

# NATIONAL CLIMATE CHANGE RESPONSE DIALOGUE

## TECHNOLOGY CHOICES IN THE TRANSITION TO A LOW CARBON FUTURE

Date: 12 November 2014

Presenter: Gina Downes



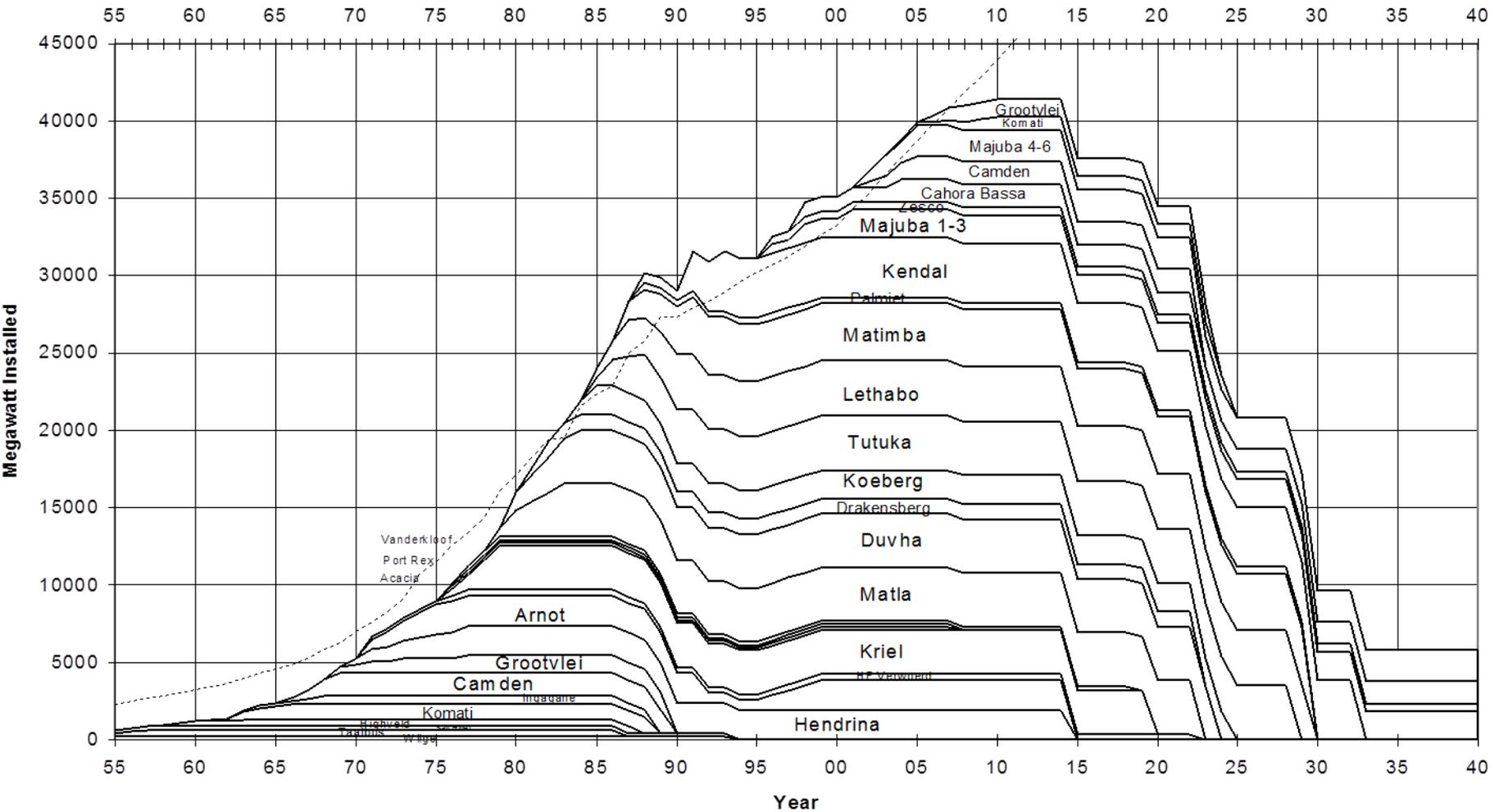
- Electrification, including offgrid
- Internal energy efficiency gains
- Demand side management initiatives, including:
  - Efficient lighting initiatives
  - Solar water heating
- Solar augmentation
- Sere
- Transmission planning for connections
- Smart grid strategy
- CSP – tower
- R,T&D, including:
  - other renewables
  - efficient components
  - clean coal technologies



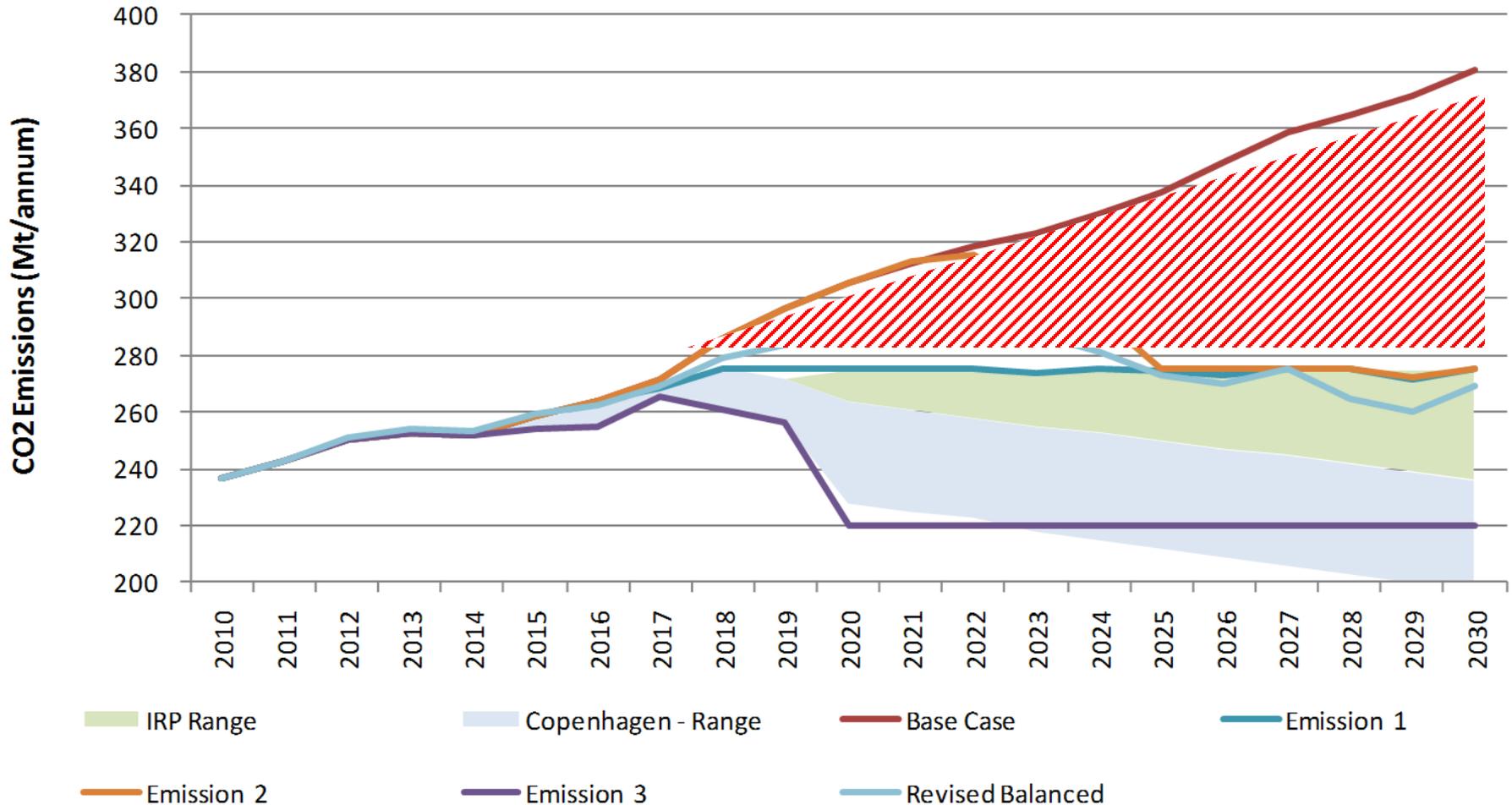
# AN INCONVENIENT REALITY...

## Eskom's Installed profile

Dashed line = Approved peak demand + 20% Reserve Margin



## CO2 emissions



# WHICH IS BEING IMPLEMENTED....

Table 1 – IRP2010 Policy Adjusted Plan with Ministerial Determinations

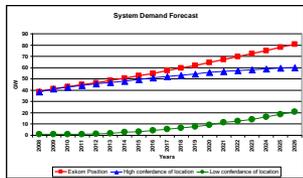
	New build options							Committed					Non IRP	
	Coal (PF, FBC, Imports, own build)	Nuclear	Import hydro	Gas – CCGT	Peak – OCGT <sup>1</sup>	Wind	CSP	Solar PV	Coal	Other	DoE Peaker	Wind <sup>2</sup>	Other Renew.	Co-generation
	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
2010	0	0	0	0	0	0	0	0	380	260	0	0	0	0
2011	0	0	0	0	0	0	0	0	679	130	0	0	0	0
2012	0	0	0	0	0	0	0	300	303	0	0	400	100	0
2013	0	0	0	0	0	0	0	300	823	333	1020	400	25	0
2014	500	0	0	0	0	400	0	300	722	999	0	0	100	0
2015	500	0	0	0	0	400	0	300	1444	0	0	0	100	200
2016	0	0	0	0	0	400	100	300	722	0	0	0	0	200
2017	0	0	0	0	0	400	100	300	2168	0	0	0	0	200
2018	0	0	0	0	0	400	100	300	723	0	0	0	0	200
2019	250	0	0	237	0	400	100	300	1446	0	0	0	0	0
2020	250	0	0	237	0	400	100	300	723	0	0	0	0	0
2021	250	0	0	237	0	400	100	300	0	0	0	0	0	0
2022	250	0	1 143	0	805	400	100	300	0	0	0	0	0	0
2023	250	1 600	1 183	0	805	400	100	300	0	0	0	0	0	0
2024	250	1 600	263	0	0	800	100	300	0	0	0	0	0	0
2025	250	1 600	0	0	805	1 600	100	1 000	0	0	0	0	0	0
2026	1 000	1 600	0	0	0	400	0	500	0	0	0	0	0	0
2027	250	0	0	0	0	1 600	0	500	0	0	0	0	0	0
2028	1 000	1 600	0	474	690	0	0	500	0	0	0	0	0	0
2029	250	1 600	0	237	805	0	0	1 000	0	0	0	0	0	0
2030	1 000	0	0	948	0	0	0	1 000	0	0	0	0	0	0
Total	6 250	9 600	2 609	2 370	3 910	8 400	1 000	8 400	10133	1722	1020	800	325	800

2011 Determinations
  2012 Determinations
  Eskom commitments (pre IRP)

## Volume & type

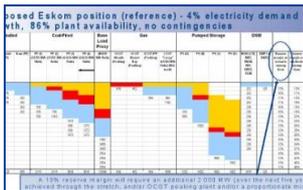
## Spatial & transportation

(a) Load Demand Forecast

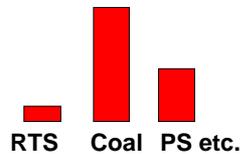


40 GW

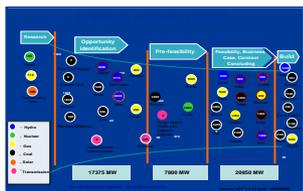
(b) Capacity Plan



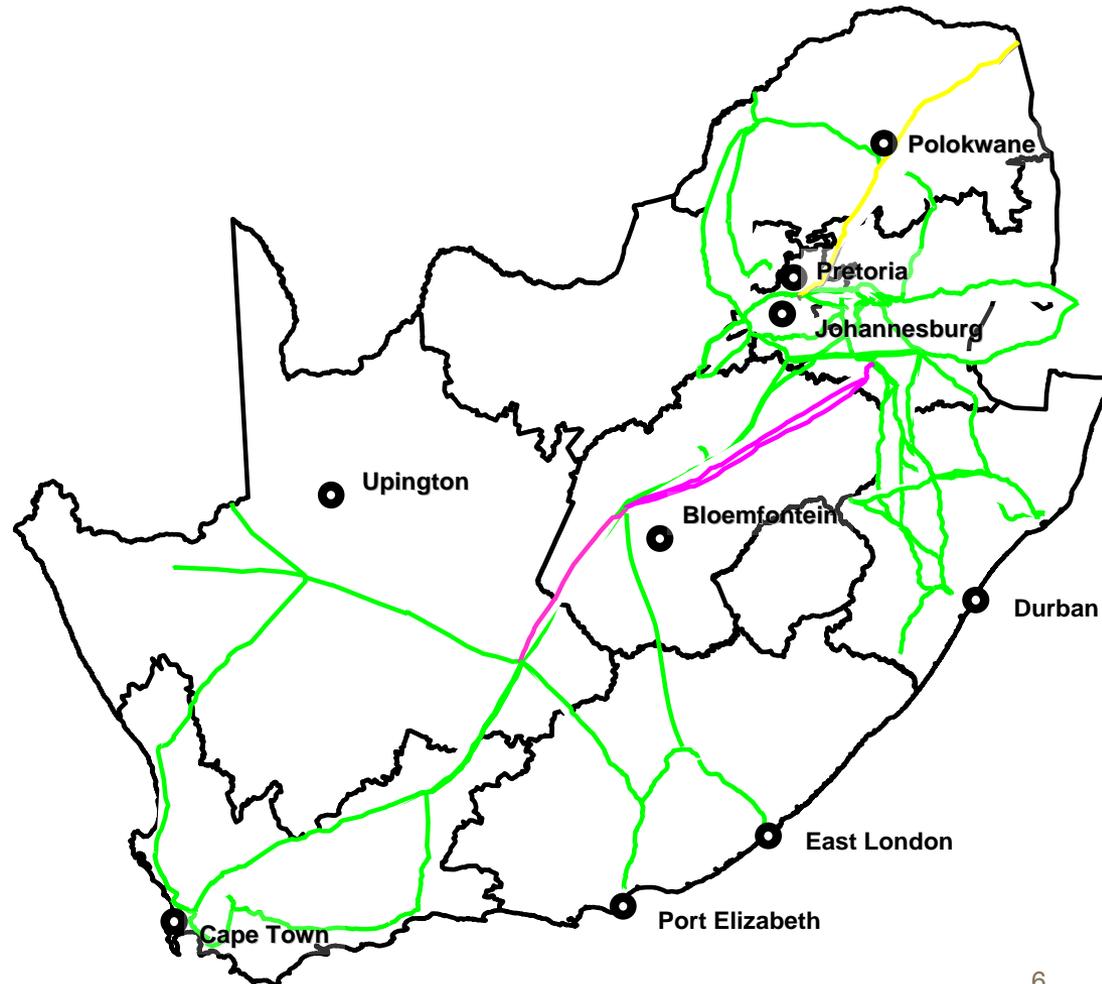
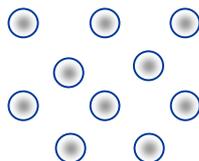
40 GW



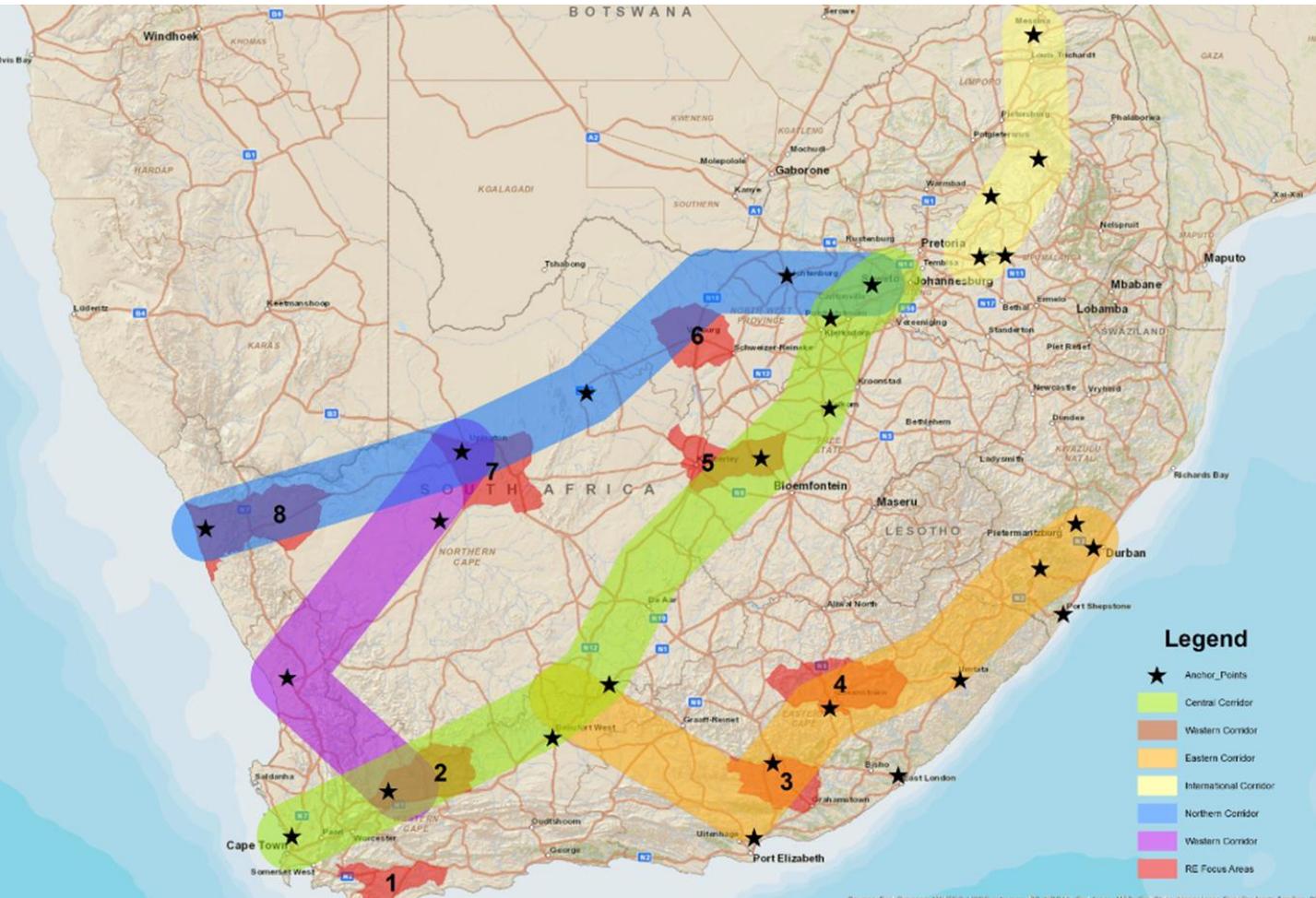
(c) Capital project funnel



>40 GW



# FINAL SEA CORRIDORS FOR SIP 10 PROJECT



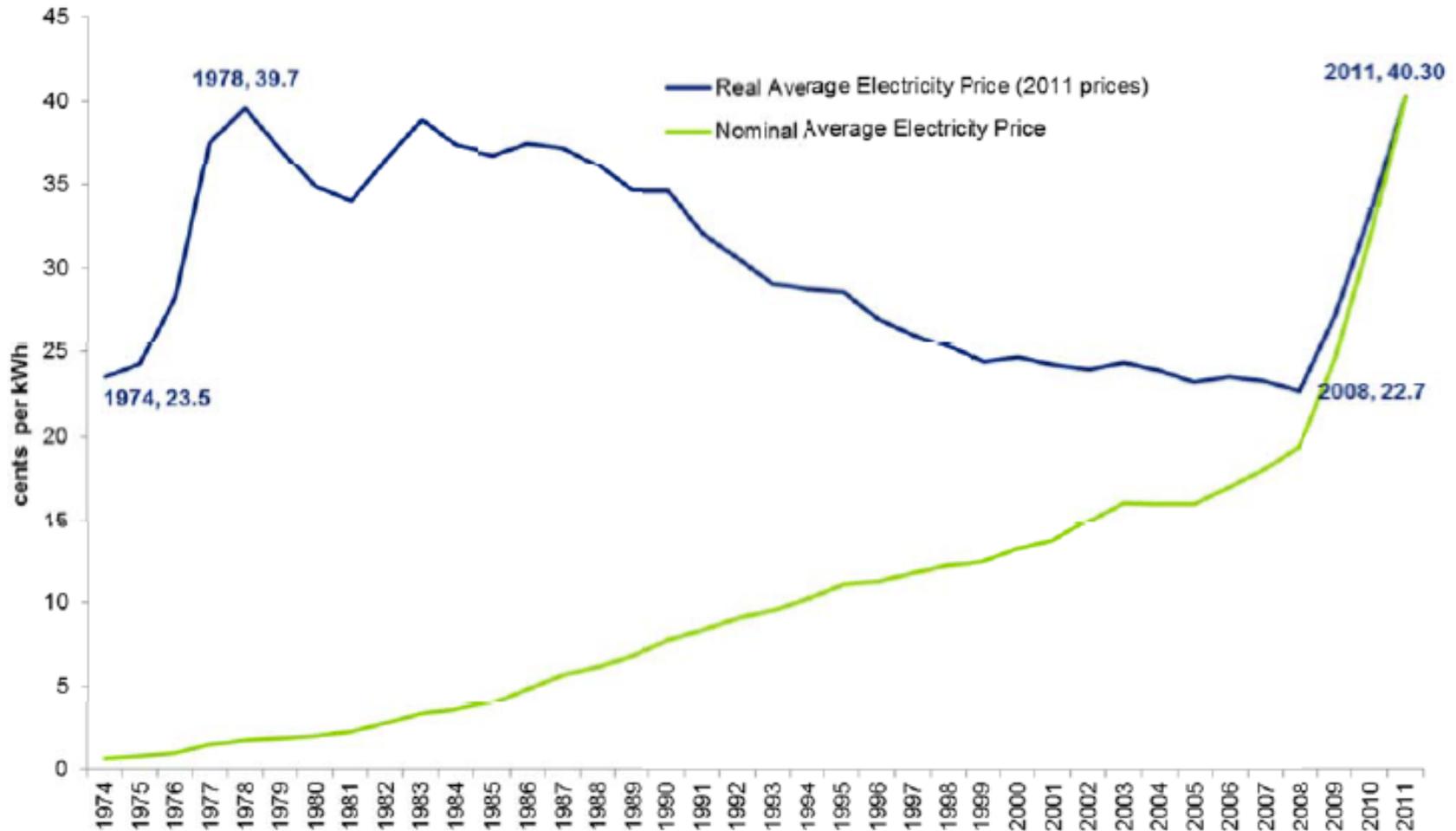
The “National” power corridors were then further refined and consolidated into five Major Transmission power Corridors.

These were then used as the basis for a national SEA study project by the DEA. This forms part of the SIP 10 project of the Govt. NDP.

The objective is to secure all the needed environmental approvals for Tx lines within the corridors which will be valid in perpetuity.

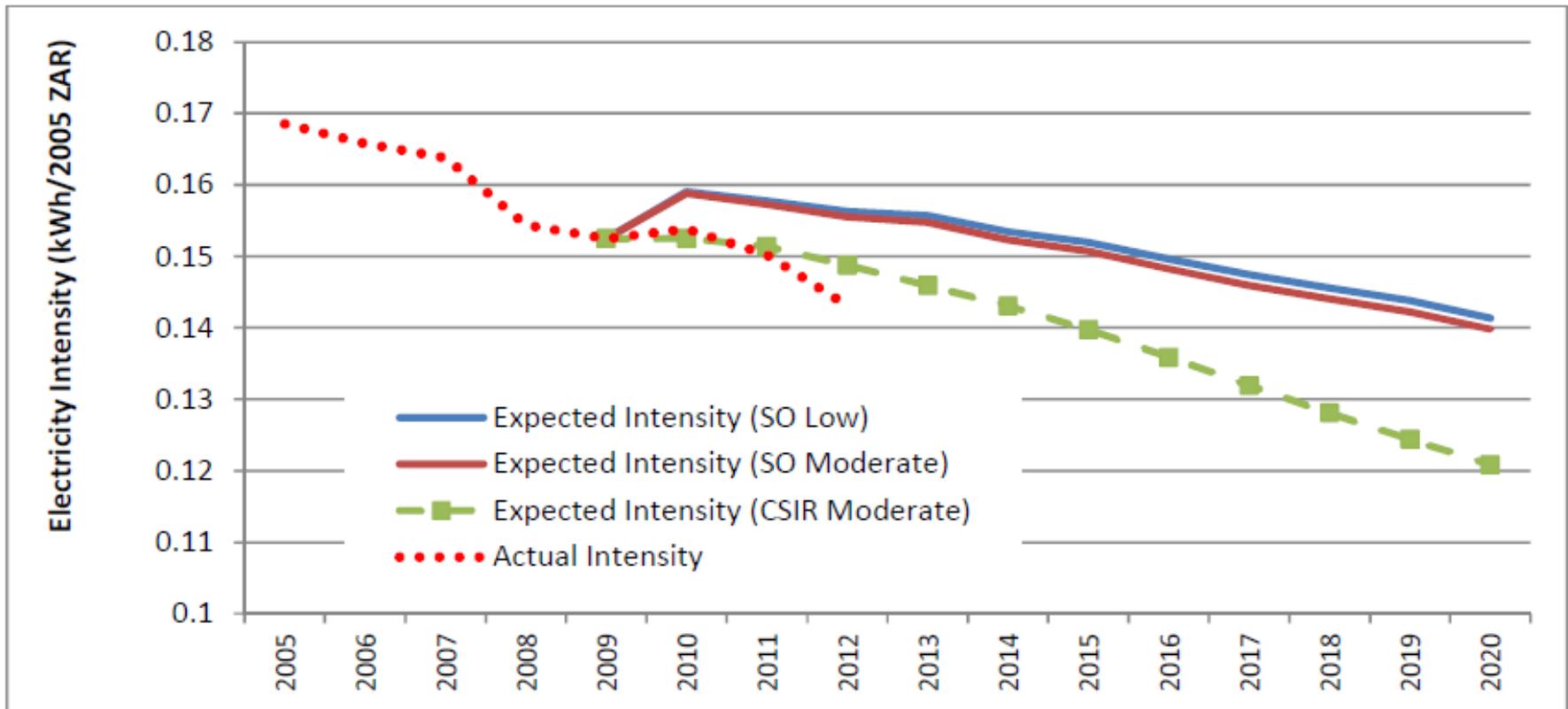
# COSTS HAVE INCREASED...

Figure 19 Trend in Average Electricity Prices realised by Eskom per kWh (1974 to 2011)



# AND INTENSITY HAS DECREASED...

Figure 9 – Actual electricity intensity relative to IRP2010 expectations



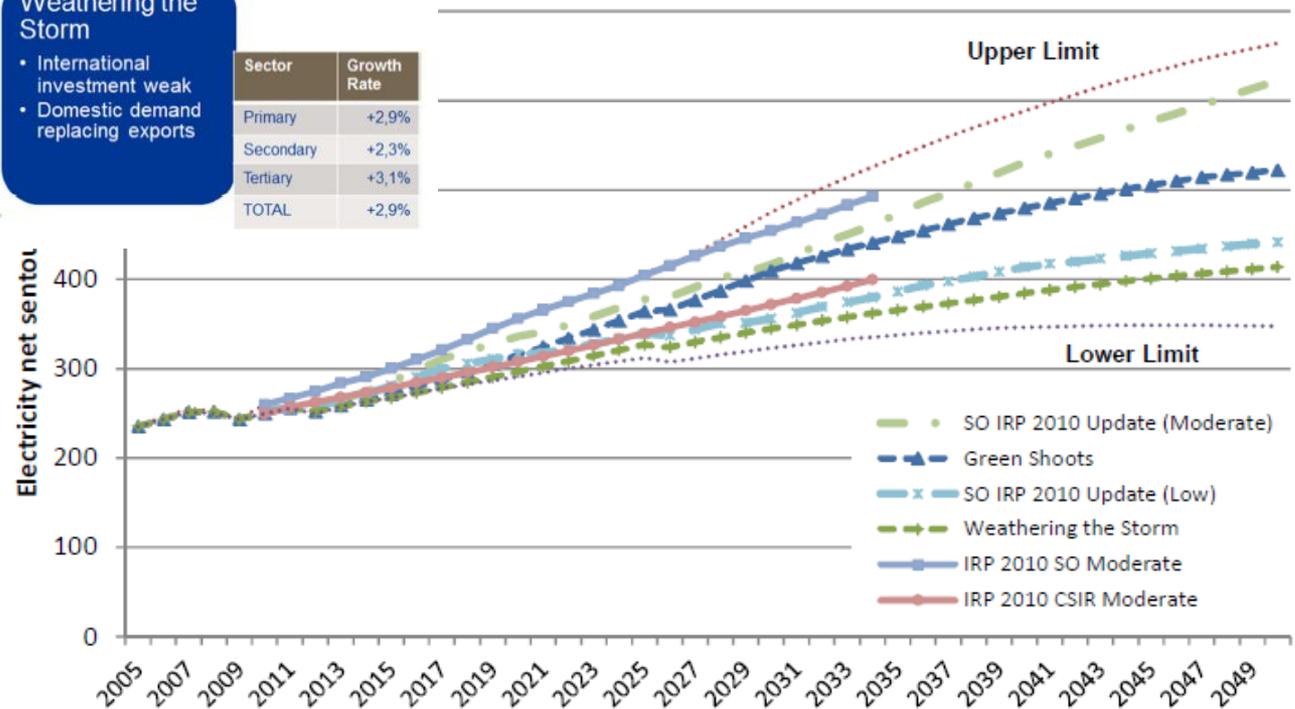
Source: Own calculations based on StatsSA actuals, IRP 2010 assumptions

# DIFFERENT DEMAND FORECASTS...

Figure 41 – Overview of Economic Growth Scenarios

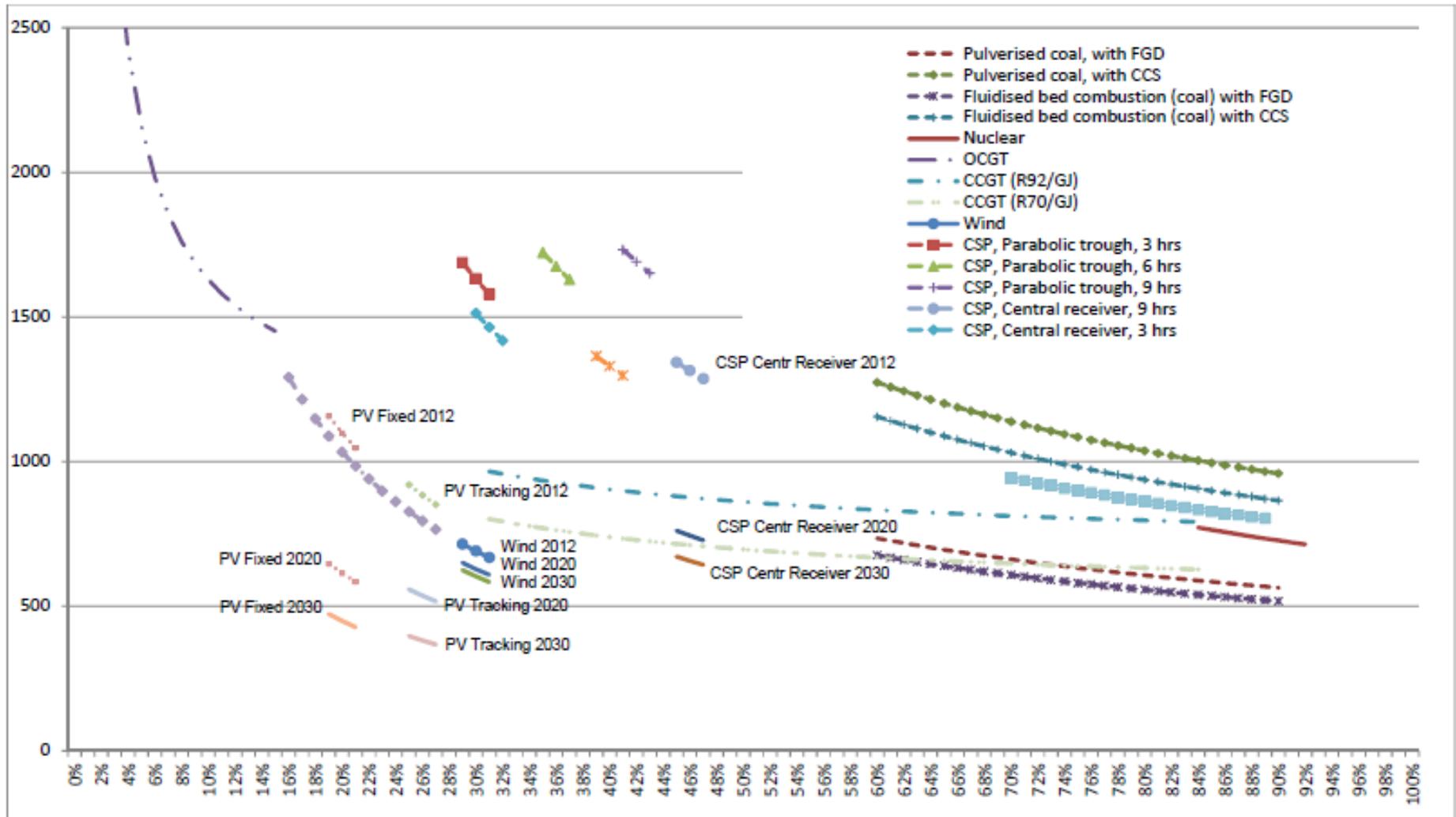


demand trajectories to 2050



# COSTS ARE AN ISSUE, AS IS AVAILABILITY

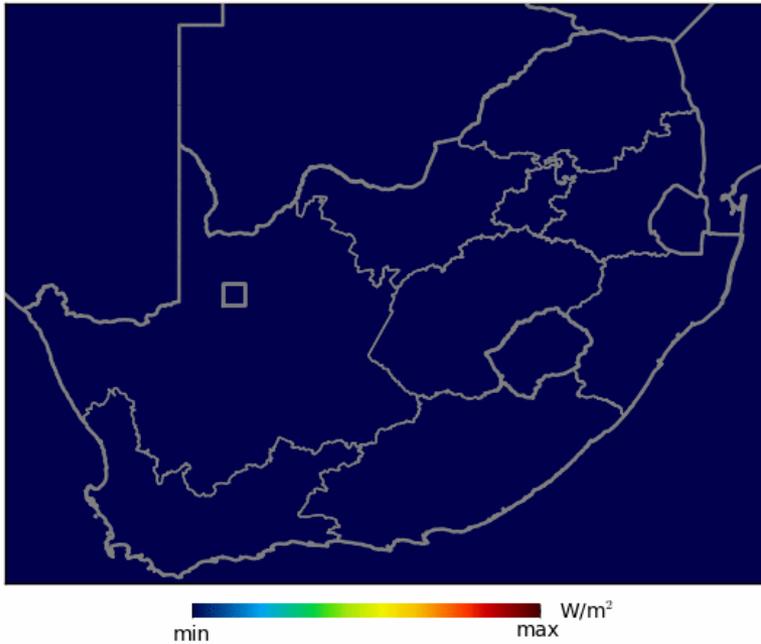
Figure 44 – Screening curve with levelised costs of technology options at different load factors (including learning)



# Cloud impact on PV power generation

23 Jan 2012 04:15 SAST

Global tilted irradiance

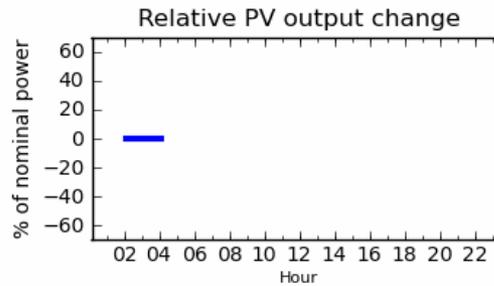
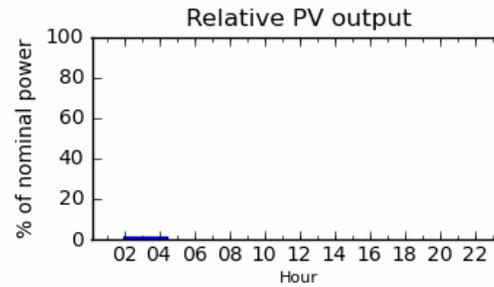


Upington area

Aggregation level: 1

Aggregation area: 50 km x 50 km

Number of PV power plants: 9

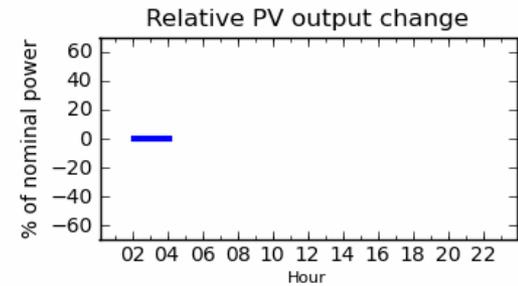
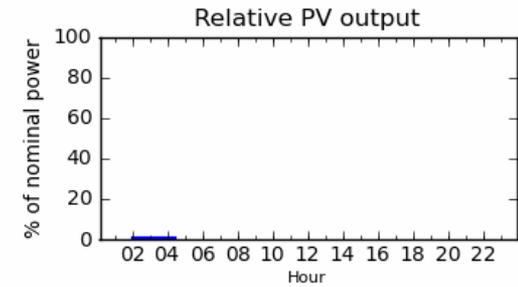


Upington area

Aggregation level: 0

Aggregation area: 5 km x 5 km

Number of PV power plants: 1



# DIFFERENT EMISSIONS TRAJECTORIES...

Figure 17 – Emission Trajectory scenarios for the IRP 2010 Update

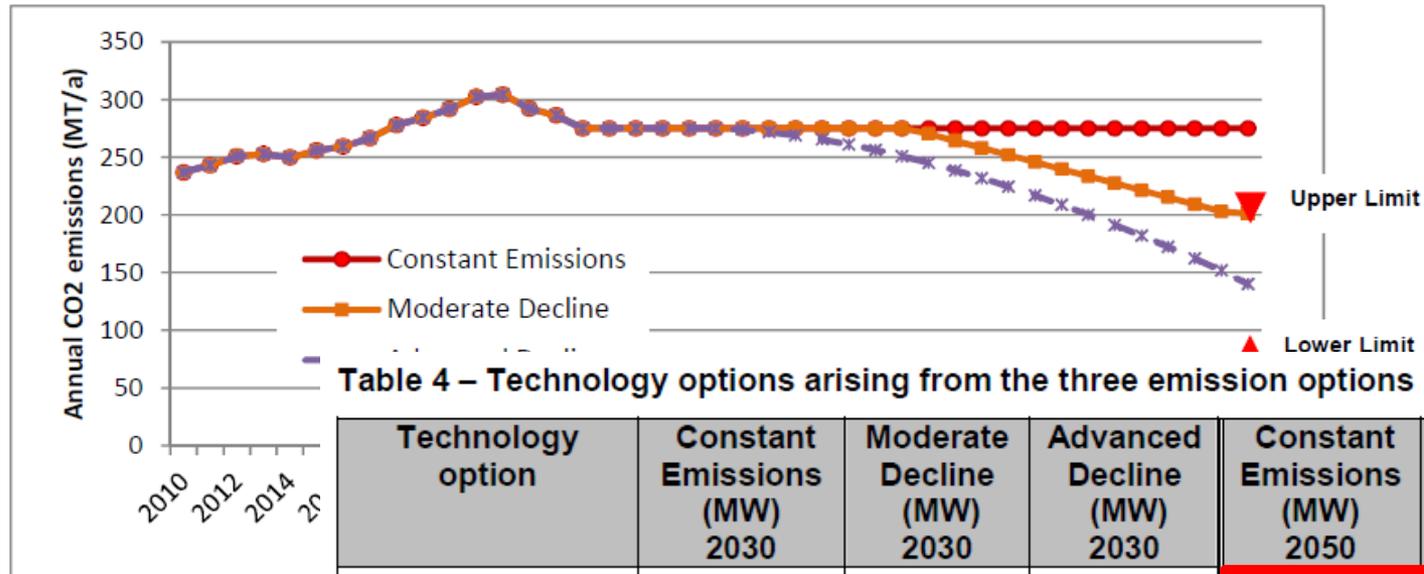


Table 4 – Technology options arising from the three emission options in 2030 and 2050

Technology option	Constant Emissions (MW) 2030	Moderate Decline (MW) 2030	Advanced Decline (MW) 2030	Constant Emissions (MW) 2050	Moderate Decline (MW) 2050	Advanced Decline (MW) 2050
Existing Coal	36230	36230	36230	16120	16120	16120
New Coal	2450	2450	2450	24700	12700	5200
CCGT	3550	3550	3550	6390	9230	8520
OCGT / Gas Engines	7680	7800	7680	12240	11400	11400
Hydro Imports	3000	3000	3000	3000	3000	3000
Hydro Domestic	690	690	690	690	690	690
PS (incl Imports)	2900	2900	2900	2900	2900	2900
Nuclear	6660	6660	6660	12800	20800	28800
PV	9770	9630	9660	25000	25000	25000
CSP	3300	3300	3600	8100	10900	11900
Wind	4360	4250	4530	10520	10680	10770
Other	640	640	640	0	0	0
<b>TOTAL</b>	<b>81350</b>	<b>81100</b>	<b>81590</b>	<b>122460</b>	<b>123420</b>	<b>124300</b>

# NEW COAL MINING INVESTMENTS ARE STILL REQUIRED

graph removed possibly outdated

**THANK YOU**

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