DRAFT IRP 2018

Louise Scholtz

Prabhat Upadhyaya, WWF SA

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Roadmap

- Positive feedback
- Global Trends
- Climate Imperative
- At what cost new coal?
- Coal redux
- Gas, but how much?
- Electricity and the city
- Going forward

Positive feedback

- IRP 2018 has made significant improvements on its predecessor

- Notable are:
    - No new Nuclear until 2030
    - Increased support for Renewable Energy
    - More diversity in the energy mix
    - Carbon budget factored in some scenarios
    - Improved assumptions in scenario building
    - Least-cost option by 2030 and 2050: based on no annual build limits for Renewable Energy
    - Acknowledge the need to phase out coal-fired power plants

Key Global Trends

- The declining cost of and increasing investments in renewable energy technologies;
  - In 2017, a record 157 GW of renewable power (excluding hydro) were commissioned globally.
  - Investments of $279.8 billion were made globally in renewable energy.
  - International Solar Alliance being positioned as the OPEC of Solar
- Energy transition preparedness amongst countries:
  - Countries – both developed (for ex: Sweden, Finland, Germany) and developing (for ex: India, Kenya, Mexico) – gearing up for shifting towards a future driven by Renewable Energy
  - With least flexible electricity system in the world, South Africa ranks 2nd last in terms of energy transition preparedness (WEF, 2018, Energy Transition Index)

Key Global Trends

- Climate change imperatives (IPCC Special Report on 1.5^{0}C)
  - Just a dozen years left to take necessary steps to prevent climate change
- Top 5 global risks, 2018, (WEF, Global Risk Report): Three are environmental in nature

2018	1	2	3	4	5
Likelihood	Extreme weather events	Natural disasters	Cyber attacks	Data fraud or theft	Failure of CC mitigation & adaptation
Impact	Weapons of mass destruction	Extreme weather events	Natural disasters	Failure of CC mitigation & adaptation	Water crises

- Business-as-Usual would translate into 140 million climate migrants by 2050 (World Bank, 2018)

Climate Imperatives for 1.5^{0}C World

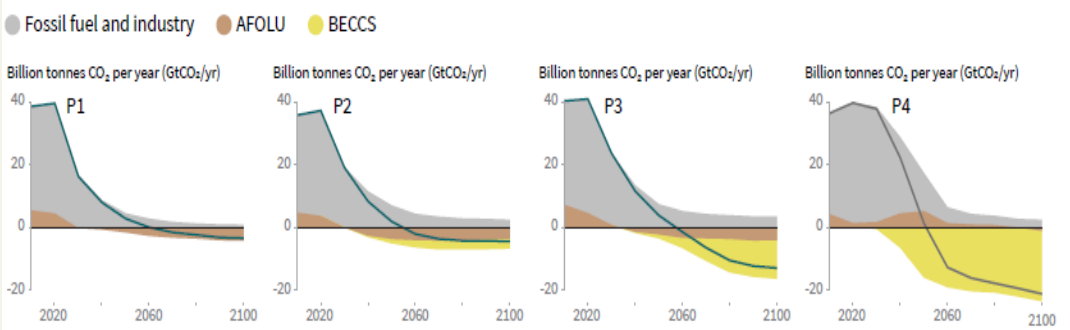
- Key findings of IPCC Special Report SR1.5:
  - Human activities have **already caused 0.87^{0}C** of Global warming above pre-industrial levels *(High Confidence, HC)*
- Climate related risks higher for global warming of 1.5^{0}C than at present, but lower than at 2^{0}C *(HC)*
  - **Reduced** global mean sea level rise by **10 cms** *(MC)*
  - **Reducing** the proportion of the world population exposed to a climate-change induced **increase in water stress by up to 50%** *(MC)*
  - **Reduced risks** to marine biodiversity, fisheries, ecosystems and their functions and services to humans *(HC)*
  - **Reduced risks** from droughts and precipitation deficits *(MC)*
  - **Reduce number of people exposed** to climate-related risks and susceptible to poverty by up to several hundred million by 2050 *(MC)*

Climate Imperatives Contd…

- "Countries in the tropics and Southern Hemisphere subtropics are projected to experience **the largest impacts on economic growth** due to CC should global warming increase from 1.5^0C to 2^0C." *(MC)*
- Climate Action is dependent on Energy Action:
  - "In 1.5^0C pathways with no or limited overshoot, renewables are projected to supply 70-85% of electricity in 2050." *(HC)* "… while the use of coal shows a steep reduction in all pathways and would be reduced to close to 0% (0-2%) of electricity." *(HC)*
  - "Total annual avg energy-related mitigation investment for the period 2015-2050 in pathways limiting warming to 1.5^0C is estimated to be around 900 Billion USD2015. … Avg annual investment in low-carbon energy technologies and energy efficiency are upscaled by roughly a factor of 5 by 2050 compared to 2015. *(MC)*

IPCC: Key message for South Africa

Breakdown of contributions to global net CO_2 emissions in four illustrative model pathways



P1: A scenario in which social, business, and technological innovations result in lower energy demand up to 2050 while living standards rise, especially in the global South. A down-sized energy system enables rapid decarbonisation of energy supply. Afforestation is the only CDR option considered; neither fossil fuels with CCS nor BECCS are used.

P2: A scenario with a broad focus on sustainability including energy intensity, human development, economic convergence and international cooperation, as well as shifts towards sustainable and healthy consumption patterns, low-carbon technology innovation, and well-managed land systems with limited societal acceptability for BECCS.

P3: A middle-of-the-road scenario in which societal as well as technological development follows historical patterns. Emissions reductions are mainly achieved by changing the way in which energy and products are produced, and to a lesser degree by reductions in demand.

P4: A resource and energy-intensive scenario in which economic growth and globalization lead to widespread adoption of greenhouse-gas intensive lifestyles, including high demand for transportation fuels and livestock products. Emissions reductions are mainly achieved through technological means, making strong use of CDR through the deployment of BECCS.

Global indicators	P1	P2	P3	P4	Interquartile range
Renewable share in electricity in 2030 (%)	60	58	48	25	(47, 65)
└ in 2050 (%)	77	81	63	70	(69, 87)
Primary energy from coal in 2030 (% rel to 2010)	-78	-61	-75	-59	(-78, -59)
└ in 2050 (% rel to 2010)	-97	-77	-73	-97	(-95, -74)

D4.4 **"Mitigation consistent with 1.5C pathways create risks for sustainable development in regions with high dependency on fossil fuels for revenue and employment generation (HC). Policies that promote diversification of the economy and the energy sector can address the associated challenges." (HC).**

D5. "Limiting the risks from global warming of 1.5C … implies **system transitions** that can be enabled by an increase of adaptation and mitigation investments, policy instruments, the acceleration of technological innovation and behaviour changes" *(HC)*

At what cost more and new coal

- Cost implications:
  - Inclusion of the two coal IPPs increases the NPV of the total system cost by R20 billion (UCT ERC)
  - Confirmed by the IRP2018 (Figure 19): 3 R-cents/kWh increase in the early 2020s
  - **Cost increase not necessary if new coal is taken out and replaced with the least-cost new-build mix of solar PV, wind and gas**
  - Existing fleet would have to run at lower load factors to allow for the new coal IPPs
- Environmental Implications:
  - Even in a base-case scenario for coal (making favourable assumptions), coal IPPs would undo the positive effects of the carbon tax.
  - Environmental impacts, particularly – water and air quality

Coal redux

- South Africa's contribution to climate change mitigation must mean **no new coal capacity addition** (ERC 2018)
    - As suggested IPPs should be compensated for cost incurred in return for overall huge net saving of not building the two coal-fired power stations (Bischof-Niemz, 2018)
    - Should remaining units at Medupi and Kusile be completed given flattening demand, rapidly developing storage technology, costs, technology breakthroughs?
- **De-commissioning of coal power plants should be accelerated** and respond to risks of coal supply to stations and cost of extension of life of stations rather than the present 50 year period (ERC 2018)
- But social consequences of shutting down large coal fired stations need to be strongly managed for ensuring a **just transition**

Gas, but how much?

- Large amount on new gas/diesel – 11 930 I MW in total
- Gas source unclear – shale gas fracking or imported LNG
- Inclusion of gas has the potential to have a meaningful impact on the future unit cost of electricity if one replaces inflation-based increases with market and currency based increases
- **Risk** associated with increasing gas volumes to support generation from renewable energy is real unless gas becomes available locally to limit exposure to market and currency fluctuations

- However, Fracking is deeply problematic
    - Both the environmental impacts and economic benefits in South Africa are poorly understood
    - Requires much more analysis to ensure that long term effects are better understood, both positive and negative
    - Questions about quantity and quality remain (UCT ERC)

Electricity and the City

- Municipalities serve large percentage of RSA's electricity consumers
  - account for over 40% of current electricity demand
  - Cities offer large potential for embedded generation for "self consumption", and flexible and participatory demand management

- IRP has a huge potential impact on municipalities' capability to provide **affordable energy** services

- Least cost energy services supply to consumers and affordability are the key concerns for local government
  - Critical to avoid over investment in stranded capital assets

- Municipalities should not be seen as passive "passive receivers" , but as a resource (SALGA)

Electricity and the City

- Active participants in the planning and supply of an integrated range of energy services and electricity supply
- Contribute to meeting demand through energy efficiencies, demand side management, alternative energy sources and distributed and embedded generation at the municipal level
- Demand forecasting and generation planning must include "bottom up" approaches capturing city level data
- Requires **active collaboration** in IRP planning between national-level and electricity distributors with capacity
- Metros can play far greater roll in energy generation and provision of other energy services and must be **allowed to procure energy directly from IPP's**

Going forward

- Critical to ensure a **just transition** for both climate as well as energy imperatives
    - New RE power generators should be situated closer to where power generators will be phases out - replace jobs from coal to renewables.
    - Coupled with retraining and reskilling of existing staff and workers
- Separate generation from grid in order for Eskom grid to be able to facilitate the transition better
- Open up generation (and later retail) business for competition whilst keeping control over transmission infrastructure assets
- IRP needs to provide stronger and clear commitment to a flexible system base on renewable energy and rapid phase out of coal
- Engage globally and regionally on export potential for renewable-electricity-based products. eg. small scale RE technologies to rest of Africa

Thank you

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