

Green and Low Carbon Energy Economy Transformation in China

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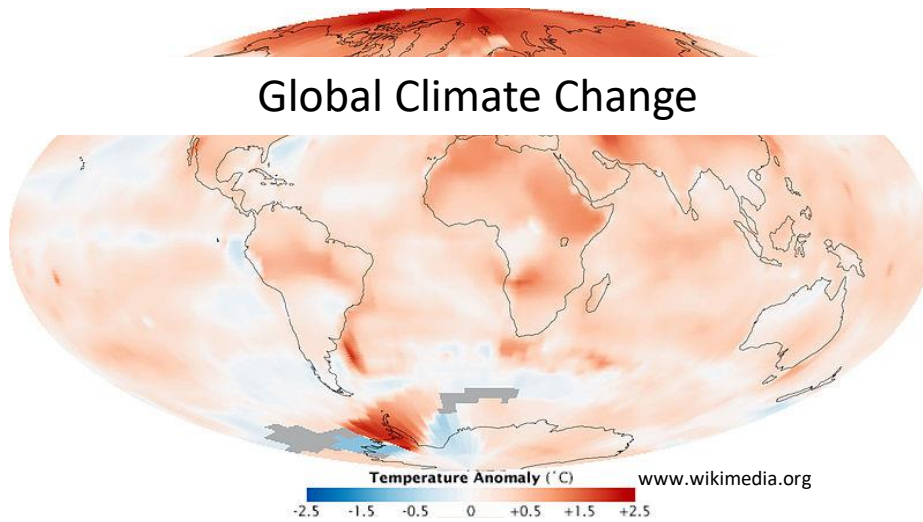
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Balancing national priorities for Sustainable development?

Global Climate Change



Local Pollution



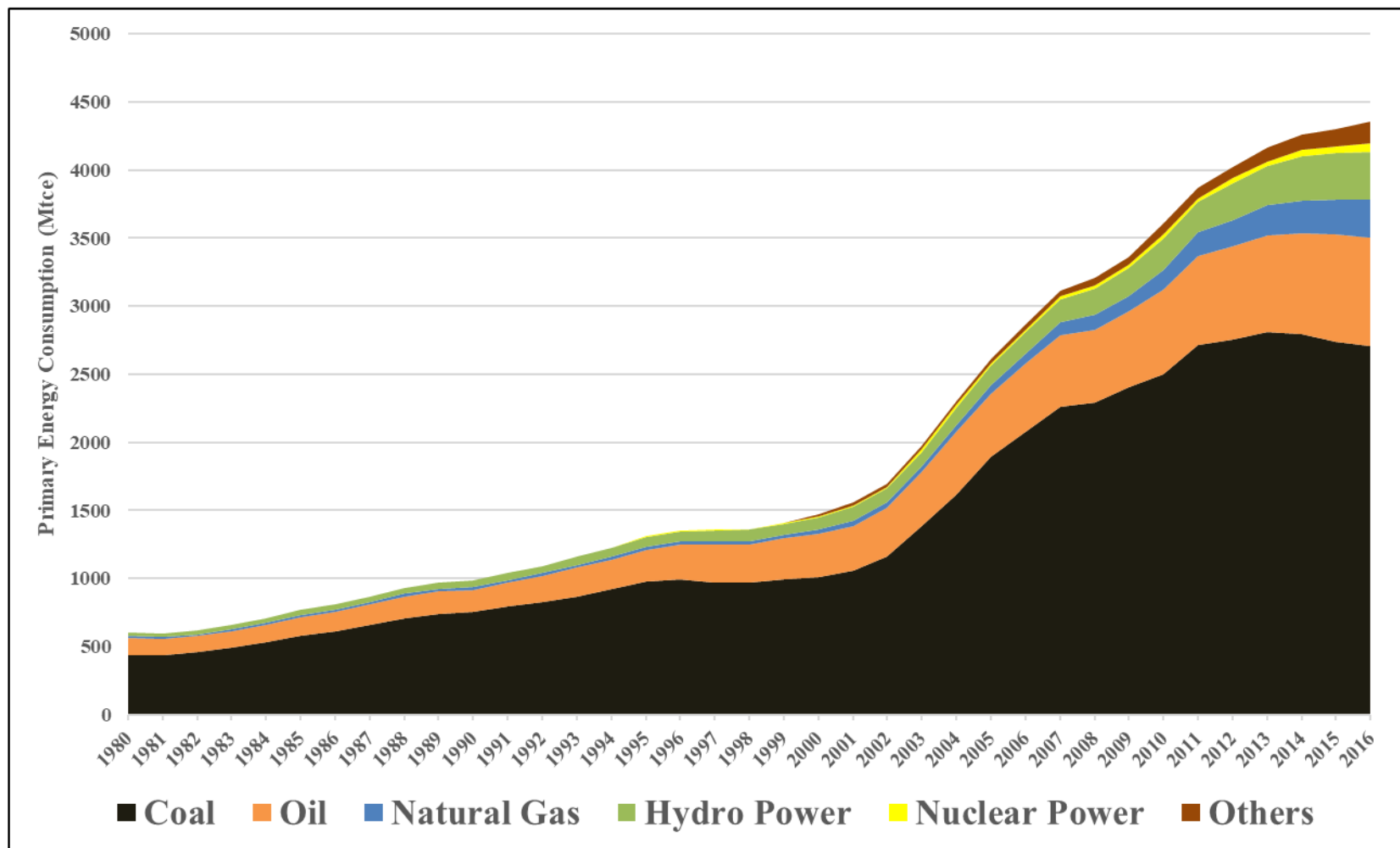
Human Development



Modernizing Industry



China's primary energy supply

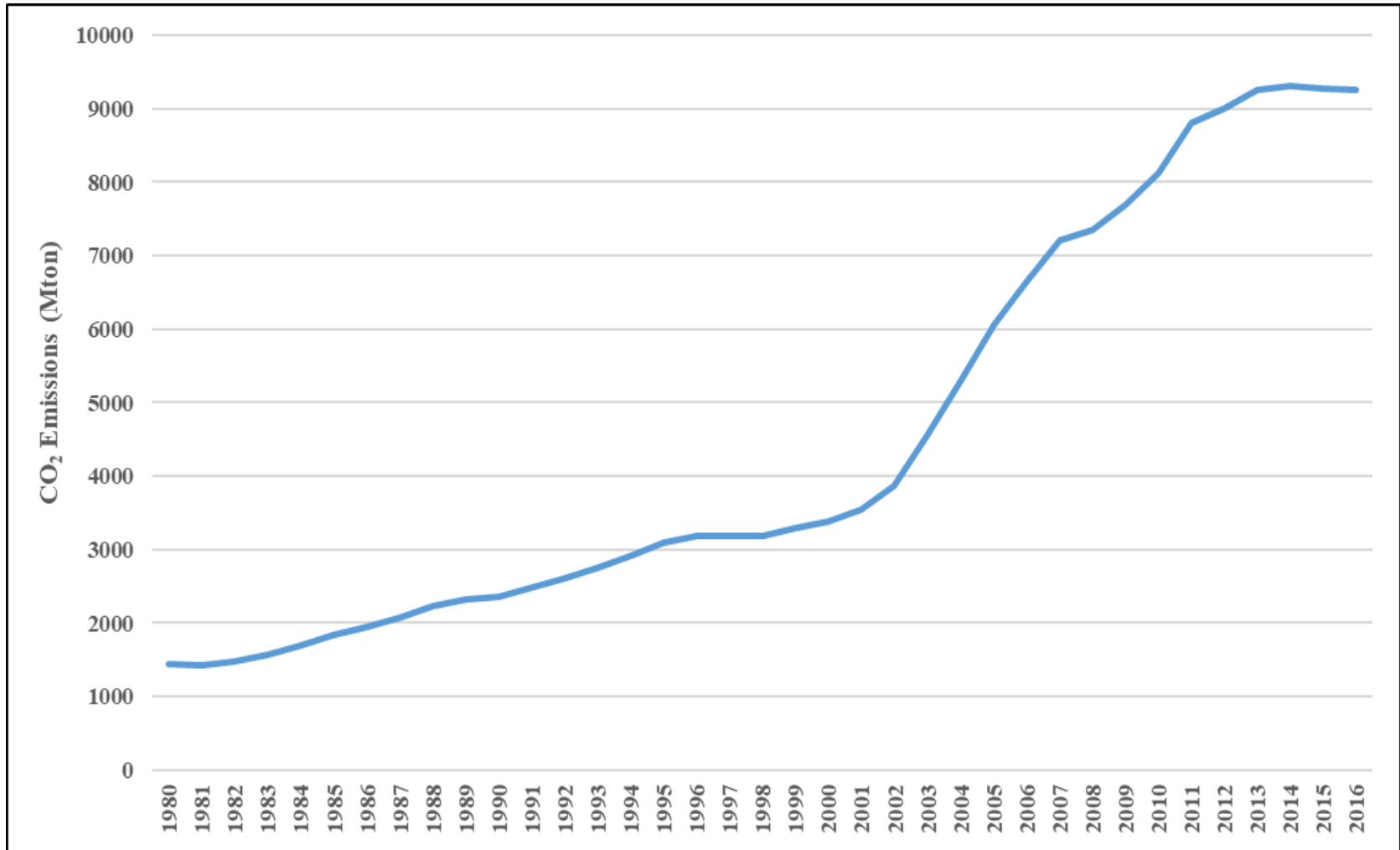


Source: SSB 2017

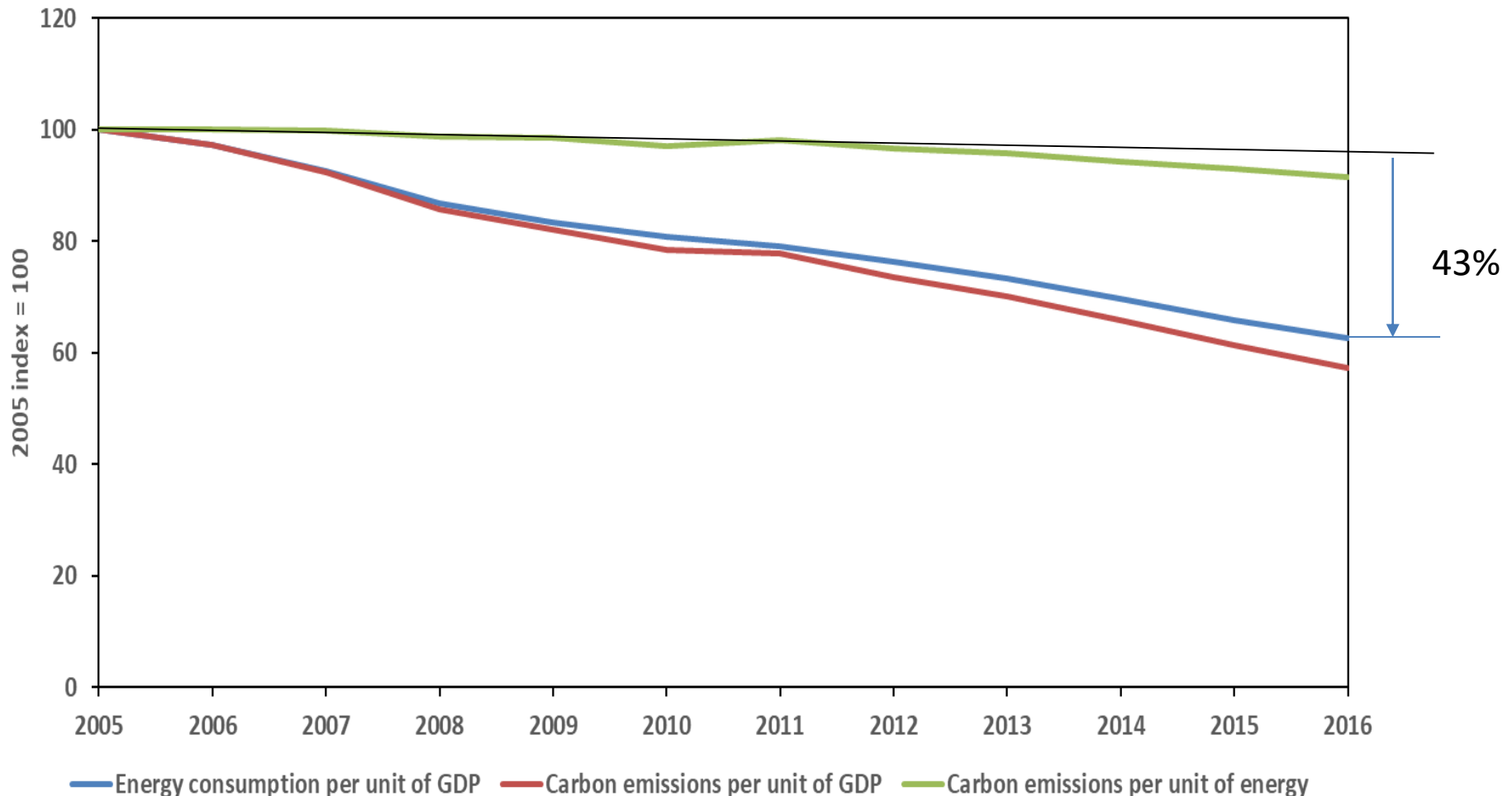


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Energy-related CO2 emissions



Carbon intensity of economy, Energy intensity of economy, and Carbon intensity of energy



The share of non-fossil fuels in primary energy supply reached 13% in 2016.



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International pledges & national legally binding targets

■ NDC under the Paris Agreement

- To achieve the peaking of carbon dioxide emissions *around 2030 and making best efforts to peak early*;
- To lower carbon dioxide emissions per unit of GDP by 60-65% by 2030 from the 2005 level; and
- To increase the share of non-fossil fuels in primary energy consumption to around 20% by 2030.

■ National targets for the 13th Five-Year-Plan (2016-2020)

- Energy intensity target: reduce 15% relative to 2015
- Carbon intensity target: reduce 18% relative to 2015
- Non-fossil energy target: 15% of non-fossil fuels in primary energy supply by 2020



Administrative arrangements & Policy measures during the 13th Five-Year-Plan (2016-2020)

- Administrative arrangements
 - Disaggregating national targets into provinces through negotiations; and
 - Yearly stocktaking of the efforts and progress made by province
- National climate R&D program: MOST and NSFC;
- Command-and-Control measures
 - Energy efficiency standards: building and transport fuel;
- Market-based instruments
 - Feed-in tariff for renewable energy electricity;
 - Electricity surcharge for renewable energy electricity;
 - Taxes: fossil resources tax and transport fuel tax
 - ***National emissions trading system (ETS)***



Major policy gaps and/or deficiencies

- There is a lack of *a primary carbon pricing policy* program for addressing climate change;
- Market-based energy policy: Too much reliance on subsidy
 - Public finance sustainability
 - Cost-effectiveness
 - Fairness/equity
- Command-and-control policy: deficiencies in implementing energy performance standards
 - *Inadequate MRV*
 - *Insufficient punishment for non-compliance*



Transformation of energy and climate policy measures

- Renewable energy policy
 - Transit from feed-in tariff to feed-in premium;
 - Introduction of renewable portfolio standards (RPS) (2018)
- Electric vehicles program
 - The subsidy from the Central Government is to be phased out in 2020
 - An approach similar to that adopted by California is under discussion
- National energy conservation program
 - Subsidy was terminated by Ministry of Finance in 2013;
 - Energy savings trading program has been considered;
 - National emissions trading program was launched in December 2017 and is under construction

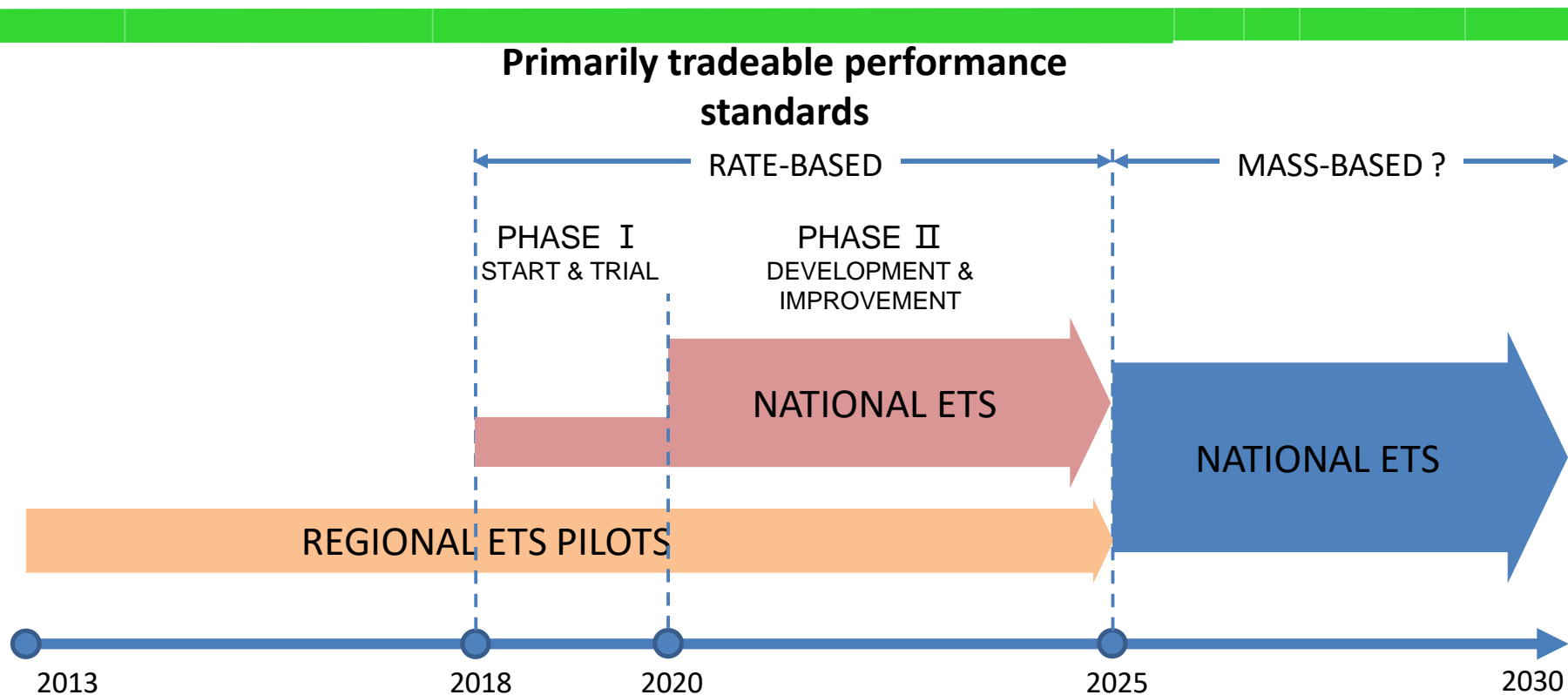


China's national ETS: an overview

- Coverage
 - 8 sectors covering the power sector and the main manufacturers
 - electricity/heat, iron & steel, non-ferrous metal, construction material, petrochemical engineering, chemical engineering, and civil aviation.
 - Emission: *direct emissions* from the burning of the fossil fuels and *indirect emissions* associated with the uses of electricity and heat
- Threshold
 - Threshold: 26000 tons CO2 emissions per year
 - Number of enterprises regulated: approximately 7500
- Total emissions (direct): *4.5 billion tons* or a half of China's total energy-related emissions
- Allowance allocation methods
 - Primary allocation method: *Output-based free allocation*
 - *Auction* is to be encouraged.



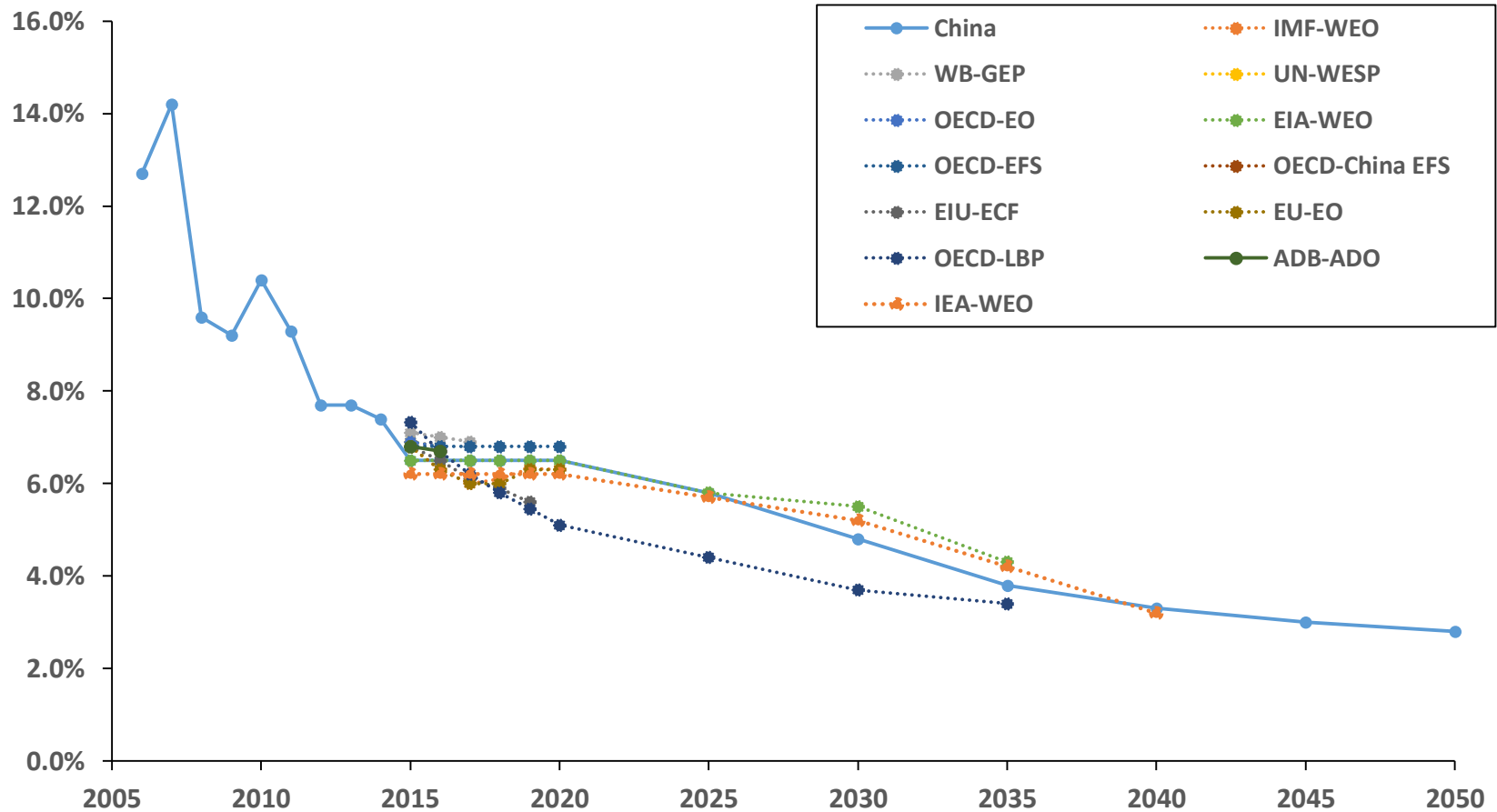
A time stretch of China's national ETS construction



It will start with the *power generation* and ultimately extend to 8 sectors, covering one half of China's energy-related carbon emissions by 2025.



Reference economic growth

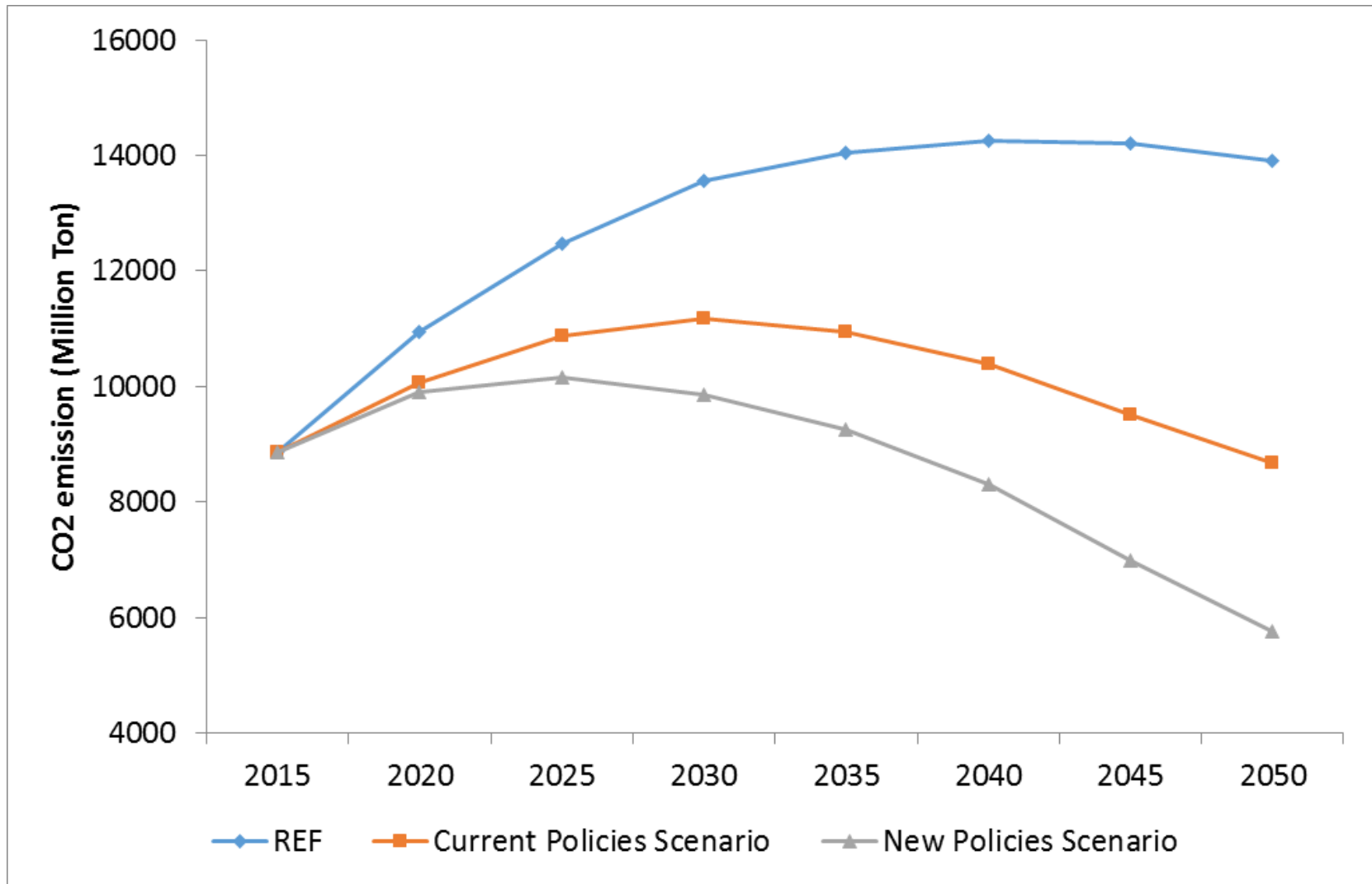


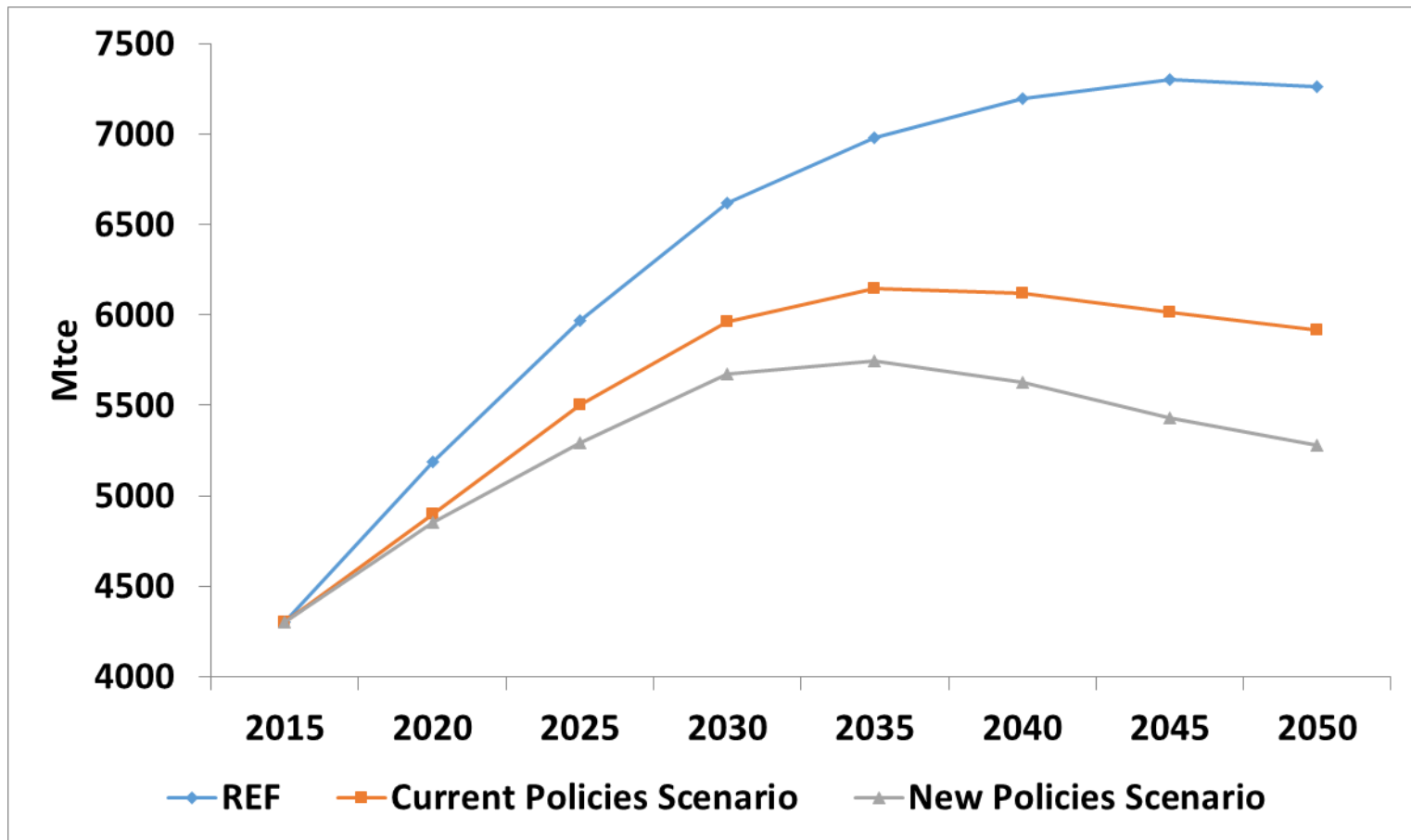
数据来源: ADB, 2015; EIA, 2014; EIU, 2015; EU, 2015; IEA, 2016; IMF, 2015; OECD, 2014; OECD, 2015; OECD, 2016a; OECD, 2016b; WB, 2015; UN, 2015.

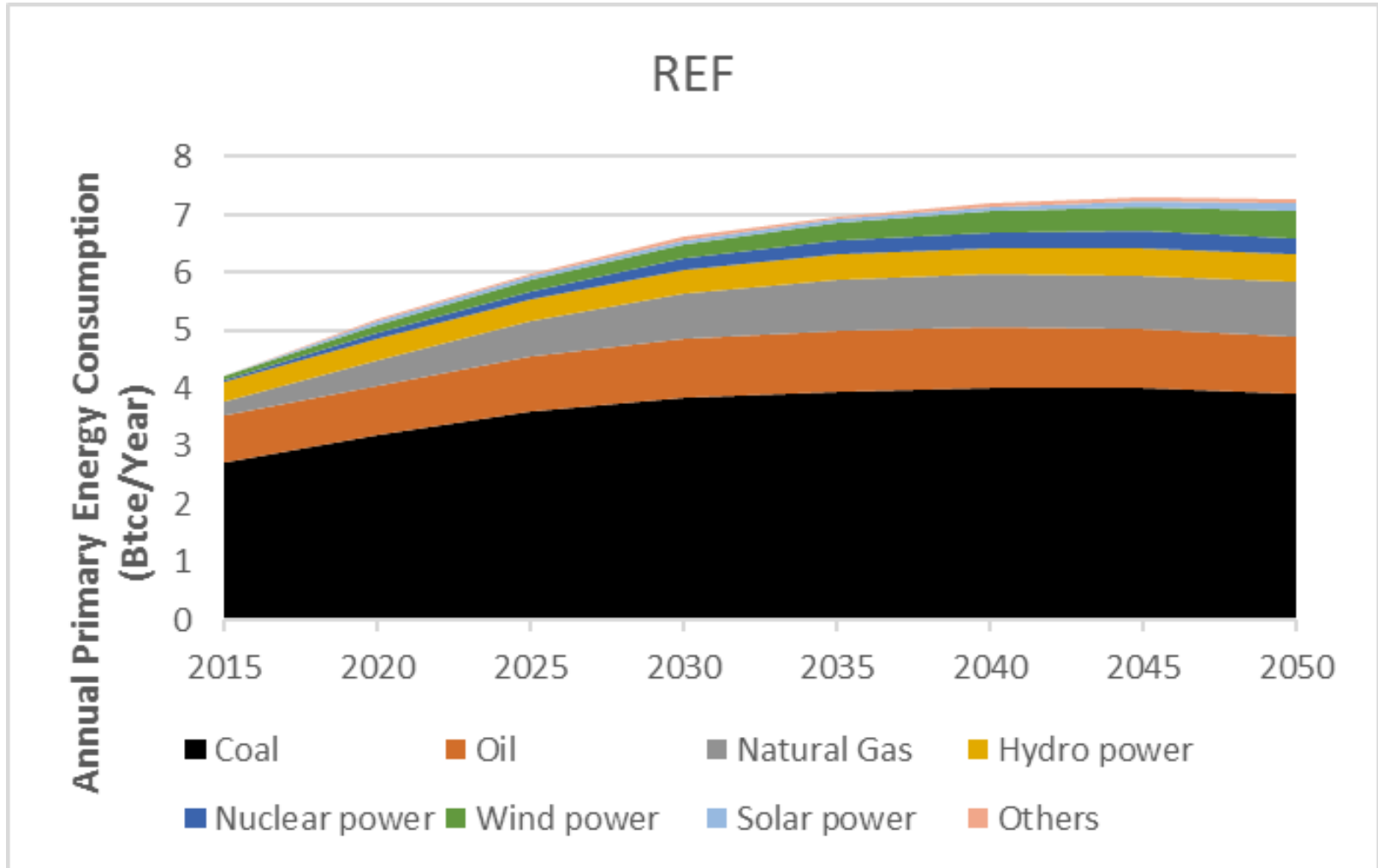


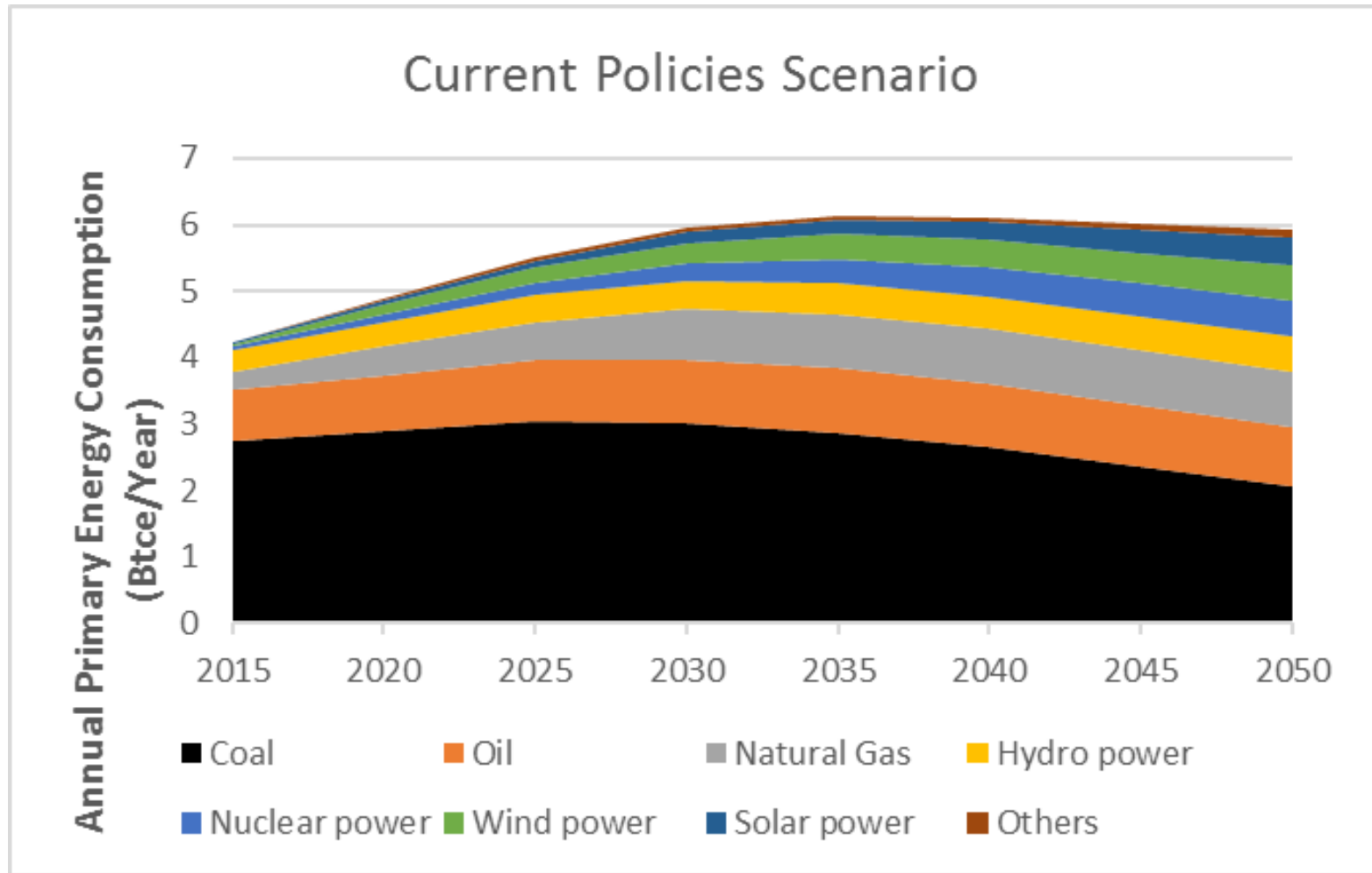
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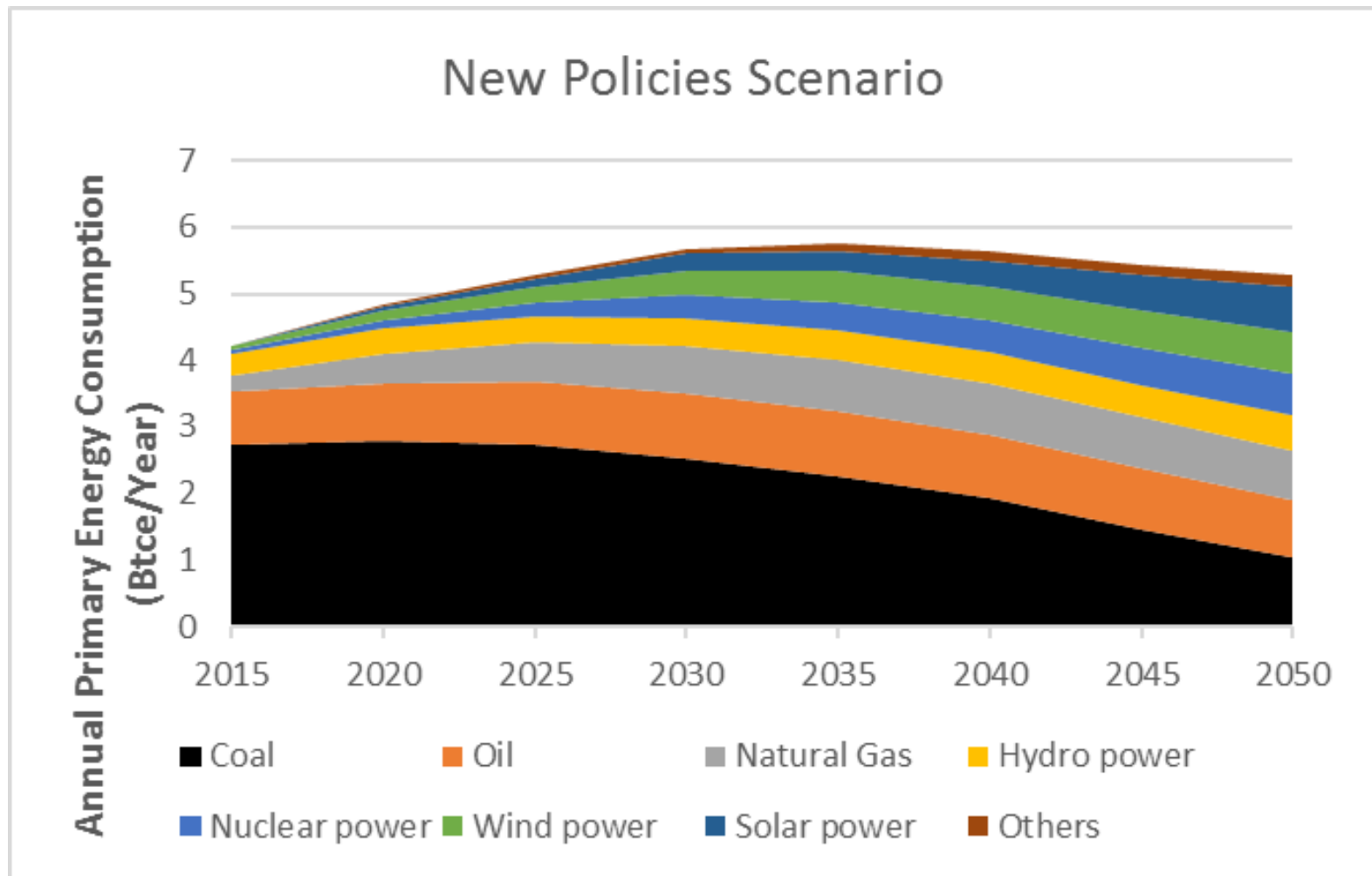
CO₂ emissions under three scenarios









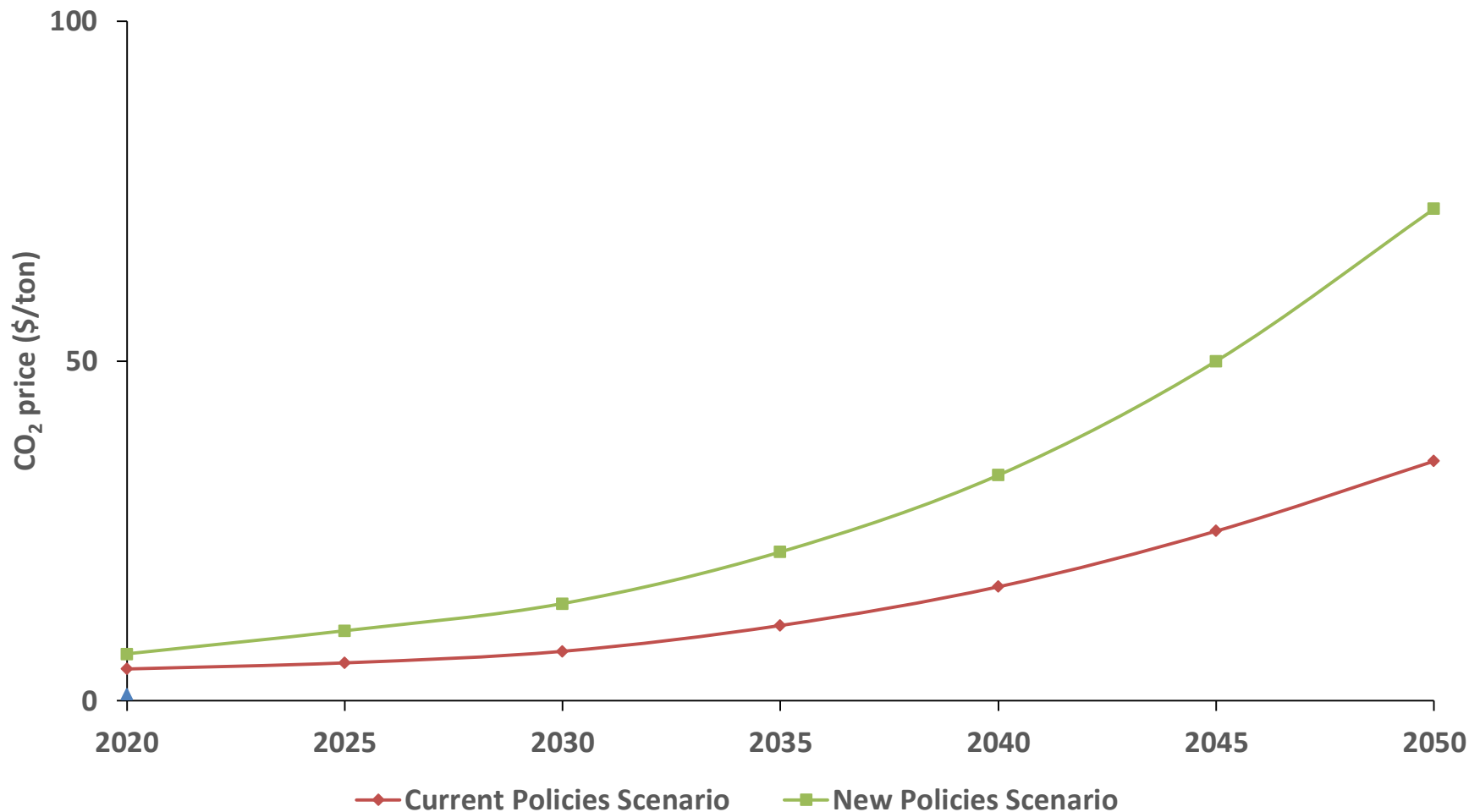


Share in primary energy supply by fuel under the two Policy Scenarios

	Unit: %	2015	2020	2025	2030	2035	2050
Current Policies Scenario	Coal	63.6	58.9	55.2	50.5	46.7	35
	Gas	5.9	9.0	10.8	12.7	13.3	14.1
	Non-fossil	12.2	15.0	17.4	20.8	24.2	35.9
New Policies Scenario	Coal	63.6	57.7	51.8	44.4	39.5	19.8
	Gas	5.9	9.3	11.3	12.8	13.1	14.3
	Non-fossil	12.2	15.3	19.3	25.7	30.4	49.8



The Carbon Price under two Policy Scenarios



Air Quality Co-benefits Increase with Tighter Climate Policy

Maps show PM_{2.5} pollution reduction relative to the 2030 No Policy case under different CO₂ intensity reduction scenarios.

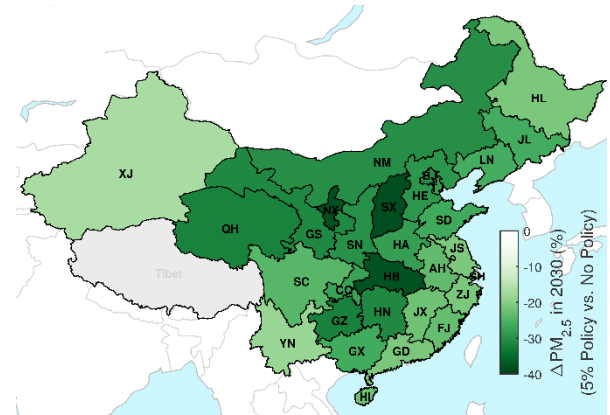
3%/year



4%/year



5%/year

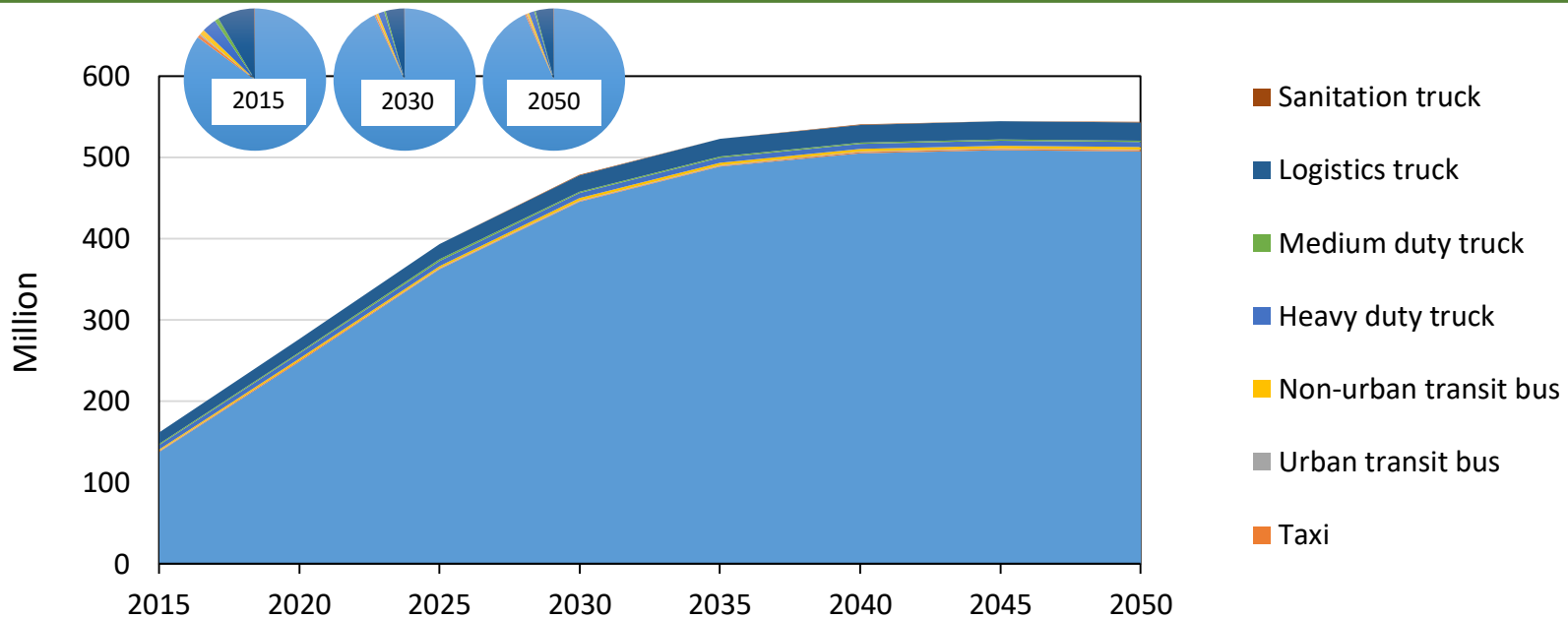


Pollution (PM_{2.5}) reductions increase with policy stringency



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➤ Future vehicle stock



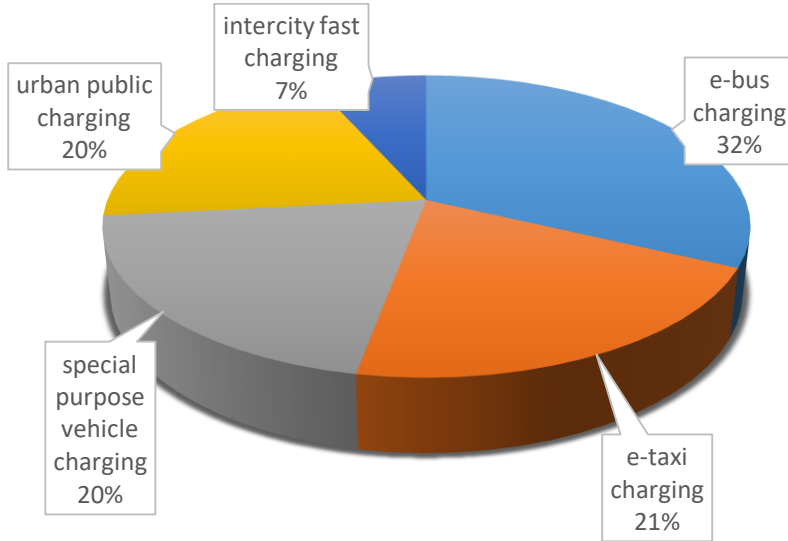
Future vehicle stock (Million)

	2015	2020	2030	2040	2050
Non-taxi passenger vehicle	137.57	248.47	444.89	504.91	507.09
Taxi	1.09	1.17	1.35	1.46	1.56
Urban transit bus	0.48	0.57	0.76	0.90	1.04
Non-urban transit bus	1.81	2.16	2.50	2.60	2.60
Heavy duty truck	5.30	5.92	6.49	6.57	6.57
Medium duty truck	1.49	1.60	1.66	1.60	1.60
Logistics truck	13.70	16.48	20.32	21.83	22.28
Sanitation truck	0.17	0.19	0.29	0.36	0.42
Total	161.61	276.57	478.27	540.24	543.16

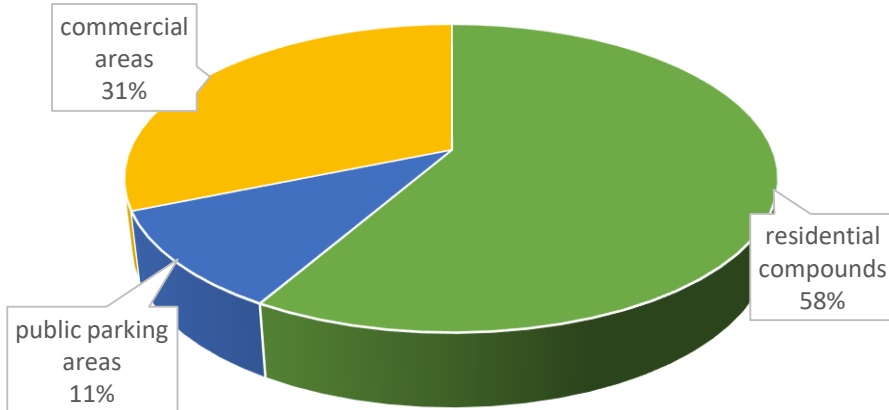


Planning for EV charging infrastructure

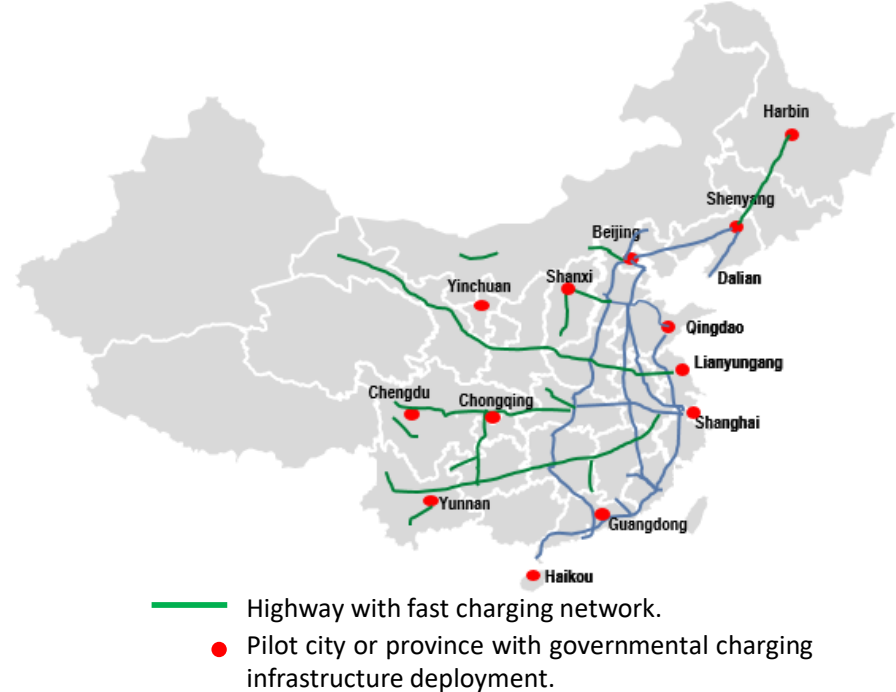
Centralized charging and swapping



Distributed charging piles



Intercity fast charging network



Source: NDRC et al., 2015.

Targets for 2015-2020

- 12,000 centralized charging /swapping stations
- 4.8 million distributed charging piles
- Construction of intercity fast charging network.

EV Subsidy policy before 2020

EV Subsidy Standard (2013-2020)									
Vehicle type	Range /km	2013	2014	2015	2016	2017	2018	2019	2020
Pure EV	2013-15 (80≤R<150)	3.5	3.325	3.15					
	2016-2020 (100≤R<150)				2.5	2	2	1.5	1.5
	150≤R<250	5	4.75	4.5	4.5	3.6	3.6	2.7	2.7
	R≥250	6	5.7	5.4	5.5	4.4	4.4	3.3	3.3
PHEV	R≥50	3.5	3.325	3.15	3	2.4	2.4	1.8	1.8
FCEV	-	20	19	18	20	20	20	20	20

➤ Policy trend

- For EV

- Accelerating the penetration of the EV market by supply-side management measures such as NEV Credits;
- Promoting the realization of scale economy of EV and reducing the comprehensive cost of EV;
- further promoting the construction of charging infrastructure and making EV charging more convenient.

- For FCV

- Further increasing investment in R&D of FCV to break through the core technologies of key materials and components;
- Increasing the scale of demonstration application of FCV;
- Expanding FCV market scale and realizing commercial application as soon as possible.

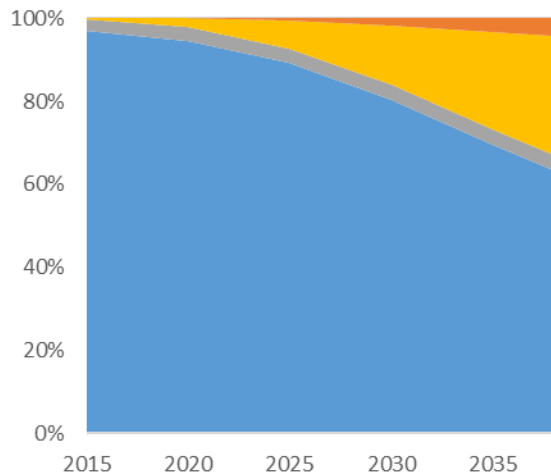


➤ Composition of vehicle stock

- The stock composition of different powertrain is assumed based on government planning, policy and technical reports, the new energy vehicle market penetration analysis model (EV-PEC).

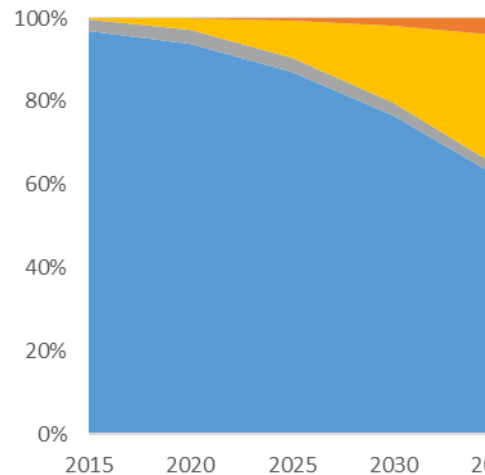
REF Scenario

Vehicle stock breakout



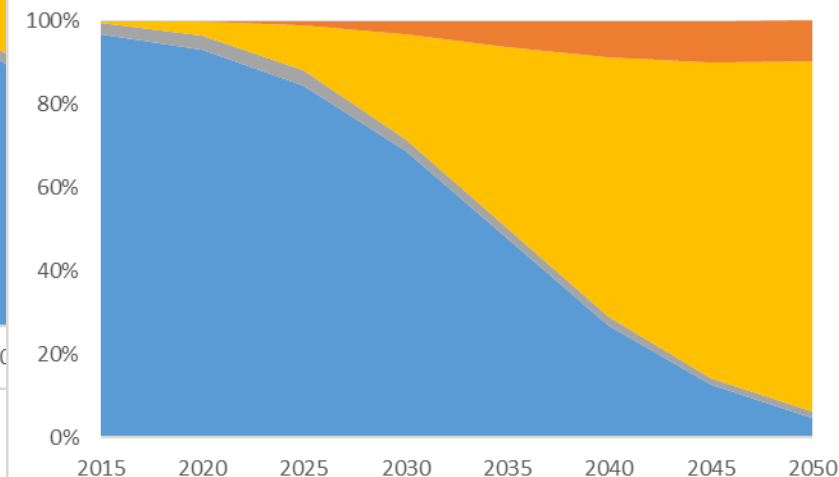
NDC Scenario

Vehicle stock breakout



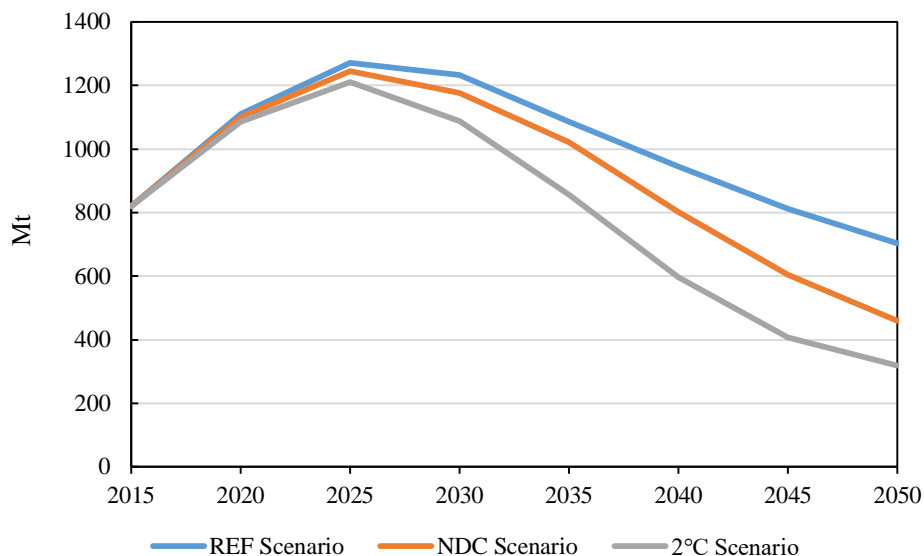
2°C Scenario

Vehicle stock breakout

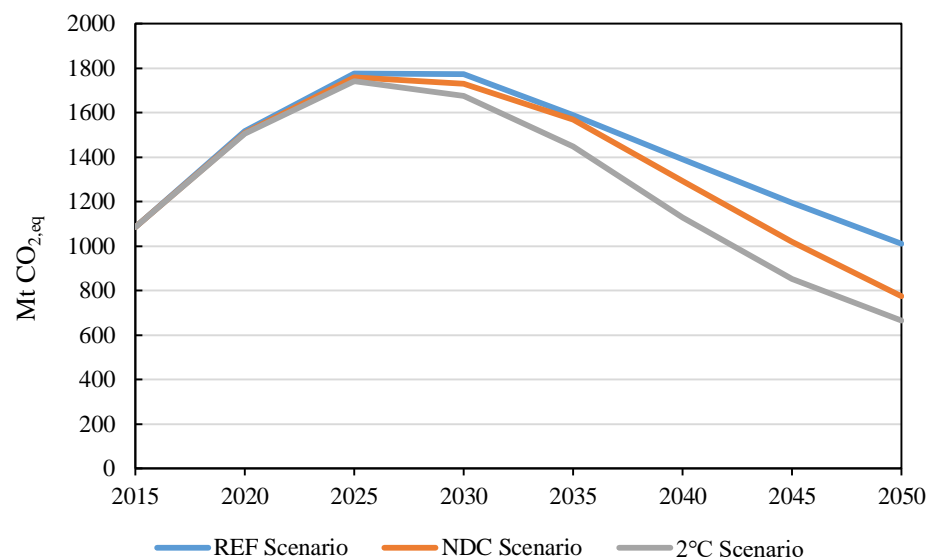


➤ Future GHG emissions of road transport

Direct GHG emissions in different scenarios



Life cycle GHG emissions in different scenarios



Direct GHG emissions in different scenarios(Mt)

	2015	2020	2030	2040	2050
REF Scenario	820.6	1111.0	1232.4	944.6	703.5
NDC Scenario	820.6	1100.1	1177.4	802.0	459.3
2°C Scenario	820.6	1086.5	1088.2	597.0	318.7

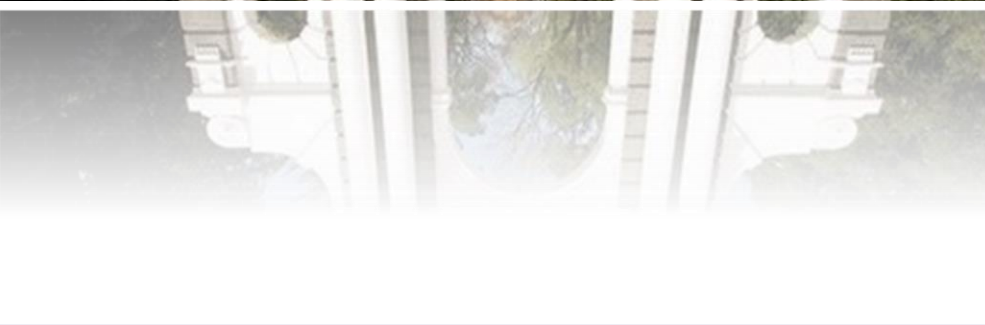
Life cycle GHG emissions in different scenarios(Mt CO_{2,eq})

	2015	2020	2030	2040	2050
REF Scenario	1086.9	1516.2	1772.1	1391.8	1011.8
NDC Scenario	1086.9	1508.3	1731.0	1294.3	776.2
2°C Scenario	1086.9	1507.2	1674.8	1128.4	664.7



Thank you for your attention.

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