

# The Vital Role of Nuclear Energy in the Global Climate Agenda

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Tokyo, 21 June 2016

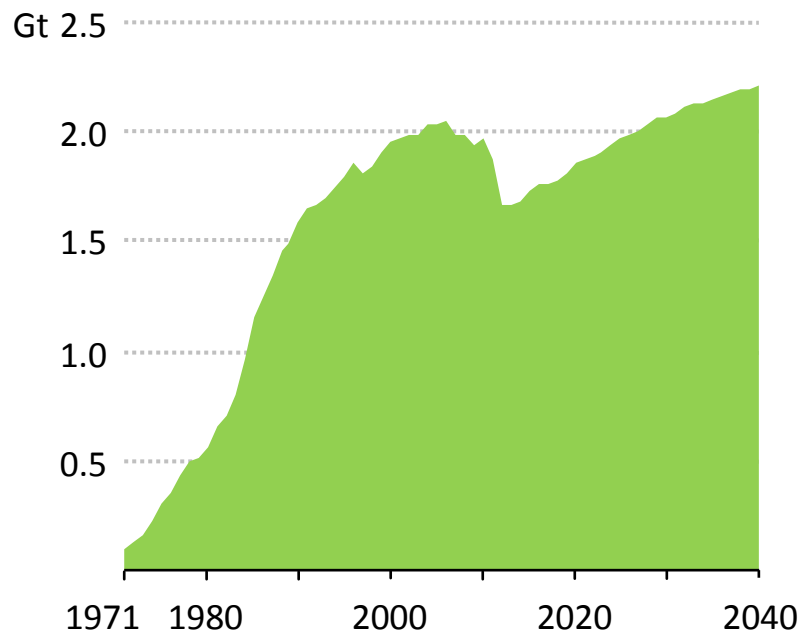
# The vital role of nuclear in the Global Climate Agenda



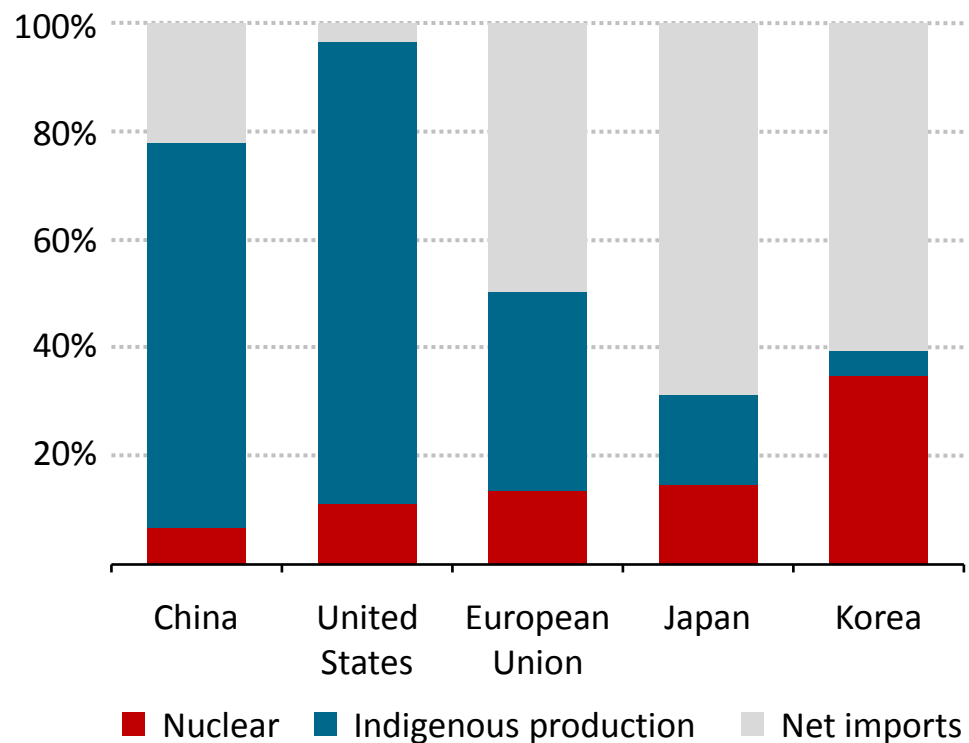
- **Maintaining momentum after Paris COP 21 agreement**
- **Tapping the full potential of nuclear**
- **Aligning the market framework for decarbonisation**
- **Outline:**
  - **Existing nuclear contribution**
  - **A key role in decarbonisation scenarios**
  - **Nuclear competitiveness**
  - **Nuclear in competitive electricity markets**
  - **Lifetime extension**
  - **RD&D**

# Nuclear power can play a role in CO<sub>2</sub> abatement & energy security

CO<sub>2</sub> emissions avoided annually by nuclear power  
1971-2040



Share of energy demand met by domestic sources  
and nuclear power in 2040

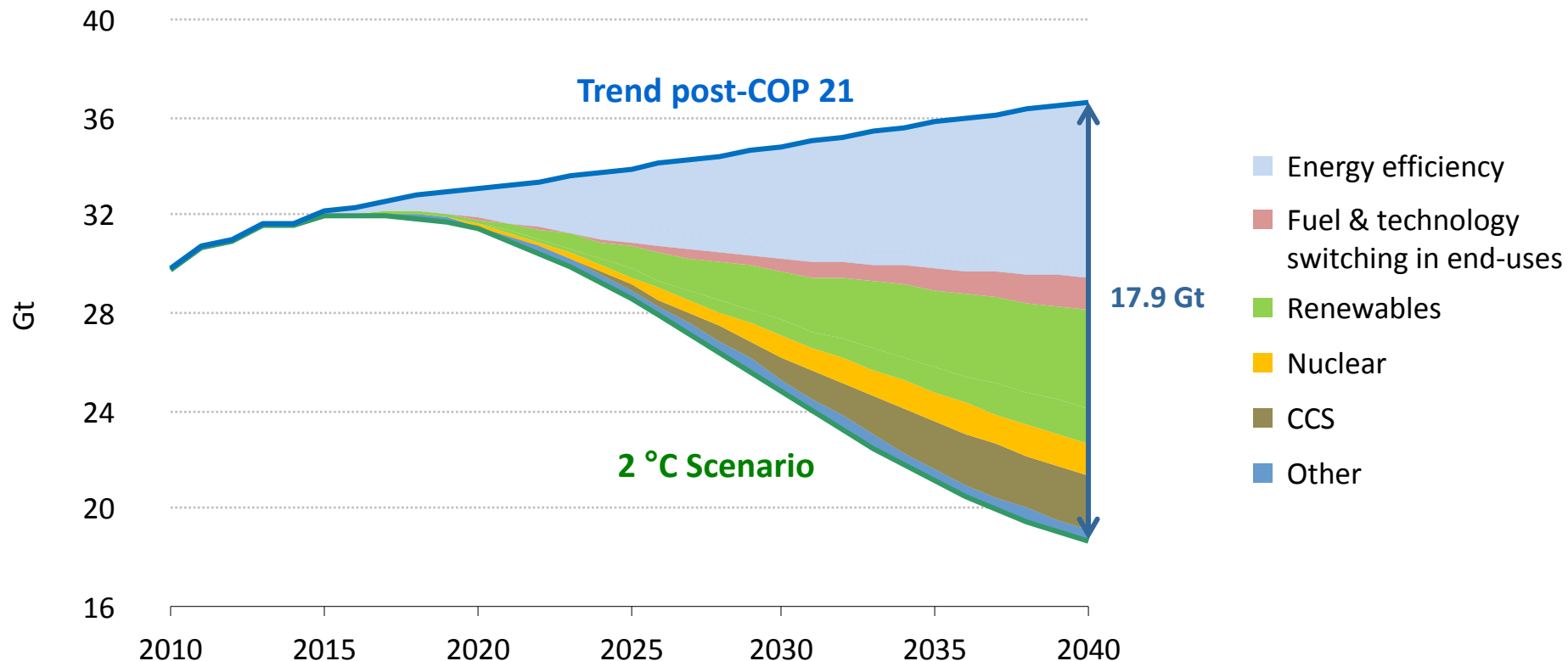


***By 2040, almost 4 years of current emissions have been avoided by nuclear power; it cuts dependence on foreign fuel supplies & lowers import bills for some countries***



# A 2 °C pathway requires more technological innovation, investment & policy ambition

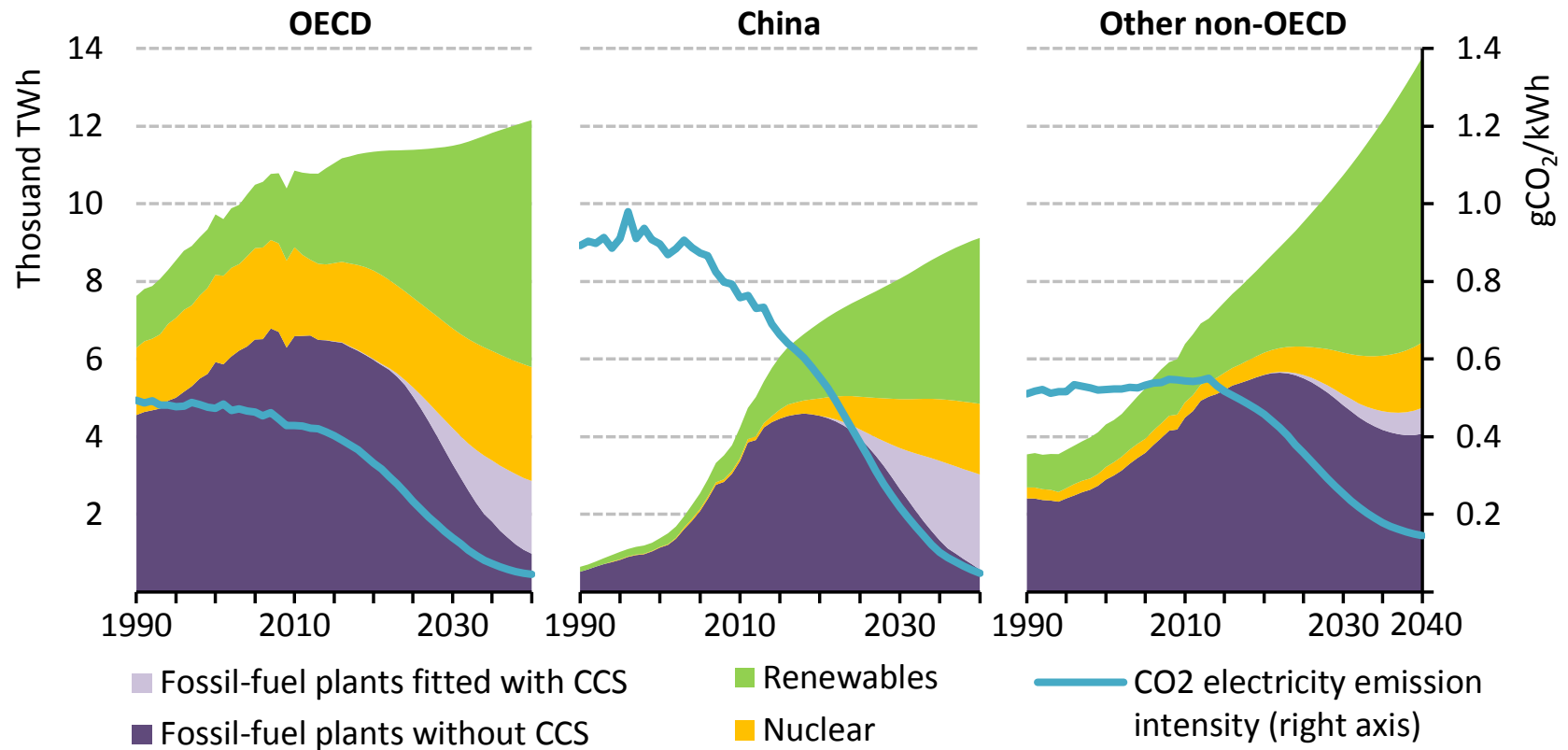
## CO<sub>2</sub> emissions in a post COP 21 world



***Massive additional investments in efficiency, renewables, nuclear power and other low carbon technologies are required to reach a 2 °C pathway***

# The power sector is central to a low-carbon world

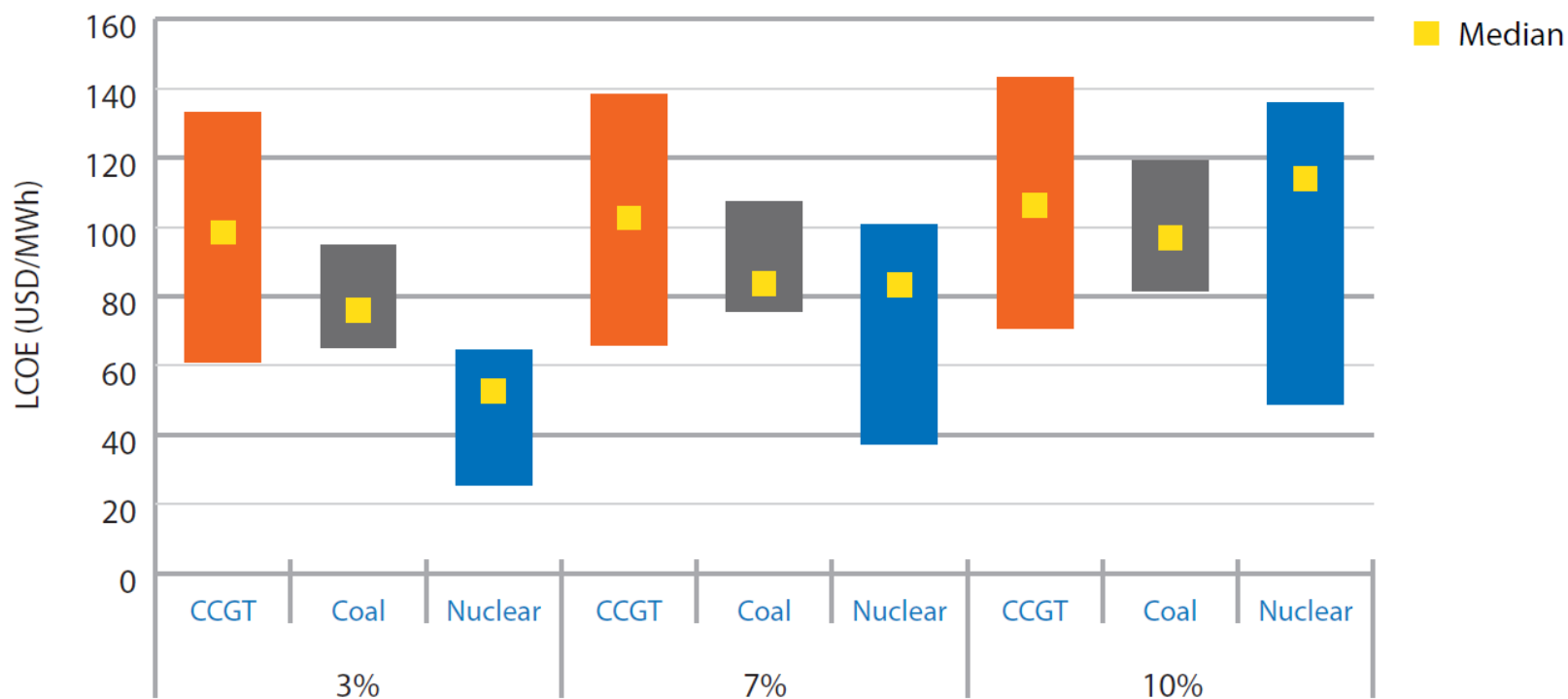
## Electricity generation by technology and CO<sub>2</sub> intensity in the 450 Scenario



***Low-carbon power generation needs to quadruple with respect to today, with renewables reaching half of the global power mix in 2040***

# Nuclear remains competitive

## Comparison of LCOEs of different generation technologies

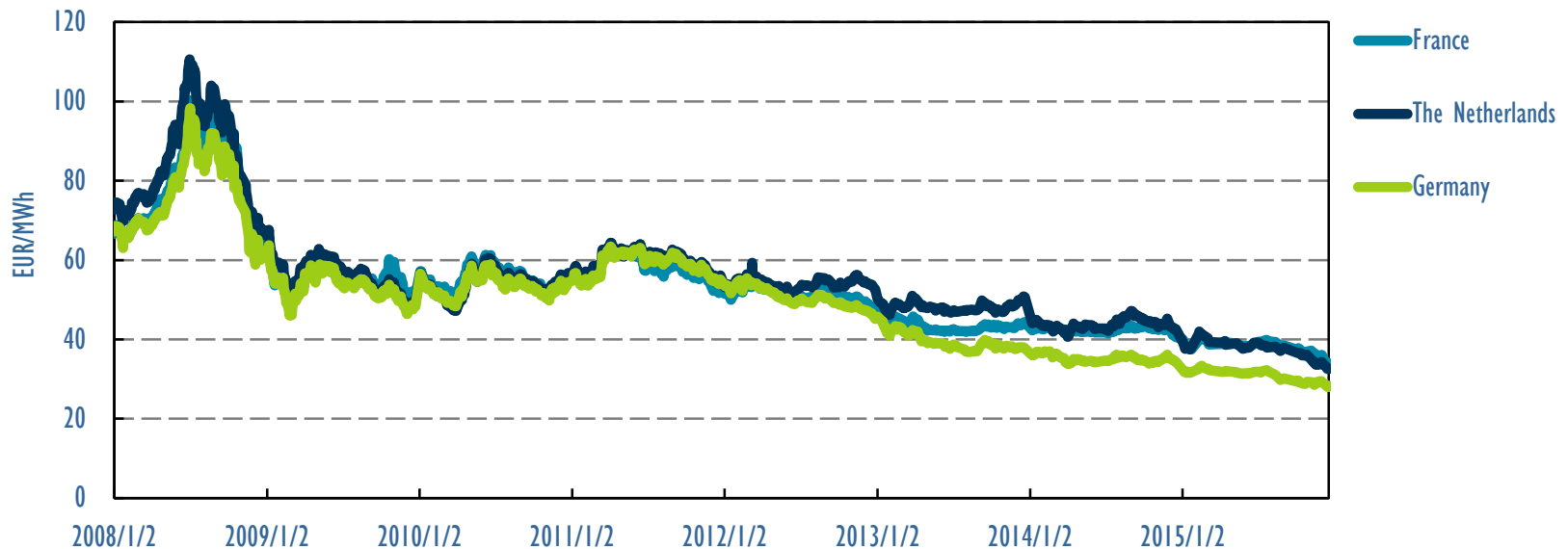


Note: Assumes region-specific fuel prices for US, Europe, Asia; 85% load factor;  
CO<sub>2</sub> price of 30 USD/tonne. (Source: Projected Costs of Generating Electricity 2015 Edition NEA&IEA)

***Despite declining costs of renewables, the IEA NEA projected cost study found that nuclear can remain in the competitive range***

# Is nuclear investable in competitive markets?

Year-ahead forward market prices (Real price 2015), 2008-15

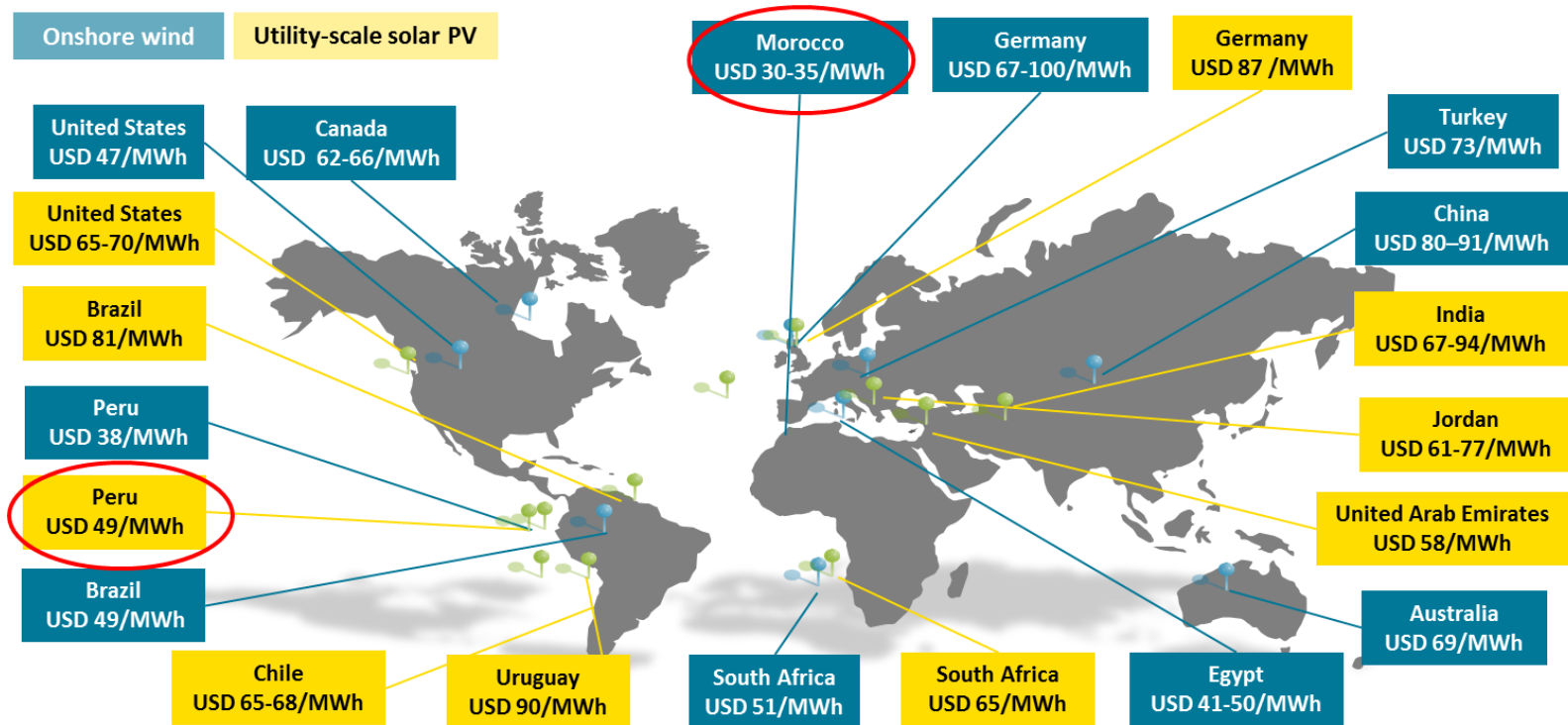


***Under current market circumstance and without a carbon price, market-based nuclear investments are unlikely***

# Even Lower Costs on the Horizon

- Auction results point to a wave a very low cost projects coming on-line over coming years

Recent announced long-term contract prices for new renewable power to be commissioned over 2016-2019



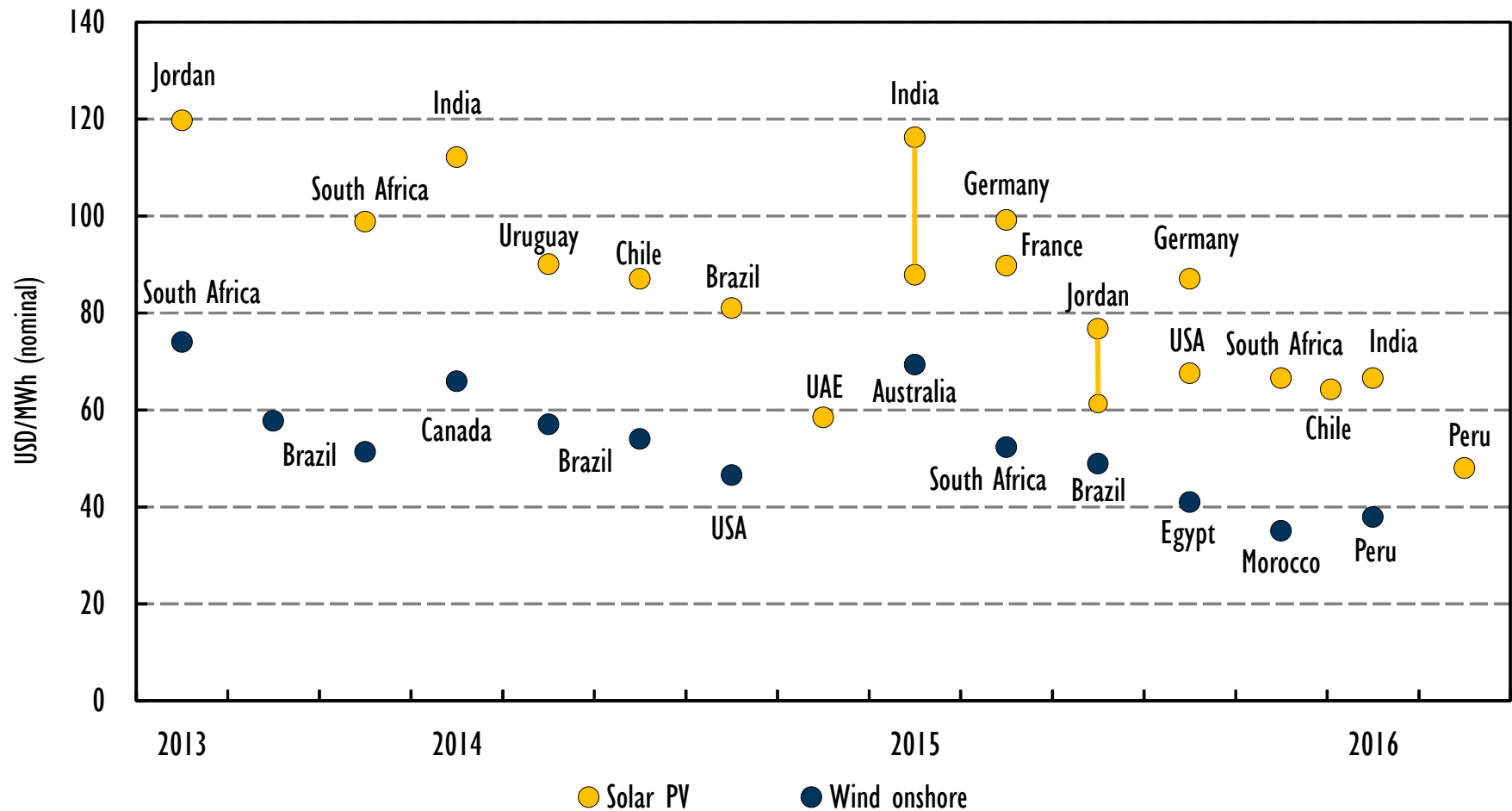
This map is without prejudice to the status or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.  
 Note: Values reported in nominal USD includes preferred bidders, PPAs or FITs. US values are calculated excluding tax credits. Delivery date and costs may be different than those reported at the time of the auction.



# Continuing cost decrease on the horizon for wind and PV



Recent announced long-term contract prices for new renewable power to be commissioned over 2016-2019



*Best results occur where price competition, long-term contracts and good resource availability are combined*

# Keeping existing low-carbon capacity



## ■ Several nuclear reactors have been or will close:

- Germany
- Japan

## ■ Risk of closure for economic reasons

- 14 reactors in the USA
- Sweden

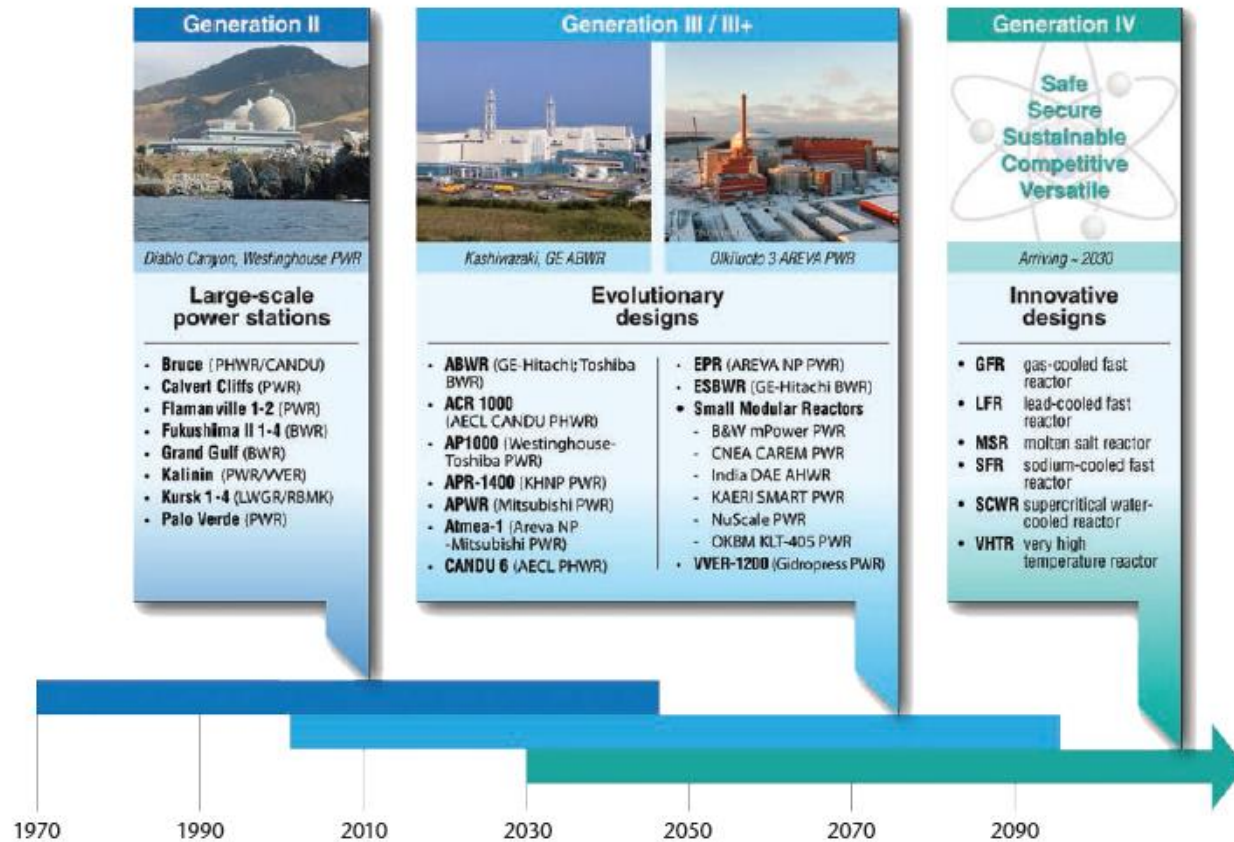


Pilgrim Nuclear Generating Station, Entergy Corporation

*Extending the operating lifetime of reactors to enable them to operate safely is essential to maintaining low-carbon generation capacity.*

# The future of nuclear

## Evolution of fission reactor technologies



Source: in GEN IV international forum  
IEA and NEA (2015),  
Technology roadmap,  
Nuclear energy

*Financing RD&D will be needed to develop new technologies in order for nuclear to be able to compete with renewables technologies*

# Conclusion: nuclear at the cross road



- **Decarbonisation of the power sector relies on a portfolio of low-carbon generation technologies, including nuclear**
- **Nuclear has to compete with other low-carbon technologies on a level playing field**
- **When technically and politically possible, keeping existing nuclear capacity is a low-cost low carbon option**
- **Future competitiveness of nuclear will depend on the capability to increase safety while decreasing costs**
- **Long term support schemes are necessary to secure financing for nuclear projects**





Thank you