



WWF South Africa

a national organisation in an international network

transformation to a climate-safe future
through people-centered development

**sustainably affordable energy services for
people and productivity**

IRP2 will have impacts well beyond the electricity supply industry (ESI)
and could severely compromise other sectors and departments, both
through carbon footprint and escalating fuel prices

President Jacob Zuma, Green Economy Summit, May 2020:
“...we have no choice but to move to a green economy.”

**50% by 2030 - Renewable Energy in a Just
Transition to Sustainable Electricity Supply**





IRP2: Rigorous resource planning, or PR exercise?

- So far it **seems public relations more important** than meaningful public participation and transparent process, BUT
- We welcome DoE commitment in Cape Town to develop additional scenarios incl. one without nuclear; with more demand side management and efficiency; with application of learning curves; and to undertake sensitivity studies and publish these in January
- **Credibility of DoE and Inter-Ministerial Committee on energy and NERSA is on the line** (joint hearings?), as is the credibility of the Copenhagen Accord commitment and the good faith of SA in multilateral negotiations

Requests yet to be addressed, inter alia:

- Elaboration of multi-criteria decision making process and rating and scoring of criteria
- Elaboration of criteria (proposal tabled in Nedlac by Community Constituency)
- Costs sensitivity studies & Sensitivity of recommended scenario to different discount rates
- Clarification/breakdown of demand projections (incl. assumptions re composition of the economy), compatibility with national Energy Efficiency Strategy and DSM terminating in 2018
- Publication/release of work under the Renewable Energy Policy Review
- Unpacking assumptions regarding “base load plant” & considering ‘smart grid’ opportunities
- Explanation of methodology for “reliable capacity” and ambiguity around ‘capacity credit’





Kusile – the Achilles’ Heel or respite for nuclear decision?

- Only one unit provided for in IRP1 – no mandate for other five
- Contractual commitments unclear – what consequence 4 units by 2020?
- Six units treated as “committed” in IRP2, compromises modelling and costings (PEV) - no cost avoided in scenarios “without Kusile” &
- ‘Copenhagen-consistent’ / low emissions scenarios have massive surplus (unutilized) capacity (Emissions 3 is a travesty – 77% reserve margin)
- With 4 units of Kusile, no possible justification for new nuclear before a lot of existing coal fleet is retired: Even if you cannot conceive electricity supply without coal or nuclear (i.e. meeting base load through effective and efficient system operation and management – cf Ecofys ‘Energy Report’), we won’t need **nuclear** before 2018, so **decision not appropriate before 2012 /13**
- In Rev Balanced Scenario both Kusile and nuclear crowd out prospects for developing local industries in renewable energy technologies and for attracting ‘climate finance’ – not consistent with stated objectives or prevailing policy
- If ESI not reduce share of national emissions by 2020, greater constrains on other development prospects, sp. coal to liquid fuels (& Coega refinery?)





The World Nuclear Industry Status Report 2009

With Particular Emphasis on Economic Issues

2002-07 share of nuclear in global energy supply declined - worldwide operating reactors total 370,000 megawatts (370 GW), about 1,600 MW¹ less than one year ago: *'nuclear renaissance' is a marketing fiction*

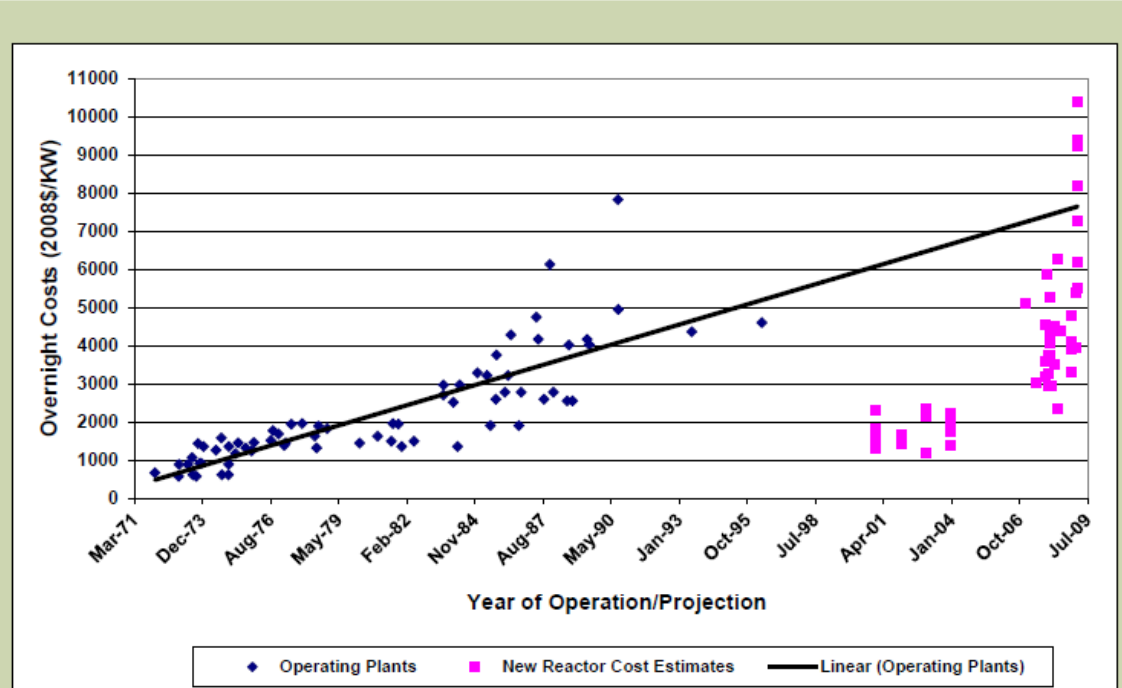
Nuclear power provides 5.5% of the commercial primary energy production and about 2% of the final energy in the world

Costs continue to climb; average life of 123 reactors closed: about 22 years;

**PRESSURIZED WATER REACTORS IN U.S.:
ACTUAL OVERNIGHT COST COMPARED
TO RECENT PROJECTIONS OF
FUTURE OVERNIGHT COSTS**

Sensitivity study should consider costs 100% higher than EPRI Benchmark figure;

need a scenario without nuclear





Job Creation Opportunities

Green Jobs: Towards decent work in a sustainable, low-carbon world Copyright © September 2008, United Nations Environment Programme www.unep.org/labour_environment/features/greenjobs.asp

“Renewable energy generates more jobs than employment in fossil fuels.”



United Nations Environment Programme



International Labour Organization



International Organisation of Employers



International Trade Union Confederation

Jobs per \$1 million invested				
Industry	Direct	Indirect	Induced	TOTAL
Solar	5.4	4.4	3.92	13.72
Biomass	7.4	5.0	4.96	17.36
Smart Grid	4.3	4.6	3.56	12.46
Coal	1.9	3.0	1.96	6.86
Oil and gas	0.8	2.9	1.48	5.18
Nuclear	1.2	1.8	1.2	4.2

Source: Heidi Garrett-Peltier and Robert Pollin, University of Massachusetts Political Economy and Research Institute. January 2009,

Government’s briefing document for the Green Economy Summit, May 2010: “15% of electricity supply from renewable sources by 2020 would create 36 400 new jobs, with no loss of jobs in the coal sector”





“least cost” ?

Cost \neq short-term capital cost

- **‘Costing a 15% target for renewable electricity supply...’** (UCT, 2008) demonstrated the potential for cheaper electricity by 2020
- Learning curves (decline of RE and escalation of fossils and nuclear costs) are trends well-established by e.g. the International Energy Agency (IEA)
- Externalised costs much higher for coal and nuclear (SA 5-10c/kWh)
- Even if UNFCCC fails, there will be a cost on carbon (int’l border taxes)
- Cost of operating entire electricity supply chain far more extensive than costs of generation plant, e.g. LNG infrastructure; coal trucking; grid expansion and strengthening for universal access (smart grid); nuclear fuel production (another energy-intensive mineral primary beneficiation activity that will drive demand for considerable time before any net contribution to supply)
- Still no account of the methodology for PEV scenario costings
- Pricing curves
- Returns on carbon reduction (Figure 7) based on perverse, outlier scenario





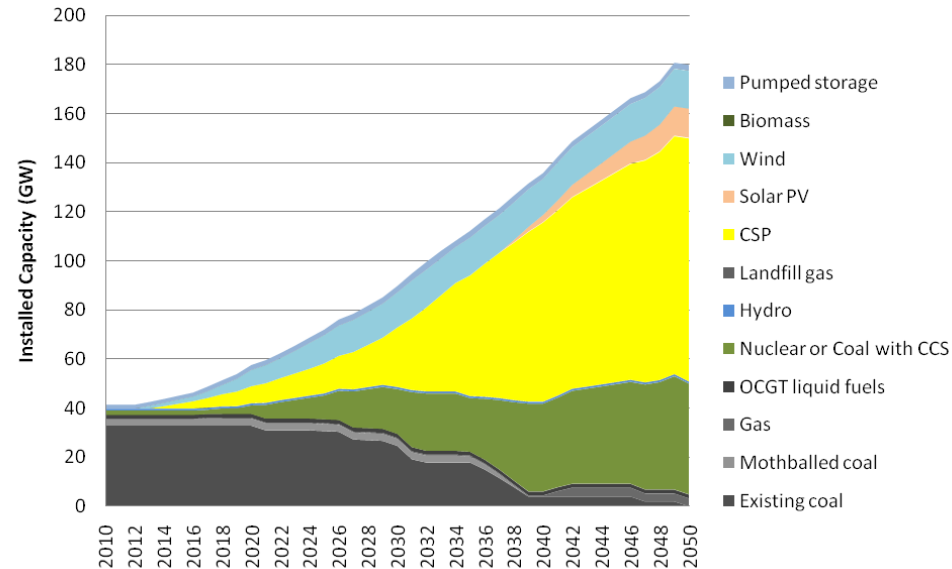
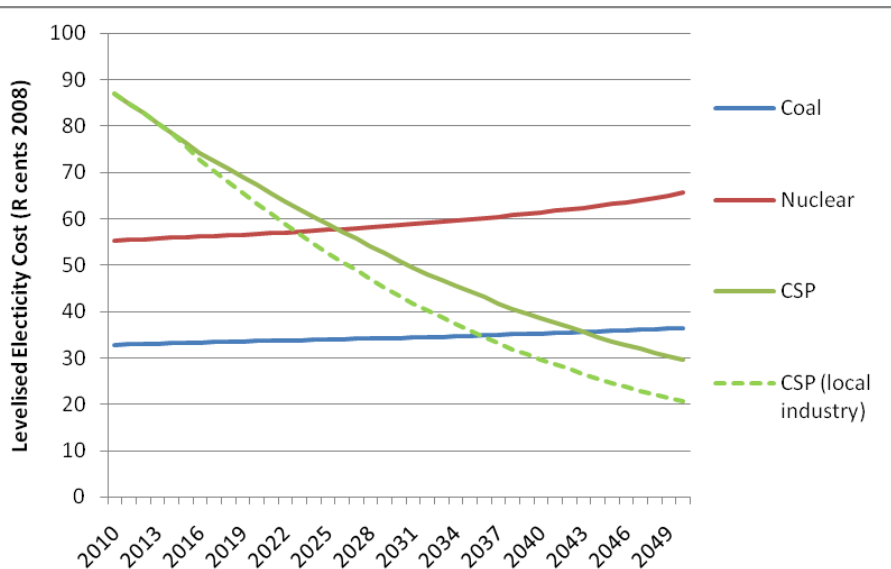
'LOCALISATION'

- 300MW/annum, >4yr a common benchmark
- 5 000 MW Solar park better benchmark – has int'l interest and aligned with securing international support for implementing Copenhagen Commitment
- Current investor interest > 14 000 MW nationally, with >5 000MW clamouring for contractual clarity...
- Ecofys Energy Report on 95% renewable energy supply by 2050

WWF RE Scenario - in 2020:

Wind (30% availability):	3 700 MW
Wind (25% availability):	600 MW
CSP (central receiver):	3 900 MW
CSP (trough):	2 000 MW
PV:	60 MW
Biomass:	590 MW

Electricity generation capacity projected for South Africa to achieve near carbon-neutral electricity generation by 2050 *Source: Winkler (2007)*





Carbon Budget (Ecofys / WWF)

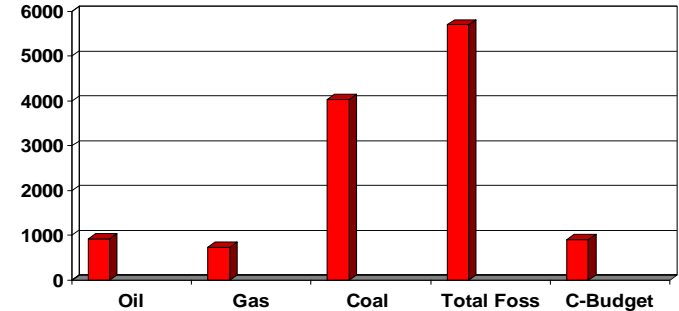
To stabilise global emissions at 400 ppm CO₂e
Very roughly 33% probability of overshooting 2°C

International Energy Agency (IEA): 450 parts per million (CO₂e) for a 50% chance

Total global emissions budget 1990 – 2100: 1 800 Gt CO₂e
(assumes land use change and forestry becomes net sink)

Emissions 1990 – 2008: 40% of total budget

Emissions budget 2009 – 2050: ~ 950 Gt CO₂e



SA share of world total:

- CO₂: 1.6%
- Electricity: 1.4%
- GHG: 1.16%
- Energy Use: 1.14%
- Population: 0.73%
- Economy: 0.71%

Defensible claim for SA CO₂e equivalent?

1% of global budget: <10Gt

Lower edge of 'required by science' range: 16.4 Gt (in LTMS, 2006)

Eskom 2006: "about 40% of national emissions"

Eskom 2010: We're entitled to half national emissions

IRP2 2010 – 2030 ? – 5.5 Gt CO₂e

(Source: cait.wri.org +)





Conclusions

Integrity in multilateral engagements (CA plan) requires

220 Mt/annum from 2020 (not > in 2025) from electricity – wiggle room might permit we ditch 2020 aspiration due to inadequate int'l support, but not credible if not get ESI down to 220Mt/a by 2025... (already have to admit failure to find Required By Science pathway proposed in LTMS)

- MTRM – build on National EE Strategy with mandatory measures
- Jobs require rapid localisation, within MTRM time-span and accelerating into 2020s;
- The Electricity Supply Industry (ESI) presents the optimal opportunity for South Africa to start the just transition to sustainable and affordable energy services for all and avoid major constraints on other sectors
- ESI the only credible platform to support a significant role for SA in the burgeoning renewable energy industries
- Renewable Energy is Peoples' Power, available locally and a basis for community empowerment
- NERSA is the *energy* regulator – shouldn't show favour to ESI





Conclusion: Process compromised by methodology

(treating plant not in IRP1 as “committed”; ignoring cost trends for technologies and fuels) and selective release of information and analysis – suggests ‘capture’ of DoE or relevant officials by vested (BAU) interests; best insurance against this risk is to **ensure no regulatory capture**

Way forward should include:

- Full disclosure of work undertaken to date, including for RE Review;
- Outstanding modeling and analysis work to be completed and published;
- Explicit account and prioritization of objectives (incl. what is required to achieve localization), policy constraints and the risks to be addressed;
- Elaboration of a transparent multi-criteria decision making process;
- Explicit commitment to annual IRP review (required inter alia due to the decision to complement REFIT with a bidding process), even if extensive modeling and scenario development is only bi-annual;
- NERSA to make separate and independent report on hearings to IMC;
- IMC to ensure IRP2 is consistent with developing local industries in renewable energy technologies





Proposed criteria for evaluation of scenarios and plans (detailed in written submission)

Social:

employment; governance; popular participation; intergenerational equity; security; worker H & S

Economic:

costs; local content; price/financial risk; financing prospects; strategic positioning;

Environmental:

water; atmosphere; air; biodiversity / ecosystem degradation; land use;

Security of Supply:

lead time reliability; technology maturity; energy return on energy invested (EROEI); exposure to price risk; credibility of demand side management interventions; base load / system management;

EROEI of electricity generation by Jamie Bull

Technology	Average EROEI	Average EIRR	Average lifespan	Number found
Coal no CCS	5.5	17%	31	11
Coal w. CCS	1.5	8%	23	2
Solar thermal elec.	9.9	40%	25	7
Gas no CCS	3.5	11%	32	5
Gas w. CCS	2.2	13%	23	2
Nuclear	10.9	36%	29	50
PV	8.3	34%	24	46
Tidal range	115.9	97%	120	1
Tidal stream	14.9	74%	20	2
Wind	25.0	125%	21	108
Wave	12.0	60%	20	2

EROEI – Chris Busby, adjusted from World Nuclear Association

Power Source	EROEI(actual)
Hydro	50, 43 and 205
Nuclear (centrifuge)	18.1, 18.4, 14.5, 13.6 and 14.8
Nuclear (diffusion)	6.0, 6.7, 5.8, 7.9, 5.3, 5.6 and 3.9
Coal	12.2, 7.4, 7.32, 3.4 and 14.2
Gas (piped)	16
Gas (piped a lot or liquefied)	3.4, 3.76 and 4
Solar	10.6
Solar PV	12-10, 7.5 and 3.7
Wind	12, 6, 34, 80 and 50

