

Brief Discussion on Energy Planning for South Africa

Comments IRP 2016

(A Nuclear Energy Perspective)

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Two Ethical Philosophies:

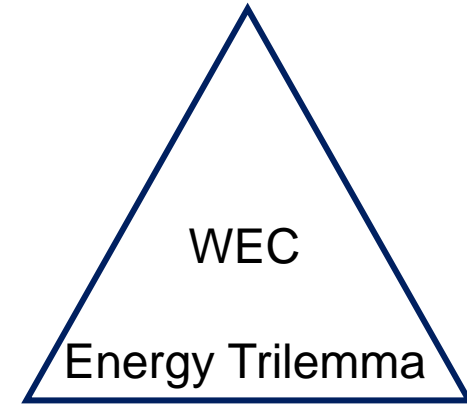
- Justice for the Planet
- Justice for the Poor

Confusion in the Energy Sector

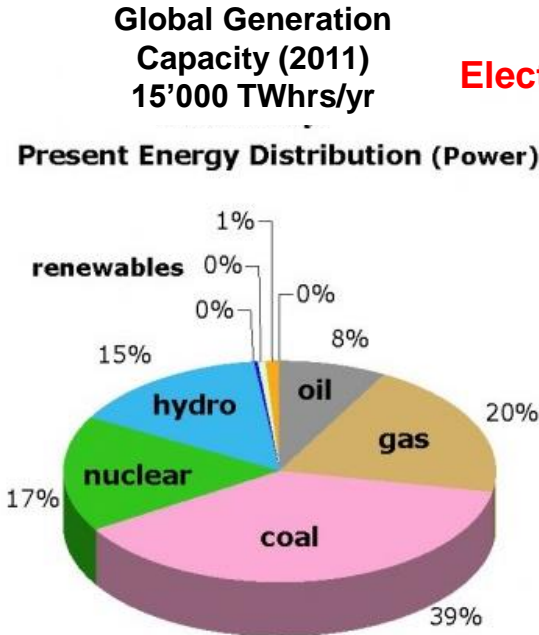
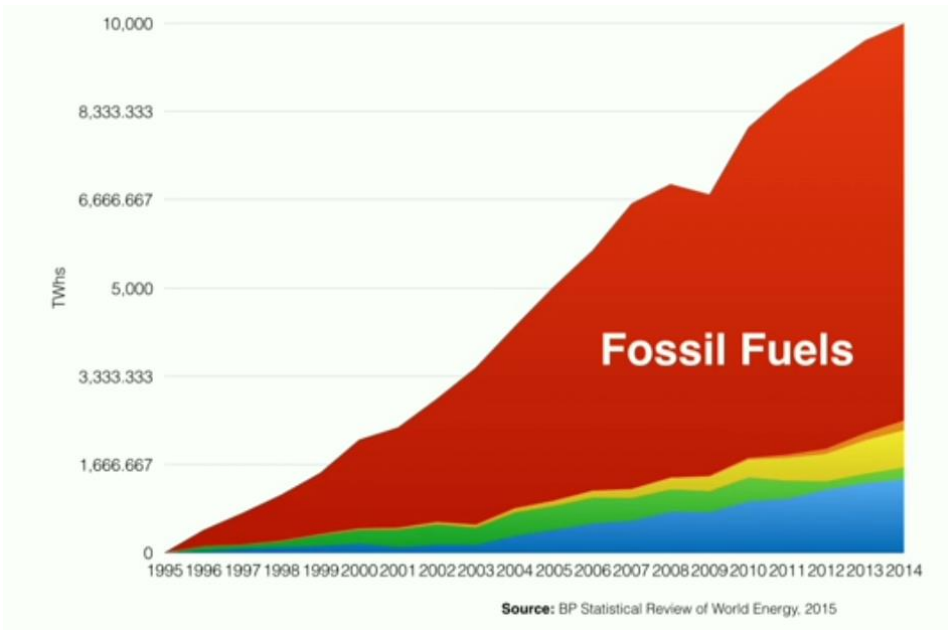
Global Energy Planning

Energy Planning Trilemma:

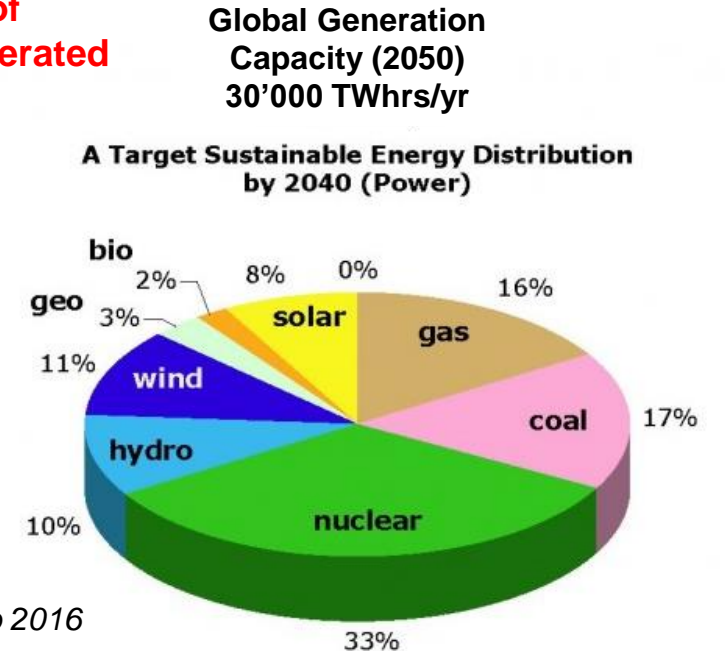
- **Energy Security** – Supply adequately meets demand.
- **Access to affordable energy by all** – Socio-economic growth.
- **Environmental sustainability** – Climate Change mitigation.



In spite of global initiatives to reduce CO₂ and toxic emission in the energy sector, we continue to increase our fossil fuel generation at an unprecedented rate. Today 66% of global power is derived from fossil fuels. (SA 80%). Actual energy generated from renewables remains insignificant in spite of a massive capacity expansion program.



Quantity of Electricity Generated



James Conco 2016

8 Key Objectives for SA's Energy Planning (a Nuclear Energy Perspective)

1. Ensure Security of supply: (Nuclear energy has the highest capacity factor and can be distributed)
2. Minimise cost of energy: (Nuclear energy's total life-cycle cost per kWhr is second only to large hydro)
3. Promote job creation and localisation: (Highest concentration of long term jobs per kW. Knowledge Economy!)
4. Minimise environmental impact: (Biggest contributor to Climate Change mitigation (waste management solution))
5. Minimise water consumption: (Coastal based power plants use sea water for cooling. Can desalinate water too.)
6. Diversify Supply Sources: (Nuclear energy is the greatest contender to diversifying SA from 80% coal power.)
7. Promote Energy Efficiency: (Coastal based power plants reduce 18% transmission losses using very little fuel.
During off-peak periods, nuclear energy can desalinate water and power a clean electric transportation system.)
8. Promote energy access: (Good energy security and distributed nuclear energy can power regions that were previously deprived of energy.)

The Relevance of Total Life Cycle Costs in Energy Planning

Included in Total Life-Cycle Costs of Electricity:

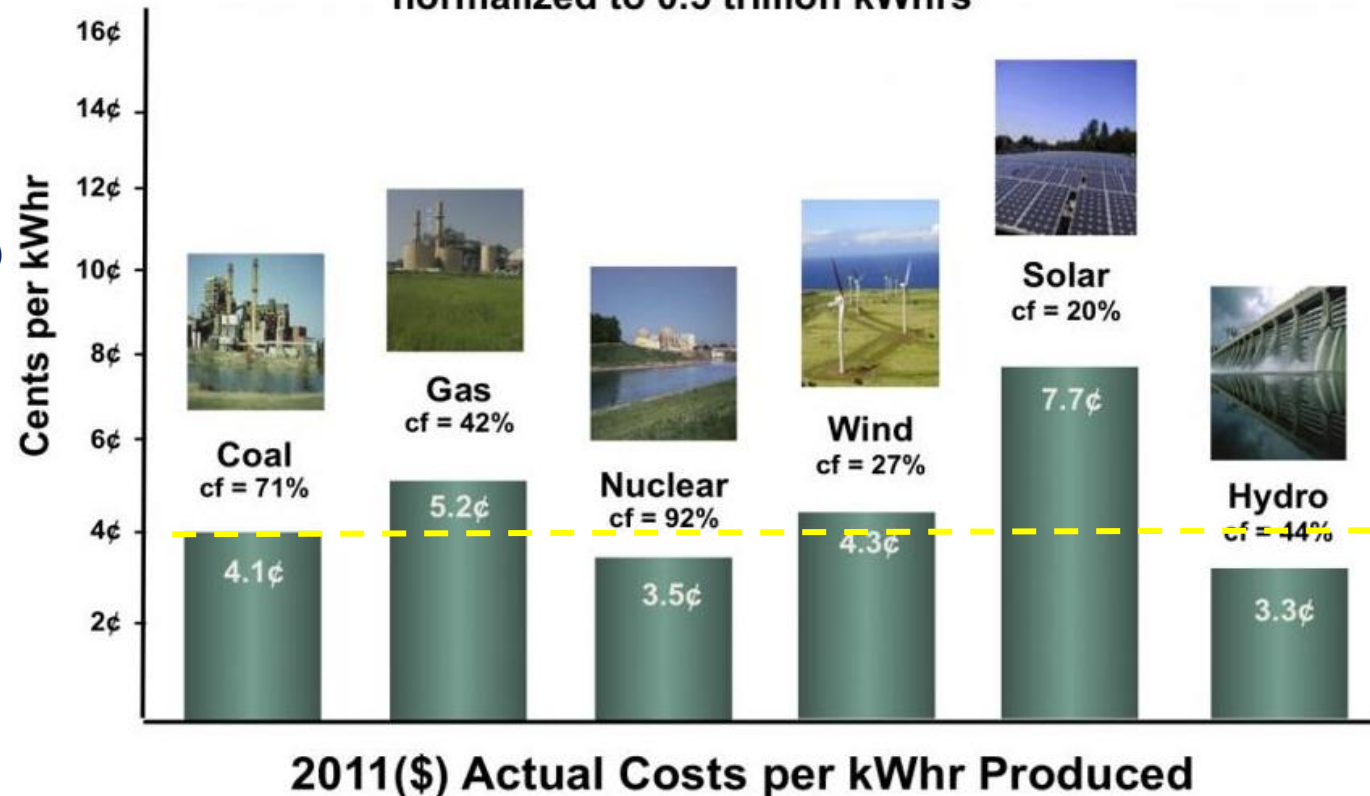
- Manufacturing and Construction costs and lead times
- Cost of Capital to finance the project.
- Operating and Maintenance costs (incl. fuel)
- Capacity Factor – Quality of energy produced
- Life expectancy of the power plant. (ranging 15 to 60 yrs)

Often Excluded from Total Life-Cycle Costs: (Externalities)

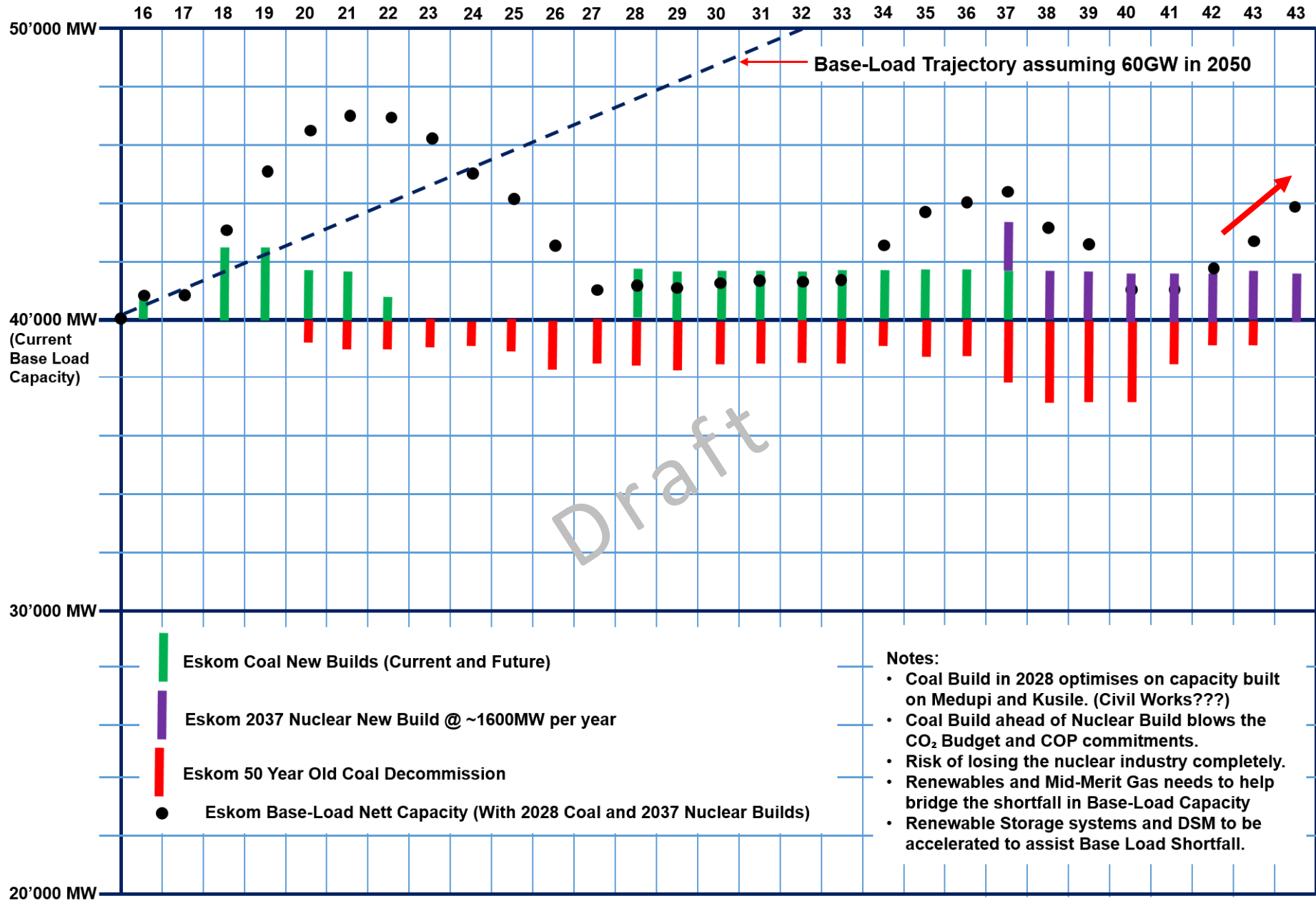
- CO₂, Pollution, Visual Impact and Health Care Taxes.
- Buffering of intermittent power generation (RE)
- Transmission and Grid Stabilisation Costs
- Socio-economic benefits from Sustainable Energy.

General Energy Costs average around 4¢

Total Life-Cycle Costs in cents per kWhr produced for each primary energy source over 60 years normalized to 0.5 trillion kWhrs



Base Case - Base-Load Capacity with 50 Year Old Coal Decommissioning – pg 18



Conclusion

Only once actual costs are known, can better long term planning can be done and some levelling factors be wisely shaped to affect a more desirable energy mix for a comprehensive energy solution for South Africa.

Thank You