

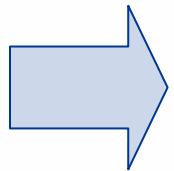
Eskom's response to Water for Growth & Development Framework

Nandha Govender

26 March 2009



Eskom generates 95% electricity



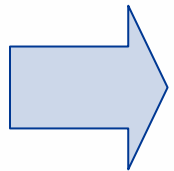
In South Africa



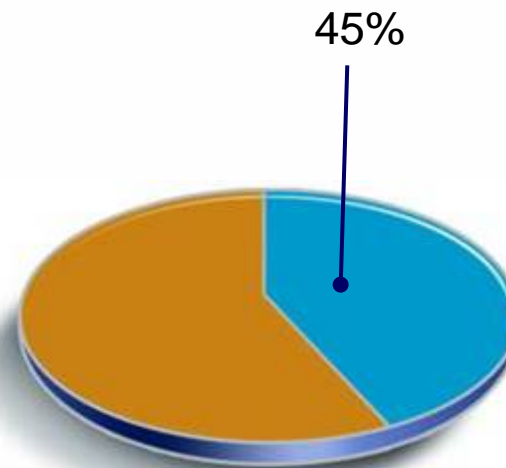
95%





Eskom generates 45% electricity



In Africa



Eskom strategic challenges

-  Securing continuity of supply requires focussing on Primary Energy (includes water, coal, gas etc.) and Demand Side Management.
-  Responding to climate change, with the aspiration of having 1600MW of renewables and 20 000MW of Nuclear or equivalent non-emitting technologies in the capacity mix by 2025.

Presentation overview

- Outline the sector's view of the WfG&D challenges
- Possible measures to address these challenges
- Any sector specific strategies in place that needs to be considered in terms of implementing WfG&D
- Conclusions

Introduction

- Population growth, urbanisation and improving lifestyles places increasing demands on water.
- Water security needed for food and energy is further exacerbated by
 - The current global economic conditions and climate change
 - It is therefore critical to raise the **political profile** of water.
- Eskom is a strategic water user
 - utilises about 2% of the total fresh water resource
 - receives its water at a 99.5% level of assurance
 - through augmentation and inter-basin transfer schemes
- Climate change/variability has the potential to impact availability, quantity and demands for water, thus a major risk to water security and energy security

Strategic drivers in the water sector



Water Challenges: Water costs

- Raw water is but one component of Eskom's primary energy costs that are subject to review by the National Energy Regulator of South Africa (NERSA)
- The average cost of raw water has effectively increased by over 26% in the last three years and is projected to treble by 2015
- Cost drivers include:
 - Development of water augmentation and inter-basin transfer schemes
 - Adequate operations and maintenance of the schemes
 - Integrated water resources management charges
 - Capital investment and operating costs in specific water treatment technologies
 - Waste management
 - Associated energy costs

Water Costs: Recommendations

- Water pricing and methodologies adopted should reflect the full cost of the supply of water
- Simple, clear and unambiguous whilst ensuring the financial sustainability of the water utilities/institutions providing the service
- The implementation of the South African National Water Resource Infrastructure Agency and the revision of the National Water Pricing Strategy could assist in addressing these issues
- The framework for the management of the monies collected and distributed should be improved and a long term realistic pricing framework developed
- Innovation in financing mechanisms to support the water sector should be encouraged and explored further in the strategic framework focusing on the 3T's i.e. Taxes, Tariffs and Transfers
- Continually explore alternative technologies and management practices to reduce water footprint and water costs

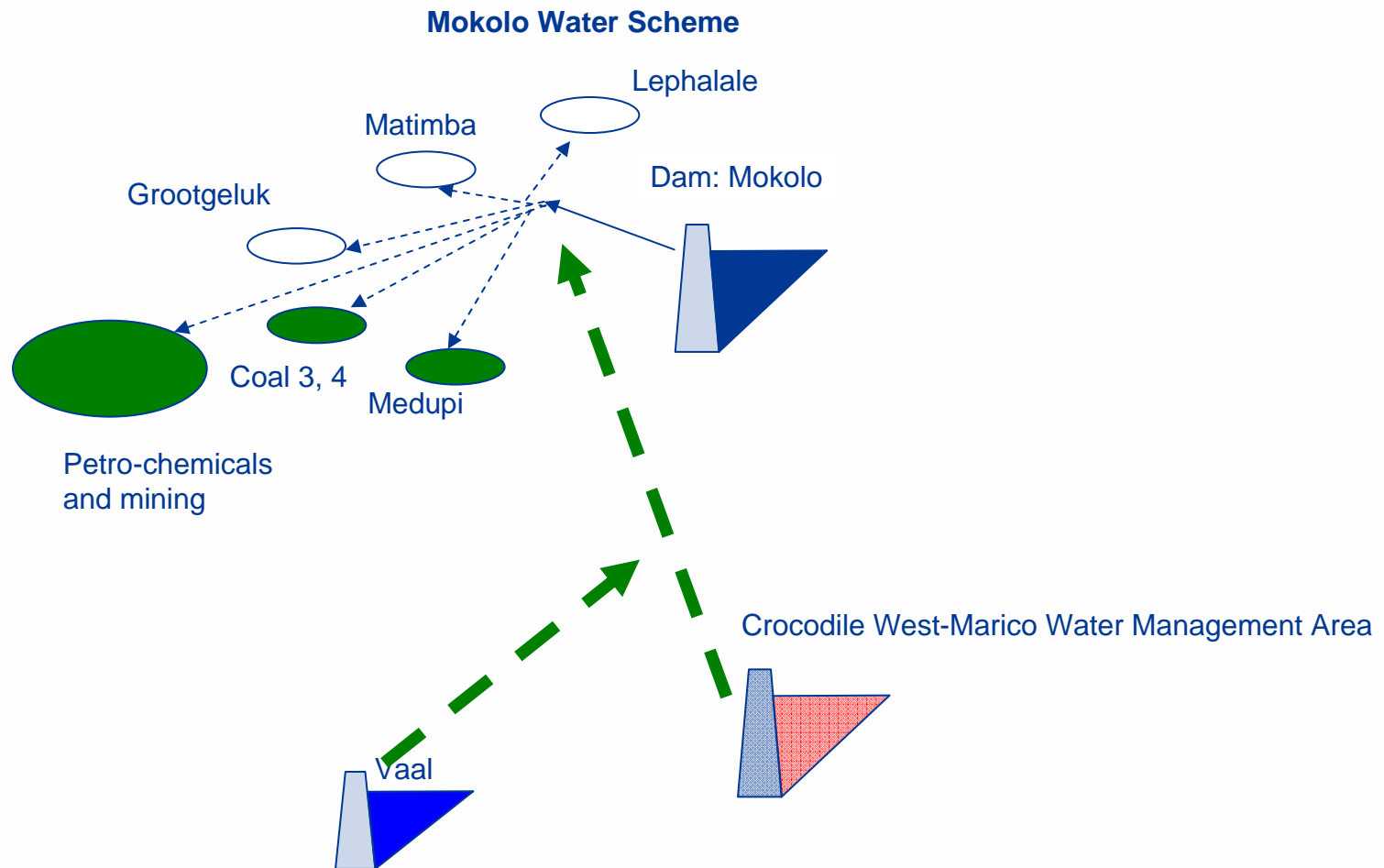
Water Challenges: Timely infrastructure roll-out

- The long lead times for major augmentation and inter-basin transfer schemes and the associated delays with multiple users have the potential to delay the timely roll-out and delivery of water to Eskom's new power stations and other users.

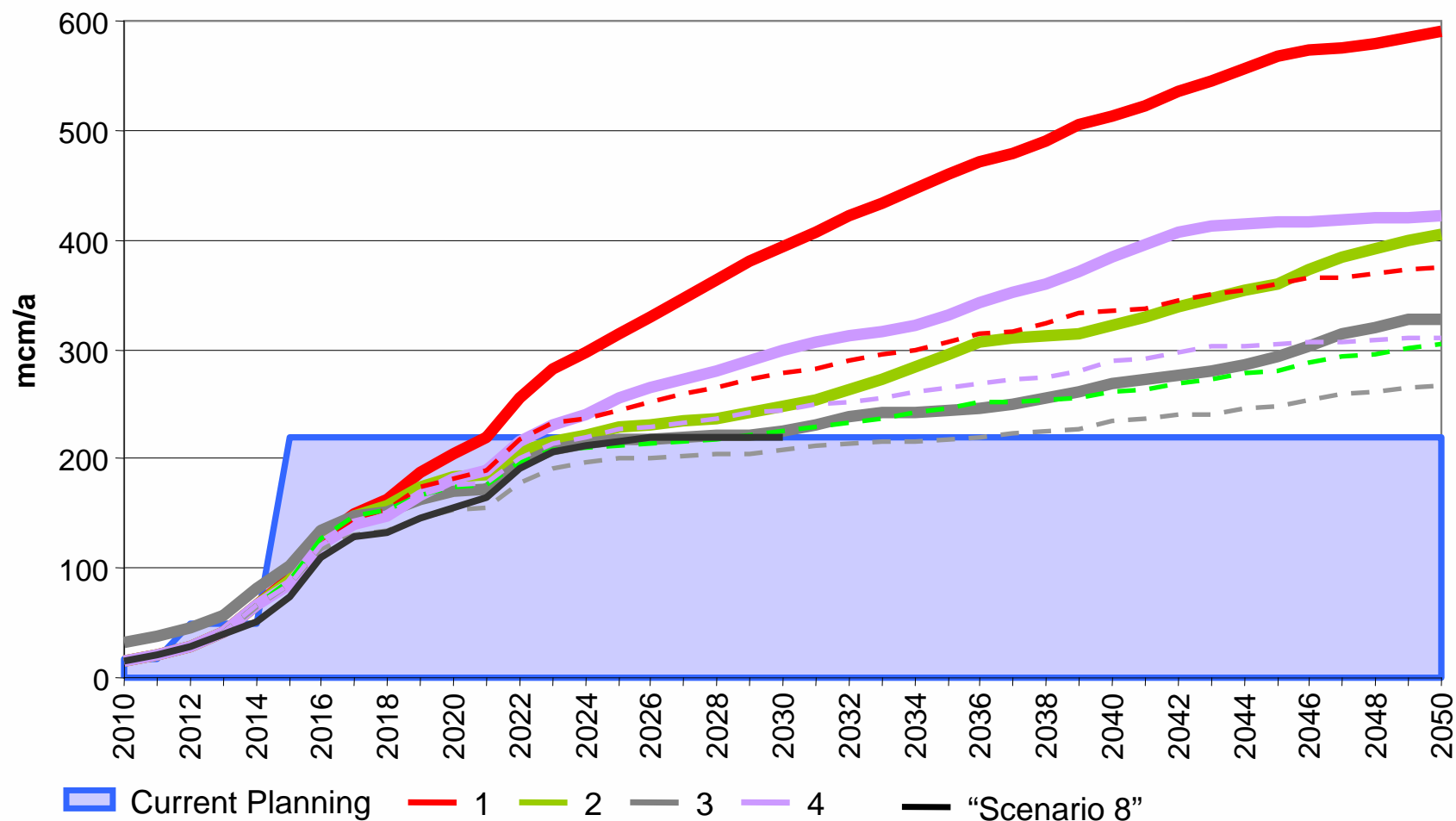
Recommendations:

- Develop a long term Regional and National Water Resources and Infrastructure Plan that is aligned and integrated with all users' plans to ensure effective and timely decision-making
- Integrate water resources and services planning across government institutions and stakeholders
- Develop long term water user demand scenarios to identify growth areas, water constraints and supply side options
- Expedite the development of the National Water Resource Strategy
- Drive Water Conservation and Demand Side Management
- Curb unlawful water use
- Expedite the implementation of the augmentation scheme from Crocodile River (West) to Lephalale

Schematic of water supply: Mogol



Waterberg scenario overview – all users



Dotted lines are the (b) scenarios

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Water Challenges: Water quality

- Significant variances from receiving water quality objectives has impacts on the quantity of water used and effluent generated

Recommendations:

- The implementation of the polluter pays principle together with compliance management and enforcement
- Co-operative governance between DWAF, DEAT, DPLG and DME is required to ensure coal mines, industries and municipalities prevent pollution by complying with relevant legislation and regulations and the enforcement thereof
- Full scale implementation of piloted water treatment technologies and systems
- Incorporate best water management practices at operations and wherever feasible utilize excess mine water
- Ensure compliance to water use licence conditions and relevant regulations

Water Challenges: Raw water infrastructure

- Eskom has embarked on its new build programme and is running its existing power stations at higher load factors.
- A step change is required in the operation and management of the assets to ensure a reliable and continuous supply of water.

Recommendations:

- Sufficient investment in and management of the bulk water infrastructure
- Focus on asset management improvement
- Implement plans to minimise the risk of water supply interruptions i.e. flexibility of supply, redundancies etc.

Water Challenges: Water institutions

- The development of the South African National Water Resource Infrastructure Agency and Catchment Management Agencies have the potential to have the greatest risk to Eskom
- There are potential teething problems in setting up these agencies, resourcing it and developing the necessary frameworks for successful implementation and minimising risks to the quality, availability and reliability of the water supply

Recommendations:

- Roll-out new water institutions with adequate support and strategic focus on resources and capacity building
- Set-up proper governance structures, primary mandates and performance management systems
- Separation of the policy and regulation roles and functions from implementation
- Need for an independent economic regulator to set fair, transparent and equitable tariffs

Water Challenges: Water sector skills shortage

- Developing and maintaining world-class infrastructure and institutions requires effective water resources management, good governance and adequate skills and competencies to implement the necessary plans to achieve growth and development.
- The general skills shortage especially in the technical areas raises concern on issues related to asset management and care, the ability to develop and manage new water works and infrastructure and the ability to regulate these.

Recommendation:

- The quality, adequacy and retention of skills should be a priority area for the water sector and collaborative and co-operative action by all stakeholders may lead to innovative solutions.

Water Challenges: Climate change

- Climate change would influence rainfall patterns, water availability and the subsequent reduction of system yields and competition for limited resources.

Recommendations

- Identification and quantification of climate-change impacts at catchment level
- Develop and communicate climate-change scenarios and incorporate into regional, national and catchment planning
- Adaptation and mitigation strategies
- Drive Water Conservation and Demand Side Management and Energy Efficiency and Demand Side Management
- Develop Business Continuity Management Plans to address business process continuity, recovery, and restoration following business interruption and disasters

Eskom's plans

- Diversification of the energy mix:
 - Capital expansion plan provides a significant opportunity to change the energy mix:
 - Clean Coal (Dry Cooled): PF with FGD and CCS or FBC with FGD and CCS
 - Gas: Underground Coal Gasification, OCGT and CCGT
 - Coastal Nuclear or Inland Nuclear
 - Large hydro imports
 - Bulk renewables including wind, solar and hydro
 - Increasing the renewables component to at least 1600MW by 2025.

Future generation portfolio by 2026

Generation Mix	Target ranges
Coal-fired generation	< 70%
Combined cycle gas turbine	Only use for peak supply when needed
Nuclear energy	17-28%
Renewable energy	> 2%
Imports	2-15%
Open cycle gas turbine	Only use for peak supply when needed
Pumped storage	4-10%

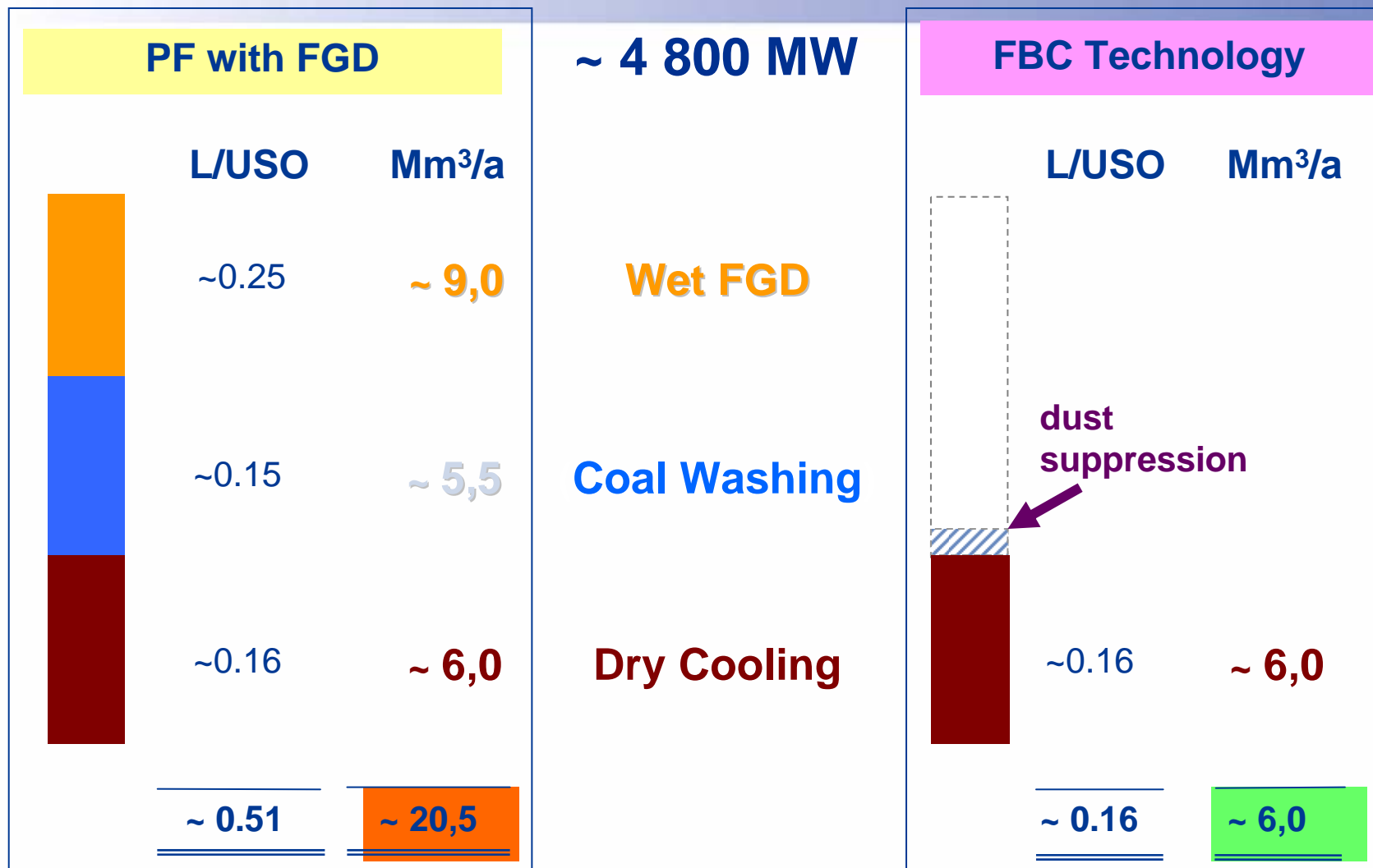
Eskom's plans

- Innovation through research, demonstration and development:
 - Eskom's clean coal technology roadmap
 - New carbon-reducing, water and energy efficient technologies
- Energy-efficiency measures:
 - Eskom internal energy efficiency programme to save a billion kilowatt-hours.
 - Demand-side management programme.
 - short-term target for DSM is to save 3000MW by 2012 and 8000MW by 2025

Indicative specific water requirements for various technologies

Type of Power Station	Specific Water Consumption (l/USO)	Mcm/a
PF Coal: Wet Cooled + Wet Ashing	1.9 - 2.1	45 - 50
PF Coal: Dry Cooled + Dry Ashing	0.12 - 0.16	3.5 - 6.0
PF with FGD*	0.25*	9
PF with CCS*	0.1*	3
FBC Coal	0.16	6
Nuclear (*excl sea water)	0.05*	1.5

Specific water use: Waterberg

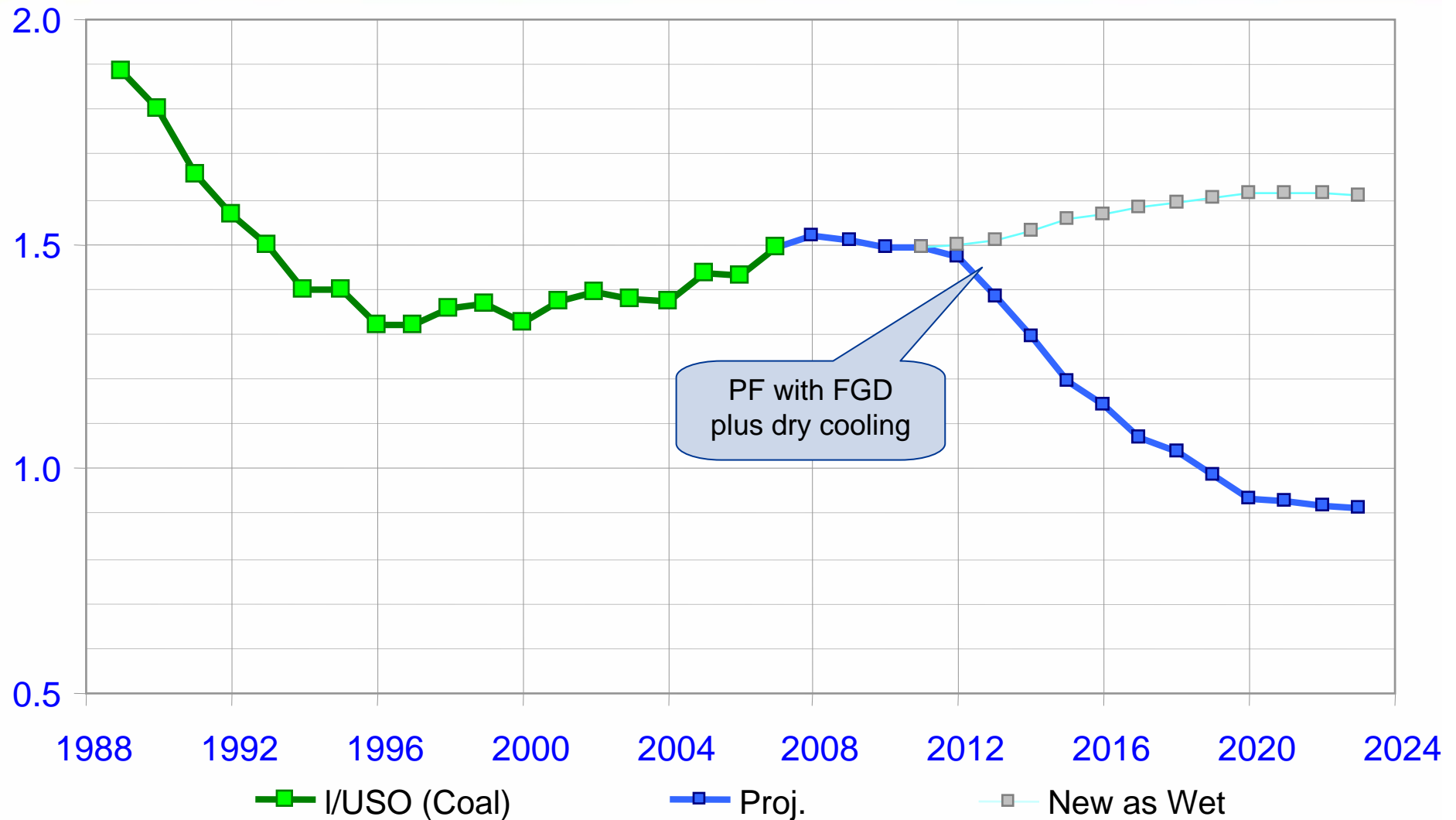


PF with FGD plant based on 1.4% coal Sulphur content and EU (90% SO_x Removal). FBC plants may capture up to 80% of the coal-bound sulphur in the fluidized bed with injection of a sorbent. A wet scrubber maybe needed to get the remaining sulphur out of the flue gas and plant water consumption will increase slightly.

Eskom's plans

- Improve water operational effectiveness and efficiencies at current power stations including Return to Service and new power stations
- Exemplary water management, conservation and water demand management programmes
- Implement innovative technology options:
 - Dry cooling technology for future new power stations
 - Mine water recovery initiatives
 - Desalination
- Thermal efficiency improvement of existing power stations
- De-commissioning of wet cooled plants at end of life
- Contribute to improvement in water resource quality

L/USO [COAL] (ISEP 11 Least Cost Plan)



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Conclusions

- Water, energy and food are inextricably linked and requires collaboration and integration on water policy, strategy, planning and decision-making
- Intensive Water Conservation and Demand Side Management and Energy Efficiency and Demand Side Management Programmes across all sectors will reduce water, energy and carbon footprints
- Long term regional and national planning by the energy and water sectors needs to be co-ordinated to ensure adequate and timeous water supply
- Eskom will continue to take proactive measures to diversify its energy mix away from water intensive energy generation technologies
- Eskom will continue to investigate more water efficient boiler and emissions removal technologies such as fluidised bed combustion
- Eskom will continue to adopt best water management and conservation practices at all of its power stations
- Eskom will supplement its raw water supply with mine water use wherever feasible whilst managing its impacts on water resource quality

Thank you

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