



# Scaling-up Renewable in China

-----Case Study of China Renewable Energy Development Project

Pattaya, Thailand  
April 24, 2014



## ***Renewable Energy Development: A Quick Look Back***

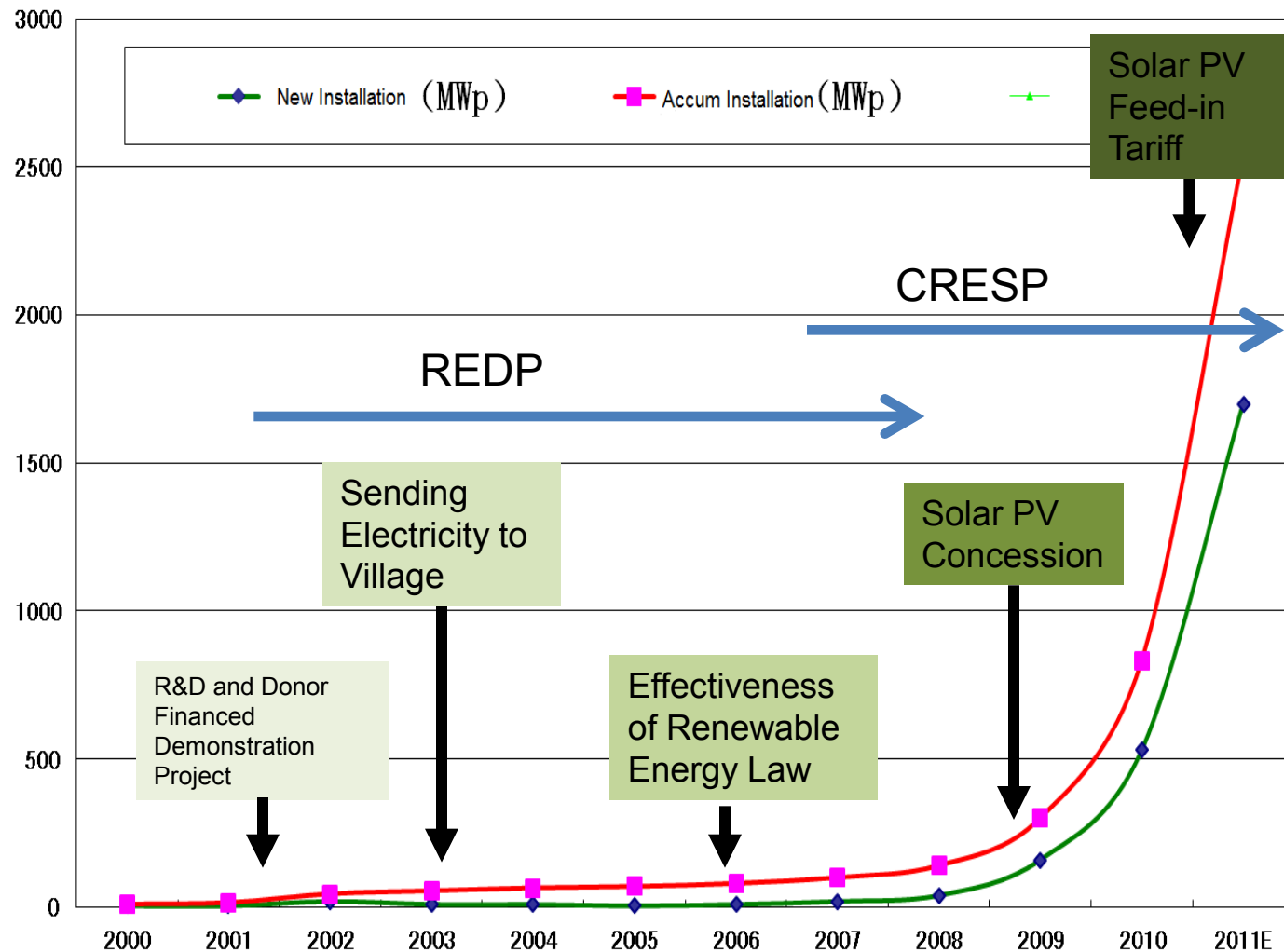
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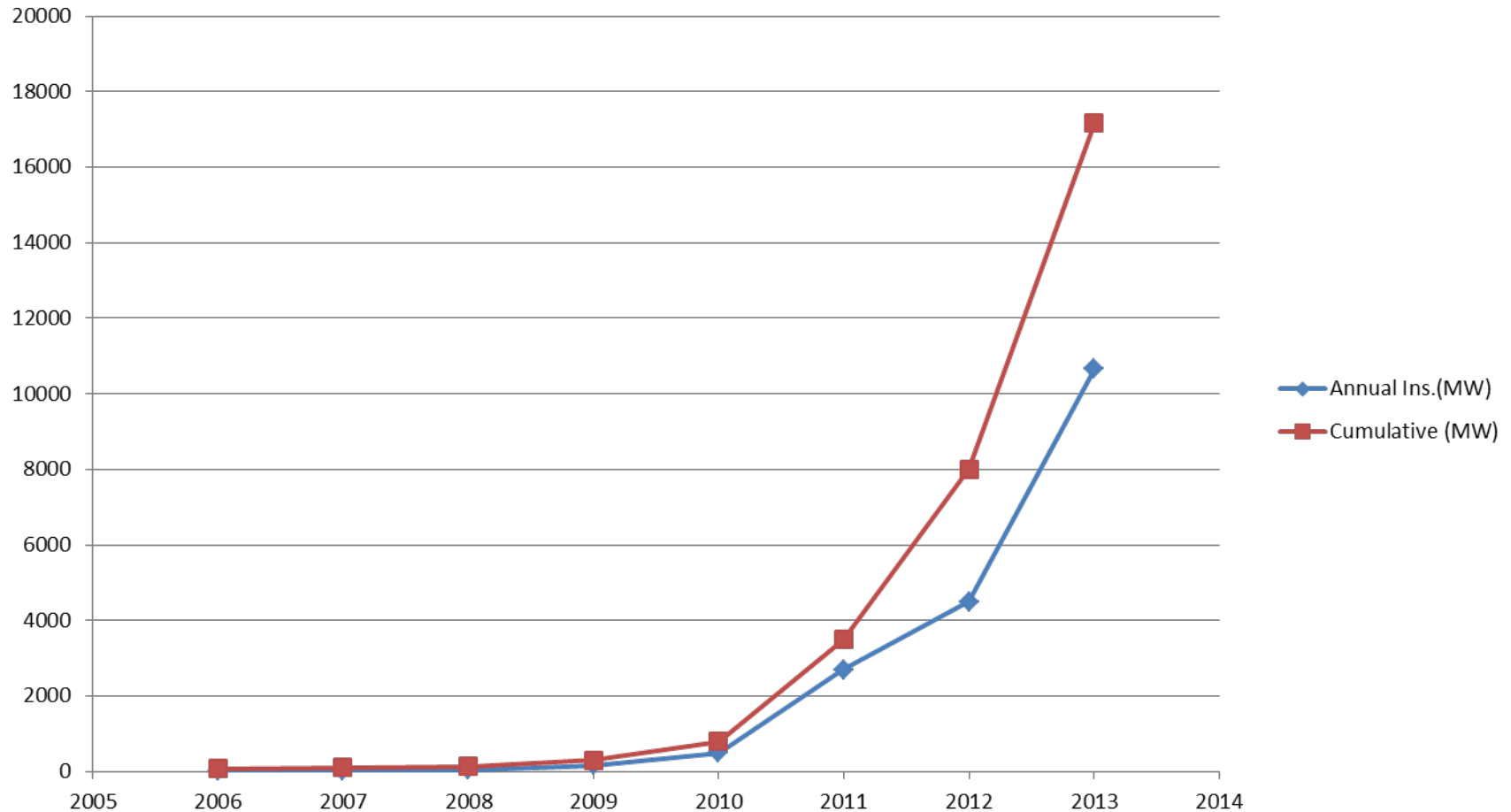
- Initial demonstration (1990-2001)(donor project)
- Industrialization (2001-2006)(sending electricity to the village)
- Scaling up and equipment localization supported by Concession program (2006-2011) (Renewable Energy Law and Bonn Conference—International market)
- Development of large scale projects supported by Feed-in Tariff (2011-) (China's domestic market)

Wind has been a few year ahead of solar PV

# Evolution of the Key Incentive Policies Related to Solar PV

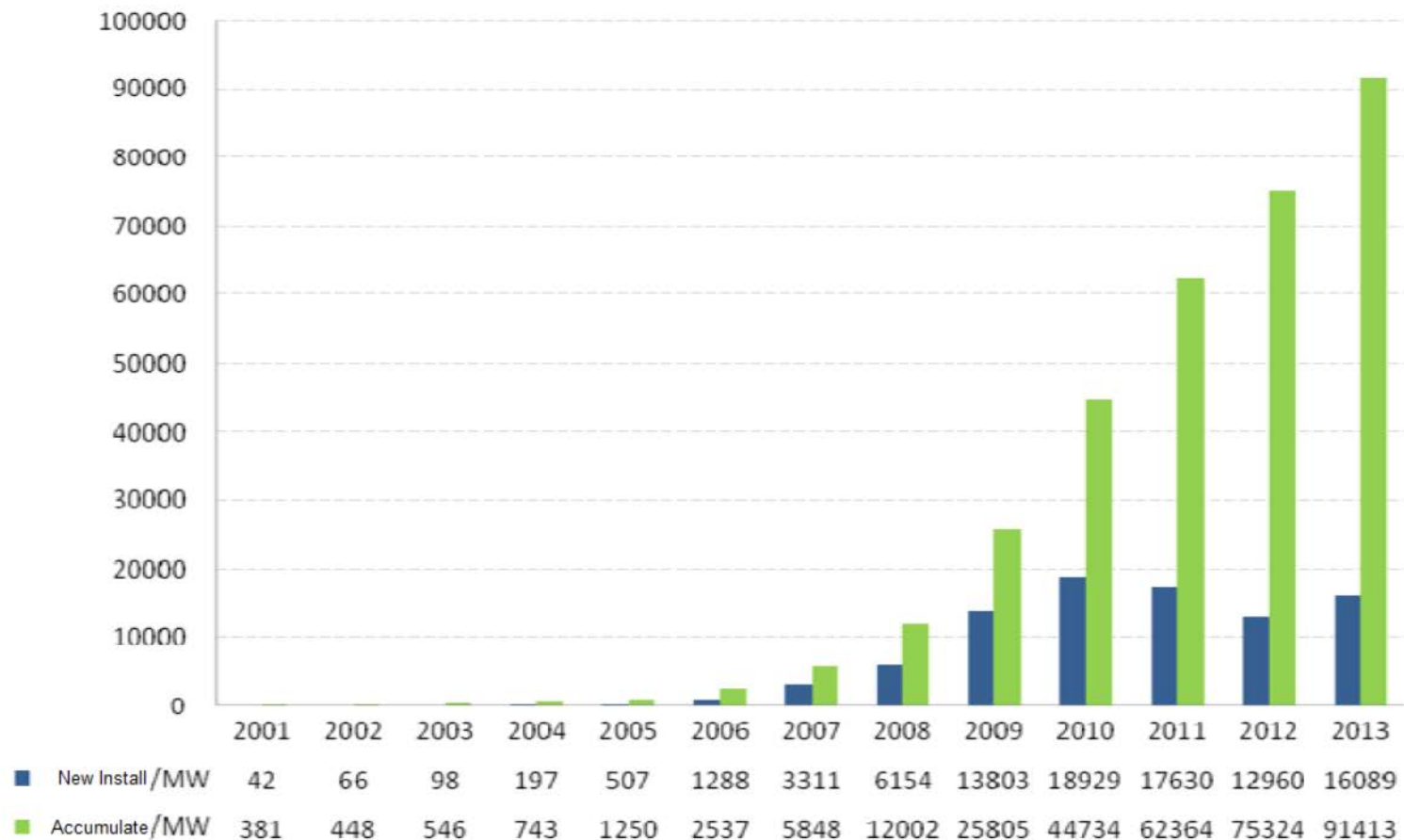


# Development of the Renewable Energy in China (Solar PV)



Before 2006, it was only SHS for rural electrification and other small market

# Development of the Renewable Energy in China (wind)



Taking off from 2006, installation doubled annually for 5 consecutive years



## ***Case Study: China Renewable Energy Development Project***

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# Renewable Energy Development Project

**Former name:** China Renewable Energy Commercialization Promotion Project

**Formal name:** China Renewable Energy Development Project

## **Project Development Objectives (from Project Appraisal Document)**

Development of sustainable markets for **wind** and photovoltaic (PV) technologies, in order to increase supply of electricity in an environmentally sustainable way and improve access of isolated rural populations to electricity services.

## **Revised Project Development Objectives (as approved by original approving authority)**

Development of a sustainable market for PV technologies and **demonstration** of the **viability** of commercial **wind** development in the **coastal regions**.

**Task Team Leader:** Nouredine Berrah, Richard Spencer

**Implementing Agency:** SETC

**Follow up project:** China Renewable Energy Scale-Up Project





The project consisted of three components:

- A wind farm component, **190 megawatts (MW) of wind capacity** at five sites. IBRD: \$100 million and GEF: \$3 million.
- A PV component, sub-grants for sales of 10 MW peak (MWp) of PV systems, market barriers removal and an institutional strengthening subcomponent focusing **on improving quality of PV equipment, certification and standards and project management and monitoring**. GEF: \$22 million.
- A technology improvement (TI) component, consisting of an investment subcomponent under **which wind and PV manufacturers were to be provided cost-shared grants to foster innovation, cost reduction and quality improvement and an institutional strengthening subcomponent for program management and monitoring**. GEF: \$10 million.



- The wind farm component, consisting of an investment subcomponent financing 20 MW of wind capacity at two sites in Shanghai, and a technical assistance subcomponent to support management of the planned wind farms and preparatory work on large coastal sites. GEF: \$1.5 million.
- The TI component, consisting of an investment subcomponent only for PV manufacturers, but with similar design as before. The institutional strengthening subcomponent remained unchanged. GEF: \$3.5 million.



- Power Purchase Agreement
- Incentive Policy and Regulation
  - Who is responsible for bearing the Incremental cost?  
Government? Enders? Or Project Developer?
- What is the mechanism?
  - Direct subsidy? High Tariff? Tax holiday?
- How to set up the price?
  - RPS? Competitive bidding (concession)? Feed-in Tariff?



## Barriers for Renewable Energy Scale Up

- **No National level commitment, no strategy, no development target (to provide a long term, stable, and foreseeable investment environment)—No market**
- **Lack of regulation and mechanisms (to provide subsidy or high tariff to cover the incremental cost)—No enabling policy environment**
- **Lack of input for R&D and equipment production capacity—No industry**
- **Lack of resource assessment**
- **Lack of supporting facilities, standards, testing, and certification**
- **Lack of public awareness**



## Renewable Energy Law (function)

- Confirm the role of RE in the national energy development strategy (importance for sustainable development)
- Clarify the responsibility for promoting the RE development (whole society)
- Create a market for the RE development (development target)
- Develop incentive policies and regulations for RE development (concessional bidding)
- Enhance the awareness building in the general public to promote the RE development



## The main achievements of REDP (1)

- (1) Contribution to rural electrification. More than two million people in western China have been provided with access to modern energy through PV systems, solving the basic electricity needs of households.
- (2) Promotion of rural PV businesses and service networks. 28 companies have developed and expanded their rural PV businesses, establishing sustainable access to PV based electricity services in remote communities in western China.
- (3) Establishment of market frameworks for PV
- (4) Step by step improvements to product quality.
- (5) Gradual lowering costs and prices.



## The main achievements of REDP (2)

- (6) Maintain competitive market. The commercial SHS market has remained competitive with the top firms having little if any market control.
- (7) Mobilizing private financing.
- (8) Neutral product / business model; demand driven capacity building.
- (9) Increased use of PV in official programs for western China development.
- (10) Development of China's PV sector. 3 national standards, 3 testing facilities and 1 certification center.
- (11) China is now the world's third largest manufacturer of PV modules with production capacity of over 40 GWp a year compared with 10 MWp in 2000. (4000 times)
- (12) Level playing field and transparent, professional project management.



## Direct Output of REDP

Indicators	Target	Actual	Note
<b>SHS installation</b>	35,000	401, 908	Applied: 501,373
<b>Total installed capacity (MWp)</b>	10	11.065	Applied:13.26 1
<b>Price (\$/Wp)</b>	$\leq 13$	8.18	20Wp system as an example
<b>Participating companies</b>		32	
<b>Qualified equipment suppliers</b>	30	74	At peak: 140

Almost all the companies and research institutes participated REDP and received the grant support from REDP during the project implementation





- Some of beneficiaries of the TI grant have become major players in the international market. Some are listed on stock exchanges in Europe and the US and are operating in markets the Europe, Japan and the US. China is now the second largest producer of PV equipment in the world, and the third largest exporter.
- At the 2007 European PV Industry Exhibition, Chinese companies were the third largest cohort of exhibitors, and at the May 2008 Lighting Africa Conference in Accra Ghana, 30 Chinese companies exhibited off-grid lighting products.
- Some REDP supported companies have won competitive bids for World Bank financed PV systems in Lao PDR, Mongolia and Papua New Guinea.
- China is now the world's third largest manufacturer of PV modules with production capacity of over 40 GWp a year compared with 10 MWp in 2000. The market share is about 50 percent world wide.

## REDP Team (2006)





# REDP Activities (1)

Company Visit



Exhibition



International exchange



Marketing activities





## REDP Activities (2)



Received by Bank President



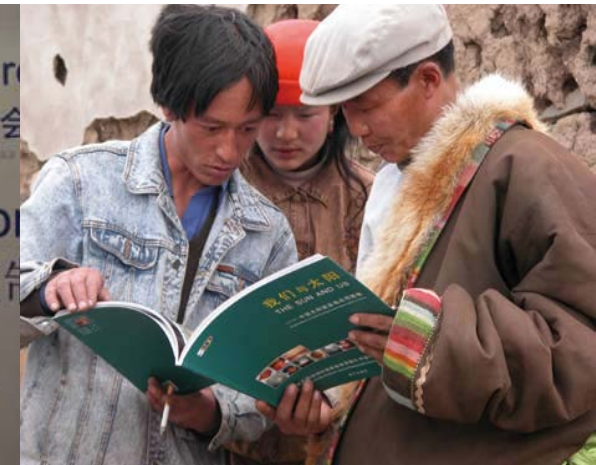
NDRC/NEA Officials visit REDP booth



Technology and business training



International conference



Awareness building

# REDP Received Ashden Awards



Wangari Maathai Present the Award



REDP Representatives



## *Questions for Discussion*

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## Questions for Discussion

- Technology: Why SHS was usually/commonly chosen as a technology for rural electrification? A few important characteristics of SHS.
- Policy: Among the following policy instruments, which are appropriate to large scale wind, which are appropriate to PV? Why?  
Credit sales, Direct Subsidy, RPS, Concession, and Feed-in Tariff
- Financing: There are a few options for financing SHS, customer self financing, credit sales, certain percent subsidy. How do you select the financing tool?
- Implementation: For a large scale project like REDP, what is key for guaranteeing the quality of implementation to make sure the GEF fund was used for purpose as it was designed?





*Thanks!*

