



groundWork and Earthlife Africa (Jhb) response to the National Planning Commission Energy Paper¹

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groundWork and Earthlife Africa (Jhb) are environmental justice organisations. We welcome this initiative to debate the national energy system. We trust the process will not be restricted to the metropolitan areas but will include those areas most affected by the energy system. In particular, we think the NPC should talk to communities on the Mpumalanga Highveld, the Vaal Triangle and the Waterberg affected by coal based power and petrochemicals, the areas of Durban and Cape Town affected by oil refining and by offshore exploration, and the areas of the Karoo and KwaZulu-Natal where fracking is proposed.

Status quo

The power system is not just Eskom's model. It is the model of the minerals-energy complex (MEC) that has shaped South Africa's development for over a century. The model is to use cheap labour to dig out more coal to fire up ever bigger base-load power stations to supply

¹ Supported by Project 90 by 2030.

‘cheap and abundant’ power at or below cost to energy intensive industries. The profits are taken by the big industry users and, since the seventies, by the colliers who cover their costs with sales to Eskom and take pure profit from exports.

This model is unsustainable economically and is socially and environmentally catastrophic. It is now collapsing – largely under the stress of trying to reproduce it. This has also given rise to secret stratagems, the abuse of governance, and the manipulation of the planning system to keep a place first for nuclear and then also for coal. Thus, the IRP 2010 grossly exaggerated future demand. The draft IRP 2016 base case does likewise but also misrepresents costs and puts an arbitrary constraint on renewables.

While we await an audit of the looting that accompanied the construction of Medupi and Kusile, we believe that these plants were never viable despite the massive subsidies from government in equity and debt guarantees.

In 2009, the World Bank moved in to rescue the new build and emphasised ‘effective pricing’. Eskom was then demanding ever steeper tariff hikes but it also indicated its future dependency on expanding sales to pay off the debt. We commented at the time: “If the price increase retards economic recovery, then Eskom is cutting at its own revenue base. It thus raises the possibility that cost recovery and expanding sales have become incompatible.”²

Profligacy was a feature of the model. Industry paid no heed to energy efficiency while Eskom and government paid no more than lip service to demand side management. Instead, and to the moment that the lights went out in 2007/8, government touted cheap power to attract new energy intensive industries. Now that the system is back in surplus, demand side management has once more been shelved. A decade of steep price rises has, however, driven a measure of energy efficiency in industry while economic recovery has failed – not only because of mismanagement and not only in South Africa. Consequently, demand has fallen.

² David Hallows 2009, The World Bank and Eskom: Banking on climate destruction, groundWork, p.28.

At the same time, a large part of the debt is held in dollars and Euros. And since South Africa opened its capital markets, the Rand is made one of the most volatile currencies, subject to the wash of ‘hot money’ – portfolio investments that can be instantly withdrawn. This flighty capital is driven more by the monetary policies of the US Fed than the SARB but South Africa has come to depend on it to balance the trade account.

As we warned in 2009:

In taking on the debt, the Treasury is making a double bet: that future economic growth, and the continuous expansion of the energy system, will more than cover repayments; and that the Rand will hold its value. Otherwise the debt becomes a trap as it did for many Southern economies in the 1980s.³

It is losing both bets. Demand has declined and the Rand is on a roller coaster. It dropped to R16.80/\$1 in 2016 and its present high (R11.80/\$1) is itself a symptom of nervousness in the capitalist heartlands. It will plunge at the next global tremor. A study by Meridian Economics now argues that Eskom would do better not to complete the last two units at Kusile.⁴

The escalation in tariffs has a big impact on energy access. About 85% of households have access to electricity in that the wires reach their homes. However, over 55% of people in South Africa are poor according to official criteria⁵ and many cannot afford electricity for the full month. They then use wood, coal, paraffin or burnable waste. In older established suburbs, people have no alternative to electricity. When they are cut off, they go without. People’s need for energy is increased because public housing has been put up without regard for the basics of thermal efficiency such as insulation and orientation to create shade in summer but let the winter sun in. Most RDP houses are also badly built and cracking up. Whether they live in RDP houses or shacks, people freeze in winter and bake in summer.⁶

³ Ibid, p.28.

⁴ Grové Steyn, Jesse Burton, Marco Steenkamp, *Eskom’s financial crisis and the viability of coal-fired power in South Africa*, Meridian Economics, 15 November 2017.

⁵ Stats SA, 2017, *Poverty trends in South Africa: An examination of absolute poverty between 2006 and 2015*.

⁶ The groundWork Report 2013, *Talking Energy: Part One in the People’s Power Series*, written by David Hallows, groundWork.

Climate change and carbon emissions

The NPC paper says “imperatives for GHG emission mitigation and adaptation are well understood and accepted in South Africa” [iv]. We don’t think so. Climate policy assumes the target of limiting warming to 2°C above the preindustrial average. Climate scientist James Hansen has repeatedly warned that the 2°C target is a recipe for disaster.⁷ Be that as it may, there is no mechanism in domestic policy or in the Paris Agreement to link reductions in greenhouse gas emissions with that target.

South Africa’s very wide ‘peak, plateau and decline’ (PPD) range was devised in 2011 to create a top line well above the level of the Copenhagen pledge. The bottom line was merely an effect of that stratagem. Nevertheless, the bottom line is itself inadequate as a ‘fair contribution’ to keeping global warming to “well below 2°C” – let alone 1.5°C – as agreed in Paris.

The International Panel on Climate Change’s fifth assessment report (IPCC AR5) gave a global carbon budget for 2011 to 2100 with a range of 630 to 1180 GtCO₂ for a two-in-three (66%) chance of coming in under 2°C.⁸ The same budget gives a half (50%) chance of coming in under 1.5°C. However, this budget relies on the scientific fairy tale of net negative emissions in the second half of the century⁹ and takes no account either of positive feed-backs or of the loss of the masking effect of aerosols. Hence, we take the bottom end of the range as a reasonable budget. This budget is being consumed at the rate of around 40 GtCO₂ per year (energy emissions and land-use change). What remains in 2018 is 350 GtCO₂ – 900 at the top of the IPCC range – and, without steep reductions, it will be gone before 2030.¹⁰

⁷ Hansen, J., M. Sato, P. Hearty, R. Ruedy, M. Kelley, V. Masson-Delmotte, G. Russell, G. Tselioudis, J. Cao, E. Rignot, I. Velicogna, E. Kandiano, K. von Schuckmann, P. Kharecha, A. Legrande, M. Bauer, Kwak-Wai Lo, 2015. *Ice Melt, Sea Level Rise and Superstorms: Evidence from Paleoclimate Data, Climate Modeling, and Modern Observations that 2°C Global Warming is Highly Dangerous*, Atmospheric Chemistry & Physics, Papers in open discussion, 23 July 2015.

⁸ International Panel on Climate Change, Fifth Assessment Report, Working Group 3, (IPCC AR5, WG3), Summary for policy makers, Table SPM1, p.13.

⁹ See Kevin Anderson, *Talks in the City of Light generate more heat*, Nature, Vol 528, 24/31 December 2015, p.437.

¹⁰ See also: EcoEquity and Stockholm Environment Institute, 2015.

The world is already behind any reasonable schedule in reducing emissions. This means a late peak in global emissions and the necessity of a steeper reduction after peak and no room for a plateau. Taking account of the principle of common but differentiated responsibilities, Northern country emissions should have been in steep decline (around 11%) from 2011 already. Had that been the case, Southern countries could delay peaking until 2025 but would then have to reduce emissions at around 7% per year. Peaking in 2020 would have allowed for a less daunting decline of 4 to 5%.¹¹ This is for all Southern countries, so those with high emissions must peak sooner and reduce faster.

Obviously, Northern country emission reductions have not come close to a double digit decline rate. Hence, they've eaten our budget and we must either face runaway climate change or all countries, North and South, must now reduce as fast as possible. Equity must then be pursued through financial and technology transfers – that is, through a settlement of the climate debt.

Finally, the coal, oil and gas from working mines and wells contains about 942 Gt CO₂.¹² That's already higher than the 900 Gt that's left at the top of the IPCC range. To it must be added another 162 Gt of committed emissions from existing cement kilns and an estimated 21 Gt from land use change to bring the total to 1,125 Gt – over three times the 350 Gt budget.

Meeting the 2°C target therefore requires not only that exploration should stop but that a substantial proportion of working mines and wells must be closed. The Department of Mineral Resources, to the contrary, makes a priority of issuing mining and exploration rights. Offshore, the Department of Environmental Affairs, responsible for policy on climate change, makes a virtue of facilitating the hurried hunt for oil and gas in the name of Operation Phakisa. Treasury's carbon tax, meanwhile, seems calculated for symbolic effect: a ciabatta loaf with more loop-hole than substance. There is nothing here that indicates a serious understanding of the 'imperative' for GHG emission mitigation. Nor do we see much urgency for adaptation.

¹¹ Anderson, K., and A. Bows, 2011. *Beyond 'dangerous' climate change: emission scenarios for a new world*, Philosophical Transactions of the Royal Society 369.

¹² Greg Muttitt with H. McKinnon, L. Stockman, S. Kretzmann, A. Scott, and D. Turnbull, 2016. *The Sky's Limit: Why the Paris climate goals require a managed decline of fossil fuel production*, Oil Change International, p.19.

Health and environment

Eskom's power stations, together with Sasol's synfuel and petrochemical plants and various energy intensive metal plants, are clustered on the Highveld and Vaal Triangle. Two more Eskom power stations are located in the Waterberg and fed by coal with a high sulphur content. And some dozen coal plants are also proposed by independent power producers (IPPs), most in the Waterberg and Highveld.

For air quality, the Highveld has long been known as the worst place in the world to build big polluting plants because it has a stable atmosphere with low windspeeds. Further, the winter inversions trap the pollutants at ground level.¹³ Using an impact pathway approach to calculate the health costs, Holland shows over 2,200 'equivalent attributable deaths' each year from only one species of pollution – fine particulates – only from Eskom's power stations. In addition, tens of thousands of people suffer bronchitis, nearly a hundred thousand suffer asthma and millions suffer restricted activity and lost working days. The cost comes in at around R30 billion a year. He emphasises that "air pollution most affects those whose underlying health condition is worst, and hence that any improvement in air quality will most benefit those who are most disadvantaged."¹⁴ With warming induced by climate change, the impact of pollution on people's health will be amplified.

Eskom, Sasol, and the coal mines that feed them also have a devastating impact on water, land and settlements. The upper Olifants catchment is effectively a wasteland and large parts of the upper Vaal catchment are severely compromised. The mines have ruined large areas of good agricultural land while water contaminated by acid mine drainage is mostly not drinkable. Nevertheless, people who cannot afford bottled water must drink it anyway. Next to the mines, people's houses crack up and their settlements are covered in dust from blasting and the traffic of coal trucks.

¹³ The groundWork Report 2017, *The Destruction of the Highveld Part 2: Burning Coal*, written by David Hallowes and Victor Munnik, groundWork, p.54 ff.

¹⁴ Holland, M. 2017. *Health impacts of coal fired power plants in South Africa*. Report to groundwork and Health Care Without Harm, p.17.

The power stations, synfuel plants and mines also use large amounts of water, much of it supplied by transfers across watersheds. The 2014-16 drought across the eastern provinces is a taste of what is to come as weather extremes intensify with climate change. The question arises: as ‘strategic’ users, will they be given precedence over people and the ecological reserve in times of drought? Given the scale of transfers, the impact will be felt from Mozambique, south through Swaziland and KwaZulu-Natal and to Senqu-Orange flowing west out of Lesotho.

Taking the case of Kusile, Nkambule and Blignaut calculate the externalities (including climate change) in the range of double to quadruple the ordinary cost of production.¹⁵ This is conservative. In the end, it will cost the earth.

Transforming energy

The NPC energy paper is largely organised according to energy technologies and sources. Below, we follow that approach but we are aware that energy is situated by what people need to do with it in their homes and settlements and by what businesses do in mines, factories, shops and offices.

The first priority must be to minimise consumption – cutting profligate consumption while ensuring that all people have enough. Enough is a lot less if homes are built for thermal efficiency. In most townships the infrastructure is also in disrepair. Roads are potholed, drains are blocked, water pipes leak, sewage spills into the streets and rubbish piles up on the corners. This makes people more vulnerable to the heavy weather of climate change. Planning for resilience is also about ease of living – amongst other things, how much energy is needed for a full life.

¹⁵ Nonophile Nkambule and James Blignaut, 2017, *Externality costs of the coal-fuel cycle: The case of Kusile Power Station*, South African Journal of Science, Vol.113, Number 9/10.

Electricity

We think the system should move off coal and onto renewables as fast as possible and this must be planned and carried through as part of a just transition that provides for workers and communities. That means no new coal stations, private or public, not completing Kusile, and early decommissioning of Eskom's stations.

The bulk of generation should be dispersed through households, community scale mini-grids and municipal scale local grids. Mini-grids should be interlinked with each other and through the municipal and national grids and dispersed generators should be backed up with national scale generators to moderate variability. Off-grid mini-grids should be engineered to link to the main grid, or neighbouring mini-grids, when this becomes practicable. In this way, off-grid systems would be seen to attract rather than repulse the grid.

All energy systems need storage. Hence, South Africa already has considerable pumped storage supplemented by hydro used as peaking plants. The grid can also be balanced by storing gas produced in municipal bio-digesters for peak use. Finally, decommissioned coal steam generators can be converted for use as fly-wheels both for storage and grid stability.

The renewable system should be socially owned. The national grid should be controlled by a publicly owned system operator separate from Eskom. We do not see any purpose in splitting planning and procurement from this entity as suggested by the NPC paper. (Note: in this context, we assume procurement is about sourcing power to balance the grid.)

We do not agree with the proposal to privatise Eskom's generators. We think private owners will prioritise profits, sweat the assets and save on environmental compliance whenever they can get away with it. Eskom needs to take responsibility for the process of closing its coal plants over the next two decades. In particular, it must close plants that do not and will not comply with environmental emission standards.

Whereas Eskom is now excluded from participating in renewable projects, it should be instructed to do so henceforth. We think it should have two roles: first, as a national scale renewable generator; and second, as a source of technical support for municipal and community generators. Its interest therefore must be reconstructed to collaborate in giving away market share.

Before the development of national grids, municipal generators were the norm. In a decentralised system, they can once more take this role.

The costs of rooftop PV are already at or below municipal retail tariffs and will soon be below wholesale tariffs. Local PV and other micro generation technologies should be accepted as part of the national and/or municipal resource. This may increase some system (grid and storage) costs but save on other system costs as generation will be closer to point of use. It will also save on procuring generators.

If the middle classes and commerce and industry are pushed off-grid, they will leave municipalities and the poor with a slum grid & more poor people cut off. The aim should be to retain a common grid and this must be accompanied by publicly funded programmes to support the development of locally owned and democratically controlled RE mini-grids in poor areas. Bringing RE to the people would be an essential element in addressing domestic air emissions, producing considerable ‘co-benefits’ for people’s health and for the health system.

Gas

We do not support the development of fossil gas – whether conventional or produced by fracking. As noted above, staying within the carbon budget requires that existing wells and mines are closed down. It does not admit of further exploration. The NPC paper observes that emissions from gas are lower than from coal when burnt [37]. However, methane is a potent greenhouse gas – 84 time more potent than CO₂ over a 20 year horizon – and leaks at well heads, pipelines and storage tanks tend to cancel the advantage. This is particularly so with fracking. A

Nasa study showed a massive methane plume over the fracked lands of the US south west.¹⁶ The scientific assessment of shale gas development in the Karoo finds a high risk that methane emissions will reduce or reverse the supposed greenhouse gas benefits.¹⁷

Shale gas extraction also uses and contaminates large amounts of water, produces toxic wastes and results in heavy health impacts.¹⁸ The Karoo assessment finds that there is not enough water in that region. Mitigation of impacts on water and air quality depends largely on industry 'best practice' and rigorous regulation. It may be noted that drilling would be done by the same bunch of cowboys that fracked the US and that regulation in South Africa shows no evidence of rigour. There would be little benefit in terms of local jobs.

Fracking – whether of shale or coal – is also proposed across large parts of Kwa-Zulu Natal, as well as inland, and would threaten key watersheds. The impacts of fracking coal – or coal bed methane – and underground coal gasification are even worse than fracking shale. These non-conventional techniques are only used where coal is un-mineable. Fully exploited, they would add emissions of between 80 and 160 GtCO₂.¹⁹

Offshore exploration already comes at high environmental cost. Seismic surveys off KwaZulu-Natal have resulted in a spike in the number of beached whales. This is the most visible evidence of a heavy toll on marine life and fisheries. Once it gets to drilling, the common industry practice is to dump drilling muds and cuttings at sea without regard for the toxicity of the material. Production is also accompanied by constant flaring and associated air emissions. Offshore production comes with the risk of high impact incidents. This risk is increased off the east coast

¹⁶ Christian Frankenberg, Andrew Thorpe, David Thompson, Glynn Hulley, Eric Kort, Nick Vance, Jakob Borchardt, Thomas Krings, Konstantin Gerilowski, Colm Sweeney, Stephen Conley, Brian Bue, Andrew Aubrey, Simon Hook, and Robert Green, 2016, *Airborne methane remote measurements reveal heavytail flux distribution in Four Corners region*, at <http://www.pnas.org/content/early/2016/08/10/1605617113.full>; See also David Suzuki, *Fracking's dark secret*, Ecowatch, 7 May 2017.

¹⁷ Bob Scholes, Paul Lochner, Greg Schreiner, Luanita Snyman-Van der Walt, Megan de Jager, *Shale Gas Development in the Central Karoo: A Scientific Assessment of the Opportunities and Risks*, CSIR, November 2016, p.26.

¹⁸ Carlos Acosta, Dusty Horwitt, Avery Kelly, Amanda Lyons, 2015, *International Human Rights Law and Fracking*, Mercy International Association.

¹⁹ Flick Monk, David Hallows, Kat Moore and Lukas Ross, *Fuelling the Fire: the chequered history of Underground Coal Gasification and Coal Chemicals around the world*, Friends of the Earth International, July 2016, p.36.

where the fast running Agulhas Current gives rise to unpredictable whirlpools and eddies.²⁰ Offshore concessions have been allocated around the entire coast. Starting with the impact on fisheries, coastal communities are already feeling the impacts.

Large quantities of energy pass through the bellies of towns and cities. Sewage works across the country are breaking down and many need to be replaced. Waste management also needs to be transformed, starting with the separation of wet and dry waste. As suggested above, municipal biogas digesters could be used to power peaking plants. They should also produce treatable water and compost or manure.

Nuclear

We are opposed to any new nuclear build. We think it is:

- Bad for democracy. Secrecy and hyped up security are characteristic of the industry and create a context conducive to corruption. Beyond that, nuclear power may come with a covert agenda to develop weapons. As the NPC paper notes, there has been little transparency to date in the nuclear procurement process. Further, as noted above, the planning process has been manipulated to keep nuclear in contention.
- Unaffordable. The starting price for the 9.6 GW build proposed in the IRP 2010 is around R1 trillion. Time and cost over-runs are virtually assured. Costs of decommissioning at the end will also escalate, at which point there is no future income to cover it. The starting price for Medupi and Kusile was around R87 billion. Costs are now estimated at R420 billion. As argued above, these projects threaten to sink the country. Nuclear will certainly achieve that end.
- Bad for the environment. Radioactive contamination is likely at all points in the chain of production. The West Rand is already heavily contaminated with radioactive mine waste and the mess is poorly regulated. At the other end, final disposal of high level waste is unresolved. The industry claims an above average safety record. This is partly achieved by keeping incidents secret. But even if true, the problem is that a single incident can be

²⁰ South Durban Community Environmental Alliance: Comments on proposed Exploration Drilling Within Block ER236, Offshore of the East Coast of Southern Africa. 5 March 2018.

catastrophic – as at Three Mile Island, Chernobyl and Fukushima. This is why nuclear facilities cannot get insurance. The costs of catastrophe are on the state.

The NPC paper suggests small modular reactors as an energy option. It says that previous work on the Pebble Bed Modular Reactor (PBMR) is now feeding into research on an Advanced High Temperature Reactor (AHTR). The PBMR saw R12 billion spent – before Medupi, that looked like a lot of money – with little to show for it. We think this is a fool’s grail.

Liquid fuels

Government has also shown little interest in energy conservation for liquid fuels. Sasol’s Secunda coal-to-liquids plant is, notoriously, the single largest point source of carbon emissions on earth. It cannot be reconciled with a serious response to climate change. Freight road transport has boomed while Transnet’s ‘road to rail’ strategy is focused on moving bulk commodities – starting with coal. On the road, private cars use the most energy and are the largest source of emissions.

The first priority then, is to create a public transport system which is safe, comfortable, affordable and preferable to using cars. Next is the transition from petroleum to electric vehicles powered from renewables. This transition is already underway and gathering pace.²¹ Finally, settlement planning needs to make walking and cycling safe and to place amenities within reach of where people live. Such ‘active transport’, along with a steep reduction in pollution, would greatly improve people’s health, according to the Lancet Commission on health and climate change.²²

²¹ Brian Ashley, Dick Forslund, Thembeke Majali, Lucia Winkler, Jonathan Neale, Jeff Rudin and Sandra van Niekerk, 2017. *One Million Climate Jobs: Moving South Africa forward on a low-carbon, wage-led and sustainable path*. Alternative Information and Development Centre.

²² Watts, N., W. Adger, P. Agnolucci, J. Blackstock, P. Byass, Wenjia Cai, S. Chaytor, T. Colbourn, M. Collins, A. Cooper, P. Cox, J. Depledge, P. Drummond, P. Ekins, V. Galaz, D. Grace, H. Graham, M. Grubb, A. Haines, I. Hamilton, A. Hunter, Xujia Jiang, Moxuan Li, I. Kelman, Lu Liang, M. Lott, R. Lowe, Yong Luo, G. Mace, M. Maslin, M. Nilsson, T. Oreszczyn, S. Pye, T. Quinn, M. Svendsdotter, S. Venevsky, K. Warner, Bing Xu, Jun Yang, Yongyuan Yin, Chaoqing Yu, Qiang Zhang, Peng Gong, H. Montgomery, A. Costello, 2015. *Health and climate change: policy responses to protect public health*, The 2015 Lancet Commission on Health and Climate Change.

Conclusion

A world that is seriously addressing climate change is a world which changes the economic and associated energy system. We propose that energy planning be made compatible with this world. Alternatively, it must anticipate catastrophic climate change.

In sum, if government wants to 1) uphold people's constitutional rights, 2) supply the energy needs of its people, 3) avoid catastrophic climate change while ensuring a just transition to clean energy, 4) clean up air pollution to let people breathe, 5) conserve land and water and prevent the further destruction of whole watersheds, and 6) avoid bankrupting itself, it is imperative to focus national resources on developing renewables under democratic control while shutting down coal plants.

End:-

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