

International Solar Alliance Expert Training Course: Session 18

The Future of Solar Policy

In partnership with the Clean Energy Solutions Center (CESC)

August 2019

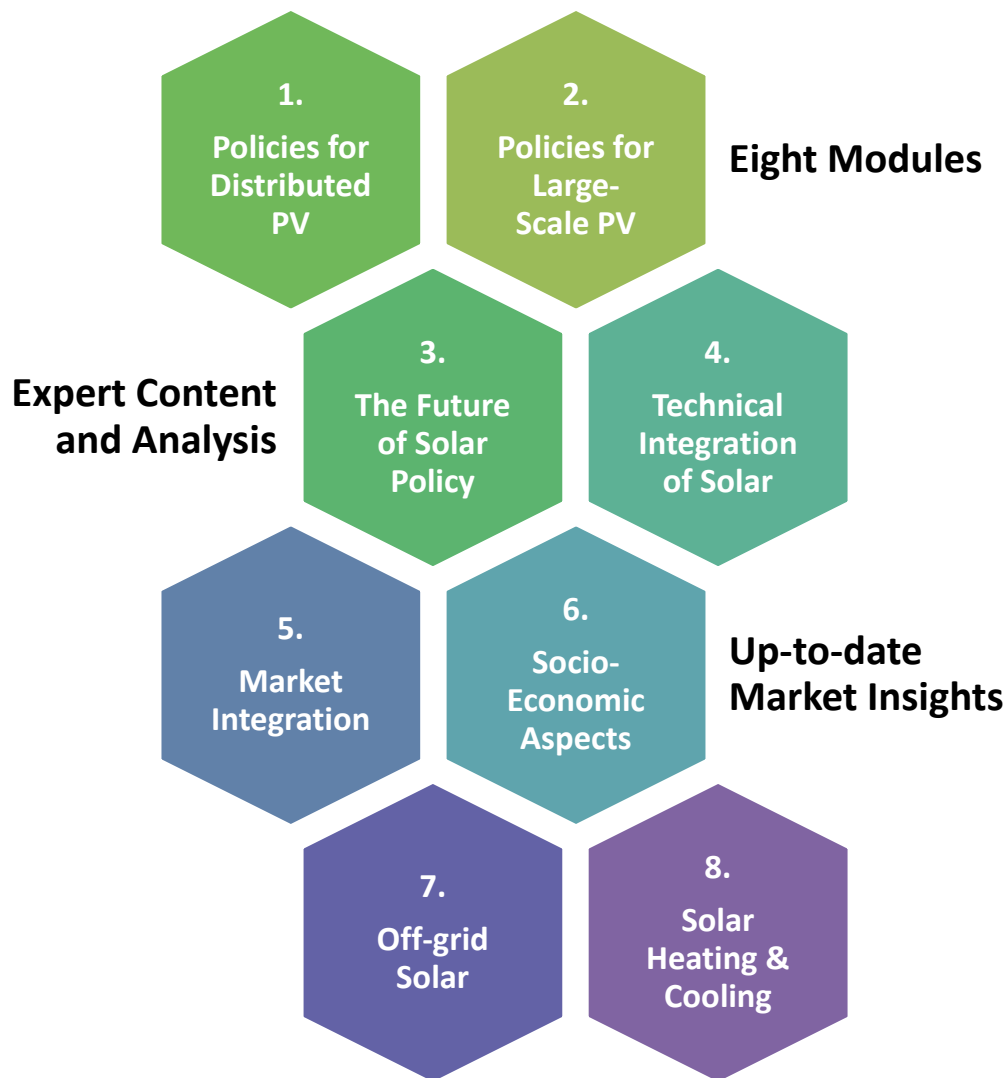
Supporters of this Expert Training Series



ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

Overview of Training Course Modules

This Training is part of Module 3, and focuses on the issue of **the Future of Solar Policy**



Overview of the Presentation

- 1. Introduction: Learning Objective**
- 2. History of Solar Policy**
- 3. Future Pathways for Solar PV Policy**
- 4. Concluding Remarks**
- 5. Further Reading**
- 6. Knowledge Check: Multiple-Choice Questions**

1. Introduction: Learning Objective

Learning Objectives

- ❖ **Understand the history of solar policy**
- ❖ **Understand the challenges and market realities that are shaping the future of solar policy (and RE policy more broadly)**
- ❖ **Understand the different pathways that the future of solar PV policy could take**
- ❖ **Understand the impacts of near-zero marginal cost electricity on electricity markets**

2. History of Solar Policy

History of Solar Policy

- For most of the last 3-4 decades, solar policy has involved tax incentives, rebates, grants, mandates, preferential treatment (e.g. priority grid access), feed-in tariffs, net metering, among others (see **Session 14 on the Introduction to Solar Subsidies**)
- However, in recent years, solar policy has begun to evolve, and often requires little or no explicit subsidy
- Some solar PV projects are becoming “**subsidy free**”. For more information on this, see **Session 15 on Subsidy-Free Solar**

History of Solar Policy

- Recent solar PV auctions in Europe have resulted in contracts with zero premium attached: in other words, projects bid in a competitive auction to obtain the wholesale spot market price
- Subsidy-free solar PV projects are now being built in Germany, Italy, Spain, and elsewhere, mostly via corporate PPAs

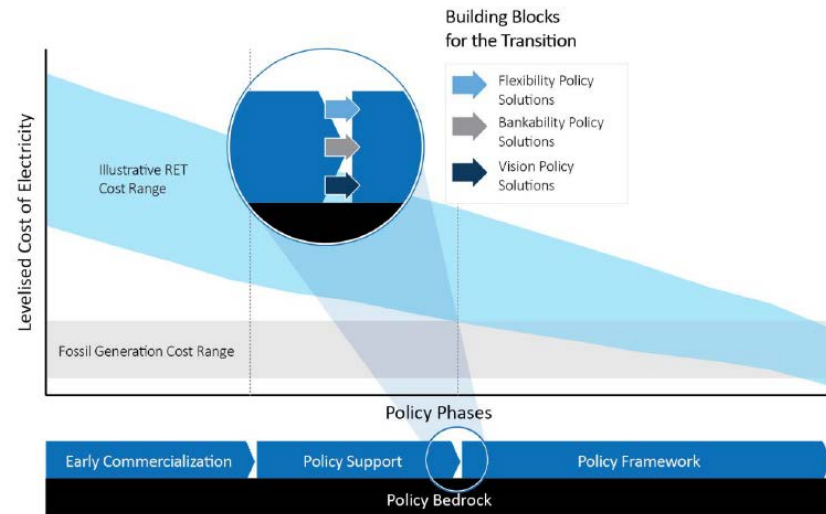
Sources: <https://www.baywa-re.com/en/news/details/baywa-re-builds-first-subsidy-free-solar-park-in-germany/>
<https://www.renewableenergyworld.com/articles/2018/09/subsidyfree-solar-farms-popping-up-from-britain-to-italy.html>
<https://www.pv-tech.org/news/investors-ready-to-pounce-on-subsidy-free-solar-momentum>

History of Solar Policy

- Three basic phases of renewable energy policy

1. **Early Commercialization Phase**
2. **Policy Support Phase**
3. **Policy Framework Phase**

Cutting across all three phases is the “Policy Bedrock”

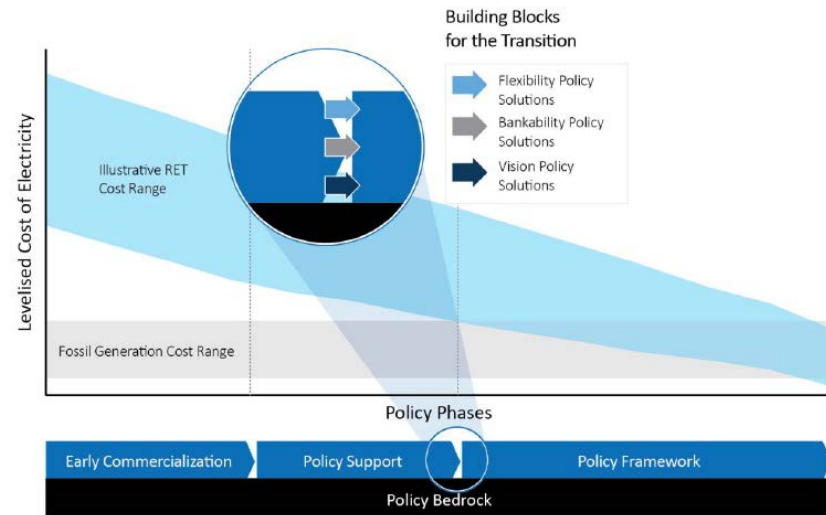


Source: [IEA-RETD 2016: RE TRANSITION](#)

History of Solar Policy

The “**policy bedrock**” refers to the basic elements required for electricity markets to function, and for investments to happen:

- Grid access
- Permitting
- Planning rules
- Zoning guidelines
- Etc.

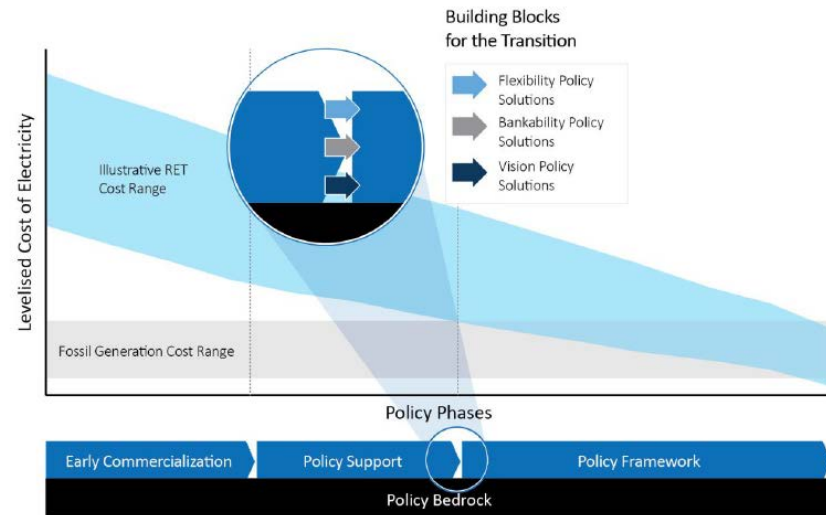


Source: [IEA-RETD 2016: RE TRANSITION](#)

History of Solar Policy

The “**Policy Framework**” phase refers to the point at which RE technologies are beyond the LCOE of conventional generation.

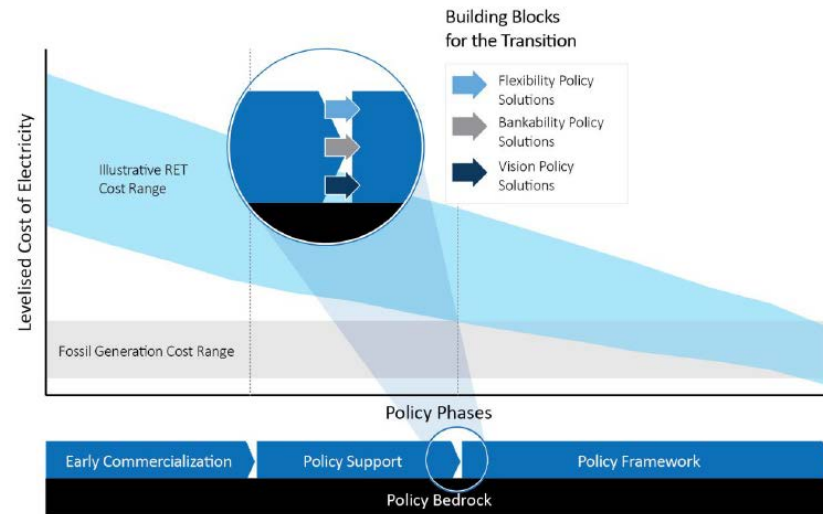
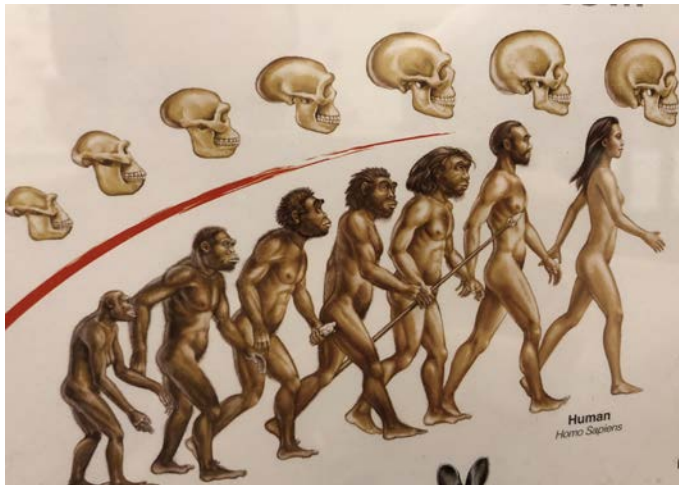
However, growing consensus that certain basic rules and provisions are still needed to ensure projects remain investable.



Source: [IEA-RETD 2016: RE TRANSITION](#)

History of Solar Policy

- As we enter the Policy Framework Phase, **solar policy is evolving rapidly**
- The question is: into what?



Source: [IEA-RETD 2016: RE TRANSITION](#)

History of Solar Policy

- This presentation lays out a number of ideas for potential future pathways
- Important to note that much of this remains **hypothetical**

”Making predictions is hard. Especially about the future.”
- Physicist Niels Bohr.

There are more than two paths to take...



Photo: https://www.huffpost.com/entry/10-useful-ways-to-choose-the-right-direction-in-life_b_9192982

3. Future Pathways for Solar PV Policy

The Future of Solar PV Policy

- Many used to think that older policies like **cash grants and rebates** would stop being used as the cost of solar declined, such policies remain widely in use in many of the most advanced solar PV markets (Australia, the U.S.)
- Grants and rebates lead to **start-and-stop cycles** of development
- Moreover, they distort the market and investor expectations
- Investors often wait until subsidies are available again before investing (even when it makes economic sense to invest!)

See Australia (July 2019): <https://reneweconomy.com.au/victoria-residential-solar-market-in-contraction-data-shows-30319/>

The Future of Solar PV Policy

- There is also evidence to suggest that **grants and rebates also push up solar PV installed costs**, as installers inflate their prices in response
- Thus, the case for phasing out subsidies, grants, and rebates for solar PV is strong

Q: What should take their place?

The Future of Solar PV Policy

- Some argue that the continuing distortions of the electricity market (e.g. the non-internalization of externalities, incumbency advantages, market power, already-amortized assets, etc.) make such policies and subsidies necessary well into the future
- **In other words:** the electricity market is already distorted beyond recognition, so it is necessary to level-out an uneven playing field



Photo Credits: Kazuya Akimoto Art Museum

The Future of Solar PV Policy

Some argue that because solar PV is now:

- Mature
- The lowest-cost source of new power generation
- Can be produced onsite for less than the utility's price in most parts of the world

There is no longer any need for further policy and regulatory support. The market will take care of the rest.

At first glance, the emergence of subsidy-free solar seems to support this view

Other trends are also emerging...

Moreover, **new business models** are entering where policy has left a gap:

- **Solar leasing**, for instance, is making it possible for many to invest in solar via a third party, overcoming many of the traditional barriers that held people and companies back
- **Corporates, peer-to-peer platforms, aggregators**, etc. are starting to redefine the terms on which solar power is bought and sold

“The Death of the Single Buyer”

Instead of one off-taker,
there are now many

Corporate PPAs (real or
virtual) are also making it
possible to procure solar
PV directly, without
relying on government
policy or price supports



Peer-to-peer electricity trading

- Customers (residential, commercial, industrial) can now share power with one another, cutting out the middle-man
- Blockchain and other applications are making it possible to "buy solar" directly from other peer suppliers on the network (see session on P2P and Blockchain)
- Such markets can function without explicit subsidies or support mechanisms

Grid defection + Load defection?

- A growing number of customers are finding it possible to disconnect fully from the grid by combining solar + storage
- This could have significant implications for the future of electricity markets (not to mention utility revenues!)



<https://rmi.org/insight/economics-grid-defection/>

<https://rmi.org/insight/economics-load-defection/>

This is not surprising: Solar PV is well below retail prices in a growing number of markets

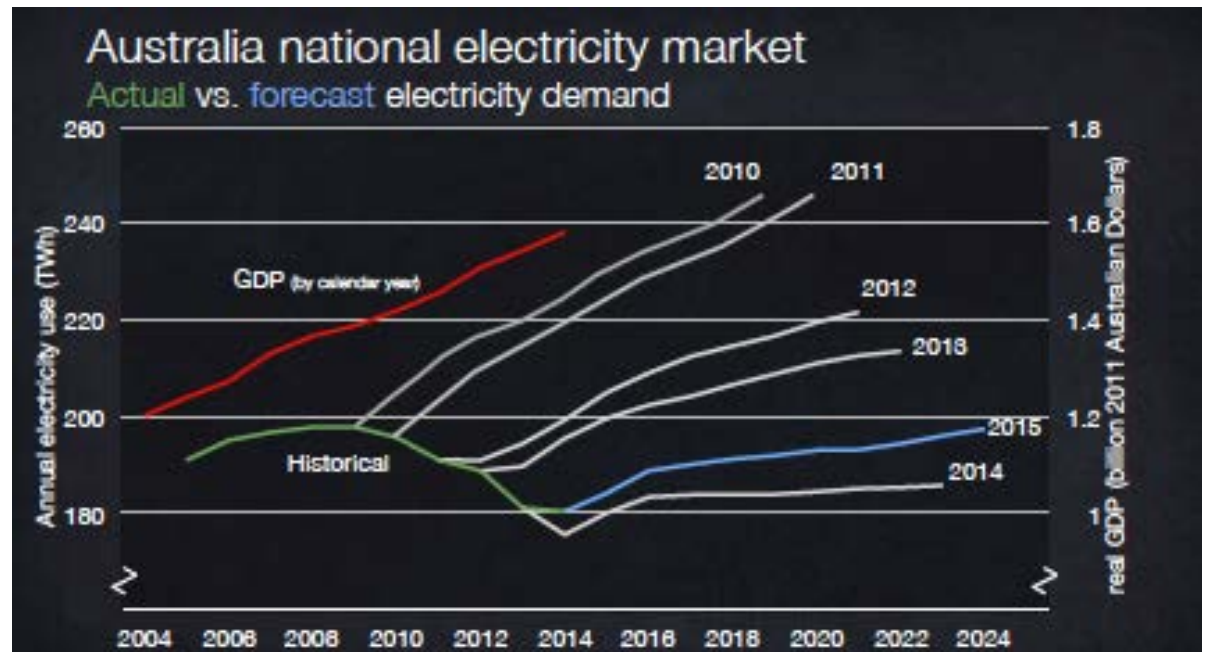
Country	Current Retail Rate (EUR/kWh)	Approximate LCOE of customer-sited solar PV (EUR/kWh)	PV LCOE as a Percentage of Retail Rate
Germany	0.30/kWh	0.8/kWh	~27%
Hawaii	0.33/kWh	0.6/kWh	~20%
Australia	0.20/kWh	0.5/kWh	~25%
New York (U.S.)	0.18/kWh	0.8/kWh	~44%
Cape Verde	0.27/kWh	0.11/kWh	~41%

Utility load-growth is turning negative...

- In some feeders, residential solar now surpasses 200% of minimum daytime load (e.g. Hawaii)

-Australia's national electricity demand forecasts continue to misfire, over-estimating demand growth

-Partly caused by the rise of distributed solar



Source:

<http://www.ucdenver.edu/academics/colleges/SPA/researchandoutreach/wirthchai/Documents/Amory%20Lovins%20slides%20Oct%206%202017.pdf>

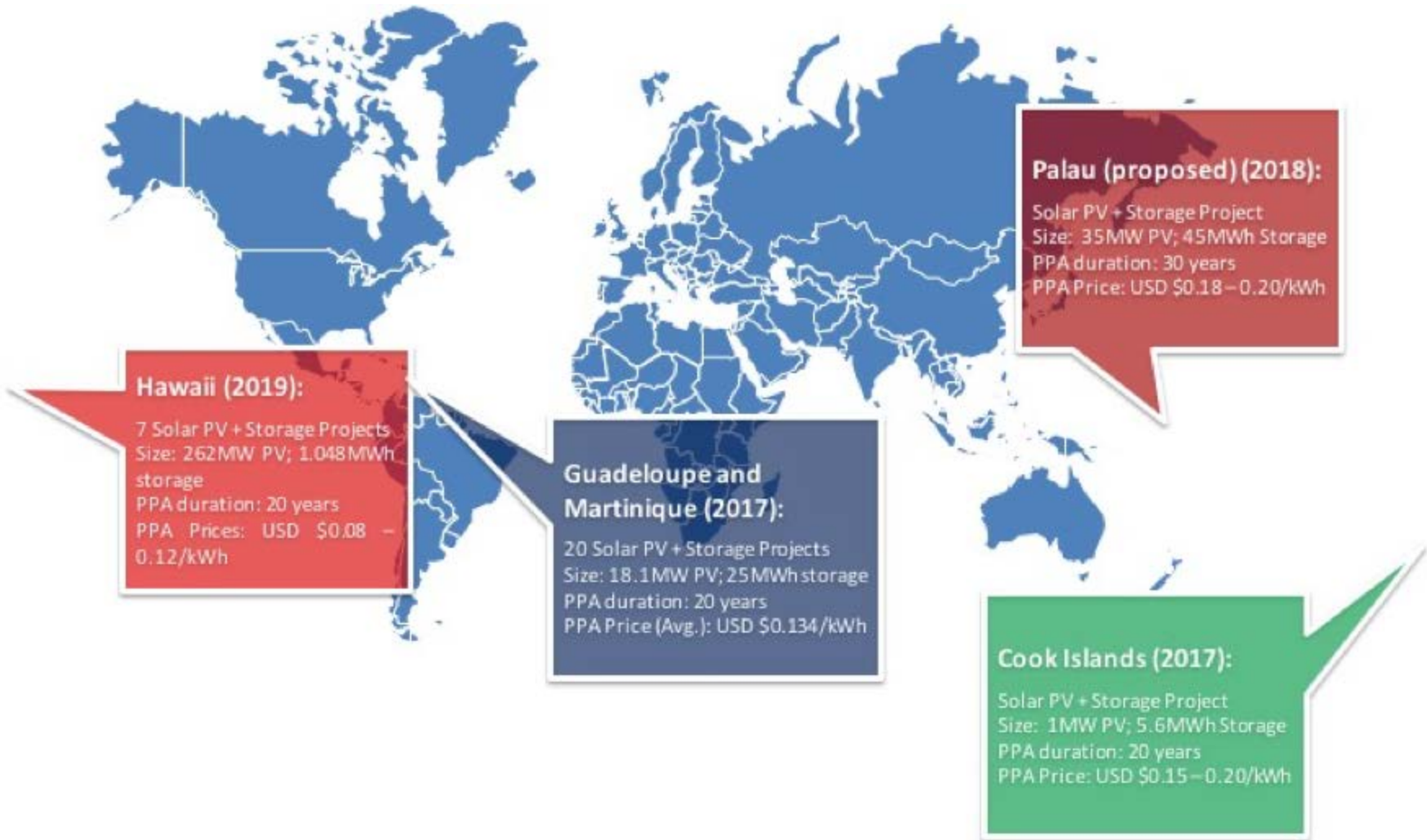
The Solar + Storage Tsunami

- Solar + Storage is becoming increasingly cost-competitive
- Australia national regulator recently found that solar+storage is cheapest way to maintain electricity access in remote communities



<https://reneweconomy.com.au/off-the-grid-aemc-paves-way-for-stand-alone-systems-to-replace-poles-and-wires-44240/>

Islands are coming to the same conclusion...



Source: E3 Analytics research

And much of Africa too...

“Solar Killed the
Generator Star”

<https://vimeo.com/341730105>

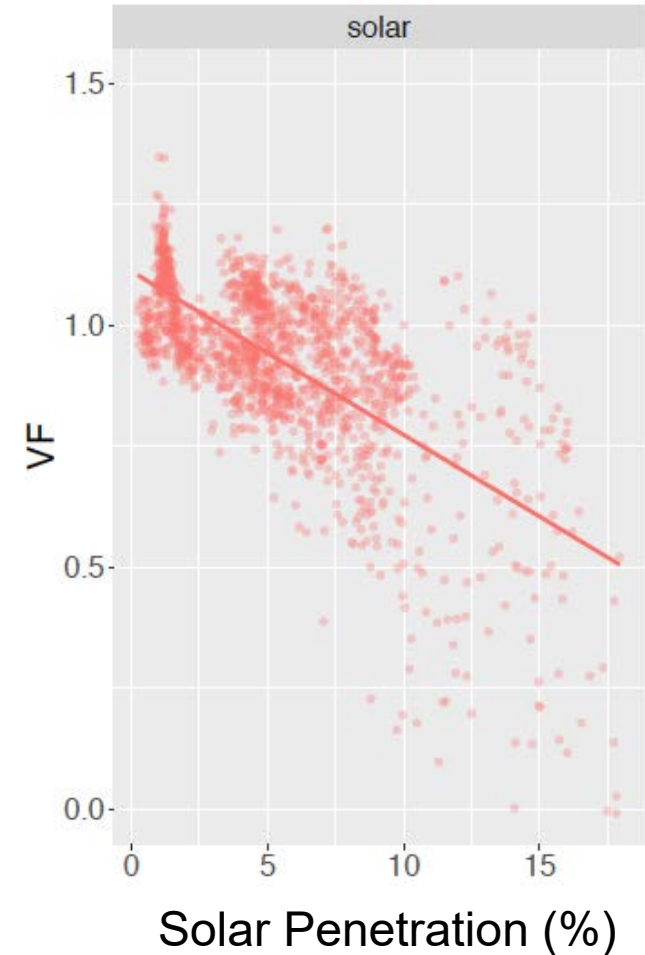


So where does this leave solar PV?

- Are subsidies still needed?
- Is policy in any form still needed?
- Are there are trends from markets around the world that provide insights?
- Is there one way forward (i.e. **policy convergence**), or rather many (**policy divergence**)?

The elephant in the room...

- Rising shares of solar PV push wholesale market prices down
- "Cannibalisation effect"
- Raises problems for "subsidy-free" solar projects
- Most use hedging strategies: hybrid PPAs



Source: https://www.eeg.tuwien.ac.at/conference/iaee2017/files/presentation/Pr_580_Lopez_Prof_Javier.pdf

4. Concluding Remarks

Reflections on the Future of Solar Policy

- **Targets** will likely remain important
- **Streamlined permitting** and interconnection procedures remain key: i.e. the “Policy Bedrock”. i.e. **Remove the barriers**
- Corporate and other bilateral **PPAs** are here to stay
- **Hybrid PPAs** (part contract pricing, part wholesale market sales) likely to continue to grow
- **New business models** (leasing, P2P sharing, virtual net metering, etc.) will continue to grow in importance

Reflections on the Future of Solar Policy

- Alternative policies like **solar mandates** (i.e. obligation on all new construction) will become more widespread
- The **self-consumption “prosumer” market** is going to become a major part of the market in the coming years
- The **economics of Solar+Storage** could define the industry’s future, and reshape the power sector in the process



Reflections on the Future of Solar Policy

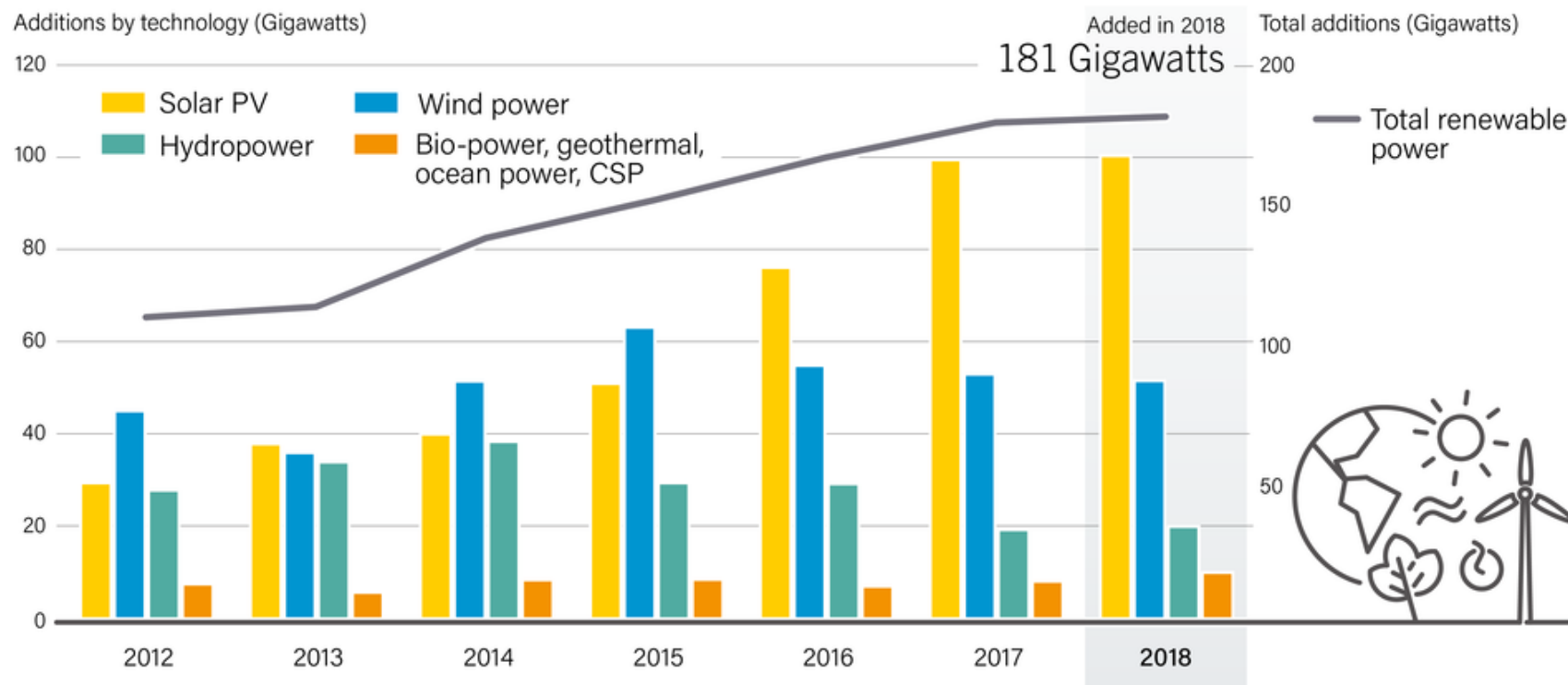
- Keeping lenders (banks) involved requires bankable business models for PV project development
- Critical to keep the flow of low-cost finance to the sector open: unclear spot-market prices can do that alone...
- Solar must remain **bankable** (even if it's the cheapest source of new electricity supply!)

Open questions

- Increased shift to **payments based on “value”** and away from LCOE-based payments (e.g. FITs & PPAs)?
- Technology-neutral **auctions** as a long-term solution?
- What about **carbon pricing**? Can't hurt.
- What about **financial de-risking** mechanisms? e.g. Low interest loans? Off-taker guarantees?

We are moving far too slowly...

Annual Additions of Renewable Power Capacity, by Technology and Total, 2012-2018

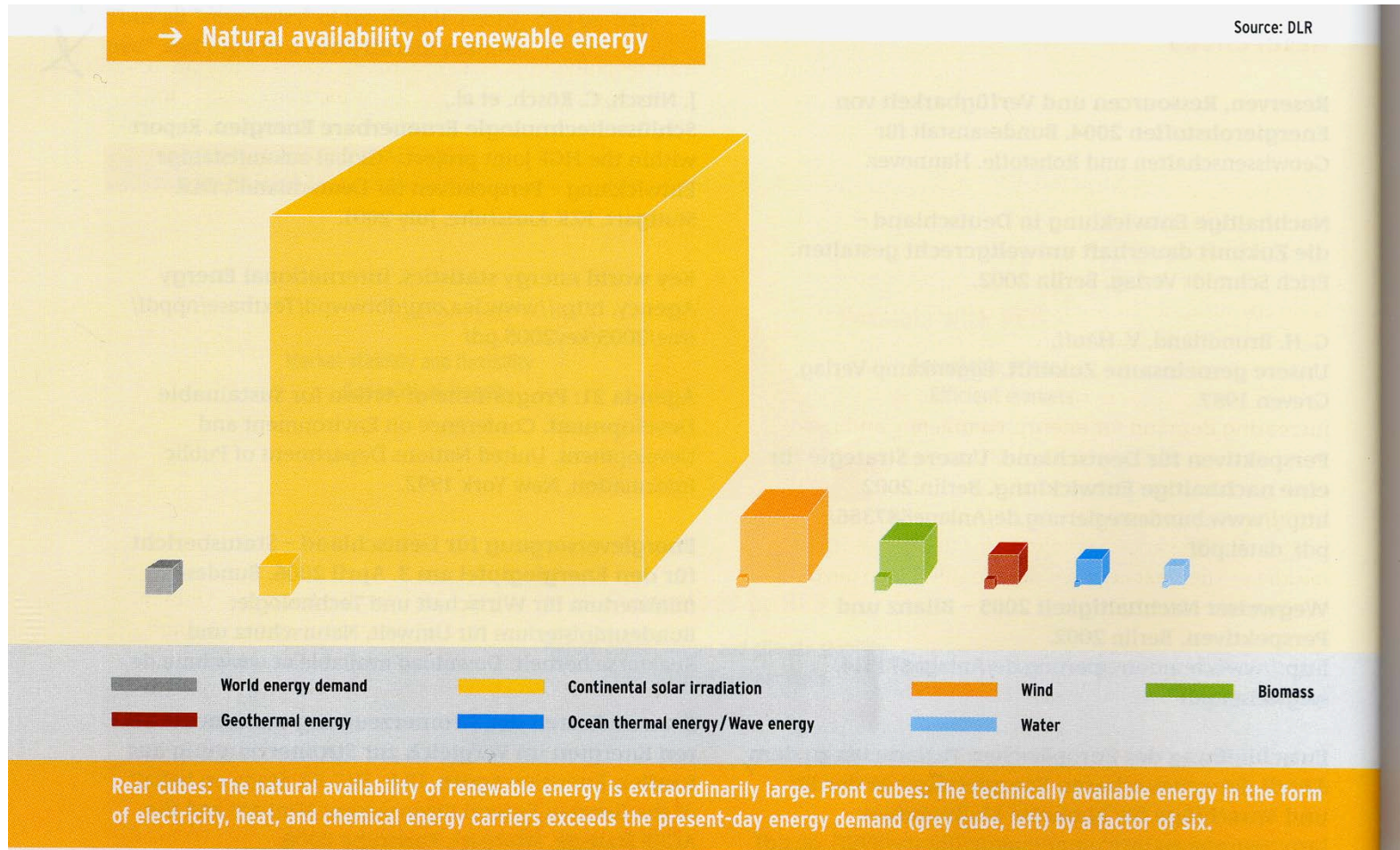


Note: Solar PV capacity data are provided in direct current (DC).

REN21 RENEWABLES 2019 GLOBAL STATUS REPORT

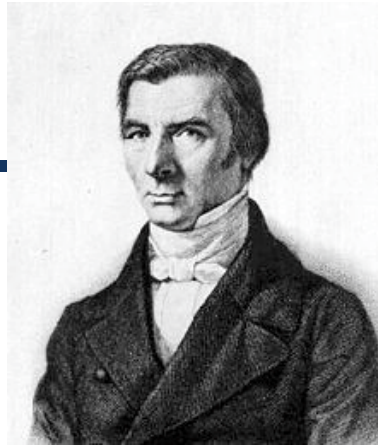
Source: https://www.ren21.net/gsr-2019/chapters/chapter_01/chapter_01/

Solar remains our most abundant energy resource

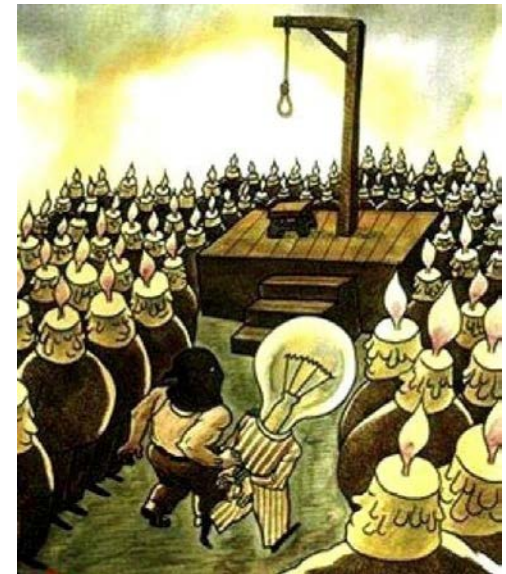


Source: DLR 2007

Frederic Bastiat

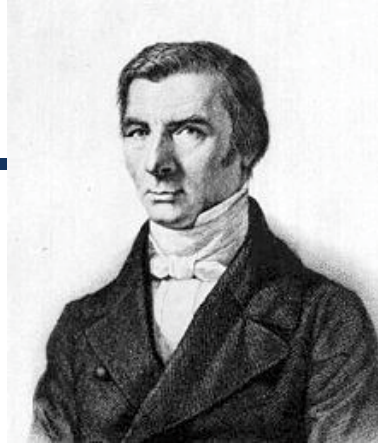


*“We are suffering from the ruinous competition of a rival who apparently works under conditions so far superior to our own for the production of light that **he is flooding the domestic market with it at an incredibly low price**; for the moment he appears in the morning, our sales cease, all the consumers turn to him, and a branch of our industry whose ramifications are innumerable is all at once reduced to complete stagnation. **This rival... is none other than the Sun.**”*

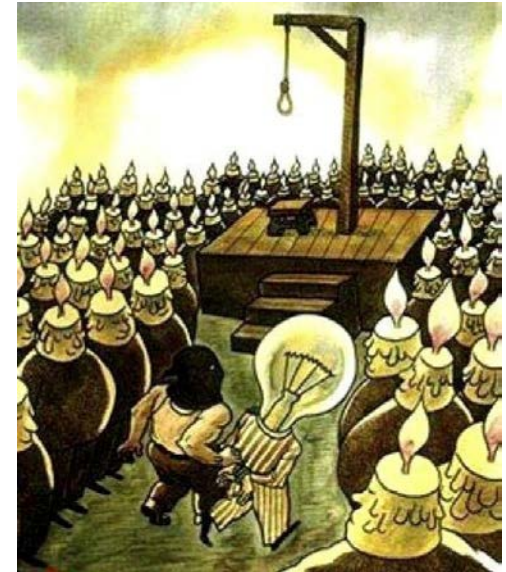


- <http://bastiat.org/en/petition.html>

Frederic Bastiat



*“We ask you to be so good as to **pass a law requiring the closing of all windows, dormers, skylights, inside and outside shutters, curtains, casements, bull's-eyes, deadlights, and blinds** — in short, all openings, holes, chinks, and fissures through which the light of the sun is wont to enter houses. Make your choice, but be logical... **how inconsistent it would be to admit the light of the Sun, whose price is zero all day long!**”*



- <http://bastiat.org/en/petition.html>

5. Further Reading

Further Reading

- Jacobs, D., Couture, T.D., Zinaman, O., Cochran, J., (2016). “RE-TRANSITION: Transitioning to Policy Frameworks for Cost-Competitive Renewables,” IEA-RETD, Paris. Available at: http://iea-retd.org/wp-content/uploads/2016/03/IEA-RETD_RE-TRANSITION.pdf
- IRENA, REN21, IEA (2018). Renewable Energy Policies in a Time of Transition, Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_IEA_REN21_Policies_2018.pdf
- Analysis of the Scope of Energy Subsidies and Suggestions for the G-20 Initiative (2010)., IEA, OPEC, OECD, World Bank Joint Report. Available at: https://www.iea.org/media/weowebiste/energysubsidies/G20_Subsidy_Joint_Report.pdf
- Can the Solar Industry Survive Without Subsidies (June 2018). The Economist. Available at: <https://www.economist.com/business/2018/06/14/can-the-solar-industry-survive-without-subsidies>

Thank you for your time!



ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

6. Knowledge Checkpoint: Multiple Choice Questions