Unlocking Commercial Financing for Renewable Energy in East Asia

Dr. Xiaodong Wang
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Structure of the Presentation

- **Conductive policies** are prerequisite for catalyzing renewable energy investments
- **When to use public funds**: overcome market barriers and risks
- **How to select financing instruments**: tailored to market barriers, segments, and local context
- **How to most effectively design and implement financing instruments**: lessons learned from case studies
- **Conclusion**

Conducive Policies: Pre-requisite for Catalyzing Private Investments in Renewable Energy

Renewable Energy: Mostly economically but not yet financially viable**,** **cost gap** between RE and fossil fuels is the No. 1 barrier

Three magic bullets for conducive renewable policies:

- **Adequate tariff levels with long-term PPAs**
  - **Mandate Price -- Feed-in Tariff (FIT)** or
  - **Mandate Quantity – Renewable Portfolio Standard (RPS)** or
  - **Competitive Tendering Mechanisms**
  - **Mutually exclusive:** Choose one, but not three policies at the same time
  - **Address affordability and minimize cost impacts on consumers**
- **Mandatory grid access**
- **Incremental cost pass-through**

RPS, FIT, and Concession: Pros and Cons

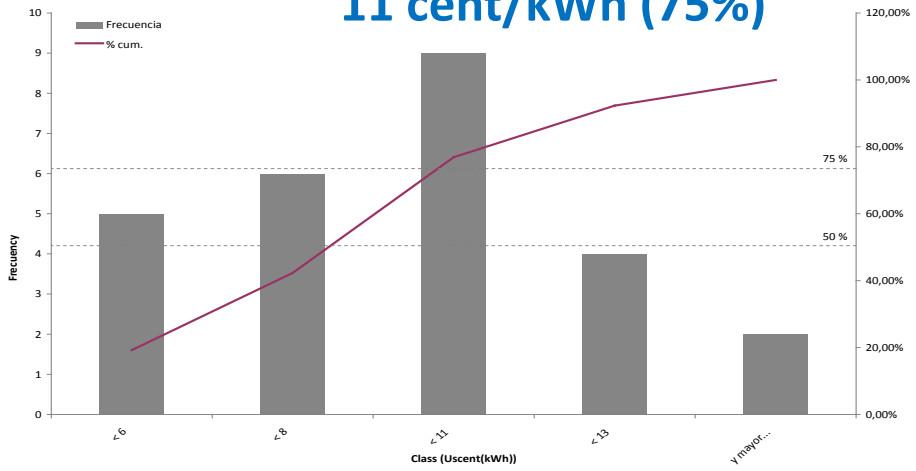
	Pros	Cons
FIT (>50 countries with FIT)	• The most successful to scale up RE • Highest price certainty to investors • Most simple to administrate	• Setting the tariff level is tricky • Affordability issue needs to be addressed • Coordination with grid expansion could be difficult
RPS (12 countries +35 US states with RPS)	• If enforced, can meet realistic RE targets	• Complex to design and administer • Favor least-cost technologies • Lack of price certainty
Concession (20 countries with bidding)	•Effective at reducing cost •Conducive for grid planning at per-determined sites	• Signed contracts may not be realized • Favor least-cost technologies • More complex than FIT, but simpler than RPS

Feed-In Tariff Principles

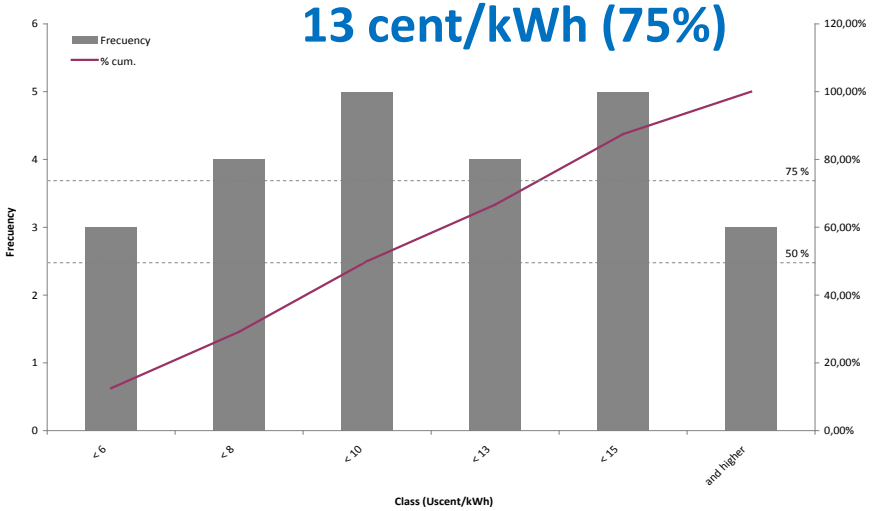
- **Objective**:
  - **balance** between **stimulating RE market** (a reasonable rate of return) and **minimizing cost impacts on consumers**
- Three methods of **setting price**
  - ✓ **Avoided cost** of conventional generation: financial cost and economic cost
  - ✓ **Cost of RE** plus reasonable profits: cost benchmark based on concession or existing project experience
  - ✓ **Average retail rate:** net metering
  - ✓ **Concession** as price finding mechanism
- **Long-term** contracts – 15-20 years
- **Guaranteed off-take**
- **Incremental cost pass-through**
- **Differentiation** by technology, resource, and size
- **Periodical tariff adjustment**, but only for new projects

FIT: Global Benchmarks

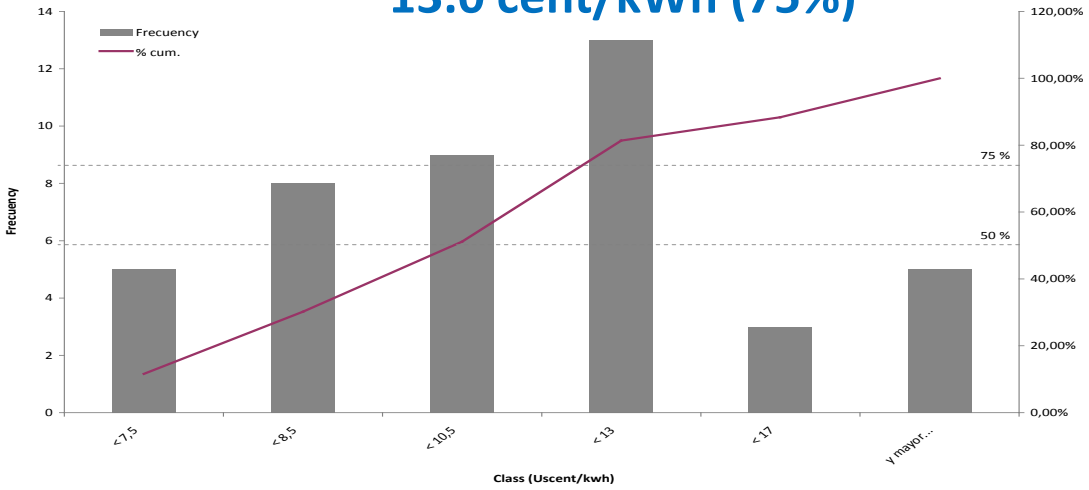
Small hydro < 8 cent/kWh (50%)
11 cent/kWh (75%)



Biomass < 10 cent/kWh (50%)
13 cent/kWh (75%)



Wind < 10.5 cent/kWh (50%)
13.0 cent/kWh (75%)



Many EAP countries have adopted ambitious RE policies and targets

China
- **RE Law: feed-in tariff** implemented
- **15% non-fossil fuel** in primary energy by 2020

Thailand
- **RE feed-in tariff** (adder)
- **20% RE** in final energy demand by 2022

The Philippines
- **RE Law: RPS and FIT**
- **Doubling RE capacity** by 2030

Indonesia
- **Concession scheme** for geothermal
- **17% RE** in primary energy by 2025

Feed-in Tariffs in East Asia

	China (varies by resources)	**Thailand** (varies by capacity)	**Malaysia** (varies by capacity)	**Philippines**
Mini/Micro Hydro		**10-12 (< 200 kW)**	**7.1-7.4 (< 30 MW)**	**13.3 (run of river)**
Biomass	**11.5**	**8.3-9.0**	**8.3-9.5 (<30 MW)**	**14.9**
Biogas		**8.3-9.0**	**8.6-9.8 (<30 MW)**	
Wind	**7.8-9.4**	**19-22**		**19.2**
Solar	**15-16.7**	**29**	**30.6-34.1 (<12 kW)**	**21.8**

Hybrid Approaches: RPS AND FIT

- **Principles:**
  - Remove overlap as much as possible
  - Apply RPS and FIT for different RE technologies or plant size: FIT covers small size projects and emerging technologies (solar PV) that are left out by RPS
- **Emerging International experience:**
  - ***Italy*** : FIT for small RE (< 1 MW) and solar PV + RPS
  - ***UK*** : FIT for small RE (< 5 MW) up to 2% of supply + RPS
  - ***California***: FIT for small RE (< 1.5 MW) up to 480 MW + RPS

Minimizing cost impacts on consumers

- **Germany:** periodically adjust down FIT levels
- **China:**
  - Concession as price finding mechanism to set up FIT
  - Wire charge to RE Fund: 0.25 cent/kWh
- **Thailand and Malaysia**:
  - FIT policy, but put **a cap on consumer price increase**
  - Thailand: no more than **0.27 cent/kWh** – allocating target for each RE technology, and reduced FIT for solar PV
  - Malaysia: no more than **1%**
- **The U.S.:** Rate increase with States RPS policy **< 1-1.5%**, and rate reduction in some states

When to Use Public Financing Instruments ?

- **With effective policies, commercial financing for grid-connected RE is the norm**
- **Public financing is needed to:**
  - **Demonstrate RE technologies**, when policies not in place
  - **Provide long-term tenure (e.g. long-term financing or risk guarantee)*:*** *Mismatch between the short-term tenure and long-term payback:*
  - **Mitigate technology risks (risk guarantee)*:*** *e.g. geothermal or CSP*
  - **Increase access to financing for SMEs (e.g. credit line, dedicated fund, mezzanine financing, equity financing) :** *Credit risks for SME developers (e.g. small hydro, biomass projects)*
  - **Overcome high upfront costs of RE consumer products:** *e.g. solar home systems and solar water heaters*

Financing Instruments: Tailored to Market Segments, Barriers, and Local Context

- ***Concessional Project Financing*: When sound policies not in place** as an interim measure, or **kick start new technologies**. **BUT** limited funds cannot lead to large **scale**
- ***Credit Lines***: Effective at increasing banks' capacity and confidence in RE investments, bundling **small-scale RE projects** (e.g. small hydro), and providing **longer term tenure** for RE projects; **BUT** supporting SMEs may be a challenge
- ***Risk Guarantees:*** Effective at increasing banks' confidence in the clients at **margins of credit ratings,** mitigating **new technology risks** (e.g. CSP) or **resource risks** (e.g. geothermal); **BUT** only reduce banks' **perceived** risks
- ***Dedicated Funds*: Effective at increasing access to financing for SMEs,** and when **domestic banks are not ready** for RE financing (e.g. IREDA); **BUT** leverage and scale-up key challenges
- ***RESCO Financing*: Effective at aggregating** small deals (e.g. roof-top solar PV); **BUT** not a magic bullet. **Super-ESCO** emerged as a viable model
- ***Mezzanine Financing*: Effective at bridging the equity/debt gap for SMEs and start-ups** (e.g. FIDEME, CAREC)
- ***Equity Funds*: Effective at supporting SMEs, RESCOs, new technologies, and start-ups** (e.g. GEEREF, Berkeley REAF)

Distributed RE Financing Mechanisms: Affordability and Delivery Models Essential

- **Consumer credit model:** Micro-finance institutions (MFI), financial institutions (FI), or utilities offer multi-year consumer credits for customers to **overcome the high upfront cost barrier**
  - **MFIs for solar home systems in rural areas**: *Bangladesh, India, Sri Lanka*
  - **FIs for RE appliances in urban areas***: green mortgage in the US*
  - **Utility On-bill financing**: *Solar water heaters in Tunisia, roof-top solar PV in the US*
- **Leasing model**: Leasing company owns, installs, and maintains solar PV, and charges a monthly fee. At the end of the leasing agreement, ownership transfers to the customers
  - *Off-grid SHS in rural areas: Laos by PESCOs and village energy managers*
  - *Distributed solar PV in urban areas: Solar City in the US, and Beijing Roof-top PV*
- **Fee-for Service model:** RESCO owns and maintains SHS, and charges a monthly fees to customers: *Dominican Republic, and Argentina and Senegal under concession model*

Which Public Financing Instruments Maximize Financial Leverage ?

- ***Engaging domestic banks through credit lines and guarantees***: high leverage of public funds and good prospects of sustainability
- ***Mezzanine and equity funds***: High leverage of public funds, particularly double leverage from Fund-of-Funds
- ***Consumer financing***: High leverage of public funds to provide low-interest rate, long-term consumer financing through utilities or financial institutions
- ***Technical Assistance (TA) to FIs, developers and govt.:*** critical with high pay-off, particularly when packaged with public financing instruments

Program Objectives Determine the Market Segments

Program Objectives:

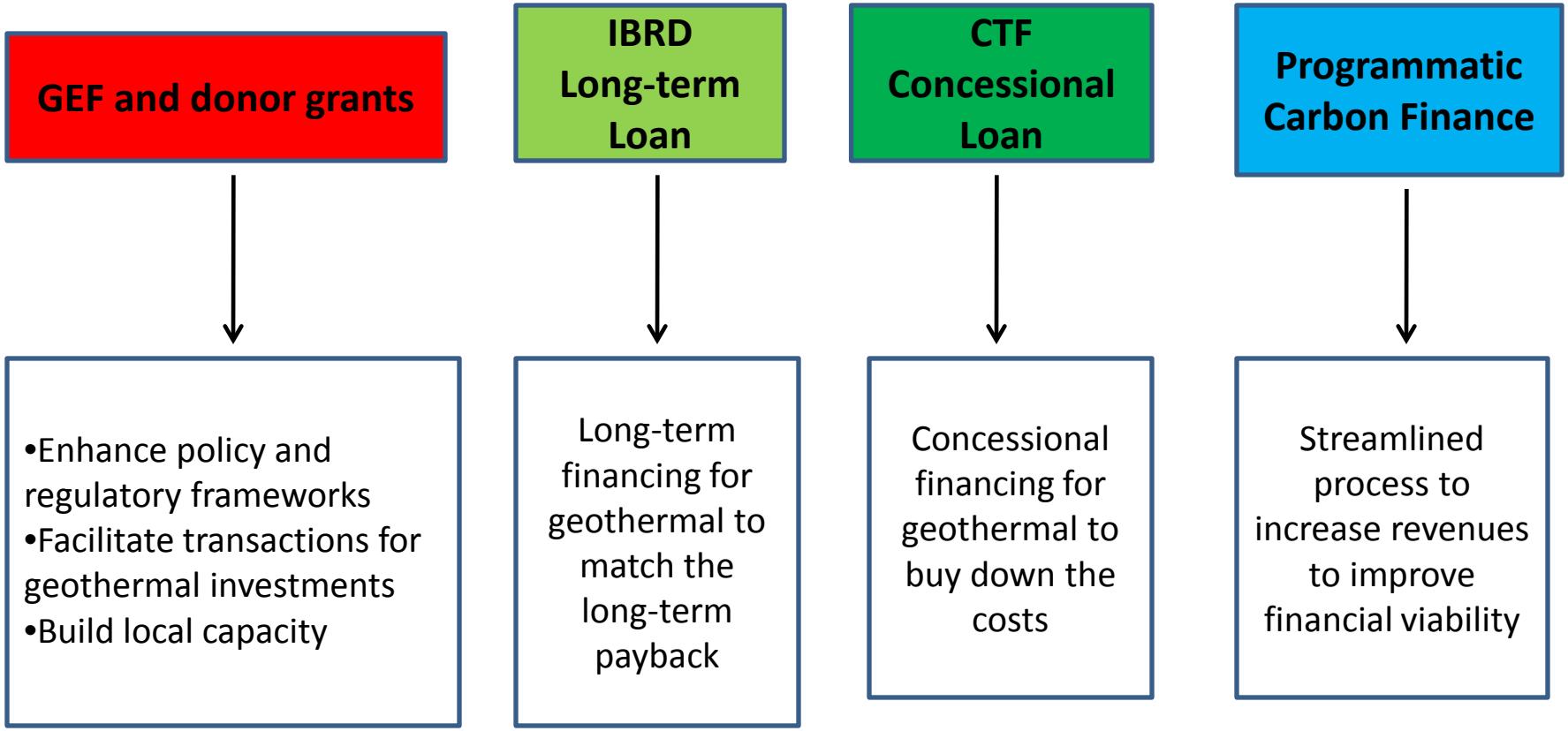
- ***Maximize greenhouse gas emission reductions:*** Most cost effective to target at large-scale grid-connected RE
- ***Increase access to electrification:*** Target at off-grid RE

Financing SMEs remains the toughest market segment

- SMEs have their own unique **constraints regardless of sector** (i.e., lack of accounting, collateral, etc.)

Indonesia Geothermal Development Project

Combing financing sources to achieve bigger impacts

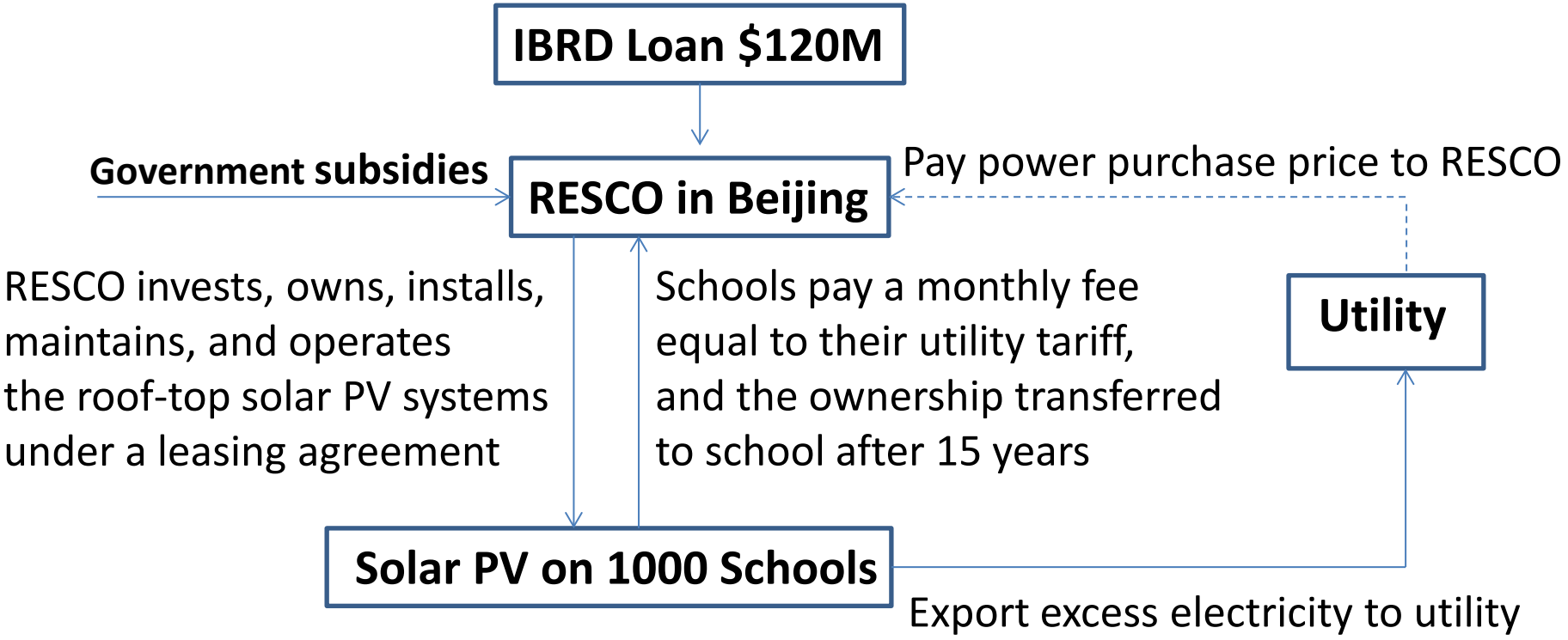


Turkey Renewable Energy Project

- **Turkey Renewable Energy Project:**
  - WB loan ($202M): **on-lend** to two local banks for RE investment
  - Focus: **small hydro**
- **Achievements**
  - **$200M leveraged $555M private investments**, RE capacity of 620 MW and annual CO_2 emission reduction of 1.7 million tons
  - Substantially increased financial institutions' interest in **providing long-term financing to RE projects**
  - Resulted in the **first CTF project** in Turkey (IBRD $500M and CTF $100M)
- **Lessons learned**
  - ***Conductive policies*** (RE obligation) are an important pre-requisite for private investment in renewable energy
  - ***Technical assistance*** to participating banks is critical
  - ***Careful selection of PFIs*** is a key success factor
  - ***Long-term financing*** to renewable energy development is essential
  - ***Streamlined procedures*** shortened approval time and clarified responsibilities/accountabilities of all involved agencies
  - ***High collateral requirements constrained*** small renewable developers from access to financing

Beijing Roof-Top Solar PV Scale-Up (Sunshine Schools) Project

- To demonstrate RESCO model for scaling up roof-top solar PV
- To install 100 MW roof-top solar PV in 1000 schools



Policy Tools Tailored to Technology Maturity and Costs
Financing Instruments Tailored to Market Segments and Barriers