



USAID
FROM THE AMERICAN PEOPLE

USAID CLEAN POWER ASIA

PHOTO CREDIT: ISTOCK.COM

An overview of international compensation mechanisms for DPV

Noah Kittner, Group for Sustainability and Technology, ETH Zürich
and Chulalongkorn University

Sopitsuda Tongsovit, USAID Clean Power Asia
December 12, 2018

Scoping a DPV Impact Analysis for the Philippines

Prepared for the ACEF conference in Manila

Outline

- International Comparison (Germany, California, Malaysia, Thailand)
 - Net metering
 - Buy all, sell all
 - Net billing
- Policy transition
- Drivers for the transition
- Observations about current motivations and challenges

Policy transition from net energy metering to net billing and self-consumption

- International transition from net energy metering
 - Issue of direct kWh credit versus including timing of generation and retail rates
- Early countries try to incentivize adoption and deployment of new technology
 - German Feed-in Tariff
- Ultimately – how do utilities value kWh at different times and avoid grid defection
- Emergence of "buy-all sell all" and "net billing"

California's Experience

- Transition to Net Metering 2.0
 - Recently changed compensation to closely reflect retail rates
 - TOU rates for residential customers
 - Identify peak period beginning at 4 PM (real peak is around 6 PM)
- Grandfathering net metering scheme for 5 years for residential and 10 years for other customers in transition
- Takes advantage of TOU pricing for utilities to manage system more efficiently
 - Innovative approaches to deal with duck curve and grid flexibility
 - Surplus of daytime power
- Challenge: US states have different net metering and billing policies that vary by state and across grid balancing authorities!
- Time of use pricing helps manage utility cost recovery.

Interconnection fees and non-bypassable charges

- Utility companies in California can now issue one-time interconnection fee for new solar PV customers (ranges from \$120 – 150 USD)
- Non-bypassable charges can be charged, therefore, net metering “credits” cannot forego charges
- Commission to adapt and revise rules in 2019 to account for new market developments

Time-of-use and locational pricing

- Highly distributed and localized costs and benefits of PV to the grid
- Commission established to investigate spatial impacts of distributed PV
- Utilities and customers seek consensus and compromise on cost/benefit framework
- Time-of-use pricing already accounts for changes to system with high penetrations of distributed PV and utility challenges of peak nighttime load management

Germany's Experience

- Transition to self-consumption and net metering
 - Why? History of high FIT led to dynamic lowering of FIT
 - Self-consumption makes sense to consumer when FIT level dipped below retail rate of electricity
- Credited at retail rate
- Incentivizes owners to match generation on site
- Potential transition to renewable energy trading at block or community scale
- Multiple policies are used together and not as replacements or substitutes for each other, i.e. FIT, low interest loans, self-consumption, third-party ownership

Declining FIT in Germany and slow growth

- Early adoption of FIT led to over-subsidization of new, lower-cost modules
- Feed-in tariff rates set to reduce significantly and halted in 2017
- Encourages more self-consumption
- Has halted growth of installations in new residential solar PV technology

Thailand

- Policy objectives to support self-production and self-consumption in households, government buildings, and commercial enterprise
- Policy to compensate less than retail rate due to utility's concerns of lost revenue and captive consumers
- Issue: Existing grid codes cap power exported through distribution feeder
- Issue: Static versus dynamic buyback rate to lower overall costs
- Issue: Lack of clarity on compensation mechanism – if lower than retail rates, how to set appropriate rate to consumers?
- Emerging Policy Ideas: Peer-to-peer solar power purchases via blockchain platform; no utility purchase needed

Malaysia's experience

- Malaysia announced net billing scheme in 2016 however, experienced slow uptake
 - Low compensation for excess generation
 - Forfeit of remaining credits after 2 years
 - Burden of metering costs on customers
- 2018 announced switch from net billing to classical net metering
 - Commercial and industrial consumers limited by max installation cap of 75% peak demand
 - Net exports have a floor of 1 kW
 - Small systems do not require feasibility studies (<72 kWp capacity)
 - Switch from capacity to percentage of peak demand-based limits

Vietnam

- Nascent rooftop solar market
- 2017 introduced version of net metering
 - Resembles “net metering with rolling credits and buyback”
- With low electricity prices, this compensation mechanism could stir support
- Lack of capital investment and surging energy demand growth during peak hours (household air conditioning)
- Solar leasing or third-party ownership mechanisms would also spur adoption

Drivers for the transition

- Timing of generation and changing economics of retail rate tariffs
 - i.e. “Duck Curve Problem”
- Who pays for utility upgrades (customers or utilities / how are revenues calculated for defecting customers?)
- Equity and fairness for customers and utility companies
- Trends toward utilizing residential energy storage options including batteries to incentivize self-consumption

Current motivations and challenges

- Increase adoption of new technologies, preparedness to integrate distributed PV, and stimulate new job-creating industries
- Reduce energy bills for residential customers
- Defer investments in distribution system equipment for voltage support and frequency regulation
- Modernize the power grid

Challenges for compensation mechanisms

- Is self-consumption good for utility companies?
- What is the value of a kWh produced?
- How do utilities increase the value of kWh produced from rooftop PV?
- Fixed charges and interconnection fees remain potential barrier to adoption
- Policy incentives can drive new industry and develop innovative business models

Brief Reviews across Continents

Self Consumption in EU

- In some European countries, NM has been chosen to follow the end of previous support schemes (FIT, Green Certificates)

Self Consumption in the U.S.

- State with high incentives: Some states (DC & LA's grandfathered projects) authorize NM with rolling credits over an indefinite period for carrying the retail credit forward.
- States that already transitioned from NM to NB: Nevada, Louisiana, Mississippi, Hawaii
- Value of Solar Rate: Arizona is considering it; Minnesota and the City of Austin already implemented it

Self Consumption in Reviewed Developing countries (See Appendix)

- Simple NM schemes or NB with compensation below the retail rate.
- Various reasons: Malaysia (learned of what's happening in the U.S.); Singapore (avoided cost concept); Thailand (upcoming: attractive economics in comparison to retail price)

Take-home messages

- There is no “best model” for DPV compensation mechanism.
- Appropriate design depends on market structure, regulatory paradigm on ratemaking, stage of DPV market development, power systems impact, and available technology (e.g., energy storage, blockchain)
- Investors want stable policy for decision-making
- Flexible approach should adapt to emerging trends including transition from feed-in tariff style programs to self-consumption schemes at higher penetrations of distributed renewable energy
- Systems-scale models help alleviate utility impacts and maximize benefits of DPV across stakeholder groups.

Mr. Sithisakdi Apichatthanapath
USAID Regional Development Mission for Asia
Athenee Tower, 25th Floor
63 Wireless Road, Patumwan
Bangkok, Thailand
Tel: +66 2257 3000
Email: sapichatthanapath@usaid.gov

Ms. Dana Kenney
USAID Clean Power Asia
Abdulrahim Place, Suite 501
990 Rama IV Road
Bangrak, Bangkok 10500
Tel: +66 2026 3065
Email: Dana_Kenney@abtassoc.com

PHOTO CREDIT: ISTOCK.COM



USAID CLEAN POWER ASIA