2021 Northeast Asia International Conference for Economic Development
Japan–Russia Energy and Environment Dialogue: The Paris Agreement and Energy Security in Northeast Asia

ENERGY RESEARCH INSTITUTE

China's Energy Policies and Cooperation in NEA

Shixian GAO
Energy Research Institute, NDRC, China
Tel: +86-10-6390-8471
Fax: +86-10-6390-8568
email: gaoshixian@eri.org.cn

3 February 2020

国家发展和改革委员会能源研究所
Energy Research Institute National Development and Reform Commission

Outline

ENERGY RESEARCH INSTITUTE

1. Present Situation of Energy in China
2. Polices of China's Energy Development
3. Energy Cooperation in NEA

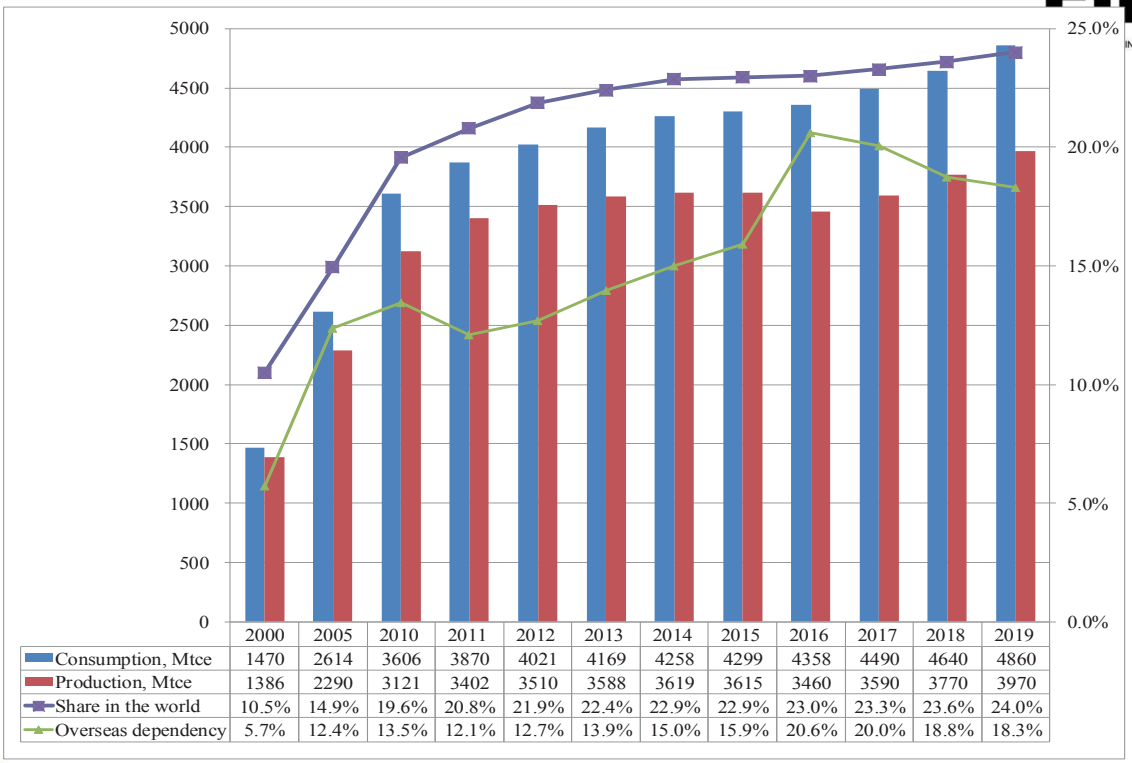
国家发展和改革委员会能源研究所
Energy Research Institute National Development and Reform Commission

ENERGY RESEARCH INSTITUTE

1. Present Situation of Energy in China

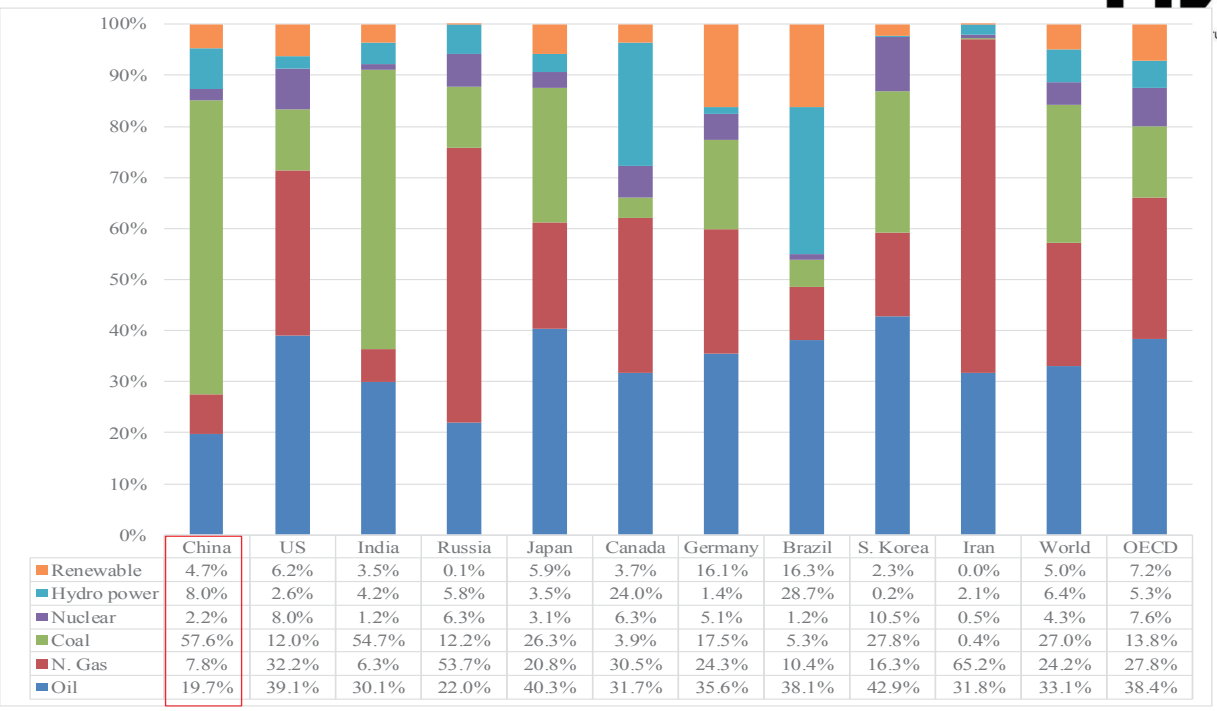
国家发展和改革委员会能源研究所
Energy Research Institute National Development and Reform Commission

China is the Biggest Energy Consumer and Producer in the World



	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Consumption, Mtce	1470	2614	3606	3870	4021	4169	4258	4299	4358	4490	4640	4860
Production, Mtce	1386	2290	3121	3402	3510	3588	3619	3615	3460	3590	3770	3970
Share in the world	10.5%	14.9%	19.6%	20.8%	21.9%	22.4%	22.9%	22.9%	23.0%	23.3%	23.6%	24.0%
Overseas dependency	5.7%	12.4%	13.5%	12.1%	12.7%	13.9%	15.0%	15.9%	20.6%	20.0%	18.8%	18.3%

China's Energy Mix by Type and It's Comparison (2019)



	China	US	India	Russia	Japan	Canada	Germany	Brazil	S. Korea	Iran	World	OECD
Renewable	4.7%	6.2%	3.5%	0.1%	5.9%	3.7%	16.1%	16.3%	2.3%	0.0%	5.0%	7.2%
Hydro power	8.0%	2.6%	4.2%	5.8%	3.5%	24.0%	1.4%	28.7%	0.2%	2.1%	6.4%	5.3%
Nuclear	2.2%	8.0%	1.2%	6.3%	3.1%	6.3%	5.1%	1.2%	10.5%	0.5%	4.3%	7.6%
Coal	57.6%	12.0%	54.7%	12.2%	26.3%	3.9%	17.5%	5.3%	27.8%	0.4%	27.0%	13.8%
N. Gas	7.8%	32.2%	6.3%	53.7%	20.8%	30.5%	24.3%	10.4%	16.3%	65.2%	24.2%	27.8%
Oil	19.7%	39.1%	30.1%	22.0%	40.3%	31.7%	35.6%	38.1%	42.9%	31.8%	33.1%	38.4%

Source: BP

Structure of Power generation in the World in 2019

	Generation, TWh	Structure						
		Oil	Gas	Coal	Nuclear	Hydro	Renewable	Others
World	**27004.7**	**3.1%**	**23.3%**	**36.4%**	**10.4%**	**15.6%**	**10.4%**	**0.9%**
OECD	11136.0	1.5%	30.1%	22.2%	17.9%	12.4%	14.5%	1.5%
Non-OECD	15868.7	4.2%	18.6%	46.3%	5.1%	17.9%	7.5%	0.4%
EU	3215.3	1.5%	21.5%	15.2%	25.6%	10.2%	23.9%	2.1%
China	**7503.4**	**0.1%**	**3.2%**	**64.7%**	**4.6%**	**16.9%**	**9.8%**	**0.8%**
USA	4401.3	0.5%	38.6%	23.9%	19.4%	6.2%	11.1%	0.3%
India	1558.7	0.5%	4.6%	73.0%	2.9%	10.4%	8.7%	0.0%
Russia	1118.1	0.6%	46.5%	16.3%	18.7%	17.4%	0.2%	0.4%
Japan	1036.3	4.3%	35.0%	31.5%	6.3%	7.1%	11.7%	4.1%
Canada	660.4	0.6%	10.5%	8.3%	15.2%	57.8%	7.5%	0.1%
Brazil	625.6	1.3%	9.4%	4.1%	2.6%	63.8%	18.8%	0.0%
Germany	612.4	0.8%	14.9%	28.0%	12.3%	3.3%	36.6%	4.2%
S. Korea	584.7	1.3%	25.8%	40.8%	25.0%	0.5%	5.0%	1.7%
Mexico	364.0	10.4%	56.5%	7.2%	3.1%	6.5%	10.4%	5.9%
Top 10	18465.0	0.8%	18.8%	43.7%	10.1%	15.2%	10.5%	0.9%

Source: BP

World PV and Wind Power Capacity during 2010-2019

	PV capacity，MW						A. GR 2010-2019	Share	
	2010	2015	2016	2017	2018	2019		2010	2019
World	**40129**	**221988**	**295816**	**388550**	**488741**	**586421**	**17.2%**	**100.0%**	**100.0%**
China	1022	43549	77809	130822	175237	205493	36.2%	2.5%	35.0%
USA	2040	23442	34716	43115	53184	62298	14.4%	5.1%	10.6%
Japan	3599	28615	38438	44226	55500	61840	9.9%	9.0%	10.5%
Germany	18007	39224	40679	42293	45181	48962	13.2%	44.9%	8.3%
India	39	5593	9879	18152	27355	35060	3.5%	0.1%	6.0%
Italy	3597	18907	19289	19688	20114	20906	20.2%	9.0%	3.6%
Australia	1091	5946	6689	7354	11305	15930	15.9%	2.7%	2.7%
UK	95	9601	11930	12782	13118	13398	43.6%	0.2%	2.3%
Spain	4605	7008	7017	7027	7068	11065	18.6%	11.5%	1.9%
France	1044	7138	7702	8610	9617	10571	11.2%	2.6%	1.8%
TOP 10	34095	181886	246446	325459	408061	474952	11.2%	85.0%	81.0%
TOP 10 Share	85.0%	81.9%	83.3%	83.8%	83.5%	81.0%			

	Wind power capacity，MW						A. GR 2010-2019	Share	
	2010	2015	2016	2017	2018	2019		2010	2019
World	**180924**	**416276**	**466827**	**514402**	**563820**	**622704**	**17.2%**	**100.0%**	**100.0%**
China	29633	131048	148517	164374	184665	210478	36.2%	16.4%	33.8%
USA	39135	72573	81286	87597	94417	103584	14.4%	21.6%	16.6%
Germany	26903	44580	49435	55580	58843	60822	9.9%	14.9%	9.8%
India	13184	25088	28700	32848	35288	37505	13.2%	7.3%	6.0%
Spain	20693	22943	22990	23124	23405	25553	3.5%	11.4%	4.1%
UK	5421	14306	16126	19585	21770	24128	20.2%	3.0%	3.9%
France	5912	10298	11567	13499	14900	16260	15.9%	3.3%	2.6%
Brazil	927	7633	10124	12294	14833	15364	43.6%	0.5%	2.5%
Canada	3967	11214	11973	12403	12816	13413	18.6%	2.2%	2.2%
Italy	5794	9137	9384	9737	10230	10758	11.2%	3.2%	1.7%
Top10	145776	339683	380718	421306	460938	507108	11.2%	80.6%	81.4%
Top10 Share	80.6%	81.6%	81.6%	81.9%	81.8%	81.4%			

Source: BP

国家发展和改革委员会能源研究所
Energy Research Institute National Development and Reform Commission

CO_2 Emission in Some Countries

	Emissions, Mt CO2		AGR during 2010-19	Emissions Share		Consumption share in 2019
	2010	2019		2010	2019	
World	**31085.5**	**34169.0**	**1.1%**	**100.0%**	**100.0%**	**100.0%**
OECD	12957.5	12012.0	-0.8%	41.7%	35.2%	40.0%
Non-OECD	18128.0	22157.0	2.3%	58.3%	64.8%	60.0%
EU	3922.9	3330.4	-1.8%	12.6%	9.7%	11.8%
China	**8143.4**	**9825.8**	**2.1%**	**26.2%**	**28.8%**	**24.3%**
USA	5485.7	4964.7	-1.1%	17.6%	14.5%	16.2%
India	1660.7	2480.4	4.6%	5.3%	7.3%	5.8%
Russia	1492.2	1532.6	0.3%	4.8%	4.5%	5.1%
Japan	1201.8	1123.1	-0.7%	3.9%	3.3%	3.2%
Germany	783.2	683.8	-1.5%	2.5%	2.0%	2.3%
Iran	518.1	670.7	2.9%	1.7%	2.0%	2.1%
S. Korea	590.9	638.6	0.9%	1.9%	1.9%	2.1%
Indonesia	428.0	632.1	4.4%	1.4%	1.8%	1.5%
Saudi Arabia	486.3	579.9	2.0%	1.6%	1.7%	1.9%
Top 10	20790.3	23131.6	1.2%	66.9%	67.7%	64.5%

Source: BP

国家发展和改革委员会能源研究所
Energy Research Institute National Development and Reform Commission

2. Polices of China's Energy Development

2.1 China's Target of Energy and Environment

To maintain energy security and achieve the Paris Agreement targets are the preconditions of China's energy policies.

General: Clean, Low Carbon, Security and Efficient.

- ✓ CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060;
- ✓ To lower CO_2 emissions per unit of GDP by over 65% from the 2005 level by 2030;
- ✓ To increase the share of non-fossil fuels in primary energy consumption to around 25% by 2030;
- ✓ and bring total installed capacity of wind and solar power to over 1.2 TWs by 2030;
- ✓ To increase the forest stock volume by 6 billion m^3 from the 2005 level by 2030.

国家发展和改革委员会能源研究所
Energy Research Institute National Development and Reform Commission

2.2 China's Energy Transition: Clean, Low Carbon

		Stated Policies Scenario				
		2019	2030	2040	CAAGR 2019-30	CAAGR 2019-40
Total primary demand, Mtoe		**3314**	**3735**	**3898**	**1.1**	**0.8**
Share, %	Coal	61	52	45	-0.3	-0.6
	Oil	19	19	17	0.8	0.1
	Natural gas	8	11	13	4.2	3.4
	Nuclear	3	5	6	5.8	4.9
	Hydro	3	3	3	0.8	1.0
	Bioenergy	4	5	5	3.8	2.7
	Other renewables	3	6	10	8.6	7.0
		Sustainable Development Scenario				
		2019	2030	2040	CAAGR (%) 2019-30	CAAGR (%) 2019-40
Total primary demand, Mtoe		**3314**	**3164**	**2897**	**-0.4**	**-0.6**
Share, %	Coal	61	43	25	-3.4	-4.7
	Oil	19	19	14	-0.7	-2.1
	Natural gas	8	11	14	3.2	2.3
	Nuclear	3	7	11	7.7	6.1
	Hydro	3	4	5	1.6	1.4
	Bioenergy	4	6	10	4.4	4.4
	Other renewables	3	10	20	12.1	9.3

Source: IEA WEO-2020.

国家发展和改革委员会能源研究所
Energy Research Institute National Development and Reform Commission

2.2 China's Transition in Power Sector

		Stated Policies Scenario				
		2019	2030	2040	CAAGR (%) 2019-30	CAAGR (%) 2019-40
Total generation, TWh		**7518**	**9952**	**12023**	**2.6**	**2.3**
Share	Coal	65	52	42	0.5	0.1
	Oil	0	0	0	-7.0	-6.3
	Natural gas	3	5	6	7.0	5.4
	Nuclear	5	7	8	5.8	4.9
	Renewables	27	36	44	5.4	4.7
	Hydro	17	14	13	0.8	1.0
	Bioenergy	2	3	3	7.7	5.5
	Wind	5	10	13	8.3	6.6
	Geothermal	0	0	0	28.8	23.1
	Solar PV	3	9	14	14.0	10.2
	CSP	0	0	0	18.2	14.6
	Marine	-	0	0	39.6	26.3
		Sustainable Development Scenario				
		2019	2030	2040	CAAGR (%) 2019-30	CAAGR (%) 2019-40
Total generation, TWh		**7518**	**9317**	**10951**	**2.0**	**1.8**
Share	Coal	65	35	13	-3.7	-5.7
	Oil	0	0	0	-4.8	-12.0
	Natural gas	3	6	6	8.0	4.9
	Nuclear	5	8	11	7.7	6.1
	Renewables	27	50	70	7.9	6.5
	Hydro	17	16	16	1.6	1.4
	Bioenergy	2	4	5	9.3	7.1
	Wind	5	15	21	11.6	8.5
	Geothermal	0	0	0	38.0	25.3
	Solar PV	3	16	27	18.6	13.1
	CSP	0	0	1	25.1	21.6
	Marine	-	0	0	33.5	21.9

Source: IEA WEO-2020.

国家发展和改革委员会能源研究所
Energy Research Institute National Development and Reform Commission

2.3 Actions

2.3.1 Supply side: Establish a Clean, Low-carbon and Multi-source Complementary Energy Supply System

✓ Promote the economic and efficient development and utilization of **non-fossil energy.**

✓ Optimize the **fossil energy** structure and guarantee energy security.

✓ Improve the comprehensive regulation capacity of power system and oil/ gas safety **reserve** scale.

✓ Build infrastructure interconnection and intelligent shared network.

2.3 Actions

2.3.2 Demand side: Establish a High-quality, Sharing, Economic and Efficient Energy Consumption System

✓ **"Double control":** total energy consumption and energy consumption intensity.

✓ Promote the optimization and upgrading of **energy consumption structure** and build **a new green and efficient energy use model**.

✓ Take the **industrial revolution** as an opportunity to push the industrial energy utilization into the plat period first.

✓ Take **green building** as the core to break the lock-in effect of high growth of building energy consumption.

✓ Focus on mode optimization and technological progress, and realize oil removal in **transportation energy consumption.**

✓ Innovate the development mode and strive to create a new model of comprehensive energy service.

ENERGY RESEARCH INSTITUTE

3. Energy Cooperation in NEA

Regional and International Energy

ENERGY RESEARCH INSTITUTE

Build a Diversified, Open and Mutually Beneficial International Energy Cooperation System to Achieve Energy Security Under Open Conditions.

- ✓ Strengthen the interconnection of energy infrastructure.
- ✓ Strengthen energy technology cooperation: Hydrogen energy. CCUS, renewable energy equipment, materials and technologies.
- ✓ Accelerate the construction of global energy governance system.

Conclusions

China is the biggest energy consumer, producer, and CO_2 emitter in the world, and has made great progress in energy transition.

- ✓ Coal as a high carbon intensity energy type takes a dominant position in China.
- ✓ China has made great progress in energy transition from high carbon intensity to lower /zero carbon energies; and energy efficient improvement.

China is facing a great challenge in achieving the goals of China NDCs coordinated with the Paris Agreement.

- ✓ The amount and intensity of CO_2 emissions by 2030 and 2060.
- ✓ The proportion of non-fossil fuels in primary energy consumption by 2030.
- ✓ Total installed capacity of wind and solar, etc.

Energy Cooperation in NEA

- ✓ We can cooperate in many fields in energy sector in NEA, in particular in maintaining energy security and achieving the Paris Agreement targets.

Thank you for your attention!

国家发展和改革委员会能源研究所
Energy Research Institute National Development and Reform Commission