

Presentation to DOE on Draft Integrated Energy Planning Report Public Hearing 24-25 October 2013 , Cape Town Gavin Lloyd – Independent Consultant

Two Passions

- to minimise our dependency on non-renewable hydrocarbons
- to develop a modular CSP + TES Technology with lowest LCOE

Just two Key Points to be raised on six slides

Quick Bio

Professional Land Surveyor - BSc Land Surveying at University of Cape Town 1976

Director of Lloyd & Hill Incorporated 2005

Director of Urban Villages 2013

President of the South African Geomatics Institute 2007-2011

First Point: Motivation to introduce a cross-subsidy for Plug-in Hybrid and Electric Vehicles

- ❑ Electricity generation after 21.30 till 05.00 hours is exceptionally inefficient since coal-fired boilers have to be kept at full operational temperature but their load is generally 45% less.
- ❑ Increased electricity purchased during this time could be supplied at very little additional operational cost to Eskom. This extra revenue could reduce electricity increases due to their improved capacity factor.
- ❑ An effective way to increase off peak night sales would be to encourage the uptake of plug-in hybrid and EV car sales.
- ❑ This could be done at no cost to the fiscus by using the revenue from the Carbon Emissions Tax on vehicles emitting in excess of 120g/km to cross-subsidize plug-in hybrids and EVs on a sliding scale. CET revenue estimated to be R450 million per annum.
- ❑ Environmentally justifiable that the high CET motorists should subsidise the low or zero carbon-emitting motorists consuming off-peak electricity.

Benefits of an incentivised Hybrid Vehicle Market

Triple win

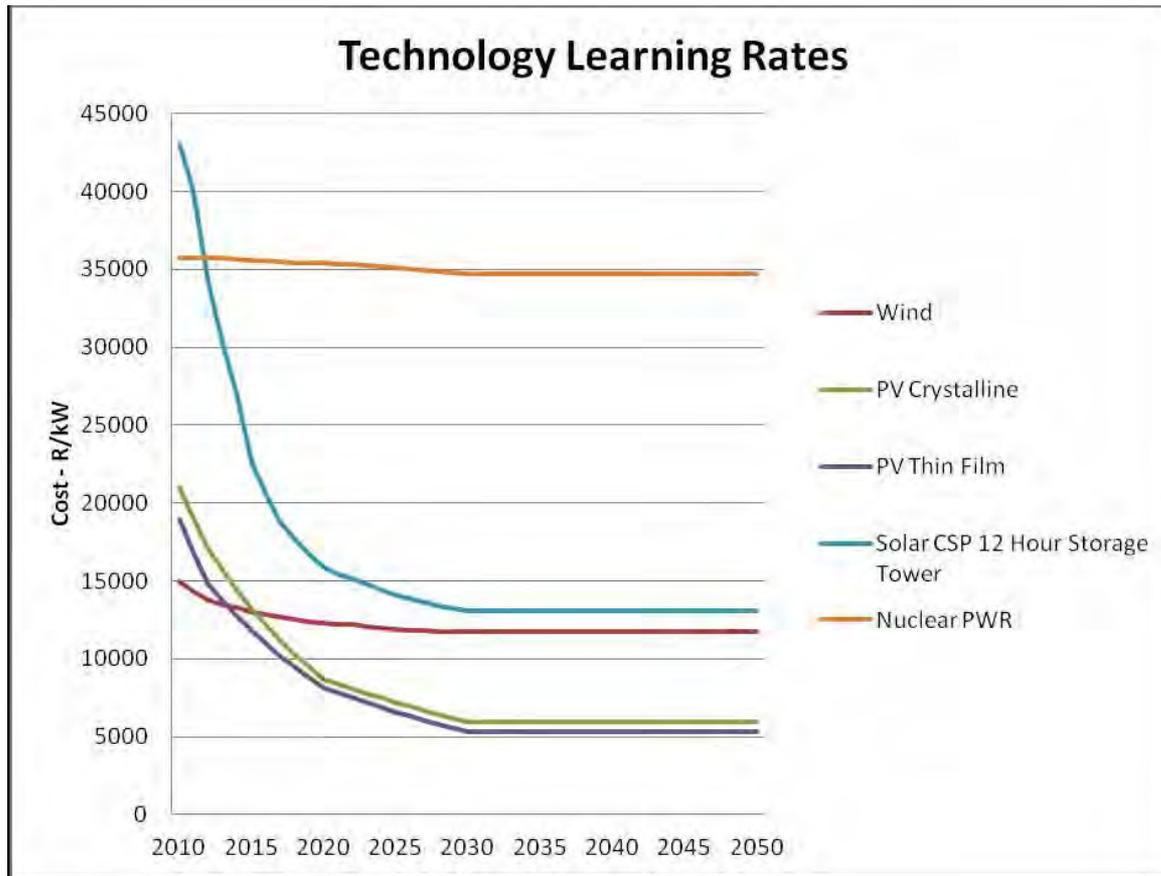
- Third generation hybrid vehicles are light, with small Ah batteries and are 39% more fuel efficient than equivalent petrol only vehicles. Very suitable for the future SA motorist. Draft IEP far too conservative in benefits and significant uptake will begin before 2020, not 2030, irrespective of policy.
- An incentive will assist in overcoming motorist reluctance to purchase due to the increased price of a hybrid vehicle even though operational costs are much lower – incentive easily scaled by regulation to maintain this advantage as technology develops.
- **Can significantly reduced petroleum imports within a decade if incentivised.**
- **Resultant increased electricity sales after hours reduces the general cost of electricity in SA without requiring additional generation capacity. General national economic benefit.**
- **General Health and Environmental Benefit. Reduced carbon emissions in the urban centres since short trips use electric propulsion only- ultimately 75% RE generation is probably achievable by 2050.**

Second Point

CSP with TES and hybrid natural gas is superior to Nuclear Option

- Modelling indicates that CSP with 15 hours TES requires less than 24% natural gas co-generation to be fully dispatchable year round.
- Since natural gas generation emits about 50% less carbon per MW than coal generation, this technology has the potential to reduce electricity generated carbon output per MW by up to 88% within a 40 years.
- Nuclear PWR require re-fuelling for 4-8 weeks every 12-16 months. But CSP with co-generation virtually 100% dependable if modular technology is adopted.
- SA has the potential to create its own modular TES technology that will be significantly less complex to manufacture and construct than CSP Tower Systems. Graph on pg 79 is, in my opinion, probable but may reach the indicated CSP 2030 level 5 years sooner.

Figure 3-1 from Draft IEP Report



R13000/KW could be achieved by 2025 with modular CSP + local co-generation

Five reasons why a Nuclear decision should be delayed till 2015

- ❑ Current economic growth at 2% is considerably less than the minimum of 3% modelled by the Draft IEP- demand delay.
- ❑ Maintaining low energy costs are critical for SA's future growth as labour costs rise above that of our manufacturing competitors. Nuclear CAPEX very expensive.
- ❑ Economic effect on the SA economy of a pro-nuclear decision will last over 100 years. Highly skilled personnel component of OPEX means cost increases will far exceed that of CSP.
- ❑ Natural Gas supplies from SADC region need to be still secured by long term contracts- unknown cost factors at present
- ❑ Local Hybrid CSP technology R & D still needs two years to prove its technical viability and dependability

CONCLUSION

- Advances in Hybrid CSP and PV technology are likely to demonstrate for most countries that Nuclear PWR Power is no longer an economic choice within 35° Latitude of the equator.
- Imported LNG can be augmented by CBM and probably shale gas to form a strategically balanced energy resource to make up the 24% requirement for dependable co-generation.
- With our excellent DNI resources, SA can transform its per capita carbon ranking from one of the worst to one of the best in the world within 40 years by developing its largely own CSP technology in preference to imported Nuclear Technology, thereby saving R Billions of foreign exchange.
- CSP+TES+Co-generation should be the clear policy option of choice for the Final IEP Report