

South African Network

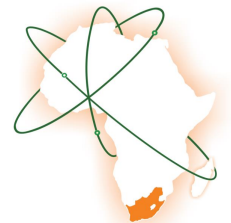
Nuclear Education, Science and Technology

Media advisory, IEP-IRP consultation workshops

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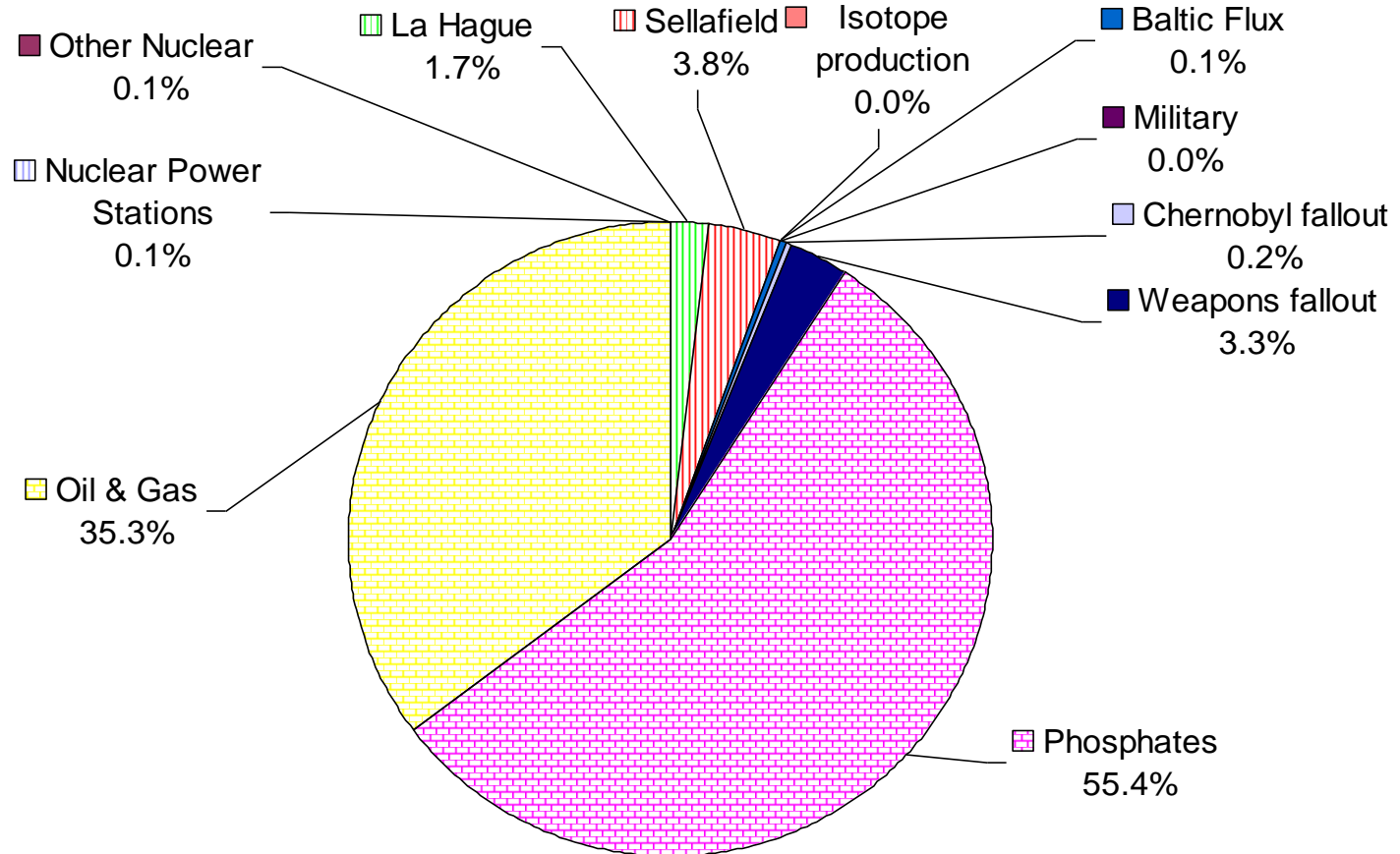
Safety of Energy Sources

Energy Source	Mortality Rate (deaths per 10⁹ kWh)	
Coal – global average	161	(50% of global electricity)
Coal – China	278	(75% of China's electricity)
Coal – U.S.	15	(44% of U.S. electricity)
Oil	36	(36% of global energy, 8% of global electricity)
Natural Gas	4	(20% of global electricity)
Biofuel/Biomass	24	(21% of global energy)
Solar (rooftop)	0.44	(< 1% of global electricity)
Wind	0.15	(~ 1% of global electricity)
Hydro – global average	1.4	(15% of global electricity, 171,000 Banqiao dead)
Nuclear	0.04	(17% of global electricity w/Chernobyl&Fukushima)

Sources –World Health Organization; CDC; ICAP - significant coal use increases health care costs approximately 11%

Source of Radioactive Dose in Europe – 2000

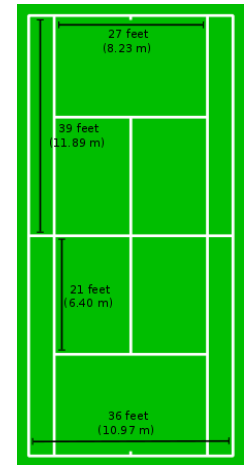
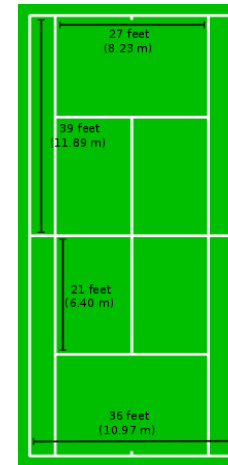
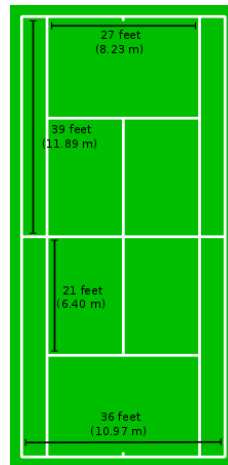
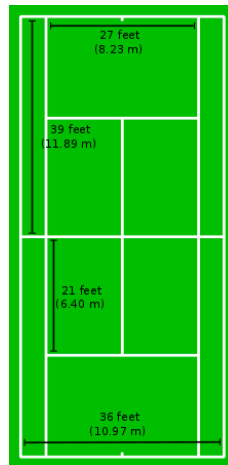
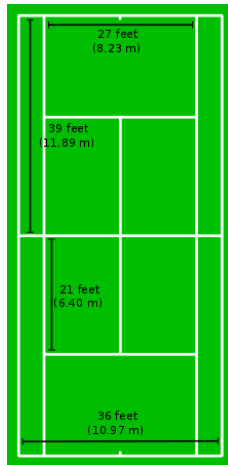
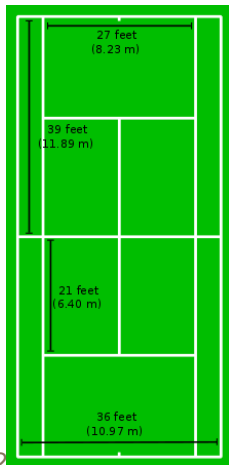
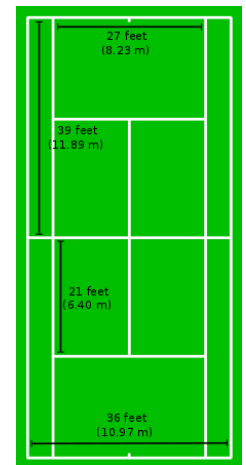
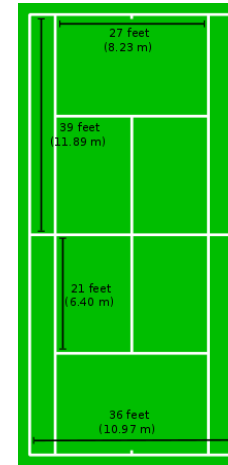
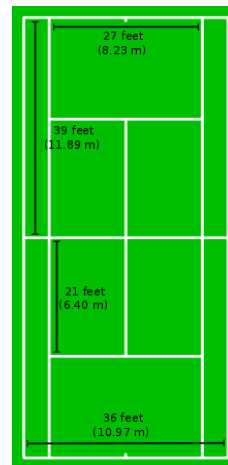
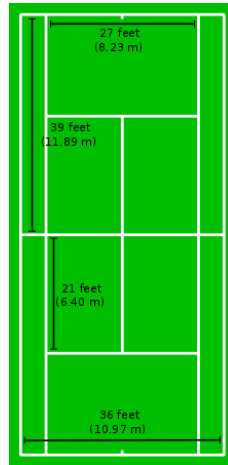
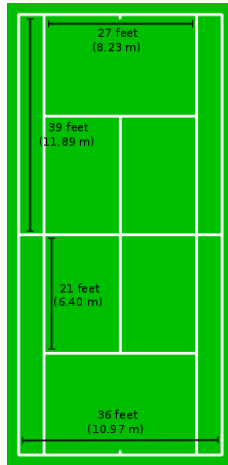
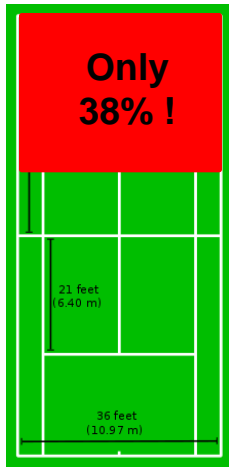
Excludes existing natural background



EU Sponsored MARINA II Project on Discharges of Radioactive Substances into the North East Atlantic

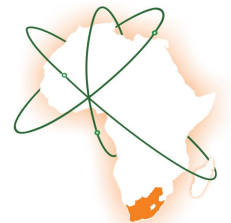
Spent Fuel Volume in Perspective

How many **tennis courts** will be covered when placing all Koeberg's spent Fuel Assemblies (FA), generated by both units since 1984 (2 173 FAs), up-right next to one another?



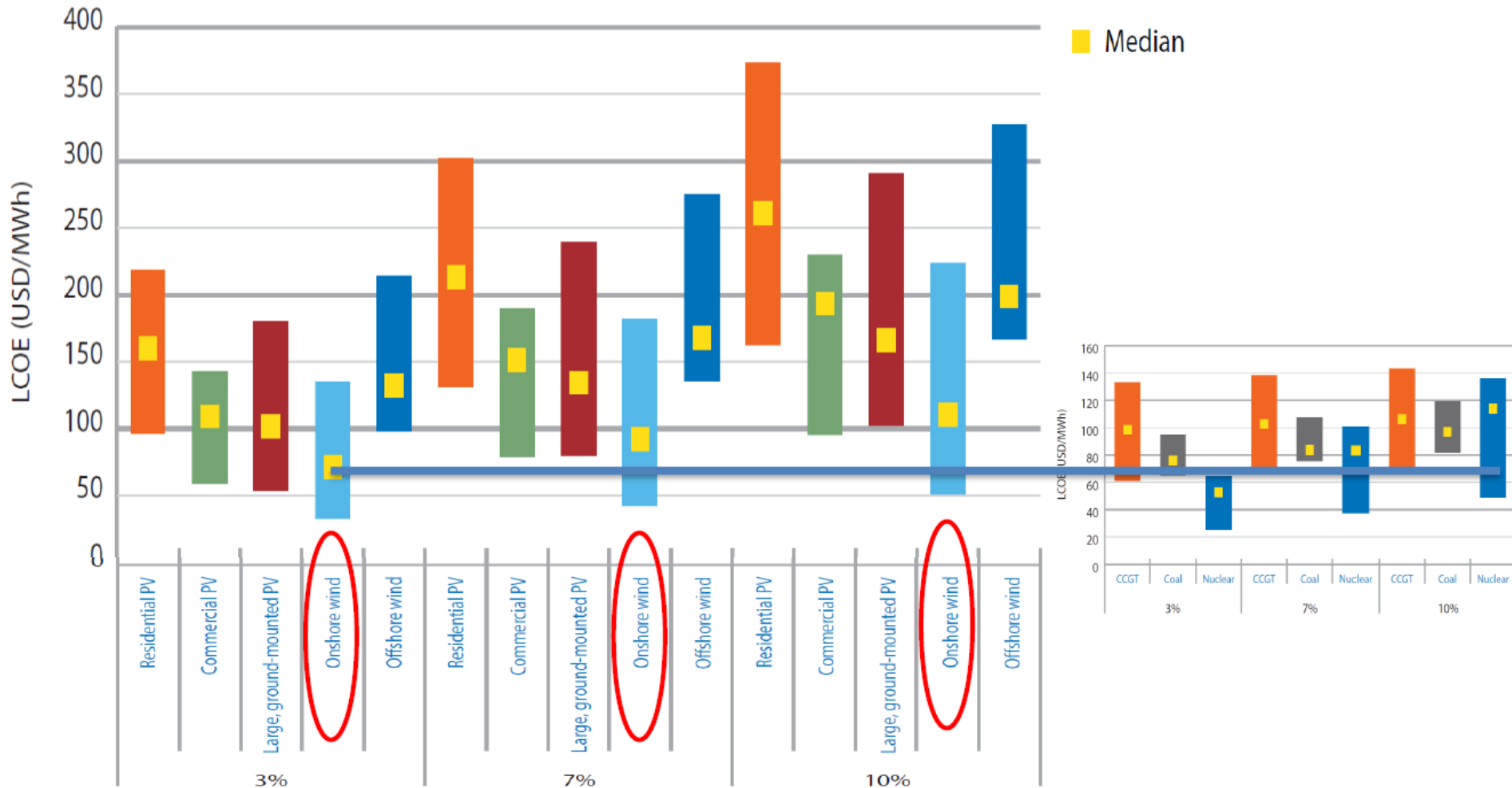
Energy safety

- Nuclear energy has demonstrated to be the safest form of energy available.
 - Lowest mortality rate
 - Negligible contribution to radiation sources.
- All nuclear waste is managed and accounted for throughout its lifetime (the only industry that does this).



Cost of Energy

Projected levelized costs of baseload capacity in 2020 less than all forms of renewables (except at low discount rates)!

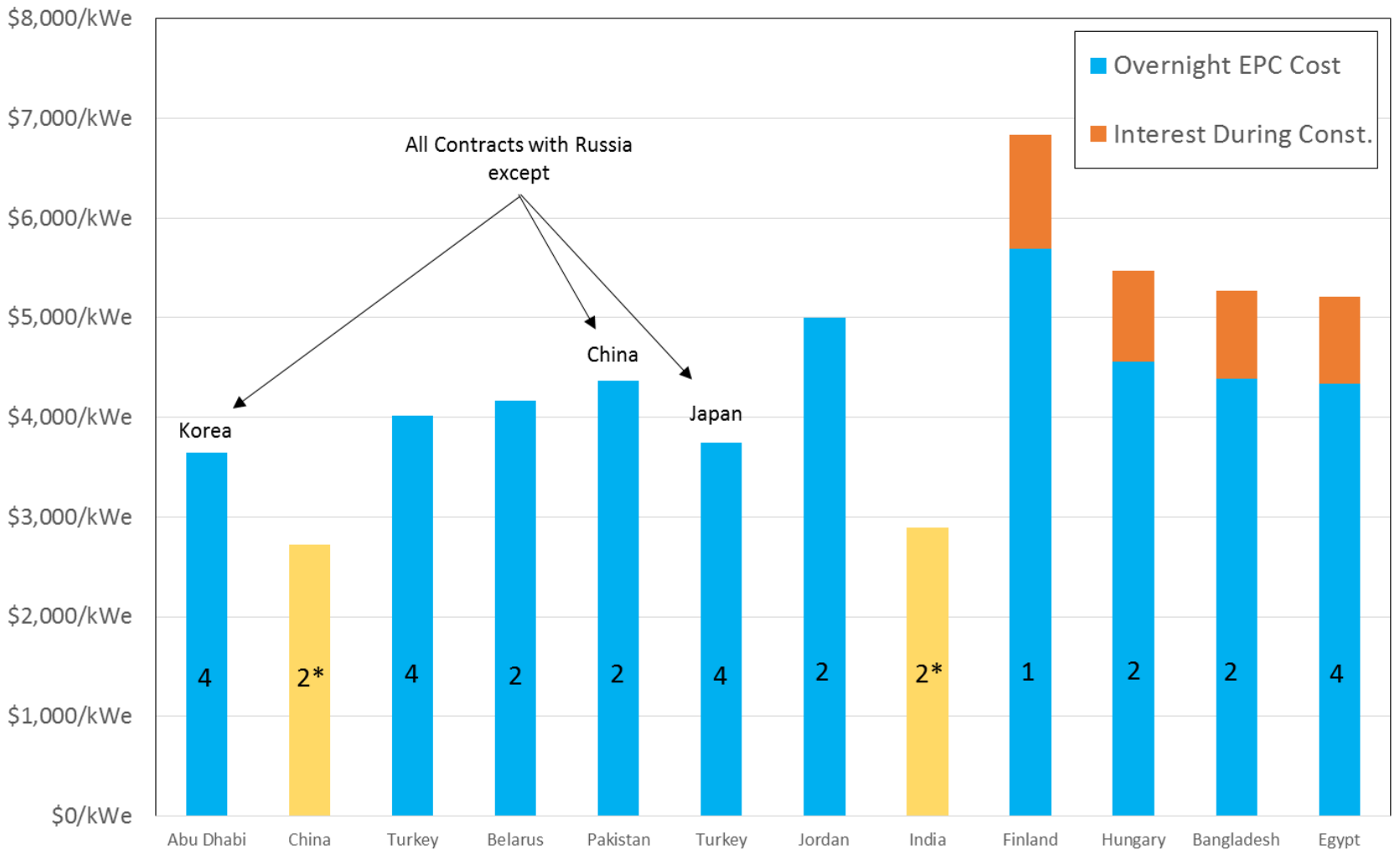


Source: NEA/IEA (2015). Projected Costs of Generating Electricity, Table ES.1+2

Nuclear Export Contracts Placed since 2009

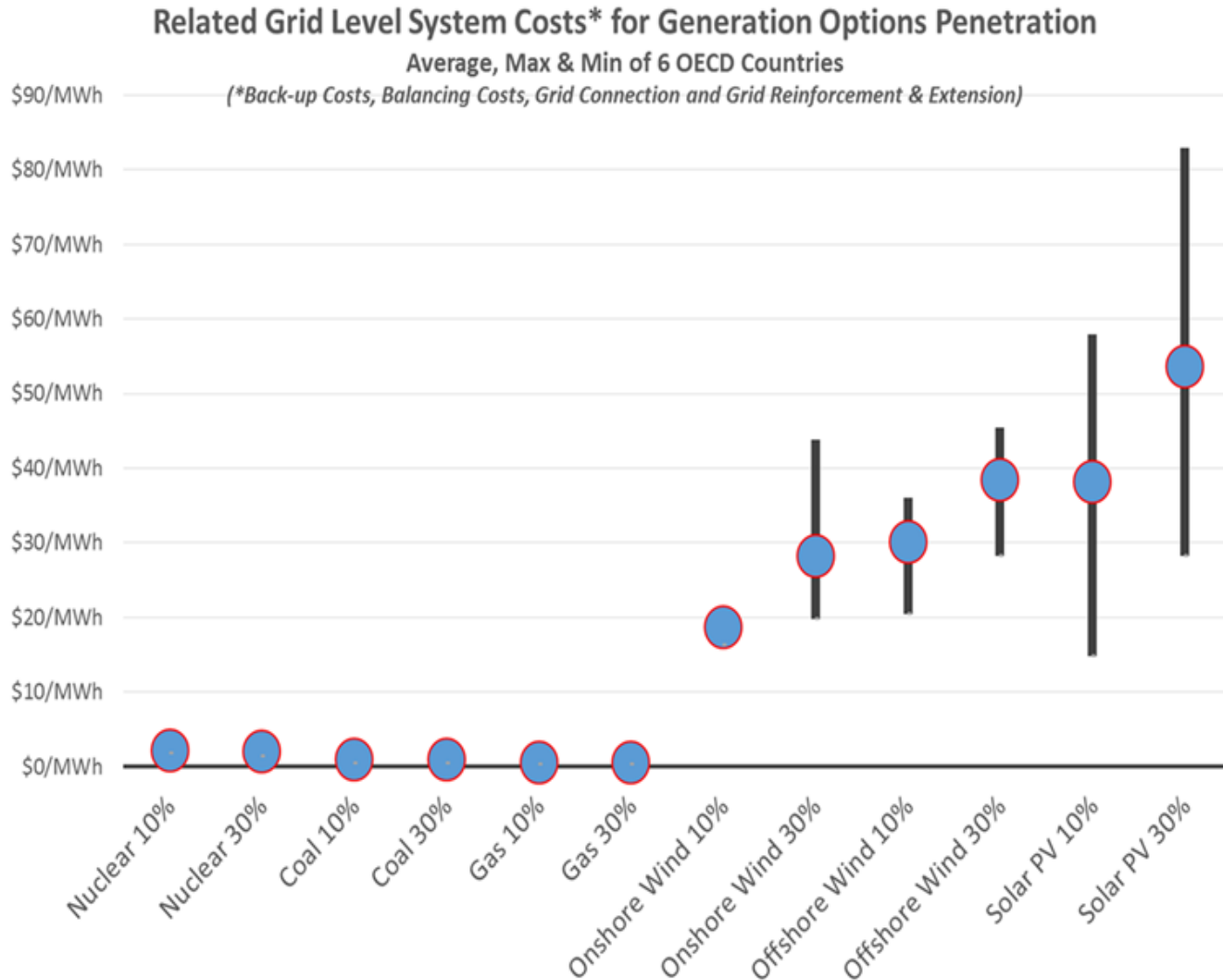
Recent Export Contracts for Nuclear Plants 2009-2015

(based upon interpretation of public data, e.g. WNN)



Costs placed in the electricity grid

This is not taken into account by the IRP or the CSIR report

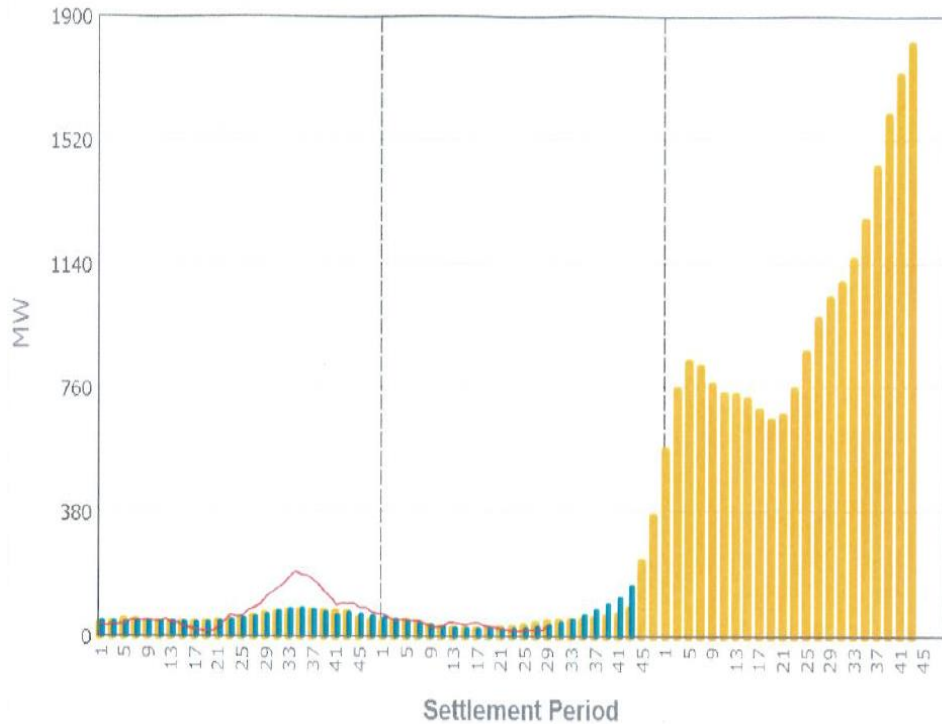


Source: System Effects in Low-Carbon Electricity Systems - OECD 2012

Alignment of Renewables with Demand

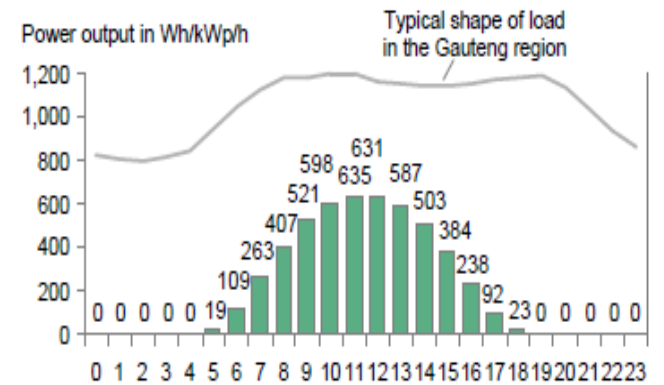
UK National Wind Output (7136MW installed)

Data referring to dates: 2012-08-09, 2012-08-10, 2012-08-11

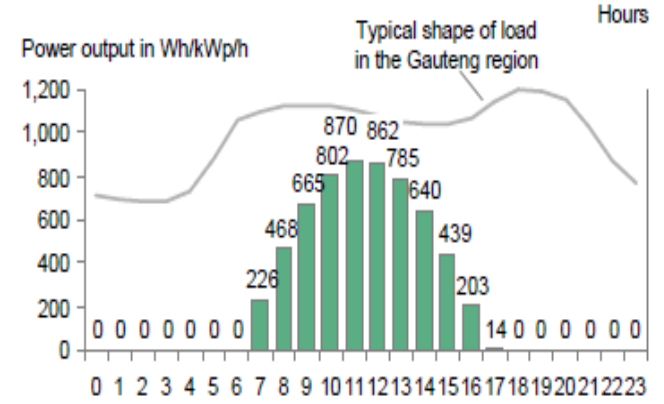


Power output for a fixed-tilt crystalline PV system, optimally inclined (30°)

January



July



Calculating the cost of electricity generation

- The IRP cannot use Independent Power Producers latest bid-window figures for use in renewable energy generating cost while using capital & operating expenses for others.
 - The IPP costs are decoupled from the capital costs and subject to manipulation (if treasury provides guarantees for the capital costs, even more so).
- All costs should be based on capital and operating costs, generation capacity and return on investment period : plant life.
 - This provides a level playing field for all energy sources.
- Grid level system costs should be included for all energy sources.
- Negative impact on other energy sources (due to intermittency and more importantly unpredictability) should be assigned to the energy source responsible.

Conclusion

- The IRP draft 2016 provides a number of scenarios, the optimal scenario should be based on the following:
 - Climate change is a political and technical constraint that will force any national electricity solution toward a low carbon option
 - The fundamental link between societal and economic growth with electricity in the South African context, is absolute.
 - Environmental pressures on generation options will increase into the future.
 - Water scarcity in South Africa must be at the forefront of any solution.
 - Energy planning in terms of its impact on the economy, job creation, and balance of payments is fundamental.
 - Energy security will require a measured approach to imported power.
 - It is unlikely that Southern African Power Pool will be able to function to the extent that the European model does with regard to interconnectedness.
 - The **total** cost of a solution and the net benefit to the economy will remain a key driver.
 - Any proposed solution must be shown to have practical success in other markets in the world.
 - The proposed solution must act to build on and bolster the technical capability that resides in the country and not be constrained by any perception to the contrary.