

# Electricity storage vs. solar thermal electricity

*Cédric Philibert*  
*Renewable Energy Division*  
*International Energy Agency*

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# STE in recent/forthcoming IEA publications

## ■ *Energy Technology Perspectives 2016*

- STE in 2050: 224 GW to 632 GW (4DS/2DS) – 900-2545 TWh

## ■ *Medium-Term Renewable Energy Market Report (24/10)*

- Prospects for STE virtually unchanged ~10 GW by 2020

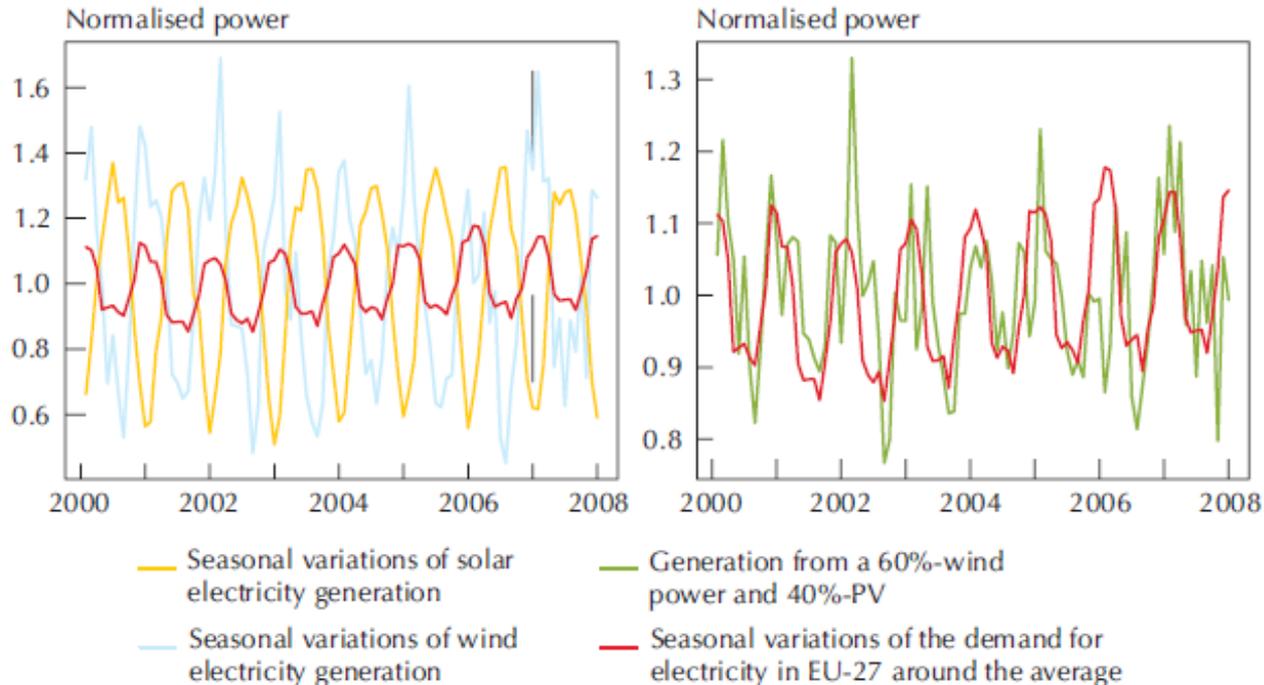
## ■ *World Energy Outlook 2016 (16/11):*

- Last year (*WEO 2015*), STE in 2040: 262 to 937 TWh (NPS/450)
- This year: Large increase in PV projection, significant increase in wind, small decrease in STE

## ■ *Energy Technology Perspectives 2017*

- « Well below 2° Scenario »: STE up to 2060?

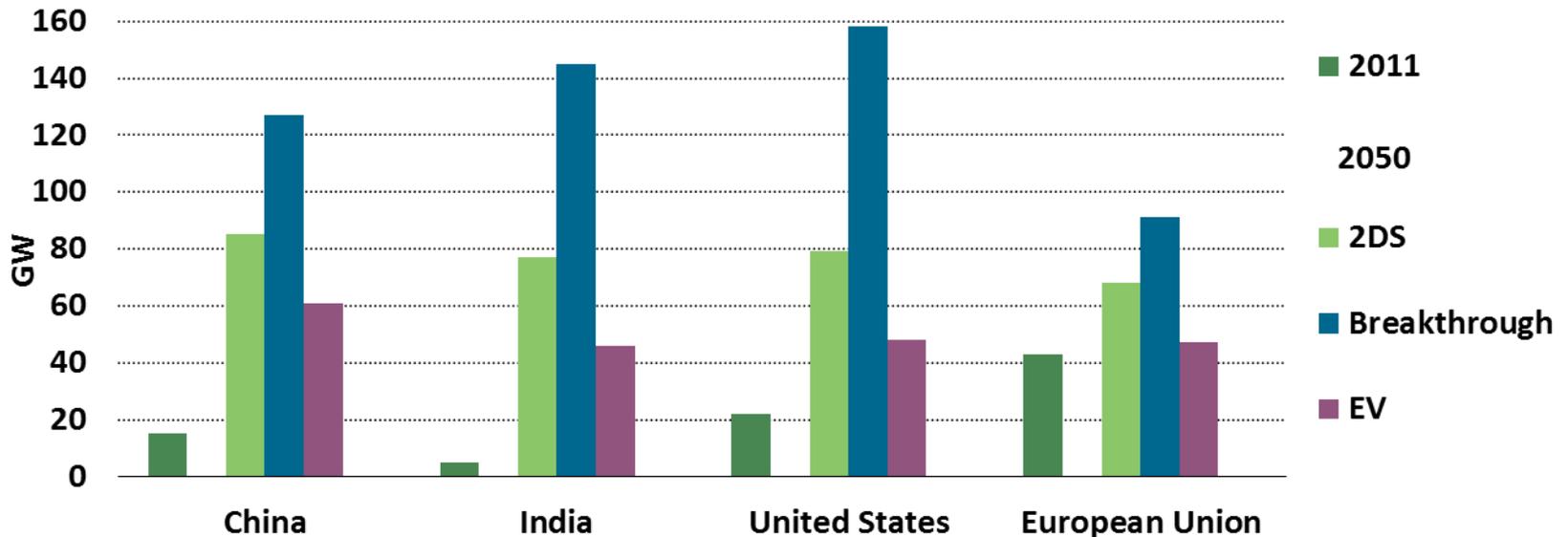
# Storage needs for large shares of variable RE



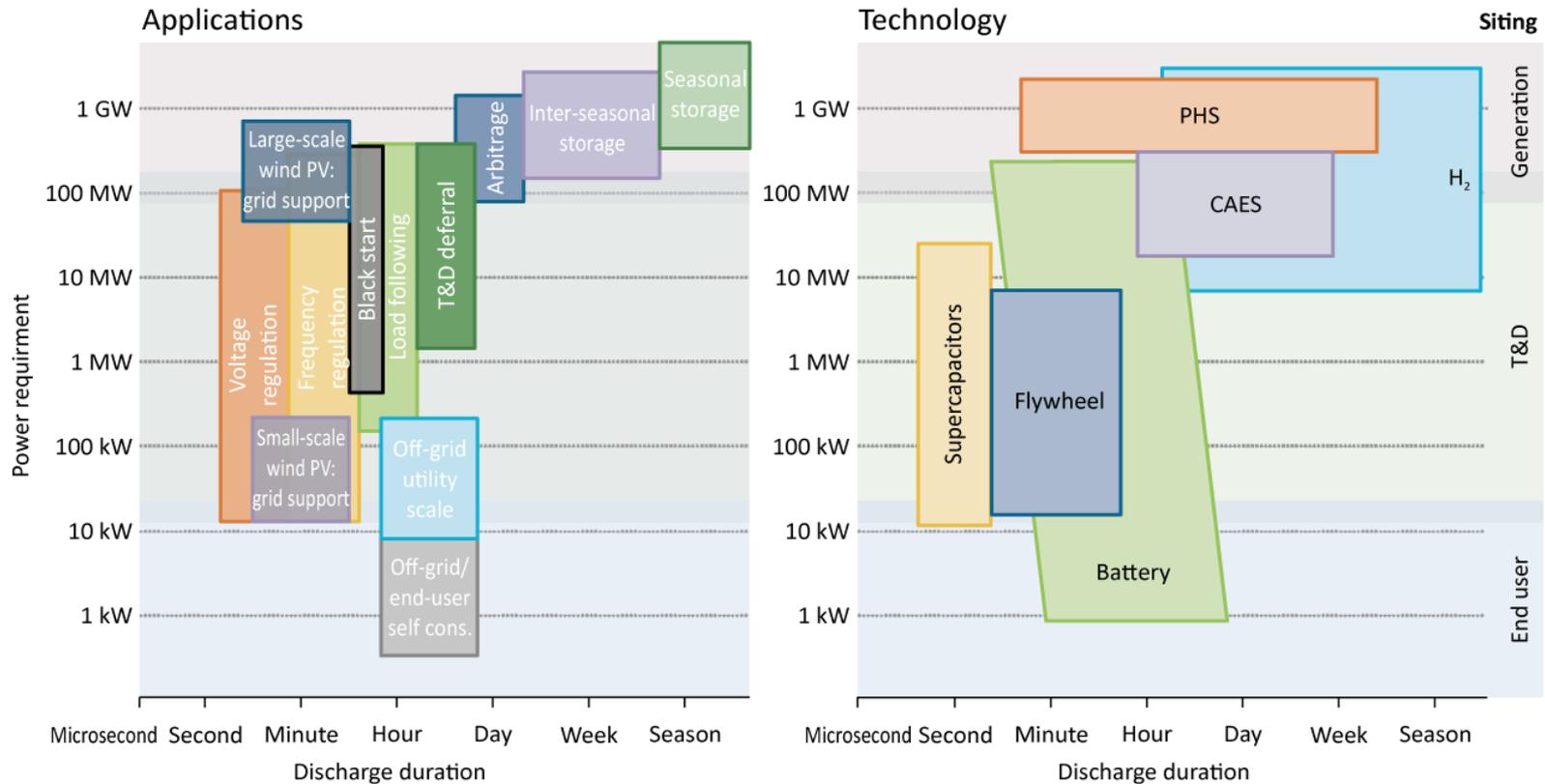
- Hourly/daily storage for solar PV and wind
- Interseasonal storage usually not cost-effective
- Interseasonal mismatches could be addressed through the right RE portfolio + peaking plants

# Potential for storage in selected regions

- Attractiveness of storage is highly context-specific, but increases greatly across all scenarios (ETP)
- Depending on the system, flexibility from demand response could provide greater returns

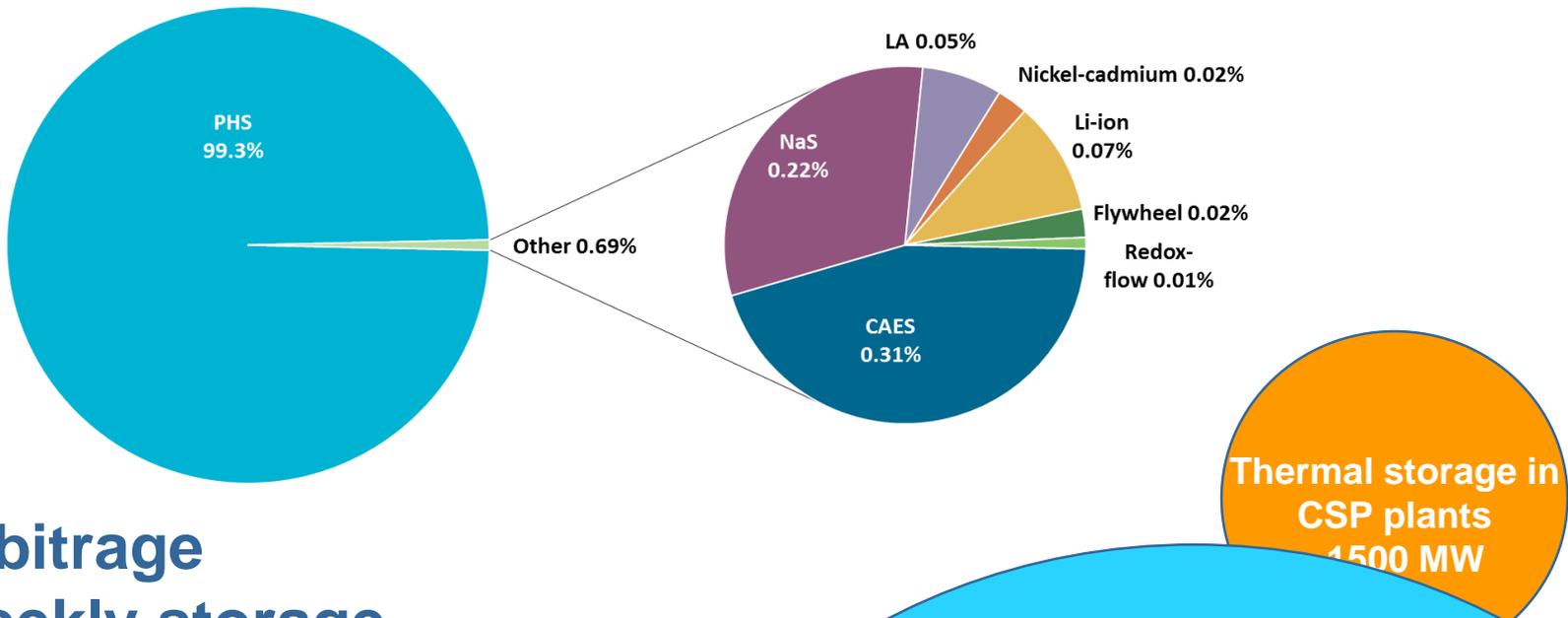


# Role of storage is defined by applications in power grids



# Pumped-storage hydropower dominates

141 GW

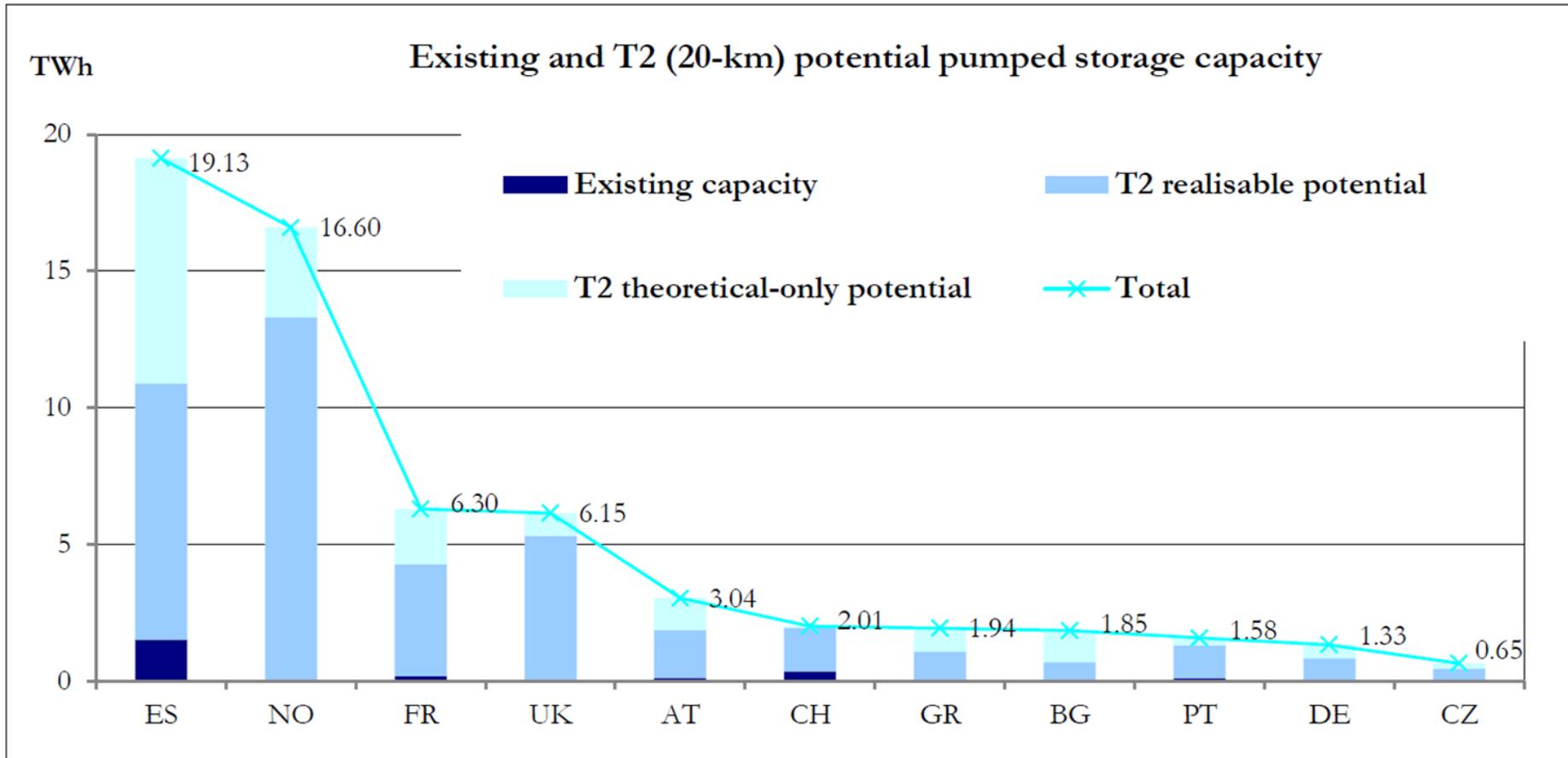


Thermal storage in CSP plants  
1500 MW

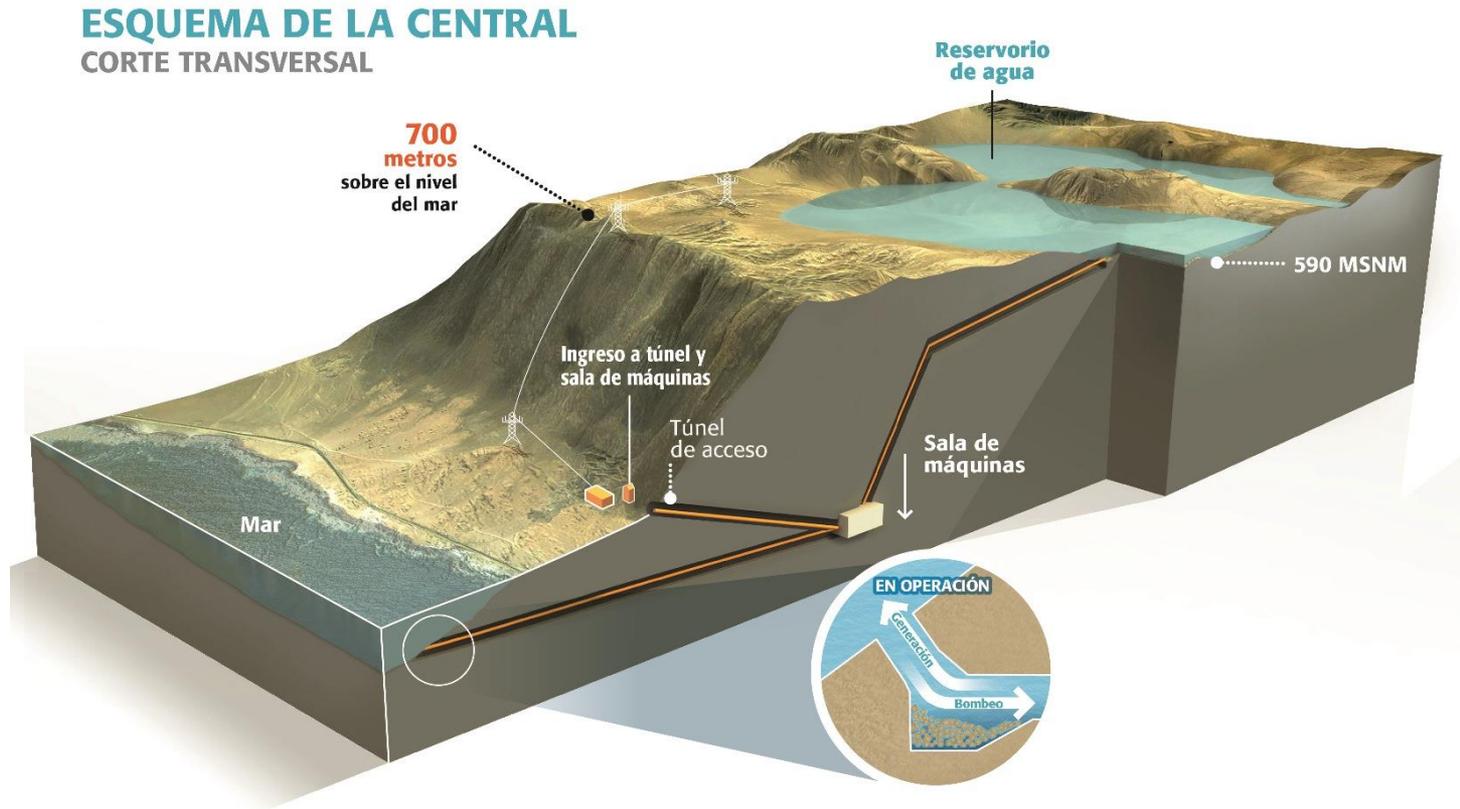
Reservoir hydropower  
~ 500 GW?

- Arbitrage
- Weekly storage
- Black start
- « Flexing » power system w. variable RE after nuclear power...

# Still large potential for new-built PSH plants

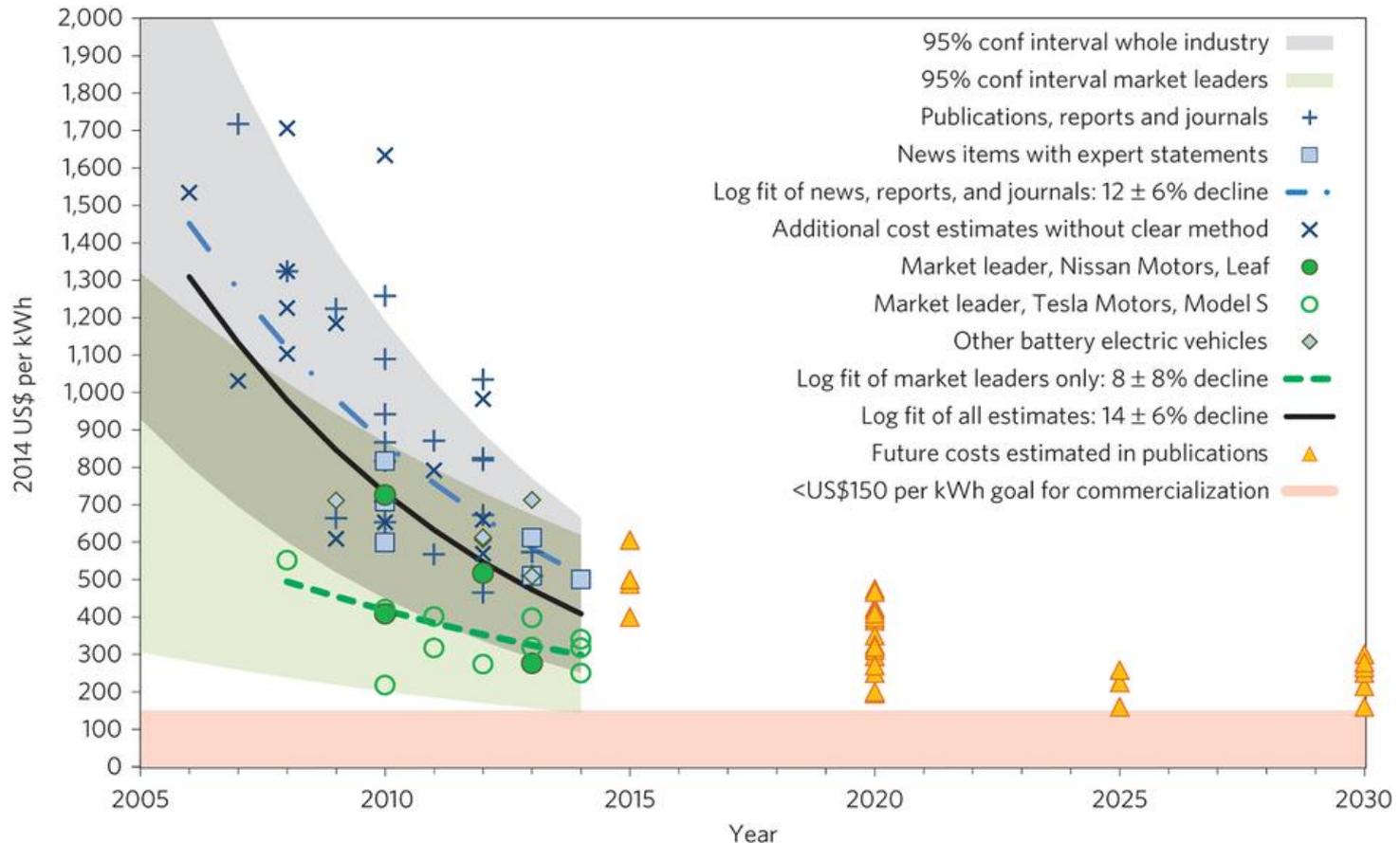


# Seawater PSH can be competitive

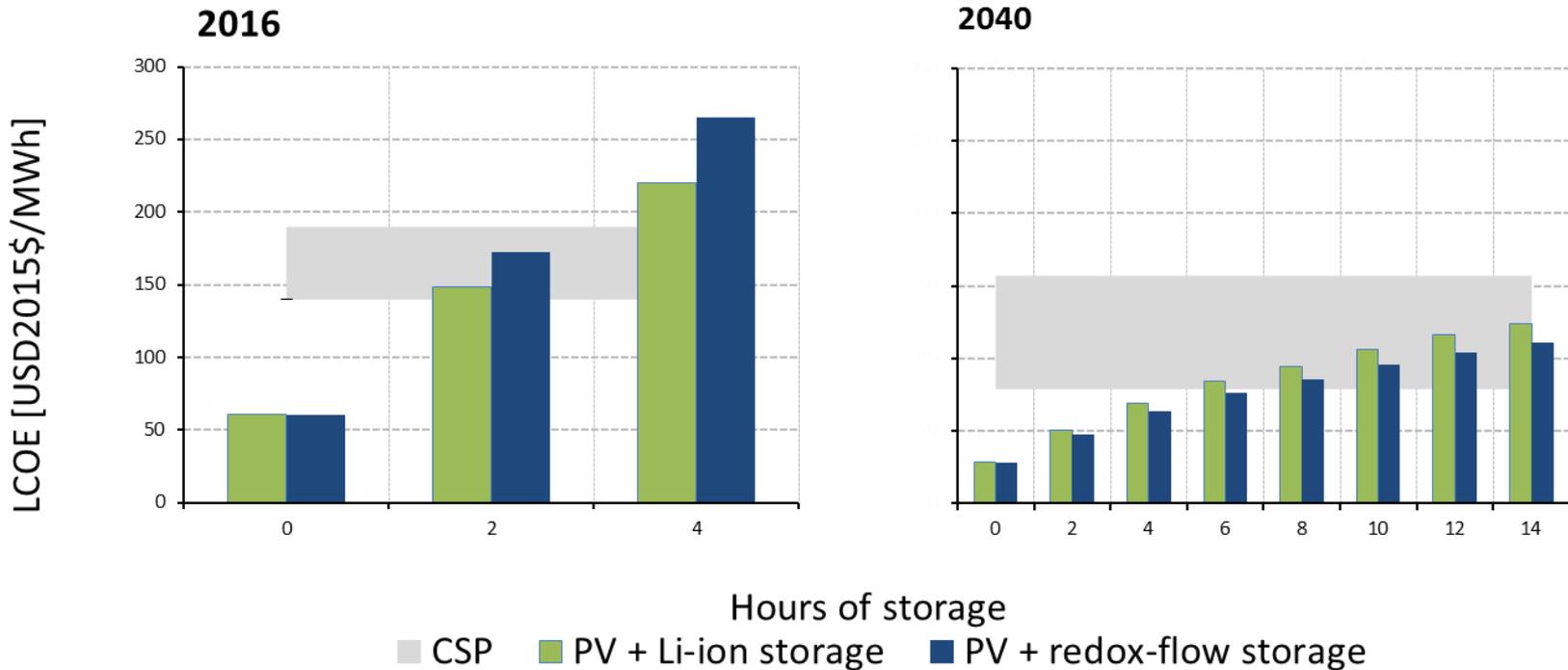


- Valhalla project: 600 MW PV + 300 MW seawater PSH

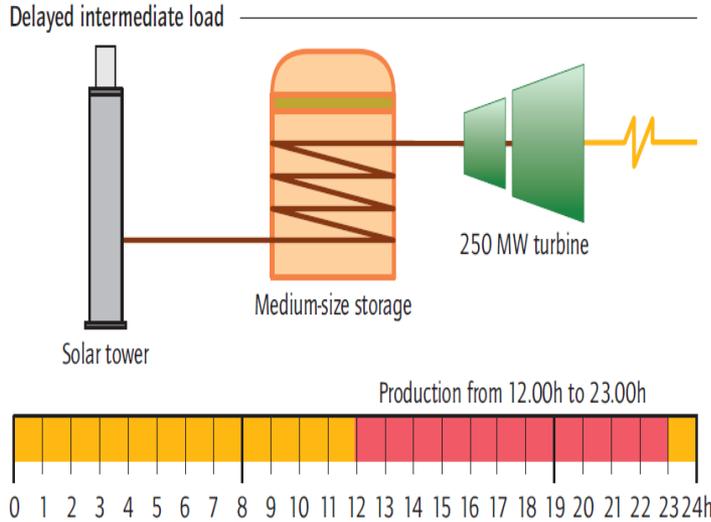
# Cost trends – a breakthrough in sight?



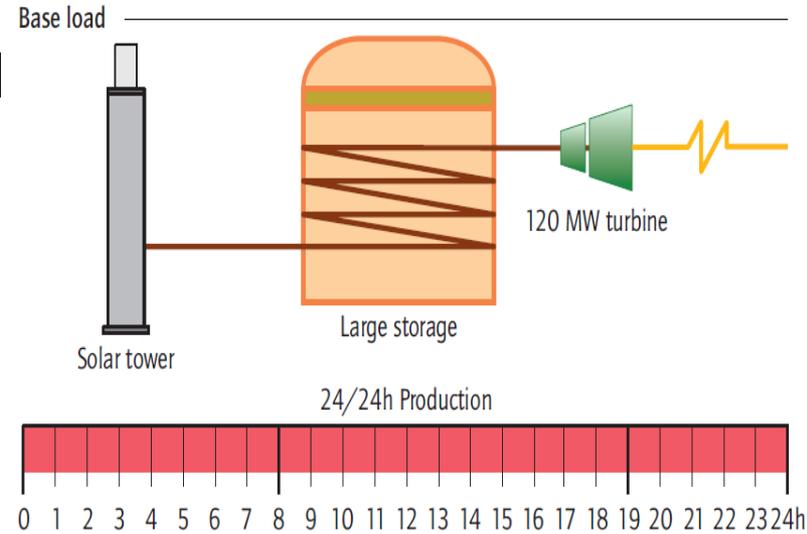
# PV + battery: an emerging threat for CSP



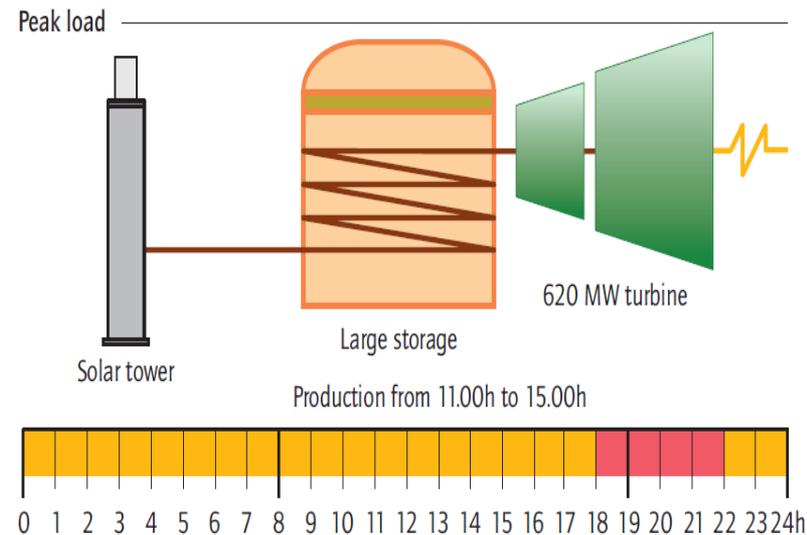
# Possik



# ii

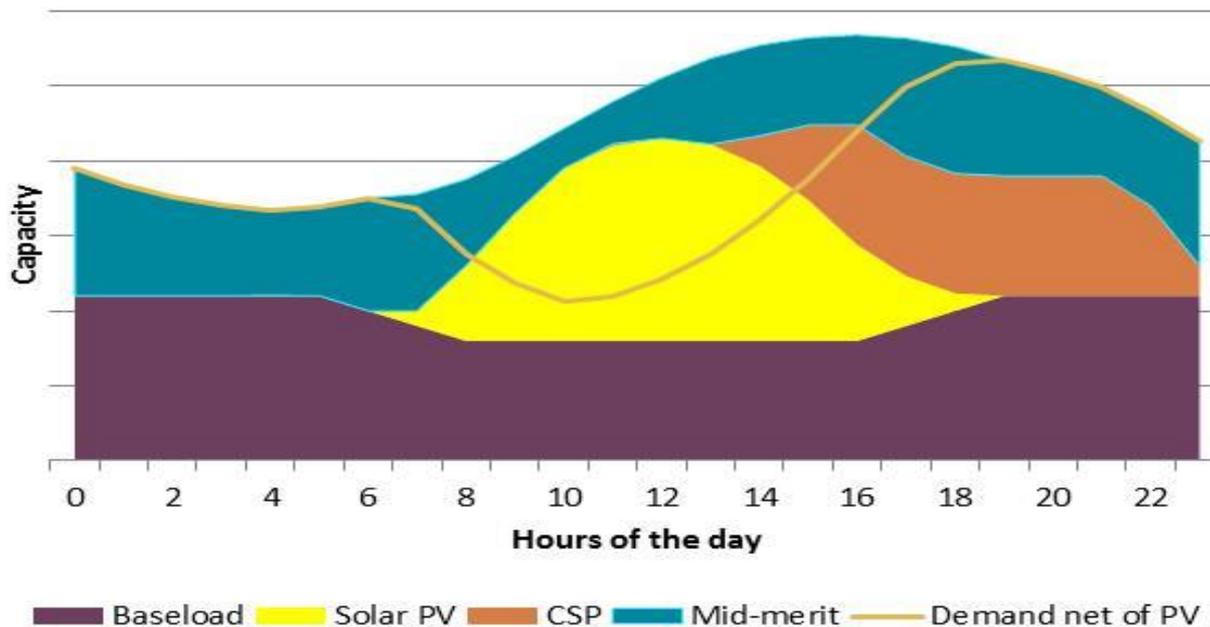


- Thermal storage can be used to shift production, to extend it to base load or to concentrate it to super peak load



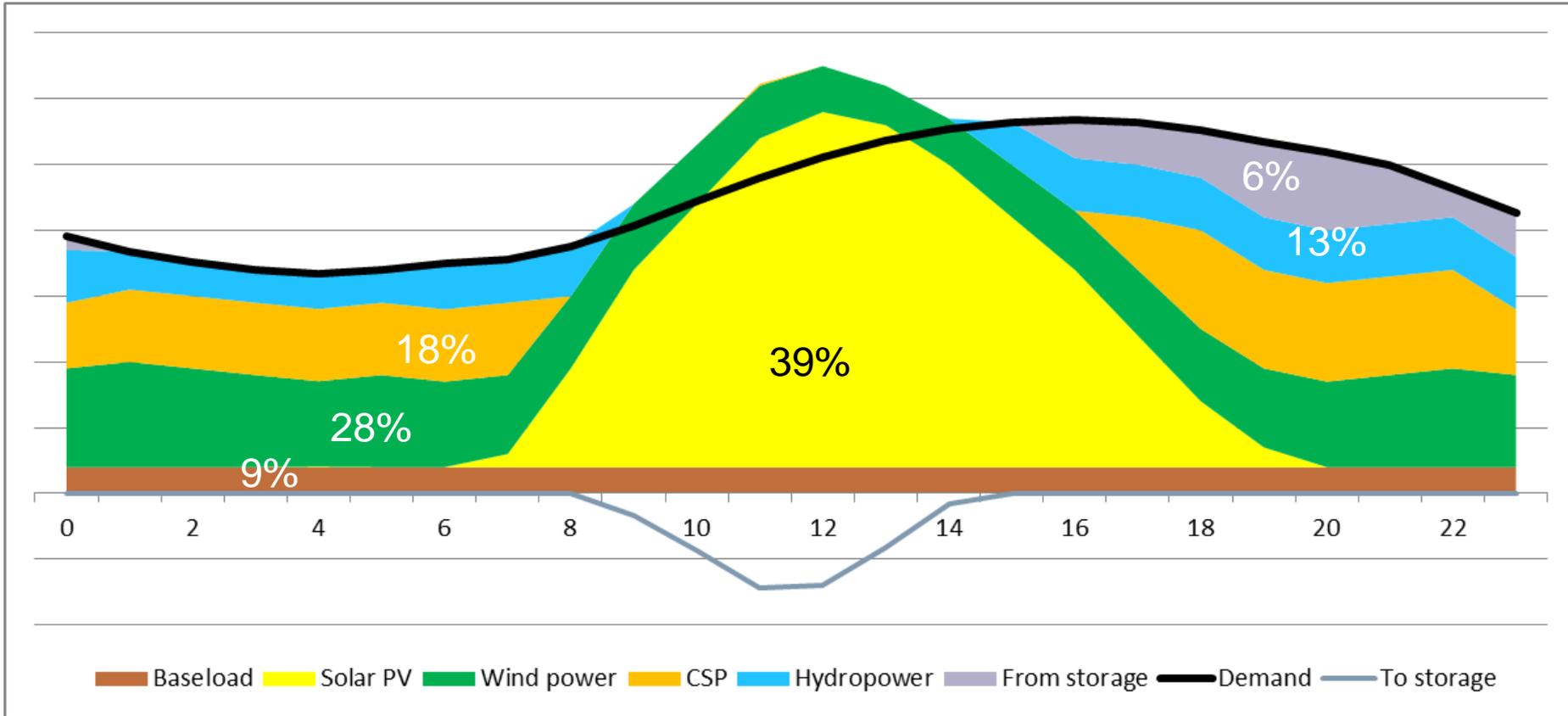
# Complementary roles of PV and STE

## *IEA Technology Roadmap (2014)*



*Thanks to thermal storage, STE is generated on demand when the sun sets while demand often peaks and value of electricity increases*

# Near-full power decarbonisation (of a much larger power system)



# Roles of storage in the energy system

**STE**

- Improving energy system resource use efficiency
- Helping to integrate higher levels of variable renewable resources
- Improving electricity grid stability, flexibility, reliability and resilience
- Allowing electrification of transport
- Increasing energy access off grid
- Maximising self-consumption w. distributed generation
- Supporting greater production of energy where it is consumed, alleviating congestion issues

**Yes**

**Yes**

**Yes**

**No**

**No**

**No**

**No**