Comments on IRP 2010
EDF South Africa (Pty) Ltd

Johannesburg, November 19, 2010

LEADING THE ENERGY CHANGE

EDF at a glance

- A global energy leader

37.9 million
customers worldwide

169,139
employees worldwide

€66.3 billion
of sales, of which 49% outside France

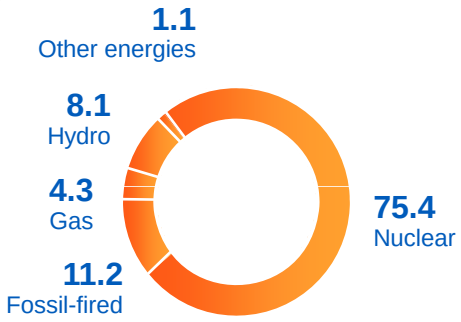
618.5 TWh
of energy generated worldwide

117 g
of CO_2 per kWh generated

- **Covering the entire chain of Electricity**, from generation to transmission, distribution and supply
- **Solidly anchored in Europe**: France, the UK, Germany, Italy, Poland, etc.
- Industrial operations in **Brazil**, **Asia** and the **US**
- Global leader in nuclear operation (82 reactors in operation worldwide)

2009 generation mix

%



Total: 618.5 TWh

EU member states - € per kWh electricity

Industrial electricity consumption

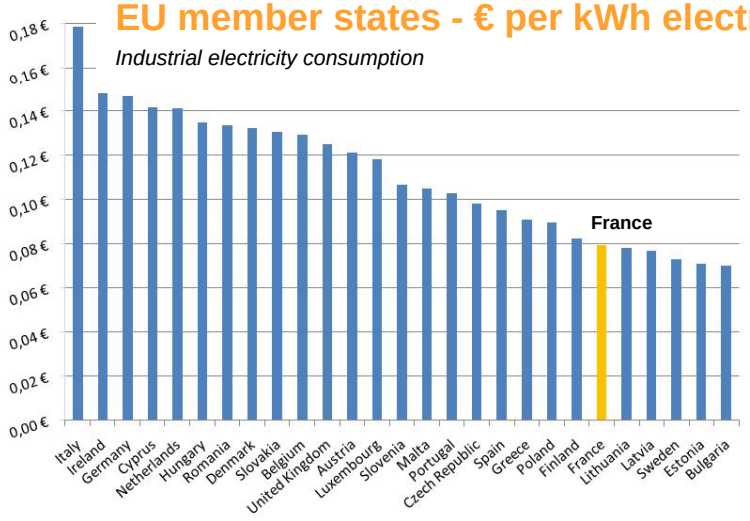
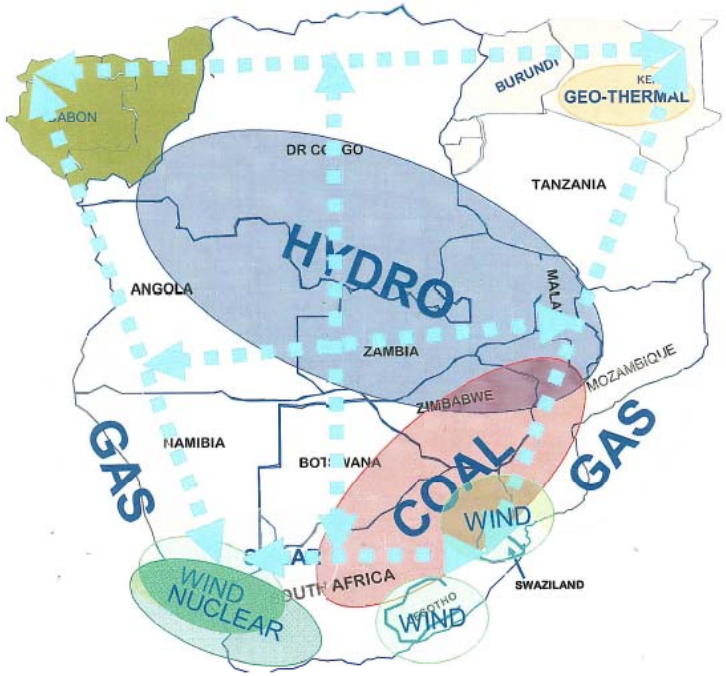


Table of Contents

Strong: IRP 2010 addresses energy challenges

Electricity sector faces challenges globally

- Electricity cannot be stored (except, marginally in dams)
- Supply must meet demand at all time
- Demand growth must be anticipated as lead times are long
- Overcapacity is expensive and under-capacity is an economic disaster (load shadings)
- Energy sector plays a key role in global warming



Source: Eskom

IRP 2010 addresses this global energy challenge with a balanced energy mix that respects resources available in South Africa

Strong: IRP 2010 mixes all energy sources

- All energy sources are needed, **there is no bad energy**, only different costs and usages







Total Cost per kWh

Hydro | Coal (excl. CO_2) | Nuclear | Coal (incl CO_2) | Gas | Oil | Wind | Solar

Cheap → **Expensive**

Source: OECD

Marginal Cost (cost of the next kWh)

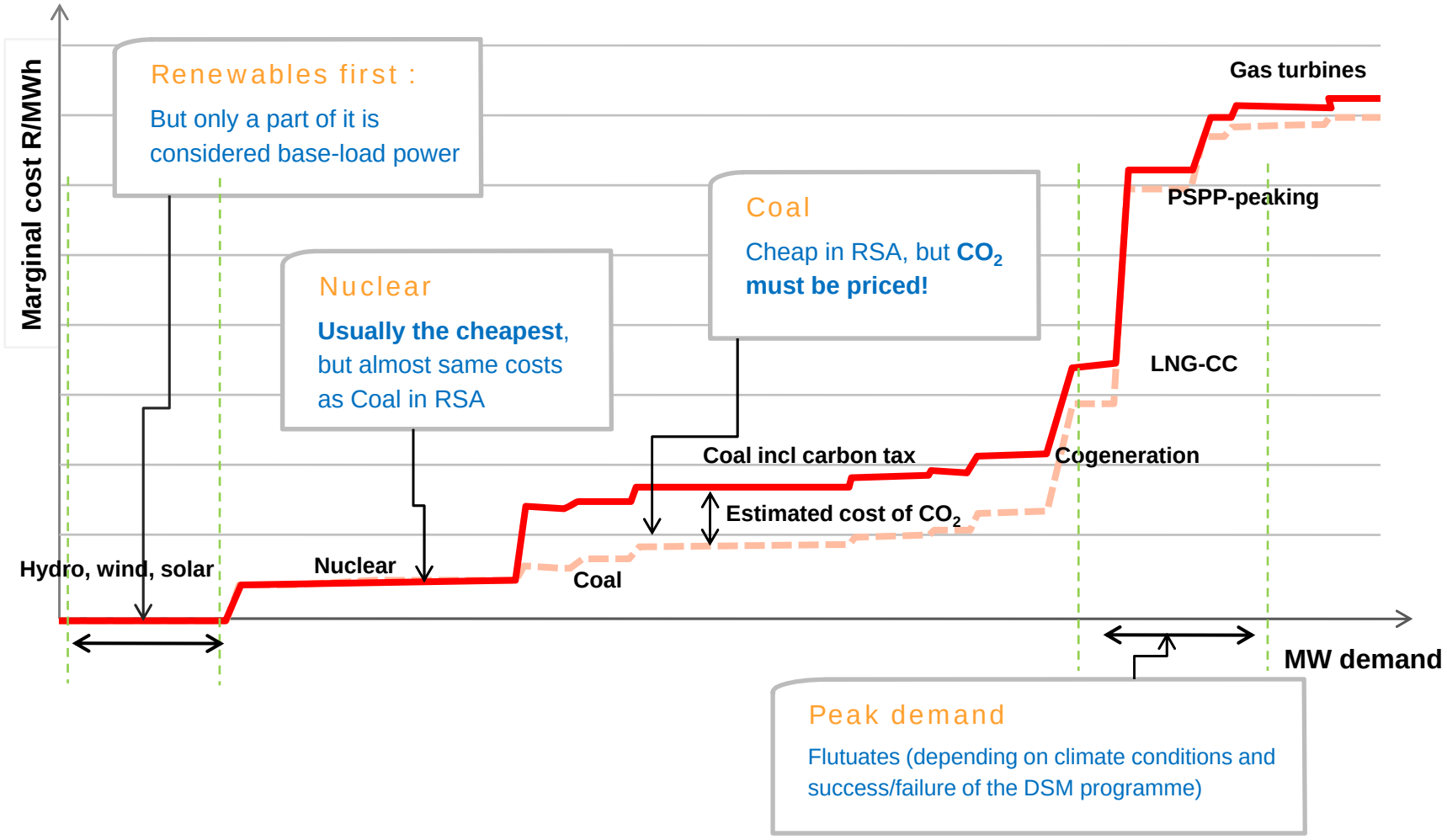
Hydro/Wind/Solar | Nuclear | Coal (incl CO_2) | Gas | Oil

Almost free → **Expensive**

Source: EDF

Strong: Supply should meet forecasted demand

- Merit-Order : The next kWh is always more expensive than the previous one



Omitted

- **It is recommended to show a consistent set of data including fuel prices (gas, coal) and carbon tax on a yearly basis for the 20 years period. This is the only way to ensure reliability of comparisons among the scenarios and alternatives**
  - Example: Coal price is quoted Table1 p6 at R200/t and gas at R80/GJ whereas the same prices are set at R288/t and R74/GJ respectively in appendix C. Furthermore, it is not clear whether these data are used in all scenarios and for every of the 20 years covered by the IRP 2010
  - Carbon tax: this major component is sometime included in and sometime excluded from calculations making it impossible to compare
- **Location of projects are uncertain. The lack of precise information prevents any accurate assessment of grid reinforcement costs,** which can be significant and impact the arbitrage between projects

Questionable: Nuclear assumptions

- **Nuclear has correctly been identified as a safe, reliable and competitive complement to Coal <u>for base-load power</u>** (ex. p19 fig10) **.** However, a few questionable assumptions remain**.**

- **Nuclear assumptions according to** Table 37 p.66 **are incorrect**

  - **Costs:** with current new build worldwide, construction costs are better known today and operational costs are recognised as cheap and predictable. Uncertainty should therefore be ranked 1.

  - **Lead time** assumption for nuclear is too long. With a procurement process launched in 2011, a first reactor can be on line by 2020. This criteria should be ranked 2.

  - **Operational risk**: given Eskom's outstanding track record in safe nuclear reactors operation - including radioprotection - and the shared experience of Eskom and Necsa in nuclear wastes management, operational risk is well managed in South Africa. There is no rational in ranking this criteria 3. 1 would be more appropriate.

- **Concerns on nuclear competitiveness are not justified**

  - P21, **funding** should not be a concern since fully funded projects are currently under development in many countries. Solutions exist.

  - P20, **costs** are known from experience on current build programmes and an increase of 40% in capital costs is not a reasonable assumption.

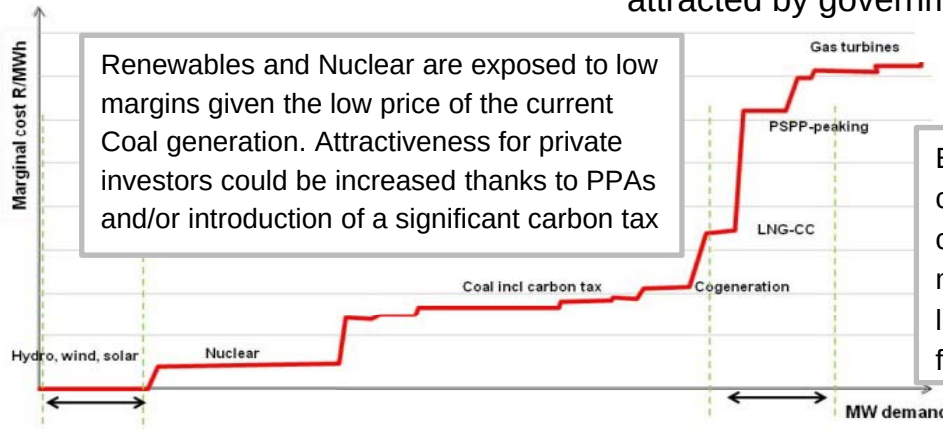
Challenging: SO and private investment

System Operation and flexibility could be a challenge

- Most of the demand is covered by Renewables and base load generation means. Hence, intra day load variations will have to be followed by Coal plants (difficult) or Gas/Oil means (expensive) since Renewables provide so-called « fatal » energy (all what is produced must be absorbed)

Private sector participation

- Most of the investments are enforced (not market related). As a consequence, the revised balanced scenario of IRP 2010 is not the least cost option. Private investors can only be attracted by governmental incentives (REFIT, PPAs)



Renewables and Nuclear are exposed to low margins given the low price of the current Coal generation. Attractiveness for private investors could be increased thanks to PPAs and/or introduction of a significant carbon tax

Electricity generated by Renewables can be significant, shifting the supply curve so that highest marginal cost means may never be dispatched. This lowers the attractiveness of gas projects for private investors.

- These Dispatch risks could be mitigated with PPAs including **take-or-pay** scheme, but electricity price would then artificially go up.

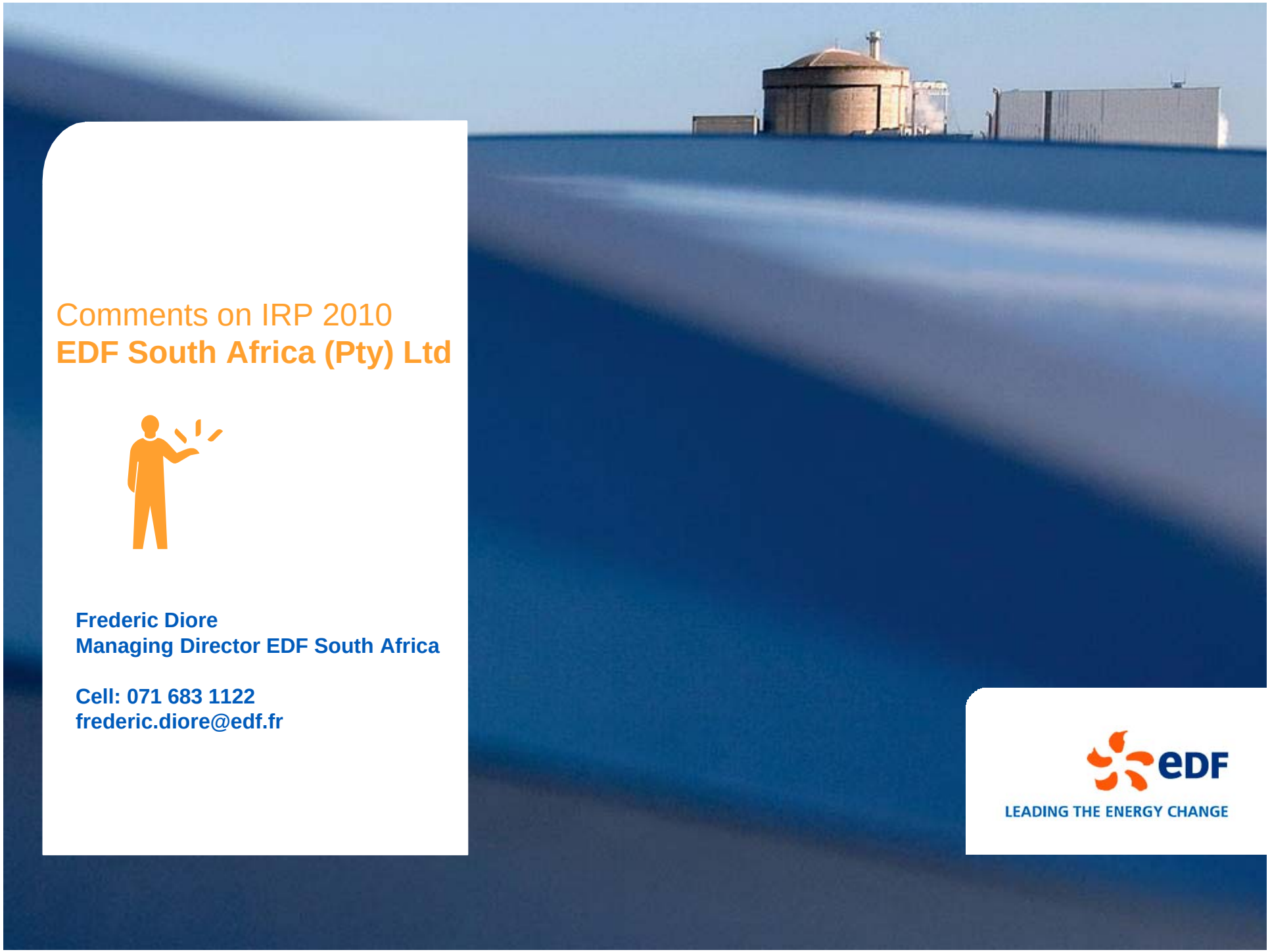
Key factors of success for implementation

Government support

- Government support has been required for Eskom to achieve its new build objectives (Medupi, Kusile, Ingula): **loan, guarantees, equity injection**.
- Renewables rely exclusively on **REFIT**, which is a government support tool.
- **State commitment** must be strong to support Eskom's Nuclear new build programme, whether it is implemented with or without an equity partner.
- Imports and Gas projects are also dependent on **regulated PPAs**.
- A strong government **commitment in skills development** is also an important requirement.
- **Government must ensure consistency across periodic IRP revisions.**

Eskom role

- Eskom is one of the largest Utility in the world with an extensive experience in **Coal** power plant management, a very good track record in safe **Nuclear** operation and a strong commitment in **Solar** technology development.
- Neighbouring countries used to rely heavily on Eskom and tend now to look for local and non-optimal solutions. **A strong Eskom is required to maximise the regional potential development** (shared capacities and interconnections).
- For a private investor, Eskom is unavoidable either as investment partner or as electricity buyer or system operator. **A dysfunctional Eskom would jeopardise IRP 2010 implementation**.



Comments on IRP 2010
EDF South Africa (Pty) Ltd

Frederic Diore
Managing Director EDF South Africa

Cell: 071 683 1122
frederic.diore@edf.fr

LEADING THE ENERGY CHANGE