



**FFF** FOSSIL FUEL  
FOUNDATION



*Unlocking the past for the future*



# **In support of the Continued Use of Coal in South Africa for the Short to Medium Term.**

*A Presentation on the Value of Coal to South Africa for  
consideration and inclusion in the IRP*

Updated Comments for the 2016  
Integrated Resource Plan for Electricity

**Compiled by the Fossil Fuel Foundation**  
December 2016



# The Fossil Fuel Foundation

The Fossil Fuel Foundation is an independent world-class, knowledge-based institution serving the techno-intellectual needs of the multidisciplinary fossil fuel and energy communities in southern Africa.

It achieves this through communication, information sharing, coordination, education, promotion and networking.

It is comprised of a Board of Trustees and an association of professional members from a wide range of disciplines, sectors and organisations, locally and internationally, including government, parastatals, industry and academia.

It has a circulation base of over 3 500 people in Africa and abroad.



# The Purpose of the Presentation

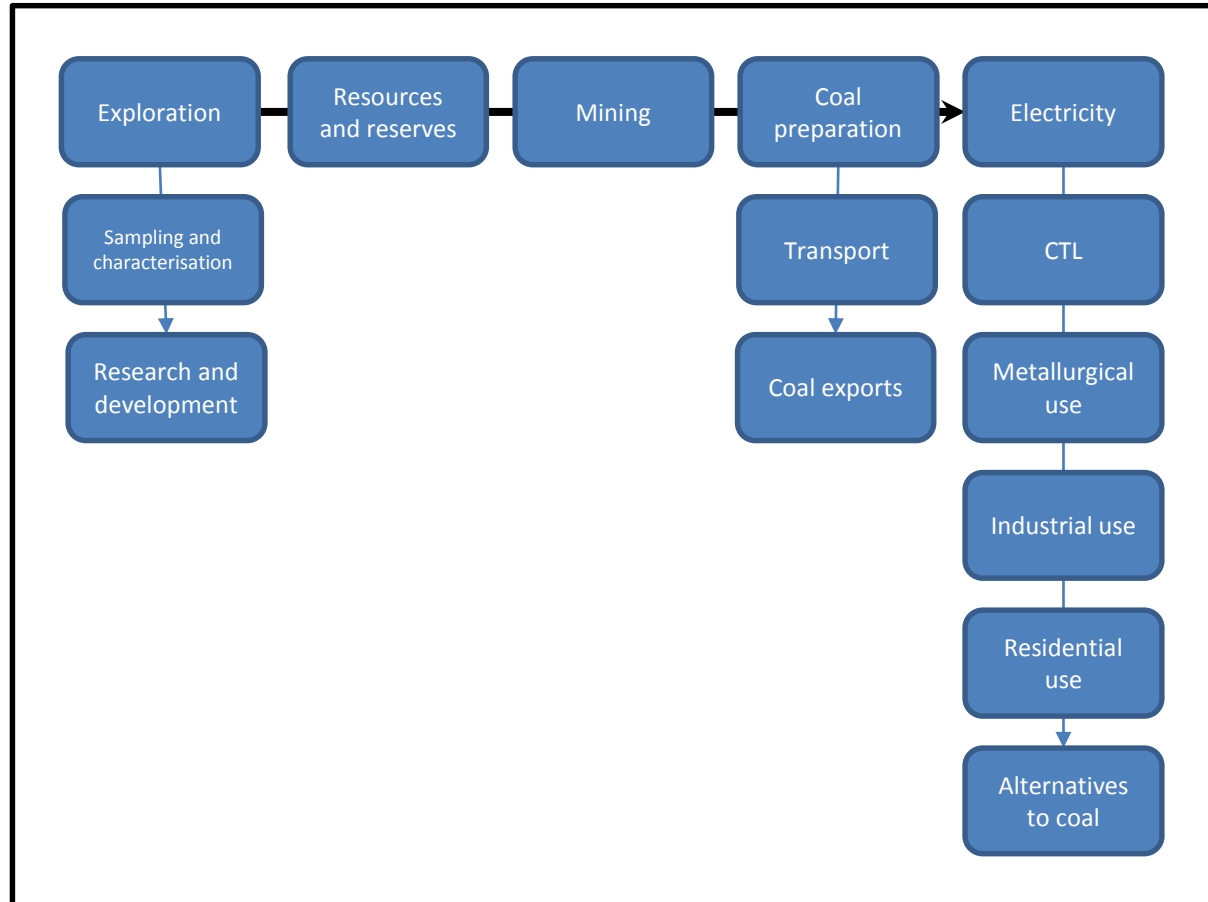
To lobby in the national interest for a secure Energy and Electricity Plan, as supported by Government, Industry and other committed parties, to ensure the following:

- **Energy Security** for South Africa in the short, medium and long term
- **Adequate, consistent, reliable, affordable and secure supply** of quality power;
- **Industrial growth, poverty eradication, job creation, socio-economic development** and national stability, thus ensuring an improved quality of life for all people in the country, and
- **Coal retained as a clean and sustainable part of the short to medium term energy mix** while the country moves to a low carbon economy and alternative energies in future.

# Importance of The Coal Industry to the South African Economy

- Coal accounts for
  - **Highest foreign exchange** earnings in the country (2011-2015)
  - **Highest income generation** for mining commodities beating gold, platinum
  - **>93% of SA's energy production**, and 81% of the regions' energy
  - **>98% of carbon reductants** in the metallurgical industry- iron, steel, FeCr
  - **>30% of the national petrol, diesel** and other fuel requirements
  - **>200 major chemicals and over 7 000 carbon-based products** (including paints, plastics, fertilisers, explosives, food and many other C-based products)
  - **Coal provides the best storage of energy**, given its ample underground resources and ease of extraction when required for use
  - **It provides the best case for secure and stable power generation (baseload power generation)** in the short to medium term

# The coal value-chain

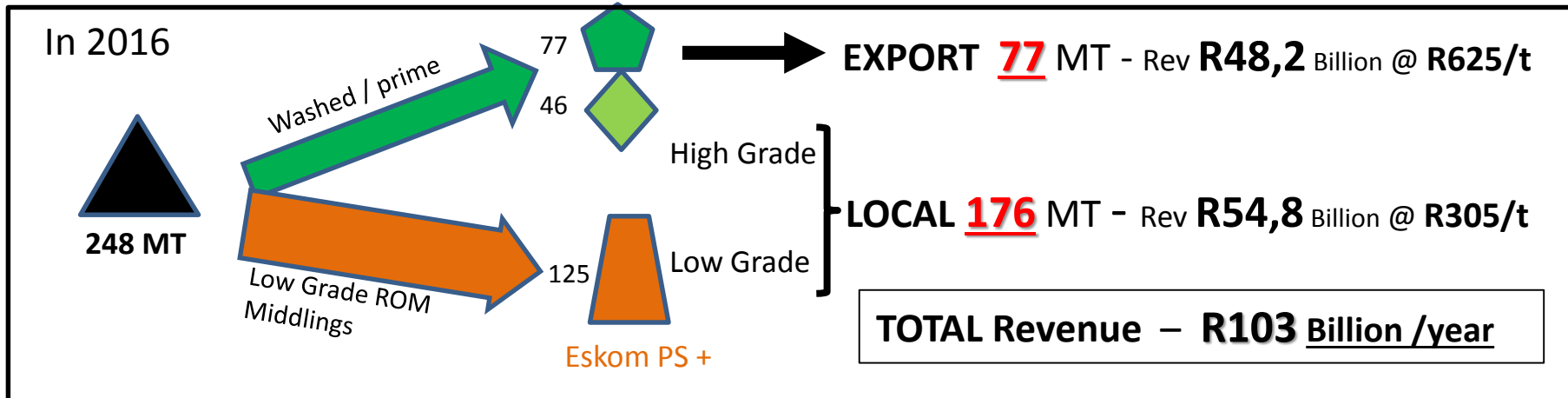
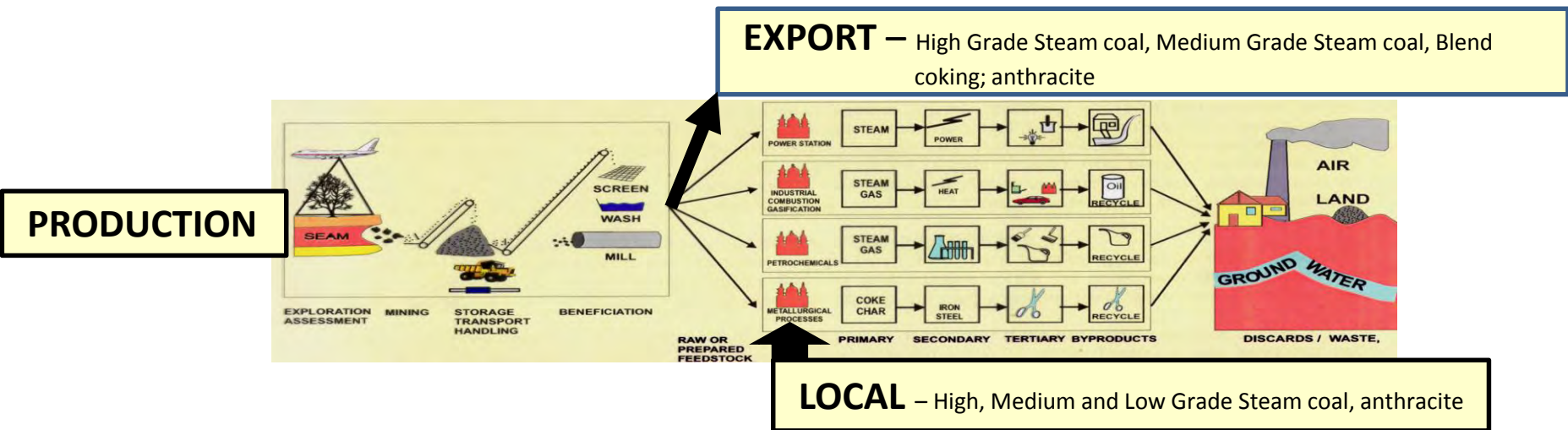


The South African Coal Roadmap (2011). Overview of the South African Coal Value Chain, p3.

# Diversity of downstream users

- **Local markets are extremely diverse** - Eskom, Sasol, metallurgical, export, local industries dependent on coal (approximately 6000 local users – brick and tile, pulp and paper, sugar, cement, hospitals, mines, transport, food, textile chemicals and other product manufacturers, etc.)
- **Advanced products derived from coal** include (but are not limited to) paint, plastic, explosives, petrol, diesel, carbon materials (coke, char, semi-coke, anthracite, etc) for smelters (metallurgical industry across the board)
- **Failure to mine coal will result in the need to import** the products currently being derived from coal (e.g. fertilisers from ammonia) or produced from coal-based processes – the overall value could rise to as high as R500 billion

# Synergy between Energy Generation and Export ECONOMICS



- ❖ Export of SA coal is financially vital for the SA economy but this requires beneficiation which leads to the production of secondary (lower grade) products for power station use.
- ❖ Export of coal cannot happen without a power station for take-off use of the secondary products so this synergistic balance is essential.

# Socio-economic aspects

Coal provides considerable value in terms of its footprint in society and in the economy, i.e.

- **Employment:**

- **77,400 to 80 000** people are **directly** employed on the **coal mines** in SA.
- **Double, treble or more** are **indirectly** employed including a multitude of **engineering, scientific and technical users +** consultants, equipment and service providers, health officials, Transnet, trucks), environmentalists, etc.
- **Plus a 10 to 1 ratio** as one individual's salary supports up to 10 or more in the greater family/community structure.

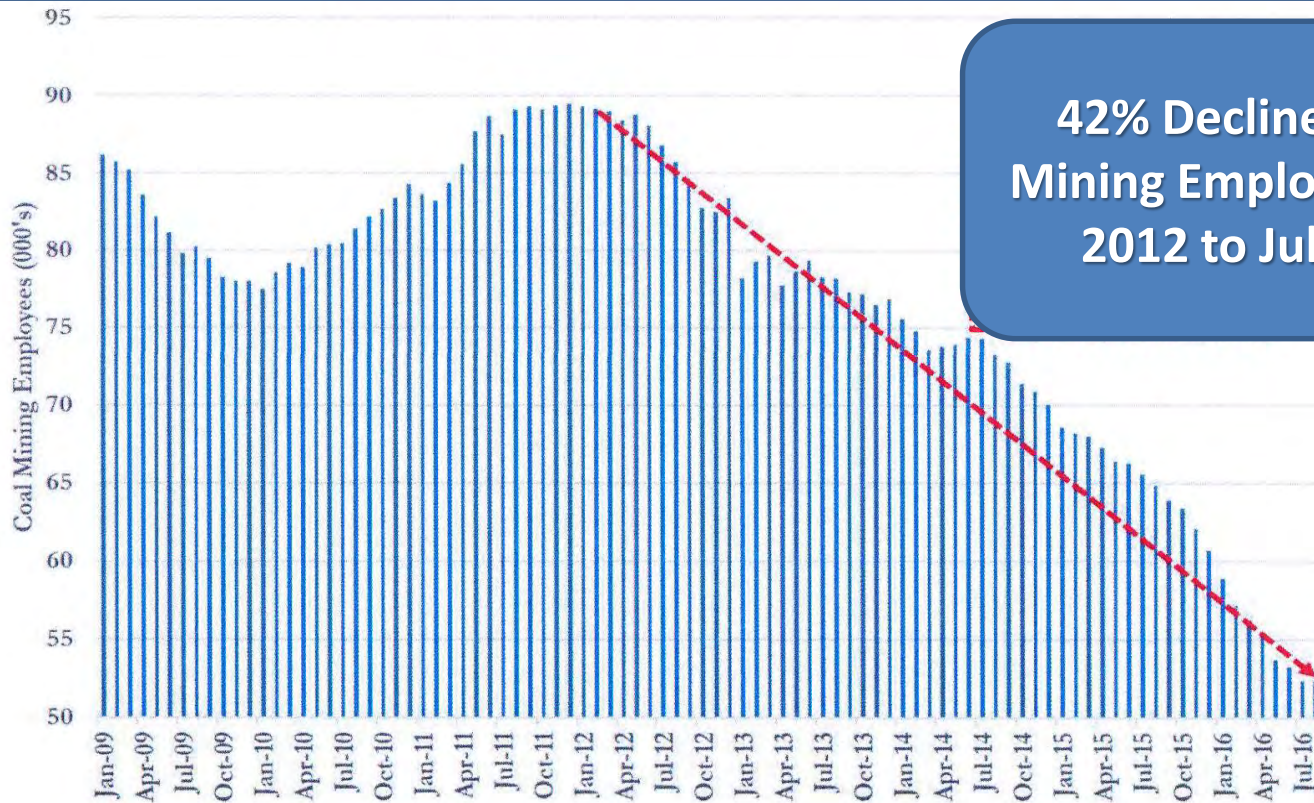
- **Local economy:**

- Coal mining companies support **towns, schools, hospitals, clinics, health programmes, infrastructure**, and so forth.

*Deviation from coal is therefore likely to lead to significant changes in socio-economic structures, unemployment and an increase in poverty*

# USA COAL - Employment issues

Coal Industry Update September 2016



42% Decline in Coal Mining Employees from 2012 to July 2016

Source: BLS and Zero Hedge.

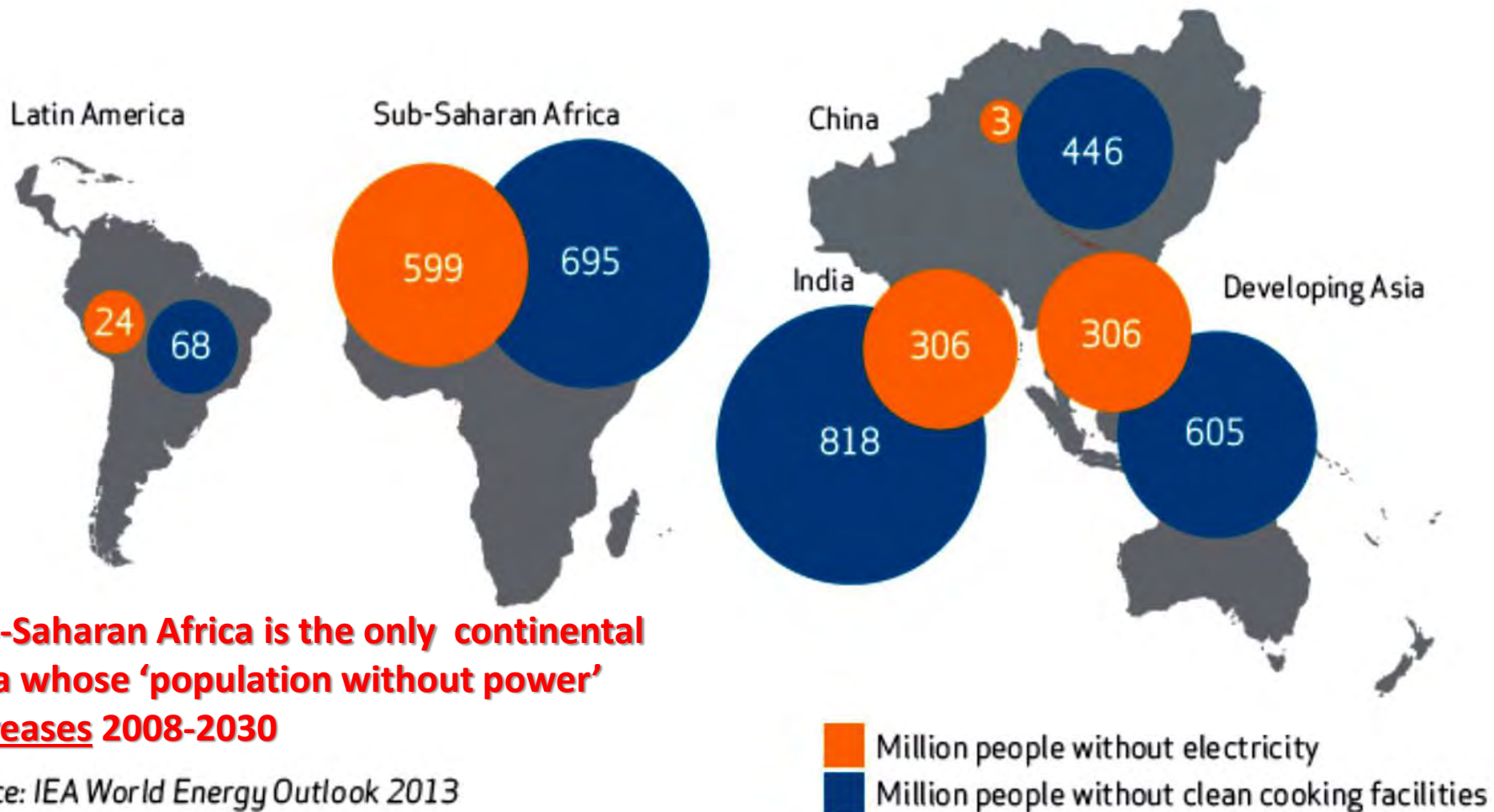
And a country voted accordingly.....

Source: X Prevost Nov 2016

# - Socio-economic Impact of Energy -

## ENERGY POVERTY IN THE WORLD

People without access to electricity



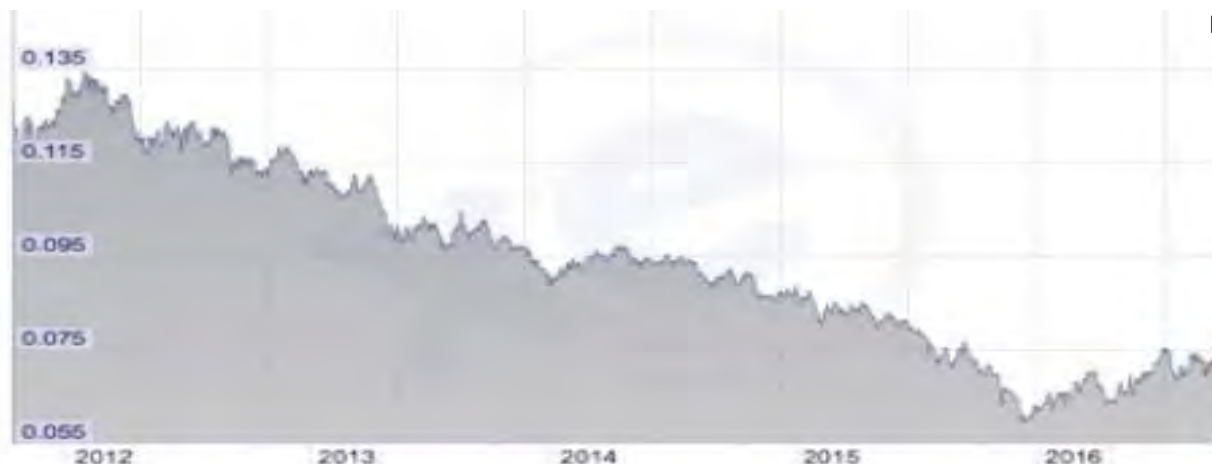
# Refurbishments of Older Power Stations

- No information has been provided in the IRP or related documents on the costs and impacts of refurbishment of current Eskom power stations (these are due to be phased out when life of plant reaches 40 years)
- Points to consider:
  - **Refurbishment is likely to be the most cost effective** for secure stable electricity production given existing infrastructure, storage capacity, licences, etc
  - **An investigation is required to establish such costs** relative to wind and solar
  - **Upgrades of current stations will include new, clean and efficient technology** which will reduce or eliminate emissions effectively:-

# Forex Risk for building Energy Plant

Table 4-2  
Assumptions of Imported vs Local, Material vs Labor Percentages

Technology	Imported	Local	Materials (Local)	Labor (Local)
PC	35%	65%	50%	50%
Integrated Gasification Combined Cycle	35%	65%	60%	40%
FBC	35%	65%	50%	50%
Nuclear	35%	65%	60%	40%
CCGT	35%	65%	60%	40%
OCGT	35%	65%	85%	15%
Wind	70%	30%	75%	25%
Solar Thermal	50%	50%	45%	55%
Solar PV	70%	30%	60%	40%
Biomass	35%	65%	50%	50%



Ref. EPRI IRP study, Sept 2015

Figure 3: value of South African rand against the US dollar over the past five years, from Xe.com.

**The fluctuating and generally deteriorating Rand/\$ exchange rate poses a risk of escalating imported capital and skill cost components. This risk is especially important given the limited local content for each technology option**



# Clean Efficient and Cost effective Coal Utilisation - SUMMARY 1

- **Local and international research and developments in Clean Coal Technology have achieved proven success** in ensuring efficient, sustainable, cost effective and clean usage of coal
- **The outcomes have been shown to lead to major reductions in all emissions**, partly through increased efficiencies in currently operating power plants, and partly by the installation of new technologies.
- *Such technologies are taking coal into the low carbon economy while renewables/nuclear gain traction in an energy mix.*
- **Such developments have not been recognised in the IRP** or taken into account in any policy documents to date
- **Funding is required to continue developments** in Coal Research. This needs to be sought from producers, users of coal and government alike.

# Clean Efficient and Cost effective Coal Utilisation – SUMMARY 2 -

- **Coal is a natural, indigenous and abundant** source of energy in SA
- **It is stored** in the ground until needed
- **It provides on-going, consistent and secure supplies** of feedstocks for baseload energy, with minimum to zero emissions in future
- **The nature of the region’s coal and local conditions are unique**, so “own” technology is developing rapidly
- **Local technological developments can be commercialised** for the region as **potential markets exist in other countries in the region** who plan to bring on coal-fired technologies for the growth and development

# Concluding Points

- **Coal can be used as a clean, low emission source of power generation** given the correct modern technologies to achieve this.
- **SA has the capacity to commercialise new and adapted technologies** to achieve
  - (i) **low carbon emissions** and
  - (ii) **secure consistent and reliable supply of energy for this country and in the region**
- **Refurbishing of old power stations by installing new cleaner technologies** could be the most efficient and least costly way in which to extend the life of those plants
- **A study of the financial, technical and socio-economic situation in South Africa** indicates that **coal is a vital part of the economy** and that **rapid reduction in its use would lead to considerable unemployment, high costs and a destabilised manufacturing industry** with loss of key commodities being manufactured in this country (petrol, diesel, iron, steel, ferrochrome and a host of diverse downstream products)
- **It is essential for the IRP to undertake a full economic impact study of effectively reducing the role of coal** in the economy to 25% or less than is currently the case.

# Specific Draft IRP 2016 Questions

*Key issues have been listed which require answers before the IRP can be finalised.*

1. The IRP should quantify the socio-economic effect of the different energy scenarios.
2. This should include a study on the economic impact of effectively reducing the role of coal in the economy to about 25% or less relative to its current economic importance
3. Is there any reason why refurbishment/life extension of existing power plant is not considered ?

# Specific Draft IRP 2016 Questions

4. Projects need to be sought to quantify the capex risk due to varying local content, and deteriorating/variable exchange rates when building all energy plant
5. The reason for the difference between the EPRI PV and Wind Capital Costs vs IRP 2016 (draft) must be established. Proposal : a benchmarked capital cost should be used to avoid project-specific bias.
6. The IRP should add a section elaborating on localisation, job creation opportunities and socio-economic impacts for the different energy technologies

# Specific Draft IRP 2016 Questions

7. Stability of the grid is vital. Coal-generated electricity enhances stability of supply. The cost of unserved/intermittent energy is substantial when variable and unpredictable sources of that energy are used, and when sourced from locations many hundreds/thousands of kms from the point of need (20% loss of energy over 1 000 km, damage to transmission lines with irregular use).
8. Such practical issues, now well known in countries in Europe, need to be costed in to the plans for the future. Is this quantified in the IRP?