

The True Costs:

Solar Photovoltaics

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Fills an important gap in knowledge

World-class database of costs

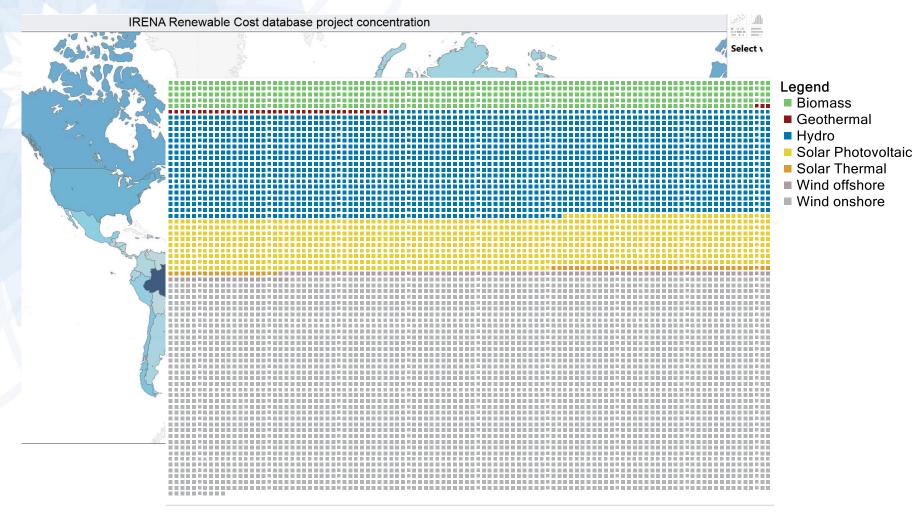
Cutting edge analysis, not just data

More products and analysis coming

Costing Alliance deepens engagement

Power generation database





15000 utility-scale projects, 9000 with LCOE data



















RENEWABLE POWER GENERATION COSTS IN 2014



Renewable Power Generation Costs in 2014

JANUARY 2015

Highlights



The relentless improvement in competiveness continues

Renewables competing head-to-head with fossil fuels

Integrating variable renewables doesn't change the conclusions

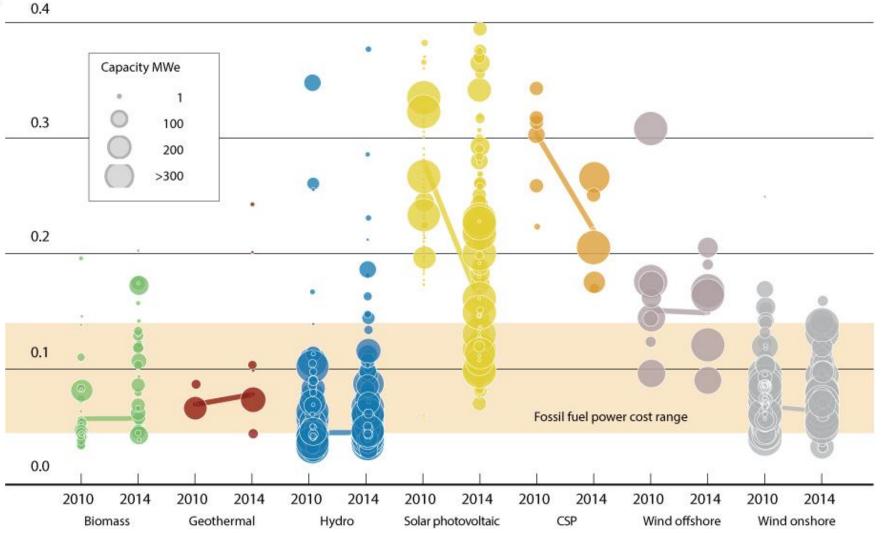


Future cost reductions will be more challenging, policy driven

Renewables competitiveness continues to improve

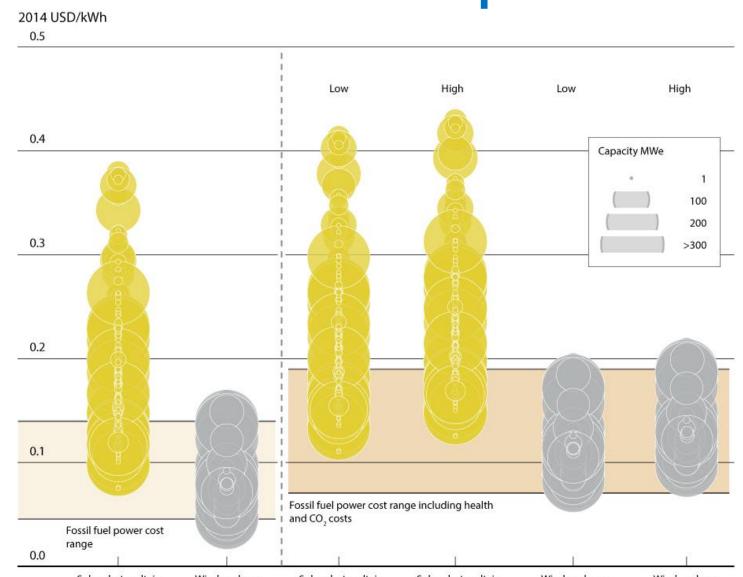


2014 USD/kWh



Integrating high levels of variable renewables is competitive





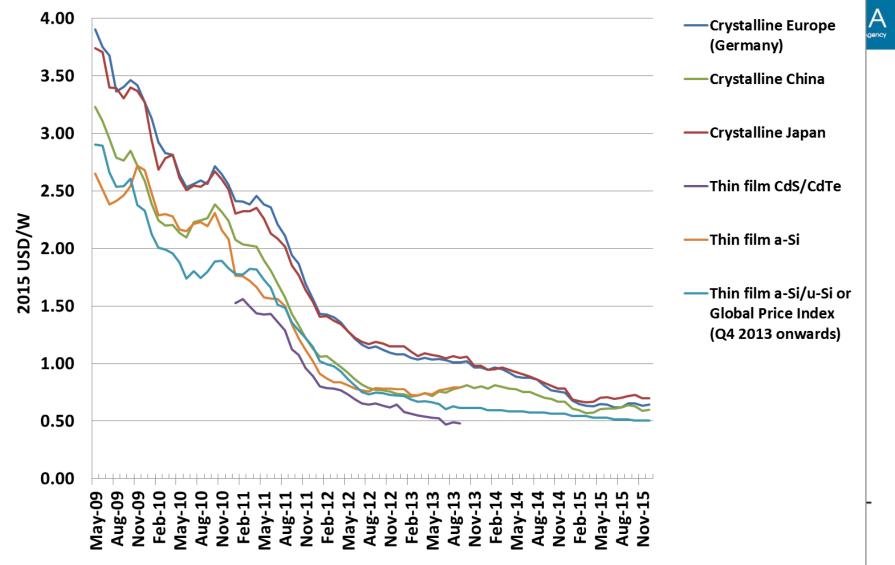
Solar photovoltaic Wind onshore Solar photovoltaic Solar photovoltaic Wind onshore Wind onshore



SOLAR PV COSTS

Solar PV module prices

International Renewable Energy Agency

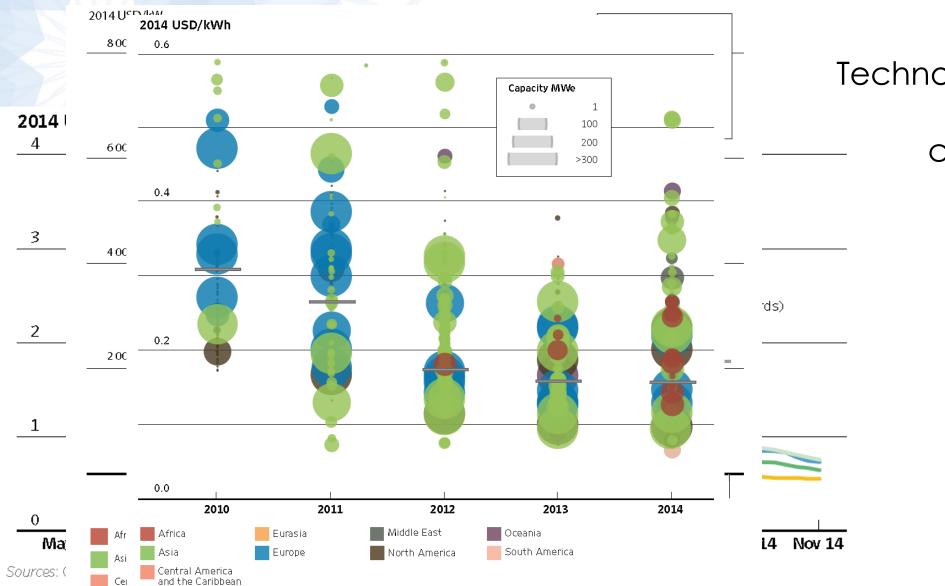


Sources, based on data nom ErnA and the Photovoltale rechnology Platform, 2011, Slobalbata, 2014, OTM Research, 2014, Elebreich,

2011; pvXchange, 2014 and IRENA analysis.

Solar PV modules and utility-scale projects



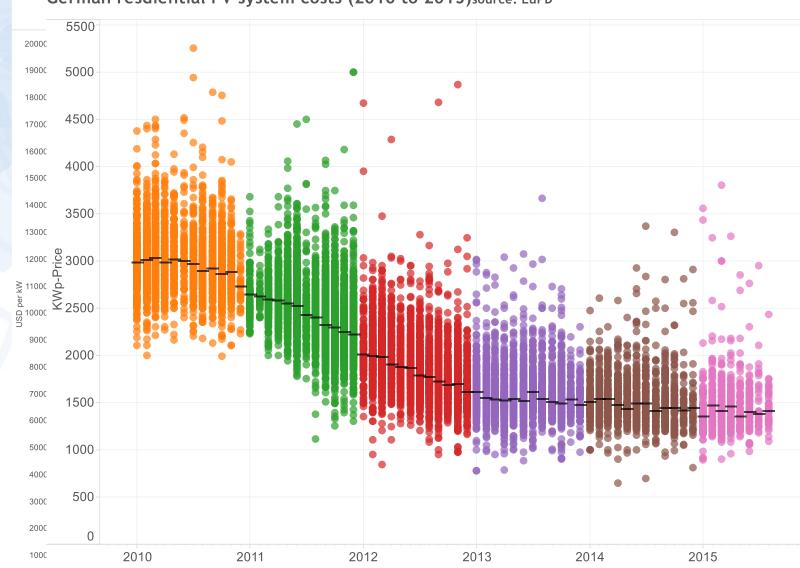


Technology improvements and – cost reductions

> = Falling LCOEs

Residential installed costs continue to edge lower





German resdiential PV system costs (2010 to 2015)source: EuPD

California

Germany

11

Februa.. May August Novem...Februa.. May August Novem...Februa.. May August Novem...Februa.. May August Novem...Februa.. May

Month of Commisioning Date

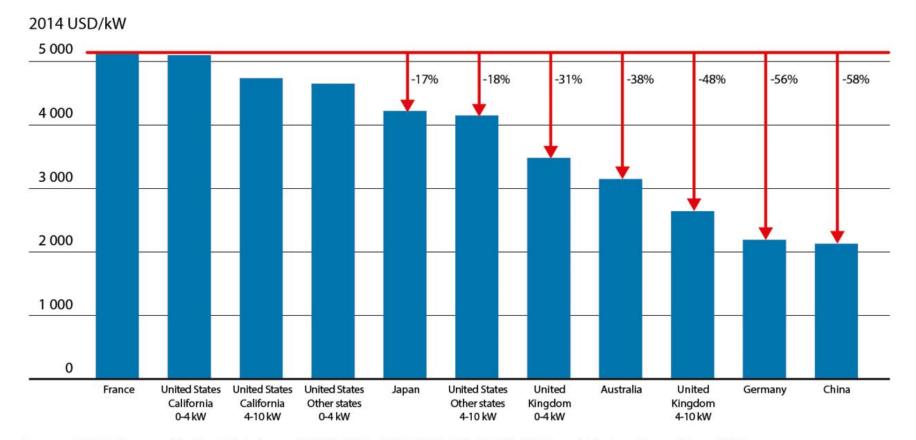
Residential solar PV: Average cost differentials

International Renewable Energy Agency

SS IRENA

RENEWABLE POWER GENERATION COSTS IN 2014

FIGURE 5.11: ESTIMATED AVERAGE TOTAL INSTALLED PV SYSTEM COSTS IN THE RESIDENTIAL SECTOR BY COUNTRY, 2014

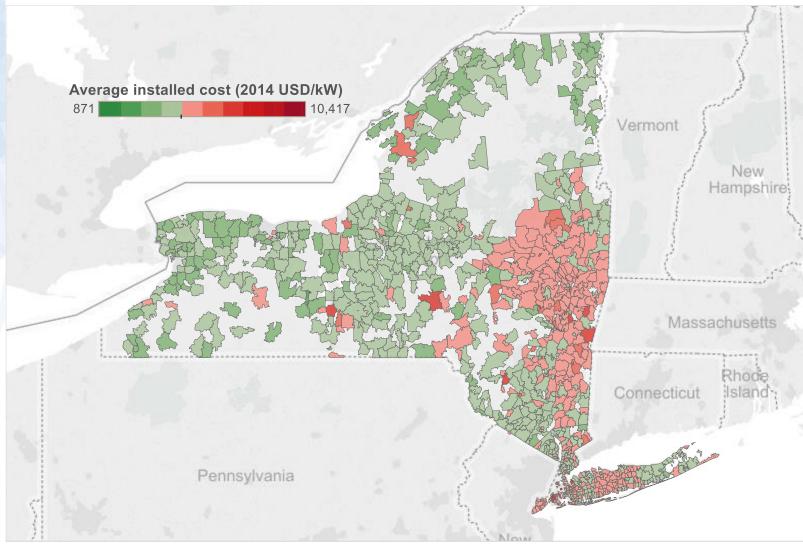


Source: IRENA Renewable Cost Database; DECC, 2014; GSE, 2014; IEA PVPS, 2014; and Photon Consulting, 2014.

Where do costs differ? Why?



Average residential PV system cost (relative to 2014 median)



PV Parity Indicators (Preview)

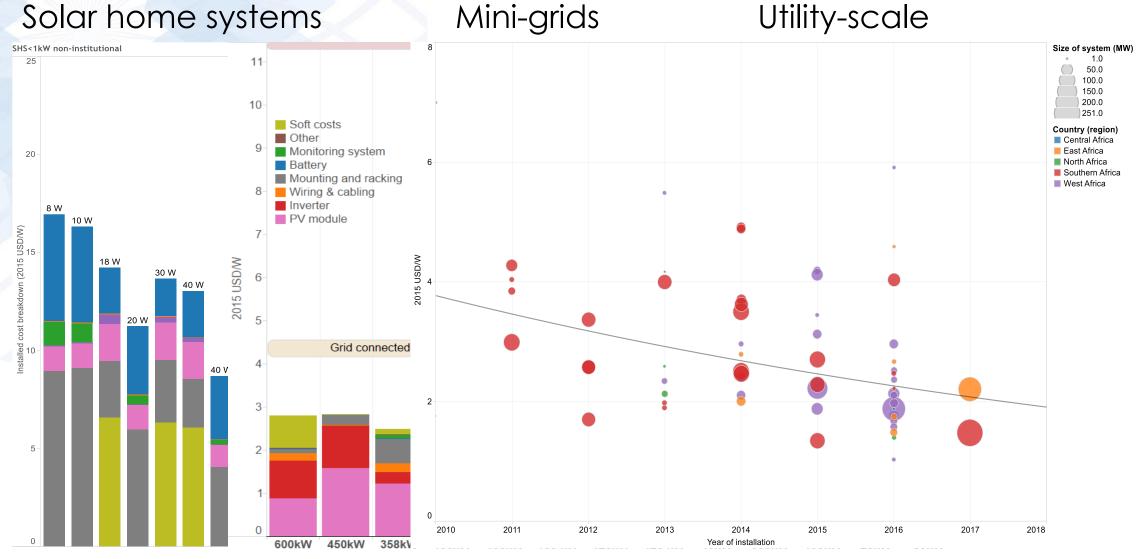


Evolution of Costs per Quarter (Prelimi^{Costs in 2014 vs System Size (Preliminary Results)} 2010 201 San Francisco 1A-JuneN 20-1.10 1.10 Band of LCOE SF <= 20 kW 1 we 2 we Band of Rate PG&E E6 Tier 1 0 0 3 wd 1.00 18 1.00 4 wd Rate High O 5 wd 6 wd ——Rate Low 0 7 wd 0.90 0.90 8 we LCOE High 16-9 we 10 wd LCOE Low [4] ₩ 10.80 11 wd O 12 wd PV Value, Base Load, E6, (5.5 kW) 0.80 O 13 wd 14 i[2015 Q3 USD/ P 0.0 02.0 14 wc 15 we 0.70 16 we 17 wo d 18 wc 12-Watt [\$/Wdc] 19 w 20 wo 0.60 Rate [Median Cos 23 we 24 wd Cost per Electricity Electr 0.50 25 wd 3.28 26 wd 27 wd 28 wd 0.40 29 we and 30 we Ш О.30 0.30 0.20 0.20 0.10 0.10 000 ο 0 0 0 0.00 0.00 0 0 2013 2013 2013 2014 2014 2014 2014 2014 2015 2015 2015 2012 2012 2012 2013 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1

Real Chrojeenticond lateratricity Rates Apply sis Analysis

Solar PV Costs in Africa





Mini-grid project



COSTREDUCTION POTENTIALS



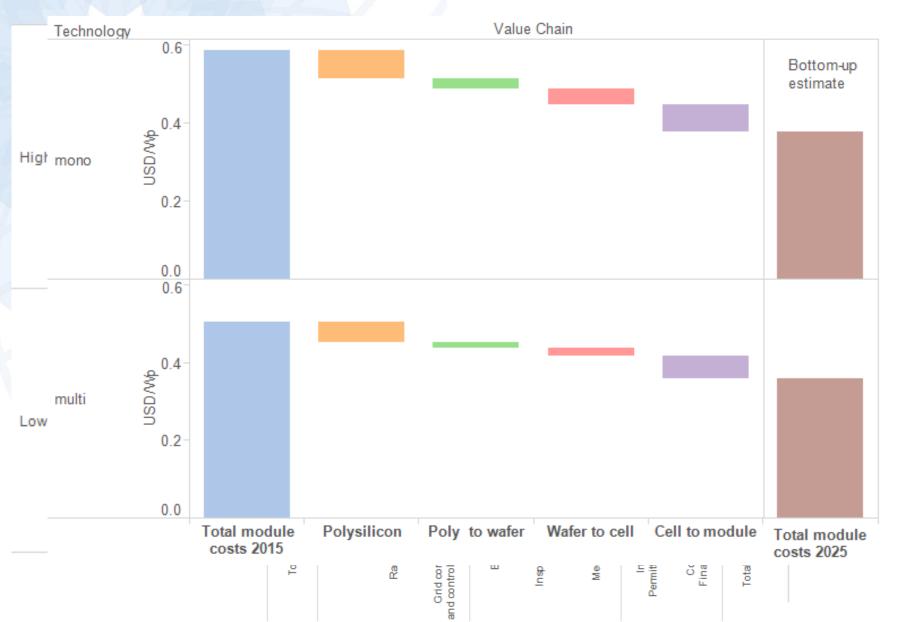
Cost reduction drivers are changing

Low equipment costs change the dynamics

Balance of project costs, O&M, financing will grow in importance

In some cases more challenging to unlock

But cost differentials are large and the policy levers exist



Solar PV cost reduction potentials



Large average cost reduction potential

BoS to dominate

Upcoming cost analysis: Firm



PV parity indicators

Global wind learning curve

Stationary applications

Energy security

RE power cost reduction potentials

RE financing costs

Solar PV costs in Africa



IRENA's Cost Analysis



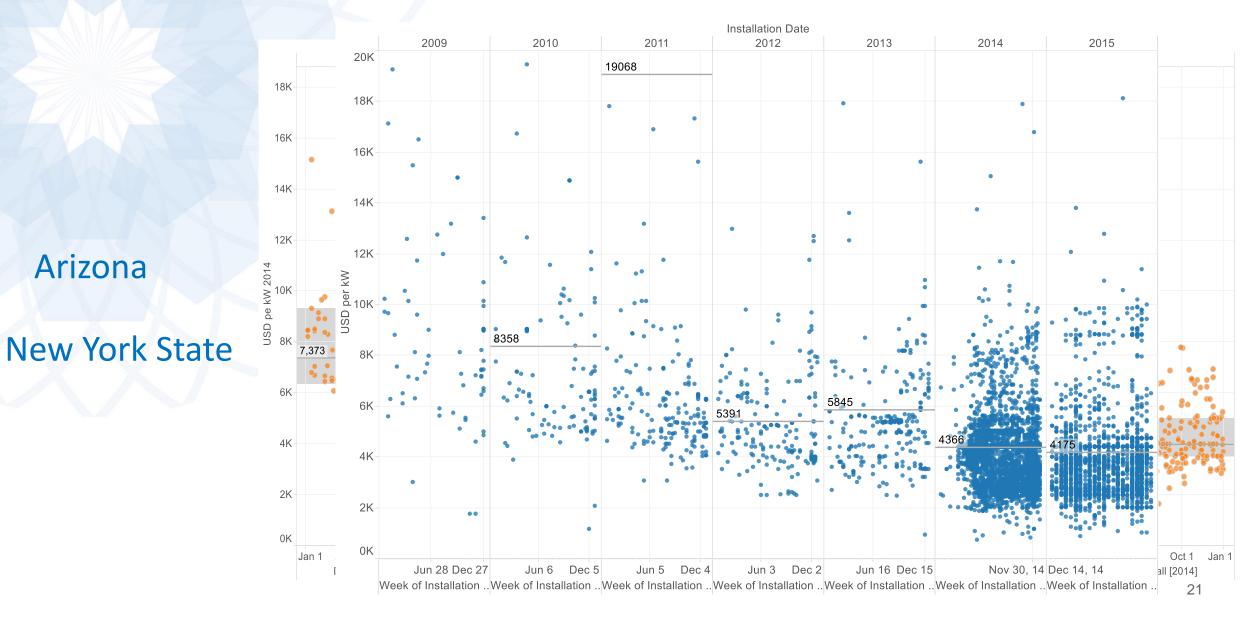


Bringing Our Future Forward

Thank you! mtaylor@irena.org

COMMERCIAL SOLAR PV COSTS

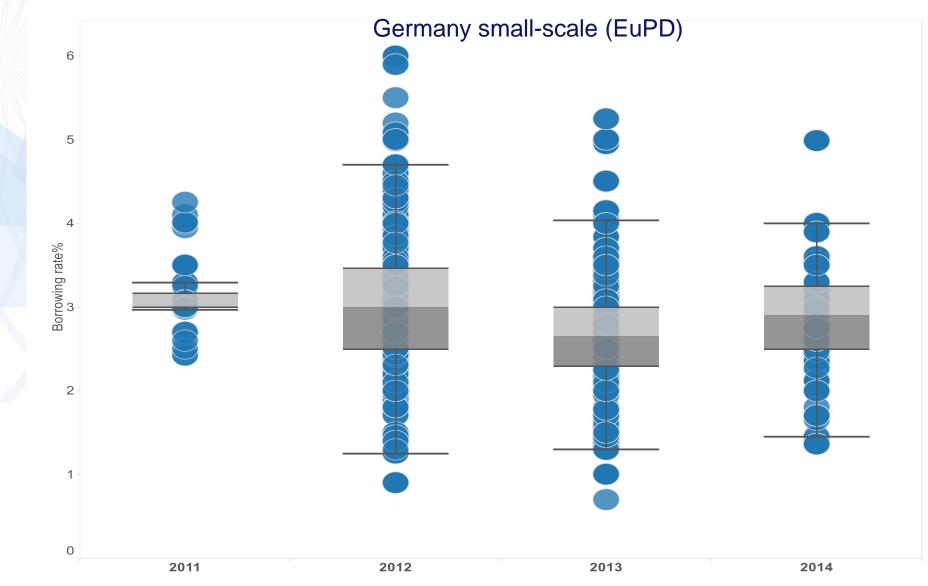




The cost of finance

16%





Source: Renewable Energy Finance Tracking Initiative

Solar PV Costs in Africa

Data collection challenging, but encouraging results

- Some markets relatively competitive
- Significant cost reductions appear possible for hardware and soft costs
- Very small SHS cost structures are challenging
- Government bodies should be aware of the "reasonable" cost range for their procurement process
- Regional deep-dives necessary for greater clarity



