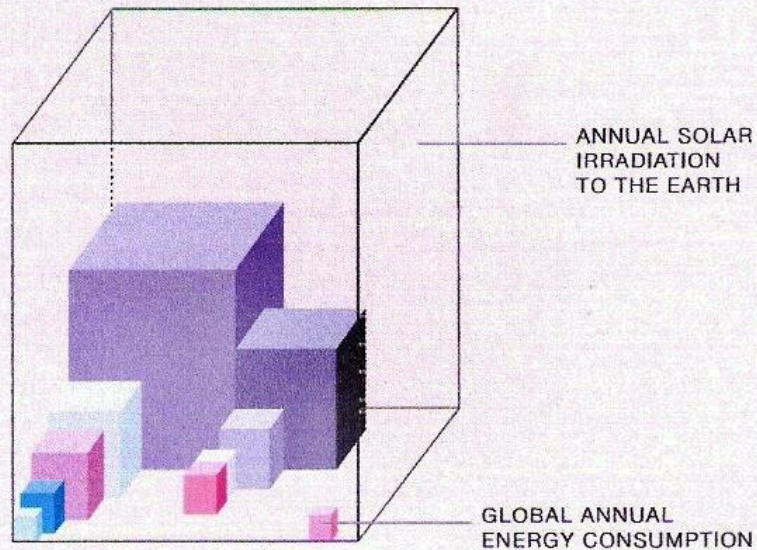

Swartland Solar Park

IRP 2010- 29th November 2010



Solar Perspectives

SOLAR IRRADIATION
VERSUS ESTABLISHED
GLOBAL ENERGY
RESOURCES

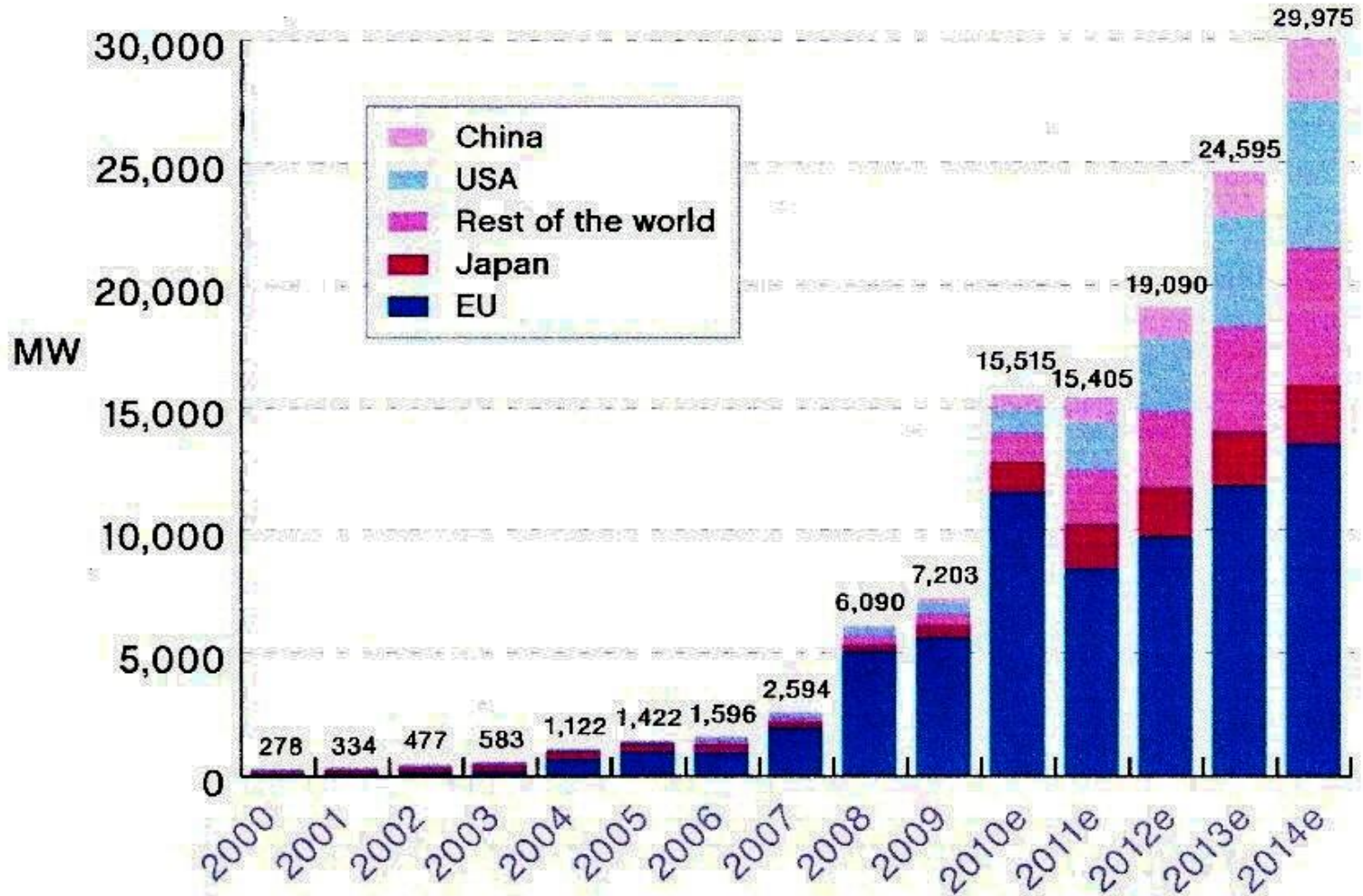


■ WIND	■ COAL
■ BIOMASS	■ OIL
■ GEOTHERMAL	■ GAS
■ OCEAN & WAVE	■ URANIUM
■ HYDRO	

FOSSIL FUELS ARE EXPRESSED WITH REGARD TO THEIR TOTAL RESERVES WHILE RENEWABLE ENERGIES TO THEIR YEARLY POTENTIAL.

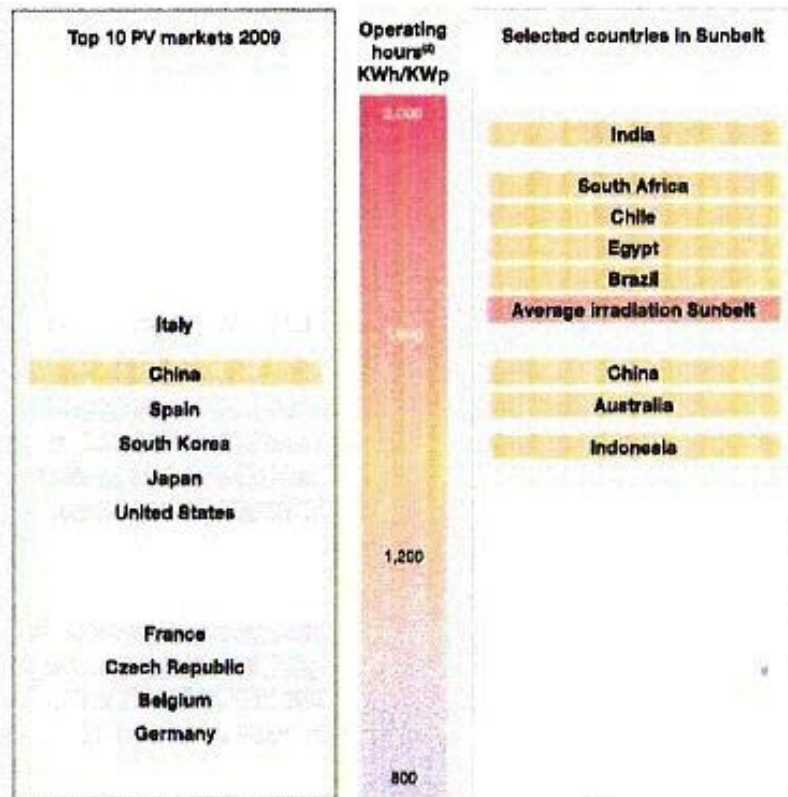
Global PV Momentum

Regional distribution

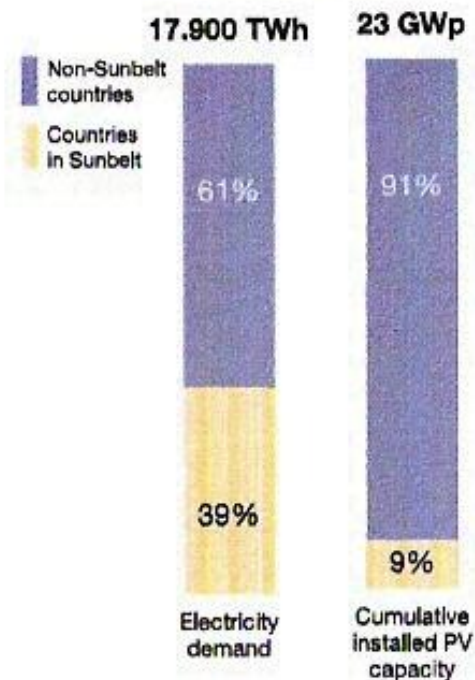


Sunbelt Identification & Potential

IRRADIATION SUNBELT VS. TOP 10 PV MARKETS 2009⁽¹⁾



SHARE SUNBELT IN ELECTRICITY DEMAND⁽³⁾ AND GLOBAL CUMULATIVE INSTALLED PV CAPACITY (TWh, GWp)



(1) For systems larger than 1 MWp; 85% performance ratio

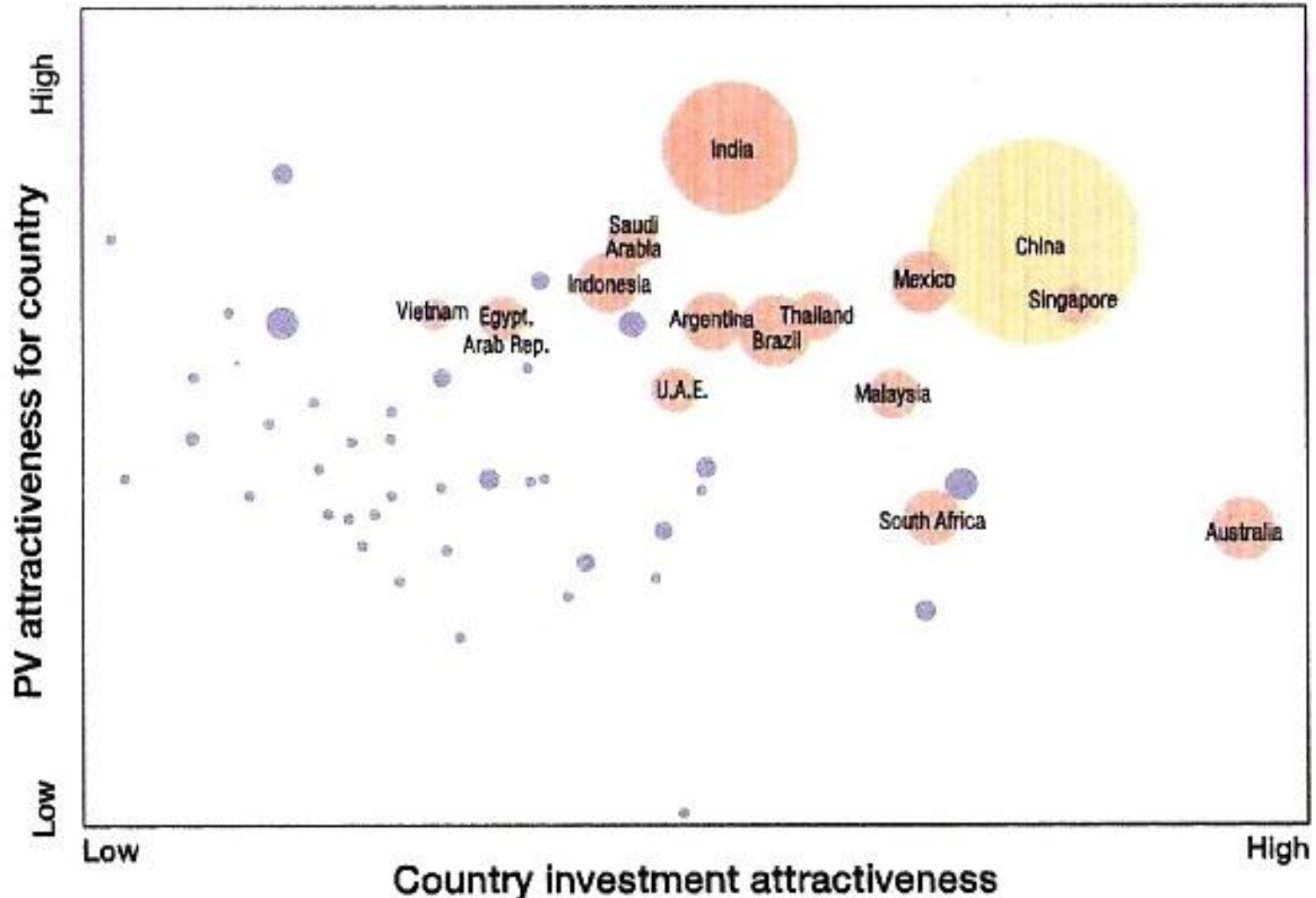
(2) Cumulative installed capacity 2009

(3) Electricity demand 2007

Source: NASA, IEA Technology Roadmap Solar photovoltaic energy, EPIA Global Market Outlook for Photovoltaics until 2014, A.T. Kearney analysis

South Africa PV Potential

PV POTENTIAL FOR SUNBELT COUNTRIES BY 2030 IN PARADIGM SHIFT (GWp)



IRP 2010 Terms of reference

“The primary objective of the Integrated Resource Plan (IRP 2010) is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. However, the IRP 2010 also serves as input to other planning functions, inter alia economic development, funding, environmental and social policy formulation. The accuracy of the IRP is improved by regular reviews and updates as and when things change or new information becomes available. For this reason, all long-term plans should be considered as indicative rather than “cast in concrete” plans.”

“The scenario evaluation process confirmed that the “Revised Balanced Scenario” represents a fair and acceptable balance considering the divergence in stakeholder expectations and key constraints and risks, including:

- Affordability***
 - Reducing carbon emissions***
 - New technology uncertainties such as costs, operability, lead time to build etc.***
 - Water usage***
 - Job creation***
 - Security of supply”***
-

IRP 2010- Positive Signs RFI

The eligibility criteria under REFIT Phases I and II should be used in guiding potential respondents in whether they should provide a response. The criteria define a qualifying renewable energy power generator as “... a new investment in

electricity generation using the following technologies:

- o biogas (≥ 1 MW)***
 - o biomass solid (≥ 1 MW)***
 - o Concentrated Solar Power (CSP) trough with and without storage (≥ 1 MW)***
 - o CSP tower with storage of six hours per day (≥ 1 MW)***
 - o Large scale grid connected photovoltaic systems (≥ 1 MW)***
 - o Small hydropower***
 - o Landfill gas***
 - o On-shore wind.”***
-

Interpreting the Draft IRP 2010

WHAT WENT WRONG ?



OR



What went wrong ?

■ Policy

- ❑ Inconsistent pull-through REFIT
- ❑ Mixed messages Solar Park

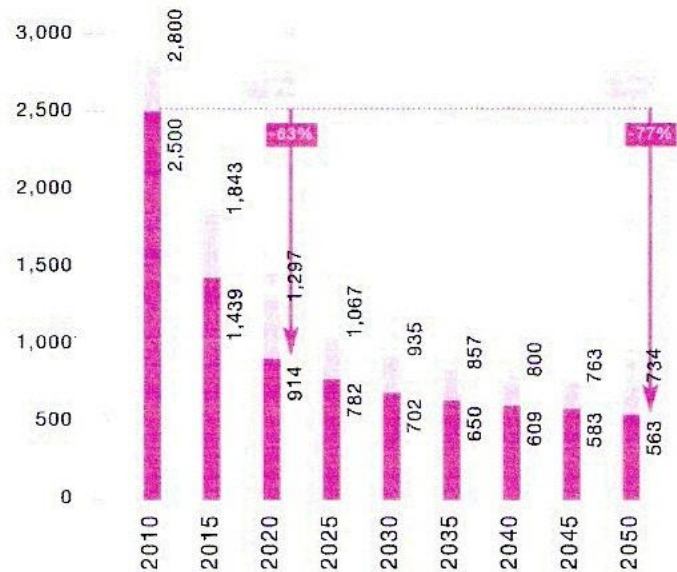
■ Technical

- ❑ Generic technology costs incomplete
 - ❑ Learning rates ignored
 - ❑ Missing Scenarios
 - ❑ Faulty effective load-carrying capability (ELCC)
 - ❑ Unclear weighting of criteria
-

How the IRP can be improved

- Incorporate PV learning rates

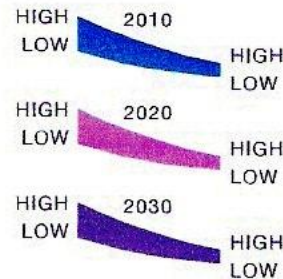
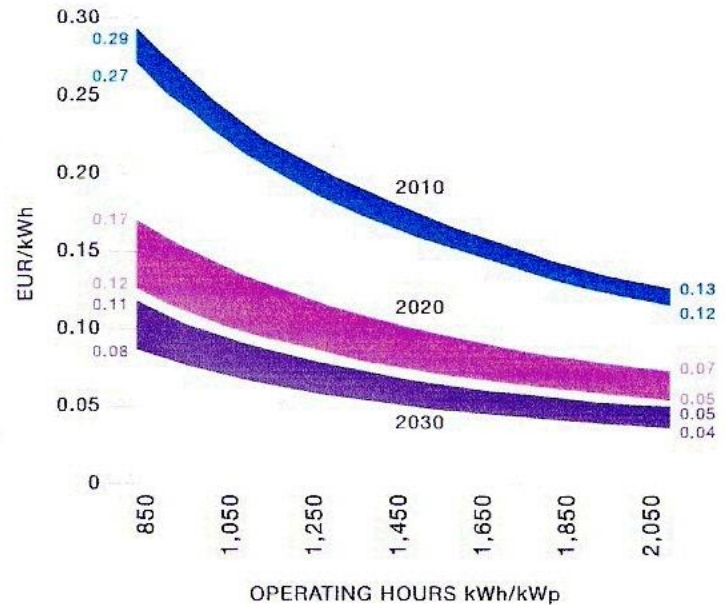
PRICE OF LARGE PV SYSTEMS EVOLUTION
EUR/KWp



ACCELERATED SCENARIO
PARADIGM SHIFT SCENARIO

source: EPIA

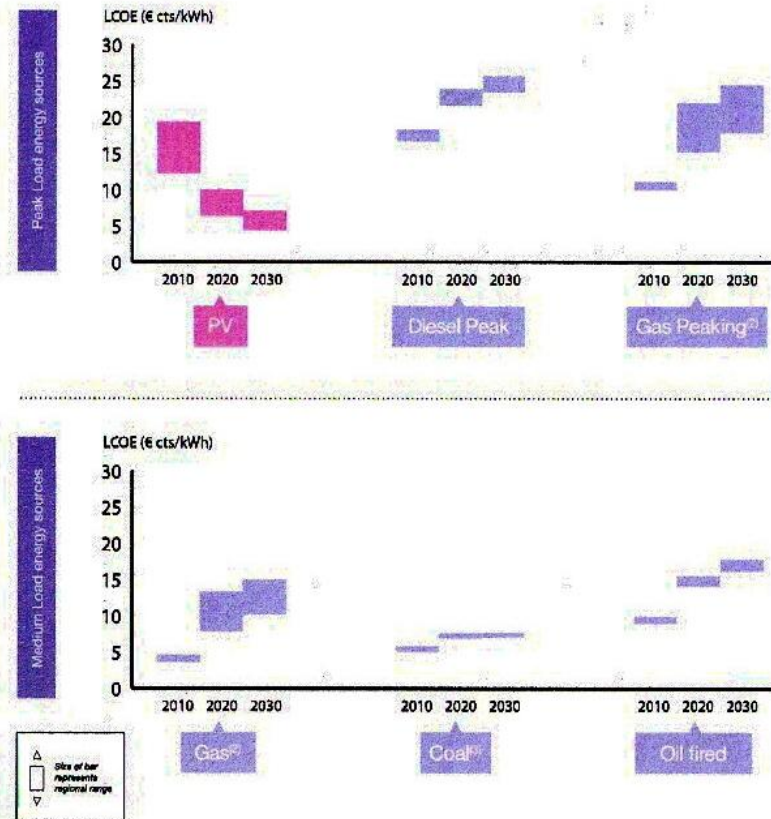
PV LEVELISED COST OF ELECTRICITY RANGES
EUR/KWh



How the IRP can be improved

- Incorporate more realistic cost comparisons

COMPARISON OF LCOE 2010, 2020, 2030, HIGH CASE FUEL PROJECTION⁽¹⁾ (€cts/kWh)



(1) WACC: 6.4%

(2) LCOE of Gas Peaking and Combined Cycle Gas Turbine (CCGT) in gas producing countries with very low gas prices are not displayed

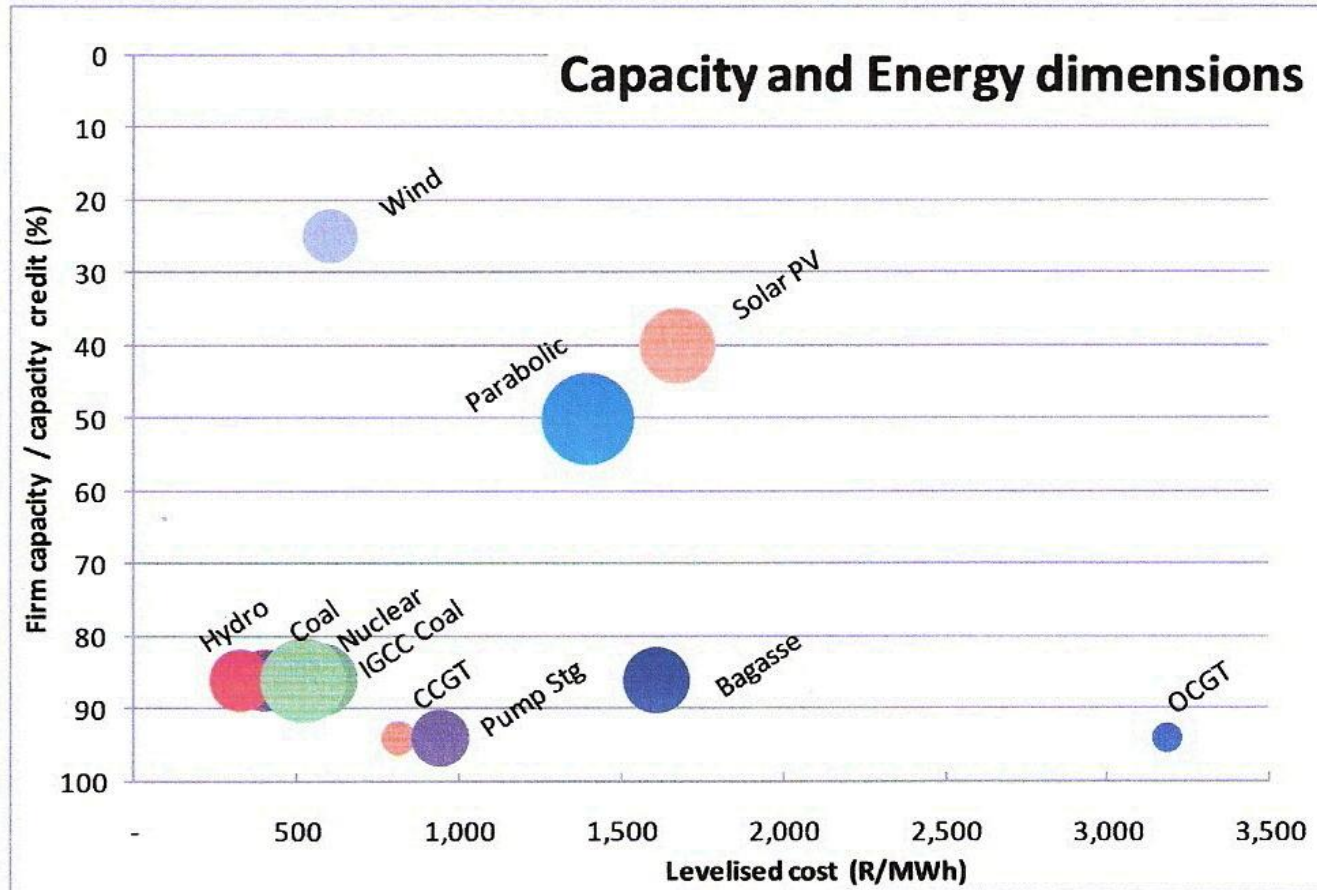
(3) IGCC = Integrated Gasification Combined Cycle, a modern coal combustion technology

Source: National Renewable Energy Laboratory, National Energy Technology Laboratory, EPIA Set for 2020, World Bank, A.T. Kearney analysis

How the IRP can be improved

- Use more accurate ELCC for PV

Figure 17. Capacity and energy dimension

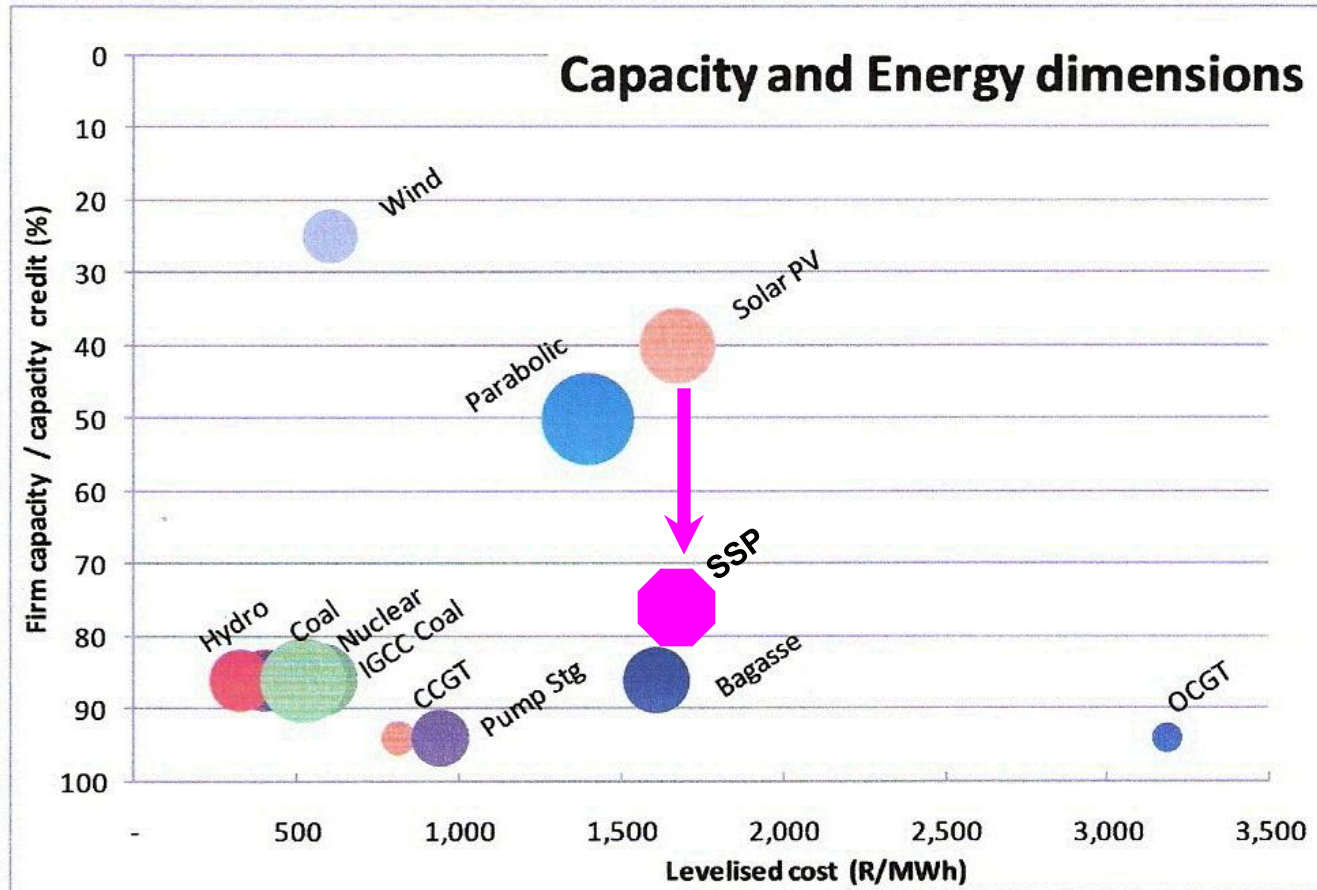


- **Note:** The size of each bubble is based on the relative capital cost (per kW installed capacity) of each technology (in 2010 present value terms)

How the IRP can be improved

- Use more accurate ELCC for PV

Figure 17. Capacity and energy dimension

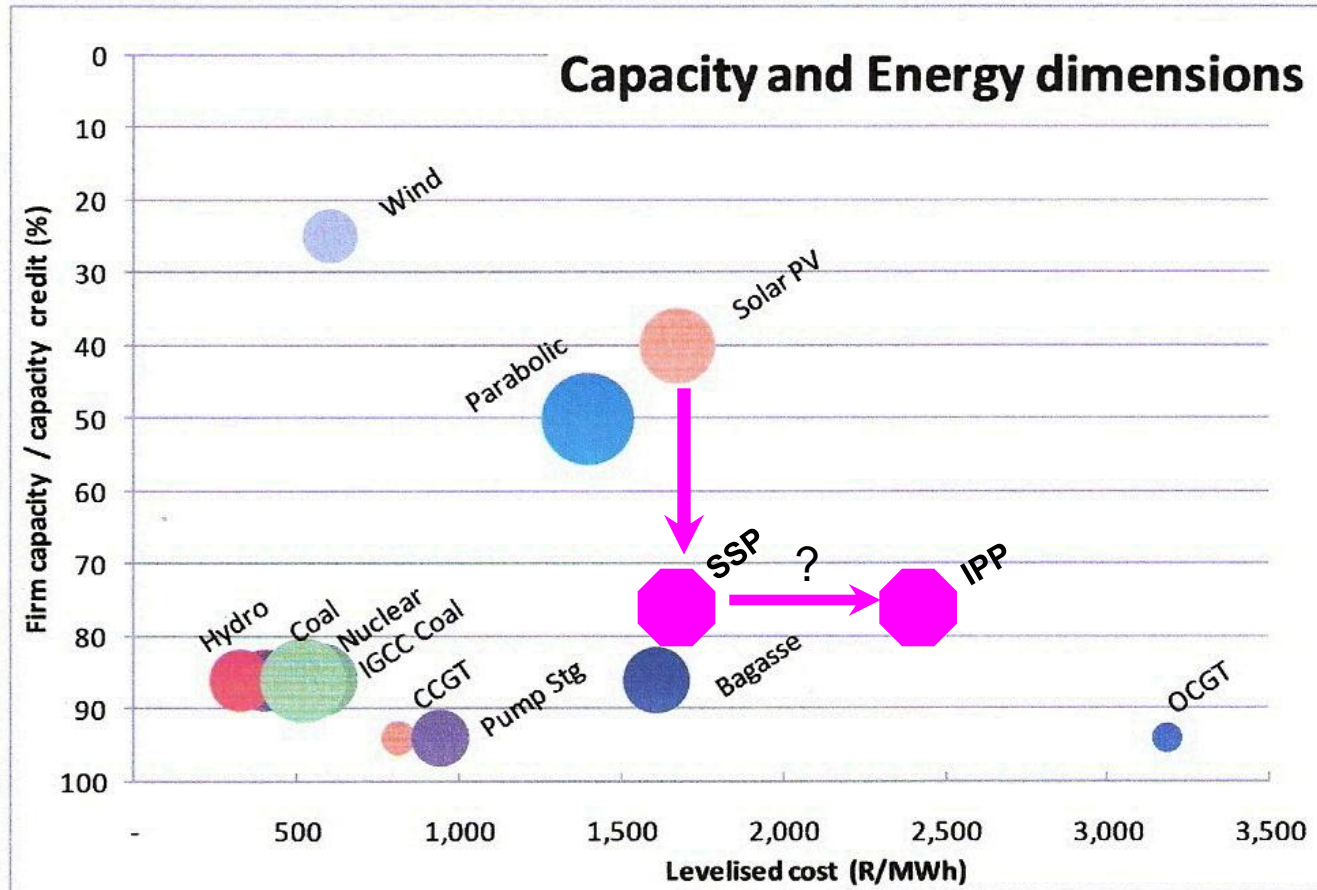


- **Note:** The size of each bubble is based on the relative capital cost (per kW installed capacity) of each technology (in 2010 present value terms)

How the IRP can be improved

- Use more accurate ELCC for PV

Figure 17. Capacity and energy dimension



- **Note:** The size of each bubble is based on the relative capital cost (per kW installed capacity) of each technology (in 2010 present value terms)

ELCC



Swartland Solar Park Demonstration Plant- Malmesbury Western Cape

Swartland Solar Park

- LCOE
- Boosting Rural Distribution
- BIPV
- AIPV
- V2G

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