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Can 2DS or 1.5DS Scenarios Be Viable in Reality?

1773009 김채연
1773015 박지원
1773022 정다정
1773023 정소현
1773117 김해찬

이화여자대학교
EWHA WOMANS UNIVERSITY

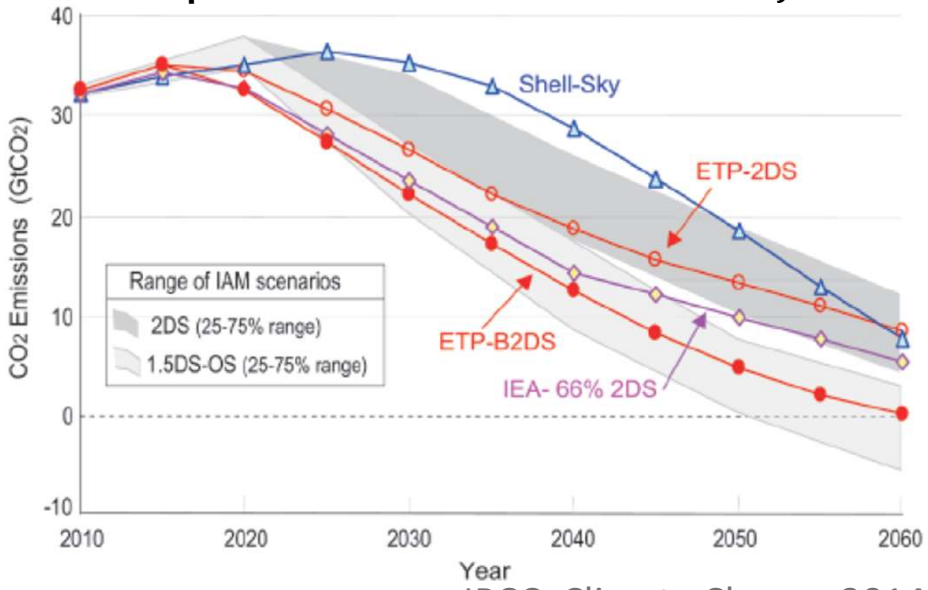
CONTENTS

1 - (1) Definition

Average global temperature rises in 2100 compared to pre-industrial level

- 2DS : below 2℃
- 1.5DS : below 1.5℃

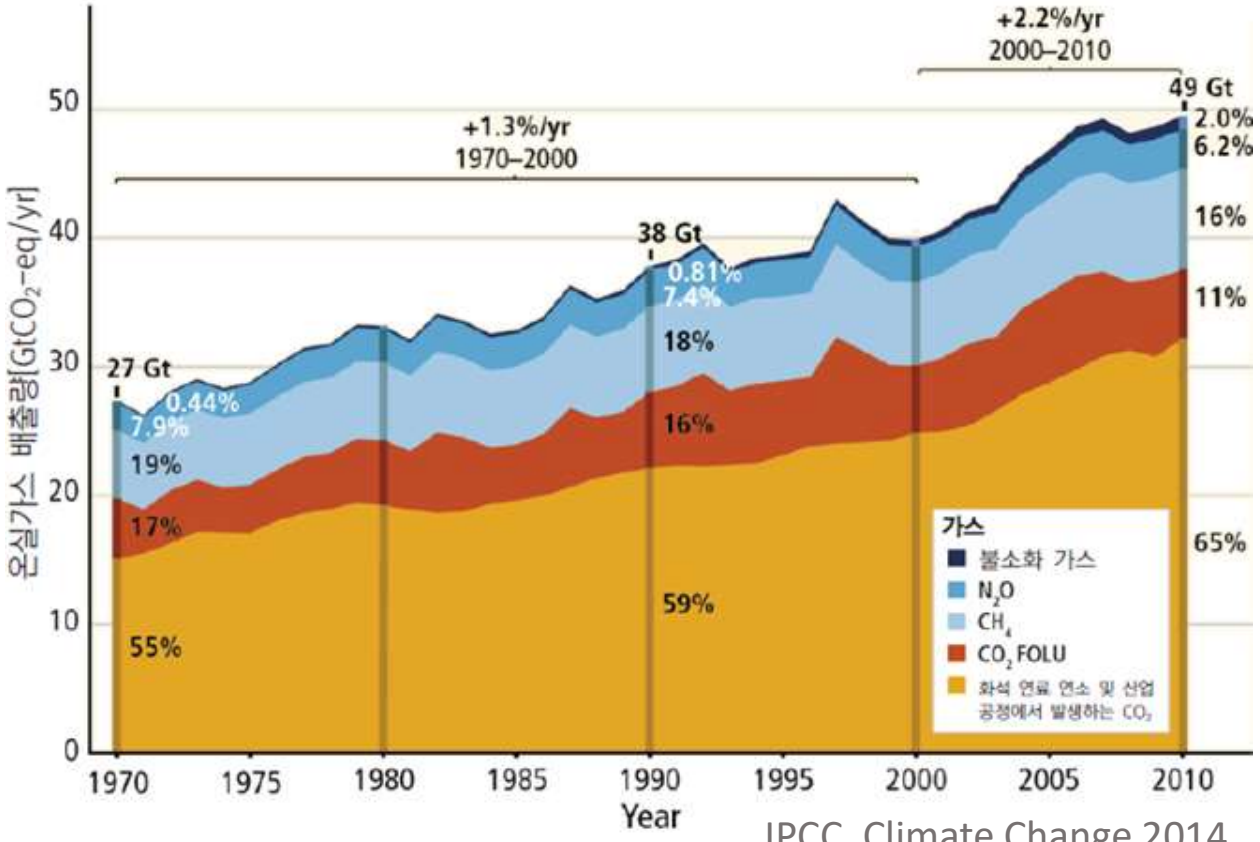
* Comparison of CO2 emission trajectories



IPCC, Climate Change 2014

Why do we focus on CO_2 for 2DS and 1.5DS?

* Total annual anthropogenic greenhouse gas emissions



IPCC, Climate Change 2014

Why do we focus on CO_2 for 2DS and 1.5DS?

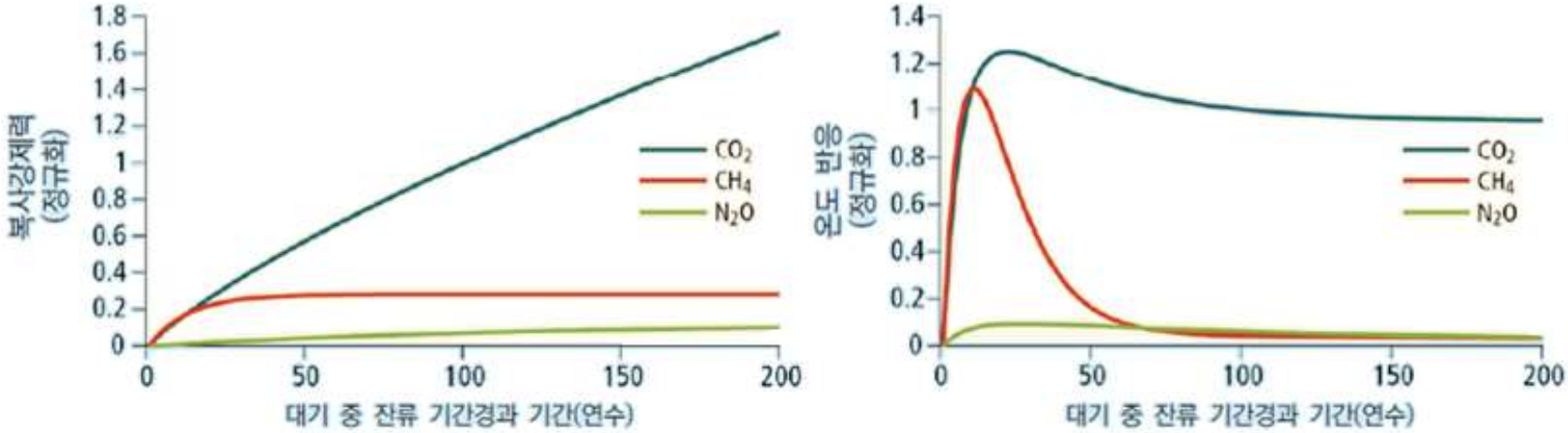
* Global Warming Potential(GWP) and Global Temperature change Potential(GTP)

		GWP		GTP	
	수명(년)	20 년 동안의 누적 복사강제력	100 년 동안의 누적 복사강제력	20 년 후의 온도 변화	100 년후의 온도 변화
CO_2	b	1	1	1	1
CH_4	12.4	84	28	67	4
N_2O	121.0	264	265	277	234
CF_4	50,000.0	4,880	6,630	5,270	8,040
HfC-152a	1.5	506	138	174	19

IPCC, Climate Change 2014

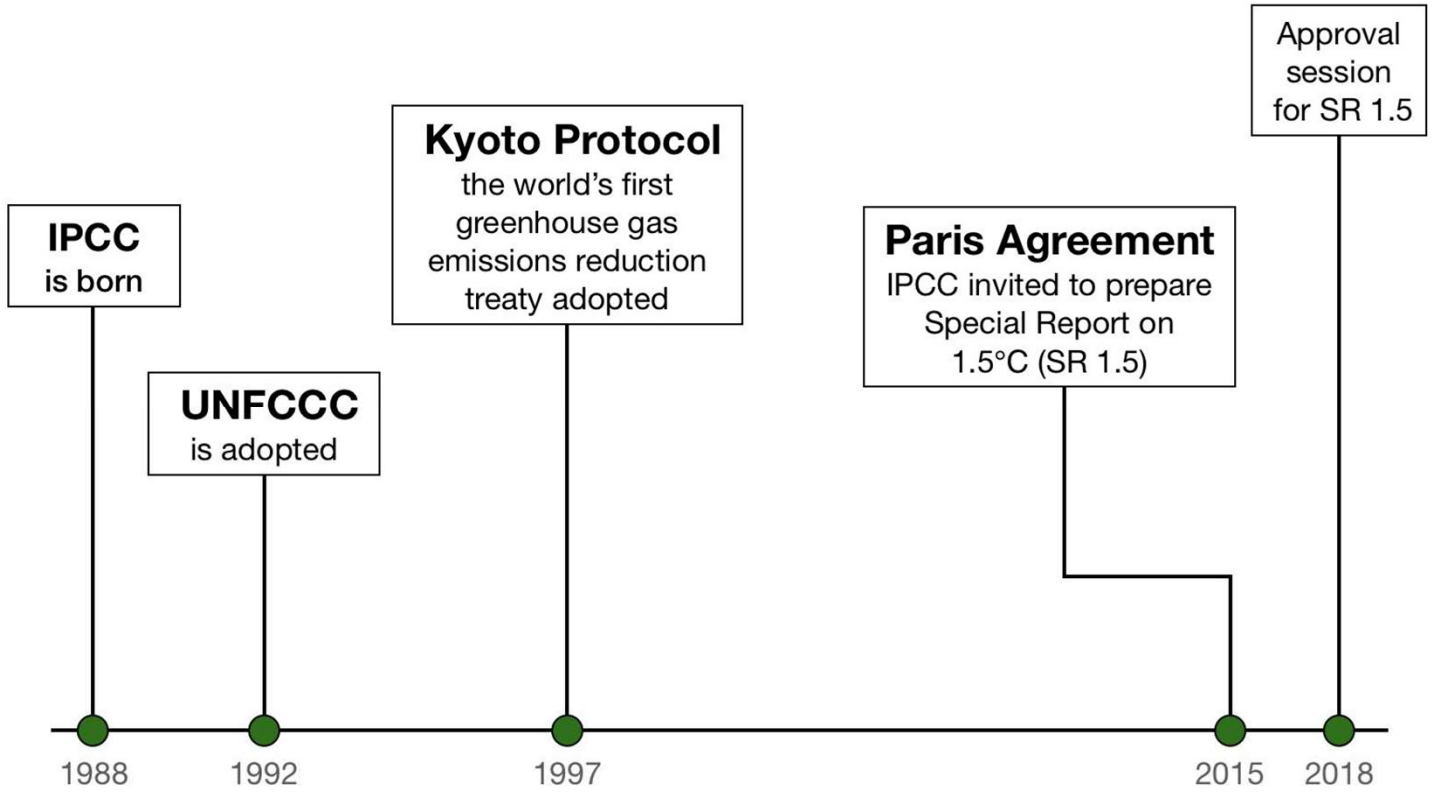
Why do we focus on CO_2 for 2DS and 1.5DS?

* Weighted emissions of current emissions over time



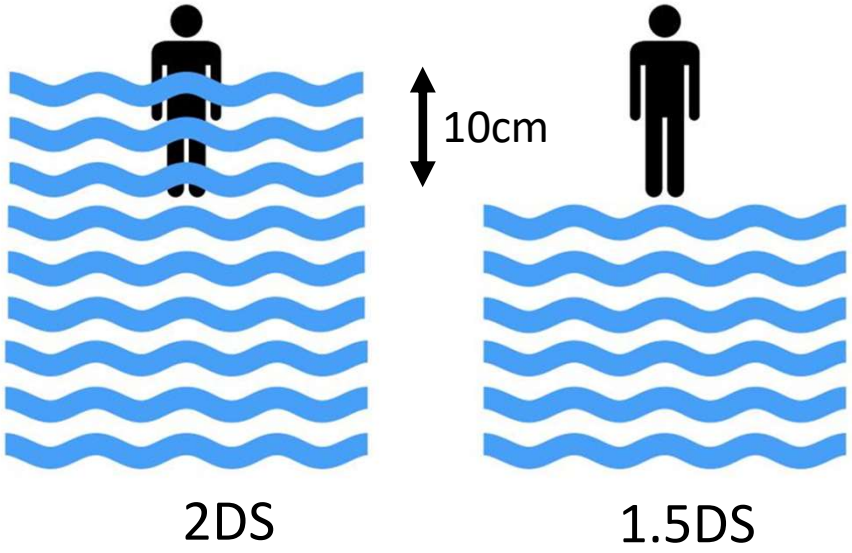
IPCC, Climate Change 2014

1 - (2) Background of 2DS and 1.5DS



2. Why do we need to pursue not 2DS but 1.5DS?

- In 2DS Scenario, sea level rises 10cm higher in 2100, making 10 million people in danger.



2. Why do we need to pursue not 2DS but 1.5DS?

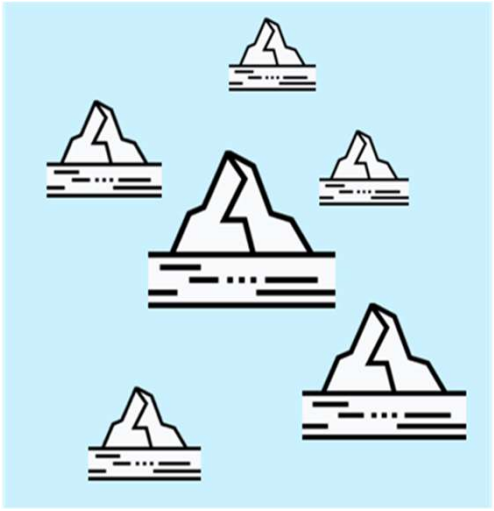
- Habitats of animals and plants become half.

2DS

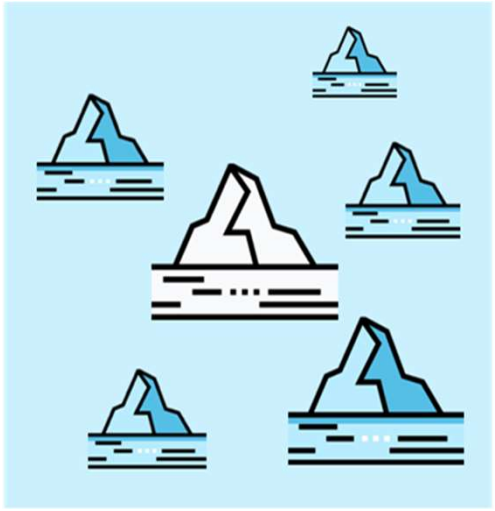
1.5DS

2. Why do we need to pursue not 2DS but 1.5DS?

- Arctic sea ice disappearance frequency in summer



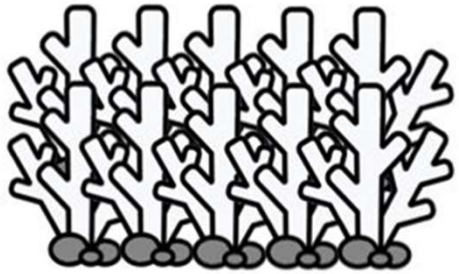
2DS : Once in 10 years



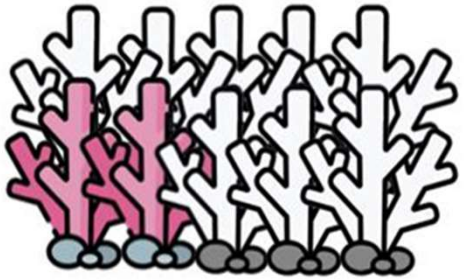
1.5DS : Once in 100 years

2. Why do we need to pursue not 2DS but 1.5DS?

- Coral extinct in 2100



2DS : up to 99%



1.5DS : 70 ~ 90%

2. Why do we need to pursue not 2DS but 1.5DS?

- Drought and Heavy Rain
- Acceleration of Global Warming by Ocean Acidification with Increasing CO_2
- Damage on Living (ex. Health, Supply of Food and Water, Safety, Economic Growth)

2. Why do we need to pursue not 2DS but 1.5DS?

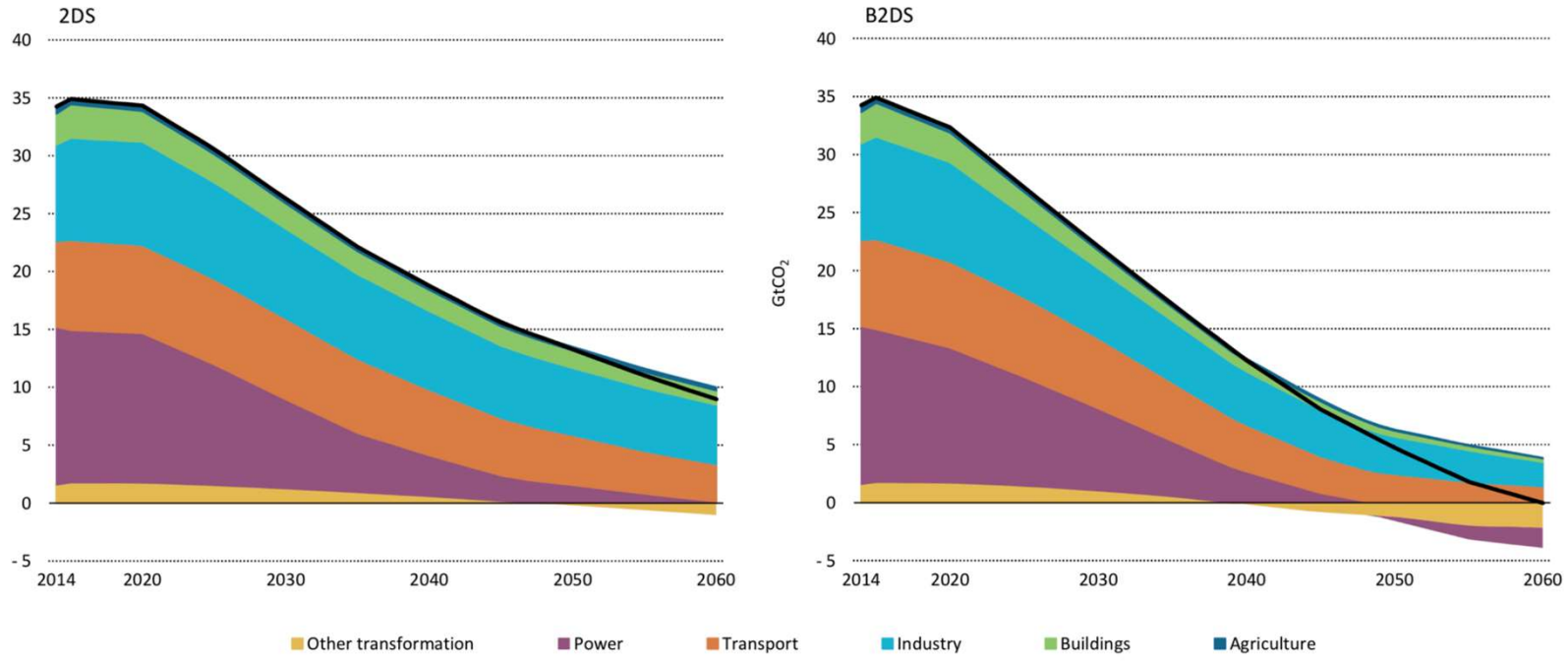
* Possibility of maintaining the temperature standards according to the concentration of CO_2

Possibility	CO_2 Concentration in 2100(ppm CO_2-eq)					
	430-480	480-530	530-580	580-650	650-720	720-1000
Below 2℃	High	>50%	50%	<50%	Low	Low
Below 1.5℃	<50%	Low	Low	Low	Low	Low

IPCC, Climate Change 2014

3. How to mitigate global warming?

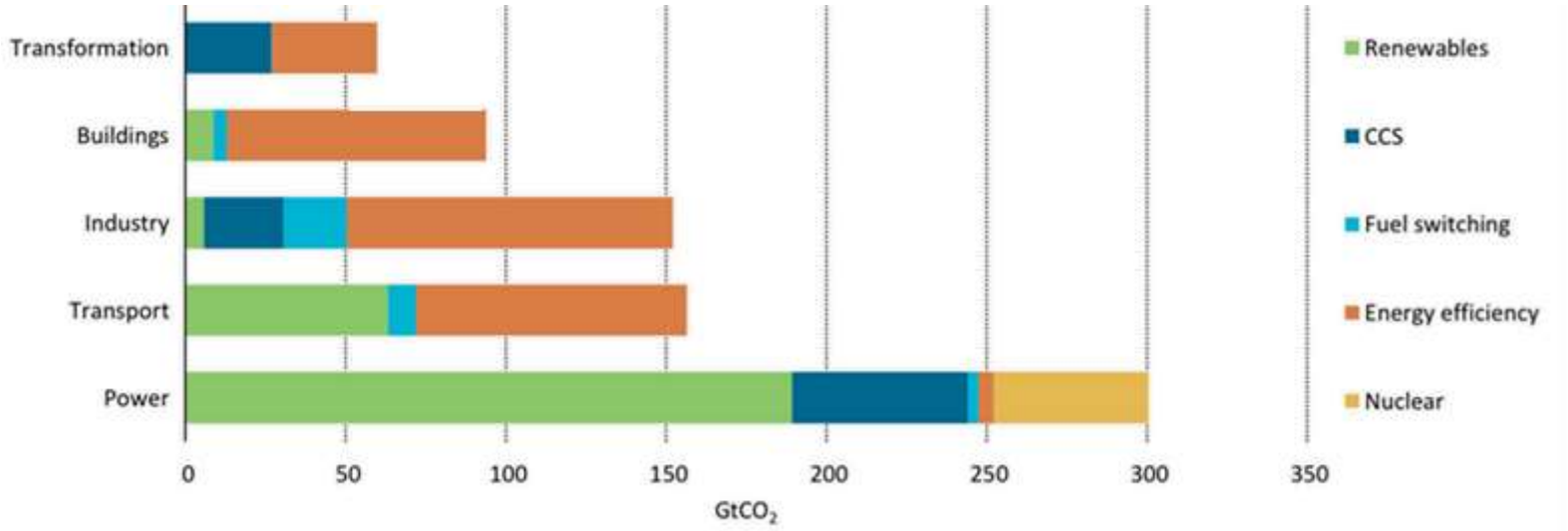
* Remaining CO_2 emissions in the 2DS and B2DS



IEA, Energy Technology Perspectives 2017

3. How to mitigate global warming?

* Cumulative CO_2 emissions reductions by sector and technology



3 - (1) Power

✓ Renewable Power

Solar PV and onshore wind

Offshore wind and hydropower

Bioenergy, concentrated solar (CSP), ocean energy and geothermal

✓ Nuclear Power

Increasing nuclear capacity deployment

Reducing the investment risk due to uncertainties

Reducing construction and financing costs in order to maintain economic competitiveness

✓ Natural Gas-Fired Power

Supporting natural gas-fired power generation as a lower carbon alternative to coal through electricity market mechanisms

3 - (2) Transport

- ✓ Electric Vehicles
- ✓ Transport Biofuels
- ✓ Road Vehicles
- ✓ International Shipping
- ✓ Aviation

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3 - (3) Industry

- ✓ Reducing Demand
- ✓ Energy Efficiency
- ✓ Increasing Electrification of Energy Demand
- ✓ Reducing the Carbon Content of Non-Electric Fuels
- ✓ Application of CCS

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3 - (4) Buildings

✓ Electrification of Fuel

Contribution to reduction of CO_2 emission with replacement of carbon-intensive

✓ Emissions Assignment

Certification for improvement of energy efficiency

✓ Subsidy Support

Revenue support grant of renovation of energy effective buildings or investment in energy-effective goods

✓ Regulations for Energy Consumers

Laws to help consumers in increasing energy efficiency

✓ Governmental Public Service Provision

Public procurement of buildings and equipment with energy efficiency

3 - (5) Agriculture

✓ Production

The imposition of fertilizer and nitrogen taxes (for the reduction of nitrous oxide)

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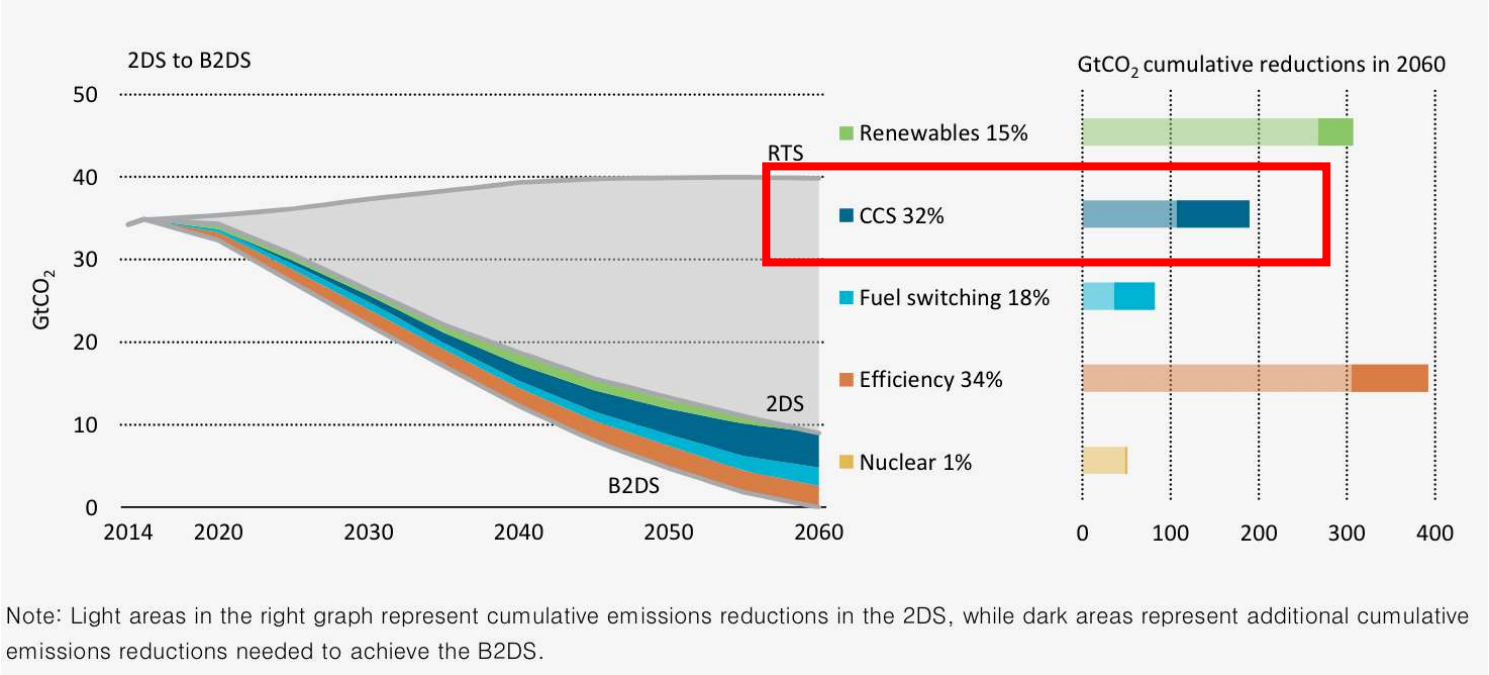
✓ Consumption

The shift to a food-oriented diet that requires lower CO_2 emissions and less land, as well as reduction of food loss and waste.

3. How can we mitigate global warming?

2DS to 1.5DS

Global CO_2 emissions reductions by technology area and scenario



Note: Light areas in the right graph represent cumulative emissions reductions in the 2DS, while dark areas represent additional cumulative emissions reductions needed to achieve the B2DS.

IEA, Energy technology perspectives 2017

Pushing energy technology beyond the 2DS could deliver net-zero CO_2 emissions by 2060.

3. How can we mitigate global warming?

Carbon Capture and Storage

✓ Recent trend

The first steel plant CCS project began operations in 2016 and the global portfolio of large-scale CCS projects continues to expand.

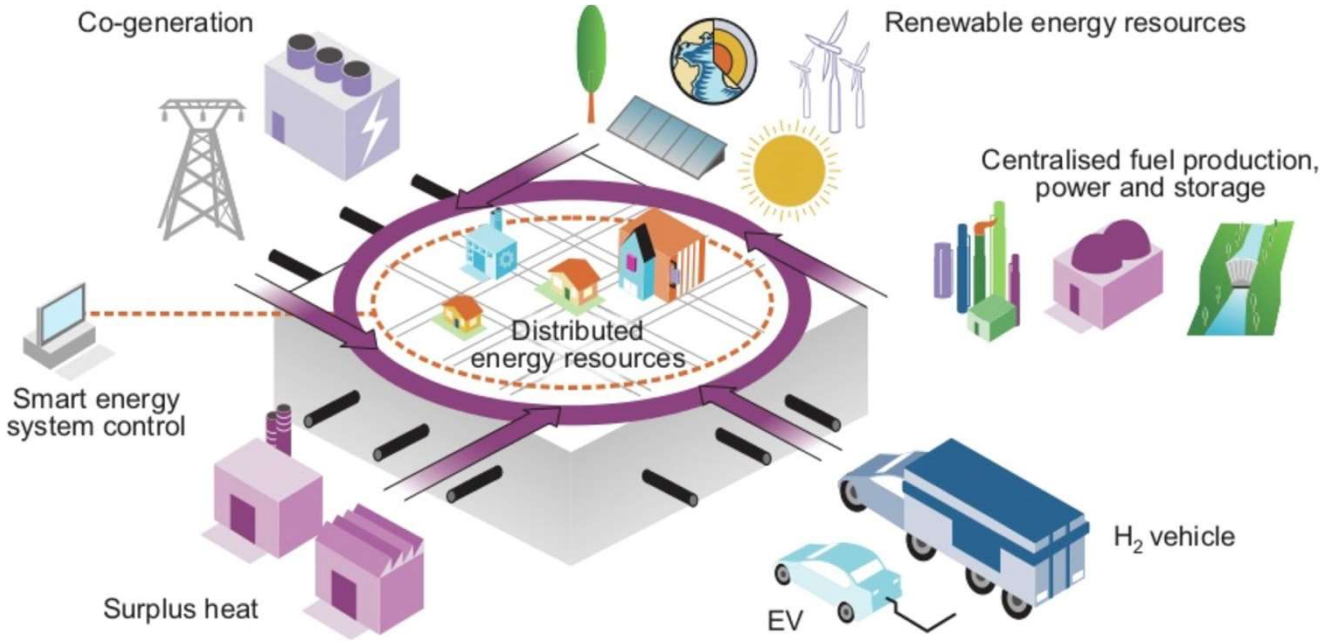
✓ Recommended actions

1. Investment in geological CO_2 storage
2. Co-ordinated and extensive CO_2 storage assessment programs are required

(to prove secure, practical and bankable CO_2 storage areas and sites in all key regions.)

3. Steady Research Activities by CESE students and Prof. Min

3. How can we mitigate global warming?



IEA, Energy Technology Perspectives 2017

4. Conclusion

Scientifically, we can estimate degrees of warming resulting from mitigation,

but they can vary significantly depending on the decisions of the individual, country and business.

Nevertheless, our efforts are needed. YES!!!!

4. Conclusion

References

- International Energy Agency [IEA]. (2017). *Energy Technology Perspectives 2017*
- Intergovernmental Panel on Climate Change [IPCC]. (2014). *AR5 Synthesis Report: Climate Change 2014*
- Intergovernmental Panel on Climate Change [IPCC]. (2014). *Global Warming of 1.5 ℃*

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Any question?

Thank you

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