A Briefing on
Energy Transition in China into 2030
- *A Step out of Environmental Kuznets Curve*

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What is Energy Transition (1)?

- A prevailing concept is referring to **a shift** from fossil fuels to non-fossil fuels (Danmark, Germany), or **a step away** from non-renewables to renewables, or **adopting** low carbonized sources to diminishing highly carbonized ones. Seemingly, correct, but superficial, and wrong per se.
- To me, energy transition refers to a **transition of choice of energy system** from existing and outdated one to new ones. Although de-carbonization is commonly central to the transition, each type of energy sources has its role to play including "dirty" coal because coal can be altered from "black" to "green" in use.

What is Energy Transition (2)?

- A prevailing concept of country's strategy toward energy transition is to do something more (solar and wind) and other things less or diminishing (coal). Seemingly as we witnessed, but it is a misunderstanding as well.
- To me, energy transition is up to the future of choices by the human and its groups or stakeholders involved.
- No existing model of energy transition in certain countries is available for others to follow in practice.
- **Environmental Kuznets Curve** witnessed in some developed countries could be a catastrophe to others (China and India).
- Each country has its localized best solutions and pattern to facilitate its good enough transition of choices.

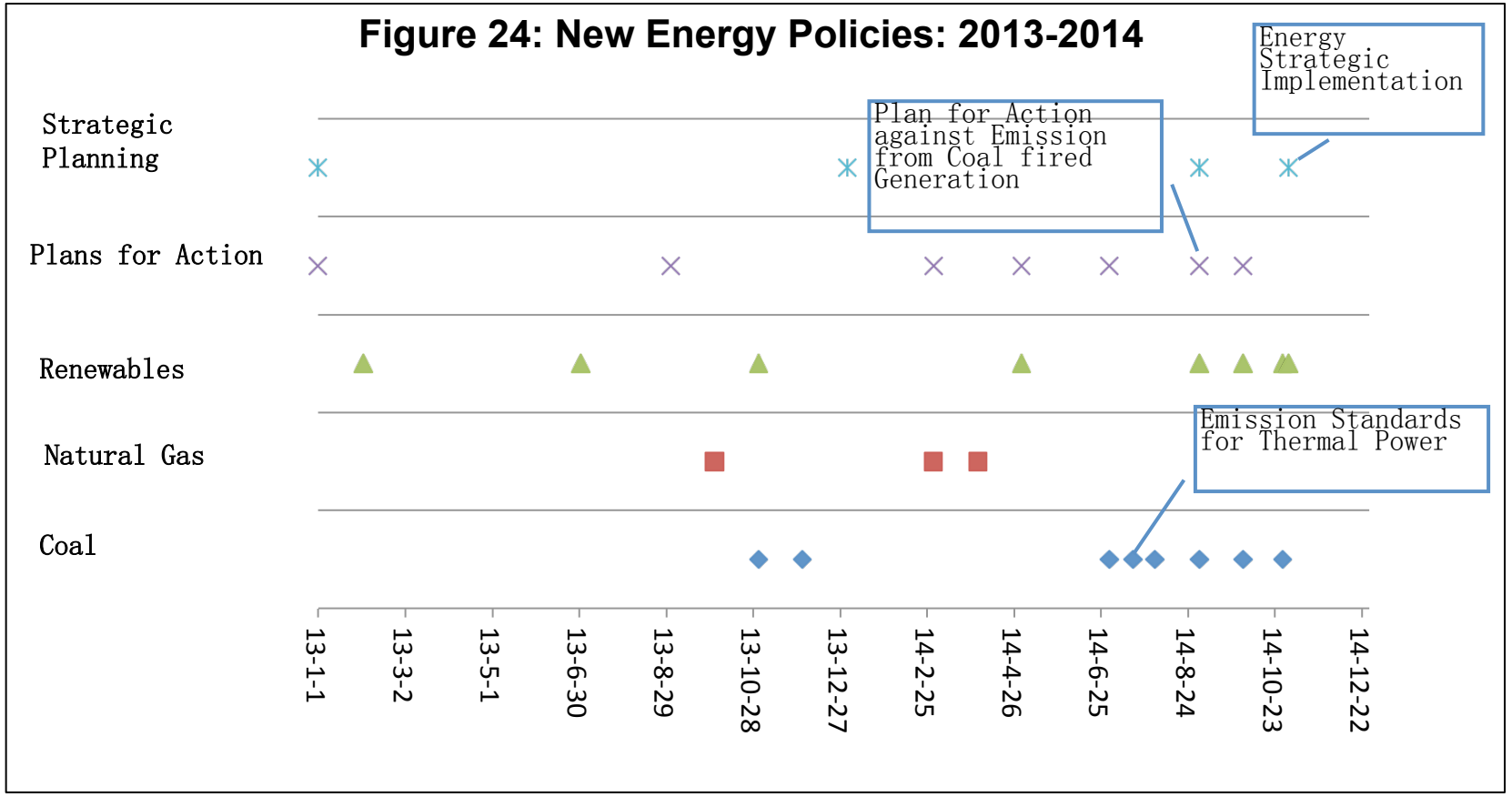
A Carbonized Energy System in China

- Energy mix – fossil fuels dominated
- Fossil fuel is blamed for serious pollution
- Existing energy system and development pattern are no longer sustainable.
- Transition is a must, but solutions are varied.

	2015
Fossil Fuels in Energy Mix %	90
Fossil Fuels in Final Use %	64
Coal in Energy Mix %	66
Coal Generation %	70

China's Actions 2013-14

There are over 50 sets of relevant policies released in 2013-2014.



Energy Policy 2015

	#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plans for Action	4						1			3
Coal	10	2	2	2	2			1		1
Oil & Gas	3	1	1			1				
Power	10			3	1		1	3	2	
Solar	2						1		1	
Wind	3	1				1	1			
EVs	2						1			1

Policy Targets Summarized

	2015	2020	2030
Coal in energy mix	65	62	?
Non-fossil Fuels demand %	11	15	20
Carbon Intensity Reduction to 2005	38	40-45	60-65%
Coal fired efficiency -existing (new), g/kwh	320	310 (300)	?
Passenger Car Fuel efficiency L/100km	6+	5?	?
Green Building, new	--	50%	?
Public Transport	--	30%	?
National Carbon Trading System	None	(2017)	

1. Is it achievable? My answer is hopefully YES
2. How to get there? It depends because of options
3. It will be something new to EKC? No sure yet.

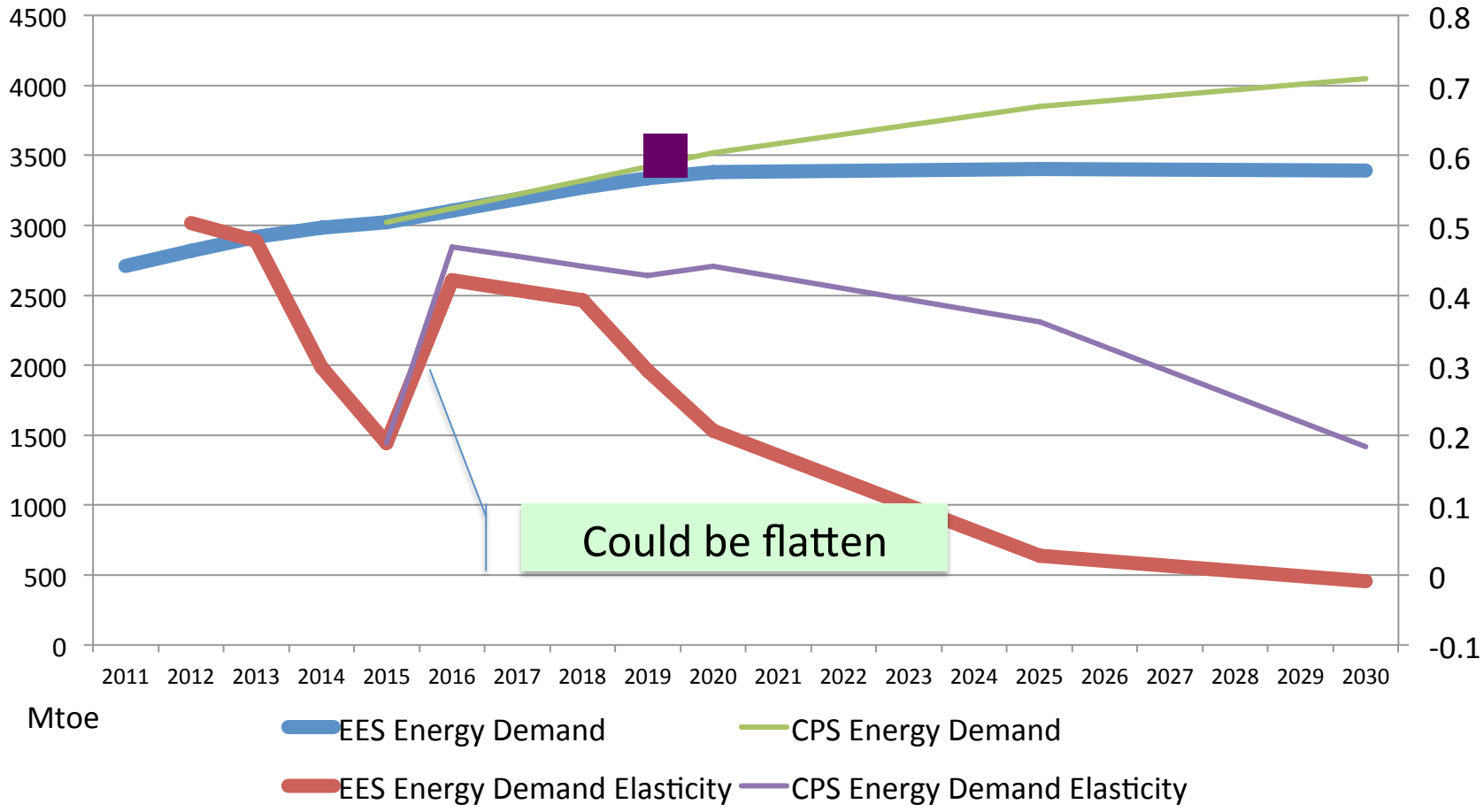
Our Research with 8 Findings

- My let team builds up an outlook database to explore our choices of energy system.
- We employ current policy scenario (CPS) and eco-energy strategy (EES) scenario with a set of assumptions as follow

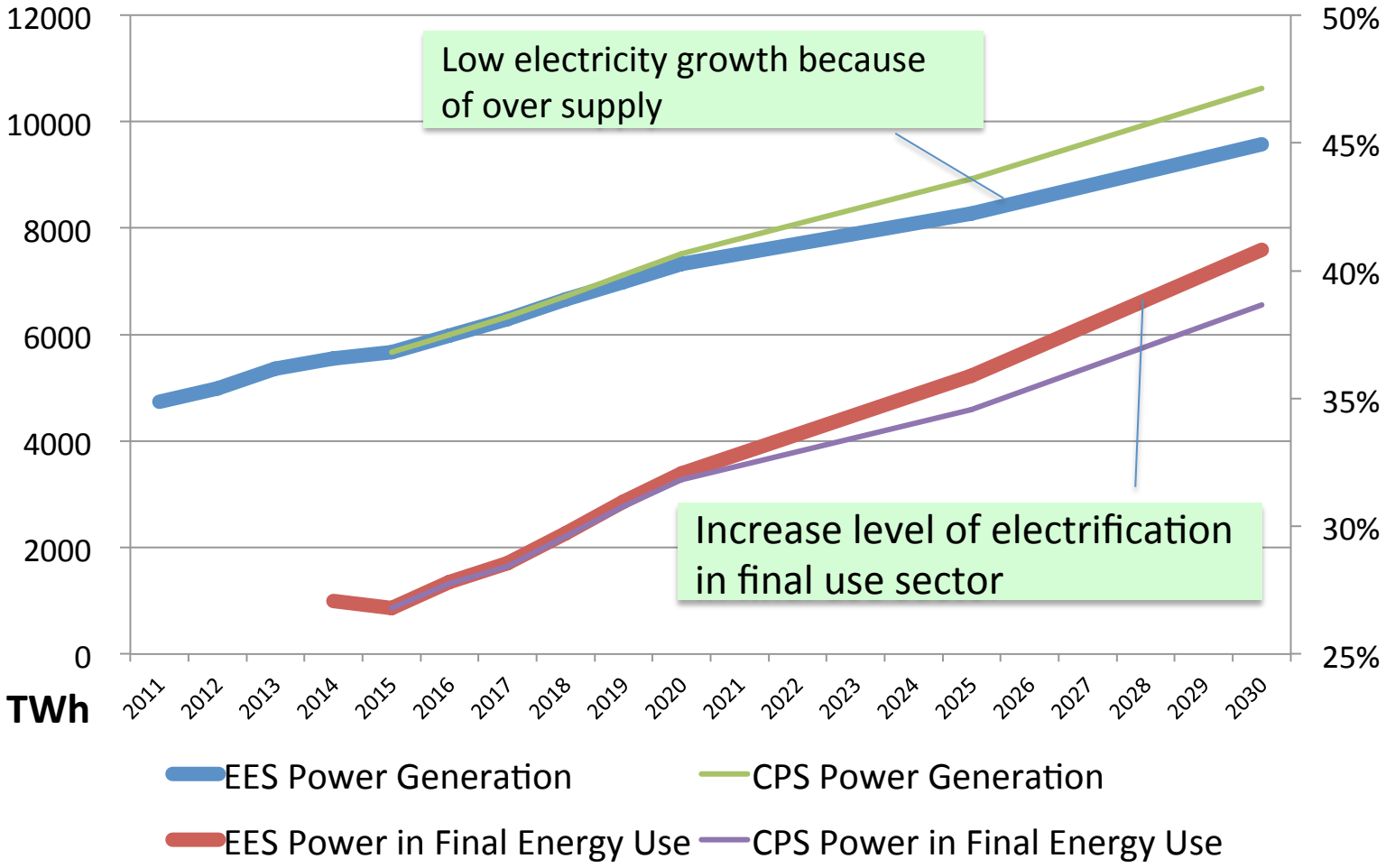
		2015	2016	2017	2018	2019	2020	2025	2030
GDP %	CPS	7	7	7	7	7	7	5	5.50
	EES	7	6.60	6.60	6.60	6	5.50	4.50	5.00
2nd Sector	CPS	41.60	41.08	40.56	40.04	39.52	39	37.50	35
Output %	EES	41.60	41.05	40.50	39.95	39.40	38.85	36.00	33
Coal fired	CPS	315.4	312.8	310.2	307.6	305	302.4	293.0	283.6
gce/kwh	EES	314.9	311.7	308.6	305.5	302.4	299.2	289.8	275.3

To name a few only

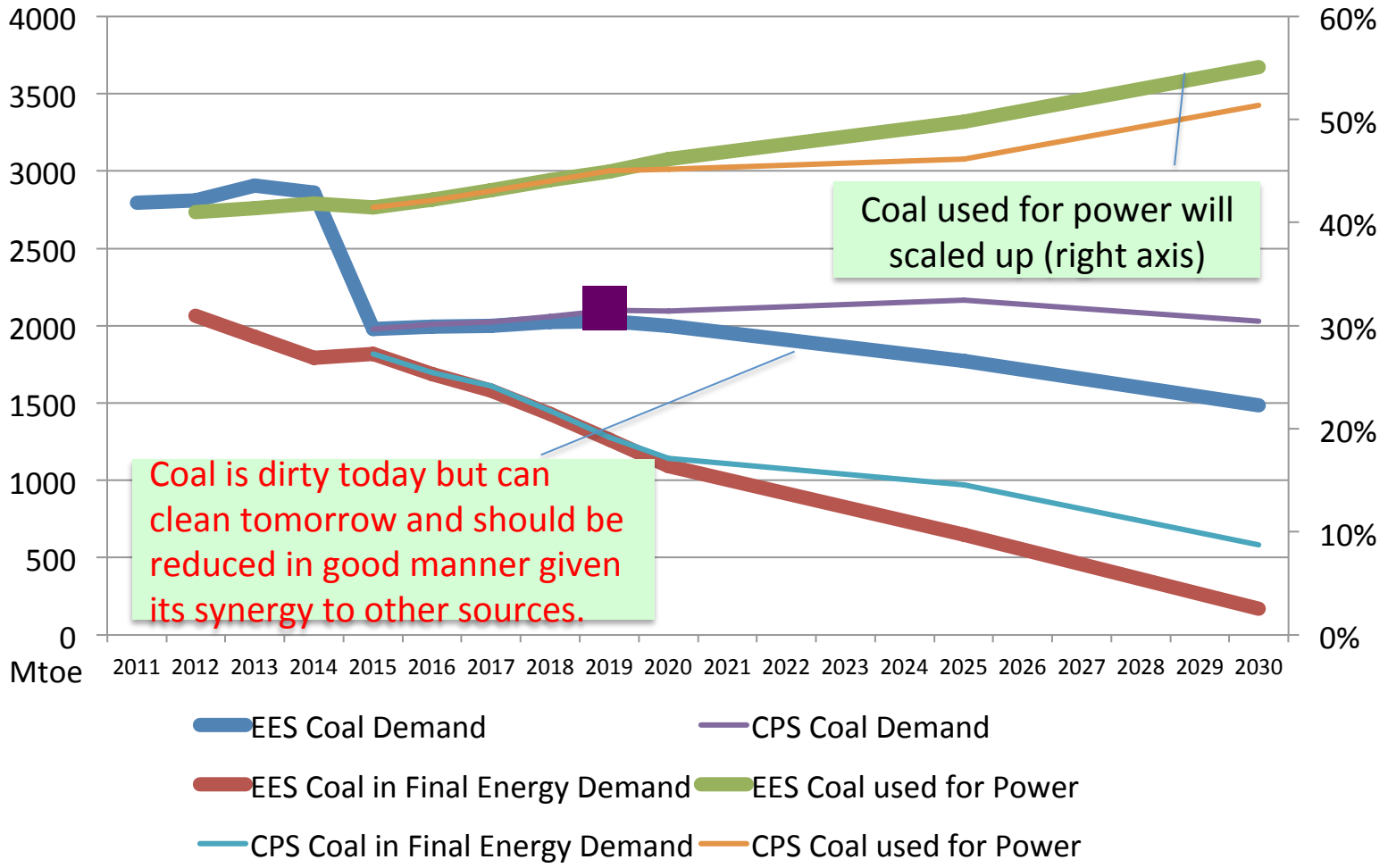
1. Energy Demand Plateau & Decouple If GDP Growth slow dowe to 6.6% even lower with higher efficiency, restructuring and upgrading.



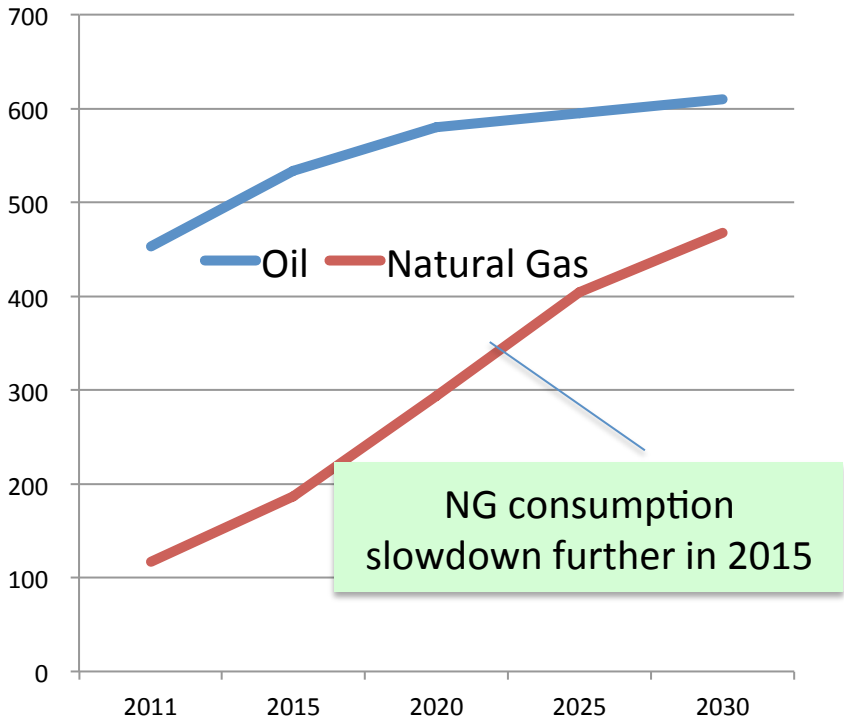
2. Higher Electrification Against Lower Level of Power Generation **If** Final Sector Prioritized

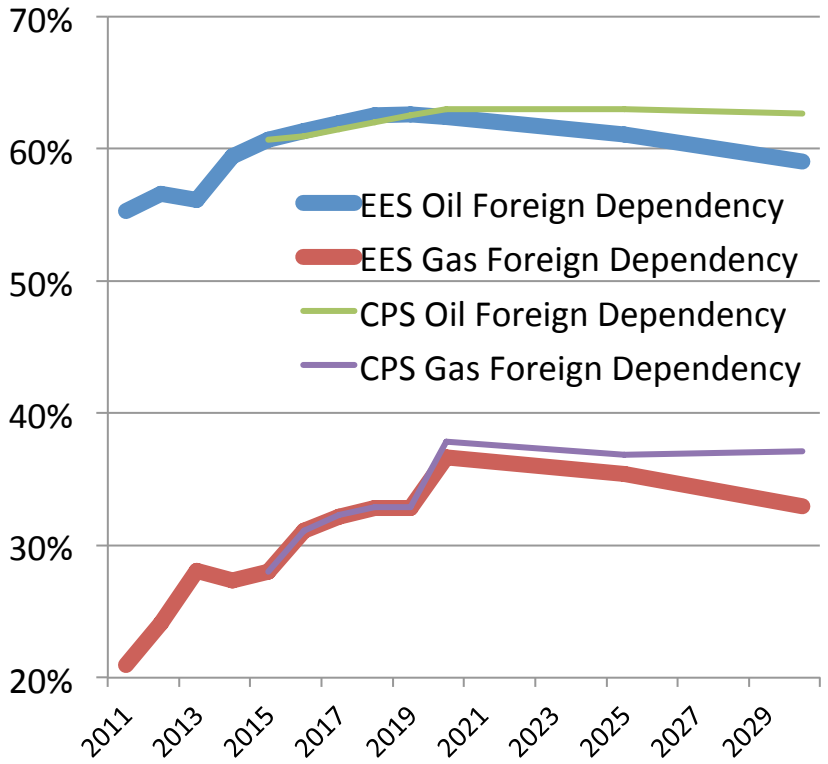


3. Coal Consumption Peak while Coal for Power Being Increased



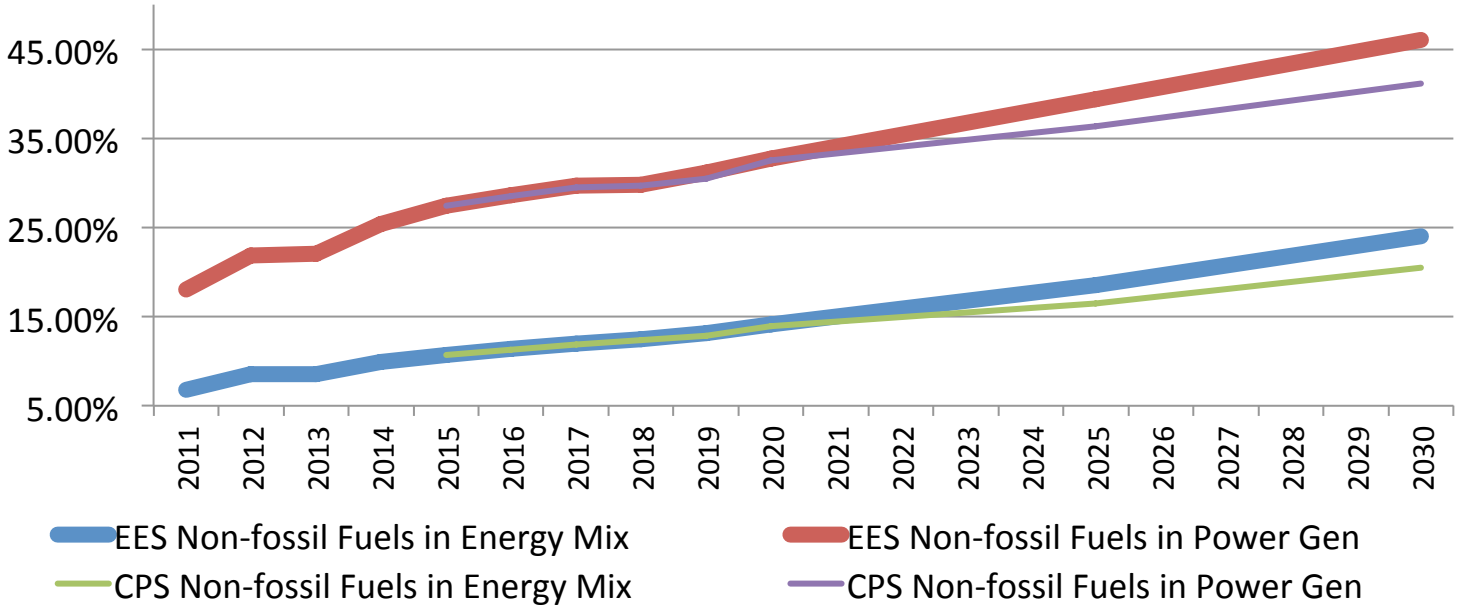
4. Oil/Gas Foreign Dependency Fall if Substitution and Saving Facilitated





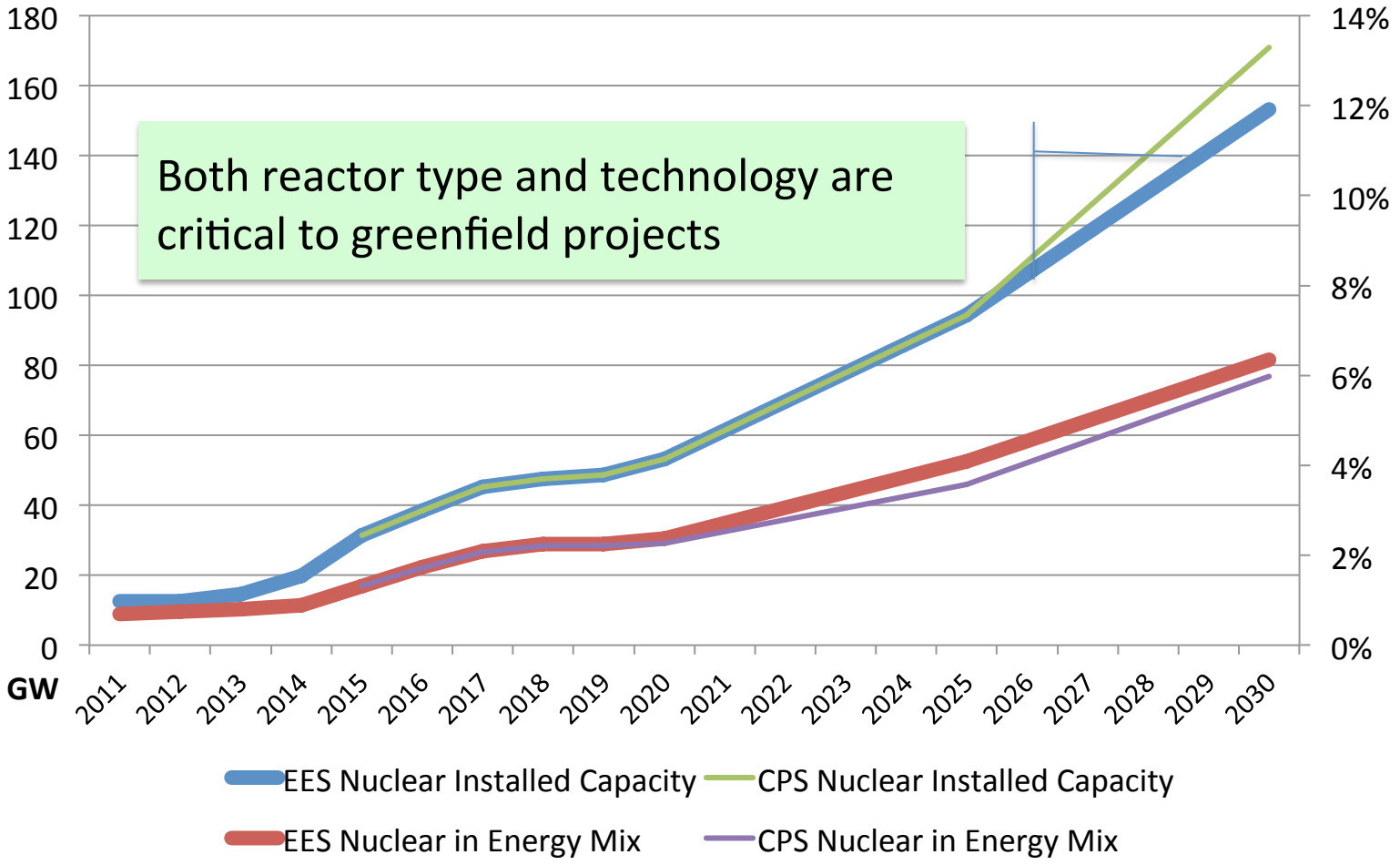
The role of oil is decreasing and replaced partially while gas will continue to grow but in different manner. Yet future oil and gas are suffering unprecedented challenges. Oil firms have to live in otherwise manner.

5. Both Non-fossil Fuels Renewable Power Generation Increased faster **If** Policies Applied Smartly.



- Currently, non-fossil fuels stay at 12% in primary energy supply mix (11% in demand mix), a far behind of our goal (20% in 2030).
- It enjoys fast development thanks to policy incentives (subsidies). 511 GW (35%) and 1553 TWh (27%) in 2015. It goes faster. We are facing 10-20% curtailed capacity

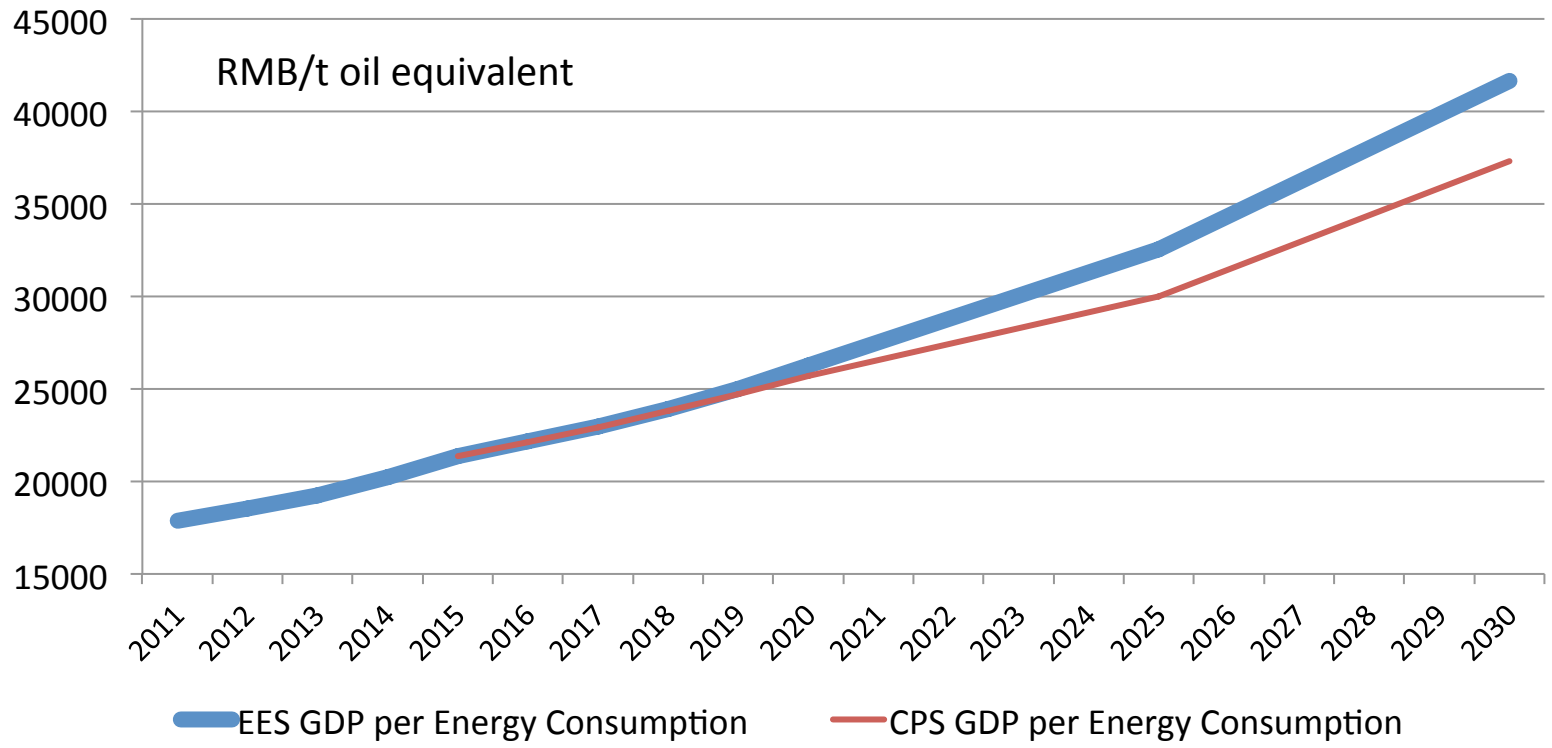
6. Nuclear Power is Indispensable (of 20%) and gain its pace and will be expanded steadily at home and abroad



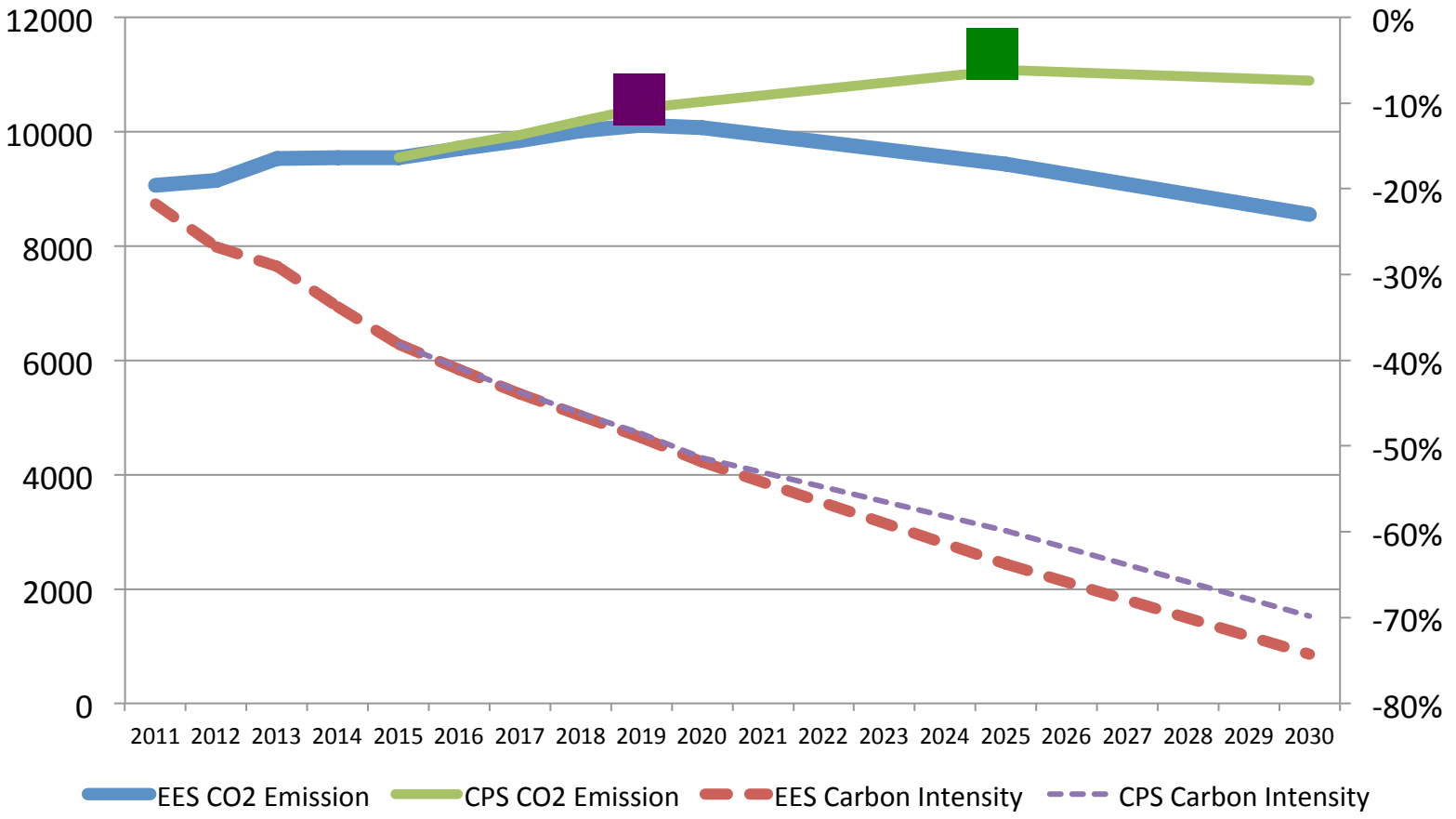
7. Efficiency Potentials Are Identified to Their Best Practices

	Unit	2000	2005	2010	2013	Best Practices	Potential%
Coal used for kWh	gce/kWh	392	370	333	321	276	**16.3**
Transmission Loss	%	7.7	7.21	6.53	6.68	—	—
Steel	kgce/t	1475	1020	950	923	—	—
Cement	kgce/t	172	149	134	125	118	5.9
Electriclytic aluminium	kWh/t	15418	14575	13979	13740	12900	6.5
Flat Glass	kgce/wb	25	22.7	16.9	15	13	15.4
Refining	kgce/t	118	114	100	94	73	**28.8**
Ethylene	kgce/t	1125	1073	950	879	629	39.7
Synthetic ammonia	kgce/t	1699	1700	1587	1532	990	54.7
Paper making	kgce/t	912	528	390	362	—	—

7. Energy Efficiency Can Be Higher **If** Policy Incentivize Bigger Efforts

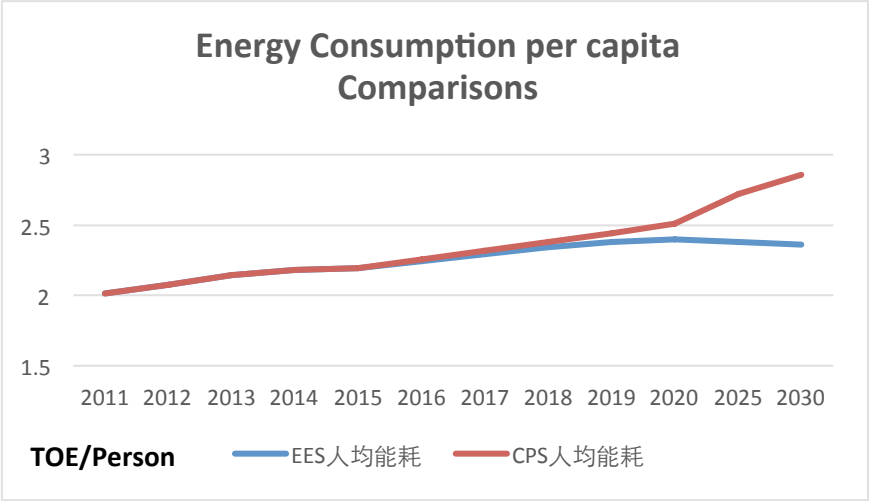


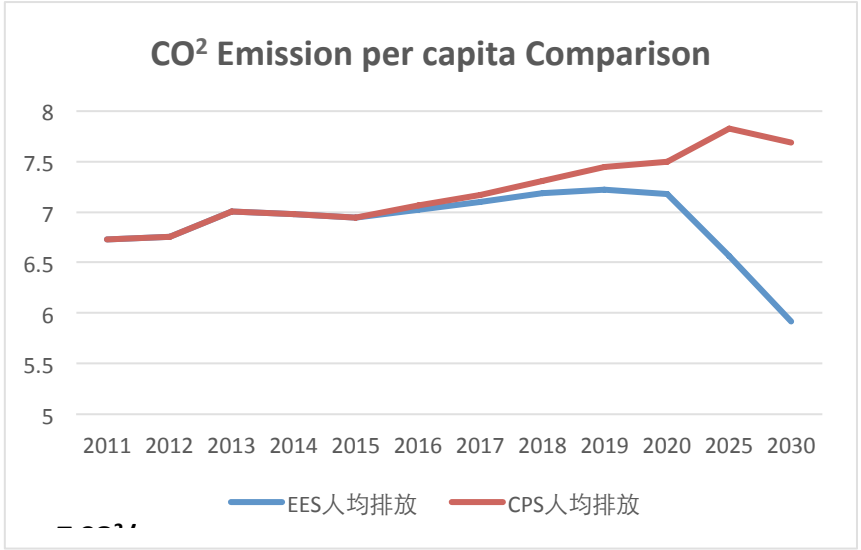
8. Carbon Emission Peak in 2020 before Declining If all mentioned above are materialized.



Concluding Views

- Current policies are correctly generated and well positioned to reach their goals. However, the energy transition may not be certain to our expectation freeing from EKC.
- All goals can be satisfied and over taken under our recommended scenario (EES), the trajectories under EES look much nicer (lower growth and demand, carbon emission, greener and more sustainable) which could pave our way out of EKC.





Concluding Views

- Therefore, our solutions are as simple as lower GDP growth, less coal in proportion for more non-fossil fuels (synergy is dealt with carefully among the relevant energy sources), higher efficiency, final use prioritized, etc. as I advise government energy agency already.
- Our expected transition is logically intertwined by the following two sets of interactive synergies.

(a) Three 50% are crucial

	2015年	2020年	2030年
Non-fossil fuel in Energy Mix %	11	14	**20/24**
Non-fossil fuel installed capacity %	35	42	>**50**
Non-fossil fuel generation %	28	≈33	46（≈**50**）
Electrification in final use sector %	≈27	32	>40（≈**50**）
Coal in final use %	≈30	≈18	<2
Gas in final use %	7.6	13？	20？
Oil in final use %	28	28	≈29？

There are bigger rooms to make these trends possible if taking into account of further reform and marketization, and smarter policy towards oil, gas and power sector.

(b) Three plateaus in 2020 are pillars

	2015	2020	2030
Energy Demand Mtoe	3021	3380	3390
Coal Demand Mtoe	1978	1997	1485
CO2 Emission bn tons	9.5	10	8.5

1. The three peak plateau pave their ways for de-carbonization and electrification in the course of energy transition.
2. And, 2016-2020 span is critical to our energy transition (in terms of energy mix, pattern, and system) .
3. In sum, the indicated and expected energy transition could pave a new way for China out of existing transition pattern or EKC seen in the West.
4. I am not sure if India think alike.

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