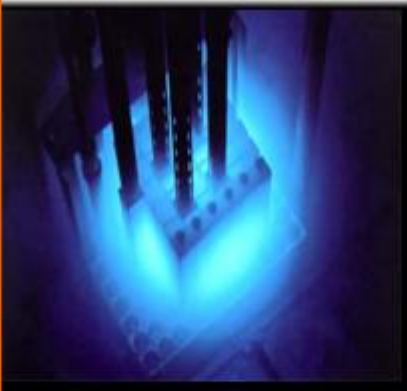


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Introduction

- 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 consultation 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 ideological 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?
- What are the linkages and dependencies on other resources such as water, primary energy sources, skills, sorbents, transmission infrastructure and land?



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The IRP needs to answer the following questions

- What is the role of Government, NERSA, Eskom, IPPs and other stakeholders in meeting these needs whilst building a sustainable industry?
- 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

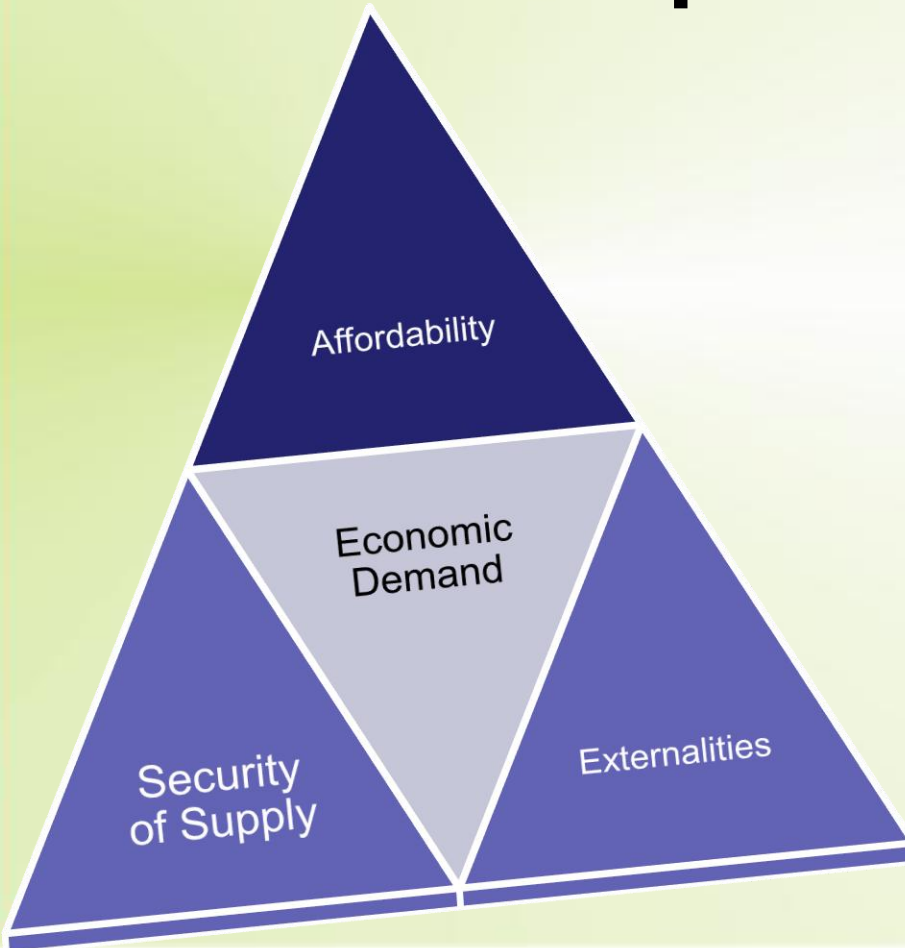
- The IRP process does not start with an end in mind
- The IRP process uses a fact base to determine the most COST EFFECTIVE mix of generation options given the constraints imposed (nationally and internationally)
- Scenarios are produced to allow the decision makers to chose which options will be accepted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



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The IRP needs to Balance the Equations



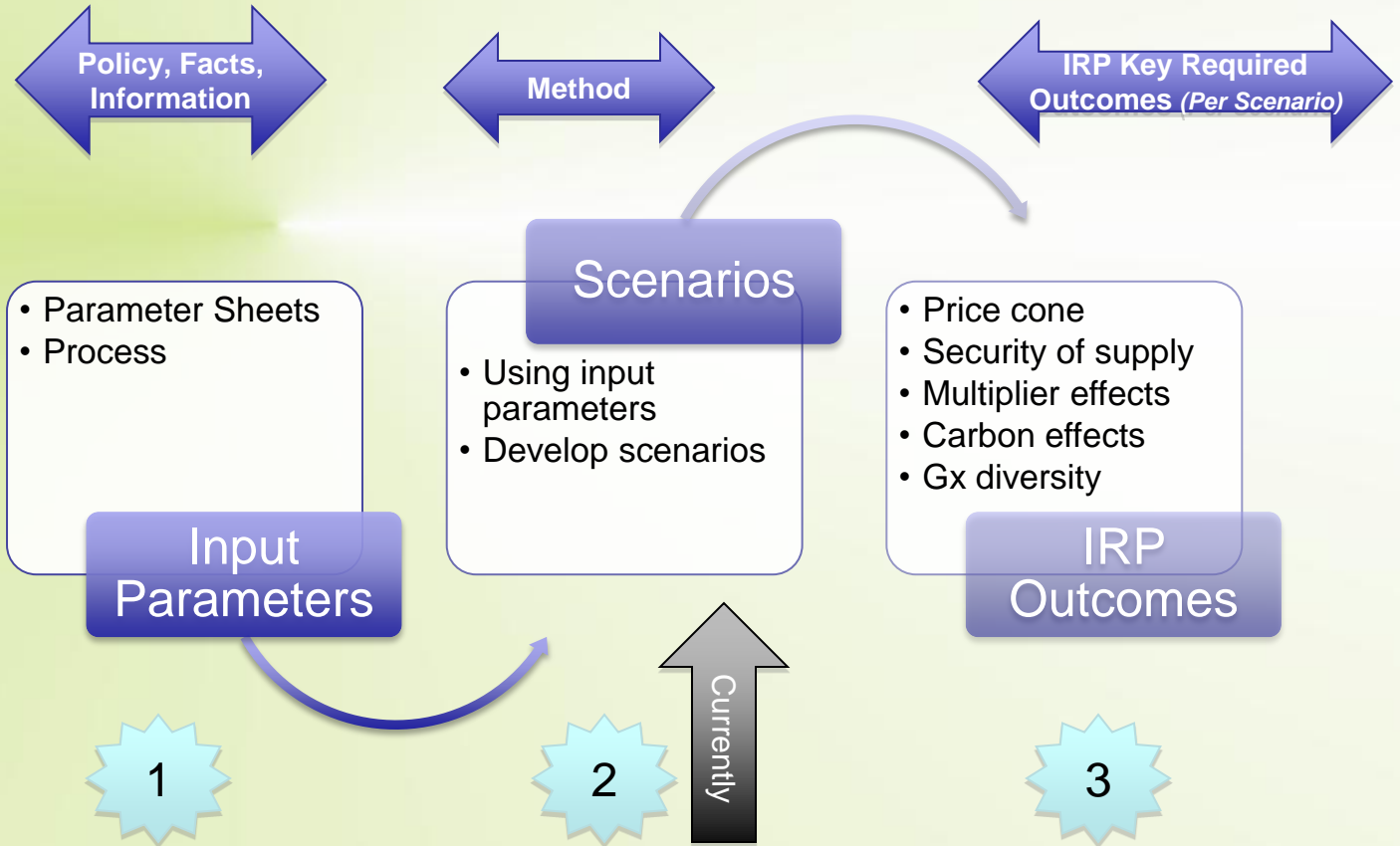
- We need to balance economic, social and environmental concerns
- We cannot focus on affordable electricity at the expense of climate
- We cannot sacrifice employment for commitments developed nations are loath to make



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3 Major IRP Consultation Points



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First Consultation Feedback

- 81 submissions were received
- 831 specific inputs based on the parameter sheets were captured and analysed.
 - Inputs received were very diverse, for example requests for policy change, recommendations, concerns, comments, questions, observations, critique, supportive of the process, requests for information etc



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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

- 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
- 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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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



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Scenarios vs. Plans



- Scenarios are not likely plans.
- They are the output of the model's attempt to optimise the mix given the scenario objectives at the least cost.
- From the scenarios a risk adjusted (Balanced) scenario is developed by tweaking the major parameters to achieve a realistic balance.
- An Economic impact study should be done on this scenario.



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IRP Critical Dimensions



- Electricity Prices / Tariffs
- Carbon and Emissions
- Regional Development
- Generation Mix
- Implementation timeframes and costs



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Key Scenarios

- Scenarios that require investigation:
 - Demand scenarios
 - Supply option scenarios
 - Economic impact scenarios
 - Climate change scenarios
 - Regional development scenarios (electricity import & export scenarios)



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Other RE Assumptions for Base Case

- Biomass (bagasse, woodchips & municipal waste)
 - For bagasse use Tongaat figures
- Pumped storage
 - Eskom PDD numbers
 - COD first unit 2018



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IRP 2010 Scenarios

- Baseline / Reference case
- Carbon - emission constrained
- Carbon – carbon taxed
- Generation diversity
- Policy, Risk & Constraint adjusted (IRP 2010 recommended)
This scenario will include sufficient detail on issues for immediate policy implementation such as:
 - Non Eskom generation
 - Critical decision milestones
 - Critical actions for the ministries
 - Inputs to national planning



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Scenario Selection Criteria

- As discussed the role of scenarios is to determine the impacts of certain decisions on the 3 major criteria:
 - Costs
 - Externalities
 - Security of Supply
- Critical criteria for selecting the optimal portfolio:
 - Optimed cost portfolio of generation expansion
 - Security of supply
 - Climate change and sustainability (includes water utilisation)
 - Regional integration and imports
 - Funding and finance requirements
 - Local economic impact



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Scenarios Developed

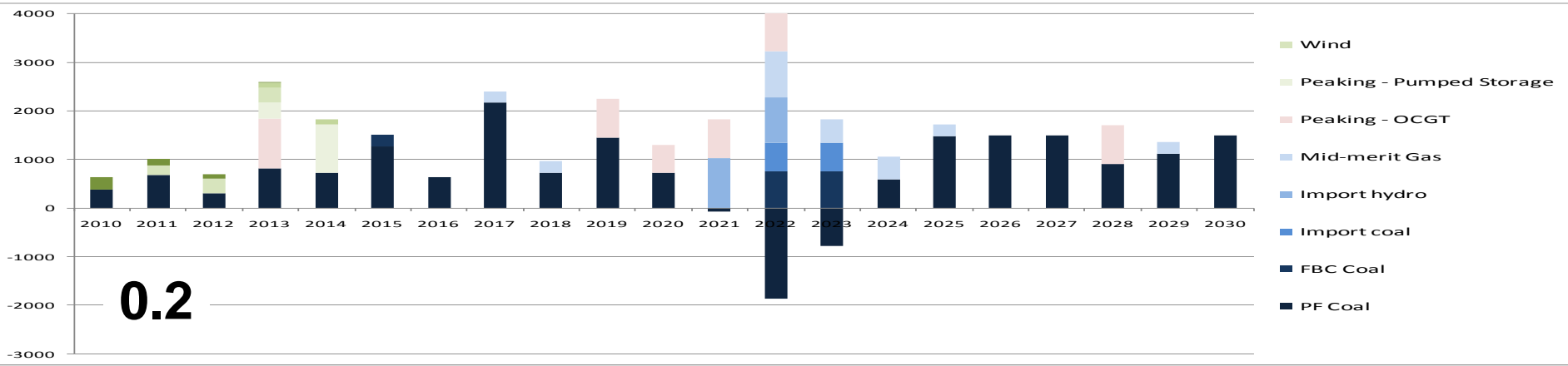
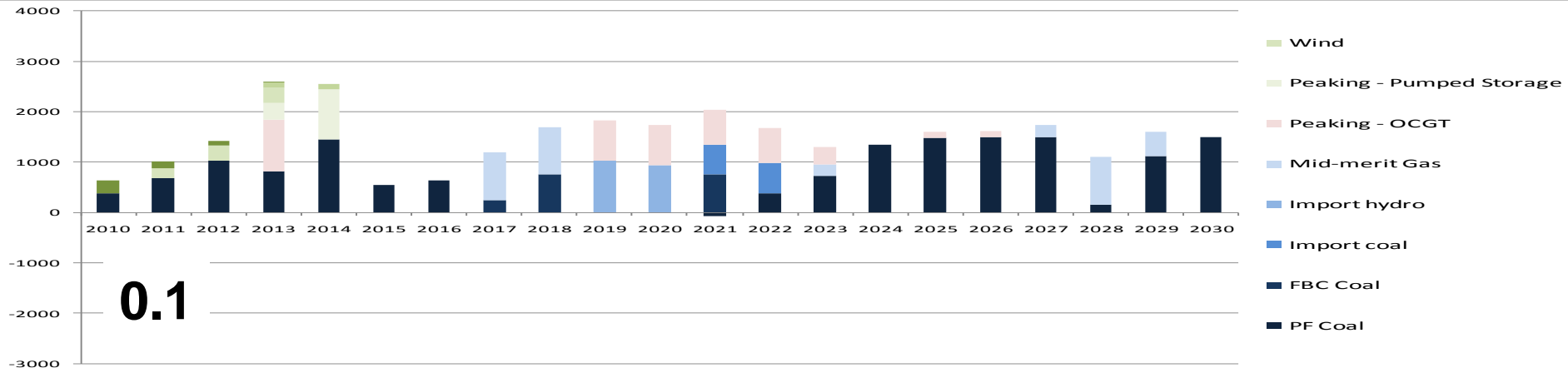
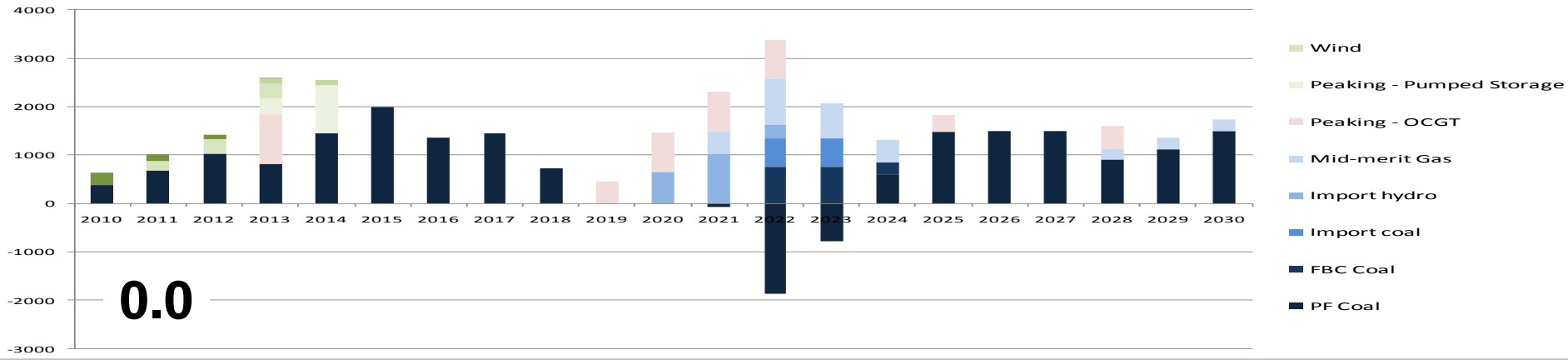
- Expansion Scenarios
 - Base Case 0.0; 0.1; 0.2
 - Emissions Case 1, 2, 3
 - Carbon Tax Case
- Price curves (of the scenarios)
- CO2 Emissions (of the scenarios)



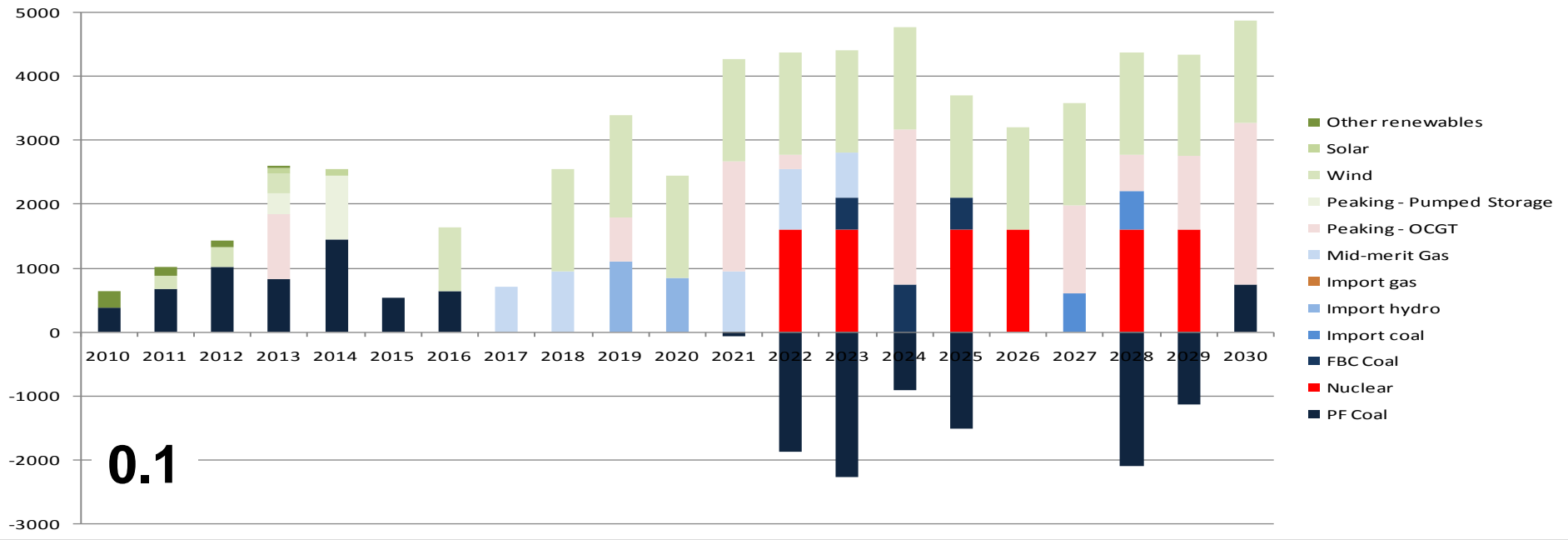
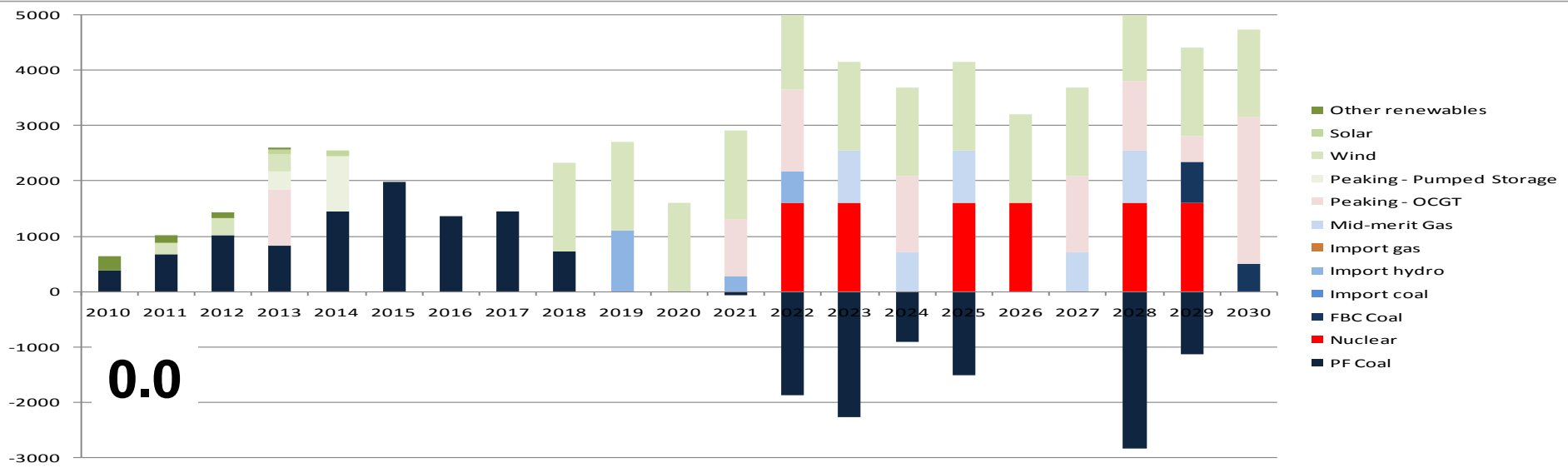
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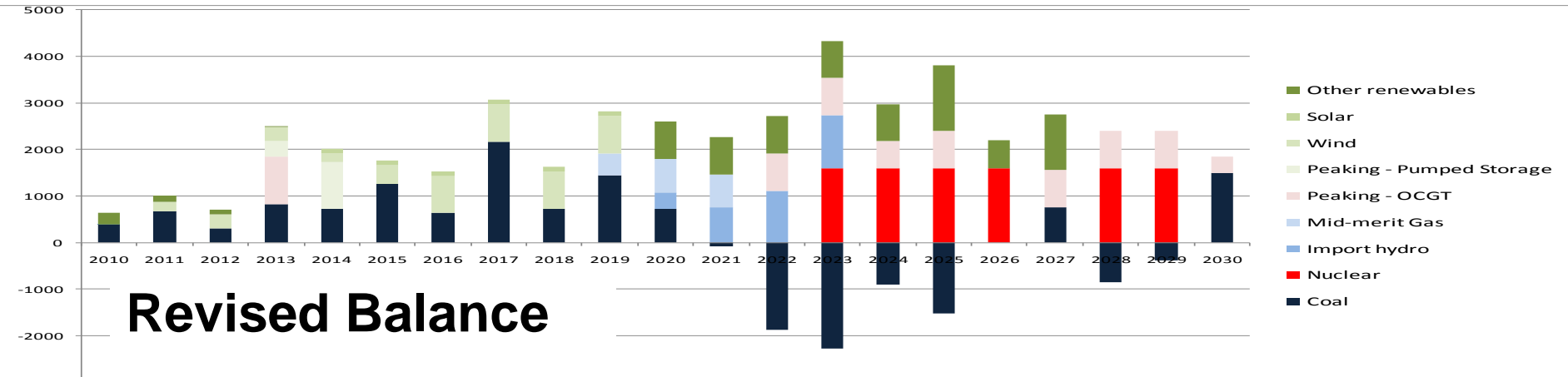
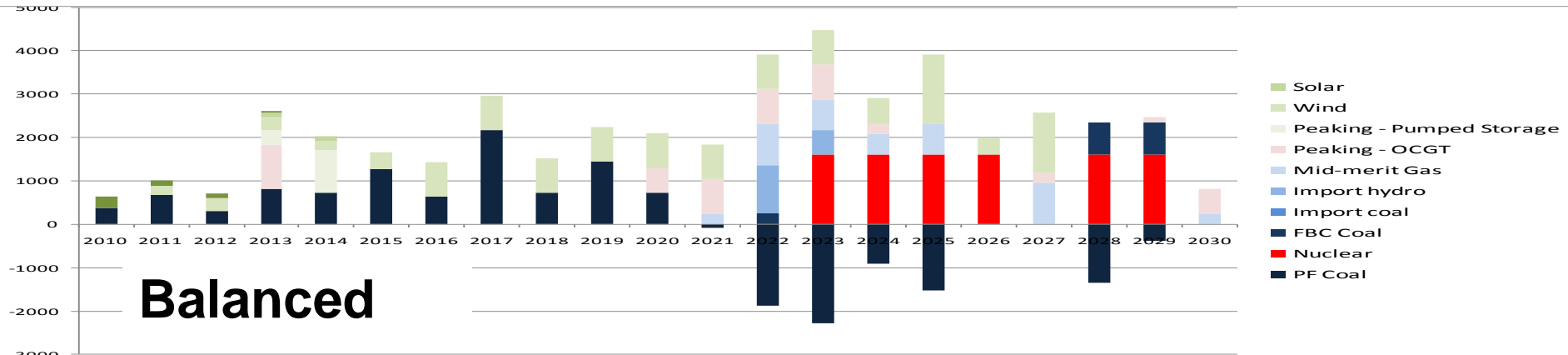
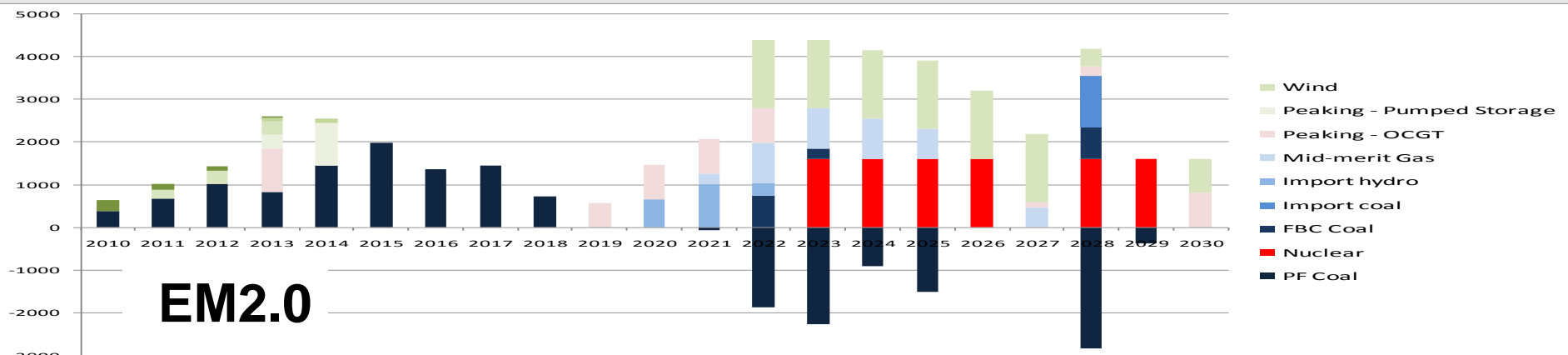
Base Case



Carbon Tax



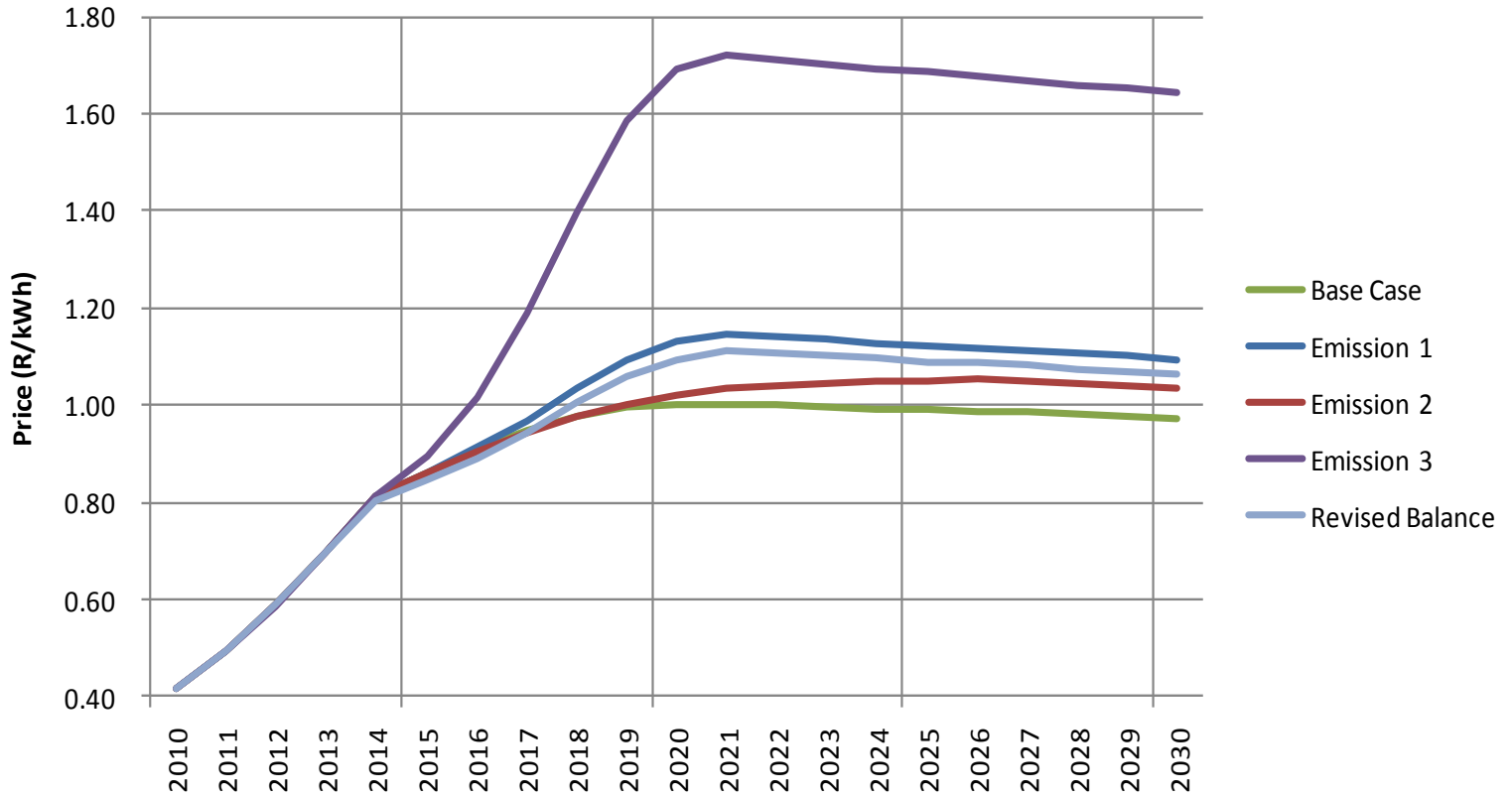
Balanced Scenario



Price Curves



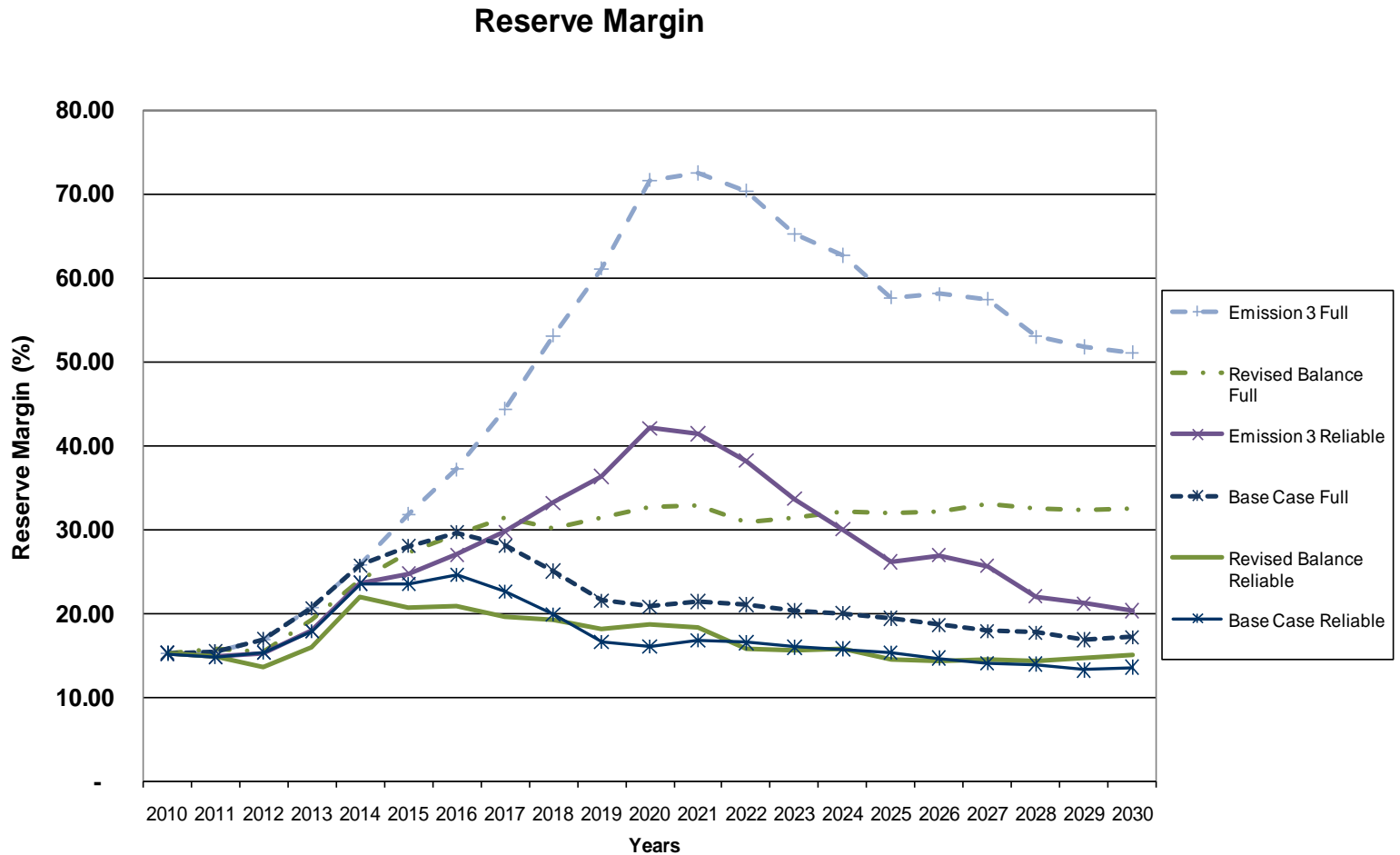
Possible price paths



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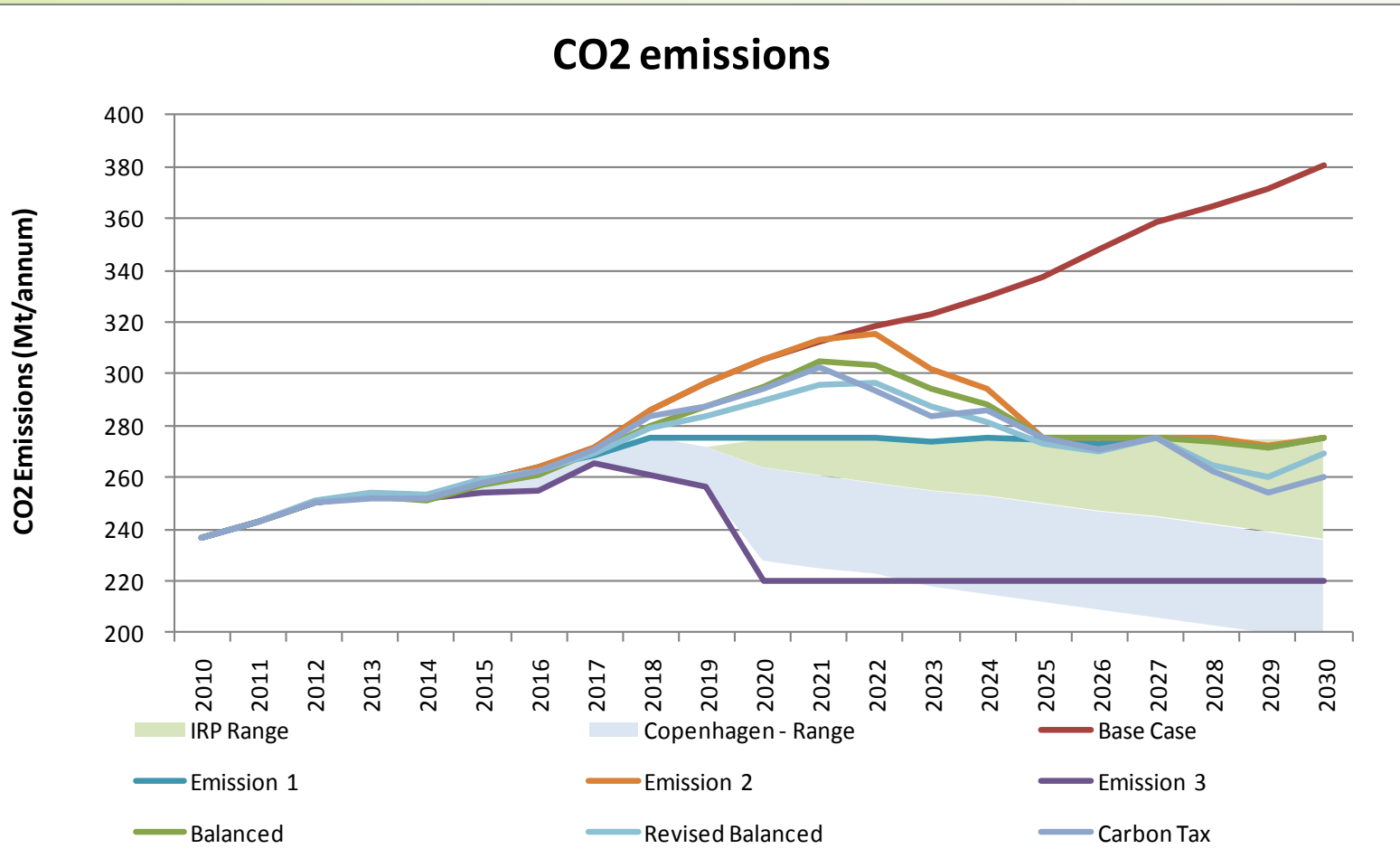
Reserve Margin



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Emissions

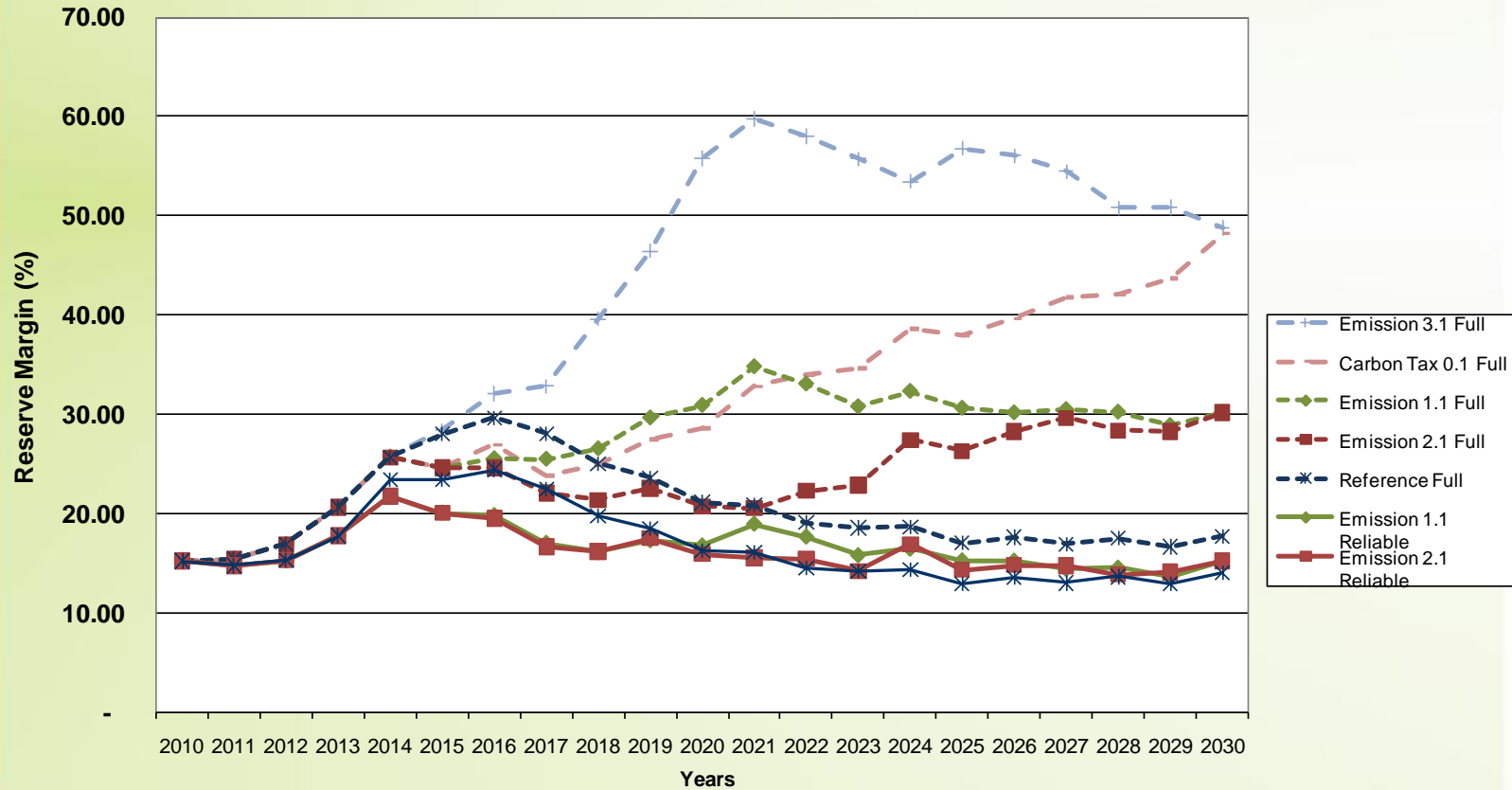


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Adequacy

Reserve Margin



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Funding Considerations

- Funding remains a serious issue.
- The majority of projects can be privately funded – removes the risk from the Govt.
- Addresses some risks associated with stranded capacity.
- However nuclear is unlikely to be privately funded.



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Generation Mix Considerations

- RE Generation – massive land requirements
 - The footprint of nuclear power is much smaller than that of solar and wind. A 1,000-megawatt nuclear plant requires less than two square kilometers of land. Comparable solar and wind plants would require, respectively, 130 and 500 square kilometers of land.
- International order book for nuclear is long
 - Between now and 2030, it is estimated that there is an order book for over 600 reactors globally
- Implementation scales – using the Spanish lessons
- The risk adjusted scenario needs to have a production study to determine its suitability and impact.



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Draft IRP 2010

Balanced Scenario Results

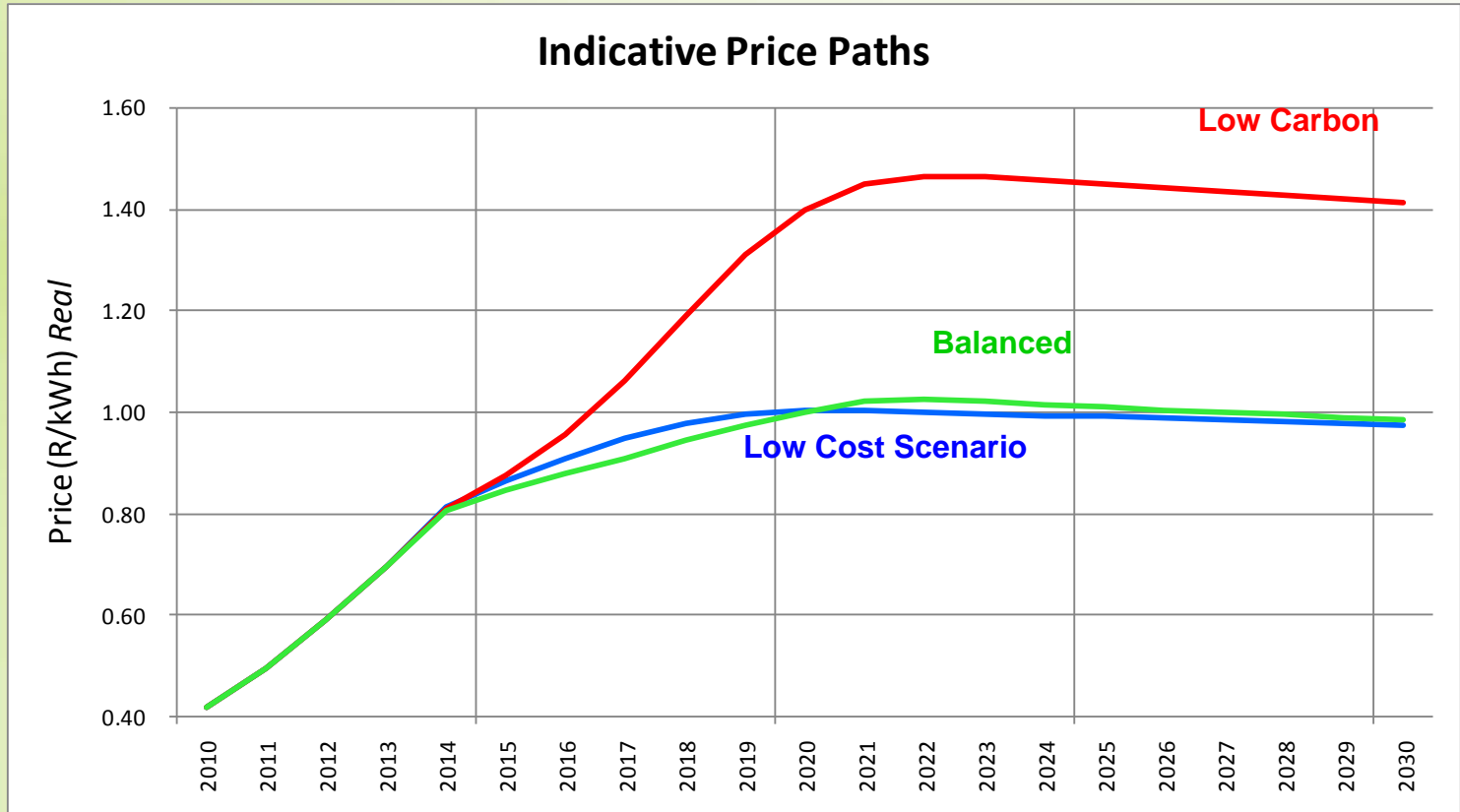


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Affordability/Price

Indicative Price Paths

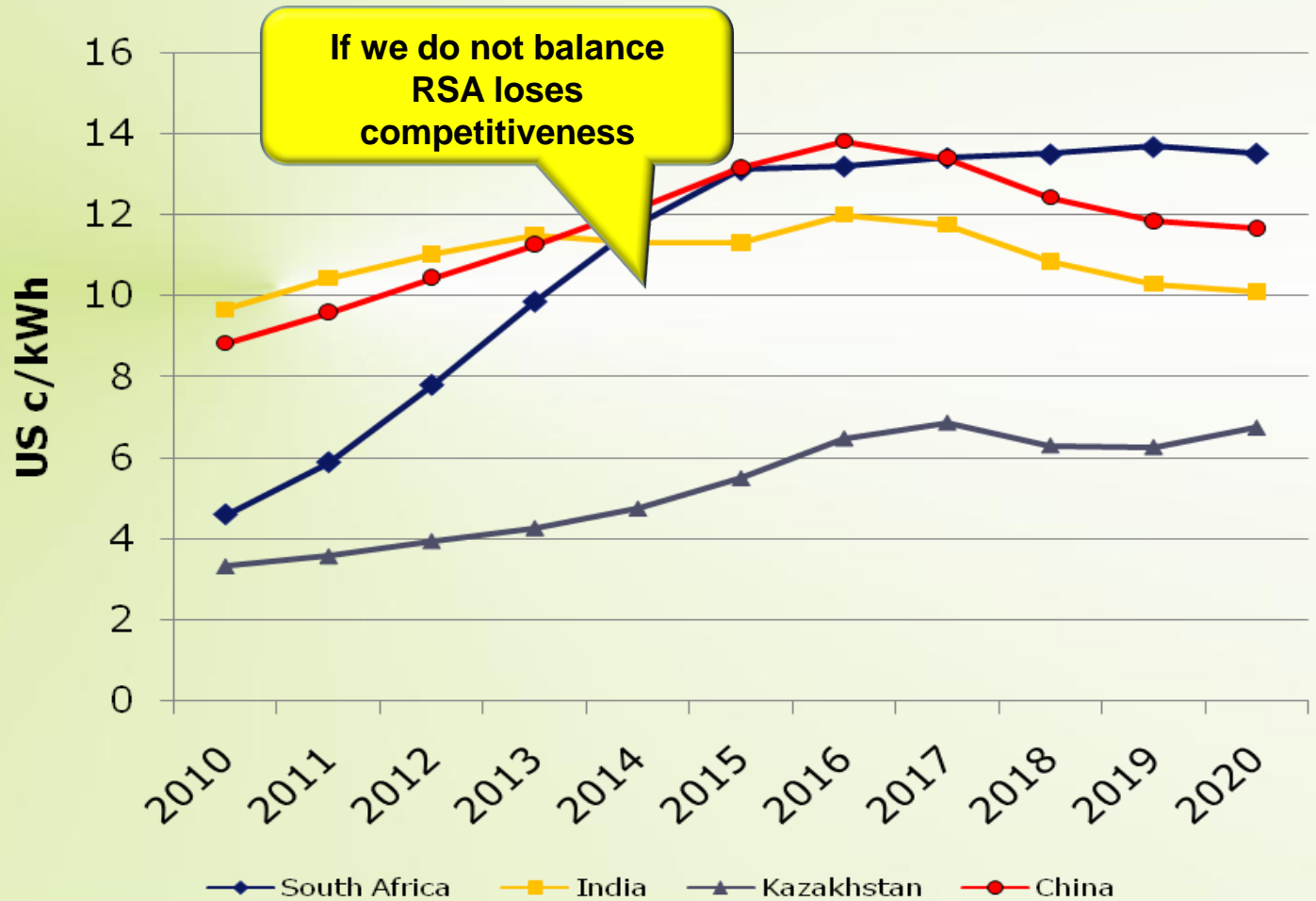


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RSA benefiting competitiveness

Industrial electricity pricing comparison (2010-2020)



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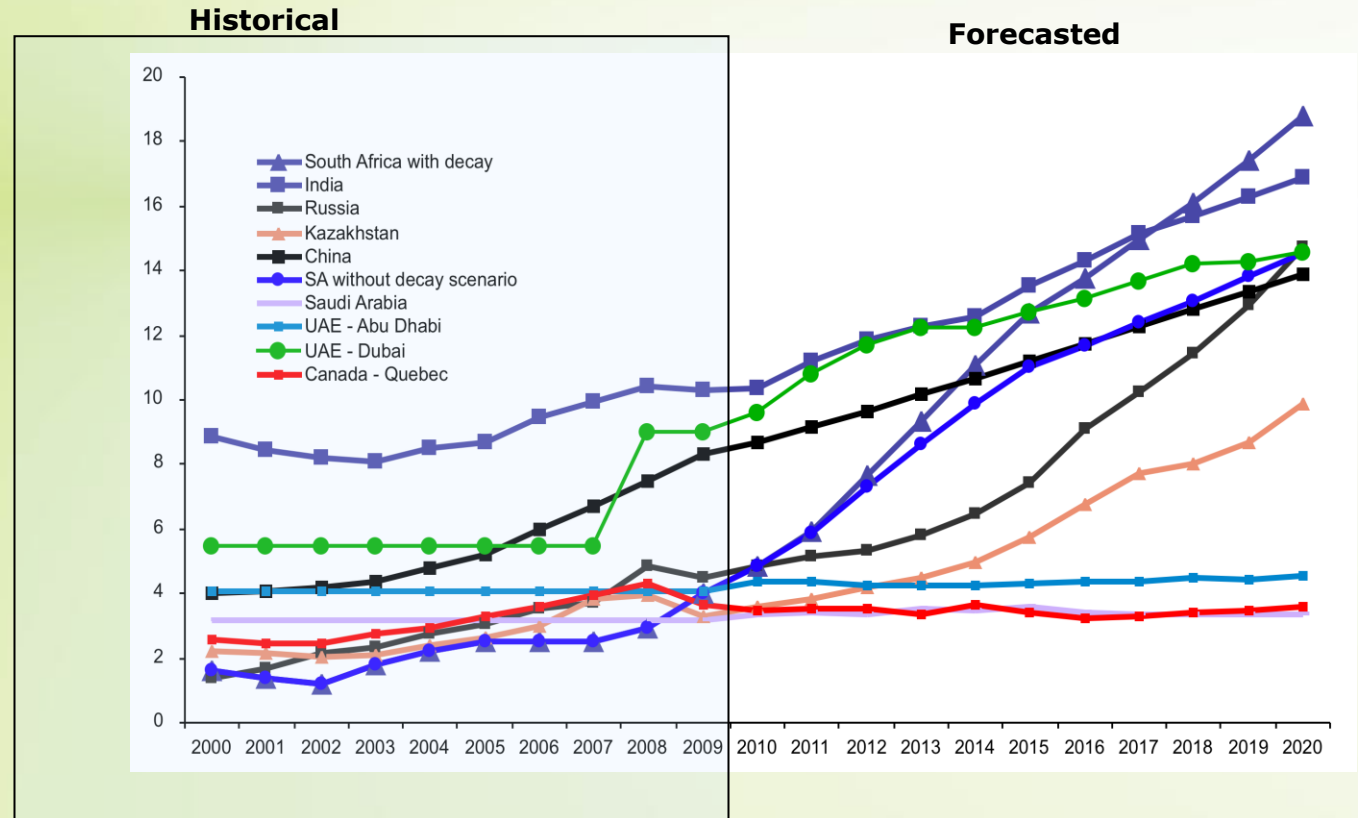
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Source: XTR Commissioned Post and Fill-in Model

Electricity price comparison with assumption of no exchange rate movement and no decay of capacity

Industrial electricity pricing comparison (2000-2020)



USc/kWh

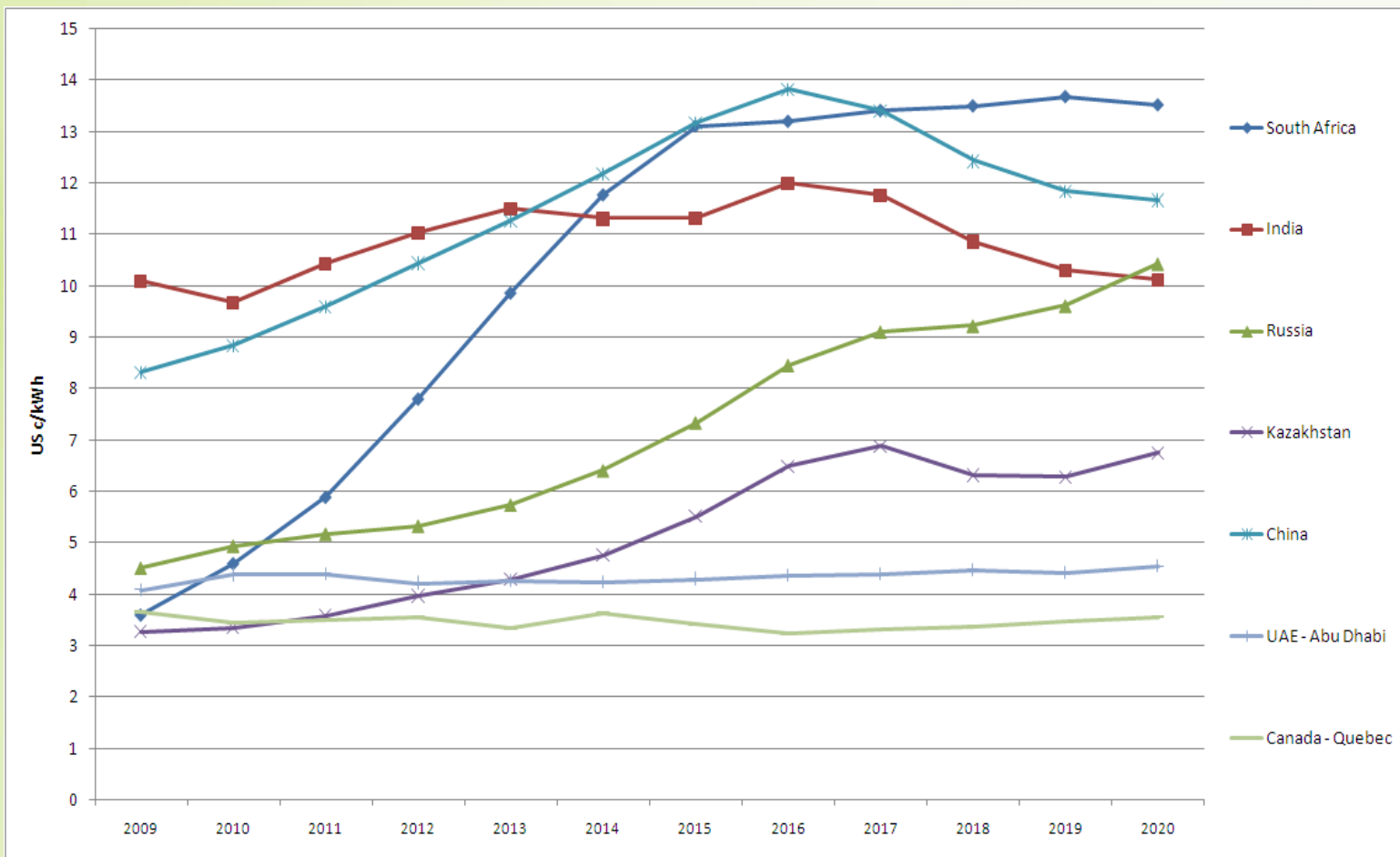


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Eroding South Africa's export competitiveness

Rising cost of electricity impacts relative competitive position

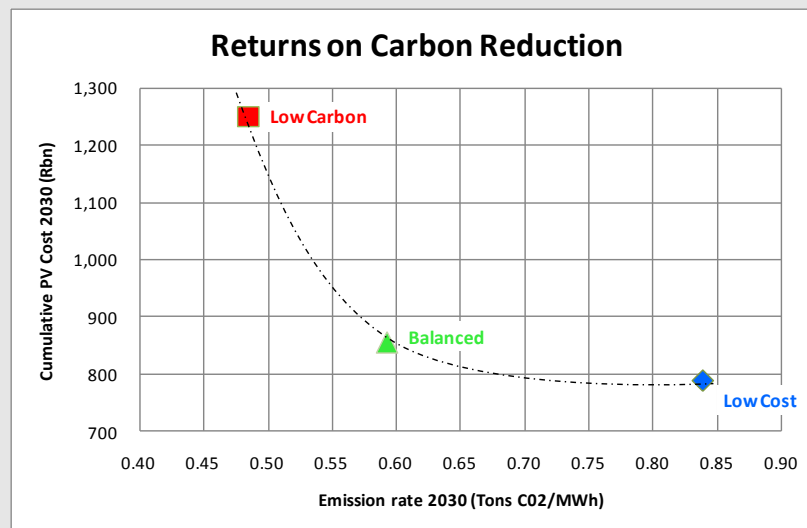
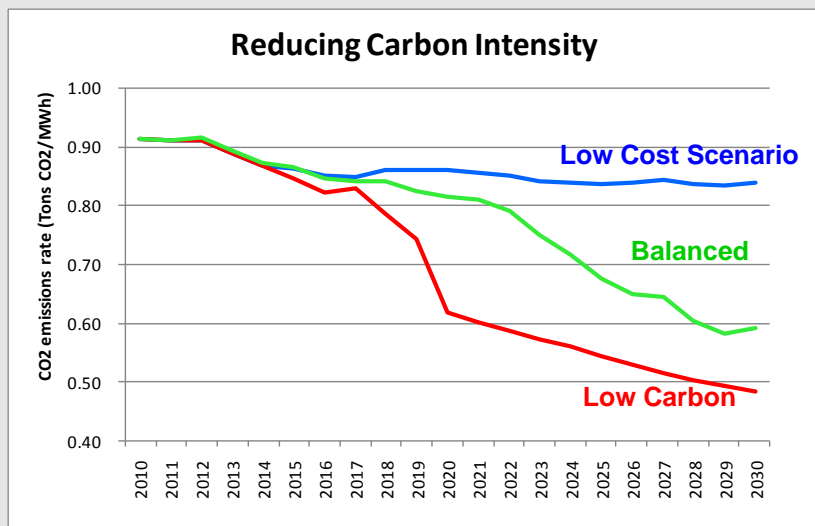


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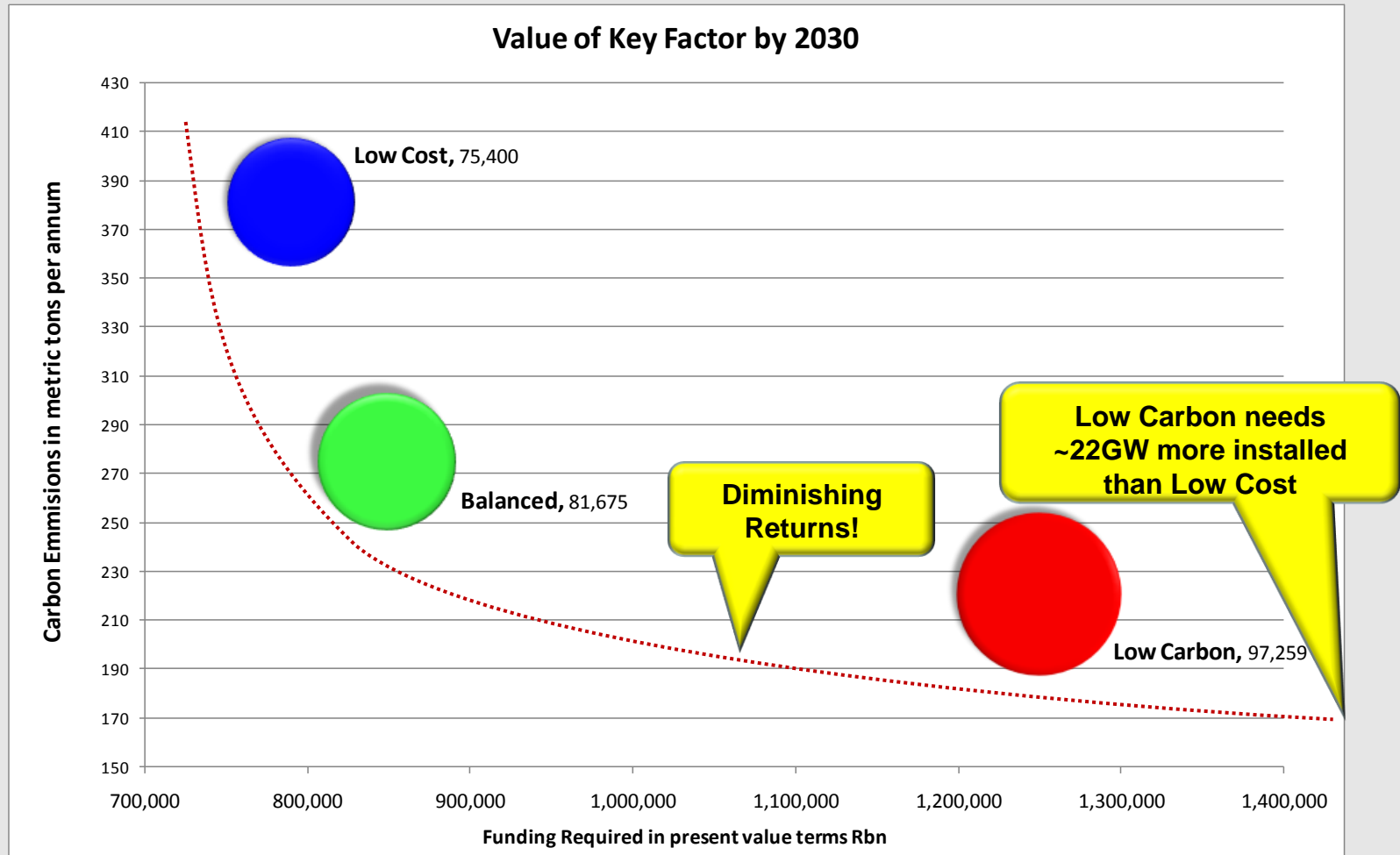
Carbon

Intensity and Emission Trends



Balancing Affordability, Price & Carbon

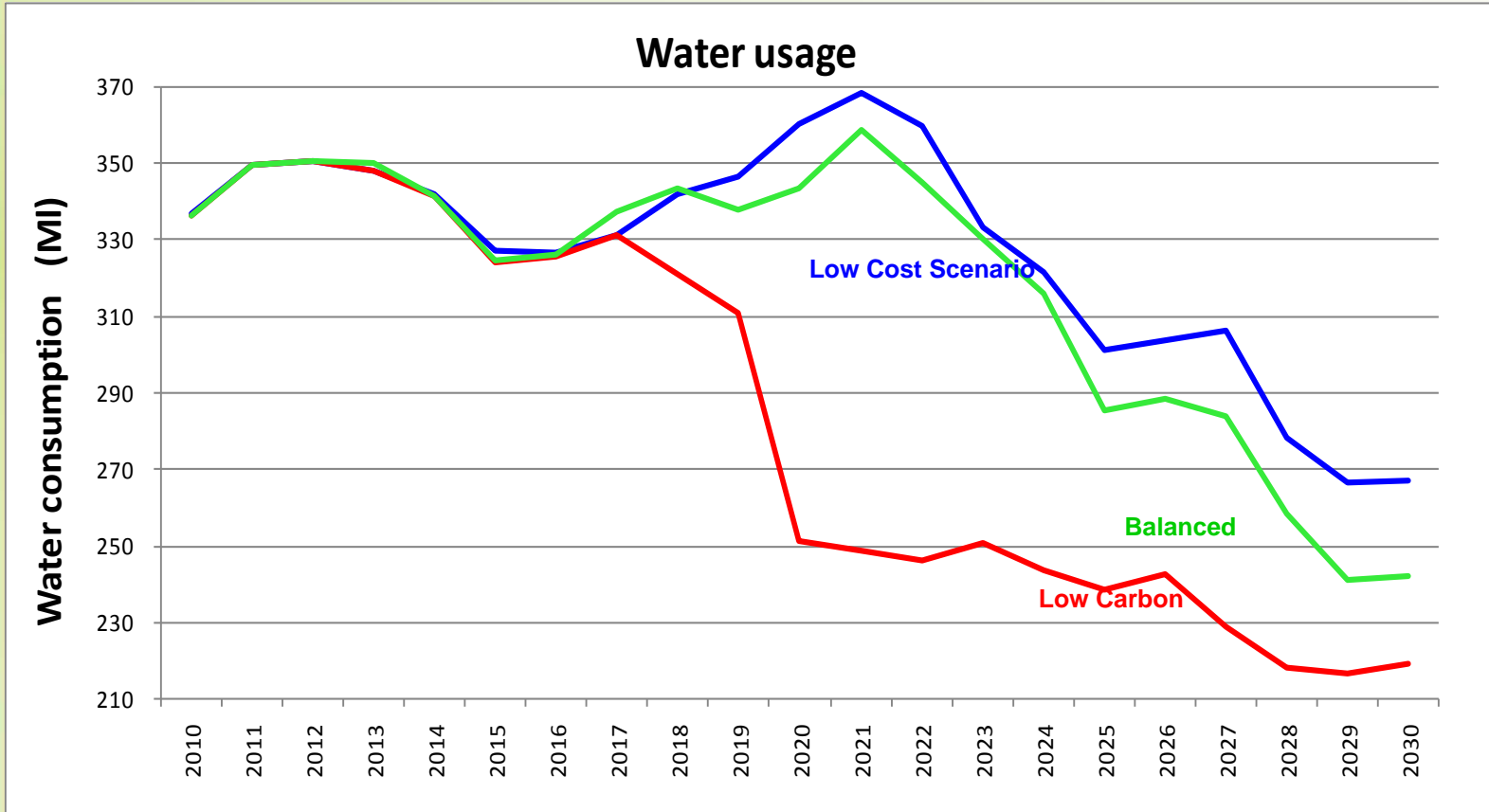
Diminishing returns on carbon reduction



Bubble Six ~ Total MW Installed

Water

Total water consumption trends



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Summary Conclusions

Cost/Price

- Obligation to protect the environment prohibit the lowest cost **scenario**
- Growth and job creation demand RSA protects competitiveness of the **economy**

Carbon/Affordability

- We cannot afford Copenhagen but,
- We can get to LTMS by 2025

Security of Supply

- All scenarios equalized adequacy of Security of Supply

Note: Scenarios are simply a test of input options, in particular policy options, and are not a reflection of expected real-world conditions. Scenarios are neither plans nor real futures. A scenario is simply a representation of one possible future state by modelling the effect of a few key decisions that are assumed to affect the future state and, That the actual IPR2010 is derived by selecting specific aspects from the various scenarios that best fit the realities of known physical constraints, prescribed specific objectives or desired future conditions.



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Summary Recommendations

- The “Balanced Scenario” represents the best fit of the realities of known physical constraints, prescribed specific objectives or desired future conditions.
- IRP Plan includes inherent uncertainties which can be reduced (but never eliminated) by repeating the IRP planning process going forward as and when new information becomes available. (Implementation of a review process)



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Conclusion

- South Africa faces a period of tough choices.
- Primarily the choice is economic growth or economic stagnation.
- No economy can grow in an energy constrained environment
- The IRP has to provide insight into how South Africa can deliver the requisite electricity to fuel growth in the economy AND do so in a manner which is affordable and ensures South Africa remains internationally competitive



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