

How Policies Narrow the Gap between Renewable Energy Actual Development and Targets in China

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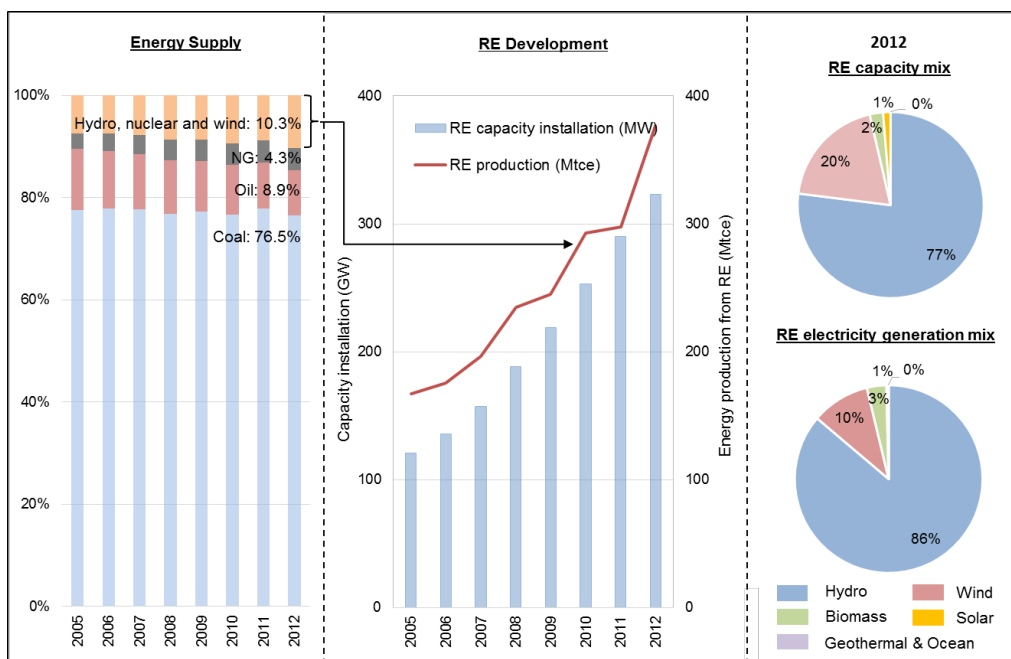
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Introduction

- Renewable energy (RE) development is a strategy to achieve sustainable growth and development, driven by the need for **energy security**, and **reductions in environmental pollution**, and by fears of **global climate change**.
- Energy demand is projected to **double** in 2040 based on the level of 2011 in the reference scenario, driven by a highly energy intensive economy and by continuing strong GDP growth.
- The introduction of power generation from RE sources provides an **alternative energy resource** in this regard, the availability of which is not subject to cost fluctuations as are fuels.

Introduction

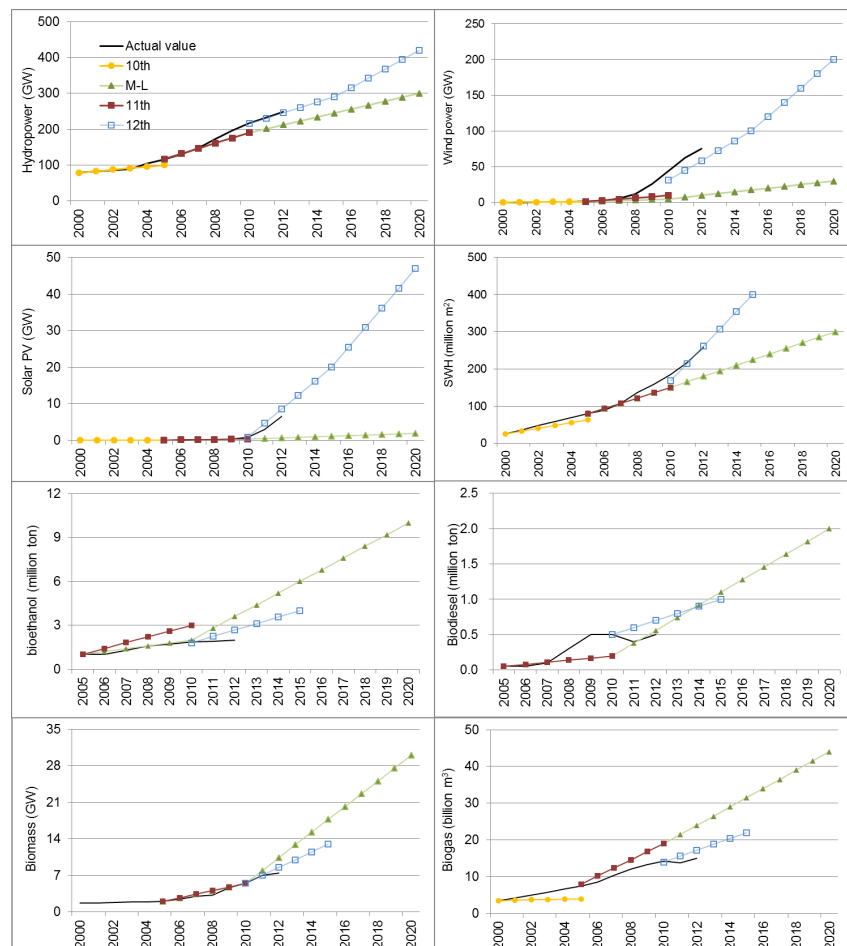


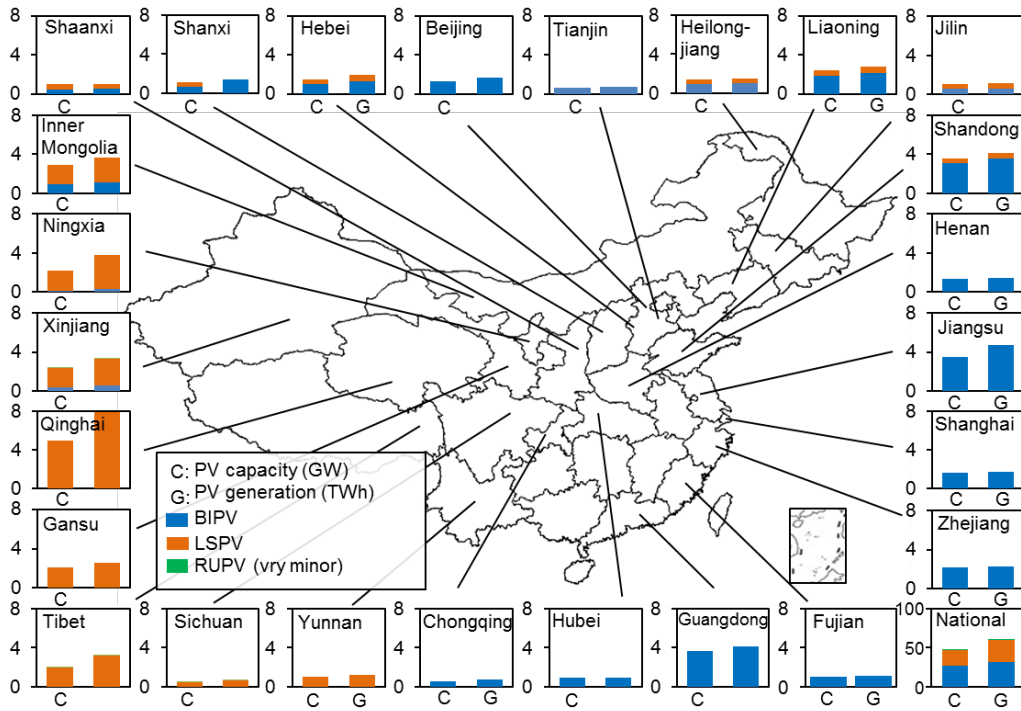
The Energy supply mix and RE structure in China

Ambitious targets set by China government

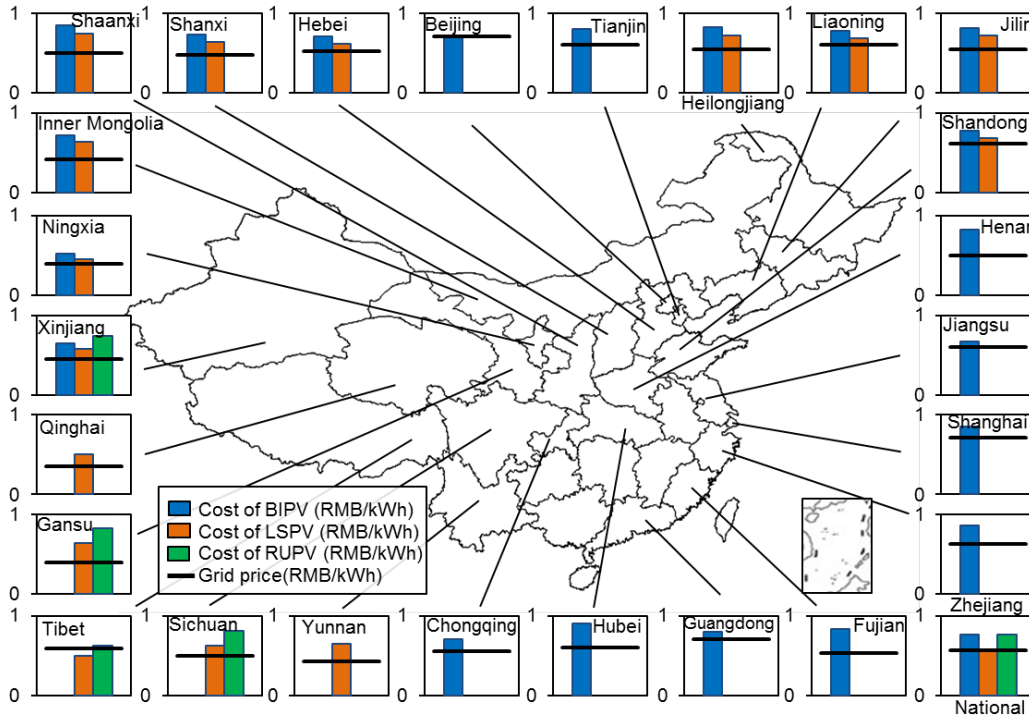
- The Chinese government has proposed an increased reliance on RE sources, especially wind, solar, and hydro power, to replace coal-fired generating plants.
- There are three overall targets for RE set by the central government
 - the Mid- and Long-Term Plan for Renewable Energy Development (MLTPRED, 2007);
 - the Eleventh Five-Year Plan for Renewable Energy Development (EFYPRED, 2008);
 - the Twelfth Five-Year Plan for Renewable Energy Development (TFYPRED, 2012).
- And there is also the Tenth Five-Year Plan for New and Renewable Energy Industry Development at the very beginning (NDRC, 2001).
- Up to now, all RE technologies, except for biomass, have been increased in successive plans, and the results have exceeded expectations. The plan targets had to be adjusted upward to account for the rapid growth of RE, and vice versa.

Comparisons of Central Government Targets and the Actual Capacity Growth of RE

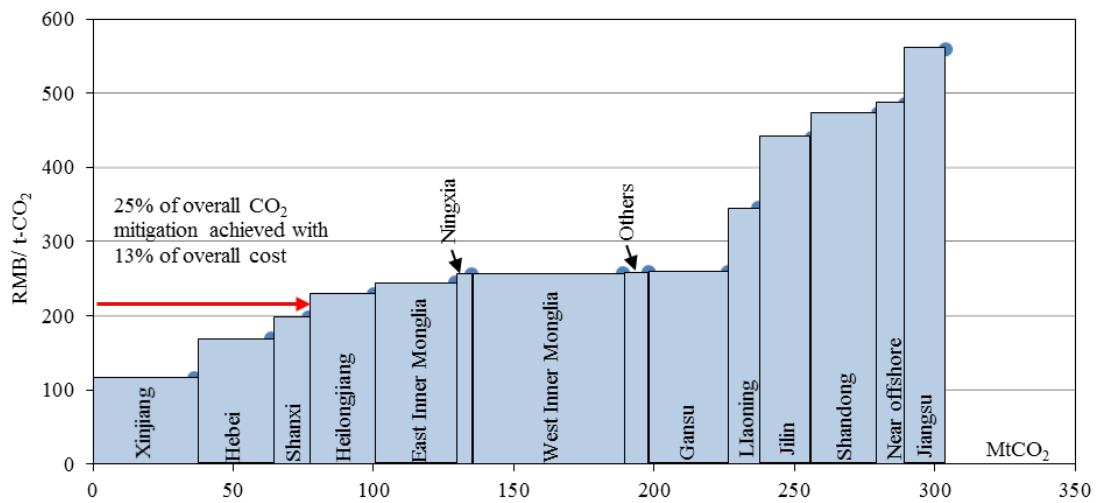




- In 2020, the cumulative PV capacity and annual generation will be 47 GWp and 60 TWh
- BIPV and LSPV have distinct geographical distributions in China



- The cost of BIPV will vary significantly between regions from 0.52 to 0.92 RMB/kWh; the cost of LSPV stations ranges from 0.50 to 0.75 RMB/kWh; the cost of RUPV is relatively high, 0.63–0.83 RMB/kWh.
- The cost of PV electricity could be 11%–74% higher due to its relatively small scale.

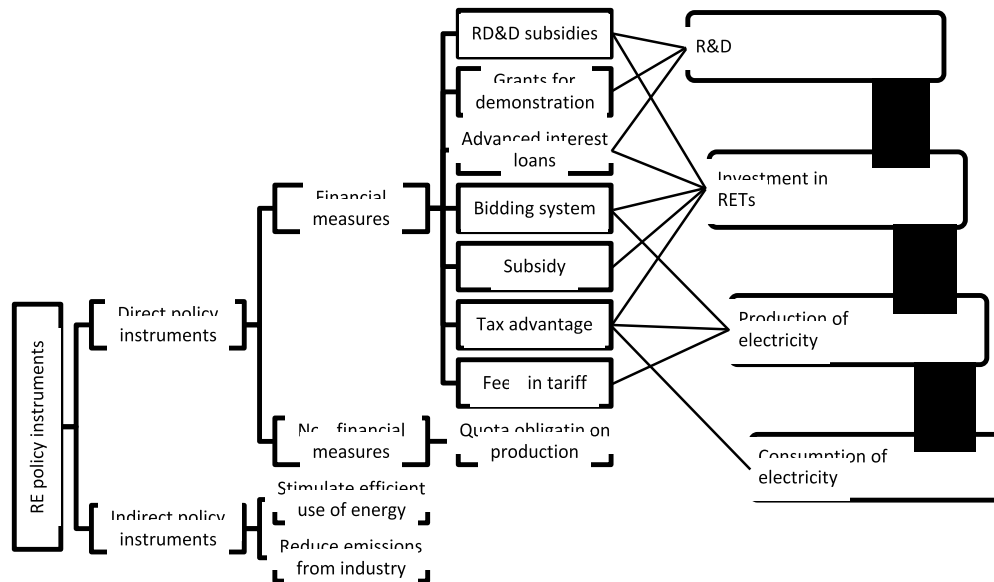


Provincial wind power 2020 projections: CO₂ mitigation potential and costs

Laws, Policies and Actions to push RE development

- The 'Renewable Energy Law' (REL) was published in 2005 and came into effect at the beginning of 2006, **which provided a single, coherent framework** of government policy for the development of RE.
- The REL instituted **five market interventions** for the government:
 - setting an overall target for RE production,
 - mandating compulsory grid connections,
 - introducing a feed-in tariff (FIT),
 - introducing cost-sharing for electricity generated from RE,
 - and establishing a special RE promotion fund
- The signals sent through these measures were positive national incentives for renewables development.

Laws, Policies and Actions to push RE development



The RE Policy System and Targets

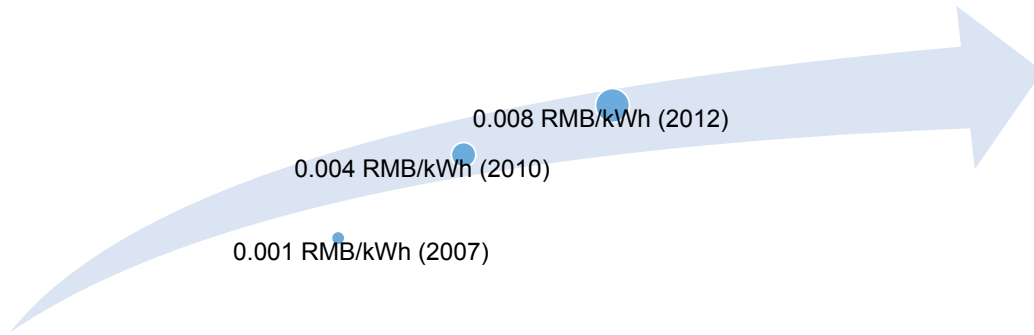
Laws, Policies and Actions to push RE development

Pricing Mechanisms for RE

	Pricing	Comments
Wind, onshore	Concession bidding (from 2003) to FIT (from 2009)	Benchmark onshore on-grid wind power prices were set from 0.51 yuan/kWh to 0.61 yuan/kWh depending on the specific resource area (NDRC, 2009)
Wind, offshore	Concession bidding/auction (from 2008)	The ultra-low price of the four 2010 projects has been blamed on a faulty bidding process. Low price reflected overly optimistic forecasts of both national incentives for offshore wind development and large scale cost decreases in the future.
Biomass	Price subsidy (2006) to FIT/concession bidding (2010, 2012)	Central government mandated a subsidy of 0.25 yuan/kWh since 2006 (NDRC, 2006a). 0.75 yuan/kWh was set as the benchmark price for agriculture, forest biomass power (NDRC, 2010); while 0.65 yuan/kWh was set as the benchmark price for municipal solid waste power generation (NDRC, 2012b).
Solar PV	Government pricing (2011) + concession bidding to FIT in some provinces (from 2013)	The benchmark price was set to 1.15 yuan/kWh for projects approved before July 1, 2011, while it was decreased to 1 yuan/kWh for projects approved after that date. Lower benchmark prices ranging from 0.90 yuan/kWh to 1.00 yuan/kWh was set for ground-based PV system depending on difference solar radiation intensity; and 0.42 yuan/kWh of subsidy for distributed PV system since September 2013 (NDRC, 2013).
Oceanic power	Government pricing	Set by the government according to the rule of reasonable cost plus reasonable profit (NEA, et al., 2013a)
Geothermal	Government pricing	

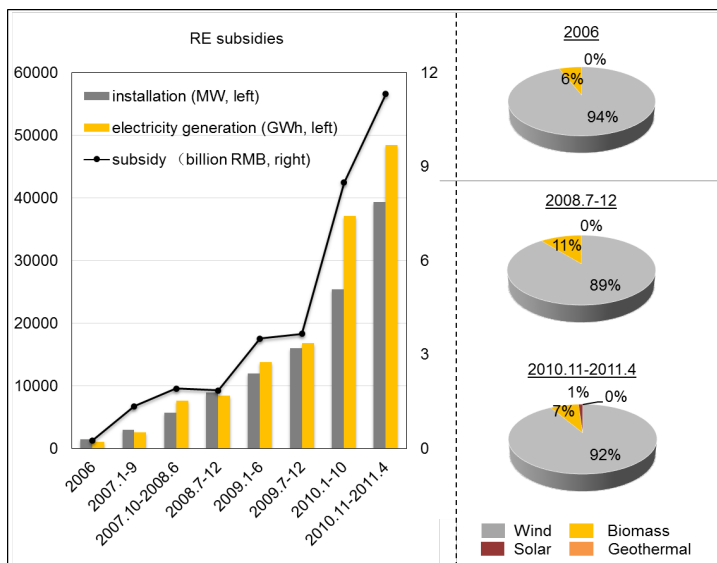
Laws, Policies and Actions to push RE development

- REL established a long-term, stable subsidization system for setting up a public-financed fund for RE development



RE surcharge was set from the nationwide sale of electricity with the goal of supporting RE development

Laws, Policies and Actions to push RE development



- Eight installments of subsidies with a total of 32 billion yuan have been distributed for RE power generation projects. As a result, the capacity of RE installations has increased from 1414 to 39,313 MW, while the electricity generated has increased from 1044 to 48,438 GWh
- The structure of RE subsidies also reveals the relatively slow development of solar PV projects and geothermal power projects, which attracted only 1 percent of total distributed subsidies

The Subsidies for RE Projects

Laws, Policies and Actions to push RE development

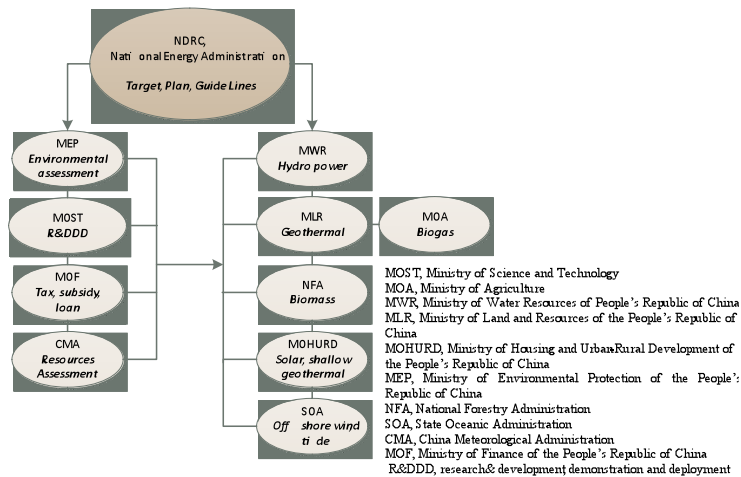
- Tax incentives used to promote green electricity are mainly designed as **tax exemptions, rebates on taxes, tax refunds or as lower tax rates** on activities promoted
 - **Value added tax (VAT):** Circular on Value Added Tax Policy of Comprehensive Utilization of Resources and Other Products
 - **Corporate income tax (CIT):** Corporate Income Tax Law—energy conservation and water saving conservation projects, environmental protection and clean development mechanism projects are eligible for a three-year CIT exemption, followed by another three-year 50 percent reduction of the CIT rate for income derived from qualified projects
 - **Customs duties:** Import tax policy to encourage the development of equipment manufacturing industry

Laws, Policies and Actions to push RE development

- RE research and development has received government support since the enactment of the Science and Technology Law of 1993.
- Since 2000, national investments in RE R&D have taken an average share of **15 percent of envisaged outlays in MOST** science and technology supporting plans.
- Wind power, solar energy, and biomass have received priority public investment support, accounting for shares of 40, 32 and 25 per cent respectively of total investments in RE technologies.
- The lower industry R&D effort reflects the long path to commercial use of these technologies on the one hand, and the weak R&D capacity of the industries on the other..

Barriers to RE development

- **Weak and incomplete incentive and supervision mechanisms**
 - Investment in R&D, and subsidies increased as well, however the fact that electricity generators have been getting the subsidies two years after the increased capacity came into operation shows that financial and managerial instruments are not yet effectively in place.
- **Lack of policy coordination and consistency**



Barriers to RE development

- **Conflicts between renewable power generators and grid companies**
 - According to SERC (2011), a total of 2,800 GWh of wind-generated electricity went unpurchased during the first half of 2010
 - The lack of regulating methods for implementing the government's mandatory quotas of RE carriage for power grid companies; the fact that no transparent and powerful supervision instruments are in
 - The mismatch between wind power and other power resources in Northeastern China.
- **A lack of innovation in R&D and regional policy**

Conclusions

- The REL of 2005 marked a new stage for RE development in China.
 - With the encouragement of, and incentives for, RE policies in place, the use of RE reached **377 million tce in 2012**, and will reach nearly **500 million tce** by 2015 according to the latest plan.
- According to the estimates in the plan, the use of RE will also result in the annual mitigation of **1 billion tons of CO₂**, **7 million tons of SO₂**, 3 million tons of N_xO, 4 million tons of smoke, and 2.5 billion m³ of water conservation by 2015.

Conclusions

- Subsidies play an important role in pushing RE development, which result
 - the large subsidies (a total of 32 billion RMB from 2006 to 2011) have led to an **excessive burden in the cost of energy for the economy**
 - the **over-expansion** and to the subsequent reorganization of enterprises within both the wind and solar power manufacture areas
- The difficulty of feeding renewable power into the grid is the most important challenge facing China's RE development. High costs and frequently recurring imbalances between RE supplies and electricity demand limit the feeding of wind power into the grid.

The end!

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