
“A place under the sun”
JUNE 7 & 8, 2010 : IRP 2010 Stakeholder Consultation
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# Presentation Outline

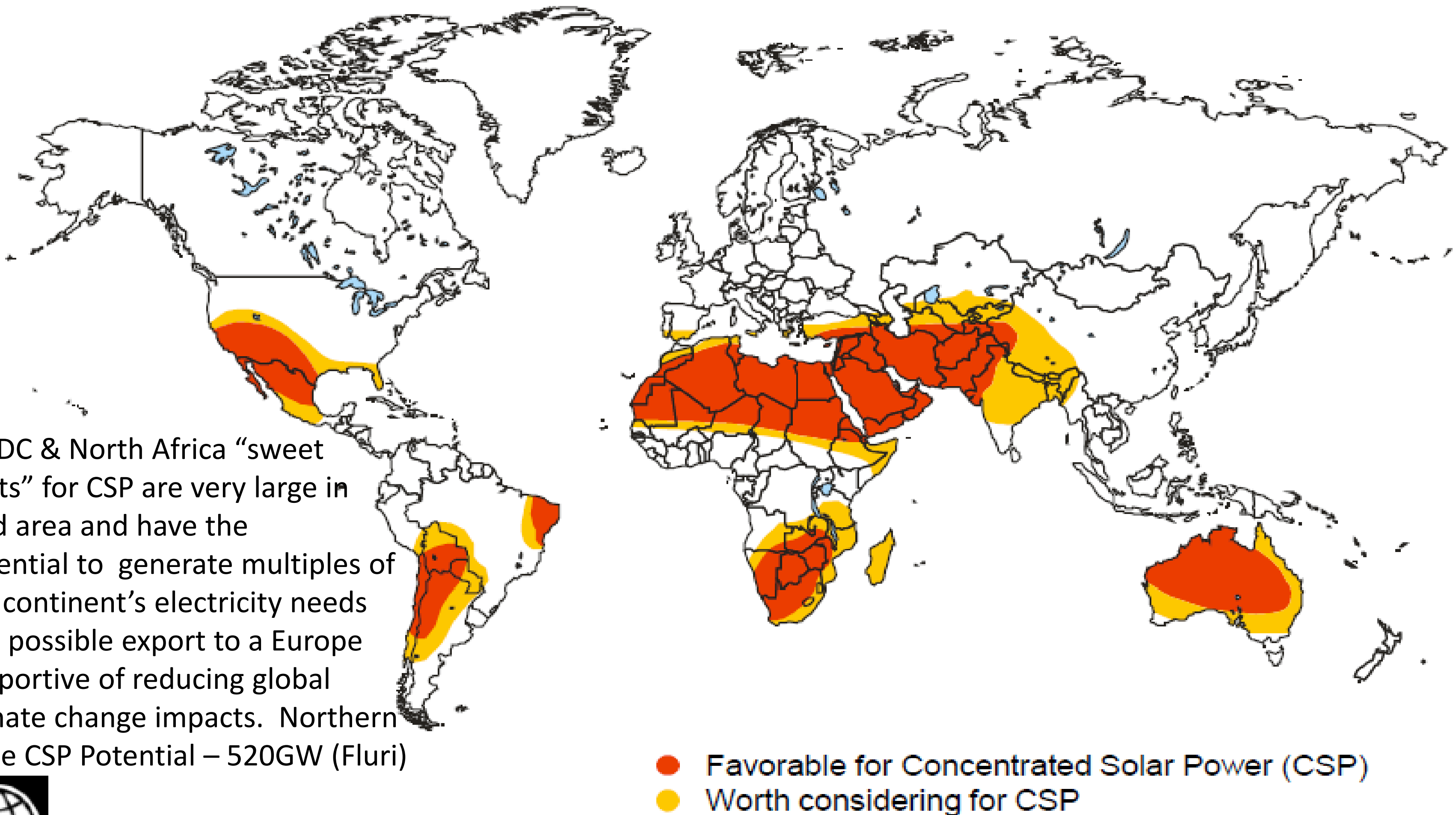
- SASTELA Background
- CSP Potential and Benefits
- Proposals on Input Parameters
- Conclusion

"Promoting a CSP Industry in Southern Africa"

# SASTELA

Some of the institutions that attended & supported SASTELA's Inaugural Meeting, 9$^{th}$ March 2010, DBSA

# Why CSP?




•SADC & North Africa "sweet spots" for CSP are very large in land area and have the potential to  generate multiples of the continent's electricity needs and possible export to a Europe supportive of reducing global climate change impacts.  Northern Cape CSP Potential – 520GW (Fluri)

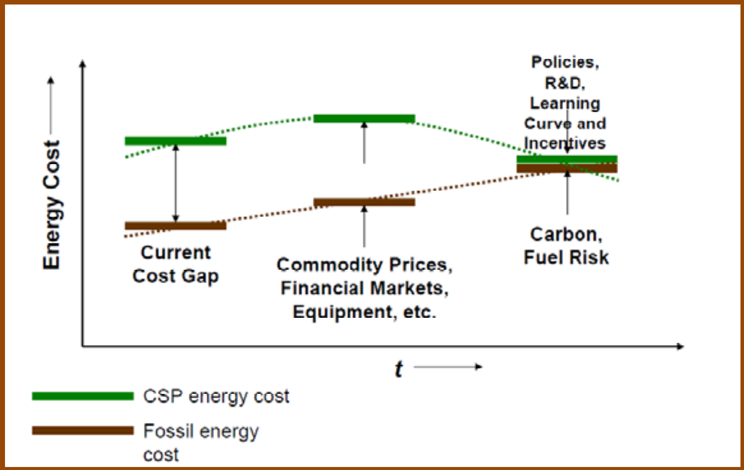
# CSP Specific Parameter

- CSP has the capability of producing "firm dispatchable" peak, mid-merit and base load (storage & hybridisation)
- CSP contributes to reserve margin and does not require backup capacity from other generation technologies – (storage & hybridisation)
- CSP plants aid grid management in that they can be built across a large area in South Africa relatively close to demand centres, reducing pressure on the existing transmission network.
- CSP provides the benefit of reduced carbon and other GHG emissions and will contribute immensely to the government's 34% GHG reduction targets.
- CSP has a life cycle analysis of 20g per kWh (trough) over the life of the plant, this compares with approx 800g per kWh coal plants, 400g per kWh Combined Cycle, 70g per kWh for Nuclear and 5-30g per kWh for Wind

# CSP Specific Parameter

- Manufacture of CSP technologies are more labour intensive than conventional technologies and require a significant labour force (link to IPAP 2)
- According to the World Watch Institute, CSP power plants creates more than double the amount of jobs per TWh, as compared to coal plants (248 to 116)
- A 125 MW CSP plant will create 100 permanent operational jobs compared to Medupi (4,800 MW) which will create about 250 permanent jobs
- A substantial CSP target will lead to the development of local expertise and know positioning South Africa as a leading CSP components manufacture for regional, continental and global export
- CSP alongside Nuclear are the low carbon utility scale electricity generation options
- With CSP we can determine today what the price of electricity per kWh will be in 20 years time. We cannot do this with conventional technologies

# CSP costs




- The cost gap will close in the next 6 years (IEA), if South Africa is to become a major player in the Global CSP industry and migrate to a low carbon future , the only opportunity we have is right now, to introduce a CSP specific input parameter
- Coal, Nuclear or Natural gas have significant long term risks with cost implications compared to CSP
- With CSP we can determine today what the cost of electricity will be per kWh in 20 years time, we cannot do that with coal nuclear and natural gas

# New Parameter: Solar Power

ISSUE

- Solar power is probably the one non-coal technology in which South Africa has the greatest comparative advantage (solar resource). Turning this into a competitive advantage will require industrialization and scale similar to that proposed for nuclear.

PROPOSAL

- Include specific targets for solar power (which includes both thermal and photovoltaic technologies) that reflects the requirement of industrialization and local manufacturing: a minimum of 100MW new capacity in any year (compared to 20GW over less than 20 years for nuclear).

- Factor in the cost savings from the scale of implementation of solar (and other renewable energy) technologies, as is presently done for nuclear (and coal, albeit not explicitly).

# Parameter: Discount rate

ISSUE

- The modelling outcome is highly **sensitive to discount rates**. The choice of discount rate requires a value judgement on the value of costs and benefits to future generations. For long-term planning, a lower, social discounting rate is recommended.

- At a 10% discount rate the value of a cost or benefit in 2020 is a third of its value today and by 2030 only one-eighth.

PROPOSAL

- Use **a central discount rate of 5%** with sensitivity analysis of +/- 2% & 5%)
  > 0% (strict sustainability),
  > 3% (IPCC recommendation),
  > 7% (optimistic cost of capital)
  > 10% (Eskom WACC)

- At a 5% discount rate, the value of a cost or benefit in 2020 is 60% of its value today and by 2030, 36%.

# New Parameter: Externality/social cost

ISSUE

- Without quantified externalilty/social costs (as per the 1998 White Paper on Energy), trade-offs are made arbitrarily.
- The exact level of carbon tax for South Africa is uncertain, but greenhouse gas emissions impose a global cost (even if Southern Africa would bear a disproportionately large share).

PROPOSAL

- Also calculate the "cost to society" including externalities
- Use the median of peer reviewed social cost of carbon estimates (Tol, 2008): \$48/tCO2 or 33c/kWh for coal.

*Table 1:* Selected Characteristics[a] of the Joint Probability Density of the Social Cost of Carbon for the Whole Sample (all) and Selected Subsamples[b]

| | All | PRTP | | | Review | | Publication date | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 1% | 3% | peer | gray | <1996 | 1996–2001 | >2001 |
| *Fisher-Tippett, sample standard deviation* | | | | | | | | | |
| Mode | 35 | 129 | 56 | 14 | 20 | 53 | 36 | 37 | 27 |
| Mean | 127 | 317 | 80 | 24 | 71 | 196 | 190 | 120 | 88 |
| St.Dev. | 243 | 301 | 70 | 21 | 98 | 345 | 392 | 179 | 121 |
| Median | 74 | 265 | 72 | 21 | 48 | 106 | 88 | 75 | 62 |
| 90% | 267 | 722 | 171 | 51 | 170 | 470 | 397 | 274 | 196 |
| 95% | 453 | 856 | 204 | 61 | 231 | 820 | 1,555 | 482 | 263 |
| 99% | 1,655 | 1,152 | 276 | 82 | 524 | 1,771 | 1,826 | 867 | 627 |
| Stern | 0.92 | 0.56 | 1.00 | 1.00 | 0.97 | 0.84 | 0.86 | 0.92 | 0.96 |

# Methodology: Portfolio risk

ISSUE

- A "multi-criteria" assessment using a balanced scorecard involves arbitrary weightings.
- Rating risks (for "risk adjustment") by technology involves arbitrary assessments and neglects portfolio risk.

PROPOSAL

- Where possible (for example carbon externality cost), use monetarized values for correcting costs (as per the 1998 White Paper on Energy).
- Use established (financial) portfolio analysis (Awerbuch) to determine the risk of different generation mixes. This realizes the goal of the 1998 White Paper on Energy of "energy security through diversity".


"Promoting a CSP Industry in Southern Africa"
Thank you on Behalf of SASTELA
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