

# How does choice of energy supply lead to higher or lower prices?

IRP March 2010.

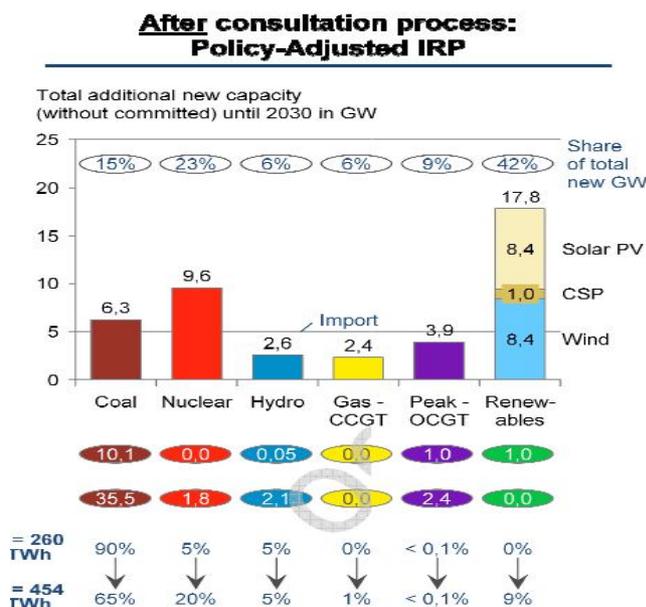
Additional cost-optimal scenarios were generated based on the changes. The outcomes of these scenarios, in conjunction with the following policy considerations, led to the Policy-Adjusted IRP:

- The installation of renewables (solar PV, CSP and wind) have been brought forward in order to accelerate a local industry;
- To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW is included in the IRP;
- The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) is maintained;
- Energy efficiency demand-side management (EEDSM) measures are maintained at the level of the RBS.

## 2 BALANCING GOVERNMENT OBJECTIVES IN THE IRP

2.1 The RBS was developed in consultation with government departments represented in Working Group 2 (as part of the inter-departmental task team process). The multi-criteria decision-making process confirmed that this RBS represented an appropriate balance between the expectations of different stakeholder considering a number of key constraints and risks, for example:

- a) Reducing carbon emissions;
- b) New technology uncertainties such as costs, operability, lead time to build etc;
- c) Water usage;
- d) Localisation and job creation;
- e) Southern African regional development and integration; and
- f) Security of supply.



**Table 4. Policy-Adjusted IRP capacity**

	Total capacity		Capacity added (including committed) from 2010 to 2030		New (uncommitted) capacity options from 2010 to 2030	
	MW	%	MW	%	MW	%
Coal	41071	45.9	16383	29.0	6250	14.7
OCGT	7330	8.2	4930	8.7	3910	9.2
CCGT	2370	2.6	2370	4.2	2370	5.6
Pumped Storage	2912	3.3	1332	2.4	0	0.0
Nuclear	11400	12.7	9600	17.0	9600	22.6
Hydro	4759	5.3	2659	4.7	2609	6.1
Wind	9200	10.3	9200	16.3	8400	19.7
CSP	1200	1.3	1200	2.1	1000	2.4
PV	8400	9.4	8400	14.9	8400	19.7
Other	890	1.0	465	0.8	0	0.0
<b>Total</b>	<b>89532</b>		<b>56539</b>		<b>42539</b>	

Notes: (1) Committed generation capacity includes projects approved prior to IRP 2010 (refer to Table 3).

**Cost of buying electricity – for Eskom:**

**Table 1: REFIT Phase I Tariffs – 2009 (R/kWh)**

Technology	Unit	REFIT
Wind	R/kWh	1.25
Small hydro	R/kWh	0.94
Landfill gas	R/kWh	0.90
Concentrated solar	R/kWh	2.10

**By 2016**

According to government, the plan is to have 3725MW of renewable energy in a total system capacity of 55000MW – 6.7%.



**Over time, renewable energy prices are coming down:**

“He argued that investing in photovoltaic (PV) energy would be worthwhile in the long run, as costs were expected to drop significantly. “Over the past few years, costs of photovoltaic energy has

decreased from \$4/W to under \$1/W. In the long term, this means of power generation will reach parity with other methods of power generation technology with regard to cost competitiveness.”<sup>1</sup>

*Wind turbines are one fifth cheaper since 2007, solar half the cost of nuclear. In spring 2009, a standard crystalline-silicon photovoltaic (PV) module cost \$4.20 per peak watt, today it is \$1.70; its forward pricing is \$1.35 for the end of 2011 and \$1.00 for mid-2012. (page 4).<sup>2</sup>*



**Over time, as finite resources such as coal and nuclear, get scarcer, their prices will go up:**

“ South Africa went cap in hand at the World Bank, looking to loan R22-billion to help plug a massive funding gap that Eskom faces even after it was granted tariff increases of 25% per year over the next three years by regulator Nersa.

Eskom finance chief Paul O’Flaherty said that after the 25-25-25 increases agreed to by Nersa, Eskom faced a R45-billion funding shortfall in year three, including the World Bank loan.....

The Nersa document detailing its reasons for awarding the increases said that Eskom’s estimate for building these two power stations had doubled from R33-billion each in 2006 to R66billion each in 2007-2008, and then almost doubled again to R120-billion in 2008-2009. And there are suggestions that the final cost for the two stations could be R140-billion each.”<sup>3</sup>

#### **Nuclear costs are likely to far exceed this:**

*In 2008 and 2009, **tenders for nuclear power plants in Canada and South Africa were abandoned** because the bids received (for AP1000 and EPR) were roughly **double the expected level**.*

*With extremely long lead times of 10 years and more, it will be practically impossible to maintain, let alone increase, the number of operating nuclear power plants over the next 20 years. The flagship EPR project at Olkiluoto in Finland, managed by the largest nuclear builder in the world, AREVA NP, has turned into a financial fiasco. The project is four years behind schedule and at least 90 percent over budget, reaching a total cost estimate of €5.7 billion (\$8.3 billion) or close to €3,500 (\$5,000) per kilowatt .<sup>4</sup>*

<sup>1</sup> <http://www.engineeringnews.co.za/article/falling-renewable-energy-costs-an-opportunity-for-africa-2012-03-28>

<sup>2</sup> [http://www.worldwatch.org/system/files/pdf/WorldNuclearIndustryStatusReport2011\\_%20FINAL.pdf](http://www.worldwatch.org/system/files/pdf/WorldNuclearIndustryStatusReport2011_%20FINAL.pdf)

<sup>3</sup> <http://mg.co.za/article/2010-04-12-eskom-power-too-costly-by-far>

<sup>4</sup> [http://www.worldwatch.org/system/files/pdf/WorldNuclearIndustryStatusReport2011\\_%20FINAL.pdf](http://www.worldwatch.org/system/files/pdf/WorldNuclearIndustryStatusReport2011_%20FINAL.pdf)

**Other information:**

EGI-SA blog site

**<http://irp2.wordpress.com>**

2010 – call for tenders for consultants for renewable procurement

[http://www.energy.gov.za/files/renewables\\_frame.html](http://www.energy.gov.za/files/renewables_frame.html)

2008 – cost of coal and nukes

[http://books.google.co.za/books?id=gFRDVOmZ1FoC&pg=PA186&lpg=PA186&dq=cost+of+coal+generation+levelised+south+africa&source=bl&ots=TNvgKWIEO4&sig=guvgyqDvwmwIqYqKLFe3gVDJ9iM&sa=X&ei=QOM0ULmglZOKhQfR\\_4HwBQ&ved=0CDIQ6AEwCA#v=onepage&q=cost%20of%20coal%20generation%20levelised%20south%20africa&f=false](http://books.google.co.za/books?id=gFRDVOmZ1FoC&pg=PA186&lpg=PA186&dq=cost+of+coal+generation+levelised+south+africa&source=bl&ots=TNvgKWIEO4&sig=guvgyqDvwmwIqYqKLFe3gVDJ9iM&sa=X&ei=QOM0ULmglZOKhQfR_4HwBQ&ved=0CDIQ6AEwCA#v=onepage&q=cost%20of%20coal%20generation%20levelised%20south%20africa&f=false)