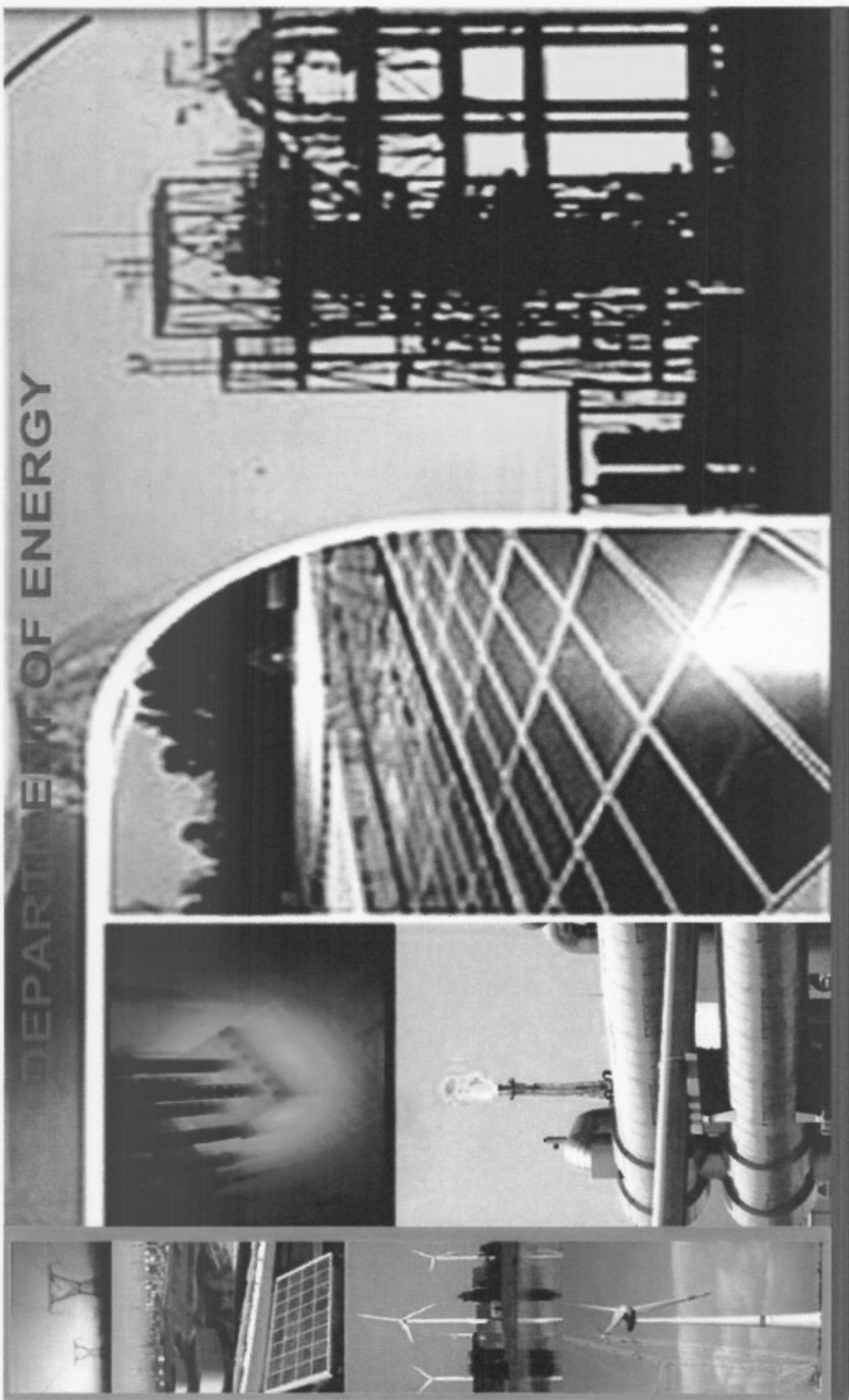


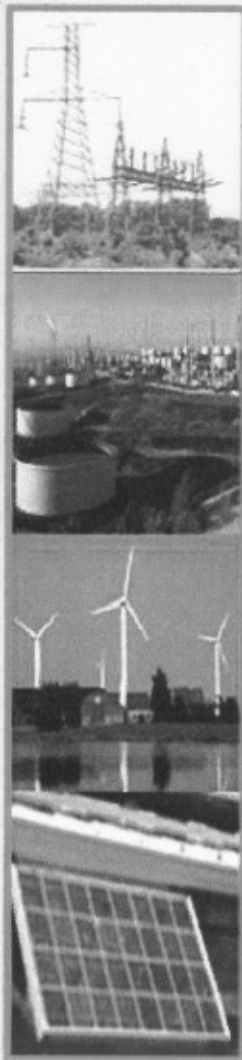
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Introduction

- Democracy is intended to flourish by engaging the population on the assumption that people can assess what is in their best interests.
- If the information on which they make those assessments is wrong or driven by a narrow lobby-group or of poor quality – Democracy cannot work
- This IRP process is designed to allow the DoE to arrive at a plan for the country which is based on knowledge, data, reason and consultation - and not on convenience or the needs of a **narrow constituency!**




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The IRP Context

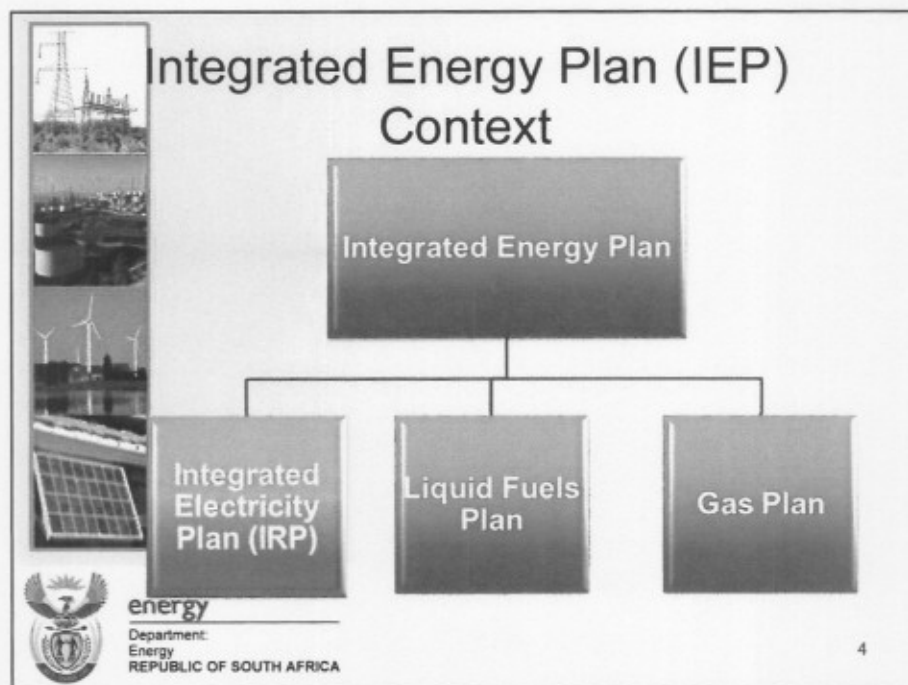
- The Integrated Resource Plan in the South African context is not the Energy Plan – it is a National Electricity Plan.
- It is a subset of the Integrated Energy Plan.
- The IRP is also not a short or medium-term operational plan but a plan that directs the expansion of the electricity supply over the 20 year period.



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The IRP needs to answer the following questions

- What are the electrical energy requirements for South Africa to achieve the aspiration of sustainable economic growth? By when is the capacity needed?
- What is the appropriate mix of technologies to meet these needs that ensures South Africa can meet its commitments to climate change initiatives, ensures adequacy of supply, creates a local manufacturing base, maintains a competitive position in the global arena and ensures sustainable use of local and regional resources?



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The IRP needs to answer the following questions

- What are the linkages and dependencies on other resources such as water, primary energy sources, skills, sorbents, transmission infrastructure and land?
- What is the role of Government, NERSA, Eskom, IPPs and other stakeholders in meeting these needs whilst building a sustainable industry?



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The IRP needs to answer the following questions

- What will it cost to meet these needs and how will it be funded? What will be the impact on future electricity prices and will they remain competitive?
- What is required to implement this plan, what is the level of confidence in achieving this, what are the commitments required and who are these required of?



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The IRP process is output focused

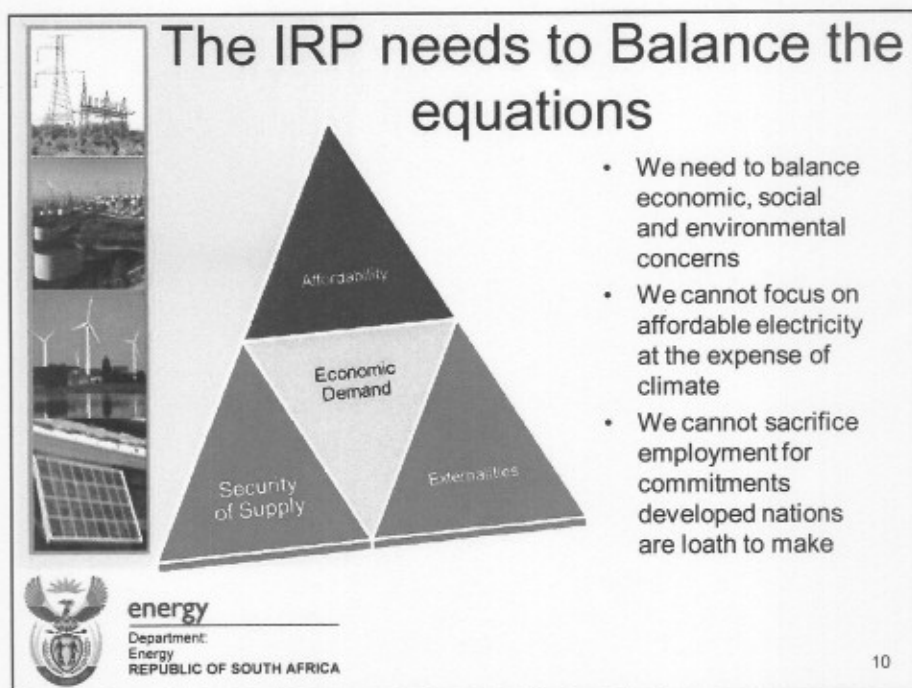
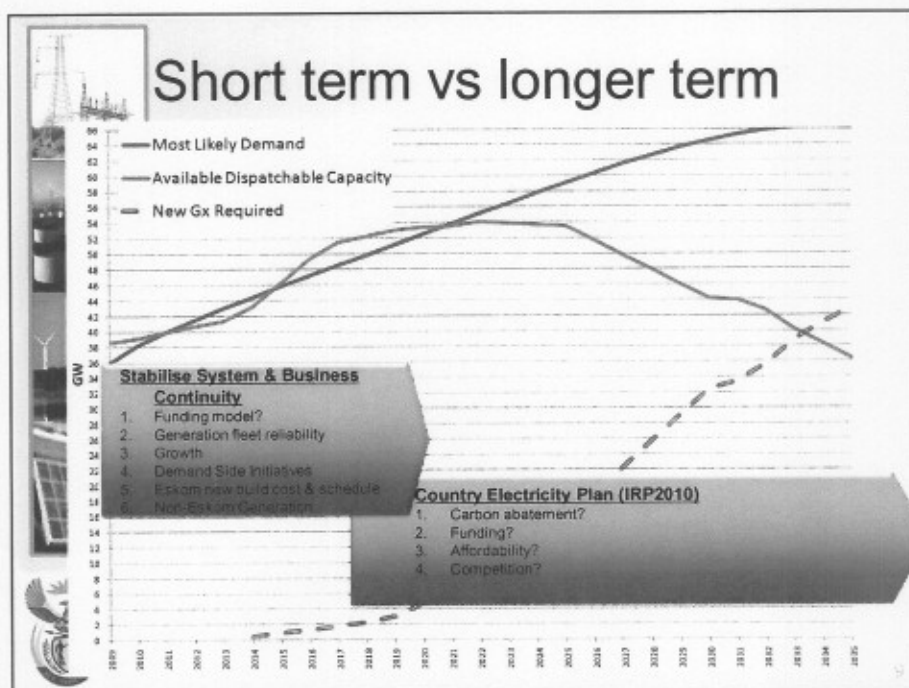
- The IRP process does not start with an end in mind
- The IRP process uses a fact base to determine the most **COST EFFECTIVE** mix of generation options given the constraints imposed (nationally and internationally)
- **Scenarios are produced to allow the decision makers to chose which options will be accepted**
- That becomes the policy and risk adjusted plan

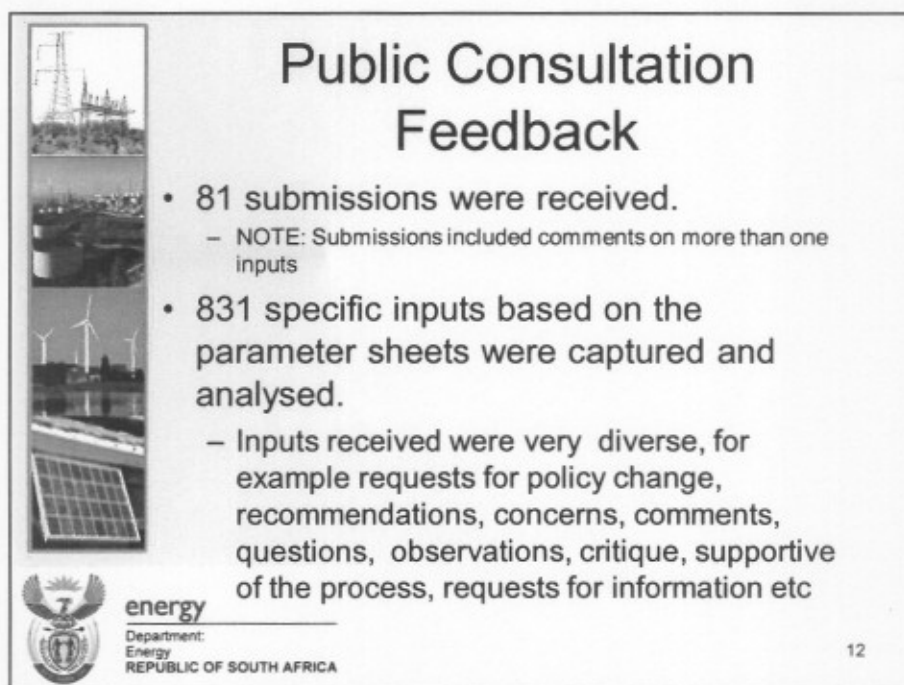
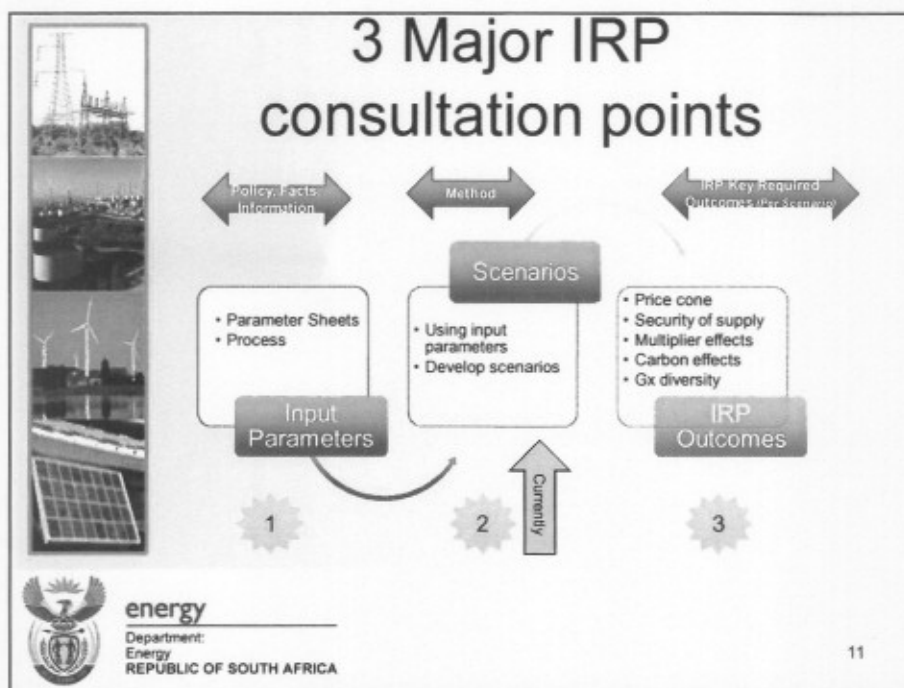


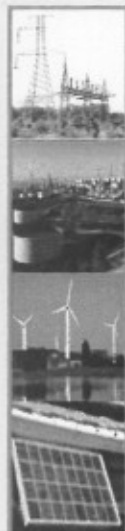
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Major Contributors

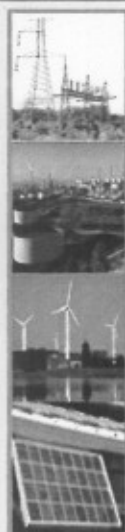
- NGO's & Civil Society:
 - 67 Organisations
- Academics & Consultants
 - 63 Organisations
- Industry and Business
 - 70 Organisations



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Consultation Analysis

| IRP Parameter | Total |
|----------------------------------|-------|
| Renewable Generation | 200 |
| The IRP2010 Consultation Process | 111 |
| Demand Response | 94 |
| Economic factors | 92 |
| Climate Change | 78 |
| Non Eskom Generation | 68 |
| Security of Supply | 52 |
| Demand Forecast | 32 |
| Price Elasticity | 29 |
| Cost of Generation Options | 28 |
| Non IRP Related | 25 |
| Water | 22 |



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IRP Process Comments

(Note: Statistics can be made available on request)

- Most respondents are impressed and satisfied with the process and congratulated the DoE on transparency.
- Many raised concerns about:
 - Insufficient time to respond adequately;
 - Lack of input from civil society and communities, especially rural communities;
 - Lack of capacity building (especially communities) so difficult to respond to complex technical issues;
 - Inability to influence existing government policies or decisions already in place;
 - Not accessible countrywide and internet driven;
- Some respondents said *Electricity* IRP should not be completed in isolation from *Energy* IRP



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Major Themes

- Most respondents called for a "low carbon economy" and for a thrust to be on renewable energy (wind; solar; geothermal etc) in future
- Range of 20 – 75% of total energy supplied by 2050
- Many respondents strongly opposed to nuclear and coal as energy solutions in future.
- Costs of financing the expansion plan are a key driver i.e. difficulty of getting funding for coal and nuclear?
- Respondents that included references in support of their energy preference were often contradicted by other submissions
 - e.g. wind versus CSP cost debate
- The need to consider new technologies on the horizon in the IRP process, such as Solar Hydrogen Technology, sugar cane fibre as a renewable energy source etc



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Major Themes

- Need to resolve the structure of the electricity market debate and put in place incentives (e.g. tax policy) to encourage Non Eskom Generation into the sector
- General confusion and lack of discrimination between inputs, outcomes, policy, regulating instruments (for example tariffs), constraints and remedies to unblock constraints (for example PPA's, MTPPP etc).
- Calls for water and other infrastructure (such as roads) and other potentially serious constraints/determinants of electricity choices to be considered.



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Other Inputs

- Constitutional issue - many respondents referred to state's constitutional obligation towards safe energy choices
- Socio economic effects of decisions (being done through the IDC economic modelling)
- Externalities (already being addressed)
- GDP Impact
 - Add Human Development Index and population growth factors
- Transmission Infrastructure (as a potential constraint/risk)
- Cost of inaction on climate change



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Dealing with Input Comments

- Each of the comments has been incorporated into the analysis for each parameter – the reasons for the final parameter range have also been updated and included in the published pack on the Web.
- For each of the parameters the inputs given were analysed and a response provided on the update input parameters.
- Several critically important aspects of Technology costs and viability (e.g. BioMass were very helpful and provided fantastic insight)
- It is clear that the public relished the participation process and its continued use in long-term planning must be ensured.



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Incorporating Public Comments (demonstration)


- Discount Rate.
- Climate Change.
- Price Elasticity of Demand.
- Plus other 26 parameters.
 - Note: Public Comments on ALL 29 parameters available on the website. www.doe-irp.co.za



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Key Parameter values used

- Discount rate
 - Economic opportunity cost of capital and also to reflect time value of money
 - Should be set at real (after tax) rate
 - 8% (NERSA in MYPD2) for basecase and 3 & 13% for sensitivity in screening curves
 - Should also serve as proxy for cost of financing project
- Energy and demand forecast
 - GDP (5.5%, 4.5%, 3.3%) translates to electricity growth of (3.66%, 2.86%, 1.76) Aligns with NT forecasts.
 - Scenario Wise Decomposition Used – statistical average between CSIR and System Operators electricity growth number.


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Key Parameter values used

- Water
 - Water usage quantified for each technology according to independent EPRI reports and Eskom existing plants
 - Cost of water for existing and committed new plant is known and quantified
 - Water infrastructure, timelines, costs and quantities for new plant to be analysed in conjunction with the DWA.
 - All future new coal fired plant will be dry cooled and have FGD installed for pulverised fuel
- Generation plant location
 - No assumption is made on plant location
 - Impact on Transmission integration and water availability and costs will need to be determined
 - Overlay the possible locations for technologies with water and transmission to see how it impacts on the plan


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Key Parameter values used

- Renewable Energy
 - Costs of various RET included in the EPRI report
 - Renewable Energy White Paper (REWP) currently under review
 - 100X 2 MW, wind class 4 @ 29 % capacity factor
 - 500MW in 2013 then 1000MW each year maximum
 - Assumptions made for now. Alignment with REWP once complete
 - Cost sensitivities to be tested using screening curves
 - Wind atlas coming out towards end of year
 - REFIT options to be modeled based on REFIT tariff
- Climate Change
 - For scenarios use LTMS peak of 550 MT in 2025 (electricity account for 50% of CO2 emissions, ie 275 MT)
 - First scenario 275 MT for entire IRP study period
 - Second scenario limit 275 MT only from 2025 onwards
 - Third scenario based on 470 MT (RBS in LTMS) in 2025 (235MT for electricity)
 - The LTMS figure of R100/ton was for 2003 if used must be escalated to 2010 prices for a specific carbon tax scenario


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Key Parameter values used

- Imports
 - No committed import options
 - Moamba, Mamabula, CHB North Bank extension, Mphanda Nkuwa and Kudu will be considered in the base case
 - Mphanda Nkuwa must be built before CHB North bank
 - Baroma, Moatize, Itzhi Tezhi, Kafue gorge and Kariba North will be included in the regional development scenario
 - Costs and parameters as per the SAPP pool and uses 2006 US\$ and escalated by USA inflation to 2010 US\$.
- Demand Side Management
 - DSM on IRP1 will be hardwired into IRP2 base-case.
 - New DSM targets to be optimized in IRP2 scenarios.
 - DSM cost (R/kW) based on current NERSA MYPD2 determination.

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Key Parameter values used

- Energy Availability Factor
 - 85 % used.
 - Based on current big ten power stations.



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Other RE Assumptions for Base case

- Wind (100x 2 MW)
 - Wind class 4
 - 500 MW in 2013
 - 1000 MW per year from 2014
- CSP (trough)
 - Optimise between 3,6, & 9 hour storage options
 - COD first unit 2018
 - 500 MW per year thereafter
- Concentrated PV (Ground)
 - 10 MW unit
 - COD first unit 2018
 - 100 MW per year
- Biomass (bagasse, woodchips & municipal waste)
 - For bagasse use Tongaat figures
- Pumped storage
 - Eskom PDD numbers
 - COD first unit 2018



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