Shandong Renewable Energy Outlook:

Low-Carbon Economy Initiatives

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Shandong province

Land: 157,900 km^2

Sea: 106,400 km^2

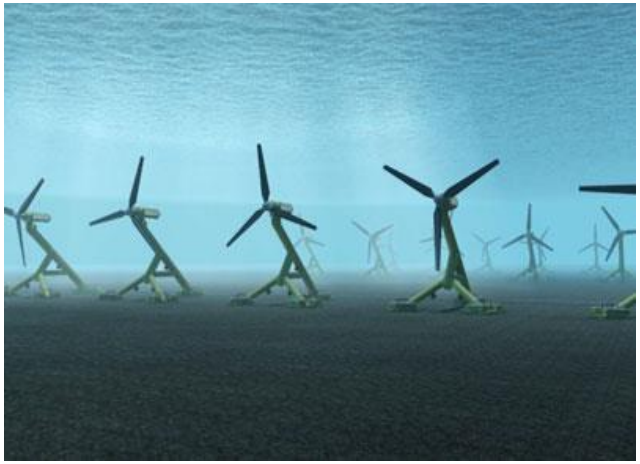
Population: 99.5 million (2016)

GRP: 1056 billion USD (2016)

GNPP: 10670 USD (2016)

Renewable energy sources

Wind	Solar	Bio
		

Geothermal	Ocean	Hydro
		

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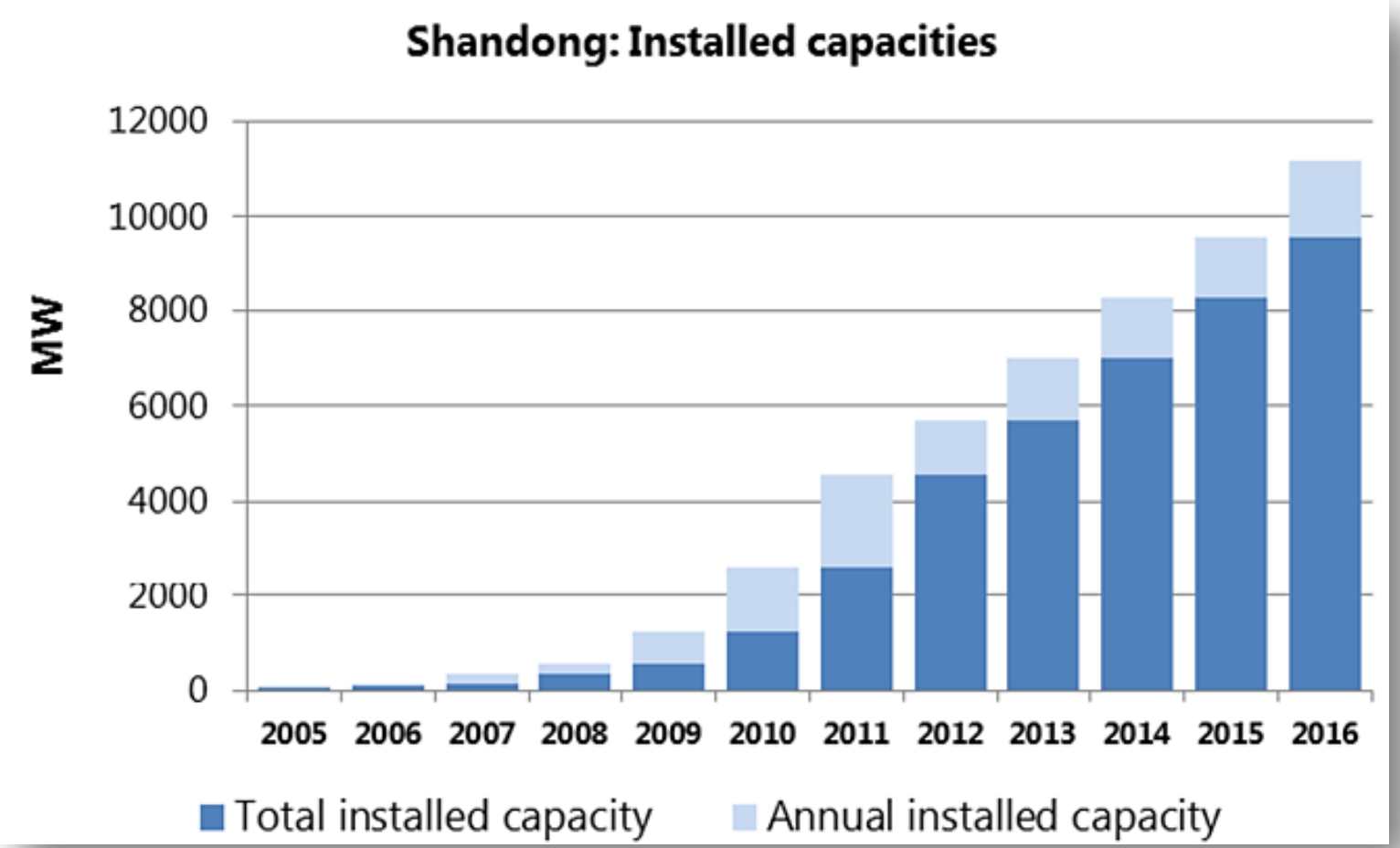
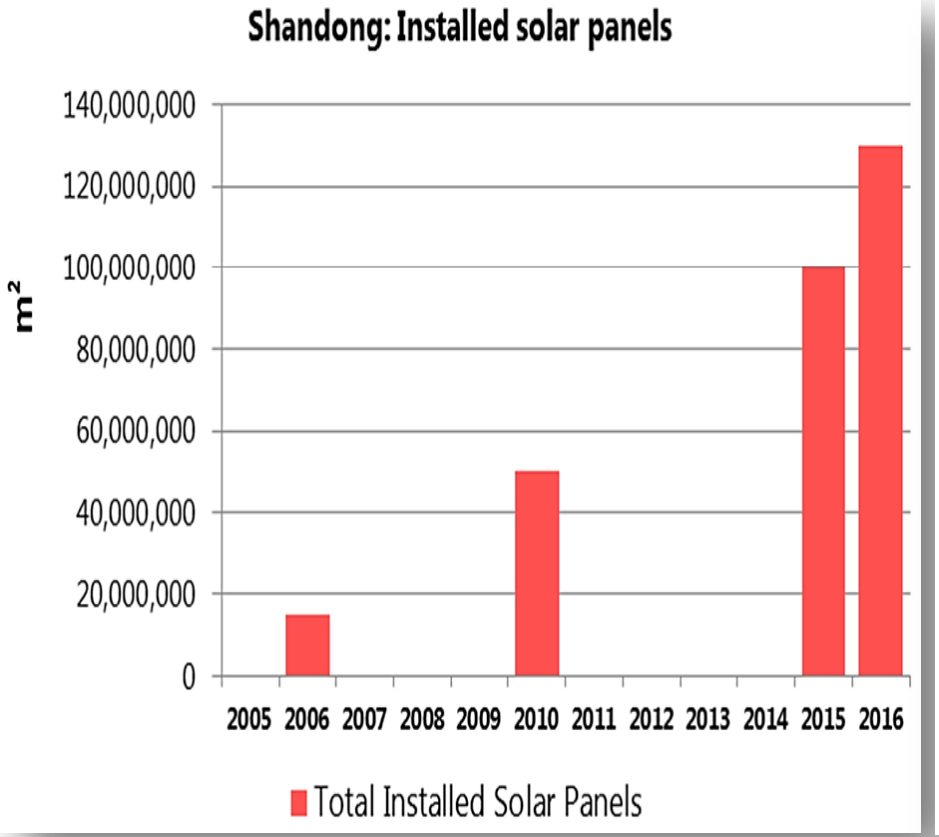
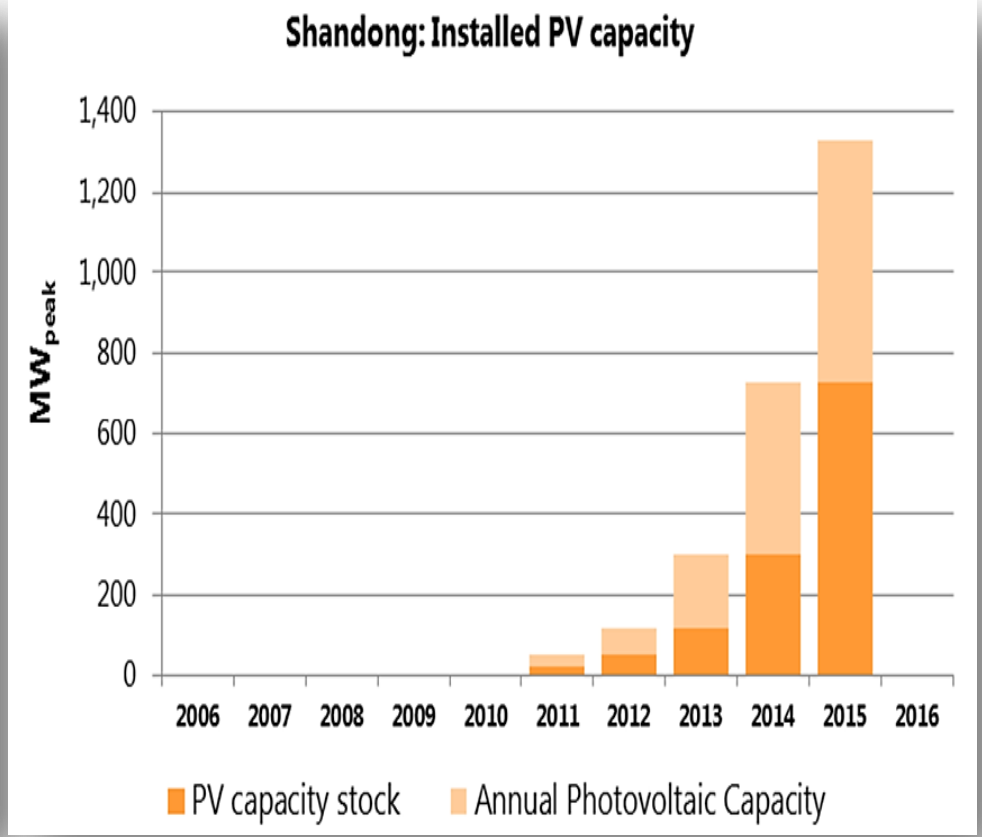
Wind energy



Solar energy





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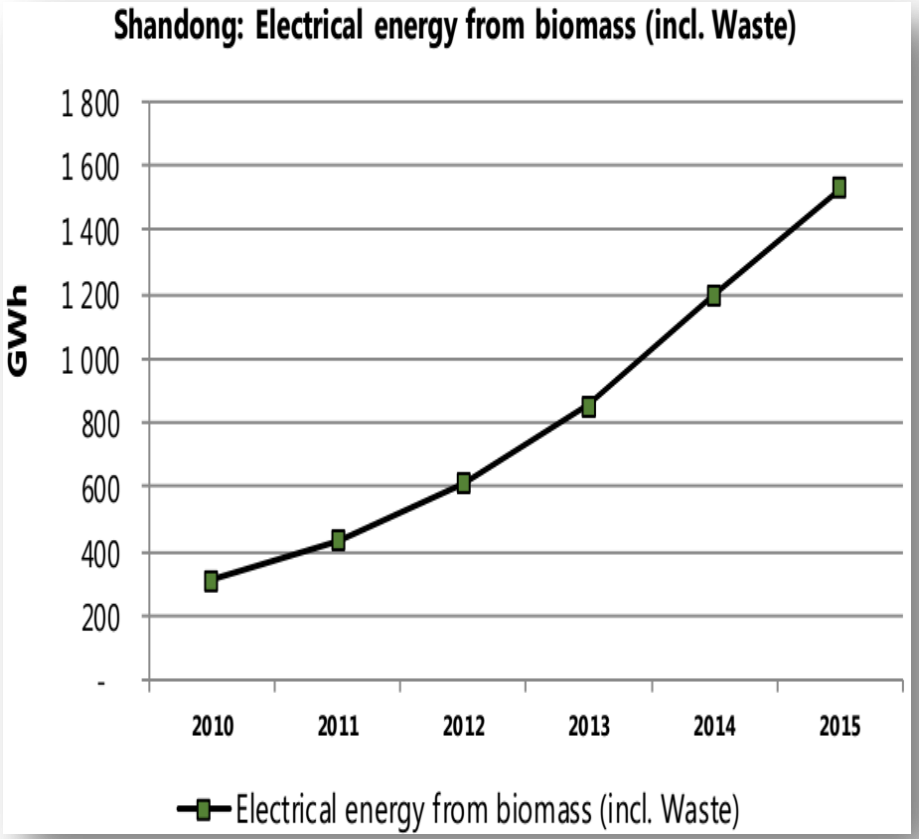
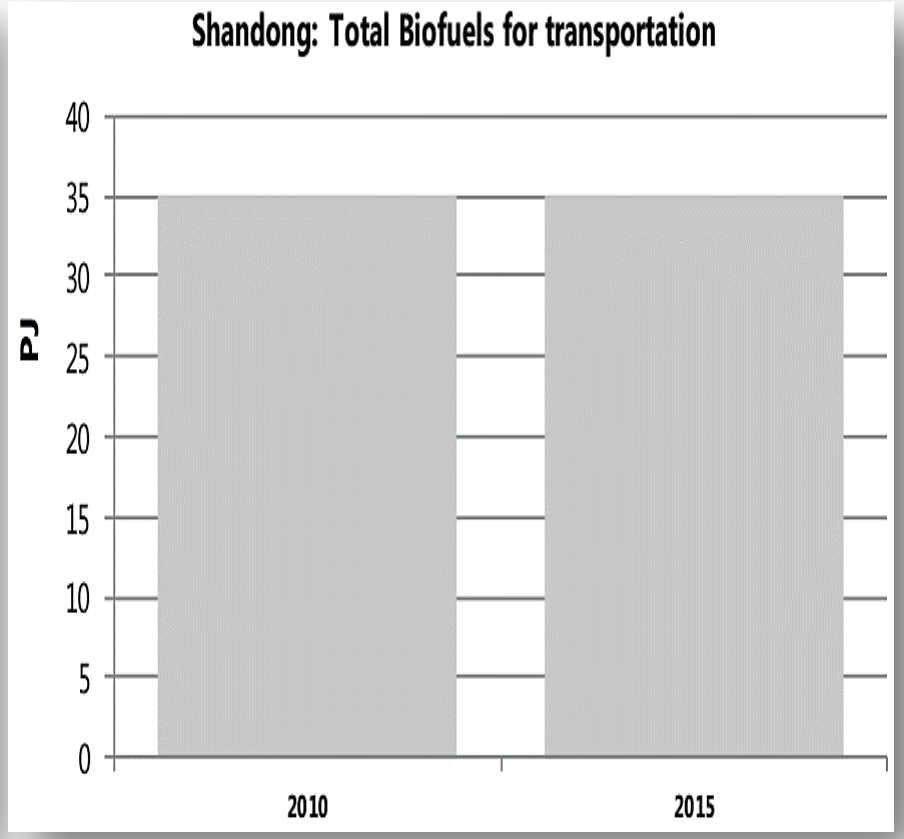
Bioenergy





Geothermal energy

The potential for geothermal energy in Shandong is estimated at 8.06×10^{17} kJ, equivalently to 27.5 billion tce, including shallow geothermal energy and hydrothermal geothermal energy. By the end of 2015, the total heating area was about 5700×10^4 m^2.

Ocean energy

Shandong is a marine big province whose the sea area is vast and the marine resources are abundant. The potential installed capacity is up to about 120 MW, which is expected to produce about 375 GWh per year.

Hydroenergy

Shandong province is one of the furthest water-lacked province in China, where water resource per capita is lesser than 1/6 of that of the China average. By the end of 2015, the total installed capacity was only about 1077 MW.

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Renewable energy outlook

Project	Unit	2020	2030
Electrical energy from renewable			
Wind power	GW	14	23
Solar power	GW	10	25
Biomass power	GW	2.3	5
Hydropower	GW	1.1	7.9
Nuclear power	GW	2.7	20.65
Thermal energy			
Solar energy	$\times 10^4\ m^2$	14000	22000
Geothermal energy	$\times 10^4\ m^2$	14000	30000
Liquid and gaseous fuel from biomass			
Gaseous fuel	$\times 10^8\ m^3$	11	13
Biomass briquette fuel	$\times 10^4$ t	150	300
Ethanol gasoline	$\times 10^4$ t	120	120
Total energy generation	$\times 10^4$ tce	4173	10870

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Renewable energy outlook

Solar power	Unit	2020	2030
Photovoltaic power station installed capacity	GW	8	17
Distributed photovoltaic power installed capacity	GW	2	8
Total	GW	10	25

Biomass power	Unit	2020	2030
Biomass from agriculture and forest	GW	1.5	3.5
Waste biomass	GW	0.7	1
Landfill biogas	GW	0.1	0.5
Total	GW	2.3	5

Environmental impacts

Pollutant reduction	Unit	2020	2030
CO_2	$\times 10^8$ t	1.1	2.85
SO_2	$\times 10^4$ t	36	92
NO_x	$\times 10^4$ t	31	81
Smoke	$\times 10^4$ t	20	50
Waste water	$\times 10^8$ m^3	2.1	5.6

New employment	Unit	2020	2030
Person	Million	50-60	100

Qingdao Institute of Bioenergy and Bioprocess Technology

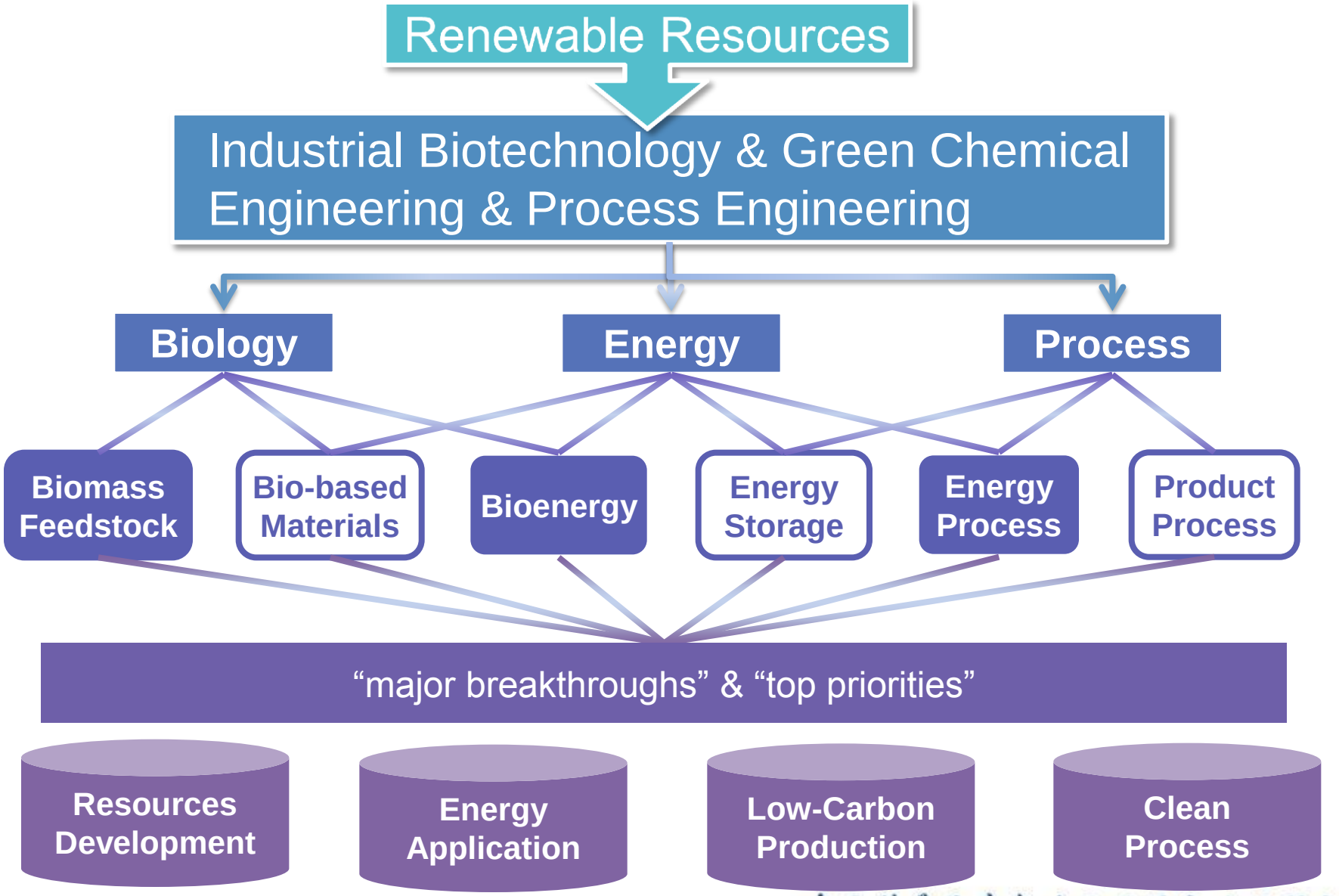
Qingdao Institute of Bioenergy and Bioprocess Technology

One of China's key national research institutions for renewable energy and green materials, focusing mainly on R&D of the resources, technologies, products and processes for bio-based energy and materials.

Devoted to providing systematic and sustainable solutions to China's bioenergy needs by integrating science, technology, and engineering in the fields of industrial biology, green chemical technology, and process engineering.

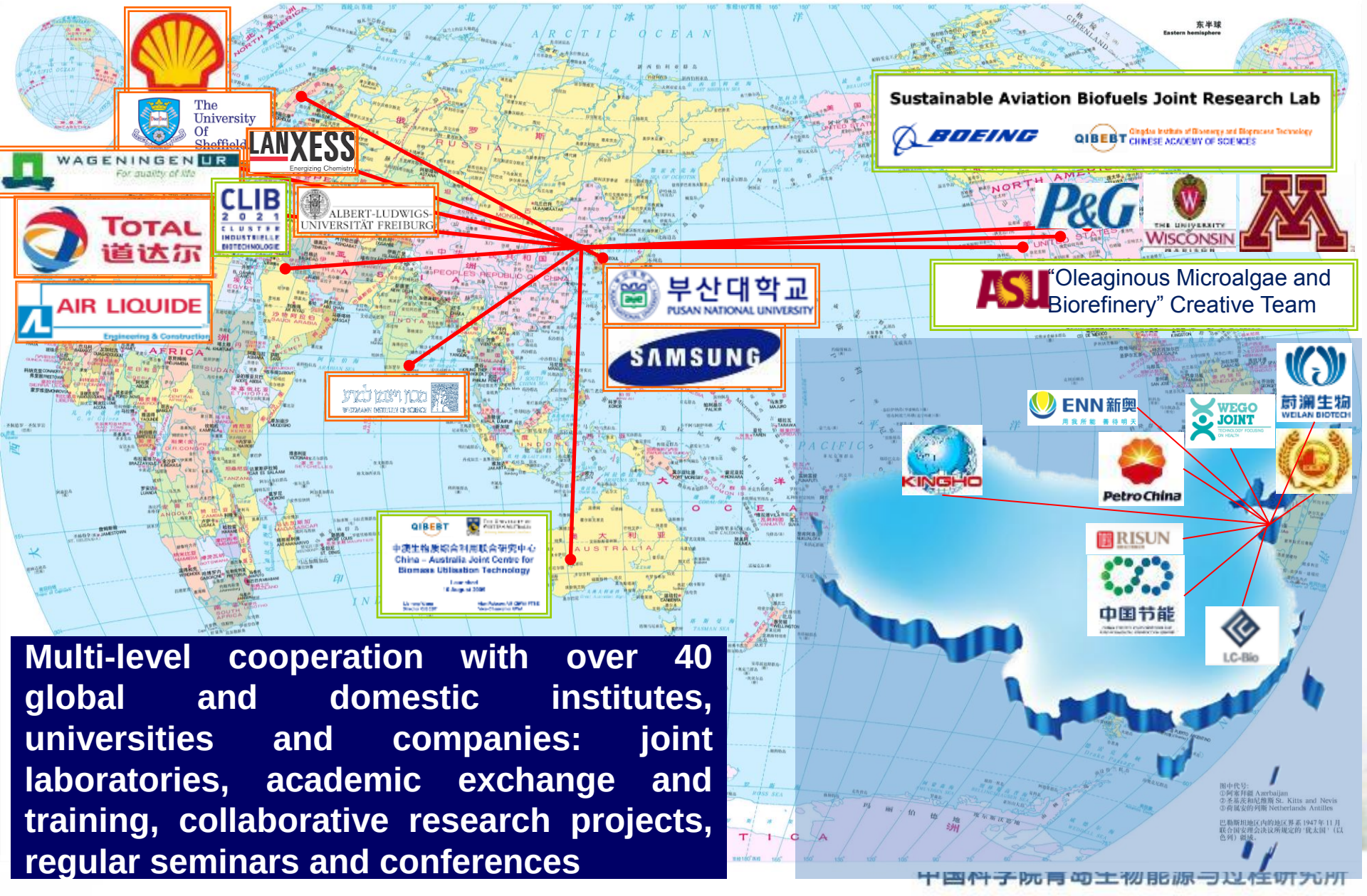
- Funded by CAS, Shandong province and Qingdao city
- Started in 2007
- More than 400 research staff
- 180 Postgraduate students
- Unique capabilities
- Collaborate with government, industry and universities

Qingdao Institute of Bioenergy and Bioprocess Technology



Research and Academic Cooperation

---global partnership for excellence in green energy and materials for a sustainable Earth



Multi-level cooperation with over 40 global and domestic institutes, universities and companies: joint laboratories, academic exchange and training, collaborative research projects, regular seminars and conferences

Summary

- More low-carbon economy potential in Shandong
- Experience from other regions are beneficial to Shandong
- Shandong welcomes participation from other regions

Belt and Road Initiative Framework