

# High Technology Roadmap

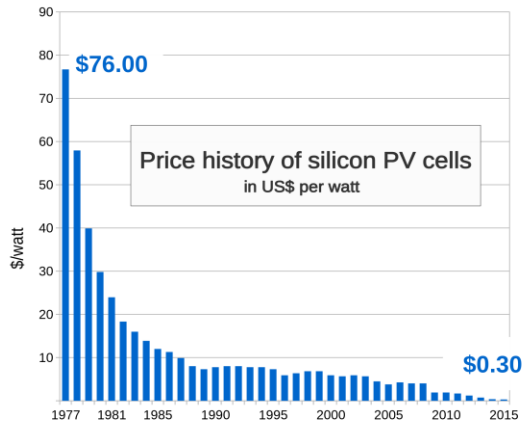
## Solar Power

Ashgabat  
11 March 2018

Sohail Hasnie  
Principal Energy Specialist  
Energy Division,  
Asian Development Bank



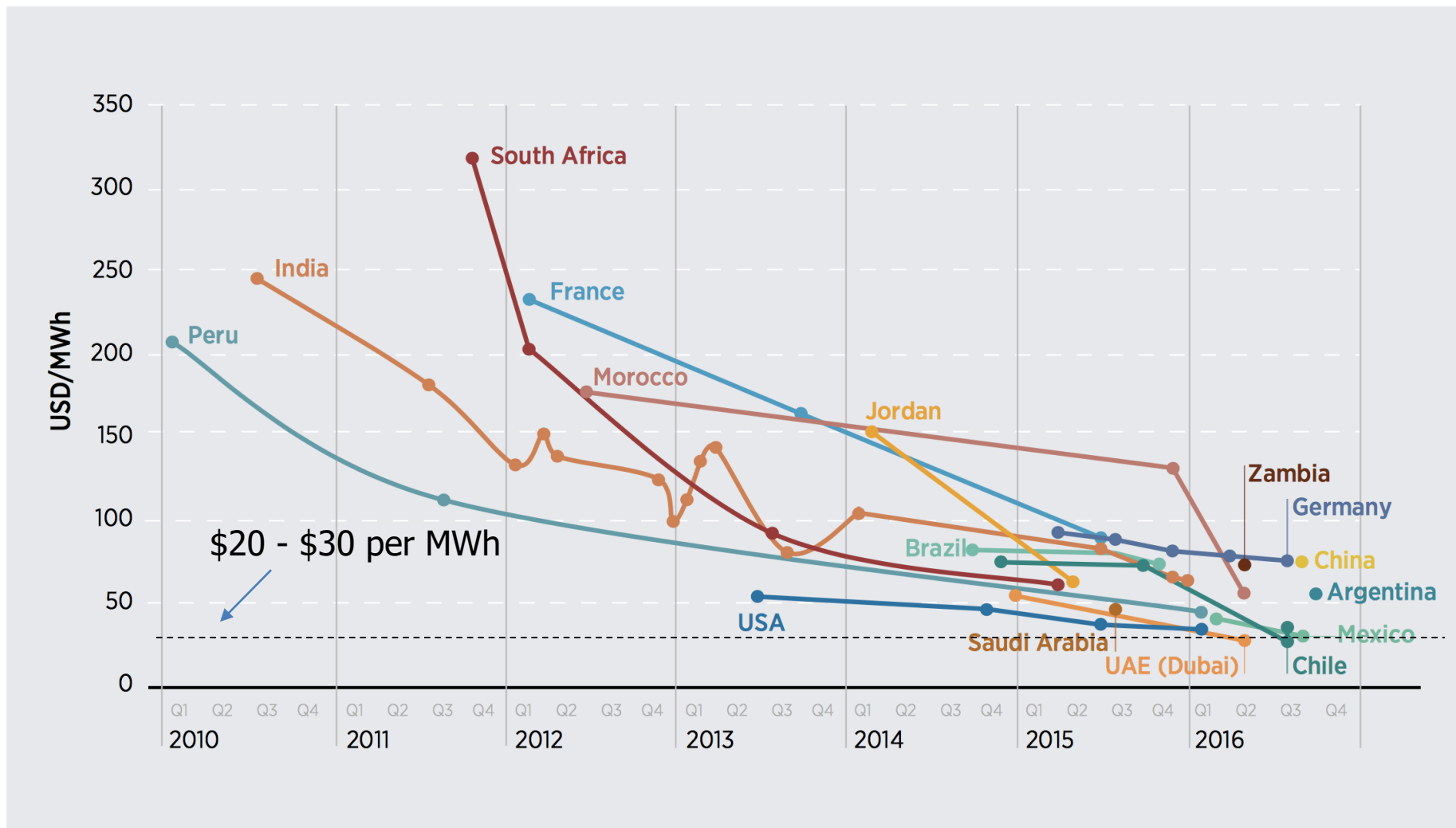
**\$8,000**



Source: Bloomberg New Energy Finance & pv.energytrend.com

Less than **\$50**

**Figure 3** Evolution of average solar prices in auctions, January 2010-September 2016



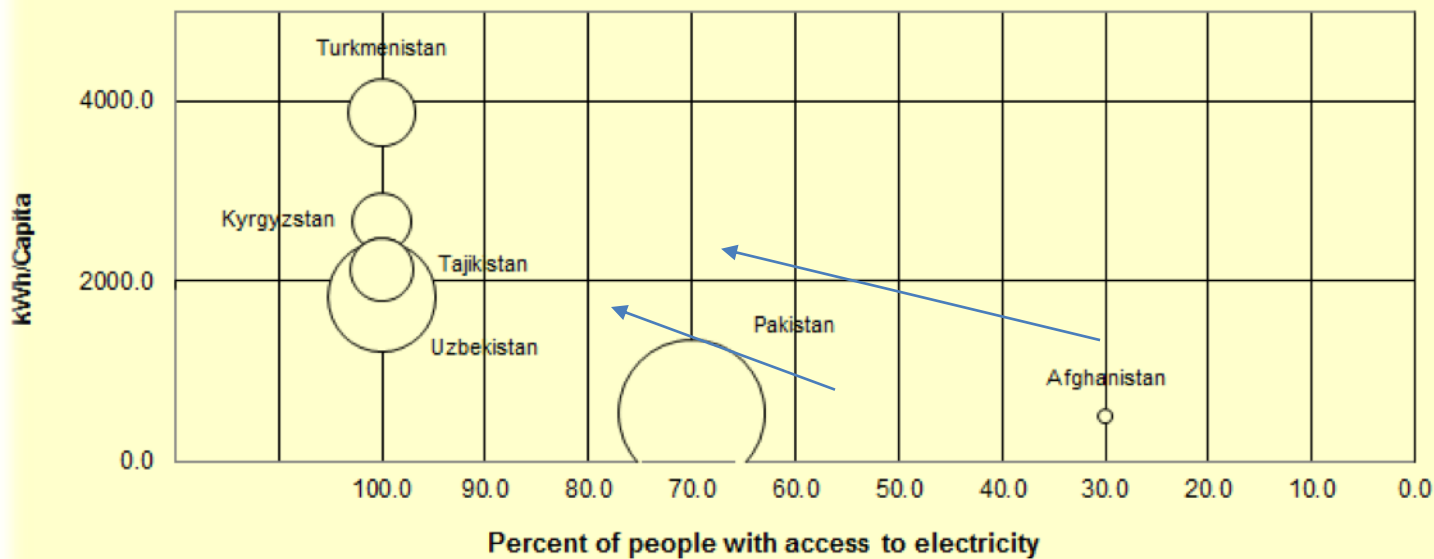
Source: IRENA, 2017.

1. This brief is a summary of *Renewable Energy Auctions: Analysing 2016* which can be downloaded from [www.irena.org/Publications](http://www.irena.org/Publications) starting March 2017.

# Central Asia-South Asia Regional Electricity Market



**Access to Electricity**





# Future: Import vs. Solar Generation



## Import

4 cents /kWh

+

Transmission line

\$300 million

(3 cents / kWh)

Construction in 3-5 years

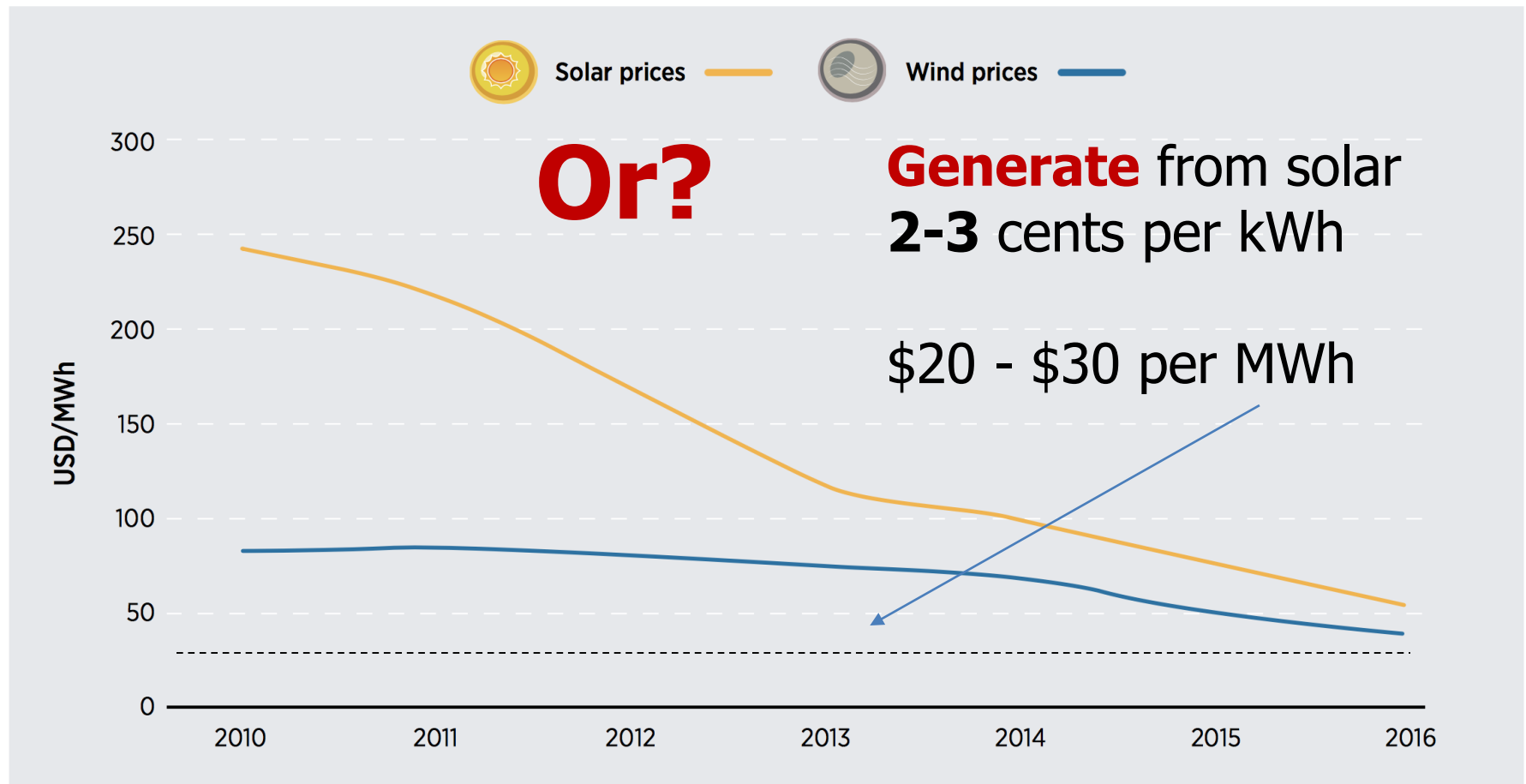
## Or?

**Generate** from solar  
2-3 cents per kWh



construction in 6 months

**Figure 1** Average prices resulting from auctions, 2010-16



Source: IRENA, 2017.

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# Saudi Arabia Gets Cheapest Bids for Solar Power in Auction

By Anthony Dipaola

October 3, 2017, 7:19 PM GMT+6 Updated on October 4, 2017, 3:00 AM GMT+6

\$20 - \$30 per MWh

Developer	completion date (2019)	nominal capacity on commercial opening date (MW)	LCOE (halalah/kWh)	LCOE (~US\$ cents /kWh)
Abu Dhabi Future Energy Company (Masdar)	7 June	300	6.69736	1.78567
Acwa Power	31 March	300	8.7815	2.342
Marubeni Corporation	14 April	310	9.976	2.66
Engie	12 July	381	10.393	2.77
JGC Corporation	30 April	355	10.44139	2.784
Mitsui & Co.	N/A	300	10.71	2.856
Total	2 May	300	10.72174	2.859
Cobra	30 April	300	12.62521	3.366

**1.78 cents per kWh** on 3 October 2017

**\$17.80 per MWh**

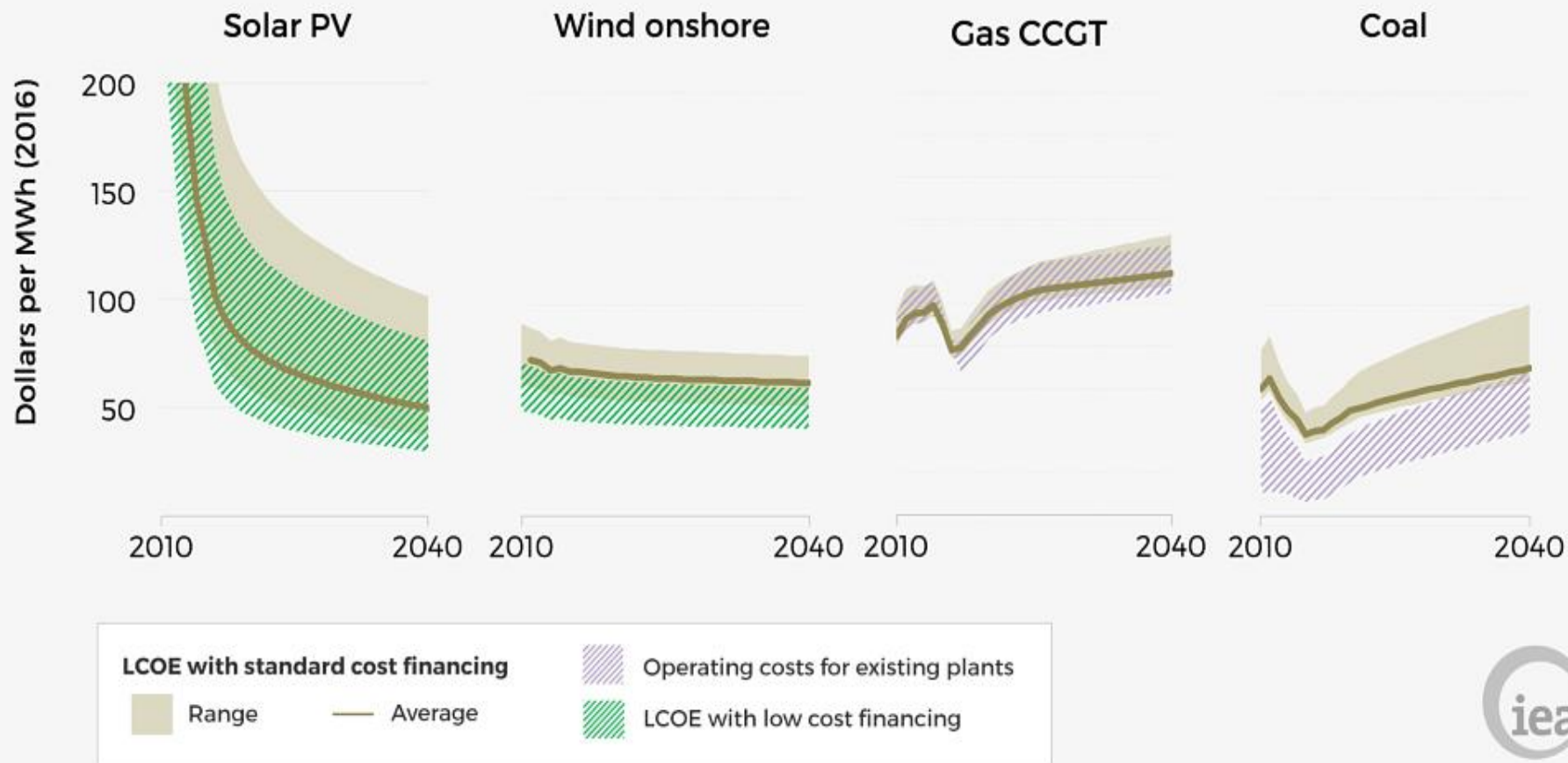
**June 15, 2017**

This year's forecast from BNEF sees solar energy costs dropping a further 66% by 2040, and onshore wind by 47%, with renewables undercutting the majority of existing fossil power stations by 2030.

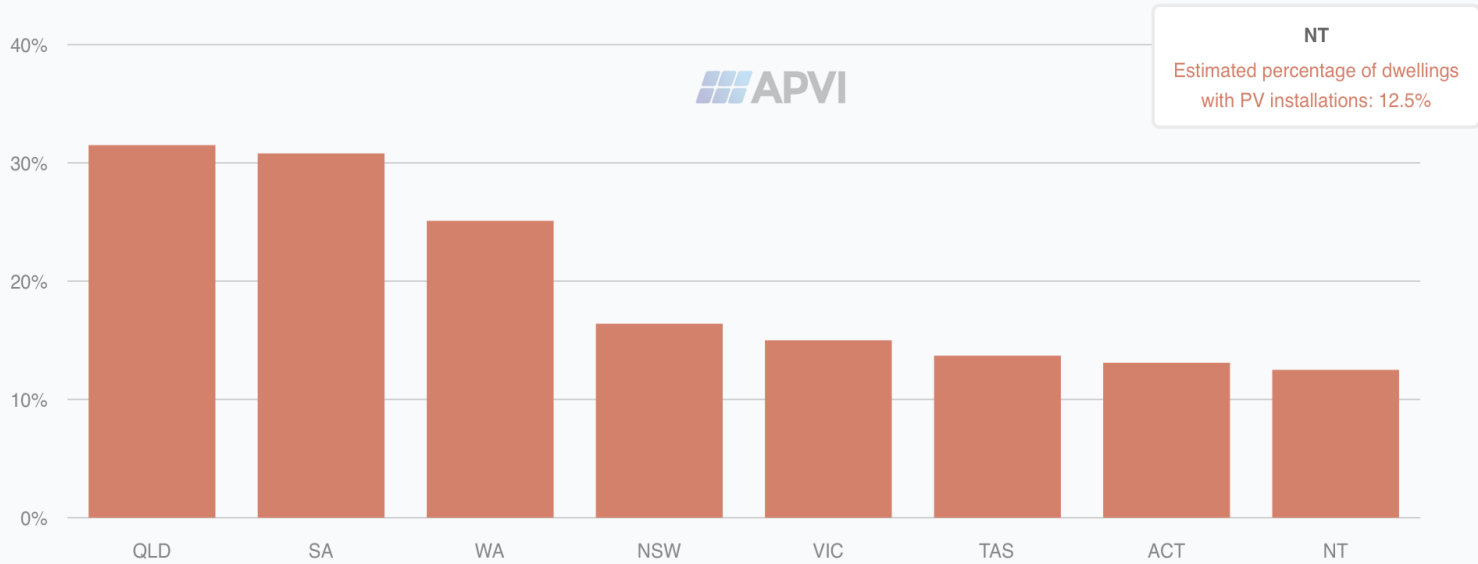


# Historical & projected levelised cost of electricity in China in the NPS

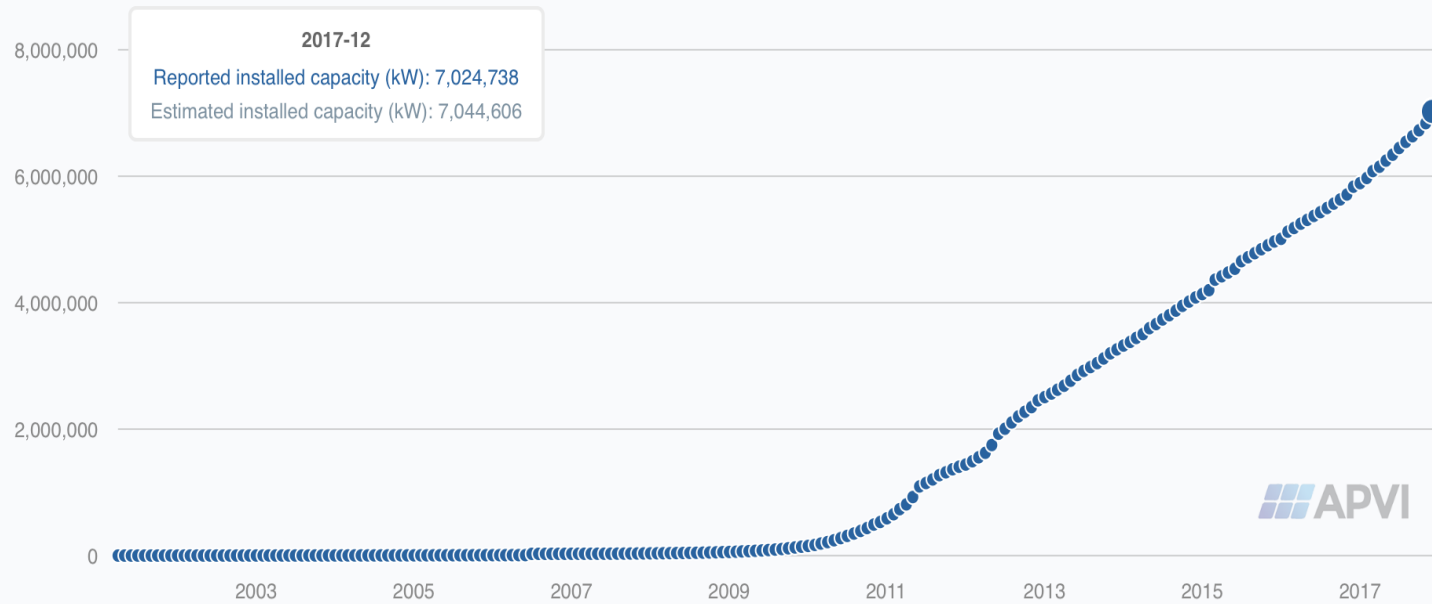
World Energy Outlook 2017



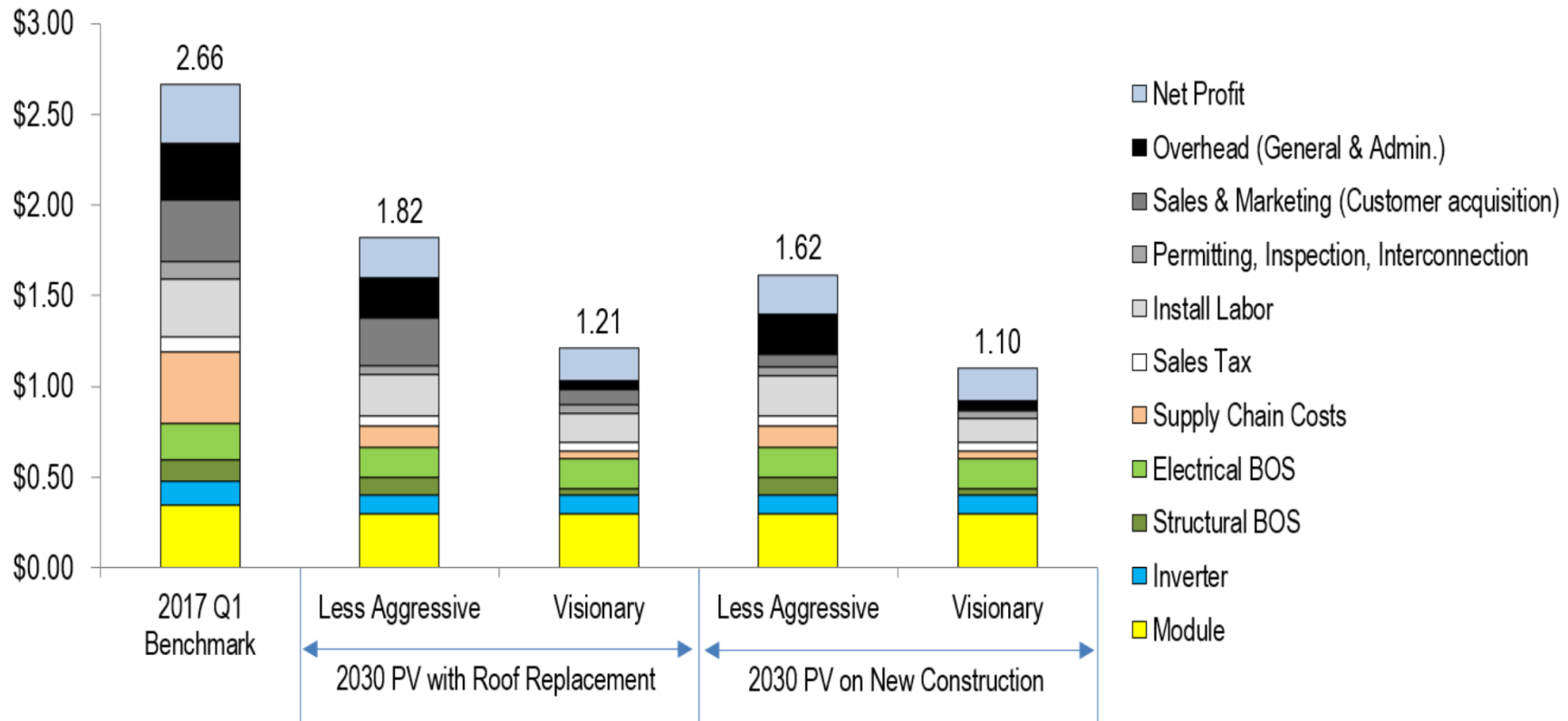
Percentage of dwellings with a PV system by State/Territory



Australian PV installations since April 2001: total capacity (kW)

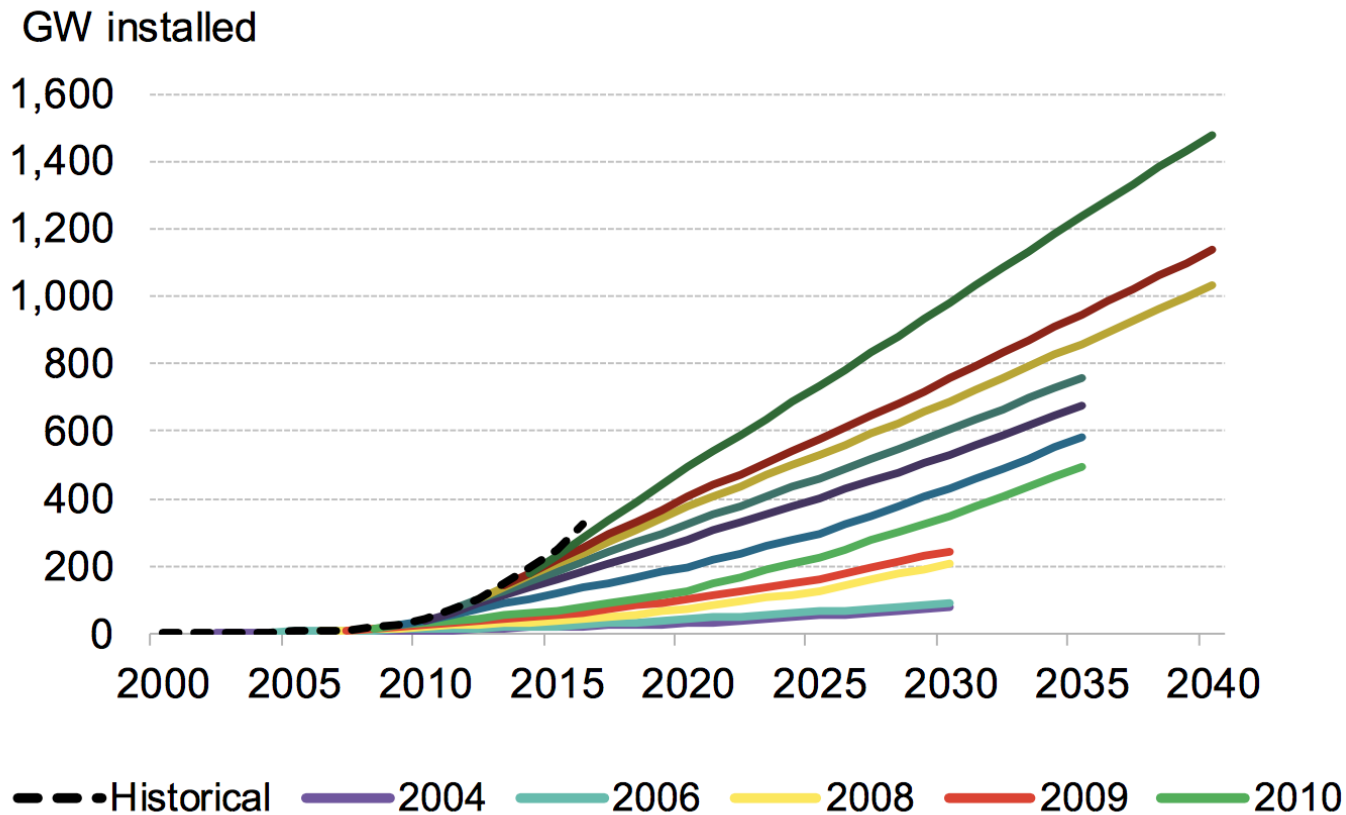


2017 USD  
per Watt DC



# IEA solar capacity forecast evolution

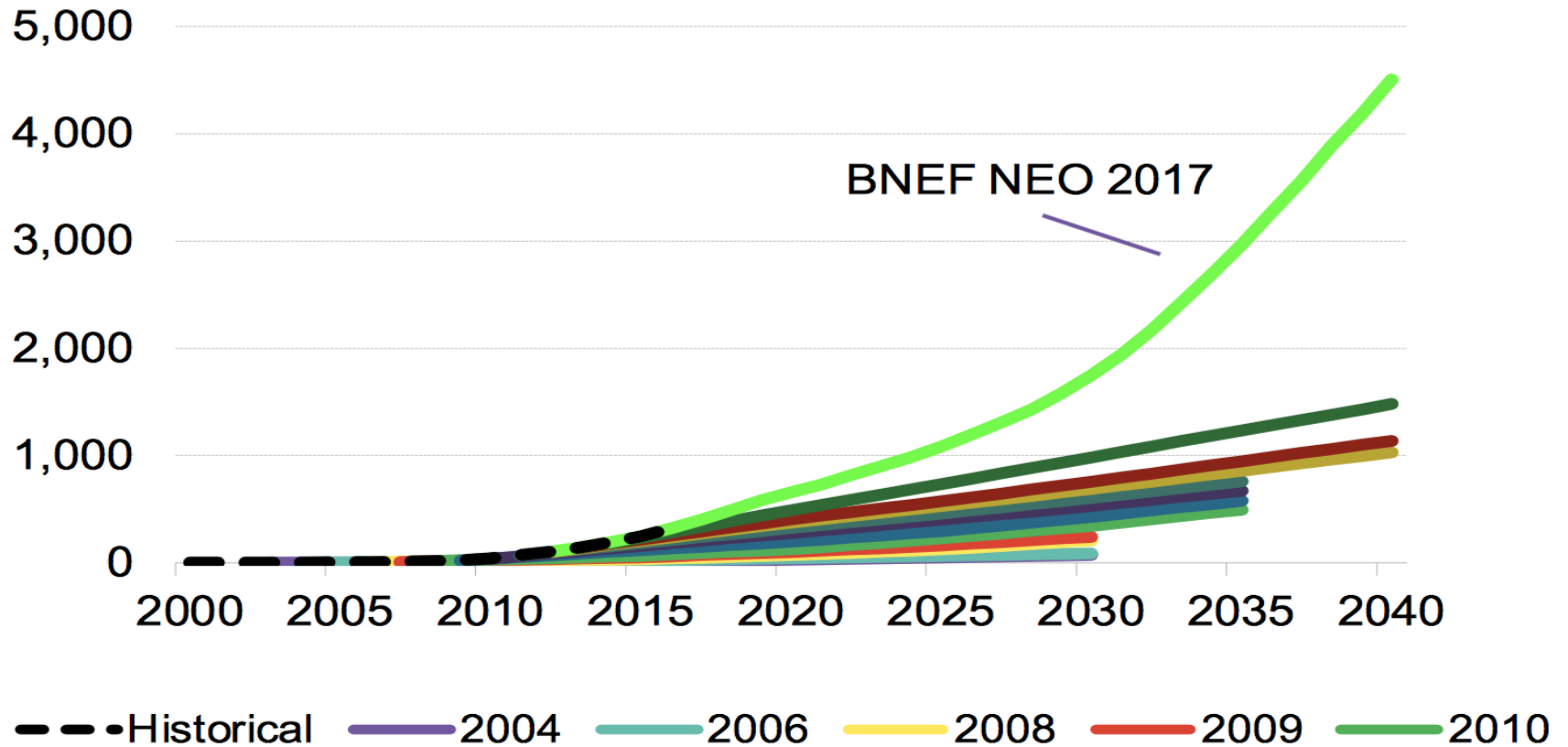
## Global cumulative solar installations



Notes: 2004-2009: Reference Scenario; 2010-2040: New Policies Scenario

# Global cumulative solar installations

GW installed





# Solar Everywhere



# Solar Everywhere



# Disruption is Real

- ~~Pumped hydro storage~~
- ~~Peaking Plant~~
- **Batteries**
- **129 MWh**
- **100 MW**
- built in **94 days**
- **\$50+** million



At full charge will power

**8,000** homes (**24** hours) or  
**30,000** homes (**1** hour)

in the event of a blackout.

**Delivered**  
**24 November 2017**



ANDERSON

THERE MUST BE  
A SOURCE OF ENERGY  
DOWN THERE

