

From Megawatts to Gigawatts

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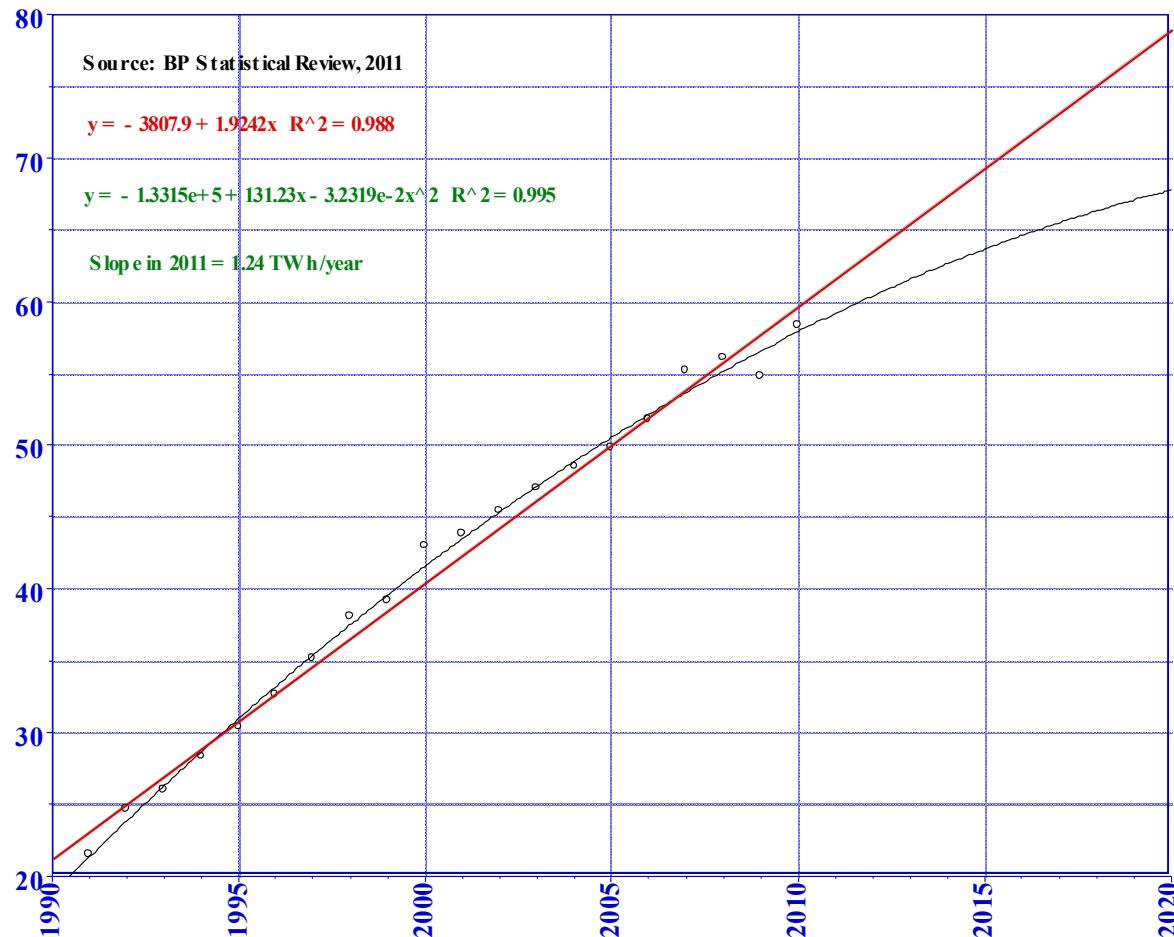
Eilat-Elot Conference: November 27-28, 2012

Is there justification for a electricity solar system without a significant storage?

Detailed calculations on the Israeli electricity grid by [**Solomon et al, 2010**] have shown that PV could provide up to approximately **20 %** of the country's annual needs, *without storage*, at the cost of dumping **5%** of the PV-generated energy. It would be necessary to operate the grid at a flexibility of **0.80** instead of the present 0.65

∴ Answer = YES

How much PV would be significant?



Answer: 1.24 - 1.92 TWh per year (730 - 1,130 MWp)

Imagine a 1 GWp PV plant

- **Where?** - 40 Negev *yishuvim*, 25 MWp each
- **How much?** - 2 Billion US\$ (?)
- **Funding?** - a 3.3 US¢/kWh loan from public
- **Payback?** - in six years, with interest

Is it technologically feasible?

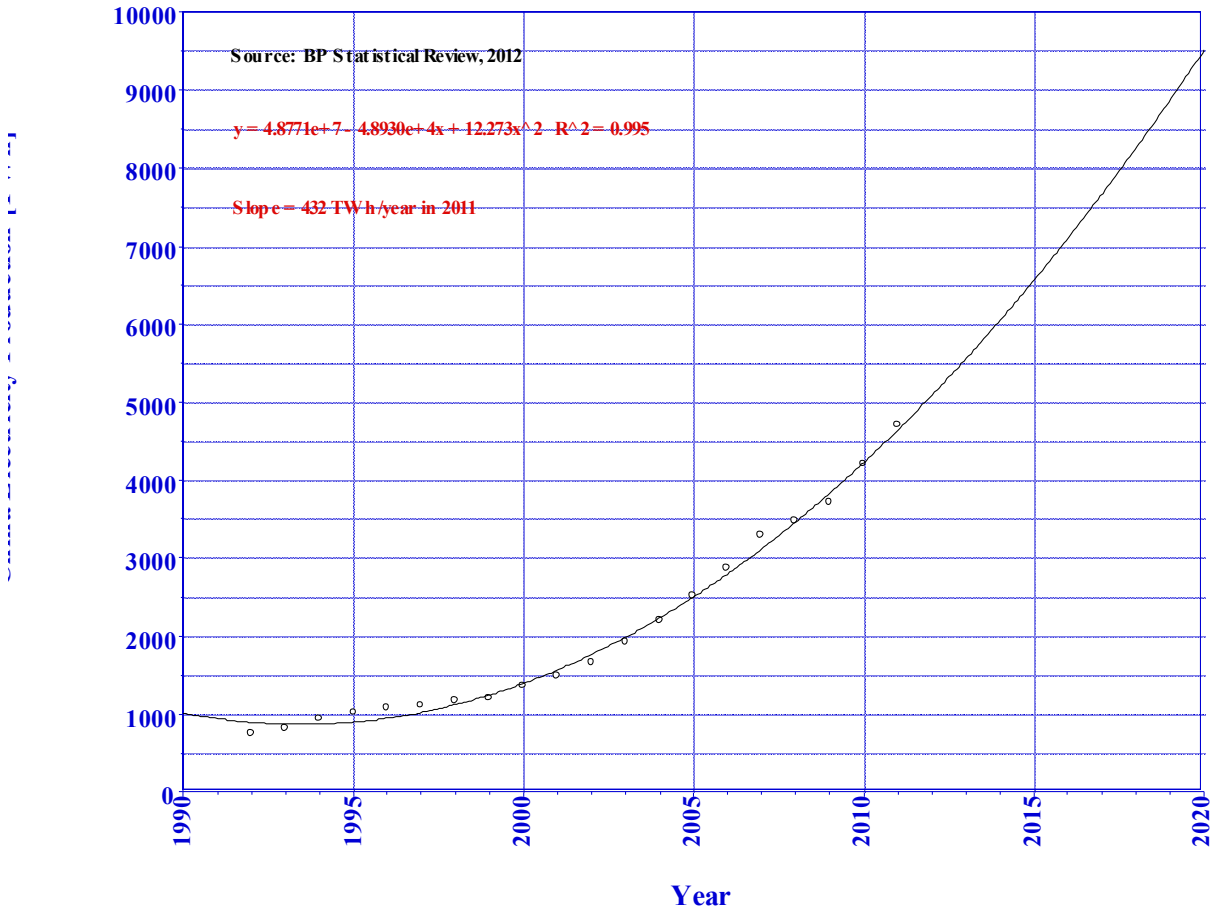


The Chinese have already done it at Dunhuang

Advantages to Israel?

- **Important lessons for the IEC**
- **Important public education**
- **In line with local business interests**
- **1st step towards a truly green future**
- **Repeatable as needed**
- **Opens path for Israeli RD&D tests**
- **Significant lesson for western world**

Is there economic justification for CPV for producing electricity only or hybrid (electricity/heating/cooling) applications is the only feasible solution for CPV?



China could use 287 GWp per year of PV internally!

What are China's plans?



Wind (960 km²)

2012-2013: 1 GW

2014-2015: 2 GW

2016-2020: 4 GW

PV (254 km²)

2012-2013: 1 GWp

2014-2015: 2 GWp

2016-2020: 5 GWp

CSP (50 km²)

2012-2015: 150 MW

2016-2020: 635 MW

Impressive - but nowhere near large enough!

What is holding them up?

Only 20 GWp module fabrication in 2011

This must be increased by factor of 15

CPV could play a significant role

(e.g. Convert 15% of PV fabs to CPV)

Conclude: China will need to invest heavily in CPV

Effect on PV module prices?

- **Massive internal usage could limit module availability, resulting in higher module prices**
- **Internal investment in CPV could release conventional PV modules for international trade**

Conclude: Chinese policy holds all the keys

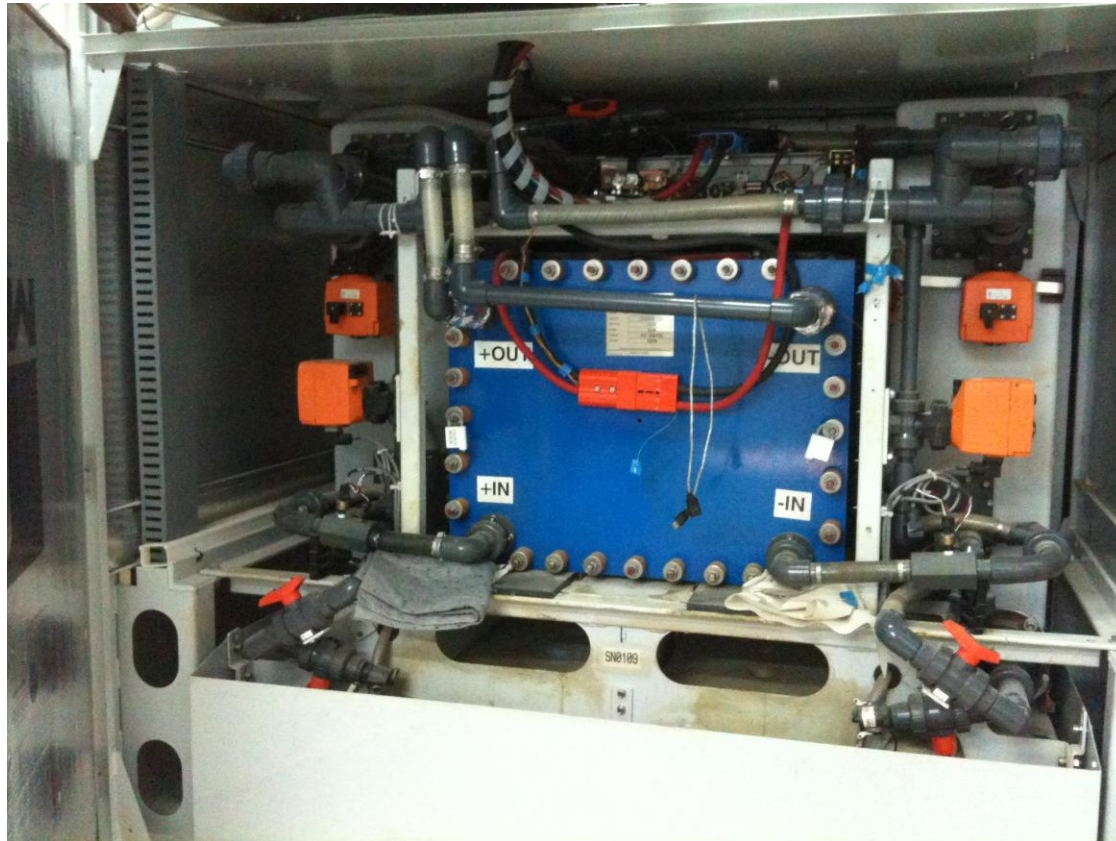
How is your company/technology dealing with the price reduction of solar (PV) panels?

All *RES* manufacturers who do not have a major alternative source of income are in trouble,

- due to the effect that cheap PV panels are having on the psychology of the investment market

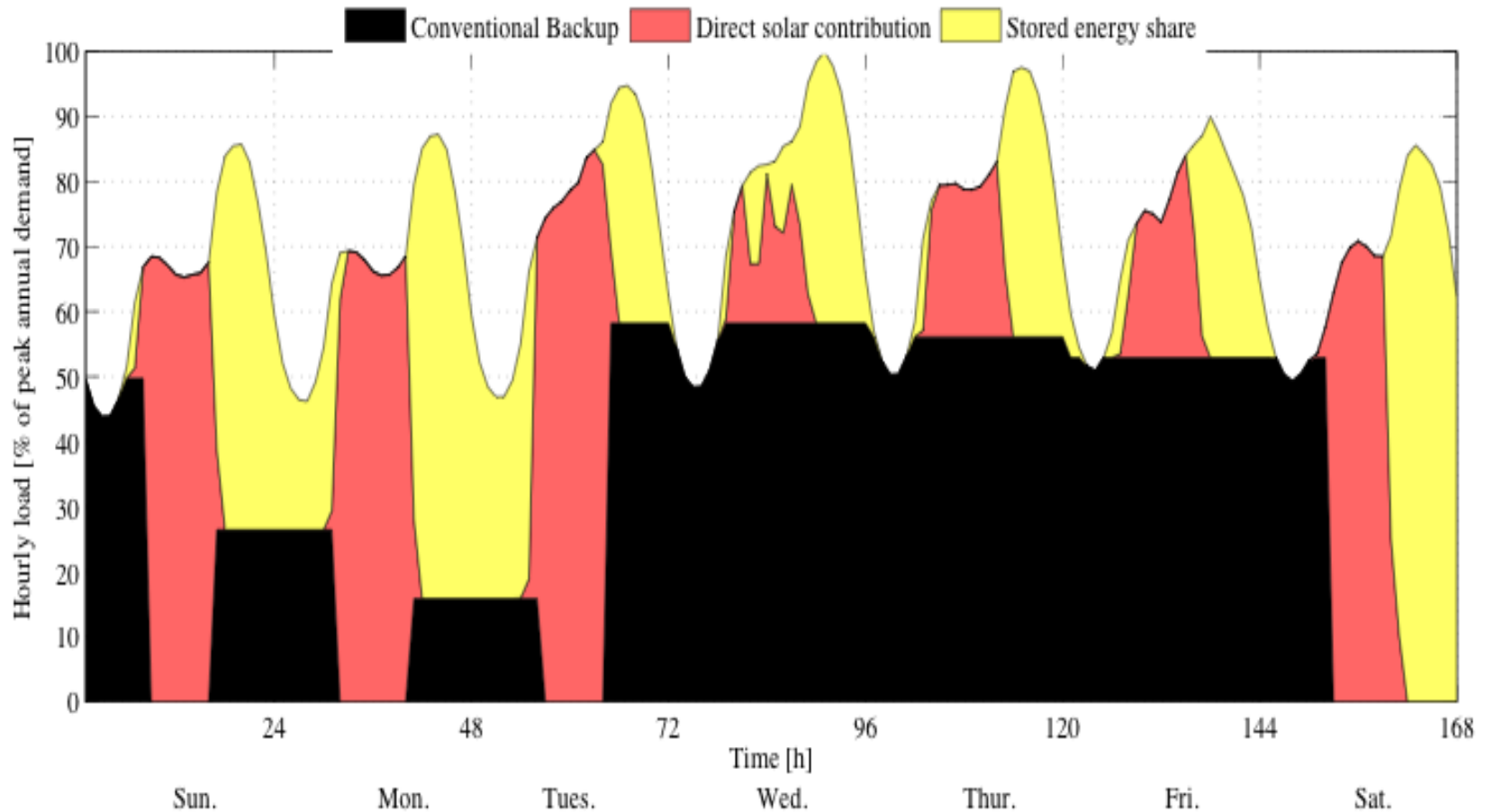
Question: Should Western governments intervene?

Are you involved in developing a feasible cost competitive thermal storage? If yes – pls provide details (as much as you may expose)



VRF has independent energy and power capacities

Why bother?



Israel could eventually be 90% solar

Thank You