

Renewables in the MENA region

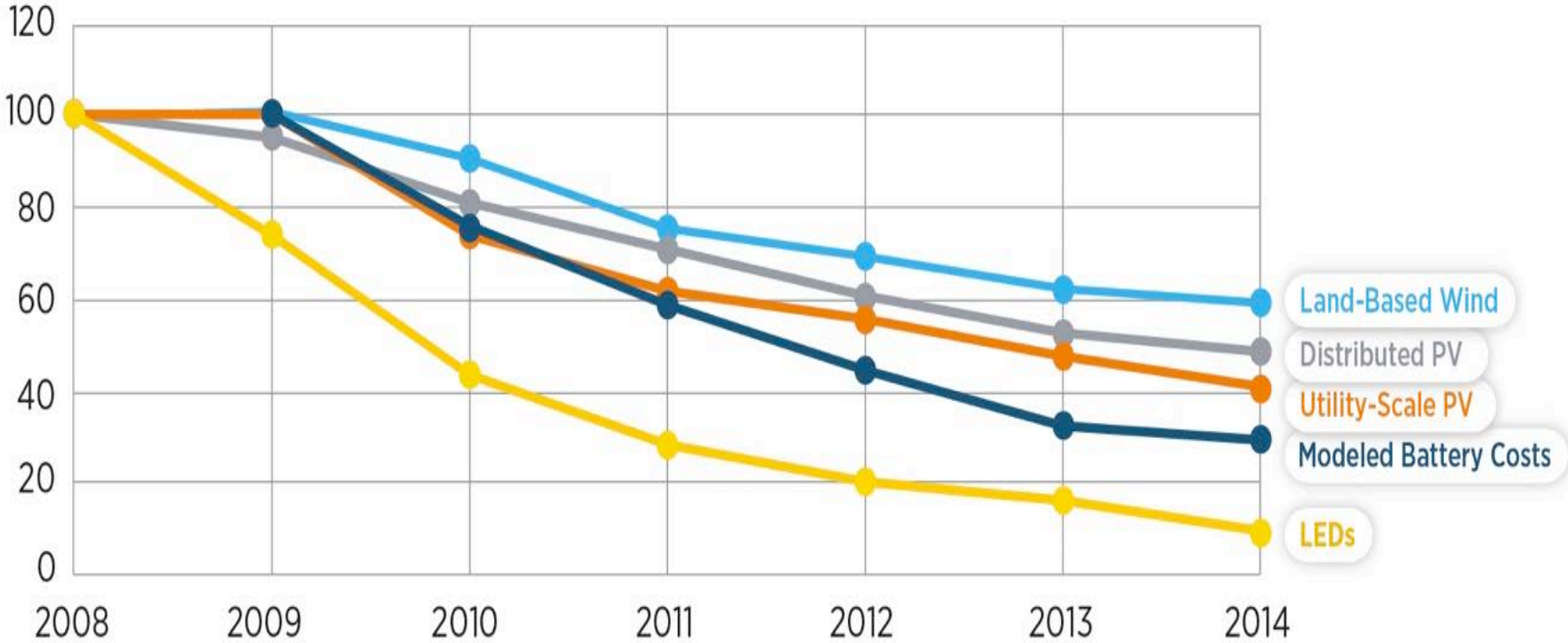
*Cédric Philibert
Renewable Energy Division
International Energy Agency*

*Moroccan Pavillion at COP21
Le Bourget, 5 December 2015*

www.iea.org

Innovation is driving costs down

Indexed Cost Reductions Since 2008

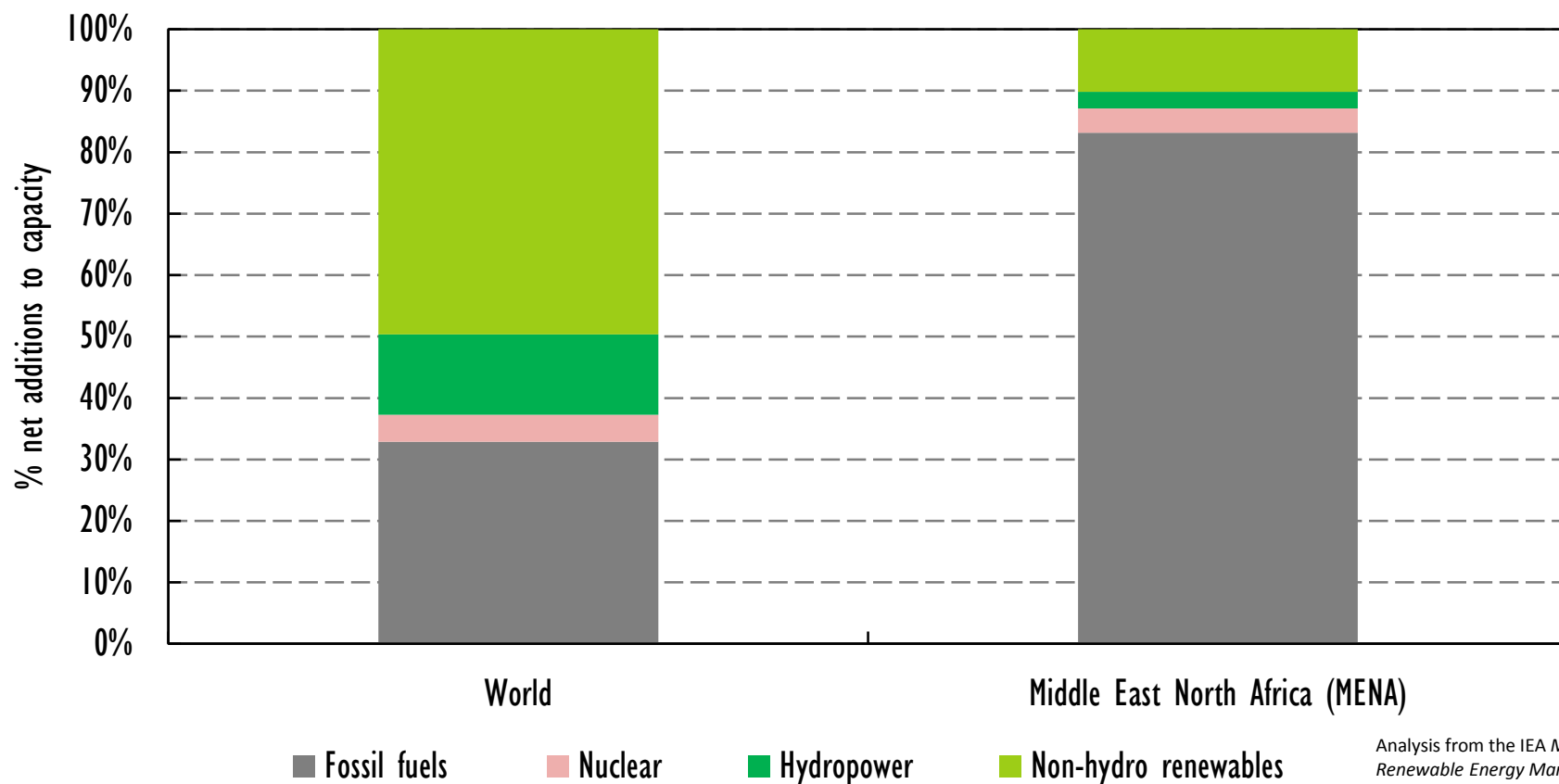


Source: Ernest Moniz, US Secretary of Energy, IEA Ministerial, 18 November 2015

The future arrives for Five Clean Energy Technologies. Changes since the time of COPenhagen are facilitating COP talks in Paris.

Renewables to dominate new global generation capacity...but not in MENA

Net additions to power capacity 2014-20, world vs MENA region

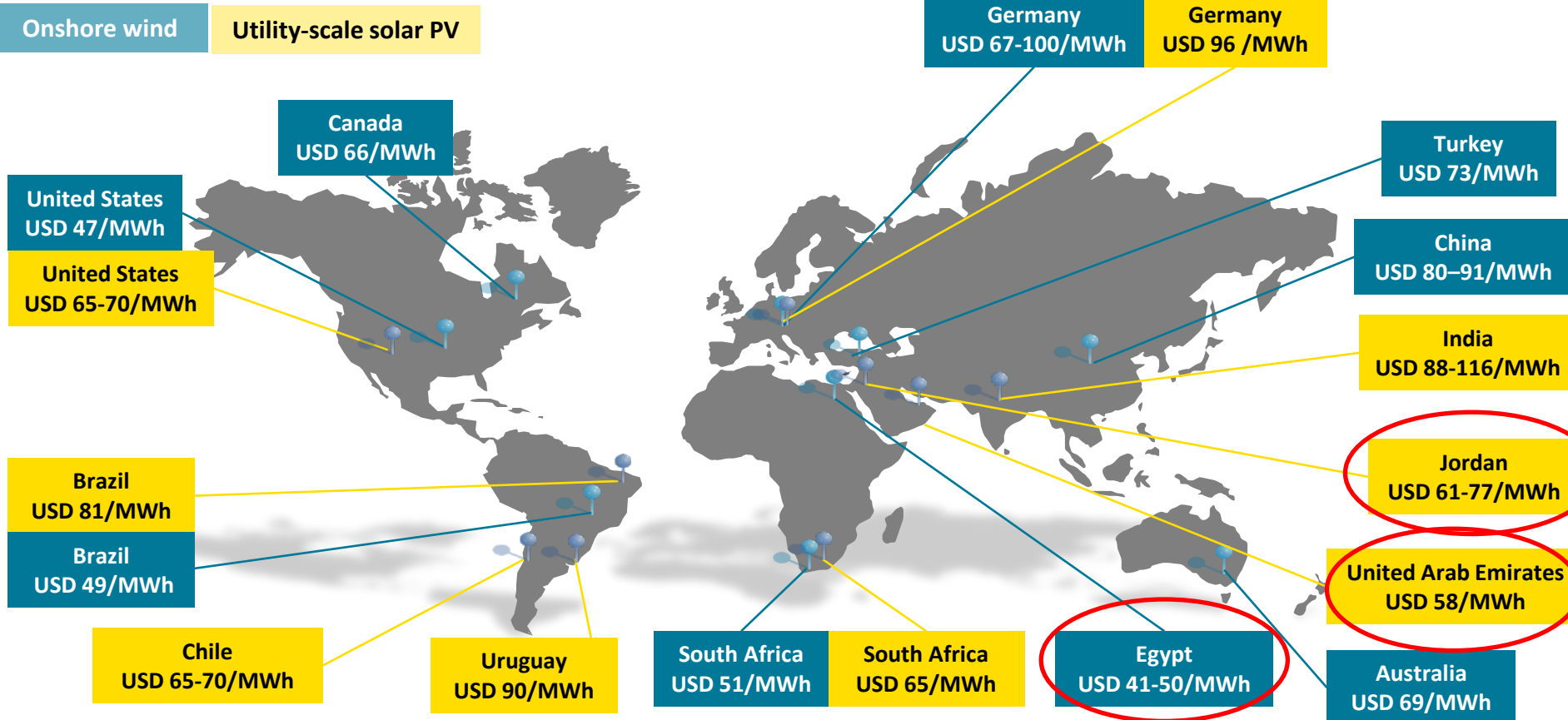


Analysis from the IEA *Medium-Term Renewable Energy Market Report 2015* and the *New Policies Scenario* of the *World Energy Outlook 2015*.

Renewables set to account for almost two thirds of global net capacity growth over the medium-term, but in MENA they comprise less than 15%

Lowest wind and PV prices now found in MENA countries

Long-term contract prices for new renewable power to be commissioned in 2016-2018

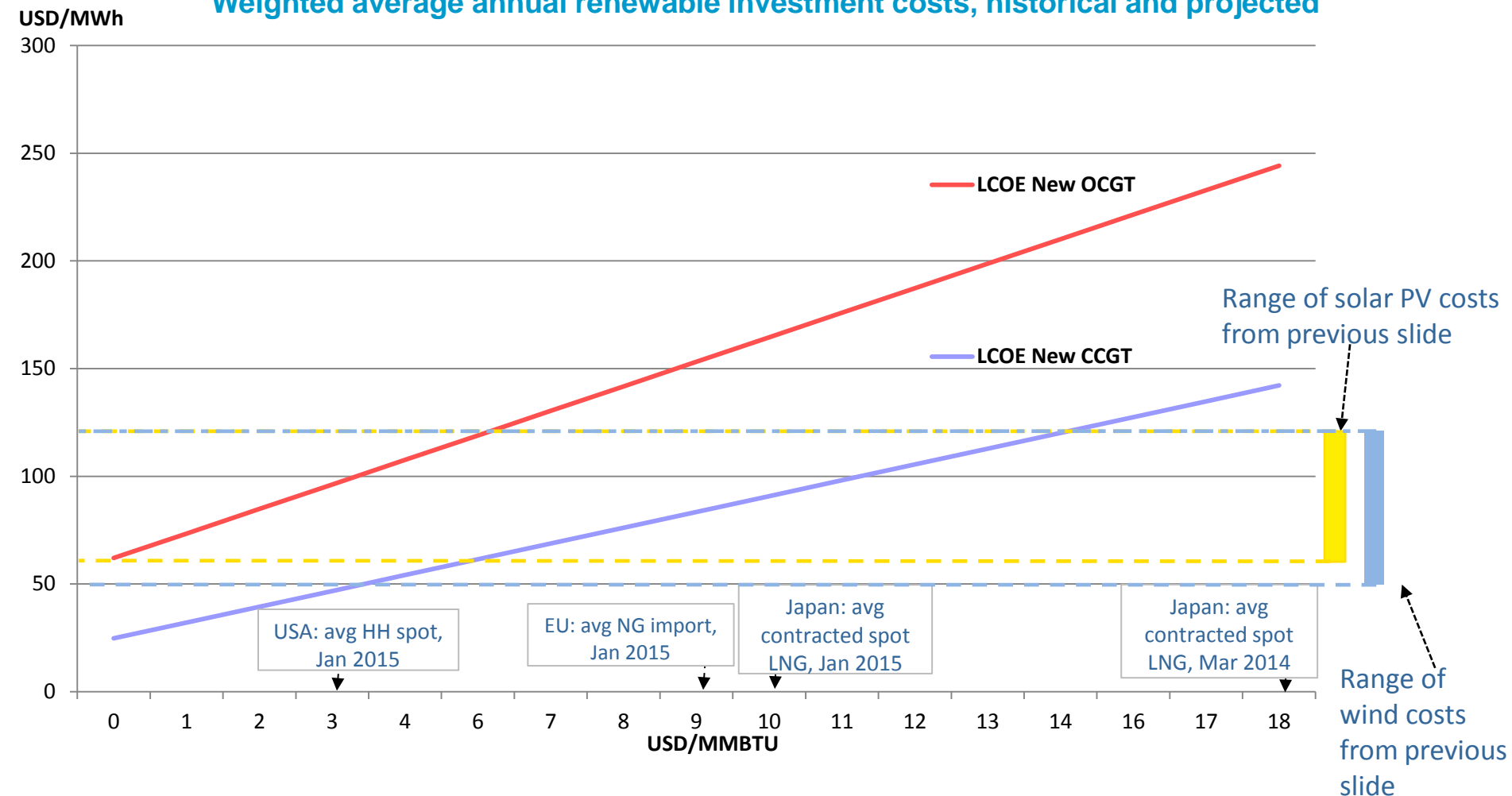


This map is without prejudice to the status or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area

Price competition, long-term contracts, good resources and financial de-risking measures create lower-cost deployment opportunities in newer markets

Even with low oil and gas prices, renewables can be competitive

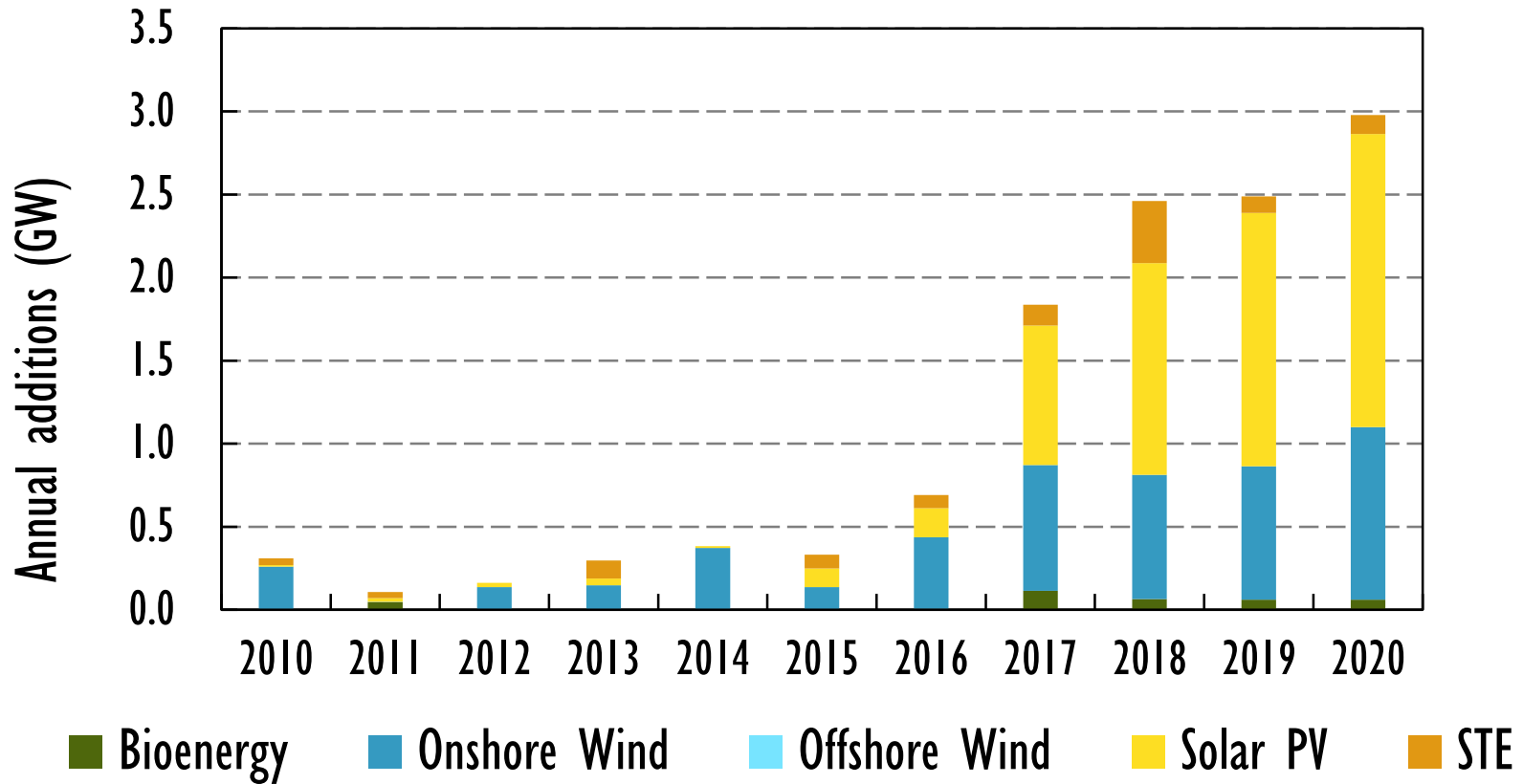
Weighted average annual renewable investment costs, historical and projected



Note: Based on EGC median case, LCOE for OCGT is calculated using a 15% capacity factor and 7% discount rate and LCOE for CCGT is calculated using a 65% capacity factor and 7% discount rate. No carbon pricing is included in LCOEs.

Increasing momentum for solar and wind

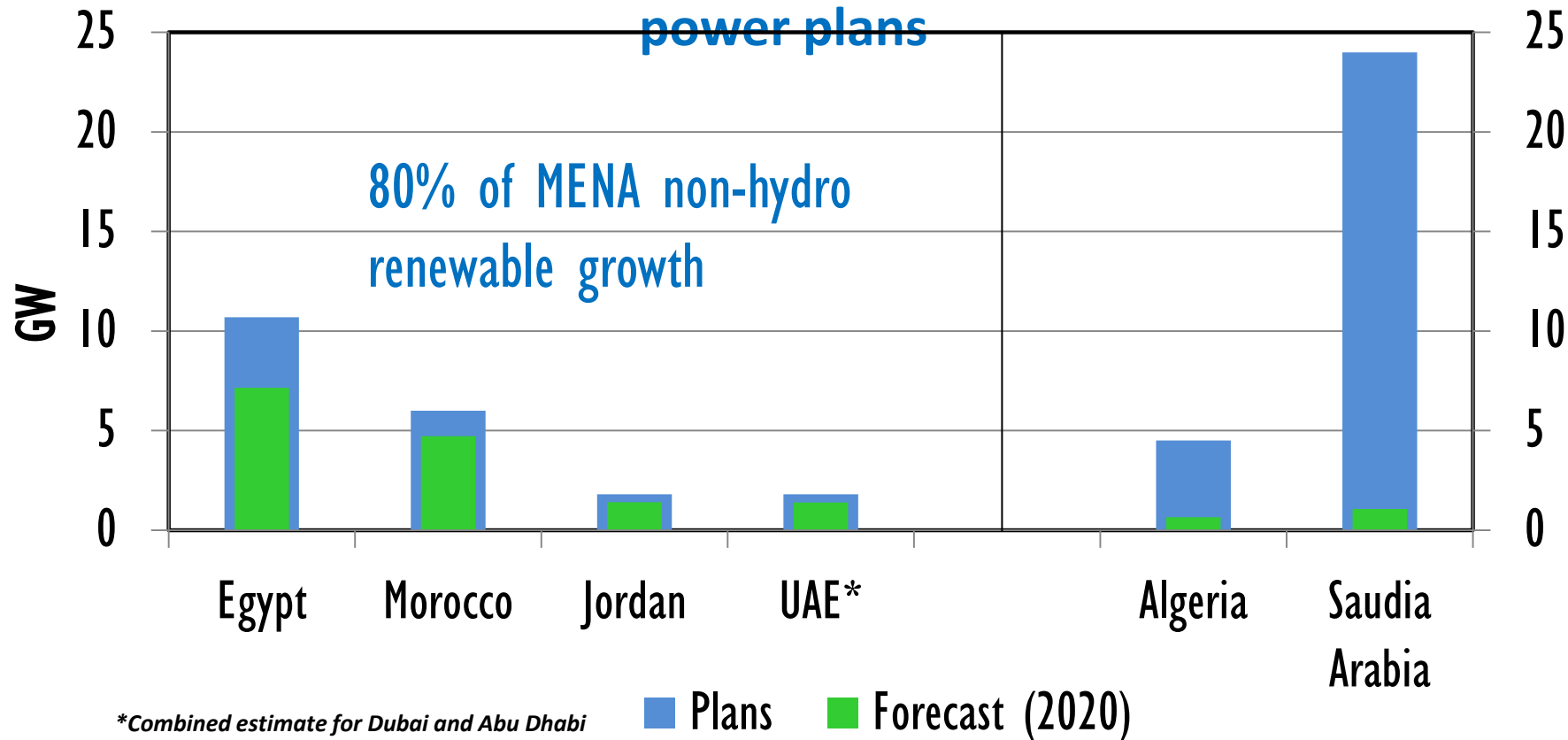
MENA historical and forecasted non-hydropower capacity additions



Non-hydro renewables grow by almost half over 2014-20, driven by fast growing power demand, excellent resources, diversification needs and increasingly attractive economics

But progress concentrated in a few key markets

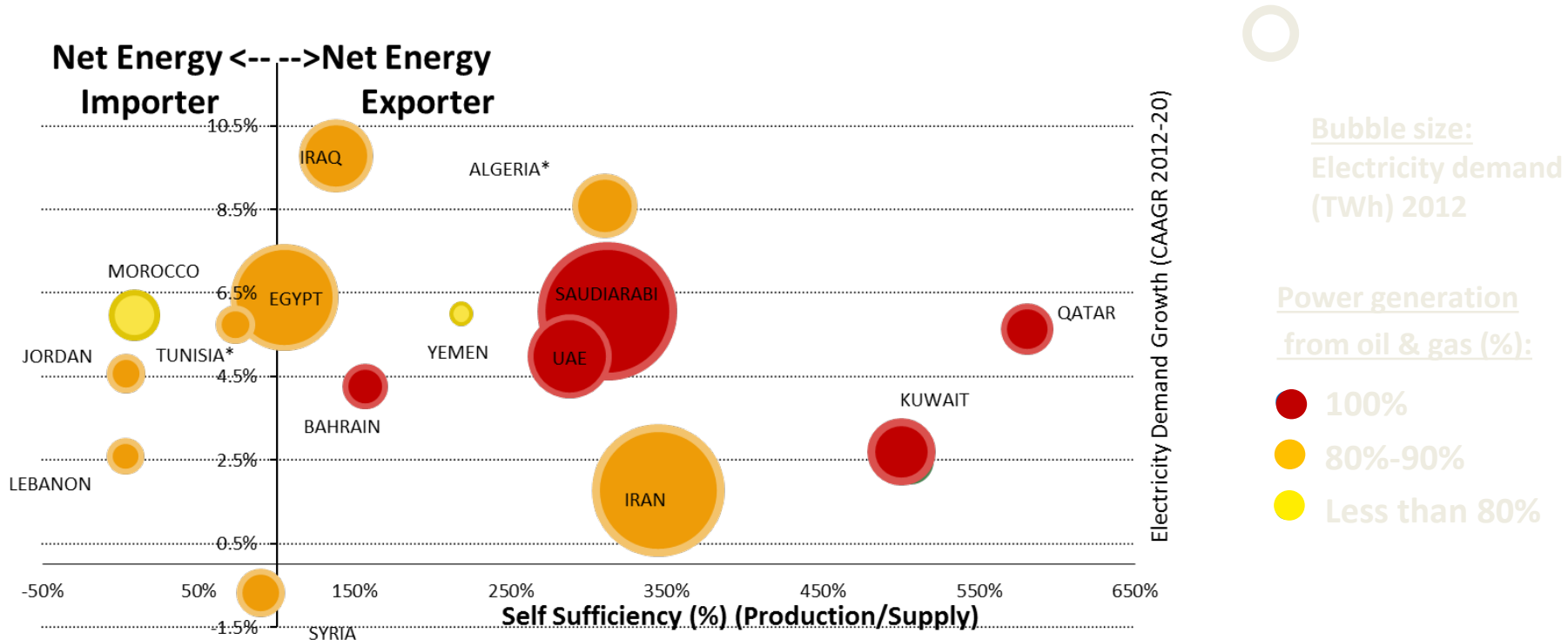
Forecast additions (2014-20) versus growth under renewable power plans



Countries where meeting power demand relies on imported fuels have been the first-movers in creating a supportive enabling environment for renewables

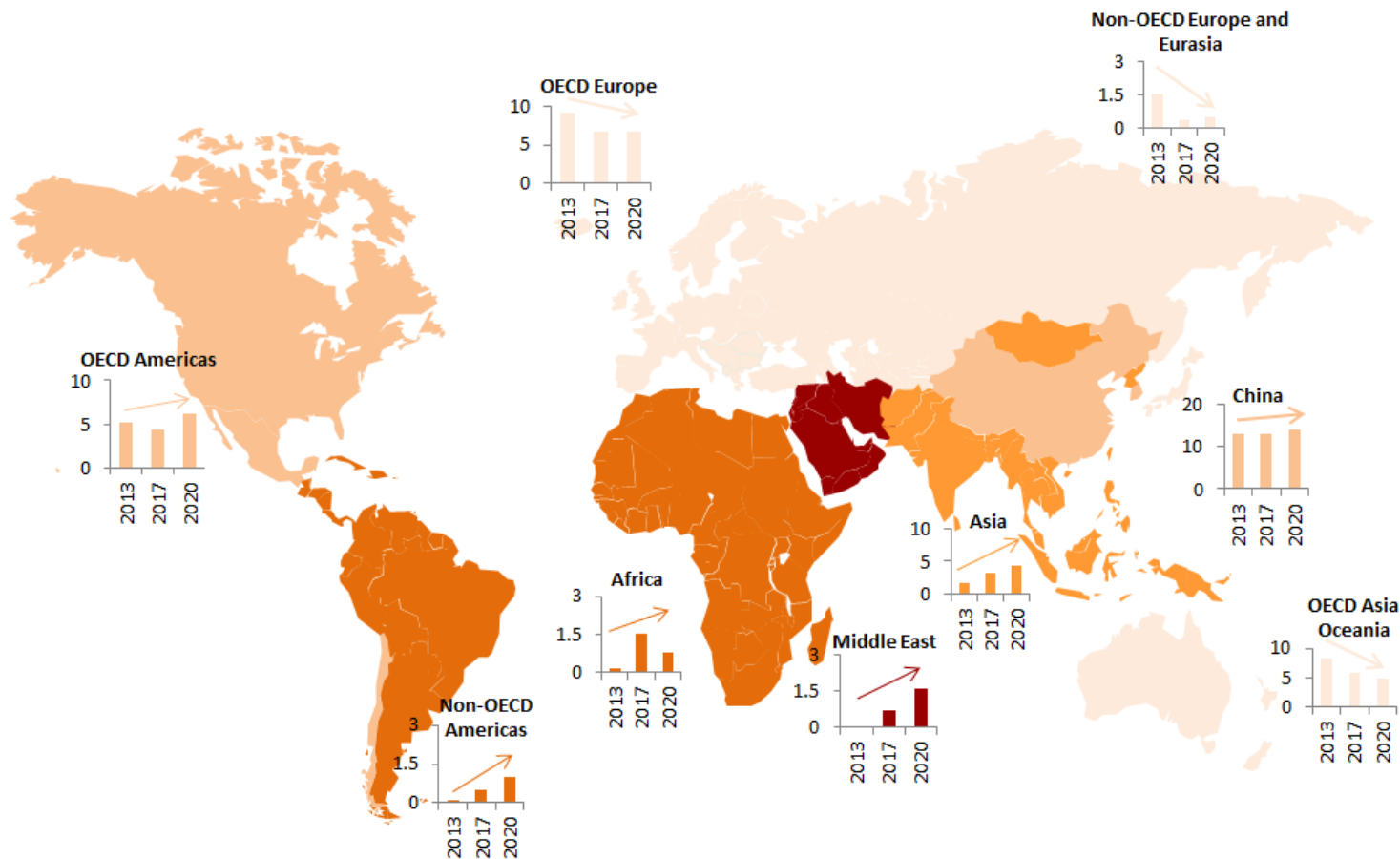
MENA profiles yield different drivers

- Drivers depend on expected demand growth, self sufficiency in meeting total energy demand, reliance on fossil fuels
- Energy security very strong driver for RE in importing countries



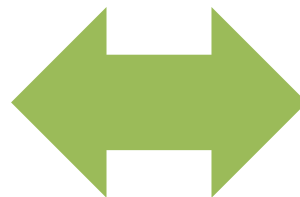
MENA expected to emerge as one of the fastest growing PV markets

Solar PV annual capacity additions (GW)

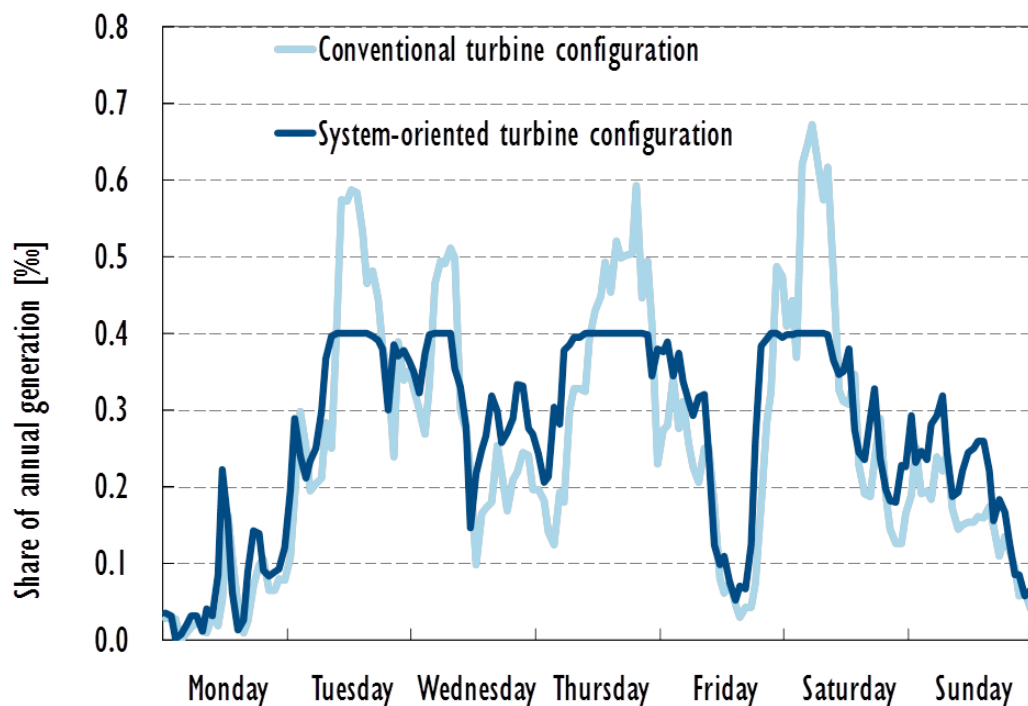


Variable RE will need more flexibility

System-friendly design



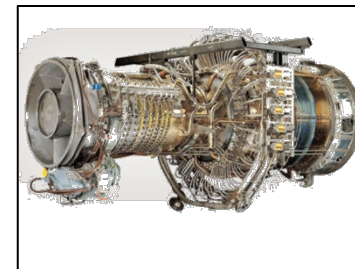
Flexibility of other power system components



Grids



Generation



Storage



Demand Side



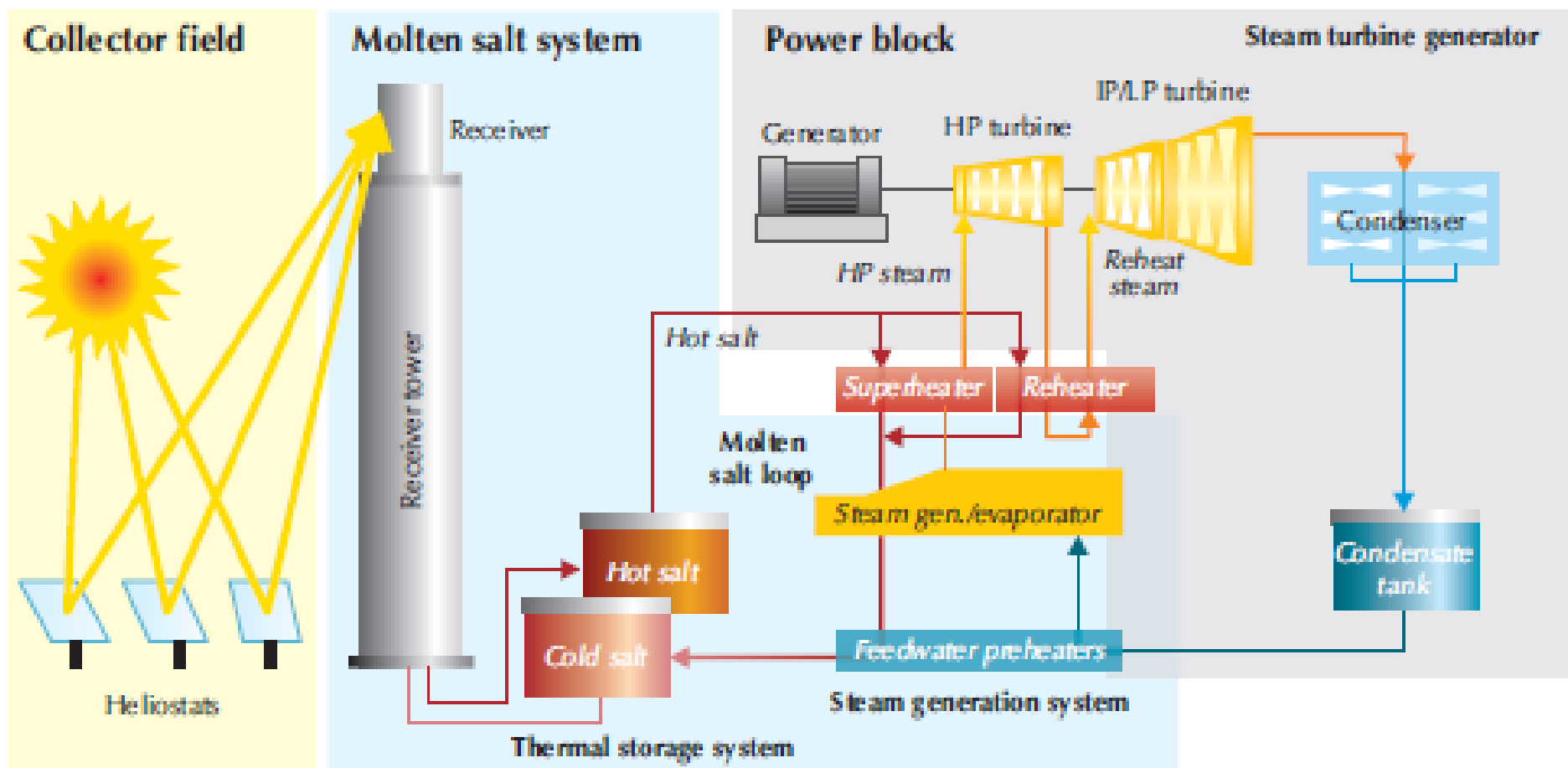
Solar thermal electricity: Morocco leads on the south shore



JON JENSEN/ICNN

*Noor 1 (160 MW) at Ouarzazate soon to be inaugurated.
Noor II and Noor III (Tower) to follow*

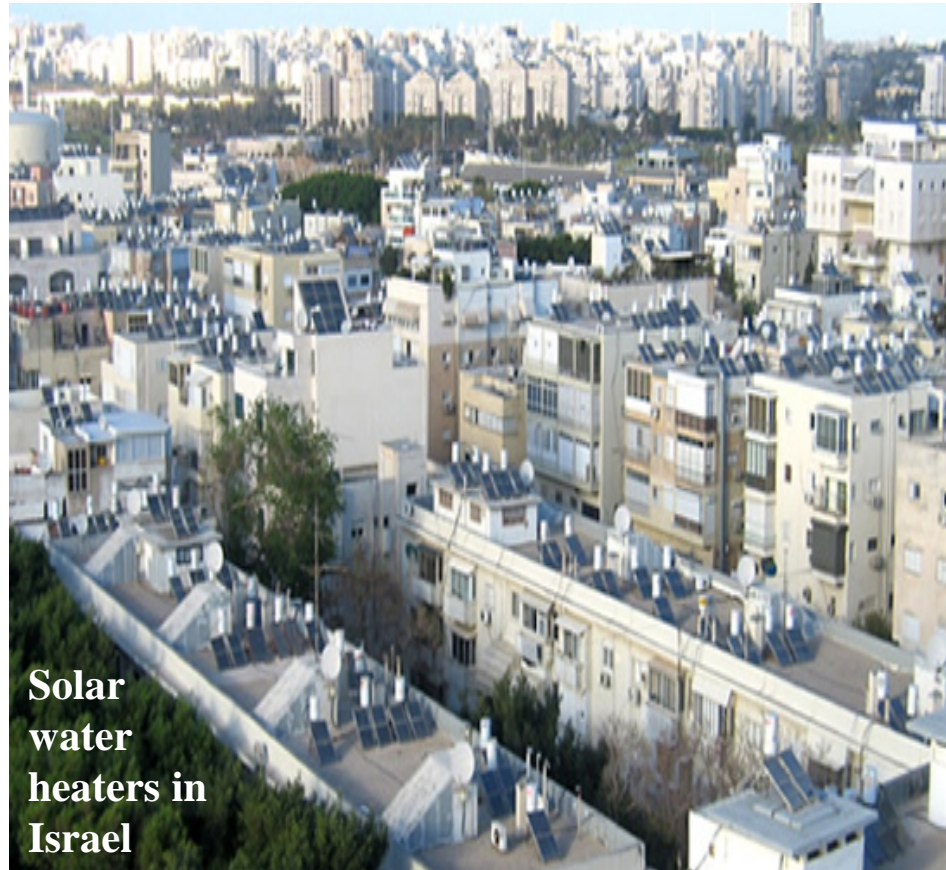
Heat storage: CSP plants deliver electricity on demand



Source: SolarReserve.

Built-in thermal storage allows to generate solar electricity when the sun sets and customers turn the lights on

Solar heat takes off cautiously



Solar heat has great potential in the MENA region but deployment is still limited to a few countries

Solar heat for industry is not a new concept

1907,
Egypt
(Shuman)



2014,
Morocco
(Italcementi)



Solar ovens for artworks

- Potteries from Safi (Morocco) cooked in the solar oven at Mont-Louis (French Pyrenees)



Mirrah, 1 GWth under construction



International Energy Agency
Secure Sustainable Together

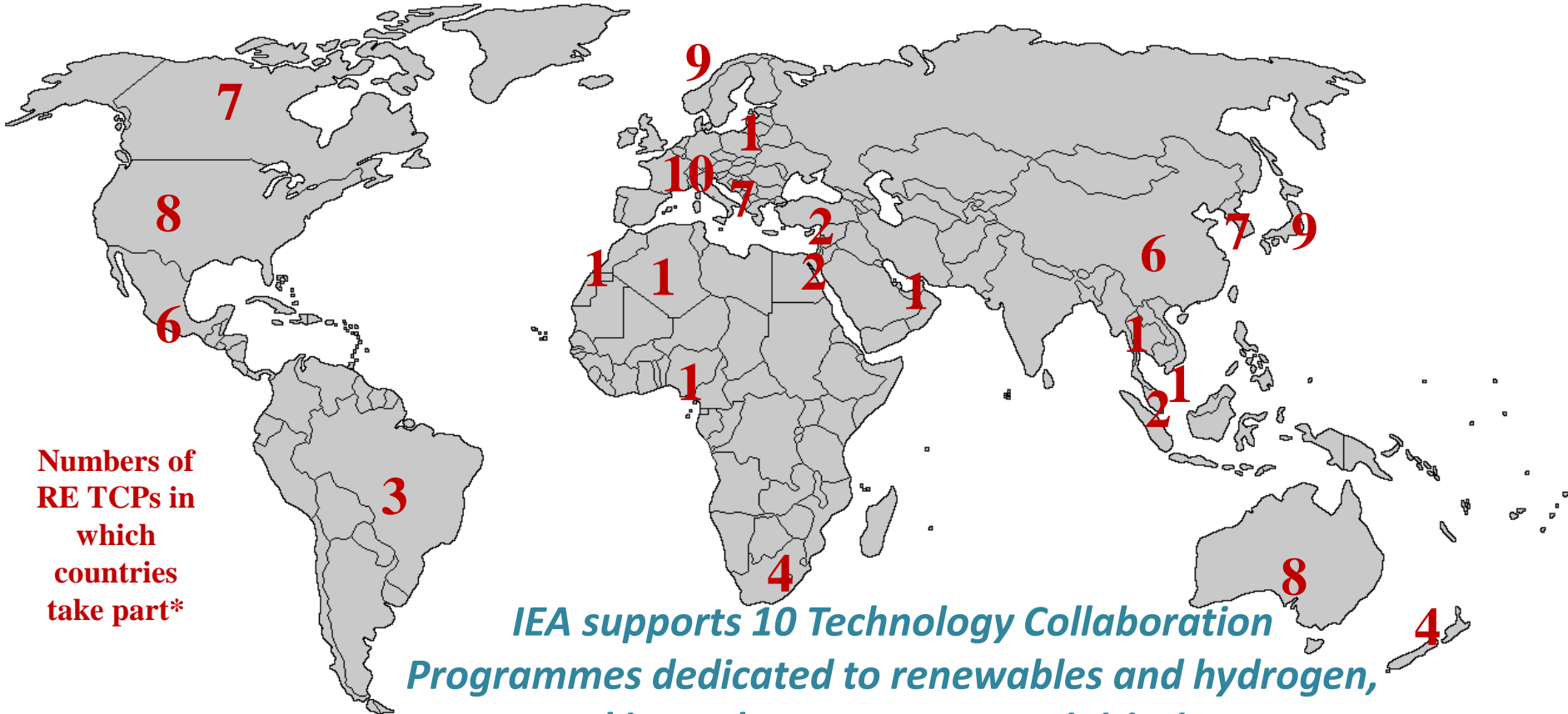
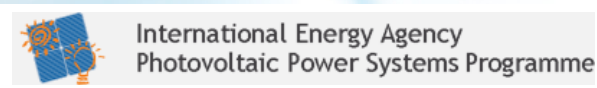


Parabolic troughs protected from winds & dust in greenhouse (*Glasspoint*)



... for enhanced oil recovery operations

RE Technology Collaboration Programmes



Numbers of RE TCPs in which countries take part*

IEA supports 10 Technology Collaboration Programmes dedicated to renewables and hydrogen, and is ready to support new initiatives

*including 4 through sponsors

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A decisive moment for the future of renewables

- With enabling frameworks and excellent resources MENA countries have the potential to leapfrog to very affordable renewables – as Morocco demonstrates as with solar thermal and wind power.
- But the low oil price environment can pose a risk to policy commitments, particularly in energy exporters
- Overall, greater policy ambitions are needed to realise the region's huge renewable potential
- A more secure and sustainable energy system requires continued progress in phasing out fossil fuel subsidies and clear policies
- Technology cooperation is key to promote innovation; the IEA stands ready to cooperate with MENA countries