision of another world. It is in these actions that hope resides.

New life

In the way industrial economies are described, agriculture appears almost as a residual sector contributing a minor proportion of GDP and invariably bracketed from the rest of the economy. Thus, major economic indicators such as employment are often

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qualified as 'non-farm'. Services and industry is what matters. But this conceals how much of services and industry finally relies on what is produced on farms and, indeed, how much of what is now defined as industry – processing food, fibres and timber – was once part of the farm or household economy.

It now takes about 10 calories of fossil energy to produce one calorie of food energy. This includes the chemicals and machines, the fuel and electricity necessary for industrial farming, food processing and packaging, transport over ever greater distances and refrigeration all the way along the fresh produce supply chains to the supermarkets. In Britain, getting food to the plate consumes 20% of total national energy.

At the wealthy end of global production networks, the brief blockade of fuel depots in 2000 revealed how vulnerable Britain's food supply is to fuel shortages. Within days, the supermarkets shelves were emptied of even such basic commodities as bread. At the poor end of the networks, many permanent as well as seasonal farm workers can scarcely afford the price of a loaf.

The global elite has long claimed that industrial farming is necessary to feed the growing population of the world. Proponents of organic agriculture have long since recognised that this argument is really a cover for promoting the interests of corporate agriculture – in much the same way that the bias against renewables reflects the interests of big oil. University of Michigan researchers Ivette Perfecto and Catherine Badgley have recently refuted the elite claim. They calculate that organic farming in developed countries would produce 92% of what industrial farming produces but, in developing countries, it would produce 80% more than industrial farming. They specifically refute the much repeated claim that organic farming cannot overcome the loss of nitrogen fertilisers.¹⁶⁷ The UN Food and Agricultural Organisation (FAO), long an advocate of industrial agriculture, has just released a report which finds organic farming superior in terms of food security, productivity and local economic returns while it reverses the ill effects on the health of workers and consumers and on the environment.¹⁶⁸

These findings chime well with the Nyeleni Declaration on food sovereignty adopted in February 2007 by organisations of peasants, pastoralists and artisanal fisher-folk, amongst others, from 80 countries meeting in Mali. They declared themselves “ready, able and willing to feed all the world's peoples”. They defined food sovereignty as:

¹⁶⁷ Catherine Brahic, *Organic farming could feed the world*, New Scientist, July 12, 2007.

¹⁶⁸ Institute of Science in Society (ISIS) press release, September 10, 2007. The report is titled *Organic Agriculture and Food Security*.

... the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations.

It defends the interests and inclusion of the next generation. It offers a strategy to resist and dismantle the current corporate trade and food regime ... prioritises local and national economies and markets ... promotes transparent trade that guarantees just income to all peoples and the rights of consumers to control their food and nutrition ... ensures that the rights to use and manage our lands, territories, waters, seeds, livestock and biodiversity are in the hands of those of us who produce food.

Food sovereignty implies new social relations free of oppression and inequality between men and women, peoples, racial groups, social classes and generations.

This agenda resonates with the call for local control of resources and energy sovereignty made by communities affected by the fossil fuel industries. In September 2005, civil society activists met in opposition to the agenda of the World Petroleum Conference in Sandton, Johannesburg. This agenda proclaimed the oil elite's intention to shape the world's energy future. Mindful of the scale of human and environmental atrocity associated with big oil's activities all along the production chain, as well as the consequences of climate change, the activists responded that 'another energy future is necessary'. They endorsed the conclusions of the 2005 groundWork Report, that the oil elite's power "is neither stable nor inevitable and that it is always and everywhere contested and renegotiated" and that the potential for people's energy "lies in connecting the promise of renewable energy sources and technologies with social movements struggling for deep transformation of the way the world works" [2005: 121].

In September 2006, member organisations of Friends of the Earth from 51 countries adopted the Abuja Declaration. It took up the theme that 'another energy future is necessary' and linked it with the idea of 'energy sovereignty'. It observes that struggles for economic, social and environmental justice are linked through their common resistance to the elite economic and political order and calls for the coordination

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of “energy struggles around the world by adopting a global strategy for resisting environmental degradation, destruction of local livelihoods, and rights abuses associated with corporate controlled energy sourcing and consumption globally”. It resolves that:

Another energy future is necessary based upon:

- a. Abandoning the belief in export led growth in favour of servicing local ... needs;
- b. Restructuring the price and production of energy;
- c. A new approach to restructuring ownership of the energy regimes; and
- d. Abandoning the mistaken dichotomy between development and environment.

It declared support for “community struggles towards energy sovereignty and democratic control of natural resources that will be the basis for alternative fair and just trade regimes that link producers with consumers, eliminating corporate led control of our energy systems”. It particularly noted the role of women in those struggles and said that they should be “fully involved in all negotiations over energy production and allocation of natural resources”.

In summary, it called on governments to:

- declare a global moratorium on new oil and gas exploration and development;
- terminate neo-liberal trade agreements and economic policies that strip people of their entitlements to basic resources and lead to their impoverishment;
- enforce strict environmental standards and redirect the super-profits of the oil multinationals to clean up the mess;
- repudiate Joint Venture Agreements between governments and corporations and replace them with agreements between governments and local communities;
- resolve the Niger Delta crisis through democratic dialogue; and
- support decentralised, democratically controlled and sustainable energy systems using clean energy like wind and solar energy.

The struggle to make the vision of food, energy and resource sovereignty real faces formidable opposition. It is a struggle that is carried on in different ways and different circumstances by millions of people across the globe and for many it is a matter of life

and death. There is no guarantee of success but, as the 2005 groundWork Report put it,

... even if these social and environmental justice movements do not succeed against the enormous power of the current regimes, and the descent into a post-fossil-fuel (and post-US empire) era of uncertainty and collapse continues, then the spaces of self-reliance and local democracy created through such struggles will emerge as the only viable basis for rebuilding a new world. [groundWork 2005: 121]

Yet the moment of crisis is also a moment of opportunity and hope as the Cubans showed in their extraordinarily creative response to an energy crisis that provided a preview of peak oil.

Cuba

Just as Taiwan and South Korea were subsidised by the US on one side of the Cold War frontier, Cuba and North Korea were subsidised by the Soviet Union on the other. When the Soviet Union collapsed, these two countries found themselves isolated and under virtual siege by the US. Both were dependent on subsidised oil from the Soviet Union and both had adopted the centralised high input agricultural systems that mirrored the technologies of the green revolution. North Korea's oil imports were slashed by 60%. Although well endowed with coal, the power and transport systems failed because the country was cut off from technical support to maintain its Soviet built infrastructure. Agriculture collapsed. Industrial agriculture had produced enough grain for the country's needs and the rigid North Korean regime attempted the impossible project of sustaining it. Famine wracked the country and over three million people are thought to have died.

In the three years between 1989 and 1992, Cuba's petroleum imports were more than halved and fertiliser and pesticide imports dropped by 77% and 63% respectively and, without oil, there was no feed-stock for its own agricultural chemicals industry. In addition, Cuba was heavily dependent on food imports which were also cut by half as the country's foreign exchange dried up. Thus began the 'special period' in Cuba. People's food consumption was dramatically reduced and people did go hungry, with the number of under-nourished people rising from 5 to 30%, but there was no famine. By 1995, Cuba had transformed agricultural production and restored adequate levels of nutrition.

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Prior to 1990, Cuban agriculture was dominated by state owned estates expropriated from capitalist plantation producers during the 1959 revolution. Ownership aside, agricultural ecologist Peter Rossett [2000] observes that the management and technology regimes were similar to corporate agriculture in California. The estates were water and energy intensive, producing sugar and other cash crops for export to the Soviet Union at five times world market prices and exchanged for energy imports. A small peasant sector – cooperatives and individual farmers – produced 40% of food on 20% of the land.

Unlike North Korea, Cuba turned to organic agriculture supported by massive household, animal and human waste recycling. The first initiative was taken by urban people who cleared waste land for gardens and learnt how to grow food organically using the methods of permaculture, and by peasants who responded to rising food prices and used animal draft for ploughing and transport. The state followed their lead. Amongst other things, it supported the establishment of farmer's markets to ensure that the value was not captured by intermediaries but returned to producers, it focused its formidable scientific expertise on issues such as organic pest control, and it supported a draft animal breeding programme. With this, the urban agriculture movement "exploded to near epic proportions" [Rossett 2000] while peasants acquired a new status in society and thousands of urban people have since migrated to the country to take up farming. Producers in and around Cuba's cities now supply 90% of urban food needs. At the same time, people's diet changed from the national staple of rice, beans and pork to one centred on fresh vegetables and their overall health improved. Now, says Roberto Perez of the Sustainable Urban Development Programme, people demand fresh produce [in Morgan 2006].

In contrast, the large estates floundered. The management regime based on input formulas and alienated labour required for large scale monocropping precluded the relationship to the ecology of the land required by organic production. Under a 'linking to the land' programme, most of the estates were consequently broken up and later turned over to the workers. The transformation of the sector has been uneven and it still battles with the skills deficit created by high input agriculture as well as from government quotas requiring production of key export crops for foreign exchange.

The transformation of energy appears less decisive. Cuba has small reserves of very low quality crude oil and has expanded both production and exploration through product sharing agreements with independent oil corporations and, more recently,

with Venezuela's PdVSA and China's Sinopec. In 2002, Venezuela agreed to supply crude and fuel to Cuba on very favourable terms and so relieved the shortage. More recently, it entered a partnership with Cuba to upgrade the mothballed Cienfuegos Refinery and production of 65,000 b/d is said to start in December 2007. Cuba's two other refineries are old, dirty and dangerous.

The most notable achievement of the special period was to cut the need for transport – which mostly did not run – through localisation. In sharp contrast to the neo-liberal response to crisis, Cuba actually expanded and localised government services to make them accessible. Thus, the number of universities was increased from three to 50. The country also imported a million Chinese bicycles and made half a million more. These heavy bikes without gears are not liked by the Cubans who consequently returned to more conventional transport when Venezuela turned on the oil tap.

For the most part, Cubans continued to rely on the grid. Most power plants are designed to use heavy fuel oil. Lacking this fuel, the state instead used the crude oil from its production sharing agreements. As well as polluting the neighbourhood, this wrecked equipment and resulted in plant failure and extended blackouts in 2004 and 2005. In 2006, diesel generators were installed in 116 of Cuba's 169 municipalities and linked through the grid to restore the power supply at a cost of \$1 billion.¹⁶⁹ The state has also developed some renewable generating capacity from wind and from bagasse¹⁷⁰ although the decline in sugar production limited the power potential from this source. There has also been a concerted effort to light up off-grid areas, particularly schools and clinics, with PV electricity.

Not quite paradise then but, in 2006, the conservative World Wildlife Fund rated Cuba the world's most sustainable country as measured by ecological impact and human well-being [WWF 2006: 19]. The experience illustrates some key points. First, technologies are not neutral but embody relationships of power and, as for sustainable agriculture, so for sustainable energy and sustainable production in general, the institutional relations of production are critical. High energy large-scale production in all sectors generally requires centralised management irrespective of ownership. Energy efficiency can certainly be improved within this regime and niche market renewables can be established – but within limits. Ultimately, these systems are not compatible with sustainable development or social justice.

¹⁶⁹ China Daily, June 14, 2006.

¹⁷⁰ Bagasse is organic waste from sugar and is commonly used to power sugar mills. Its alternative use is as a compost, indicating the choice of power or soil fertility.

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Second, the cheap energy, cheap food, cheap goods regime of production claims to represent the interest of consumers. This ignores that consumers are also workers. Cheap goods are the product of cheap labour and polluting production and part of the arsenal of managing labour demands. The neo-liberal fixation on inflation presents the transfer of resources from workers to capital, evident in growing inequality, as a matter of technical economic management. Cheap food similarly favours the distribution of resources from rural to urban areas. It represents the low social value afforded to small farmers in particular and is inseparable from more direct forms of dispossession. This is not an argument for inflationary policies designed to revive consumption but for equality. Cheapness provides neither food nor energy security to the poor but creates dependence on global chains of production managed for profit. Equality of power does not guarantee sustainable production but sustainable production does require social equality and it is this combination that will produce security for ordinary people.

Energy intensive agriculture is justified on the basis of productivity. It is a dubious claim. In agriculture for example, small scale production is generally more productive per hectare than industrial agriculture unless the machinery and chemical inputs are heavily subsidised. Peasants and small farmers are not being wiped out for lack of productivity but for want of power in a market constructed by and for corporate production and the extreme concentration of economic power secured by these means. Similarly, this report has remarked the massive subsidies, including the externalisation of environmental and social costs, that make fossil fuel energy appear more economic than sustainable energy technologies.

Third, Cuba was and is an authoritarian and patriarchal state. The path of sustainable agriculture was forced on it as a matter of national security. The alternatives were famine or allegiance to Washington. Refusing dependence on the global regime of accumulation, Cuba was also excluded from development aid and famine relief which elsewhere acts as a palliative for 'market failure'. Yet, however imperfect, and unlike North Korea and Zimbabwe, Cuba's political elite appears to retain the egalitarian spirit of the revolution. Thus, during the special period, the state imposed equal food rations on all citizens irrespective of status. According to Pat Murphy of The Community Solution [in Morgan 2006], this prevented a situation in which competition for declining resources would lead to social disintegration and instead created the essential basis for social solidarity. Cubans felt that they were facing a common crisis together. The role of the state has been decisive – both in making the conditions of dependence on the Soviet block and in supporting and building on the creativity of people's

response to the crisis. Since the alliance with Venezuela has partially restored cheap energy supplies, it may be that the Cuban state will choose to revert to high energy agriculture and so repeat its earlier dependence on the Soviet Union.

Yet it appears that people will defend what they have created. The 'green revolution' involved everybody in a way that resonates with the aspirations articulated in the Nyeleni Declaration on food sovereignty. It ended the regime of the 'passive consumer' for food as for energy. It changed people's imagination of the world, creating a new sense of social identity in which people see themselves making their own future and remaking in their daily lives the social solidarities previously made over to the paternal state. Reflecting on the experience, Cuban lawyer Rita Pereira comments that "we can be happy with less" and she sees the potential of peak oil as "a time for sharing, for co-operation, for solidarity. Maybe we'll have a better world" [in Morgan 2006].

From the point of view of the state, it seems that sustainability is the last resort rather than the first choice. South Africa has not faced a crisis of last resort, although many of its people face a crisis of survival on a daily basis. The state's policy choices are for integration into the global circuits of capital accumulation and climbing the ladder to what that system defines as higher value production.

Anticipating peak oil

The assumption that abundant energy is never ending informs energy planning in most countries. Cuban town planner Miguel Coyula remarks that countries dependent on imported oil are not seriously thinking about alternative energy and are, in effect, "just planning for the next week" [in Morgan 2006]. People's initiatives at local level are challenging this. In the North, a growing movement is drawing together the permaculture and localisation movements to confront both peak oil and climate change.

This movement makes several basic assumptions that distinguish it from those discussed in the renewables section in Chapter Two above. First, renewables cannot compensate for declining fossil energy enough to power never ending accumulation and economic growth. Peak oil thus implies a radical restructuring of economies including enforced localisation. People and governments therefore need to plan for an 'energy descent' or, in Heinberg's phrase, to 'power down' [2004]. This would certainly include an expansion of renewable energy systems and the construction of local minigrids as well as a heroic drive for energy conservation. Local production of food and other goods

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would produce local livelihoods and radically cut the energy now used to transport goods around the world. People would still trade but only after satisfying local needs. In this vision, the ideal future is a democratically directed, locally centred steady state economy compatible with natural energy flows which cannot be expanded.

Second, powering down is also necessary to prevent global warming of more than 2°C. Even if oil production declines faster than anticipated, it is unlikely to match the very steep decline in carbon emissions required from 2010 at the latest. Using more than a fraction of the remaining oil, gas and coal is planetary suicide. The elite's proposal for the technical fix of carbon capture and sequestration is at best a massive gamble because it cannot be shown that it will work on the scale required – that is, that 80% of global emissions can be safely sequestered. More likely, it is a cynical pretence at action designed to save fossil corporations rather than address climate change. Nuclear energy similarly fails to address climate change and leaves an additional toxic heritage. It also multiplies the threat of nuclear weapons proliferation and multiplies the excuses for the US to embark on imperial wars.

The key challenge for this northern movement is seen to be persuading people that the energy descent is both doable and desirable. The alternative is the impossible politics founded on economic growth to which the elites are wedded. Given the inevitable failure of growth, and the collapse of the market in jobs, this implies a descent into chaos and fascism as people seek scapegoats for their pain.

The movement is therefore supporting people's planning processes which consciously anticipate peak oil by developing local 'energy descent plans'. The process builds the local movement and creates the popular support and pressure for local councils to adopt the plans. In Britain, this process has been captured in the idea of 'transition towns' advanced by permaculture designer Rob Hopkins [2006]. Just as Pereira considers peak oil an opportunity for a better world, so too Hopkins argues that "life with less oil could, if properly planned for and designed, be far preferable to the present" [undated: 5]. Anticipation of peak oil and the enforced localisation of economies is thus embraced as an opportunity for reviving local democracy and relations of mutual solidarity and creating local livelihoods founded on environmentally sustainable practices.

Green activists Caroline Lucas, Vandana Shiva and Colin Hines give a wider dimension to this vision, arguing that the rules of global trade are designed to prevent both local and democratic control of economies. Further, the organisation of the global

economy supported by these rules has the effect of “making poverty inevitable” [2005]. Localisation in the North is thus the other side of the coin to end to the plunder of the South.

Everyone's village

Aamar Gram, Tomar Gram, Shobar Gram: Nandigram, Nandigram.
My village, your village, everyone's village: Nandigram, Nandigram.

The chant was taken up across India after police killed 14 people at Nandigram, West Bengal, in March this year. The people were part of a massive protest against the enclosure of their land which the state wanted for ‘development’ to sustain economic growth at over 8%. Nandigram was to be one of the many Special Economic Zones (SEZs) being set up around India in areas close to mineral resources, to energy sources and to ports from which export goods can be shipped. In most, people are stripped of their rights in land and fisheries as the transnational corporations move in and are granted exemptions from tax and from labour and environmental regulations.

For writer Amit Sengupta, the chant links the “thousands of farmers, dalits, tribals, being forcibly displaced to benefit big business and big projects, in Kashipur, Kalinganagar, Bastar, Punjab, Dadri, the Narmada valley, Tehri Garhwal”.¹⁷¹ And it links these protests to the long history of resistance to dispossession stretching back to the great 1857 rebellion against the British Raj.

It is a chant that might echo around the world as states and corporations collude in appropriating people's rights in order to maintain profits and growth and, when they resist, assaulting the people themselves. In the Niger Delta, people's struggles against big oil's despoliation of their land and water reached a new pitch earlier in 2007 when they locked in a large proportion of oil production; in Ireland, the people of Rosport are blocking the state's appropriation of their land in favour of Shell which wants it for a gas pipeline; in Columbia, peasants and small scale miners are resisting removals designed to benefit AngloGold Ashanti subsidiary Kedahda; in Britain, activists gathered at a ‘climate camp’ next to Heathrow Airport protesting government's expansion of airports; in China, local peasant and worker rebellions are now a daily occurrence.

¹⁷¹ Amit Sengupta, *The train stops at Nandigram*, Hardnews April 2007 at www.hardnewsmedia.com.

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In South Africa's northern province of Limpopo, platinum mining is booming to meet world demand for catalytic converters among other things. Reducing car emissions is no doubt an environmental good so long as the world is dependent on cars. As with much 'green consumerism', however, the environmental and social costs are relocated up the production chain. Anglo Platinum, part of the giant Anglo-American Corporation, last year topped groundWork's Corpse Award for worst corporate practice. It was nominated by the Mapela people for "removing communities from their ancestral land, stealing peoples' resources and gagging voices of resistance". The corporation claims its rights on the basis of agreements got by bullying and buying off leaders who, according to the community, had no mandate from them.

Thus far, 6,000 people have been pushed off their land and removed to a dusty relocation village where they say there is no adequate infrastructure for energy and water and no livelihood prospects. A further 10,000 people are threatened with removal and are resisting through legal and direct actions. Their fields have been literally enclosed with security fencing by the mines, their water supply destroyed and their houses rocked by mine blasting.¹⁷²

Over the last year the people have asserted their rights to their land, taking down the fences, ploughing the land and forming human chains in front of the bulldozers. The police have consistently enforced the rights claimed by the corporation, arresting people and using rubber and live ammunition to break up protests. In September 2007, the people of Maandagshoek detained mine officials who "illegally entered Maandagshoek community land" despite warnings to keep out. Community leaders then called the police to arrest the officials.

When police arrived (in large numbers) they instead refused to open a case and indicated they would arrest all the community ... members present. Not surprisingly, people legitimately resisted and clashed with the police. Chief Isaac Kgwete and [Maandagshoek Development Committee] Chair, Michael Kgwete, were beaten and arrested and then charged with robbery, public violence and kidnapping. ... The situation in Maandagshoek today is reminiscent of the old apartheid days when mining corporations did exactly as they pleased to any community and were protected by the police and the government.¹⁷³

¹⁷² Statement put out by Richard Spoor in his capacity as attorney for the Plaintiffs and on behalf of members of the Mohloholo community, July 25, 2007.

¹⁷³ Maandagshoek Development Committee, Press Statement, September 9, 2007

Land is not the only resource in question. The development of these huge open cast platinum mines contributes significantly to the expansion of national electricity demand. It also drives the construction of dams on Limpopo's rivers. This is a generally arid area susceptible to periodic droughts and the water table has been sinking for some decades due to heavy extraction by commercial agriculture. The new dams are justified in the name of 'delivering' water to people. The thirsty mines, however, will take precedence. Already, the indications are that in dry years there will be little left to the people or to the legally required 'ecological reserve' needed to sustain the rivers.

The enclosure of people's resources precedes a second form of dispossession: the externalisation of environmental costs. In many cases, there is a direct continuity between these forms of dispossession as pollution poisons people's resources – their land, crops and water – and diminishes their livelihoods. Finally, pollution is an assault on people themselves. After long years of campaigning, the people of south Durban in South Africa have forced official corroboration of the health impacts of living in the neighbourhood of two of South Africa's largest refineries and of several hundred smaller smoke stack industries. A major health study found high levels of respiratory ailments in south Durban compared with other sites and it conservatively estimated the risk of cancer at 250 times the accepted norm [Naidoo et al 2006].

The health study confirmed that the transgression of people's Constitutional right "to an environment that is not harmful to their health or well-being" is systemic: it is built into the economic fabric. And whereas the state is obliged by the Constitution to enforce and promote the realisation of this right, it has in fact protected and promoted corporate polluters in its efforts to 'grow the economy'. For people living in South Africa's pollution hot spots, demonstrating the health impacts has been integral to a larger campaign to force government to withdraw the extraordinary rights it has granted to corporations and to take responsibility for the devastation that it has promoted in the name of development. This campaign has seen some success with the enactment of a new law on air quality and, after years of neglect, more determined regulation of polluters in some areas. Thus, the unrestrained freedom to pollute in south Durban has been curtailed and routine emissions from the refineries reduced. Incidents, however, including the September fire at the Island View chemical tank farm, are still part of the every day reality of life in the shadow of the chemicals industry throughout South Africa.

Even as the regulatory system is being tightened in some respects, it is being loosened in others, particularly in respect of planning permissions. Thus, the Environmental

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Impact Assessment process was 'streamlined' in 2005 on the rationale that it was delaying 'development' and so inhibiting South Africa's drive to 6% growth. Development is always about the future and specific projects are details of a picture of the future to be built. Along with other planning laws, EIAs are a way of securing the appearance of consent to the elite future but they carry the risk of opening that future to contestation.

The focus on the detail of single projects to the exclusion of the broader implications and cumulative impacts narrows the scope of contestation and thus manages the risk. Thus, the vigorously contested EIA for South Africa's pebble bed modular reactor was restricted to the demonstration plant alone and excluded the implications of the broader plan for 20 to 30 plants – with 20 times the nuclear fuel, transport, and waste while the risk of accidents would multiply faster than the number of plants.

In the Philippines, by contrast, resistance to plans to build new coal fired power stations has resulted in government declaring the island of Negros a fossil free zone. Local activist Romana de los Reyes comments on the necessity of vigilance in defence of this declaration because the state "conveniently forgets the fossil-free policy" when lobbied by investors.¹⁷⁴

In a context where much of the generating capacity is supplied by private sector Independent Power Producers (IPPs), democratic governance is the first casualty of corporate proposals for new coal plants. Proponents have typically campaigned for the projects by securing the sponsorship of powerful politicians at national and local levels ahead of community consultations required by Philippine law. These elite figures have then not hesitated to use the coercive power of the state to suppress resistance, including posting armed police outside public scoping meetings to exclude opponents. The opposition, by contrast, campaigned from the bottom up to build a broad movement founded on local churches and people's organisations and including elements of the local elite, particularly professionals. Using the procedural requirements of planning laws to focus action and build the movement, they reclaimed democratic decision making from corporate subversion.

This confrontation of campaigning styles was also accompanied by the confrontation of information and images of the future. In the Philippines, as in South Africa and

¹⁷⁴ Personal communication.

everywhere else, 'host communities' were promised new jobs and 'multiplier effects' which would create rising local prosperity. Indeed, it is generally the case that the larger the project, the more exaggerated the benefits. "Only time exposes the empty words of the coal plant proponents," observes De los Reyes [2006: 1]. The proposed future, however, is mostly already the experience of people elsewhere. People living with coal power stations told those where new plants were planned what the reality is like. They told of lost health, lost land and polluted water. They told of plants wilting in the fields and orchards, animals dying and fisheries in decline. They told of the daily battle with coal dust and ash in their houses, on their dishes and on their washing. They told of the smell and the noise. They told of the lost beauty of their land. They said, "Do not allow the coal plant to be built in your area. You will end up suffering like us" [quoted by De los Reyes 2006: 15].

The struggle continues. In September, following a four year battle, construction of a coal fired plant was approved on the island of Cebu neighbouring Negros. The new plant, however, will not be viable unless Negros is obliged to buy power from it. The last line of defence within the formal regulatory system is now to prevent the state approving the power supply contract.

Industrial Development Zones (IDZs) are the South African equivalent of India's SEZs. Coega is the most ambitious IDZ to date and the state has sunk billions into it, claiming that it will create thousands of jobs, boost economic growth and contribute substantially to eradicating poverty in the impoverished Eastern Cape province. The benefits to Alcan, the anchor project, are obvious and confirmed by the very secrecy that obscures their precise value. As in the Philippines, the local campaign of resistance disputes the promised benefits but foresees heavy costs to local communities. These include the litany of environmental impacts from just the aluminium smelter:

Toxic emissions into air and our water include fluoride, sulphur dioxide, polycyclic aromatic hydrocarbons, nitrogen dioxide, carbon dioxide, other greenhouse gases and others – all of which have severe impacts, such as respiratory diseases, cancers, Alzheimer's disease, brittle bone diseases, smog and acid rain. Despite the latest findings by leading scientists that establish a clear link between the exposure to fluoride and lung and bladder cancers in smelter workers, and despite health warnings Alcoa sent out to 3,000 of its workers worldwide, the [Coega Development Corporation] continues to deny there could be any problems. And let's not forget global warming – 1.8 tons of carbon dioxide is produced for every ton of aluminium.¹⁷⁵

¹⁷⁵ Letter to The Eastern Cape Herald, June 15, 2007.

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Further, there are no credible plans for dealing with spent pot linings and other hazardous waste to prevent contamination of water or air. To the contrary, groundWork notes that spent pot linings from the Richards Bay aluminium smelters are already incinerated as cheap fuel for the Pretoria Portland Cement (PPC) plant at New Brighton, a working class suburb of Port Elizabeth, and it seems probable that Alcan's pot linings will go the same way. Emissions from this plant are not adequately monitored. In common with other cement kilns in South Africa, PPC is now undertaking a short-cut EIA for 'Secondary Materials Co-Processing'.¹⁷⁶ This is the cement industry euphemism for incineration and the EIA will have the effect of retrospectively justifying what they are already doing at New Brighton.

Alcan now appears as just the beginning of the construction of a new pollution hot spot bought at considerable expense to the public purse. The local activist groups note that they have proposed "environmentally friendly alternatives" for the area but have been disregarded by government.

Organised public opposition has persuaded the conservative German Chancellor, Andrea Merckel, against trying to revive the nuclear industry. The annual ritual of this opposition is the turnout of hundreds of thousands of demonstrators to obstruct the delivery of radio-active waste for disposal in Gorleben by literally putting their bodies on roads and railway lines. This opposition has radicalised the residents of what was a parochial region, changing their attitude both to nuclear energy and to public participation in national decision making.

The South African communities expected to 'host' the next PWR are on high alert. Veteran anti-nuclear campaigner Mike Kantey has attended public meetings in these areas and reports that "each and every site has an active anti-nuclear lobby" linked to each other "through an informal anti-nuclear network".¹⁷⁷ Public debates in Thuyspunt, close to Port Elizabeth and the nearby Coega, questioned the fact that alternative sources to nuclear power were not being discussed. In the Northern Cape, there are well founded fears that the Vaalputs low level nuclear dump will eventually be made

¹⁷⁶ 'Secondary materials' include unspecified hazardous wastes as well as spent pot linings, old tyres which will be made hazardous by incineration, sewage sludge pellets and biomass. Bobby Peek, personal communication; groundWork letter to Eastern Cape and Nelson Mandela Metropolitan Municipality regulators and PPC EIA consultants, December 22, 2006.

¹⁷⁷ Email network communication August 6, 2007.

to take high and low level waste from the expanded nuclear industry. In July 2007, the community of Komaggas in the Northern Cape said they would not allow Eskom to go ahead with its plans to build a nuclear power station on their land. Andy Pienaar, a community representative, threatened: "I think from here on we are going shut these people out of the community and we are going make every effort to make sure that they do not erect a power station at Brazil or Schulpfontein for that matter."¹⁷⁸ Residents resisting the new uranium enrichment plant at Pelindaba have organised themselves into the Pelindaba Working Group, also part of the new nationwide anti-nuclear alliance.

The blatant ambition of agricultural corporations such as Monsanto to take control of food systems through genetic engineering and patenting of seeds has similarly run up against serious resistance in Africa, Europe and Asia. European consumers reject it because of concerns about food safety while African and Asian farmers understand that it is a threat to their very ability to produce food.

Struggles in tension

South Africa remains a sharply divided society. The historical divide, where race and class were virtually synonymous, is now cut across with the emergence of a black middle class and increasing stratification within the working class. For many white people, environment has been primarily about conservation. For many black people, environment was an elite white concern. However, most of those who live on the fenceline of polluting industry are black and working class and are increasingly resistant to carrying the costs of pollution.

These divisions are always at issue in any attempt at building broad campaigning coalitions and, on this ground, the elite representation that the environment must be played off against development – 'balanced' is the usual word – has traction.

Geographer David Harvey [2005] argues that, during the 'golden age' of post war capitalism, the exploitation of labour was the primary means of accumulation and this created a working class politics for 'expanded reproduction' – for full employment and better paid jobs based on higher levels of growth sustained through increased demand. In the neo-liberal period, accumulation by dispossession is the primary means for wealth creation and most of the working class gains made in the earlier period have been severely eroded. These gains, however, were largely confined to the First World and were not shared by Third World workers. Now inequality is growing

¹⁷⁸ Email network communication July 15, 2007.

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in all countries and the promises of development ring hollow. Yet they retain great power because there is no evident escape from dependence on capital: if there are no jobs on offer, then there is nothing but scavenging scraps from the world's overflowing rubbish dumps. Yet the numbers of those made destitute through the enclosures and externalities of accumulation by dispossession grows every day while the potential for expanded reproduction within industrial capitalism shrinks and will collapse with peak oil.

Nevertheless, the tension that Harvey sees in contemporary struggles for justice between demands for expanded reproduction and demands for an end to dispossession grows sharper but also more ambiguous. Thus, for example, there is an evident tension in Nigerian demands for cheap petrol while the Delta and its people are trashed. As argued in Chapter 3, the demand is not only about the price of transport but also resistance to oil corporations running off with windfall profits while people pay for it in higher costs. Similarly, in South Africa, a series of strikes have won wage increases above government's inflation target but below the actual rate of inflation, particularly for food, experienced by most workers.¹⁷⁹ For economists, this raises the threat of 'second round' inflation. For workers, it was about barely keeping up with the cost of living. They had, moreover, seen corporate managers walking off with record multi-million Rand bonuses in 2006. Few economists saw inflationary dangers in these inflated rewards.

This dynamic will be terminally destructive in environmental, social and economic terms. It is rooted not in the demands of workers and consumers but in the massive appropriation by the elite classes that has created gross inequality globally and in most countries. At present, scarcity for some and plenty for others is engineered through the markets. As scarcity of energy, food and other goods becomes absolute with peak oil, and assuming that capitalist accumulation survives for some years past the date of peak oil, this dynamic will intensify. The contrast with the food rations that imposed equality, at least in the bare means of life, in Cuba could not be sharper.

Equality is no longer only about a utopian hope or the survival of the poor. It is now also a matter of planetary survival. The fundamental problem with Kyoto is that it evades this necessity and, to the contrary, promotes growing inequality and environmental injustice through its carbon trading regime.

¹⁷⁹ Inflation on those goods that the poor spend most of their money on is higher than official inflation.

In transition

The concept of an energy transition poses the question of how to use the resources now available to society as a whole to create the basis of a future energy regime that will provide for people but not for profit. Environmentalists have commonly argued that a sustainable energy regime will create more jobs than the centralised fossil energy regime.

Urbanist Mark Swilling adds that a policy priority to ecological sustainability ahead of economic growth will create greater social equity even if this choice is accompanied by economic recession. The ‘consumption city’ can be, and should be, replaced by a ‘sustainable city’ in which improving living standards are decoupled from rising (and unsustainable) resource consumption. Such a city, composed of sustainable neighbourhoods

... generates more energy than it consumes, generates zero waste (both liquid and solid), meets most of its basic food requirements from local sources, requires little or no fossil fuels to transport people, and releases minimal amounts of CO₂ into the atmosphere. The ‘sustainable neighbourhood’ helps to rebuild eco-systems and mitigates the risks associated with the rising costs of fossil fuels as these non-renewable resources run out. [Swilling 2007: 5]

Box 20: Agenda for a transition to environmental justice

The 2003 groundWork Report argued that the Environment Right in the South African Constitution “requires sustainable development based on environmental, social and economic justice”. In concrete terms, a transition from policies based on the Property Right to policies based on the Environment Right would have the following elements:

- The rejection of the current rules of international relations, finance and trade, including the repudiation of the monetary debt that the North claims from the South and a demand that the ecological debt owed by the North to the South be honoured;
- Taming finance capital and markets through the use of a Tobin tax,¹⁸⁰ exchange controls or other means to moderate exposure to global economic volatility;
- Dismantling the power of corporations which is presently guaranteed by the state – or, more accurately, the international system of states – and expanding the space of the people’s commons.

¹⁸⁰ A Tobin tax is imposed on international financial transactions. So foreign investors in the stock exchange would pay a small percentage of the amount that they invest in tax, both when they put the money in and when they take it out. The effect is to discourage purely speculative investments.

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- Fair trade and exchange at all levels (local, regional and global), including increased protection for vulnerable industries, such as textiles and clothing, that will be difficult to re-establish following a contraction of global trade;
- The use of green taxes, including carbon taxes, to reflect externalised costs of production;
- A transition to sustainable energy systems under people's common control, based on decentralised renewables and energy conservation, with the subsidy to fossil fuels transferred to renewable energies. Energy would need to be shared equally between all to ensure that everyone has enough. Similarly, local, national and global carbon allowances must be based on equal shares for all within the limits necessary to avoid global warming of more than 2°C;
- Zero waste, including the return of organic wastes and sewerage to local energy systems and to soil fertility and the design of production and products such that all wastes are reconceived as resources;
- A major expansion of public transport systems and dramatically reduced use of petroleum to prevent the economy being drained by rising oil prices;
- The reconfiguration of urban space to shift away from consumption neighbourhoods defined by class and to reintegrate the poor into central areas while also putting amenities and jobs within walking distance for most people;
- Sustainable building with housing and workplaces that do not impose high costs for people to be comfortably warm or cool, built with low energy building materials such as earth rather than cement;¹⁸¹
- Support to local economic development – which may in any case be stimulated by escalating transport costs – with expanding local demand through increased employment and grants;
- Local organic food production linked to people's markets as part of a broader turn to organic and permaculture production technologies coupled with accelerated land reform;
- Sustainable water management with neighbourhood sewage systems providing energy, manure for urban agriculture and recycled water;
- Securing people's health and well-being, requiring both a radical reduction in pollution and provision of housing and services designed to meet people's needs rather than being designed for cost recovery;
- Conservation of local ecologies and biodiversity to ensure both the sustainability of 'ecological services' and as accessible local amenities;
- Ensuring inclusiveness and people's participation while interrogating the exclusive implications within the consumption economy.

¹⁸¹ Cement making is one of the most energy intensive industries. In South Africa, the industry is angling to switch to waste incineration to reduce energy costs. This would make it even more pollution intensive and is vigorously opposed by groundWork.

Movement

Given the urgency of climate change, many civil society organisations have concluded that those who now hold decision making power – in the state system and capital – must be persuaded of the necessity for change. As corporations proclaimed themselves ‘part of the solution’ this strategy met with the dubious success of Kyoto, winning targets for carbon reductions which, it was hoped, would be made more rigorous over time, but at the cost of acquiescing to the carbon trading regime.

That the governments who claim to speak in the name of citizens, and the corporations who are given such powers by the nation states, must be confronted with the devastation of the future that they are bringing into being is clear. But the tactic of persuasion misses the logic of the power that it would persuade. As the *Retort* group argue:

... right at the heart of capitalist modernity ... has been a process of endless *enclosure*. The great work of the past half-millennium was the cutting off of the world's natural and human resources from common use. Land, water, the fruits of the forest, the spaces of custom and communal negotiation, the mineral substrate, the life of rivers and oceans, the very airwaves – capitalism has depended, and still depends, on more and more of these shared properties being shared no longer, whatever the violence or absurdity in converting the stuff of humanity into this or that item for sale. [2005: 193-4, their emphasis]

They go on to quote war apologist Thomas Friedman: “... the hidden fist that keeps the world safe for Silicon Valley's technologies to flourish is called the US Army, Navy, Air Force and Marine Corps” [195].

In his compelling critique of carbon trading, Larry Lohmann argues:

Defining the climate crisis ... as a problem to be solved through indefinite capital accumulation, state subsidies for large corporations and consultants, transnational capital flows, international trade and national ‘development’, makes it almost impossible to connect top-down emissions targets with support for effective actions at the local level. [2005: 349]

For activists in the environmental justice tradition, the issue is not only about what decisions must be made, but about where decisions are made and who makes them. It is, in short, about the order of power in society.

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Environmental justice requires a radical redistribution of rights from private capital and corporations to people. Across the world, the daily struggle over rights takes place every day at innumerable locations and on many fronts. The tactics used vary according to circumstances. In many cases, particularly in the South, it involves a direct clash as people's lands and resources are invaded and enclosed. In other cases, as with the transition towns, it involves softer tactics but still works for a transformation in power. This too will finally lead to a confrontation of power for it should not be expected that capital will relinquish its rights in people's lives without a fight – even if the fight is on the edge of the precipice of its self-destruction.

Central to this approach is solidarity with community and popular resistance to enclosure of people's commons and to the global institutions supporting enclosures, including the IMF, World Bank, World Trade Organisation and, indeed, Kyoto. Lohmann warns against 'silver bullet' solutions such as carbon trading that play into the hands of such powerful institutions and try and avoid the messy stuff of "democratic political organising and an uphill political struggle" [337 ff]. Thus, on the question of the subsidies enjoyed by fossil fuel corporations, he argues:

Powerful enough political movements could shift [subsidies] towards a coherent programme of, for example: renewable energy development; community-based planning for lower-carbon lifestyles; support for local movements protecting land, forests and smallholder agriculture; better insulation and heating; promotion of public debate and exchange on climate change; and just treatment for those who would otherwise suffer from the transition to less carbon-intensive industry, including fossil fuel workers and the poor.

This raises the fundamental question of whether the broad justice movement can indeed create 'powerful enough' movements. In the spirit, although not always the practice, of the World Social Forum, such movements would have to be created without replicating the vanguard activism that has hitherto provided the means of unified mass mobilisation but has also repeated, and often exaggerated, the authoritarianism that it seeks to undo. Such movements must therefore honour the specificity of local struggles and respect the leadership of local people in those struggles. Solidarity that turns to the colonisation of local struggles to the benefit of movement leadership is no solidarity.

In 2005, Oilwatch issued an open-ended invitation for dialogue with others to create 'powerful enough' movements. It is a powerful statement of the need and it does not duck the difficulties. And it may be observed that capital itself is linking together the crises that it engineers in people's lives. Thus, the turn to biofuels has the effect of repeating the invitation to dialogue between the movements for energy and food sovereignty.

Never before have the limits of the current development model based on hydrocarbons been so clear or close. Never before has the relationship between oil and the networks of power that control the world been so clearly understood, nor have the relationships between oil and the main causes of misery that affect humanity been so evident ...

For the Southern part of the world, the oil model has meant the perpetuation of inequitable exchange, technological dependence, indebtedness, and impoverishment. The ecological debt between North and South, which began during the colonial years, rose with unequal economic and ecological exchange.

We have accepted separately each one of these aggressions. Or worse still, fought among ourselves: inhabitants of one country fighting against another, oil workers against indigenous communities, people from the North against those from the South, the poor of the cities against indigenous and peasant peoples ... those that propose against those that criticize ... And the list goes on and on.

What are the organizations and networks with whom we can start a positive collaboration in the fight against the oil civilization? What are the social, local and global movements that cannot be ignored in our efforts? What are the international agreements and programs that can best help us in this process? What are the new initiatives that we could and should devise?

To answer these and other needs, Oilwatch is inviting sympathetic networks to initiate a joint dialogue on our struggles and launch a global campaign against a civilization based on oil.

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We invite you to share your opinions, comments, suggestions and ideas, to build a new path together...where we can reflect each and every one of our struggles. This way, each and every one of our battles will gain a new dimension.

Oilwatch, 16 September 2005

Box 21: Enough

Climate Change has revealed our home on the planet to be fragile. We have reached the limits of what the planet can absorb in waste and pollution, and still remain liveable. “If all the countries of the globe followed the industrial model, five planets would be needed to provide the carbon sinks required by economic development” [Sachs et al 2002: 19]. We have only one. The situation invites us to think about what is enough.

Continuing greenhouse gas emissions above the safe limit, with enough knowledge of the consequences and the means to change, is no less than climate crime. There is a difference between what carbon emissions, from cows and rice paddies releasing methane, are needed for subsistence and for necessary industrial production, and that which is superfluous, including elite travel and transport in search of the cheapest sweat shop labour. While it may not always be easy to draw the line between ‘necessary’ and ‘criminal’ activities, there is such a difference, embodied in the time-honoured and multi-faceted concept of enough. Enough means poor people must be able to enjoy more of the earth’s riches, and rich people must not endanger everyone by consuming more than their share.

Enough – besides being a spiritual goal of not only material self-sufficiency but also happiness in oneself – also promises a series of non-monetary rewards: community, time, health and a clean conscience! In the Jo’burg Memo, prepared for the 2002 World Summit on Sustainable Development in Johannesburg, Wolfgang Sachs and his co-authors propose reducing consumption through ‘wealth alleviation’ instead of the inept meddling of ‘poverty alleviation’. Better still would be the eradication of wealth which sustains unequal power relationships and starvation in a world of potential abundance.

‘Enough’ is not only a restraint. It is also autonomy in that, when enough is achieved, the overwhelming majority of people will not need anything from the capitalists because they will have reversed the enclosure of resources. It is the hope that people can throw off dependency as the power of the current rulers erodes so that a fair sharing of the resources of the planet and those created by people becomes possible.

In the words of Peter Kropotkin:

That we are Utopians is well known. So Utopian are we that we go to the length of believing that the Revolution can and ought to assure shelter, food and clothes to all – an idea extremely displeasing to middle-class citizens, whatever their party colour, for they are quite alive to the fact that it is not easy to keep the upper hand of a people whose hunger is satisfied. [1913: 69]

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