The Role of New Technologies for a More Competitive and Productive World Energy Mix

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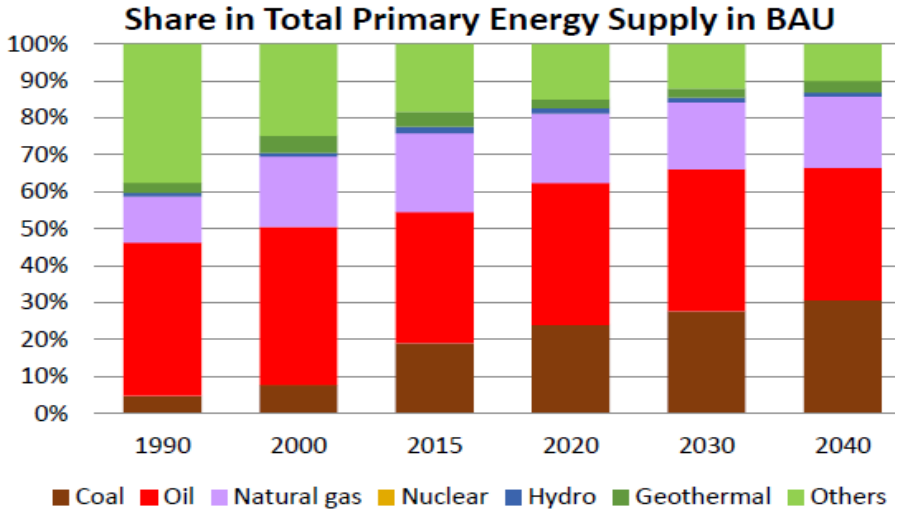
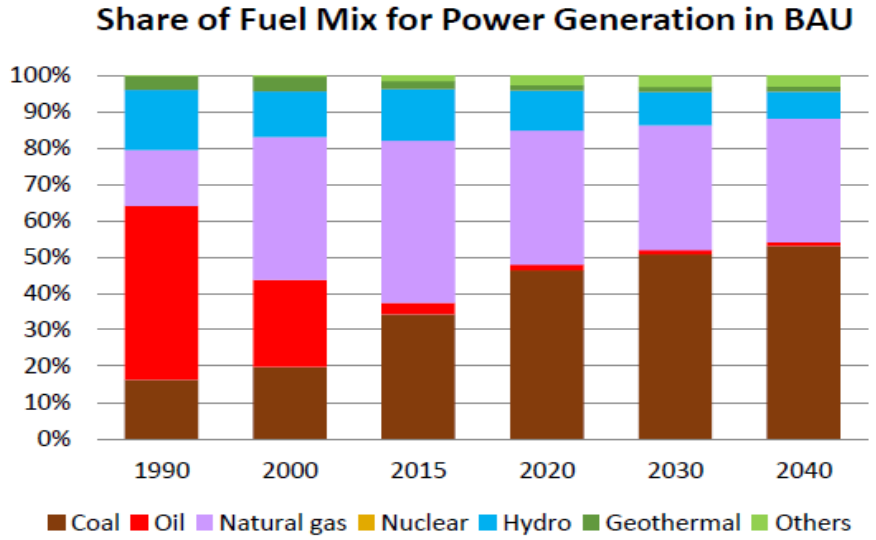
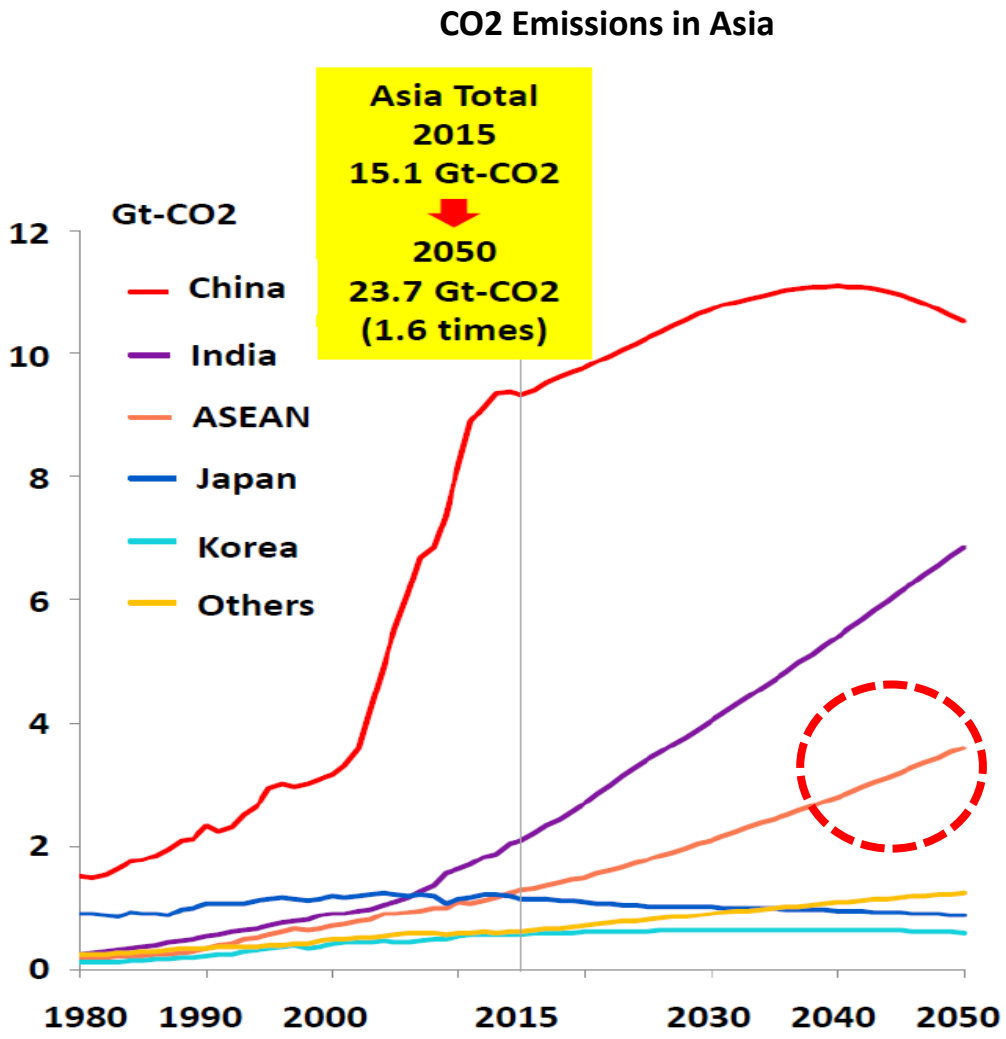
Outlook of Fuel Mix in ASEAN in BAU

- **Fossil fuel (in particular, coal) will play dominant role in ASEAN energy mix in coming decades.**
- **Together with India, ASEAN will drive CO2 emissions growth in Asian region.**





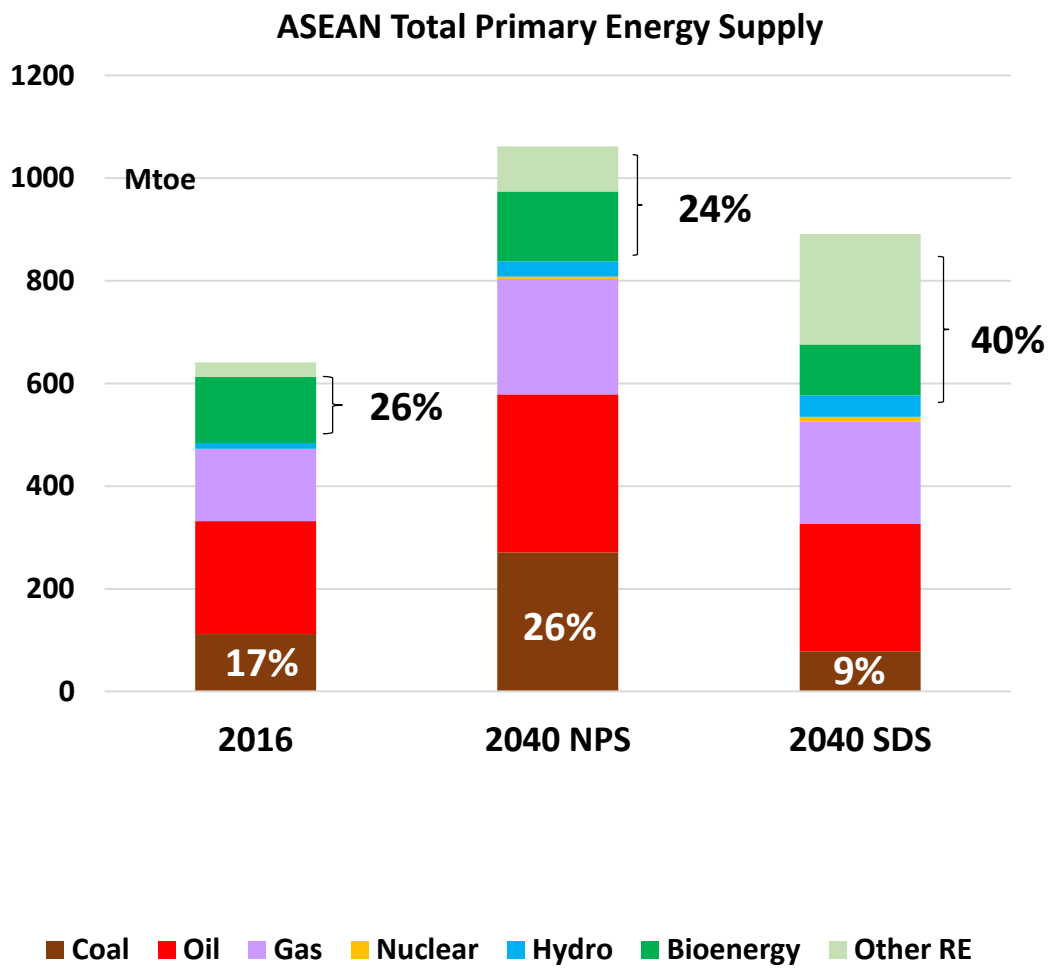
Source : ERIA Energy Outlook and Saving Potential of East Asia Summit Countries 2018

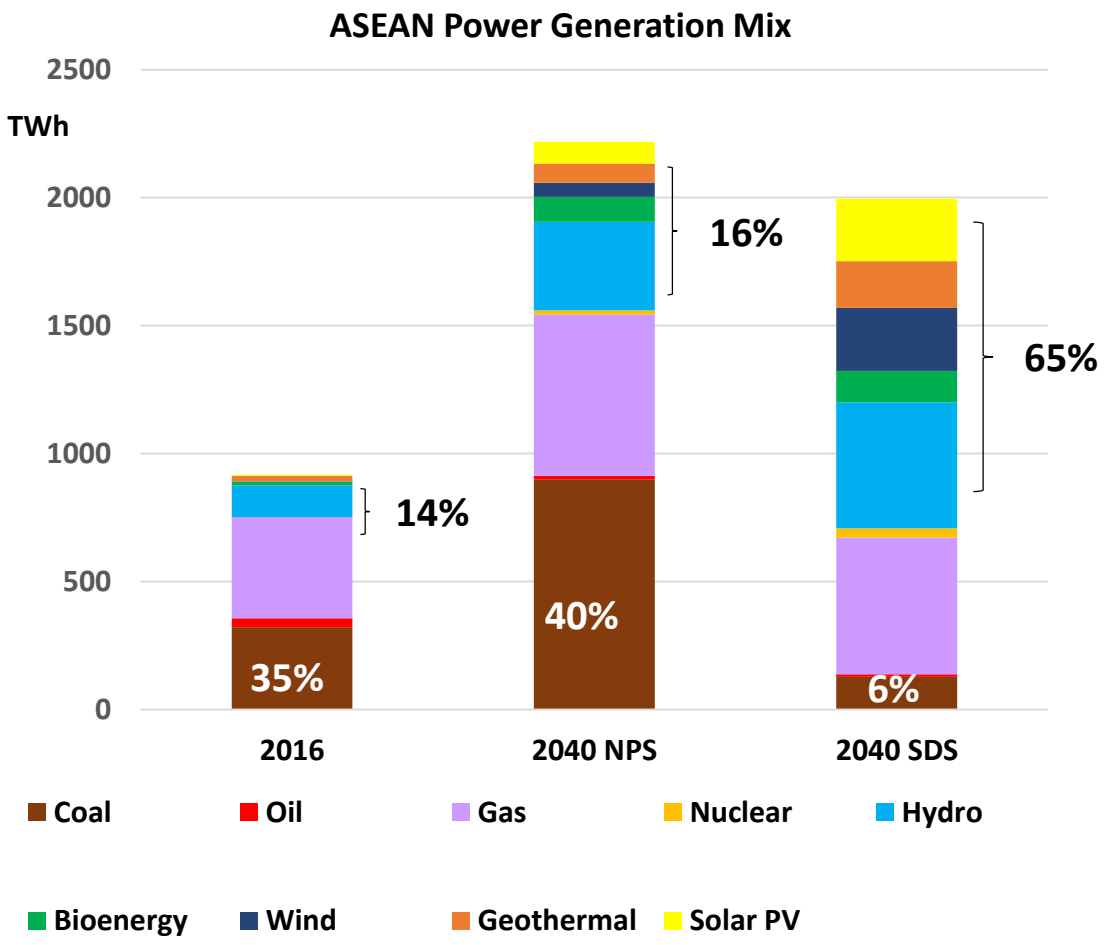


Source: IEEJ Asia and World Energy Outlook 2018

Paris Agreement Calls for Drastic Energy Transition

- **Under the scenario compatible with Paris 1.5-2.0 degree target, there must be drastic energy transition, much lower share of coal (40% ➔ 6%) and much higher share of RE (16% ➔ 65%)**

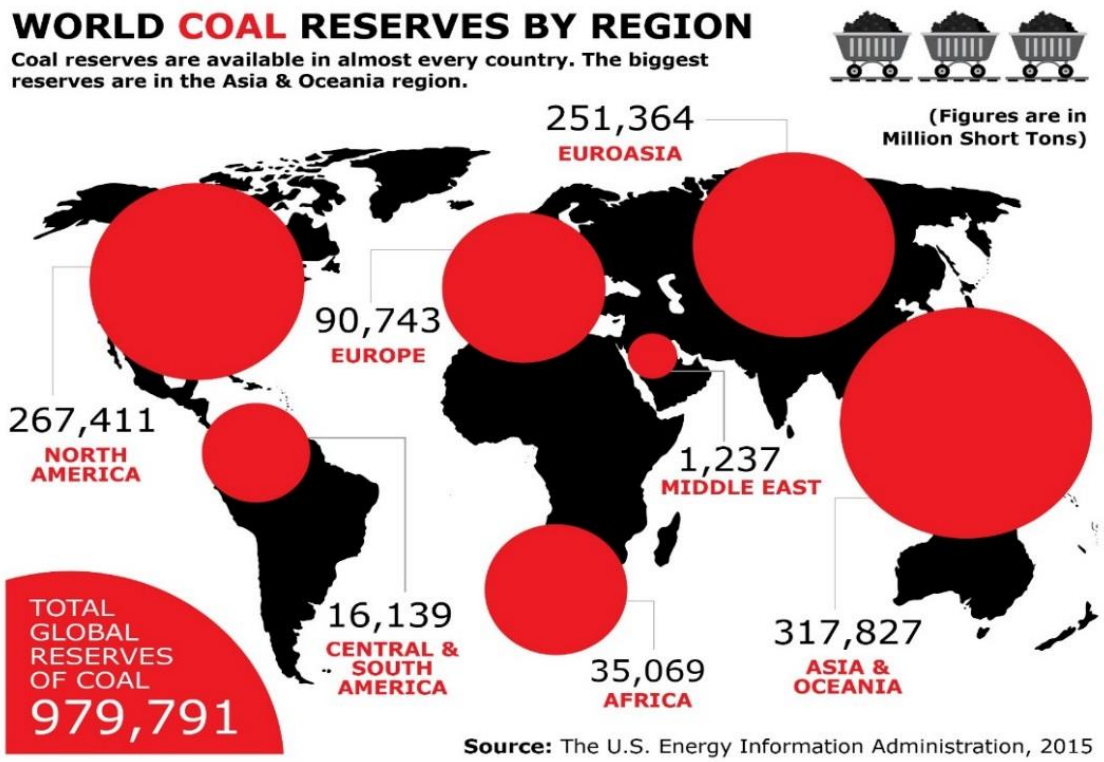




Source: IEA Southeast Asia Energy Outlook 2017

Climate Monotheism VS 17 SDG Polytheism

- Climate change is one of 17 SDGs, but not the supreme one. Priority among 17 SDGs could be different depending on national circumstances.
- Many SDGs are achievable only when robust economic growth is achieved underpinned by cheap and reliable energy. Due to its abundance, low cost and widespread global distribution, coal cannot be simply dismissed in ASEAN region.
- Clean use of coal should be pursued rather than simply ruling out coal altogether. HELE technologies and ultimately CCS /CCUS technologies must play a vital role.



Gap between COP Narrative and Willingness to Pay

- Huge gap between the carbon price suggested in the IPCC SR 1.5 and "willingness to pay" by general public (e.g., Yellow Vest)
- Resistance to high energy cost would be even higher in developing countries from which the bulk of additional energy demand and CO2 emissions would come.
- Energy transition needs to be affordable. ➔ Innovation is the key

	Un-discounted 2010 US Dollars			
	Carbon Tax per Metric Ton of CO_2			
	2°C Pathway Low	2°C Pathway High	1.5°C Pathway Low	1.5°C Pathway High
2030	$10	$200	$135	$5,500
2050	$45	$960	$245	$13,000
2070	$120	$1,000	$420	$17,500
2100	$160	$2,125	$690	$27,000

10 EUR/t-CO2 increase of carbon tax ➔ Yellow Vest

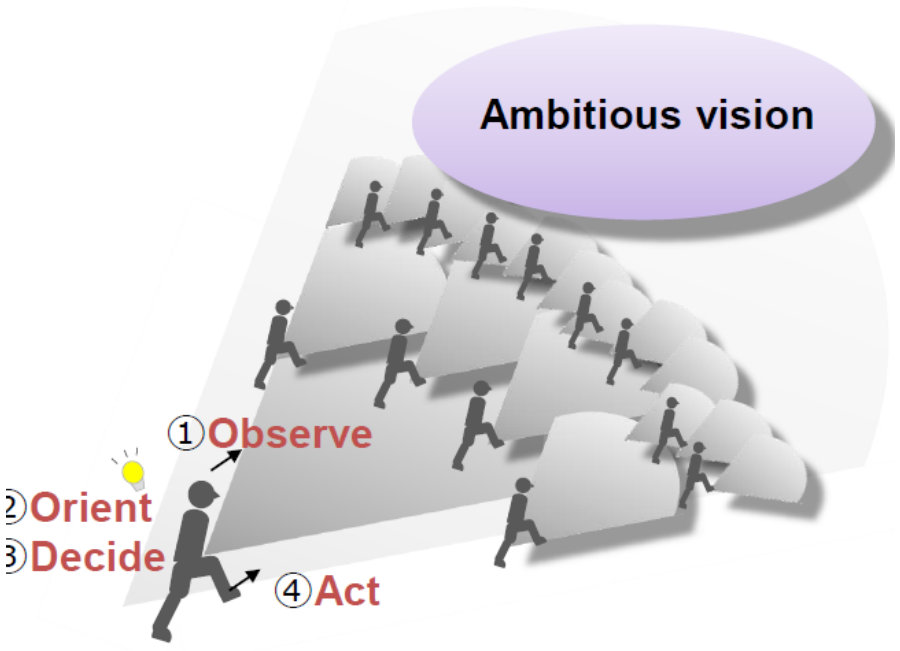
Source: IPCC Special Report on Impacts of Global Warming of 1.5 degree above Pre Industrial Levels

Source: Le Monde

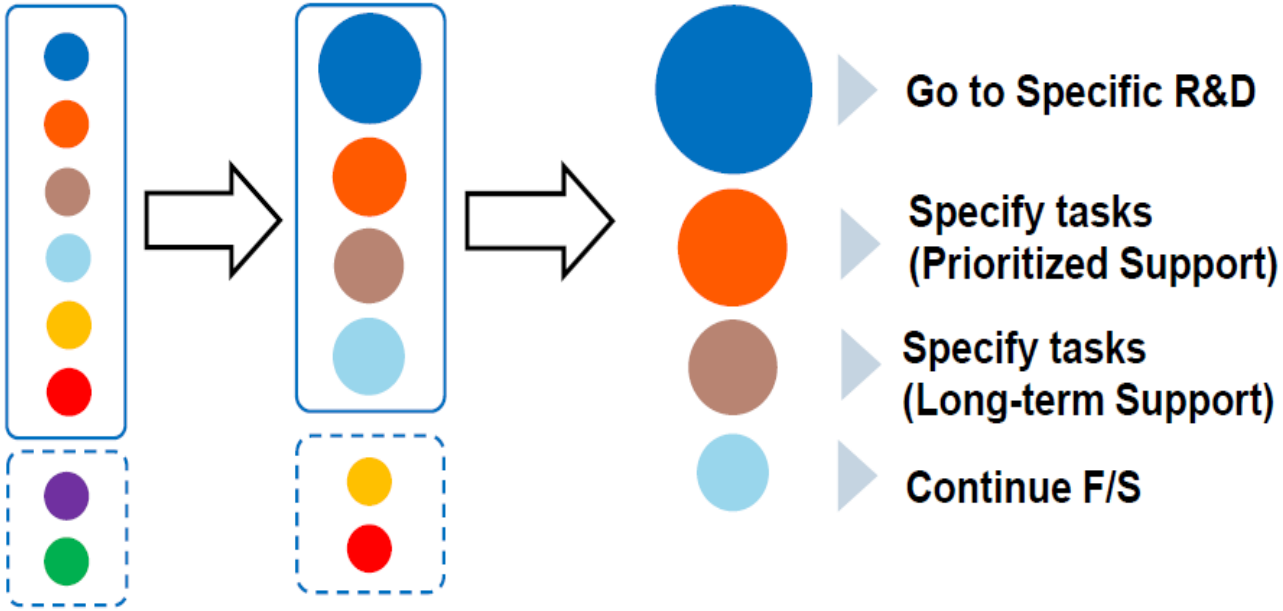
Multiple Pathways to Decarbonization

- **Volatility, uncertainty, complexity and ambiguity about future ➔ flexible and adaptable policy approach taking multiple pathways (RE + battery, CCS/CCUS, hydrogen, nuclear….)**
- **Inflexible pathways could be costly, and not politically and economically sustainable.**
- **With periodical review, technology scope should be gradually narrowed down with tailor-made support**

Multi-track scenario with Ambitious vision
(OODA cycle)



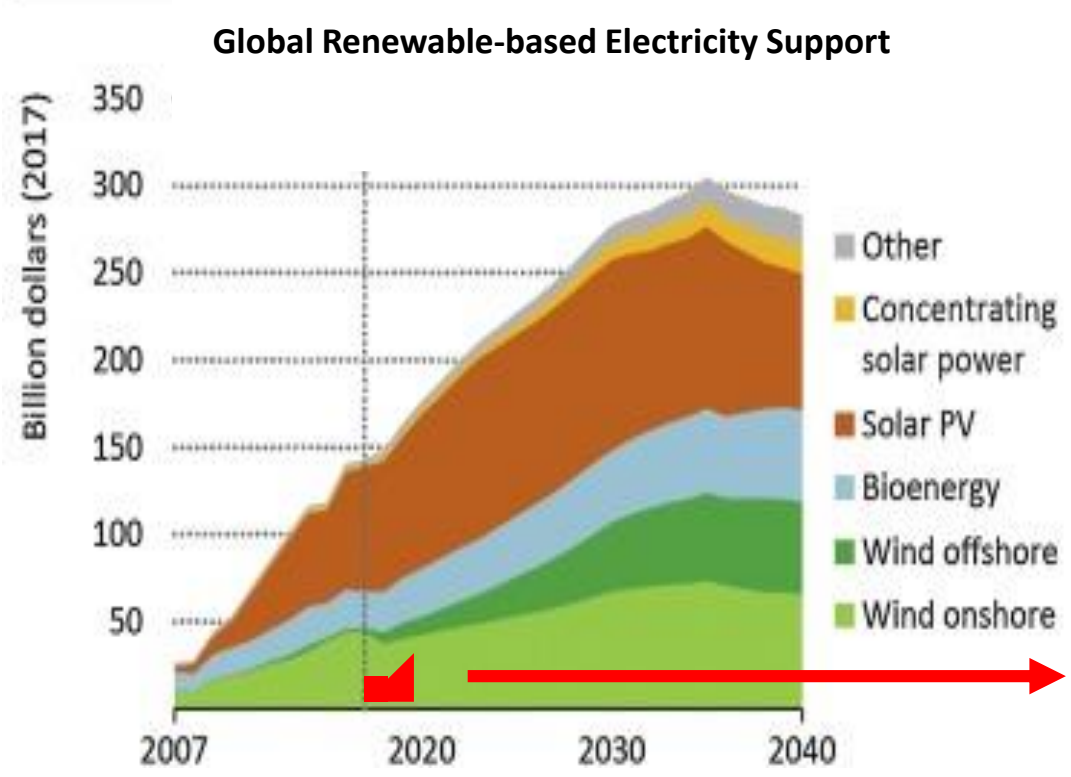
Gradually narrow down technologies to be supported and categorize support based on the maturity of technologies



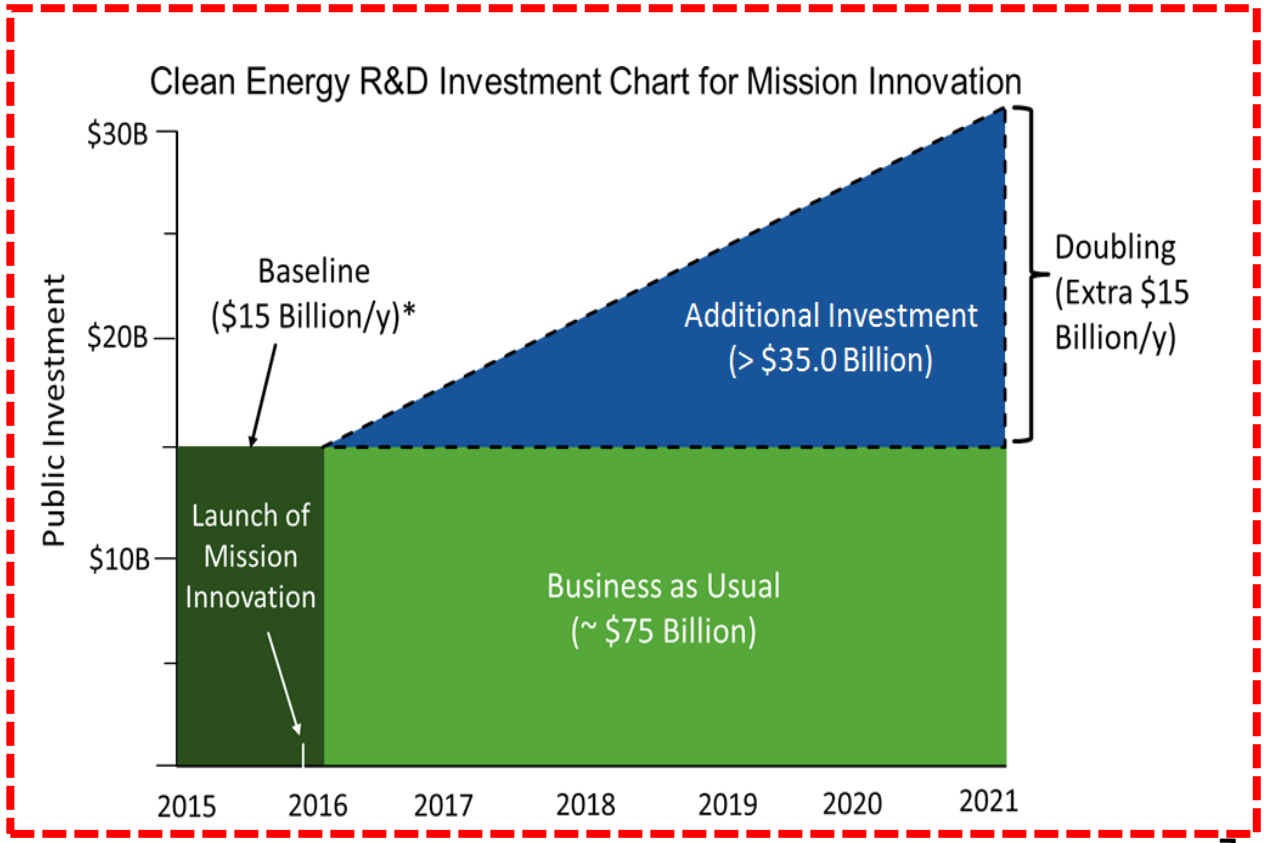
Balance between RE Support and Clean Energy R&D

- Boosting innovation needs more funding for R&D.
- Global renewable energy based electricity support is much larger than clean energy R&D expense envisaged under the Mission Innovation

➔ Huge subsidies for existing technologies and modest spending on future technologies. Right balance???



Source: IEA World Energy Outlook 2018



Source: Mission Innovation

Key Messages

- **Paris Agreement calls for drastic energy transition.**

- **For developing countries, climate change is not the supreme objectives among 17 SDGs. They will take various energy transition pathways based on their national conditions. There is a huge gap between COP/IPCC narrative and people's willingness to pay.**

- **Energy transition needs to be affordable. Technologies must be innovative in terms of performance as well as cost competitiveness.**

- **Uncertainties (energy cost, technology, geopolitics etc) ➔ Multi-track approach for decarbonized energy systems backed by scientific review**

- **There should be rebalance between huge subsidies for existing RE and modest R&D spending for cleaner energy.**