

BRICS Energy Development and Cooperation

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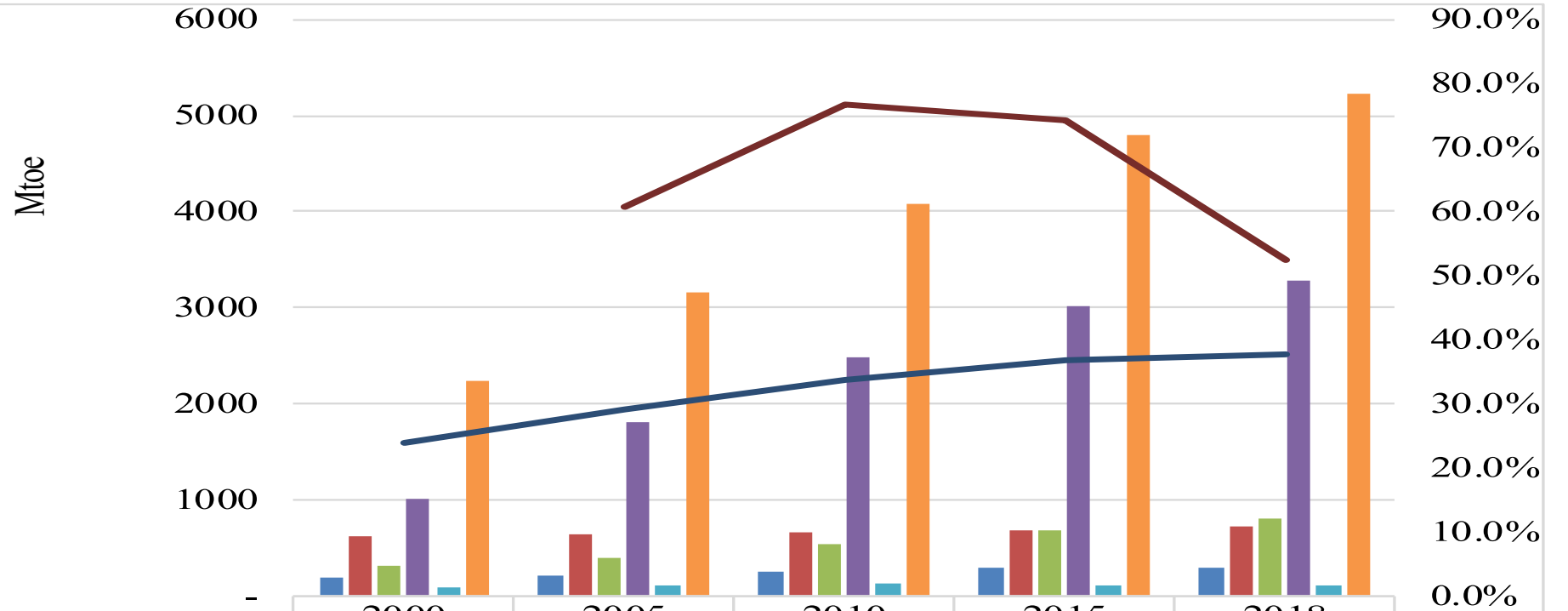
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1. Energy present situation in BRICS

1. Energy Present Situation in BRICS

1.1 Total Energy Consumption



	2000	2005	2010	2015	2018
■ Brazil	188	210	263	296	298
■ Russia	613	640	669	675	721
■ India	318	395	539	690	809
■ China	1011	1803	2492	3010	3273
■ S. Africa	102	112	126	122	122
■ BRICS	2232	3160	4090	4793	5222
— BRICS Share in world	23.8%	29.0%	33.8%	36.7%	37.7%
— BRICS increment share in world		60.6%	76.7%	74.3%	52.5%

1. Energy Present Situation in BRICS

1.2 Energy Consumption Structure by Source in 2018

	GDP		Population		Energy consumption		CO ₂ emission		Energy intensity in 2018, toe/ k USD	Energy consumption per capita in 2018, toe
	Current billion USD	Share in world	Ammount, Million	Share in world	Amout, Mtoe	Share in world	Amout, Mt- CO ₂	Share in world		
Brazil	1869	2.2%	209	2.8%	298	2.1%	420	1.2%	0.159	1.421
Russia	1658	1.9%	144	1.9%	721	5.2%	1551	4.6%	0.435	4.989
India	2726	3.2%	1353	17.8%	809	5.8%	2481	7.4%	0.297	0.598
China	13608	15.9%	1393	18.3%	3273	23.6%	9420	28.0%	0.241	2.350
S. Africa	366	0.4%	58	0.8%	122	0.9%	421	1.3%	0.332	2.103
BRICS	20227	23.6%	3157	41.6%	5222	37.7%	14293	42.4%	0.258	1.654
World	85791	100.0%	7594	100.0%	13865	100.0%	33685	100.0%	0.162	1.826

1. Energy Present Situation in BRICS

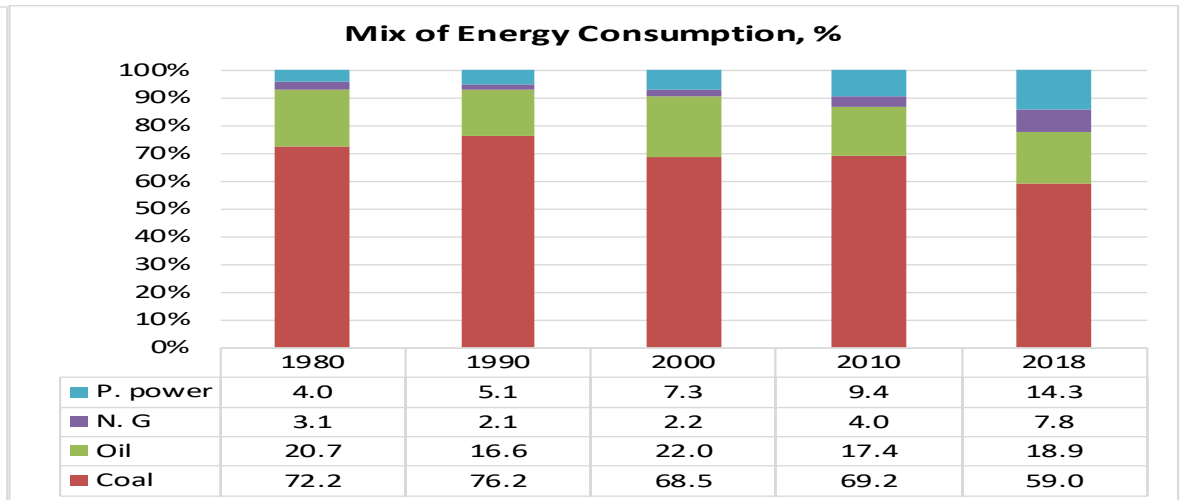
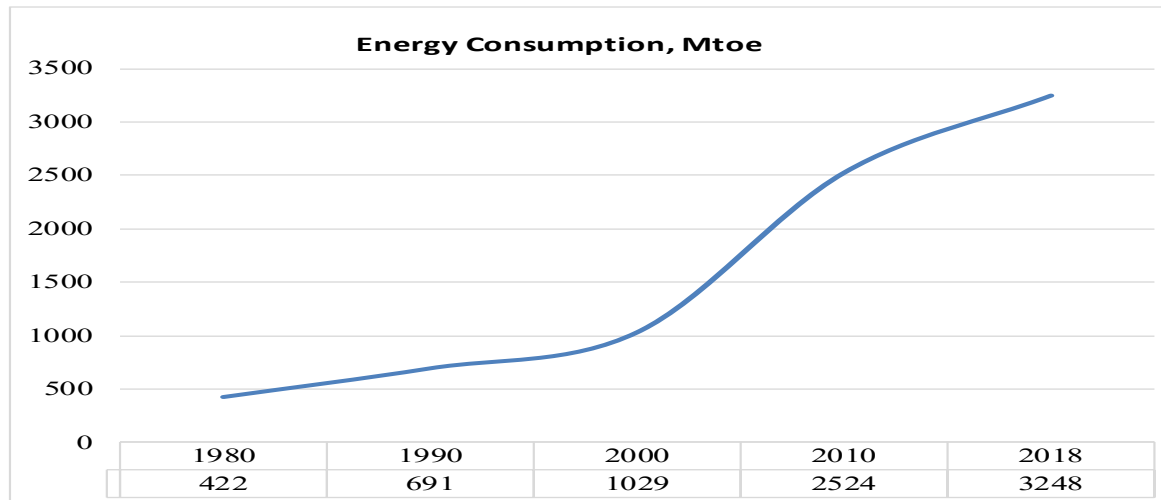
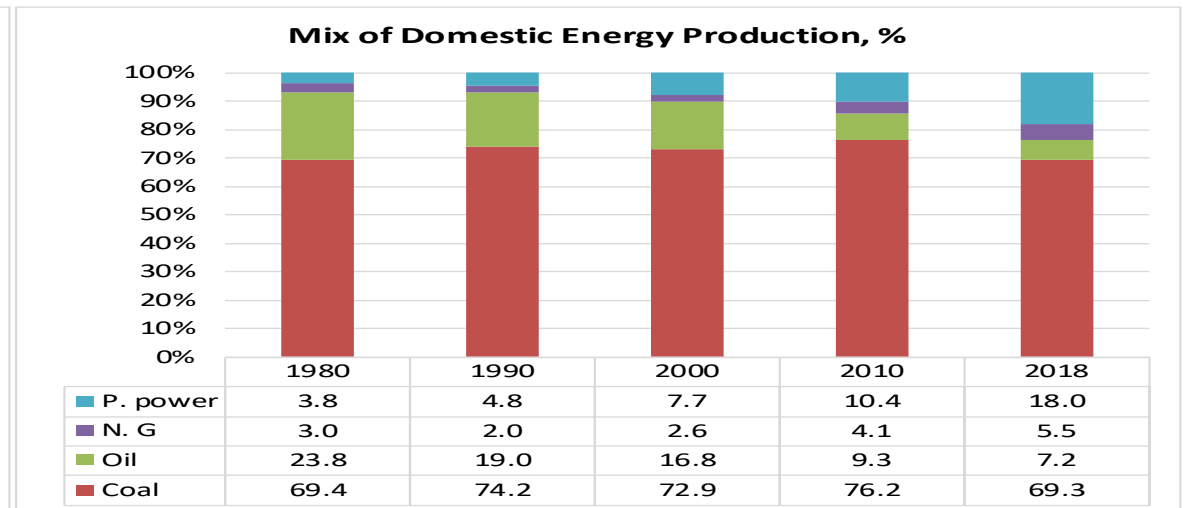
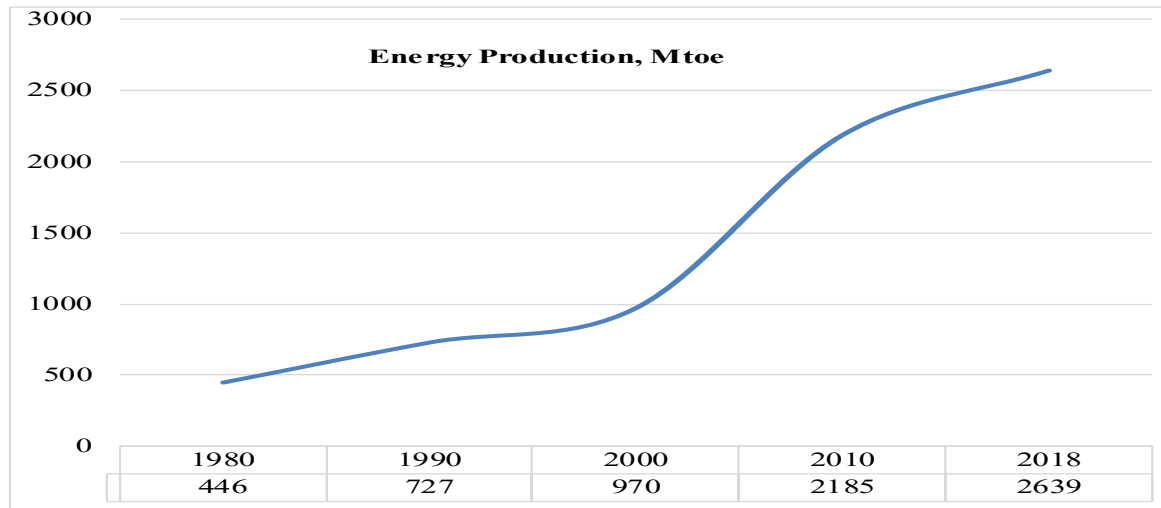
1.3 General Information in 2018

	GDP		Population		Energy consumption		CO ₂ emission		Energy intensity in 2018, toe/ k USD	Energy consumption per capita in 2018, toe
	Current billion USD	Share in world	Ammount, Million	Share in world	Amout, Mtoe	Share in world	Amout, Mt- CO ₂	Share in world		
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Source: Energy data are from BP Statistical Review of World Energy June 2019
GDP and Population data are from World Bank

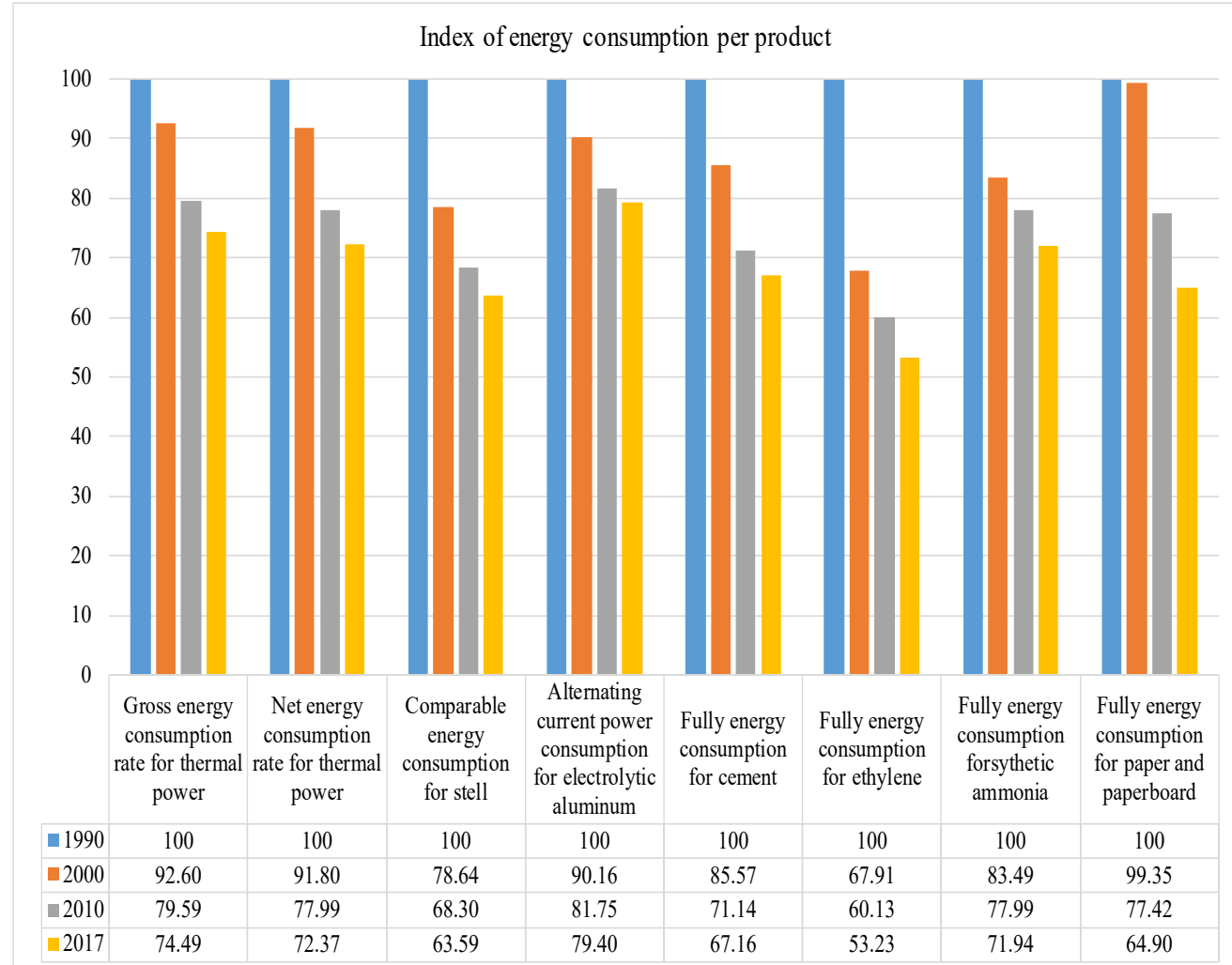
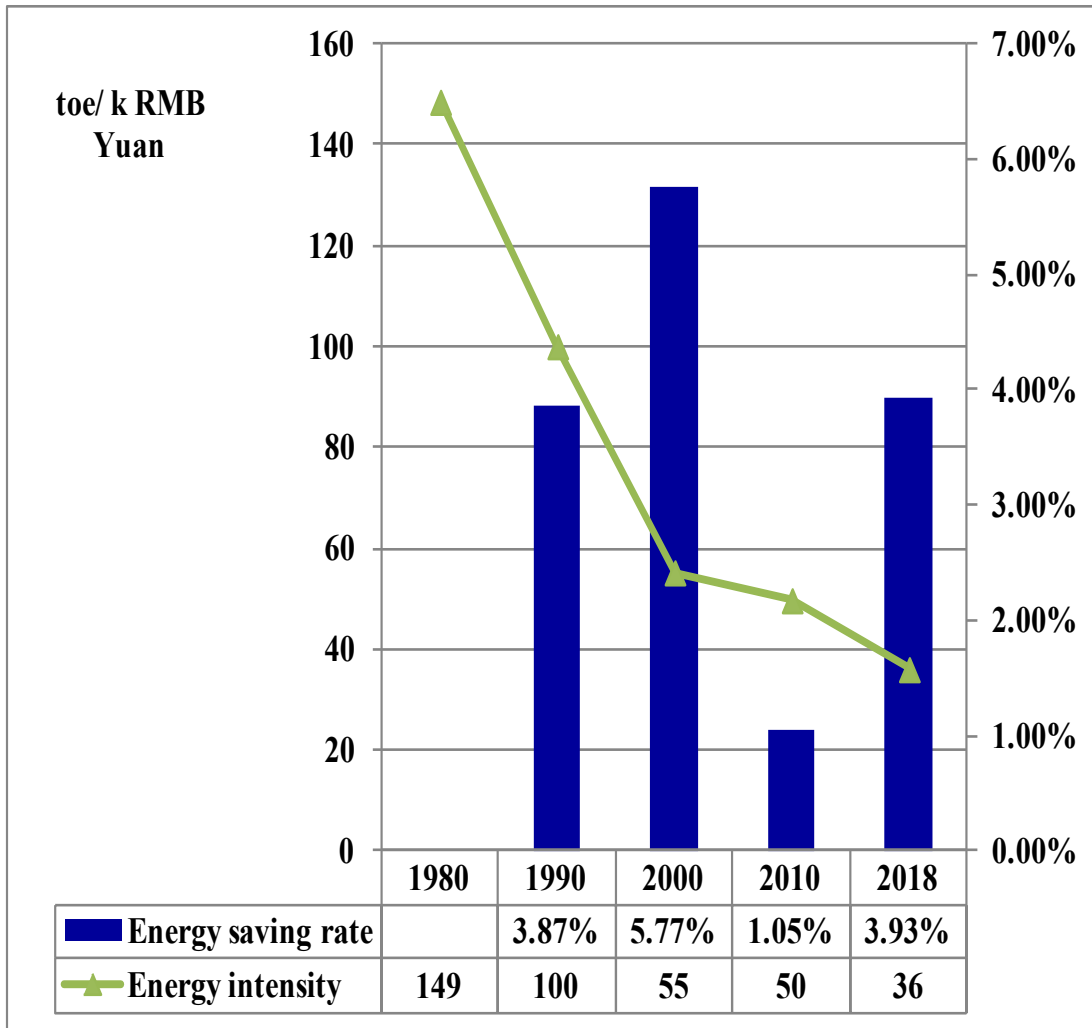
1. Energy Present Situation in BRICS

1.4 China's Energy Present Situation



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1. Energy Present Situation in BRICS

1.4 China's Energy Present Situation

Energy universal has made greatly progress.

- Access to electricity;
- Access to clean cooking;

Energy international cooperation has made greatly progress.

- Energy infrastructure interconnection;
- Energy and resources cooperation;
- Capacity cooperation;
- Capacity-building cooperation;
- Technical cooperation;
- Energy and environment governance cooperation.

1. Energy Present Situation in BRICS

1.4 China's Energy Present Situation

The Experiences of Promoting Energy Development in China.

- Energy policy basis:
- Actions:
- Technological innovation:
- Energy legislation and institutional mechanism:
- International cooperation.

2. Energy Cooperation among BRICS Members

2.1 Match of Energy Policies in BRICS

Transformation targets: Guarantee energy security, develop clean, low/free carbon, efficient and economical energy system.

The actions:

- ✓ Increasing fossil energy supply ;
- ✓ Diversification of energy supply/ exports;
- ✓ Increasing the proportion of non-fossil energy in total energy consumption;
- ✓ Reducing the intensities of energy consumption and CO₂ emission in terms of GDP.

2.1 Match of Energy Policies in BRICS

2.2.1 Improving Energy Infrastructure in BRICS

- ✓ To strengthen infrastructure construction and cooperation in oil and gas pipeline networks.
- ✓ To improve electricity installation and power grids.

2.1 Match of Energy Policies in BRICS

2.2.2 Utilizing Coal Clean and Efficient

- ✓ Advanced technologies of power generation fired coal: ultra-low emission technology of clean power;
- ✓ Modern coal chemical industry: CTL, CTG
- ✓ CCUS: Carbon Capture, Utilization and Storage

2.1 Match of Energy Policies in BRICS

2.2.3 Developing Vigorously Low Carbon/Carbon-Free New and Renewable Energy

Rich renewable energy resources and experiences for large-scale development

- ✓ Brazil: biofuel and hydropower;
- ✓ Russia: wind and solar power, as well as hydropower;
- ✓ India focuses on wind, solar and biomass energy;
- ✓ China : solar, wind power, hydropower;
- ✓ South Africa: CTL, CTG, solar.

Fully recognized the important role of developing low carbon /carbon-free energy.

All the members can cooperate to develop jointly the low carbon/carbon-free new and renewable energy.

2.2 How to foster BRICS energy integration on gas and nuclear energy

Natural gas demand and the change of shares of BRICS in the world

	2000	2017	Energy demand (Mtoe)			Shares		
			2025	2030	2040	2017	2030	2040
TPED	10027.2	13971.7	15387.8	16167.3	17714.7	100.0%	100.0%	100.0%
Coal	2308.25	3750.13	3768.33	3783.45	3808.9	23.0%	23.4%	21.5%
Oil	3664.89	4435.31	4754.21	4830.22	4894.2	36.5%	29.9%	27.6%
Gas	2071.36	3107.1	3539.31	3820.28	4435.84	20.7%	23.6%	25.0%
Nuclear	675.47	687.67	805.13	847.88	971.13	6.7%	5.2%	5.5%
Hydro	225.13	353.35	414.57	458.26	531.29	2.2%	2.8%	3.0%
Bioenergy	1022.2	1384.4	1590.34	1691.27	1850.6	10.2%	10.5%	10.4%
Other renewables	59.88	253.75	515.88	735.91	1222.72	0.6%	4.6%	6.9%

	Natural gas demand (bcm)						Share					
	2 000	2 016	2 017	2 025	2030	2040	2 000	2 016	2 017	2 025	2030	2040
Brazil	9	35	36	33	39	62	0.4%	1.0%	1.0%	0.8%	0.8%	1.1%
Russia	388	441	460	469	468	475	15.4%	12.1%	12.3%	10.9%	10.1%	8.8%
India	28	55	57	94	122	171	1.1%	1.5%	1.5%	2.2%	2.6%	3.2%
China	28	214	248	464	559	708	1.1%	5.9%	6.6%	10.8%	12.0%	13.1%
S. Africa	1	4	4	5	6	10	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%
BRICS	455	748	806	1 066	1 194	1 425	18.1%	20.5%	21.5%	24.8%	25.7%	26.4%
World	2516	3647	3752	4293	4641	5399	100%	100%	100%	100%	100%	100%

2.2 Foster BRICS Energy Integration on Gas and Nuclear Energy

2.2.1 Gas

Global gas demand, production and trade by scenario (bcm)

			New Policies		Current Policies		Sustainable Development	
	2000	2017	2025	2040	2025	2040	2025	2040
Power	907	1 515	1 618	1 981	1 668	2 226	1 602	1 265
Industry	631	872	1 076	1 436	1 089	1 522	1 041	1 221
Buildings	652	802	887	1 014	918	1 133	839	811
Transport	70	131	182	328	168	254	207	408
Other sectors	256	432	531	640	544	712	501	479
World natural gas demand	2 516	3 752	4 293	5 399	4 386	5 847	4 189	4 184
<i>Share of Asia Pacific</i>	<i>12%</i>	<i>21%</i>	<i>25%</i>	<i>29%</i>	<i>25%</i>	<i>29%</i>	<i>26%</i>	<i>36%</i>
Conventional gas	2 311	2 918	3 064	3 654	3 153	3 889	3 006	2 899
Tight gas	136	273	238	293	233	302	313	195
Shale gas	22	495	884	1 267	885	1 451	752	919
Coalbed methane	38	74	68	121	75	137	80	112
Other production	-	10	40	63	40	67	38	59
World natural gas production	2 507	3 769	4 293	5 399	4 386	5 847	4 189	4 184
<i>Share of shale gas</i>	<i>1%</i>	<i>13%</i>	<i>21%</i>	<i>23%</i>	<i>20%</i>	<i>25%</i>	<i>18%</i>	<i>22%</i>
Pipeline	391	447	491	532	500	657	458	452
LNG	136	323	509	757	518	807	527	627
World natural gas trade	527	771	1 000	1 289	1 019	1 464	985	1 080
<i>Share of production that is traded</i>	<i>21%</i>	<i>20%</i>	<i>23%</i>	<i>24%</i>	<i>23%</i>	<i>25%</i>	<i>24%</i>	<i>26%</i>
Henry Hub price (\$2017/MBtu)	6.0	3.0	3.3	4.9	3.4	5.3	3.3	3.6

Source: IEA: World Energy Outlook 2018

2.2 Foster BRICS Energy Integration on Gas and Nuclear Energy

2.2.1 Gas

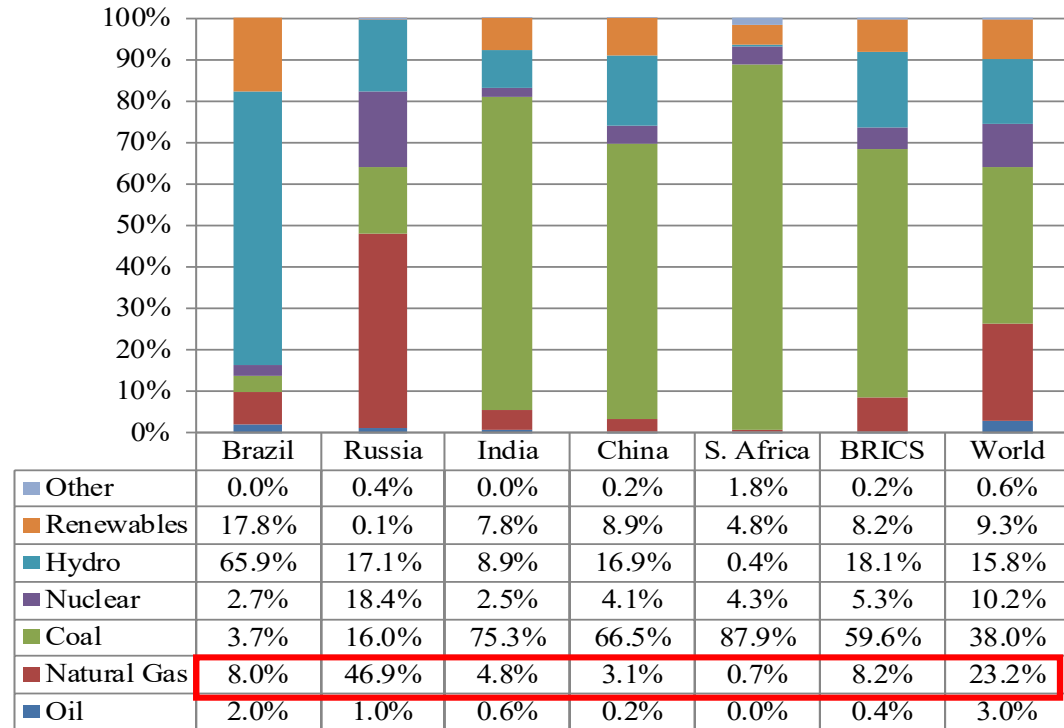
BRICS countries can cooperate in integrating the natural gas market and infrastructure:

- Export side: Russia & Import side: China, India, Brazil.
- Cooperate fields in: Upstream sector, middle-stream and downstream among the countries, as well as the third part cooperation.
- Resources trade modes: Pipeline, LNG.

2.2 Foster BRICS Energy Integration on Gas and Nuclear Energy

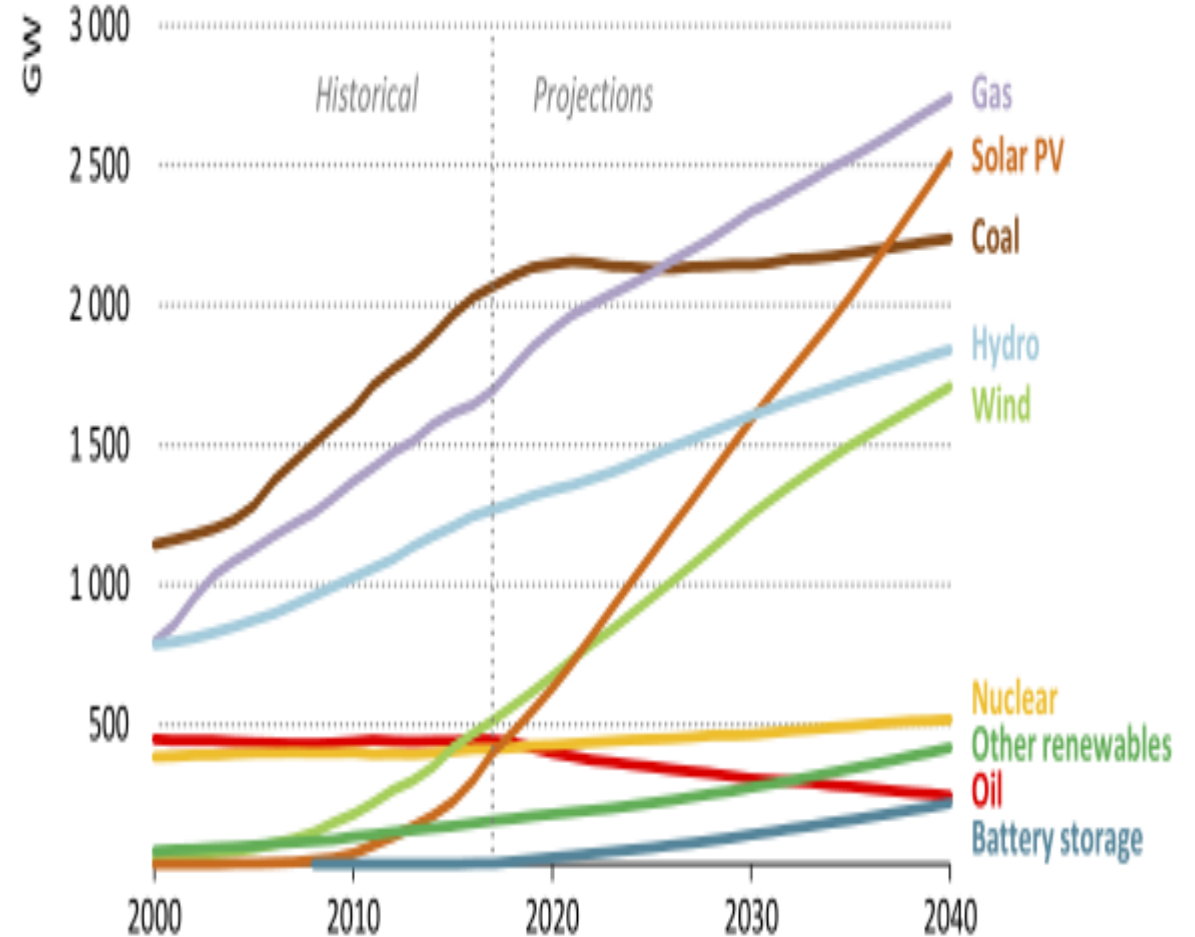
2.2.2 Nuclear Energy

The Mix of Electricity Generation by fuel in 2018



Country	Nuclear energy, TWh	Share in the world	Position in the world
China	294.4	10.9%	2
Russia	204.5	7.6%	3
India	39.1	1.4%	11
Brazil	15.6	0.6%	13
S. Africa	11.1	0.4%	15
BRICS	564.6	20.9%	
World	2701.4	100.0%	

Installed power generation capacity worldwide by source in the New Policies Scenario Projected by IEA



2.2 Foster BRICS Energy Integration on Gas and Nuclear Energy

2.2.2 Nuclear Energy

In nuclear energy field, BRICS countries can cooperate in :

- ✓ Security information share;
- ✓ Technologies R&D;
- ✓ Equipment manufactory and supply of nuclear fuel for power generation;
- ✓ The third part cooperation.

2.3 The Opportunities for BRICS Cooperation on International Energy Governance

Establishing an Open Multilateral Energy Cooperation Mechanism

- ✓ Deepening multilateral energy cooperation among BRICS members and strengthening partnerships relationship.
- ✓ Promoting the establishment of a BRICS energy think tank alliance and a BRICS energy research platform.
- ✓ Increasing cooperation in energy science and technology and promote the development and application of new energy technologies..
- ✓ Promoting the reform of global energy and environmental governance.



**Thank you for your
attentions!**