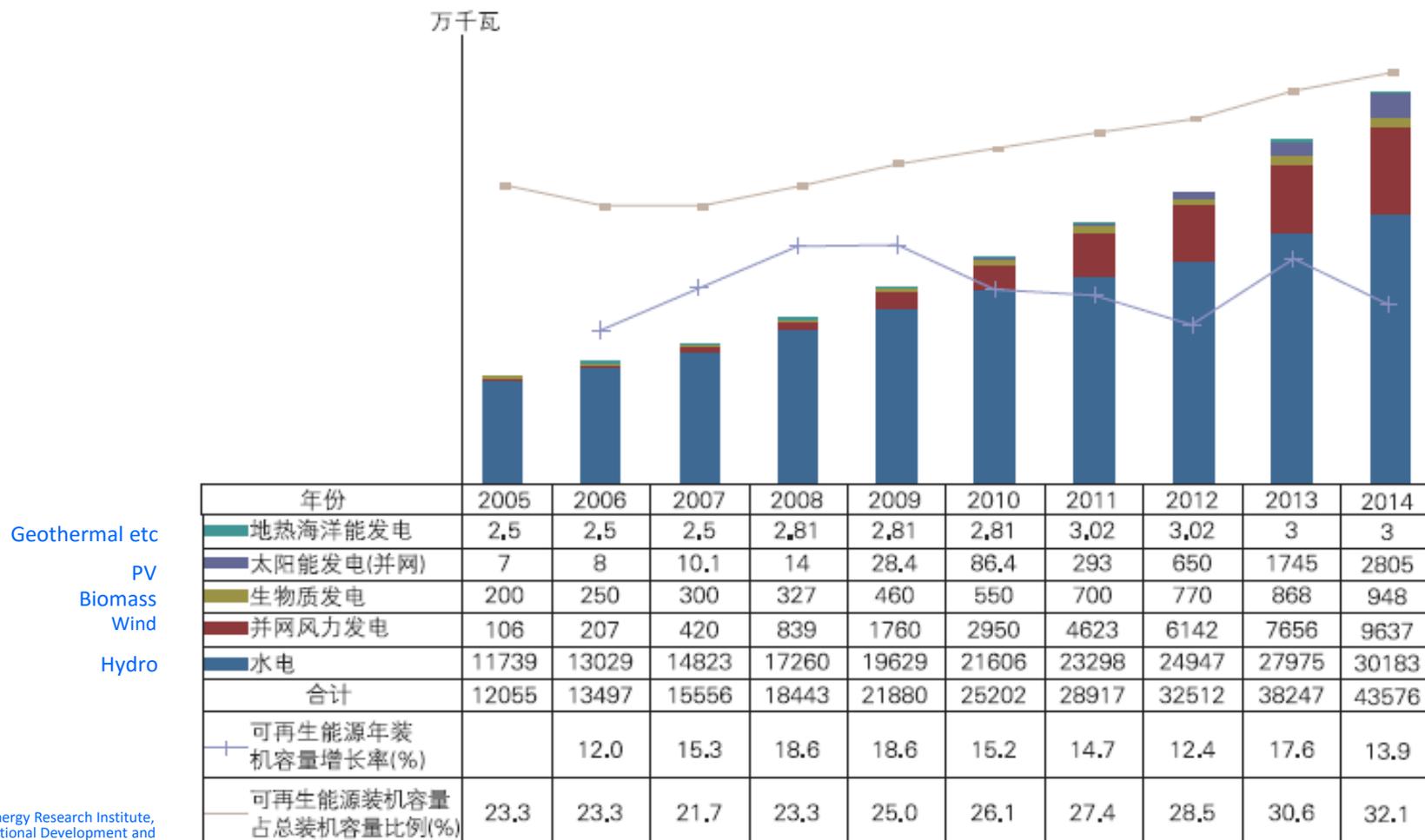


**ASIA PACIFIC ECONOMIC COOPERATION (APEC)  
NEW AND RENEWABLE ENERGY TECHNOLOGIES EXPERT GROUP (EGNRET) MEETING  
45TH MEETING**

**Overview of Renewable Energy in China  
Policy Strategy and Priority of New and Renewable  
Development**

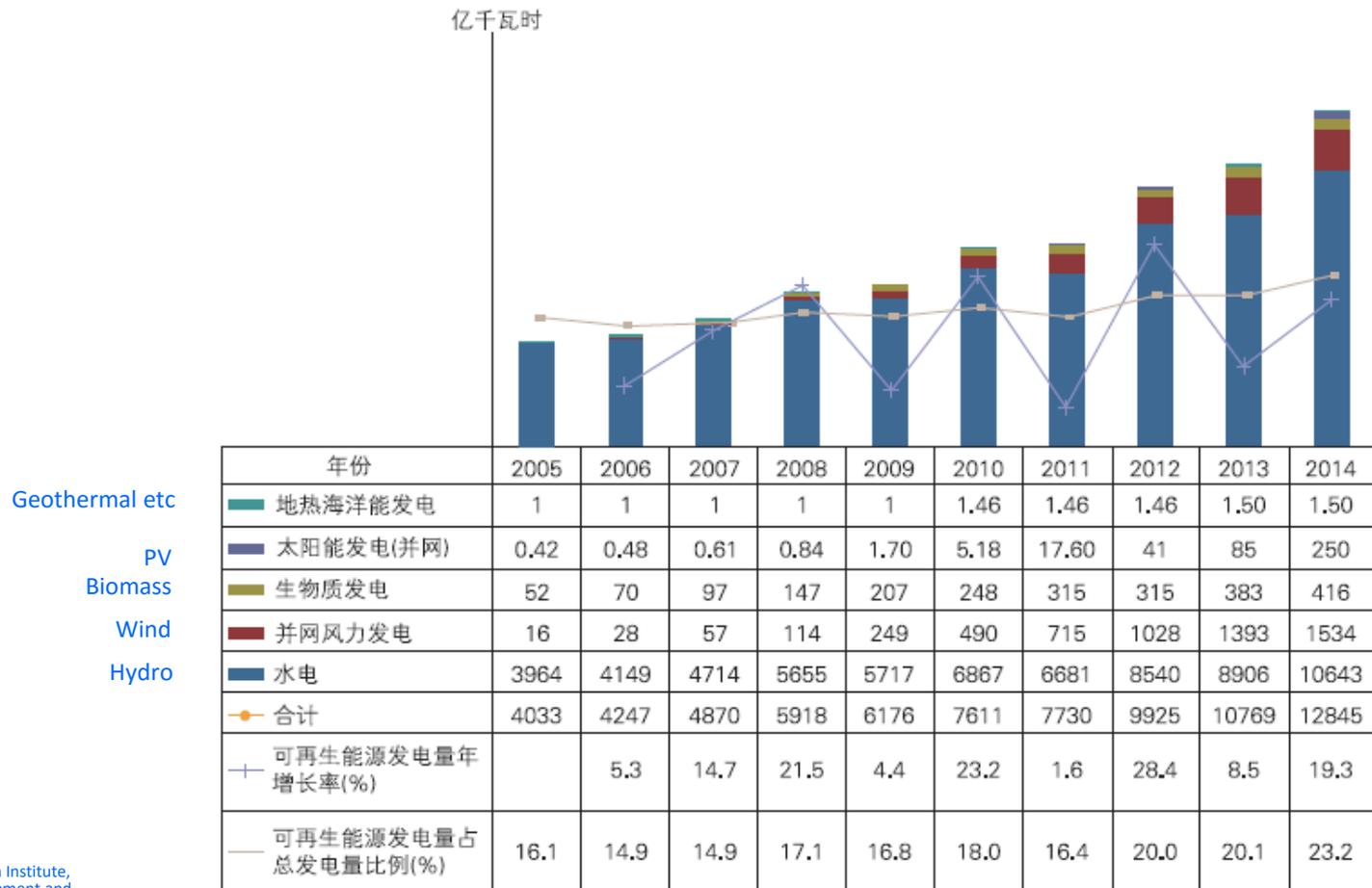
**Mr. Lin WAN  
November 2015**

# China's RE Installation



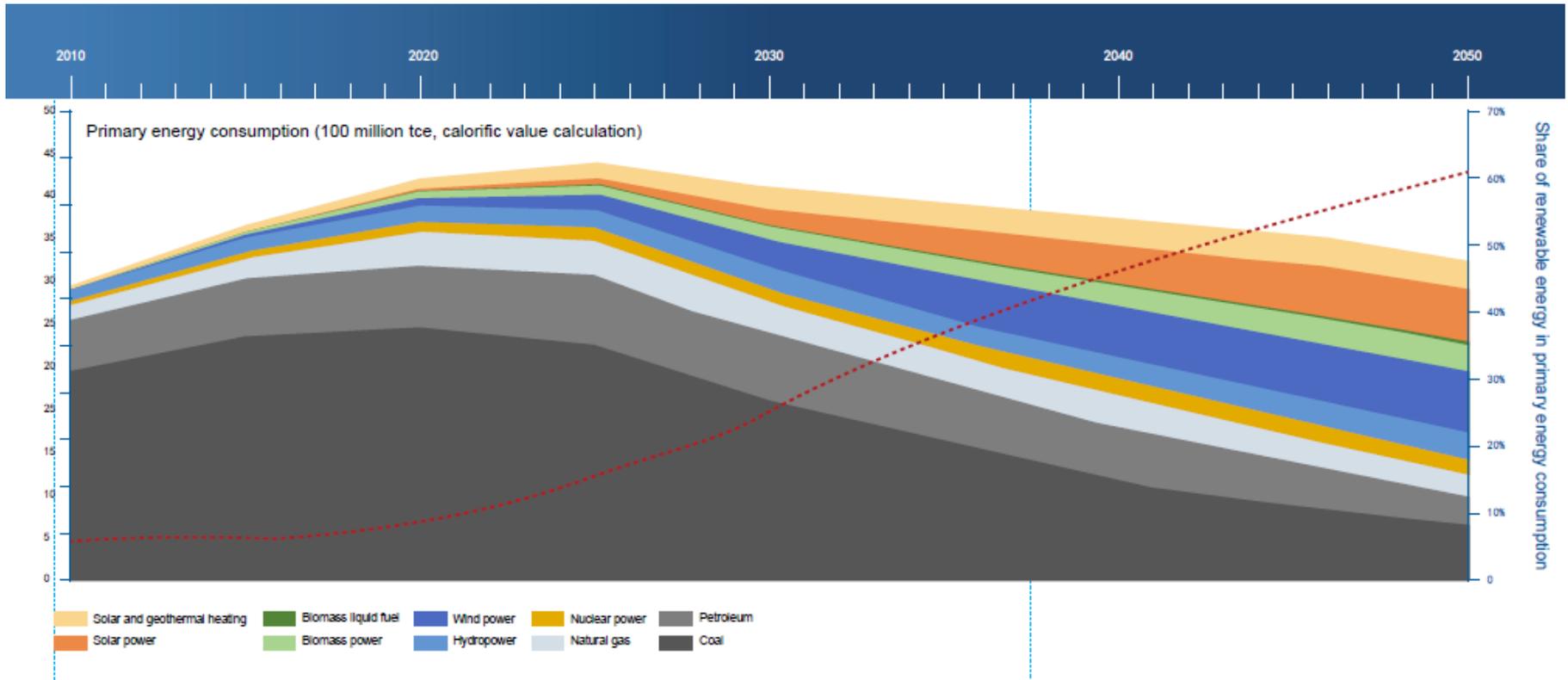
Source: Energy Research Institute,  
National Development and  
Reform Commission

# China's RE Generation



Source: Energy Research Institute,  
National Development and  
Reform Commission

# China's Energy Consumption and Expectation

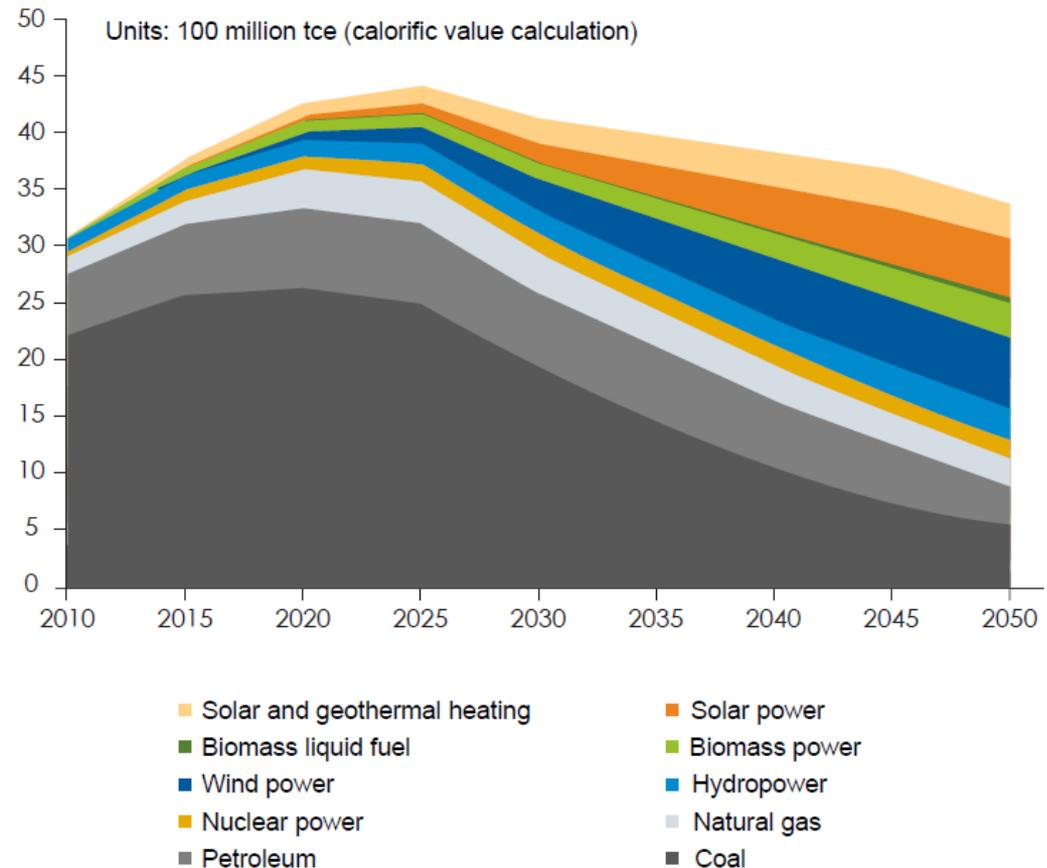


Source: Energy Research Institute,  
National Development and  
Reform Commission

# China's Primary Energy Consumption



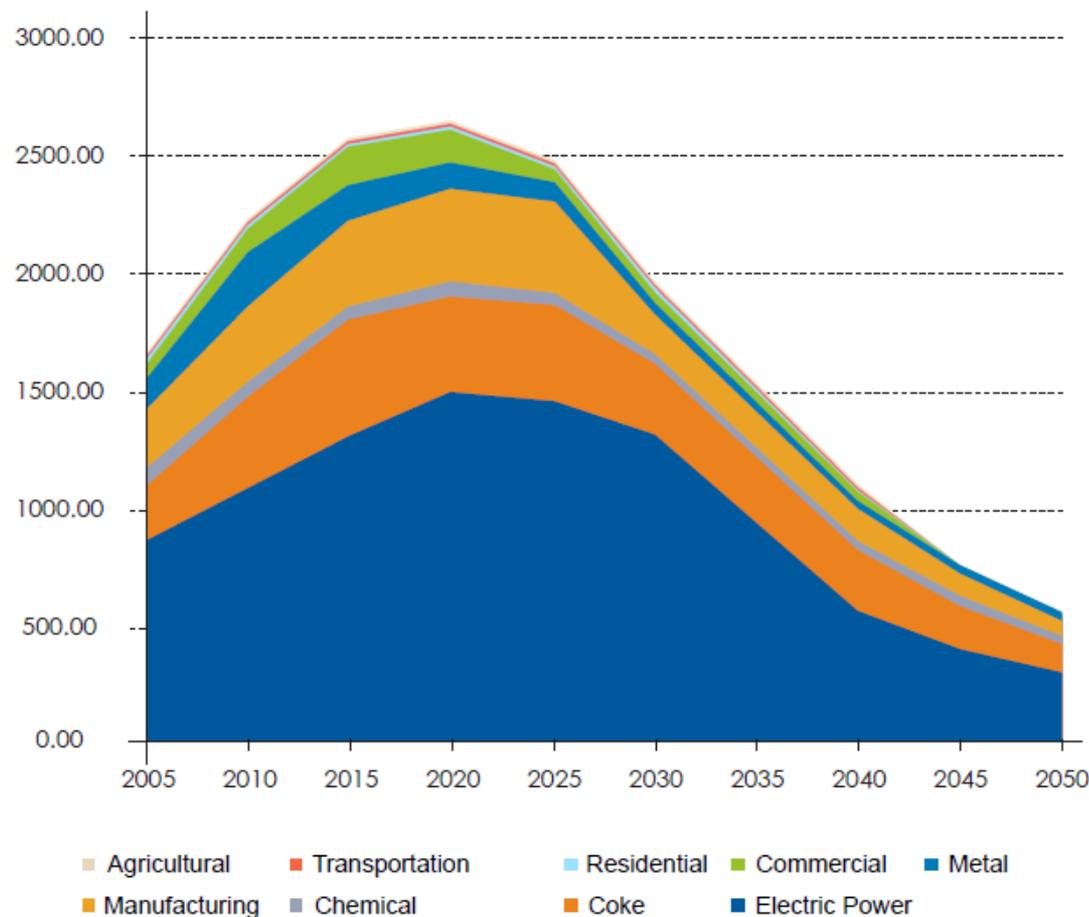
- In a high renewable energy penetration scenario where over 60% of end-use energy consumption is electricity, the energy system in 2050 is highly efficient, with energy efficiency 90% higher than in 2010. By that time, primary energy consumption is 3.4 billion tons of coal equivalent, and renewable energy accounts for 62%.



# China's Coal Consumption by Sector in High Penetration Scenario (million tce)



- Under the high renewable energy penetration scenario, coal consumption will be effectively controlled and the coal consumption peak can be reached by 2020. The consumption peak of fossil energy will be realized by 2025, and thereby reaching the goal of peaking greenhouse gas emissions by 2030 will be assured and most likely to happen as early as by 2025.

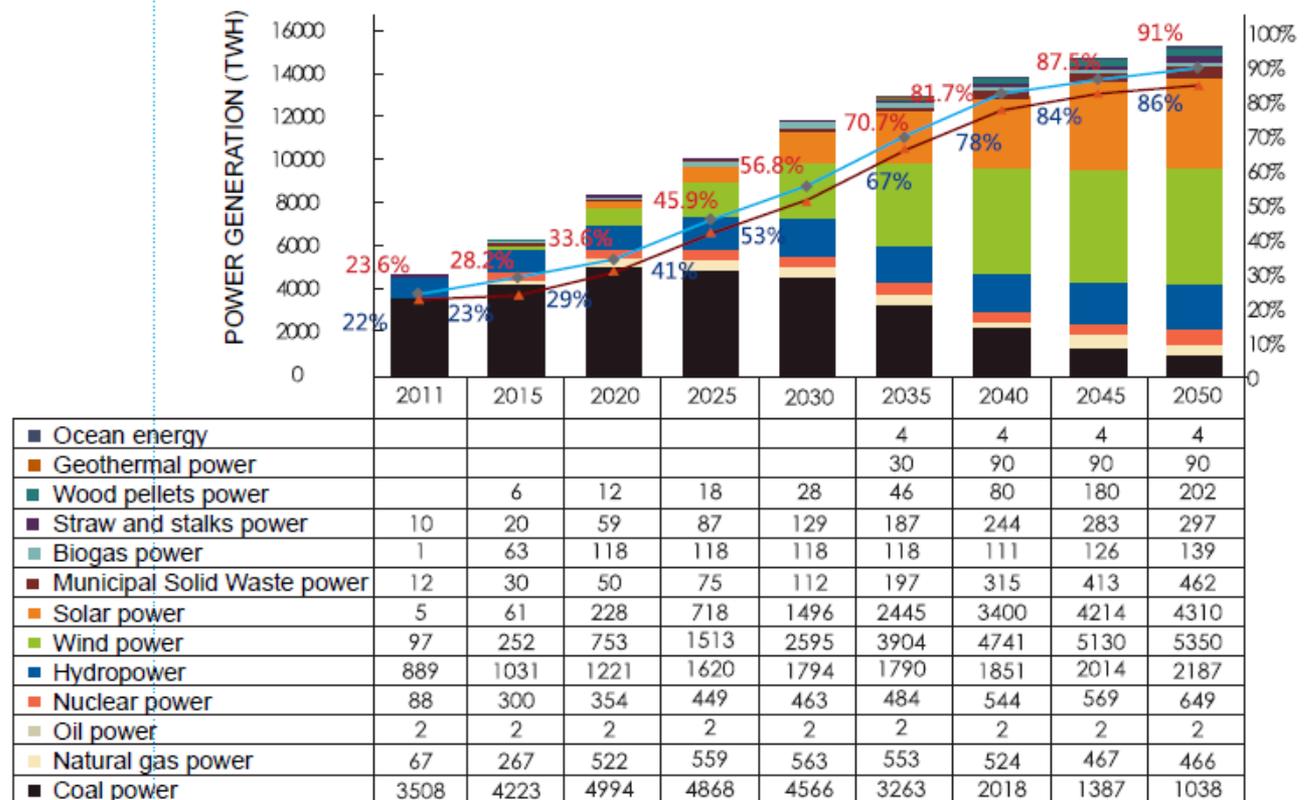


Source: Energy Research Institute, National Development and Reform Commission

# Power Generation in High Penetration Scenario



- By 2050, the national total power generation will be 15.2 trillion kWh, 86% of which will be renewable power and 91% non-fossil energy, while coal power drops to below 7%.

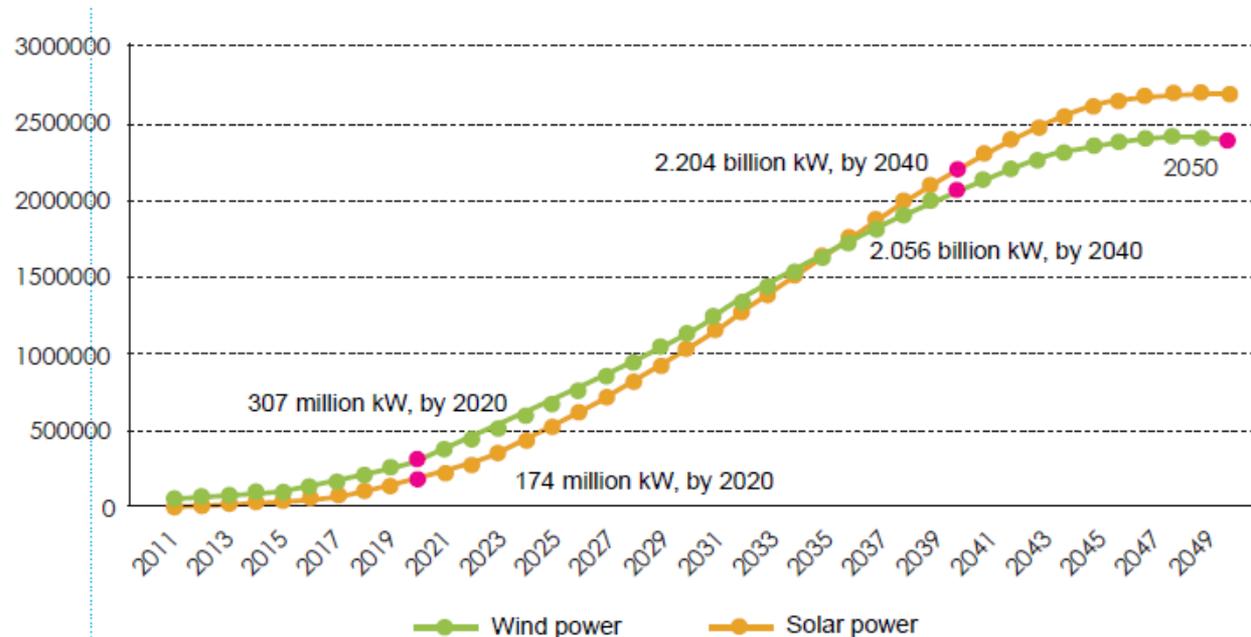


Source: Energy Research  
Institute, National  
Development and  
Reform Commission

# Development Phase Diagram of Wind and Solar Power Generation in High Penetration Scenario



- Through technological breakthroughs, cost reductions as well as the comprehensively deepening of power sector reforms, between 2020 and 2040, wind and solar power will develop rapidly, with an average of annual newly installed capacity of close to 100 million kW. By 2050, 2.4 billion kW of wind power and 2.7 billion kW of solar power will be installed, with a total annual output of 9.66 trillion kWh, which will account for 64% of China's total power generation and will become the main power source of the future green electricity system.

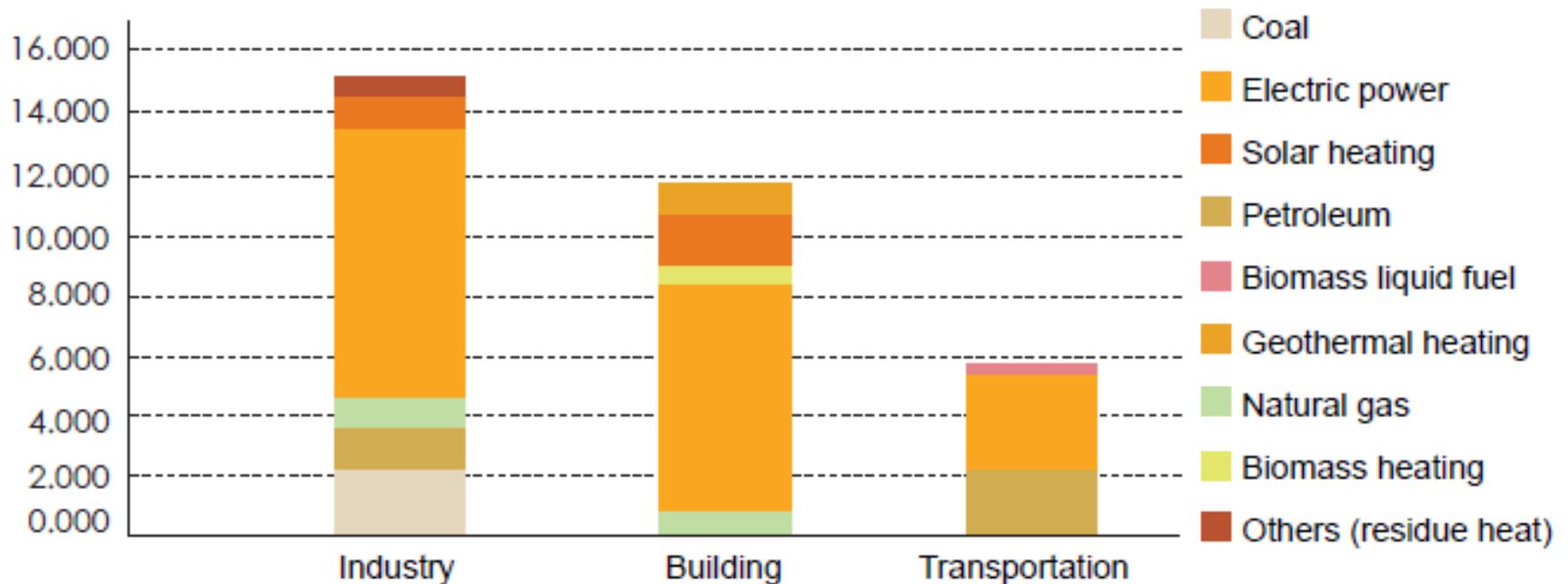


Source: Energy Research Institute, National Development and Reform Commission

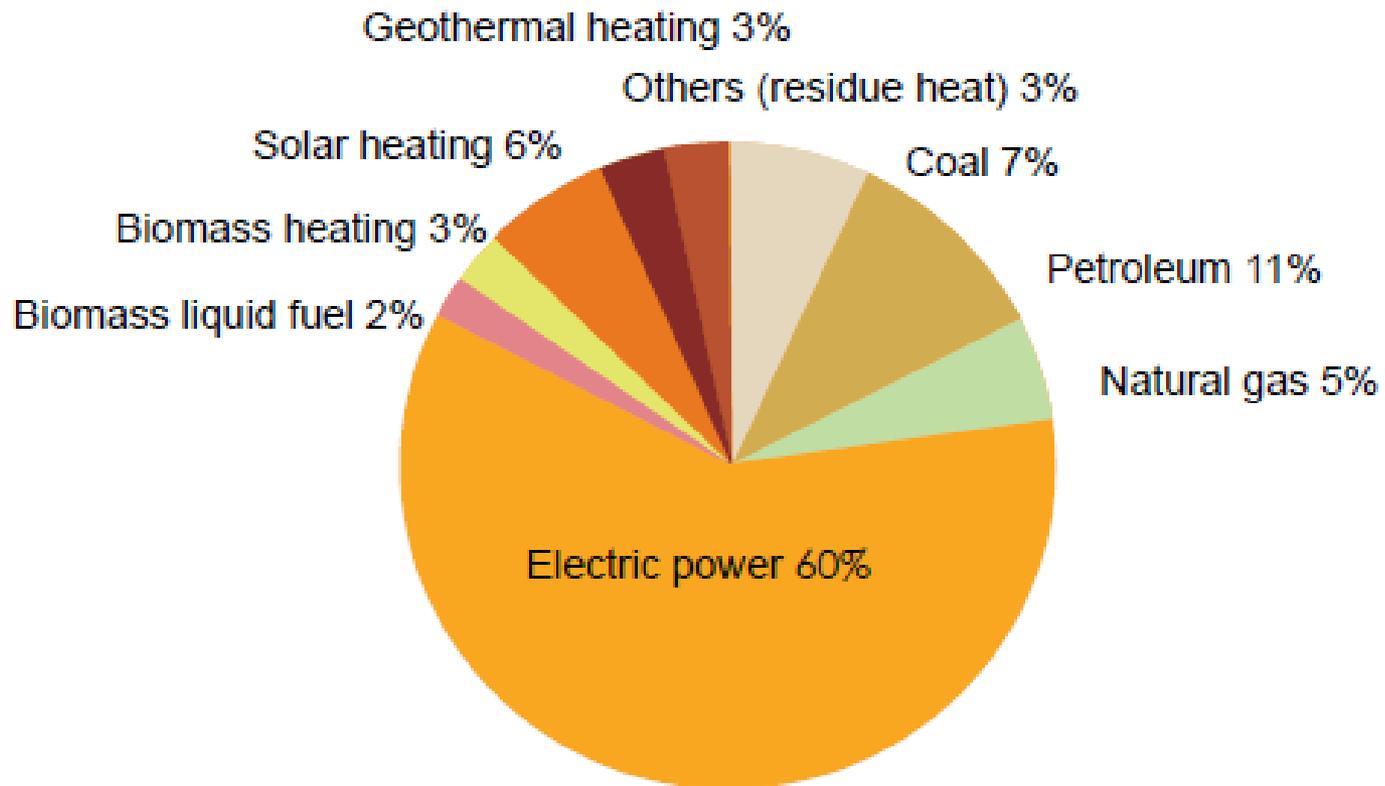
# Electricity Consumption by Sector



- By 2050, China's end-use energy consumption will reach 3.2 billion tons of coal equivalent, of which electricity will account for 60%, 36 percentage points higher than that of 2010. Electricity will become the main form of energy for people's production and living.



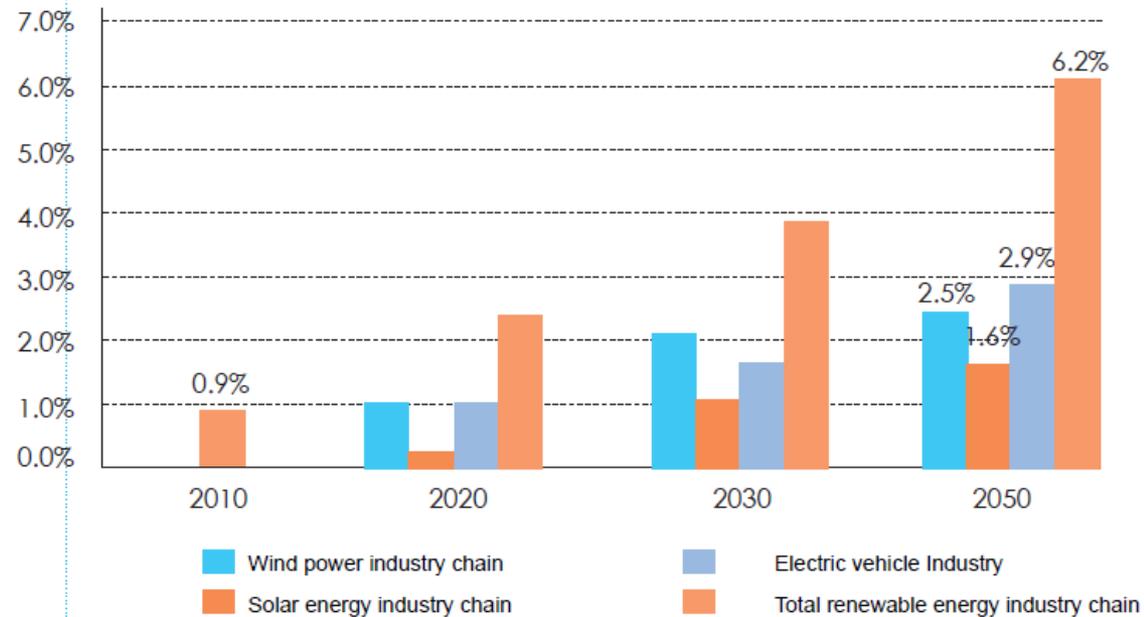
# Share of Electricity in End-Use Energy Consumption



# Contribution of Renewable Energy and Related Industries to GDP



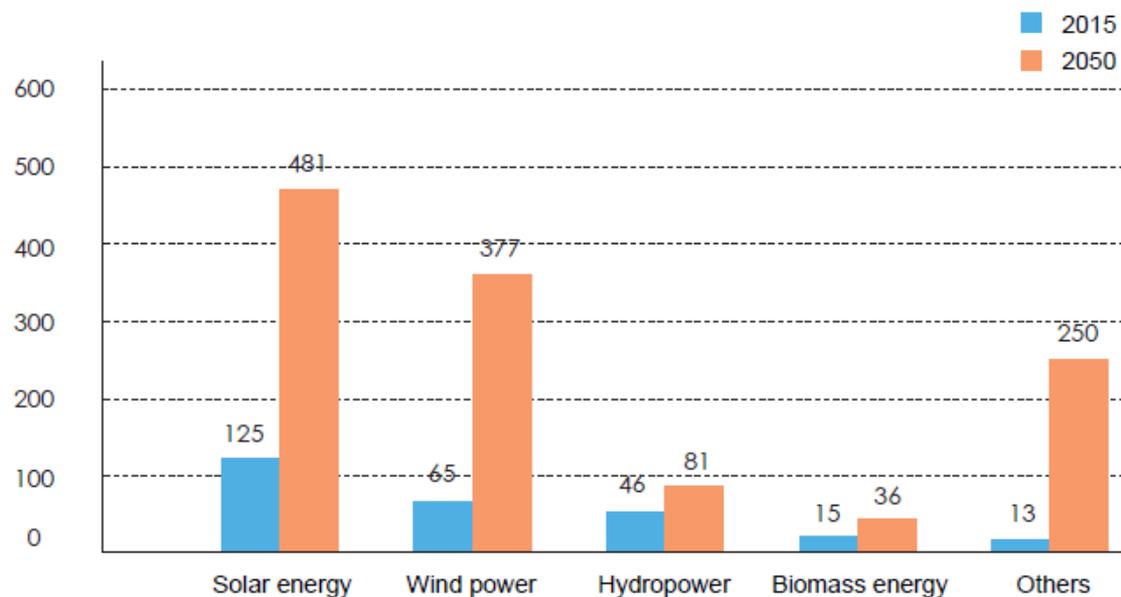
- Emerging industries like wind power, solar power, and electric vehicle will become a new economic growth point. In 2050, the added value of renewable energy industries will grow to RMB17 trillion, making a contribution of 6.2% to the GDP of that year. The added value of electric vehicle industry will grow to close to RMB 8 trillion, accounting for 2.9% of the GDP.



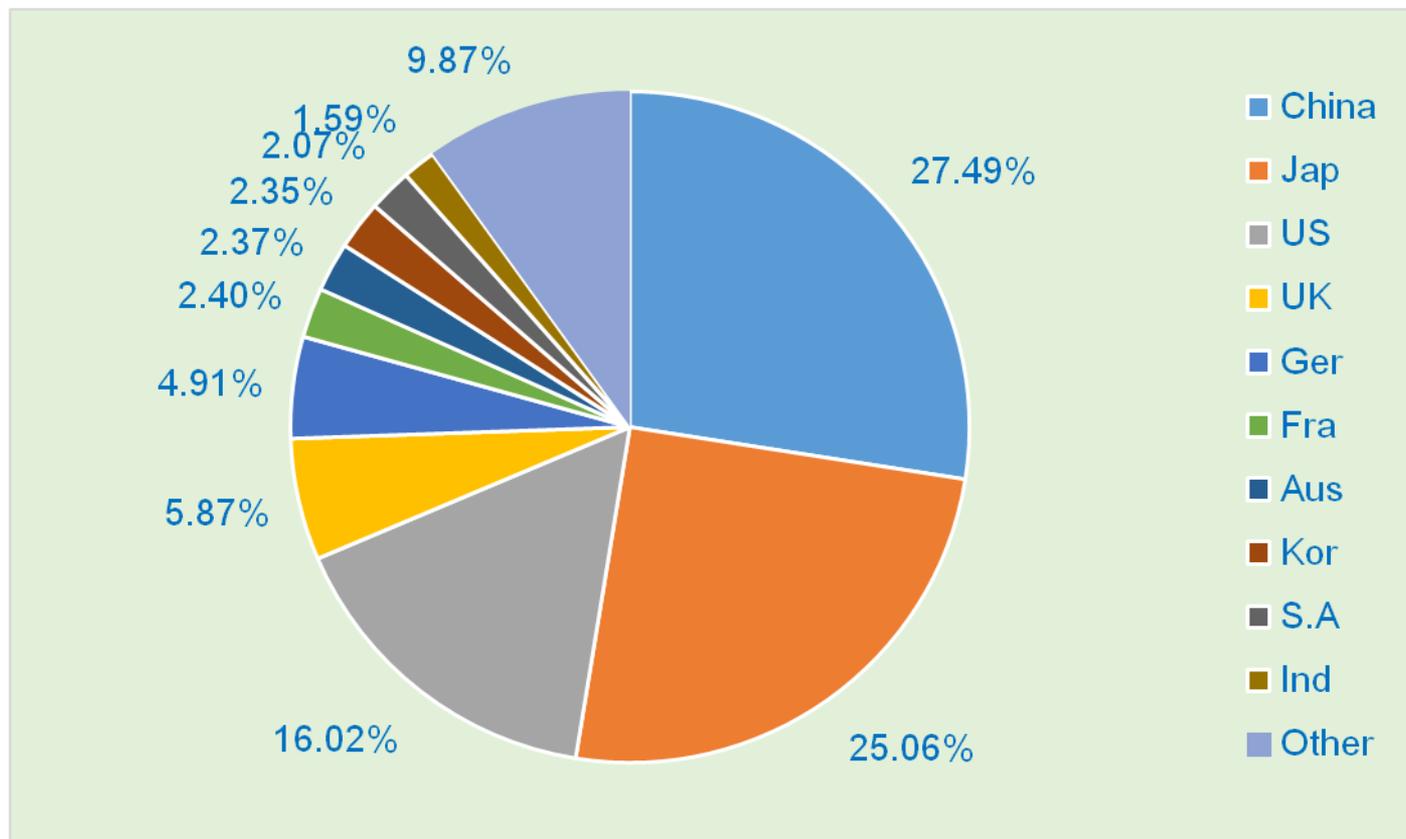
# Growth of Employment in Renewable Energy and Related Industries (Unit: 10 Thousand)



- The high renewable energy penetration scenario will create 12 million jobs in 2050 in the renewable energy and related industries, which will promote the transmission of China's employed population from traditional manufacturing to high value add industries.



# World PV Annual Installation by Countries (2014)



Country	China	Jap	US	UK	Ger	Fra	Aus	Kor	S.A	Ind	Other	Total
2013 ( GW )	9.50	6.90	4.50	1.70	3.30	0.60	1.20	0.44	0.30	0.44	9.47	38.35
2014 ( GW )	10.64	9.70	6.20	2.27	1.90	0.93	0.92	0.91	0.80	0.62	3.82	38.70
2014 Share (%)	27.49	25.06	16.02	5.87	4.91	2.40	2.37	2.35	2.07	1.59	9.87	100.00
Cumulative (GW)	28.38	23.30	18.28	5.10	38.20	5.66	4.13	2.38	0.92	2.94	47.70	177.00

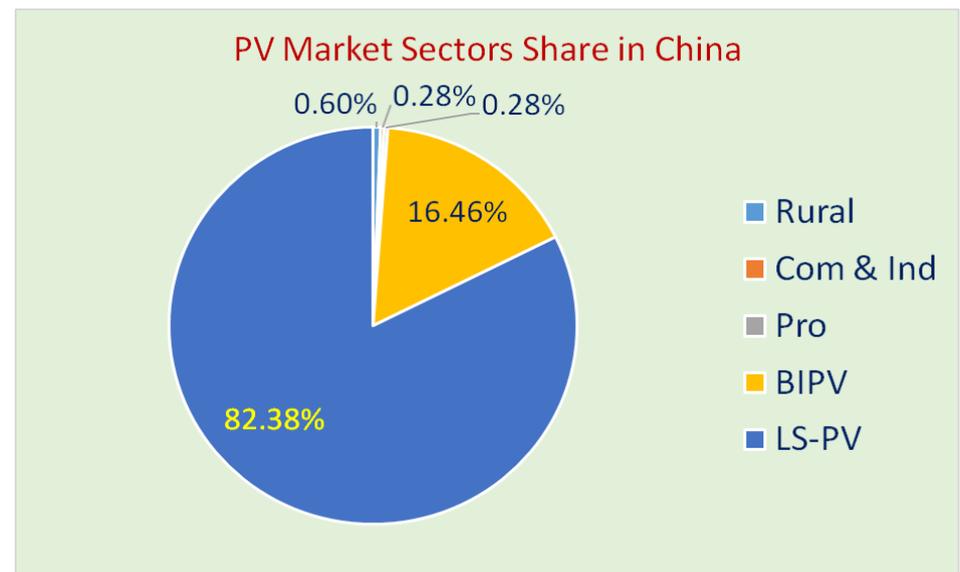
Source: IEA PVPS 2015

# 2014 Domestic PV Market by Sectors

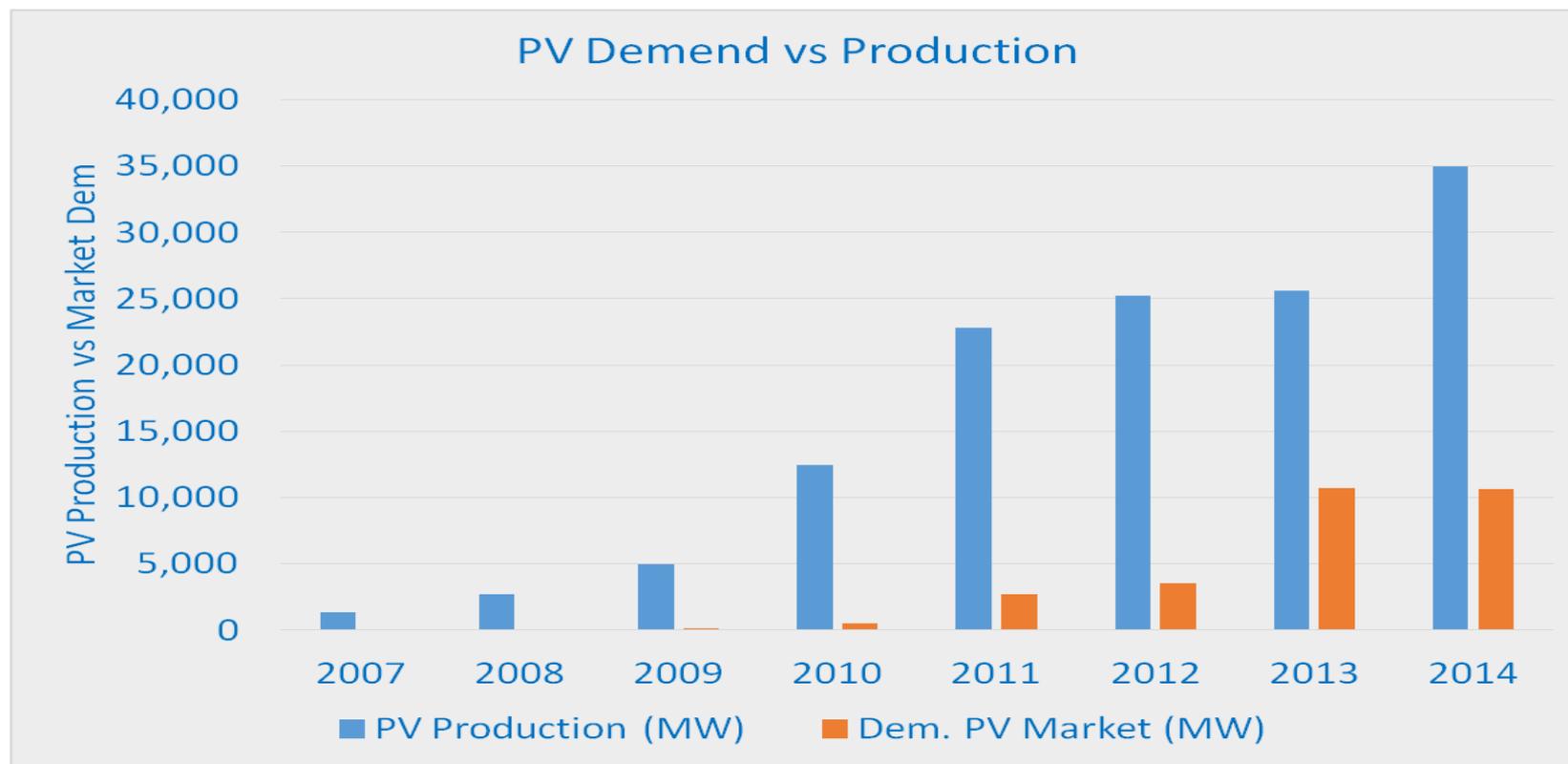


2014 Domestic PV Market by Sectors			
No.	Market Sector	Annu.Ins.	Cumm. Ins.
		( MWp)	( MWp)
1	Rural Electrification	20	170
2	Comm.& Indus.	10	80
3	PV Products	10	80
4	Building PV	2050	4670
5	Ground Mounted LS-PV	8550	23380
	Total	10640	28380

Source : National Energy Administration (NEA) , Feb. 15, 2015



# China's PV Industry Development

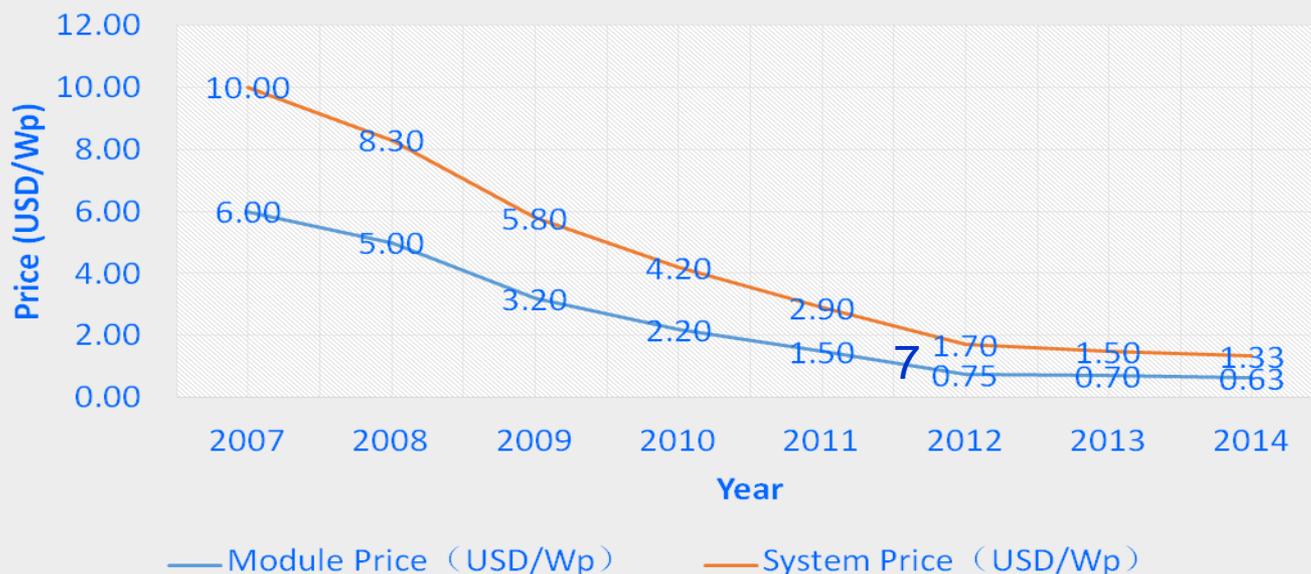


Year	2007	2008	2009	2010	2011	2012	2013	2014
PV Production (MW)	1,340	2,714	4,990	12,437	22,798	25,214	25,610	35,000
Dem. PV Market (MW)	20	40	160	500	2,700	3,560	10,680	10,640
Share of Export (%)	98.51	98.53	96.79	95.98	88.16	85.88	58.30	69.60

# PV Module and System Price Reduction



China PV Module and System Price 2007-2014



**During Last 7 Years :**

**086.4% of module price decreased;**

**086.7% of system price decreased ;**

**076.2% of PV FIT decreased**

**04 Yuan/kWh was set for PV in 2008 (for the 1MW PV project in Shanghai).**

Year	2007	2008	2009	2010	2011	2012	2013	2014
Cumulative Installation (GWp)	0.10	0.14	0.30	0.80	3.20	6.70	16.28	26.84
Module Price ( USD/Wp )	6.00	5.00	3.20	2.20	1.50	0.75	0.70	0.63
System Price ( USD/Wp )	10.00	8.30	5.80	4.20	2.90	1.70	1.50	1.33
Feed-In Tariff of PV (Yuan/kWh)	4.0	Set through Bidding			1.15	1.00	0.9-1.0	0.9-1.0

# Domestic Policy to Encourage RE



附件 1:

2015 年光伏发电建设实施方案

序号	地区	2015 年新增光伏电站建设规模 (万千瓦)	备注
合计	全国	1780	
1	河北	120	其中 30 万千瓦专门用于光伏扶贫试点县的配套光伏电站项目
2	山西	65	其中 20 万千瓦专门用于光伏扶贫试点县的配套光伏电站项目
3	内蒙古	80	
4	辽宁	30	
5	吉林	30	
6	黑龙江	30	
7	江苏	100	
8	浙江	100	
9	安徽	100	其中 40 万千瓦专门用于光伏扶贫试点县的配套光伏电站项目
10	福建	40	
11	江西	60	
12	山东	80	
13	河南	60	
14	湖北	50	
15	湖南	40	
16	广东	90	
17	广西	35	
18	海南	20	
19	四川	60	
20	贵州	20	
21	云南	60	
22	陕西	80	
23	甘肃	50	其中 25 万千瓦专门用于光伏扶贫试点县的配套光伏电站项目
24	青海	100	其中 15 万千瓦专门用于光伏扶贫试点县的配套光伏电站项目
25	宁夏	100	其中 20 万千瓦专门用于光伏扶贫试点县的配套光伏电站项目
26	新疆	130	
	兵团	50	

注: 1、新增光伏电站建设规模包括集中式光伏电站和分布式光伏电站。  
2、北京、天津、上海、重庆及西藏在不发生弃光的前提下, 不设建设规模上限。

## 国家能源局文件

国能新能[2015]73号

### 国家能源局关于下达 2015 年 光伏发电建设实施方案的通知

各省(自治区、直辖市)发展改革委(能源局)、新疆生产建设兵团  
发改委,各派出机构,国家电网公司、南方电网公司,内蒙古电力公  
司、陕西地方电力公司,水电规划总院、电力规划总院:

根据光伏发电项目建设管理有关规定,综合考虑全国光伏发

**By the end of June, about 7.73GW of PV has been installed, only 1.03 GW is from distributed PV generation.**

1. Target **17.8GW** (**1.5GW** for poverty alleviation);
2. PV Buildings and Self-Consumption projects **no need of quota**;
3. Quota will be distributed by competition.

# Domestic Policy to Encourage RE



To speed-up PV industry re-combination and weed-out backward capacity, “**Leading Runner Plan**” was issued by **NEA/MIIT/CAA**.

Type	Size of Cells □(mm)	Cell Number in one Module	15.5% Efficiency ( Wp )	16% Efficiency ( Wp )	16.5% Efficiency ( Wp )	17% Efficiency ( Wp )
Multi-Si	156*156	60	255	/	270	/
	156*156	72	305	/	325	/
Mono-Si	156*156	60	/	260	/	275
	156*156	72	/	315	/	330

Only the PV modules with higher efficiency can get subsidy from Government. Datong Citi is the first demo zone (1 GW additional quota).

Source: China PV Industry Association ( CPIA )

# Domestic Policy to Encourage RE



## State Council – Going Out Strategy [2015]No. 30 Encourage Overseas Investment and Win-Win Policy

《国务院关于推进国际产能和装备制造合作的指导意见》

国发〔2015〕30号

Anti-dumping and Local Content  
(US, EU, Canada, Australia, India....)

- ↗ **Trina Solar**: 1GW solar cell line and 1GW module line in India;
- ↗ **GCL**: Cooperate with India Ardani Group to set up PV manufacturing base with whole chain.
- ↗ **CSUN** 100MW Solar Cell line and 300MW Module line in Turkey;
- ↗ **Jinko** built a PV module line in South Africa
- ↗ **ReneSolar** built OEM lines in 7 countries
- ↗ **Yingli Green Energy** plan to build module line in Thailand
- ↗ **Comtech Solar** built 300MW wafer line in Malaysia
- ↗ **Zhongli Talesun Solar** invested in South-East Asia

# EWG 11 2013A



- APEC Photovoltaic Application Roadmap and Model Study (PVARM)
- Case study and SWOT analysis to typical PV project, including casualty and losses, in different area and environment
- Suggestion of possible PV application roadmap for APEC economies' reference
- Compare and discuss the advantages and weakness of different PV development models, including large size ground-mounted power plant, industrial and commercial project, residential project, and application in agriculture, transportation, and to summarize the best practices.



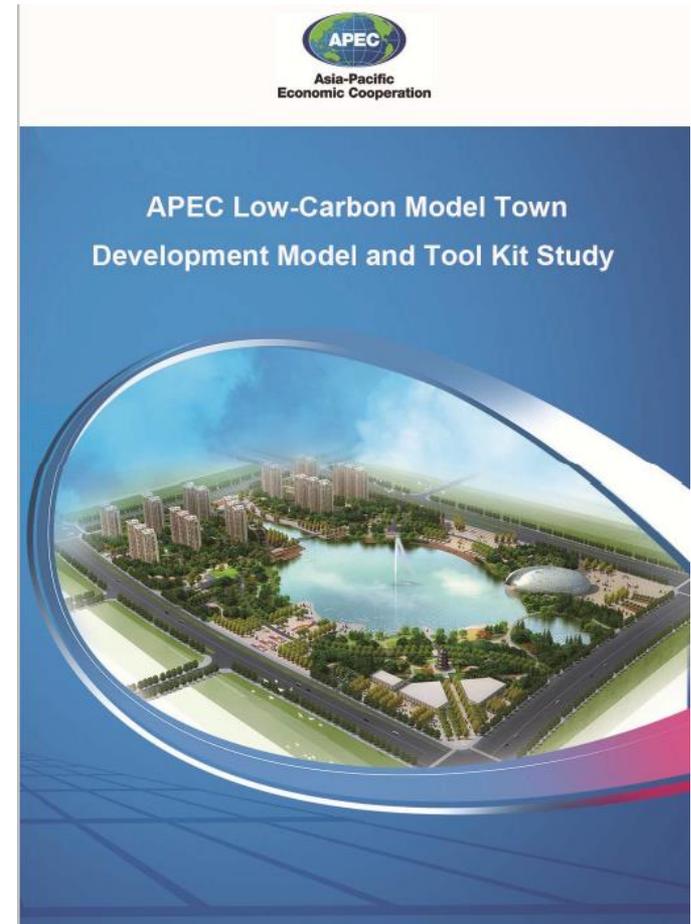
## APEC Photovoltaic Application Roadmap and Model Study



# EWG 13 2013A



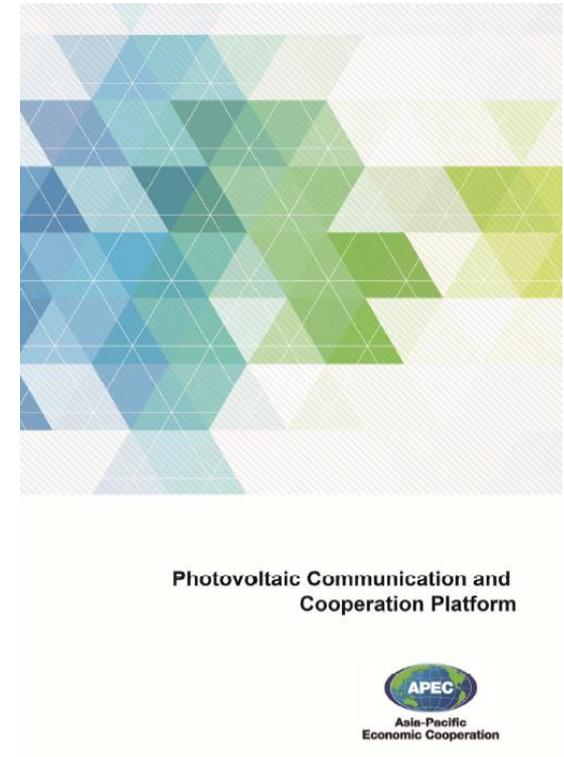
- APEC Low-Carbon Model Town Development Model and Tool Kit Study (LCMT-DMTK)
- Procedure that help to improve development efficiency
- Solution, from existing project, research and other industry
- Tool kits, especially feasibility study and planning, etc., on the basis of China-EU cooperation, and the Solar Decathlon competition held in China in August 2013.



# EWG 16 2013A



- APEC Photovoltaic Communication and Cooperation Platform (PVCCP)
- Establish a PV System Life-cycling Risk Management Scheme, to identify and control potential risks of different periods including planning, design, manufacturing, construction, maintenance, etc,
- Develop PV Risk Analysis Tool Kits to carry out risk analysis, mainly focus on three stages: design, construction and maintenance,
- Provide support to EGNRET and related stakeholders who wish to evaluate the risk and quality of specific PV project,
- Provide content and tool support concerning PV to the Knowledge Sharing Platform (KSP) of Energy Smart Communities Initiative (ESCI).





- APEC Photovoltaic System Best Practices and Latest Development Comparative Study (PV-BPLD)
- To carry out comparative study of different PV system practices, including most popular large scale PV system, high concentrated PV system (HCPV), low concentrated PV system (LCPV), PV system with optimizer or micro-inverter, etc.
- To recommend best practices in different APEC member economies to increase safety and efficiency, and reduce cost. Those practices include but not limited to solar resources evaluation, system design, module and main equipment selection, manufacturing supervision, construction management, complete check, performance ratio evaluation, maintenance, recycling, financing and insurance.



**APEC Photovoltaic System Best Practice and Latest Development Comparative Study**



# New Project Proposal

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- Off Grid Electrification Option for Remote Region in APEC Economies
- This project is planning to investigate the off grid electricity supply options using DC solar technology in remote regions in APEC economies.
- It will investigate the feasibility and economic advantages to use DC solar energy technology to provide electricity for remote villages and islands that do not have existing grid facility in APEC economies.
- The project team will investigate at least three representative economy region for the feasibility study , one region each from advanced countries, developing countries and third world countries respectively, and to investigate the current off grid electricity option, the cost, problem and obstacles, and technology and economical advantages to adopt DC solar vs. AC solar and other existing technologies.
- At the end of project, one day workshop will be hosted to facilitate in-depth discussions, and sharing ideas, and develop strategies to use DC solar energy in these regions. The time will be around Nov. 2017 and the location will be at Xiamen University, Xiamen, China.



Thanks for your precious time



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