Scale and Timing of a Large Solar Thermal programme in South Africa

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CSP in the South African Electricity System

Two studies have been done which have used models of the electricity system to project a plausible large-scale roll-out of CSP, subject to current uncertainties and unknowns:

1. Cost – wide range of cost estimates internationally, all for small plants, high degree of uncertainty due to small number of plants, and no plants bigger than 20MW.
2. Availability / Dispatchability – significant variations, and added cost uncertainties – makes a very significant difference to role of plants in electricity system, levellised cost and incremental system costs.
3. Technology learning – uncertainties about the rate of learning (dependent on global roll-out)
4. Constraints on rate at which plants can be built

A. The LTMS – various renewable electricity options, plus significant role in combined scenarios. (to 2050)

B. Study on costing a 15% renewable electricity target by 2020. (to 2020)

Solar Thermal in the LTMS

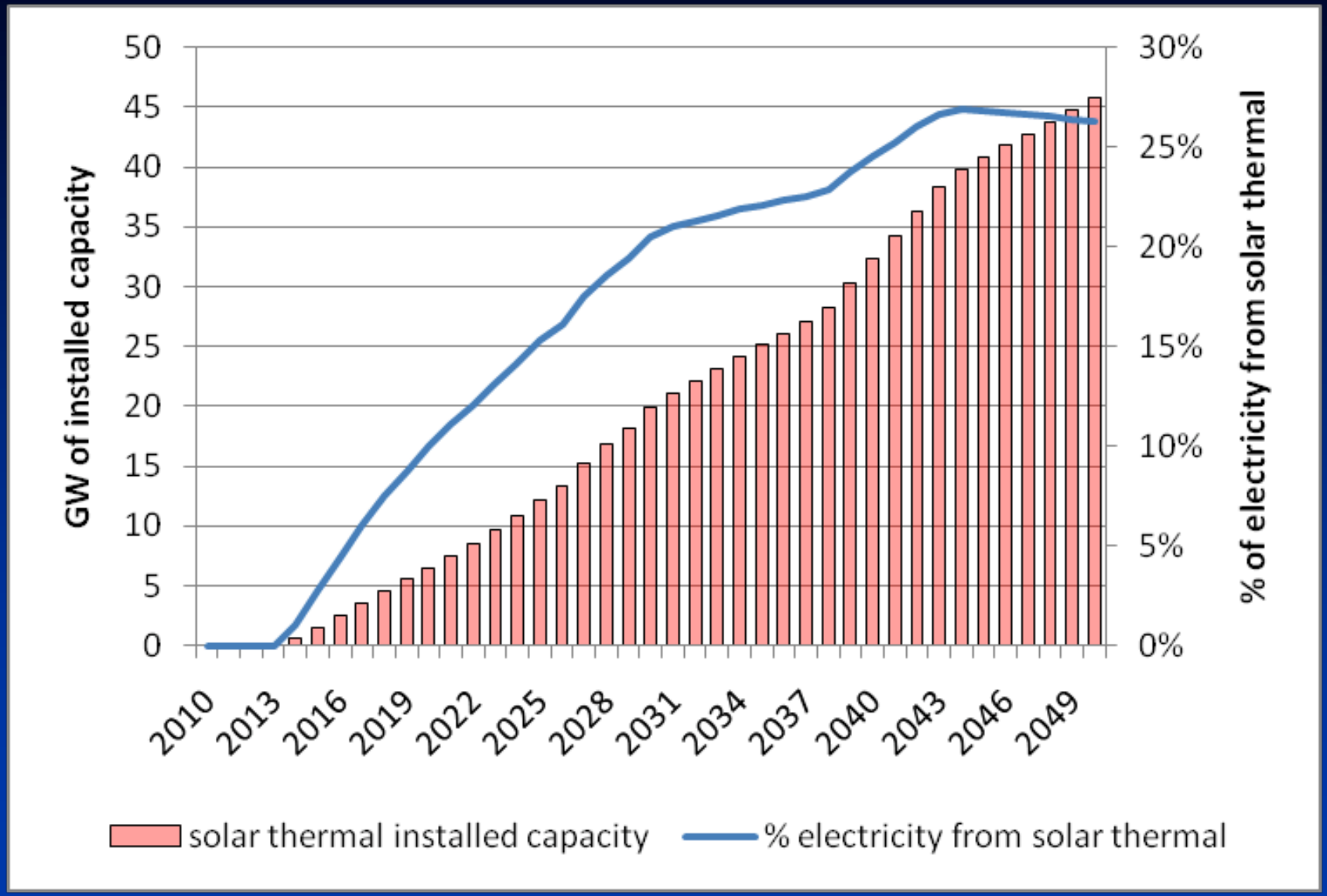
Solar Thermal was modelled as part of a non-technology specific renewable energy target. Two variants – one with 27% of electricity from renewable sourced by 2050, and the other with 50% by 2050.

Targets were met via a combination of wind and solar thermal plants – solar thermal predominated.

The scale of the programme would be massive – for instance, for the 50% case, by 2050 we would need around 85GW of installed solar thermal capacity (assuming an availability of 60%), which would involve around 600 square km of mirrors, 6800 square km of land (about 82 x 82 km) – 3 x the area of Cape Town.

Plants would be built at a rate of 40 new 100MW plants each year by the 2040s.

LTMS 27% renewables target



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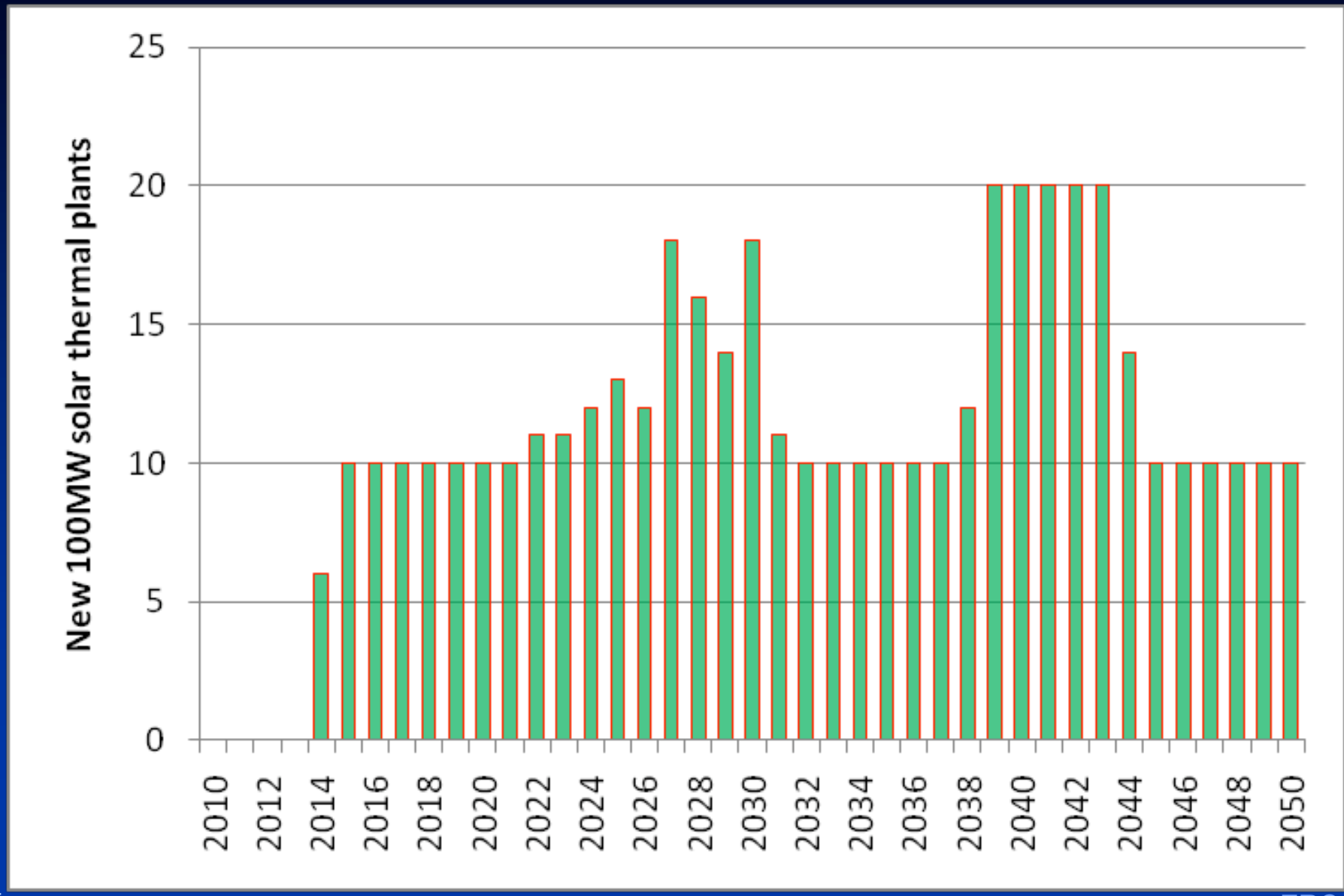
LTMS 27% renewables target – new build



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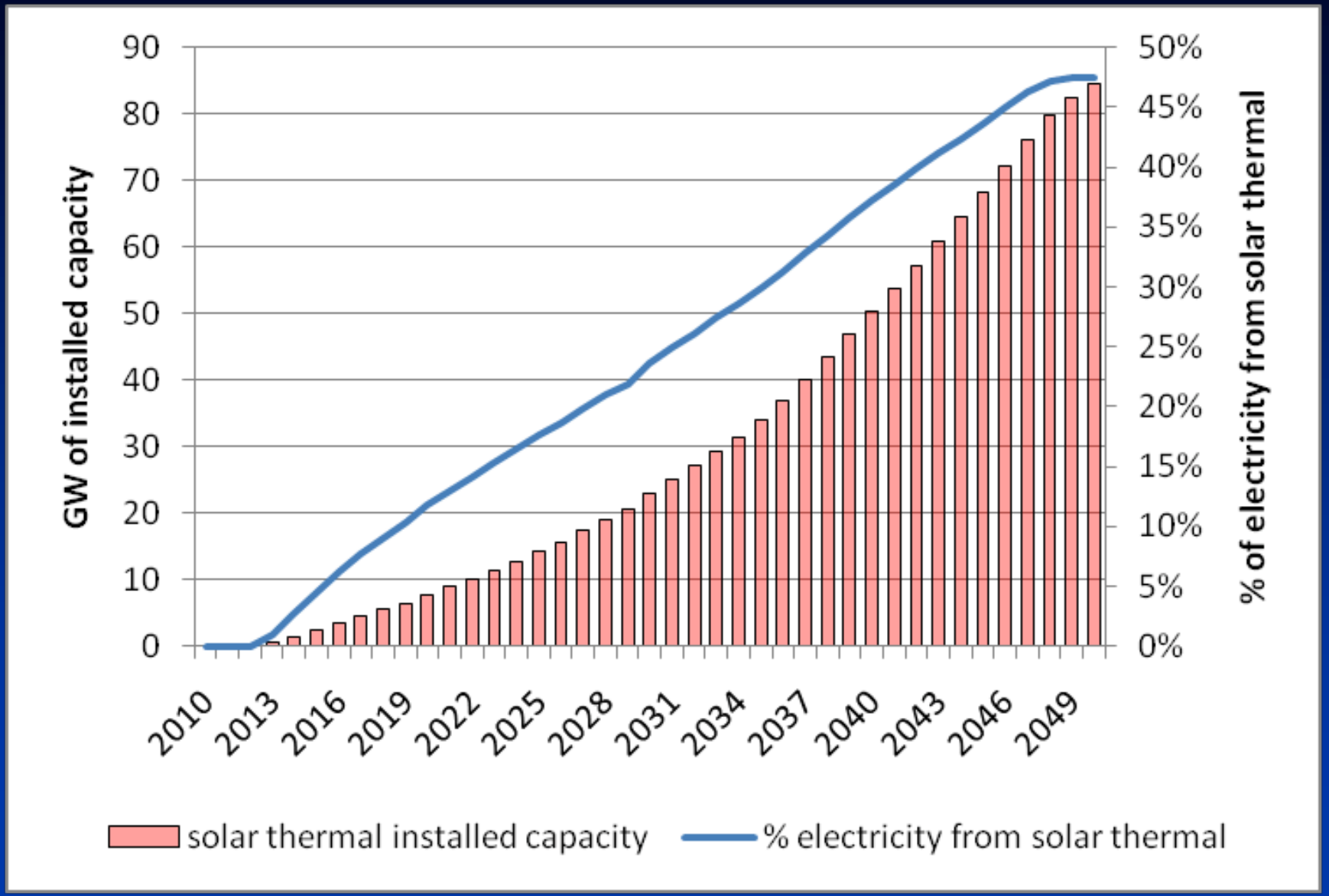
LTMS 50% renewables target



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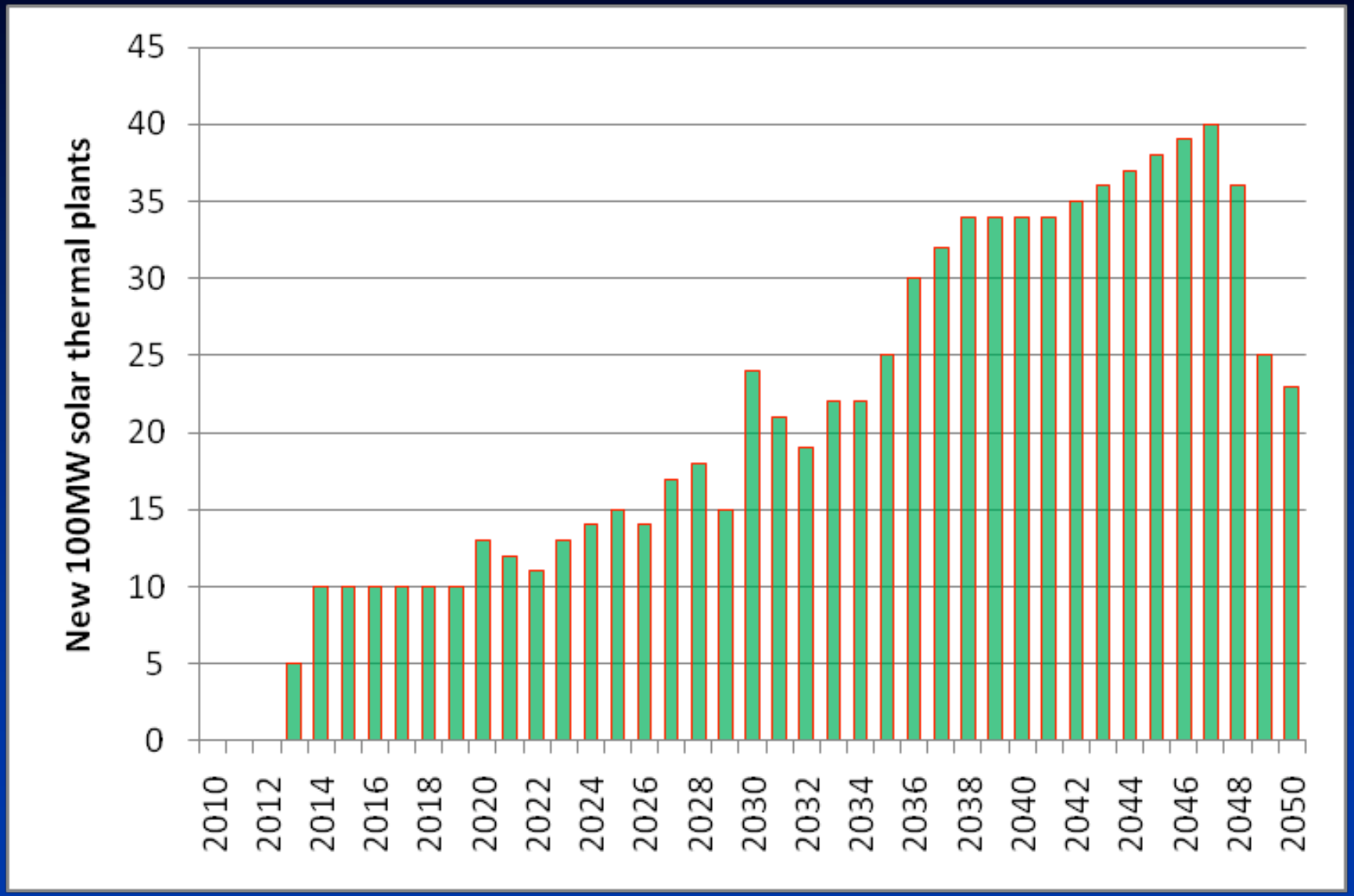
LTMS 50% renewables target – new build



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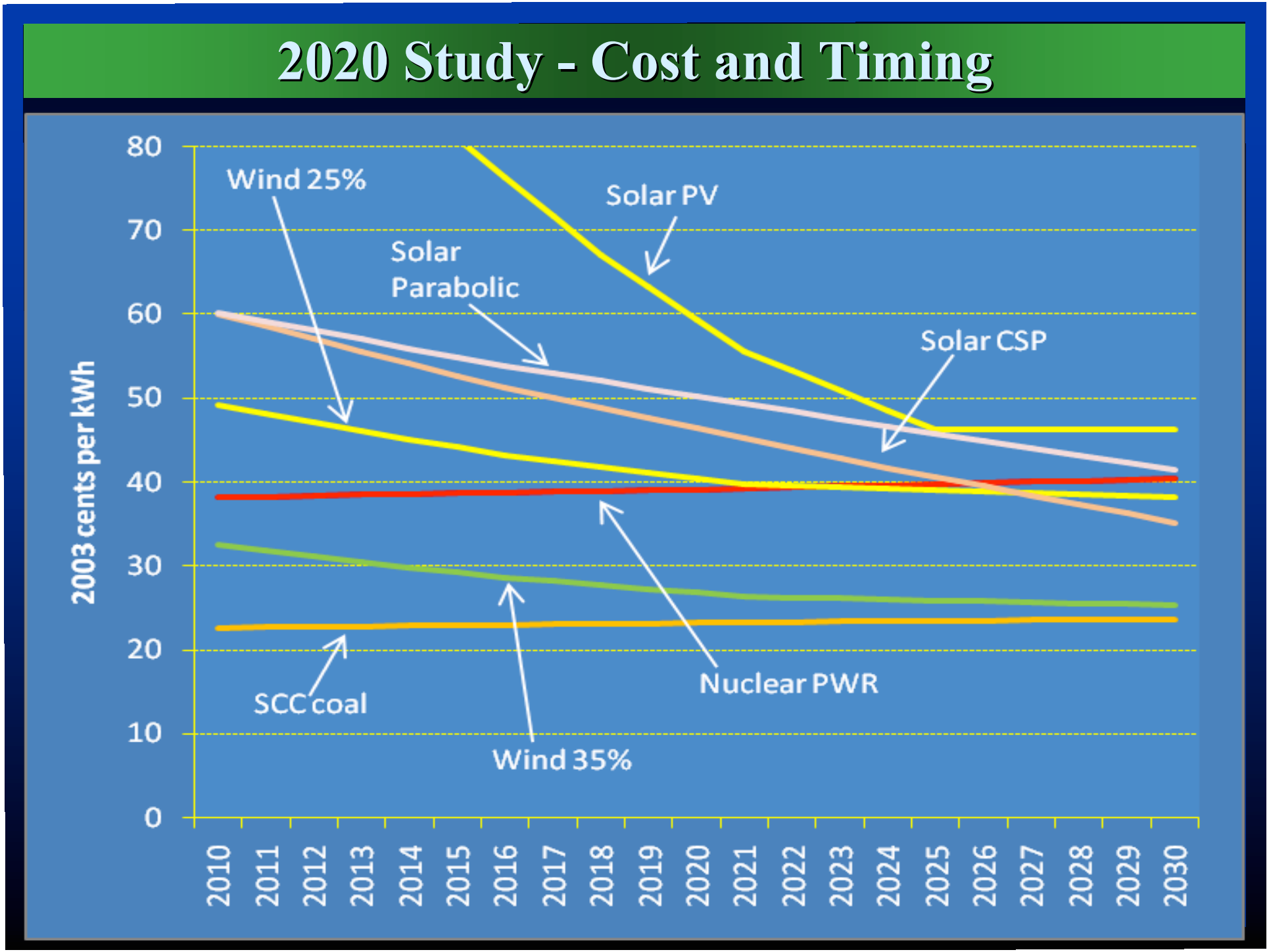
Meeting a more modest medium-term target

Several cases modelled for a renewables target of 15% electricity by 2020. Technology-neutral – solar thermal comprised about half of this in the case under consideration – i.e. meeting a target of around 6% of electricity from solar thermal by 2020.

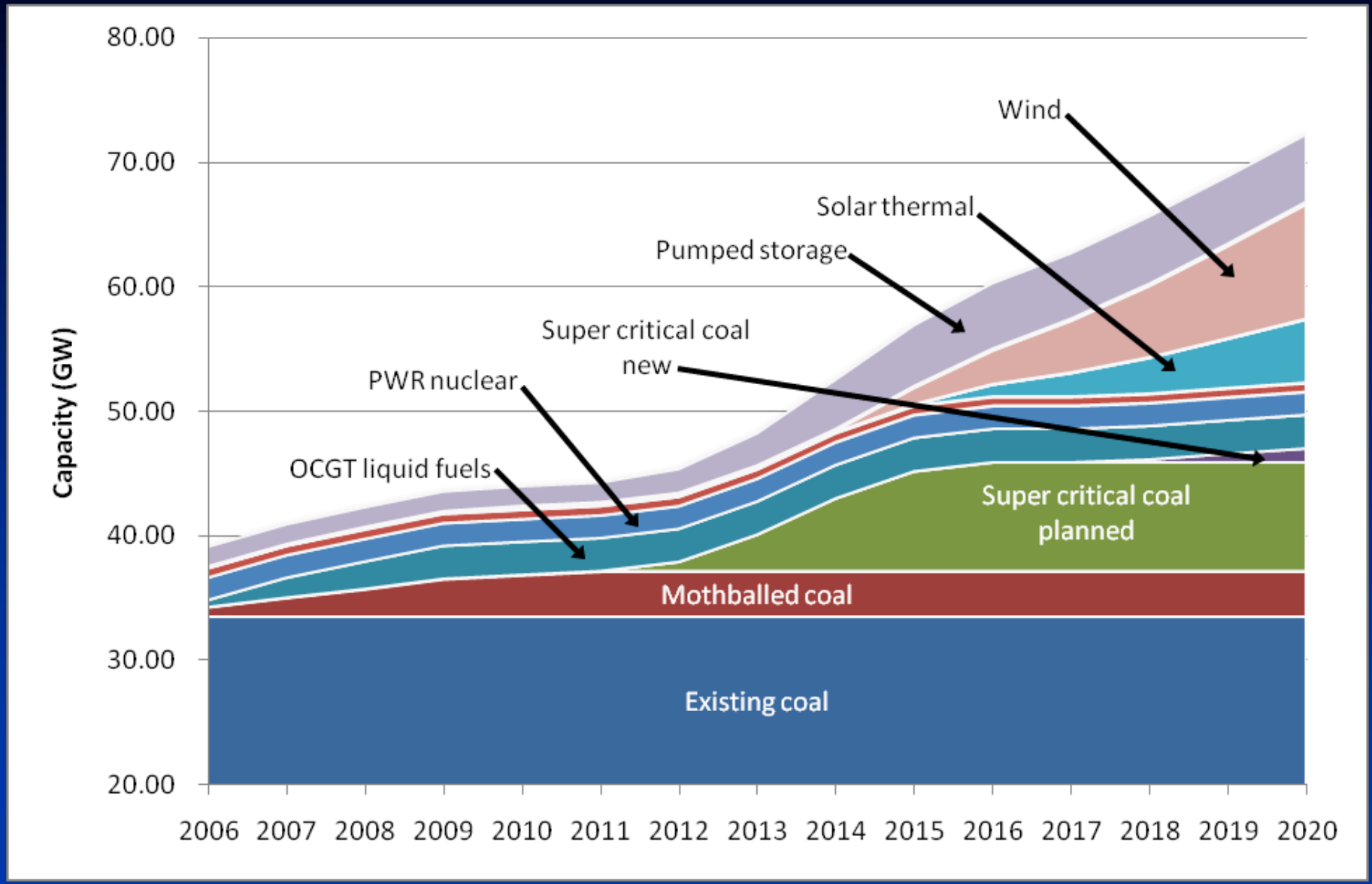
Use of a more accurate reliability check revealed that solar thermal is probably much cheaper in the long run than wind (dispatchable with storage, higher availability factor).

Assuming a 5-year lead time (including EIAs etc), we would have to initiate project for first plant in 2010, and initiate another 9-11 plants every year after that.

2020 Study - Cost and Timing



2020 Study – grid expansion plan



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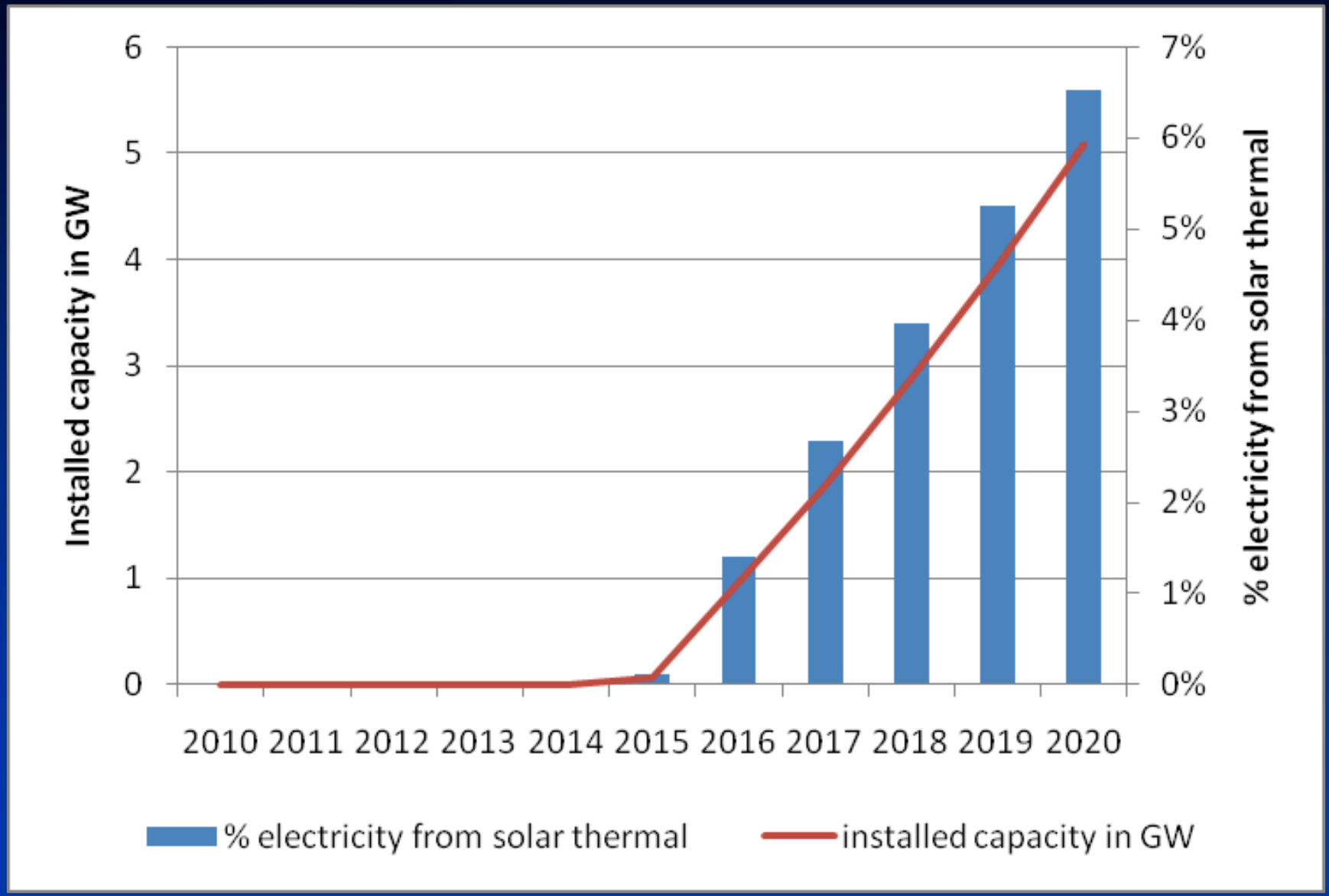
2020 Study – capacity and % electricity



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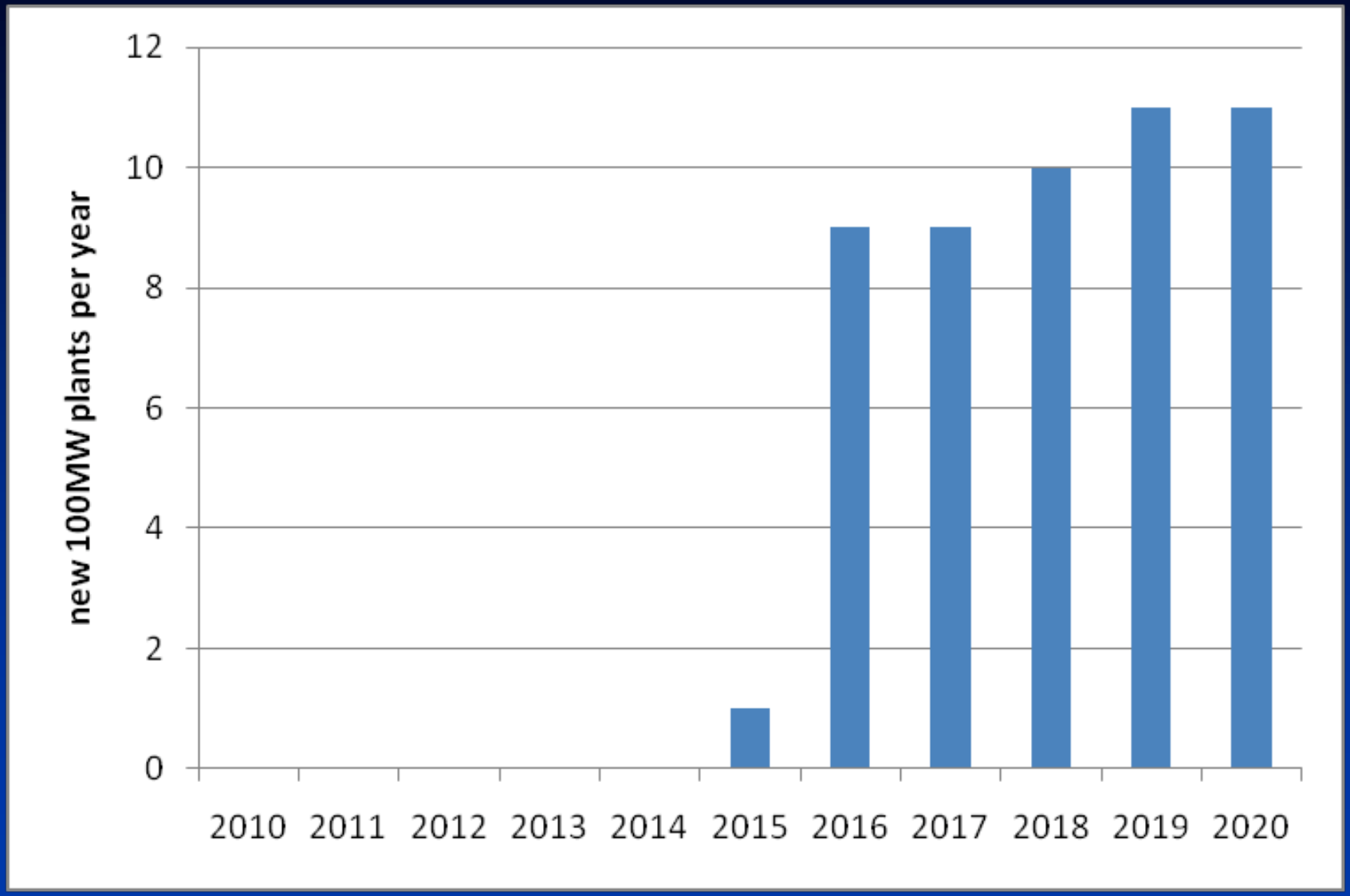
2020 Study – new plants



Thank You