

# 기후행동 컨퍼런스 2018

CLIMATE ACTION CONFERENCE 2018

[발표자료집]

주최



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Ministry of Trade,  
Industry and Energy



환경부  
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한국에너지공단  
KOREA ENERGY AGENCY

기후행동 컨퍼런스 2018

CLIMATE ACTION CONFERENCE 2018

[ 오프닝 세션 ]  
Opening Session

Keynote II

Mitigation pathways for 1.5 and  
What needs to be done

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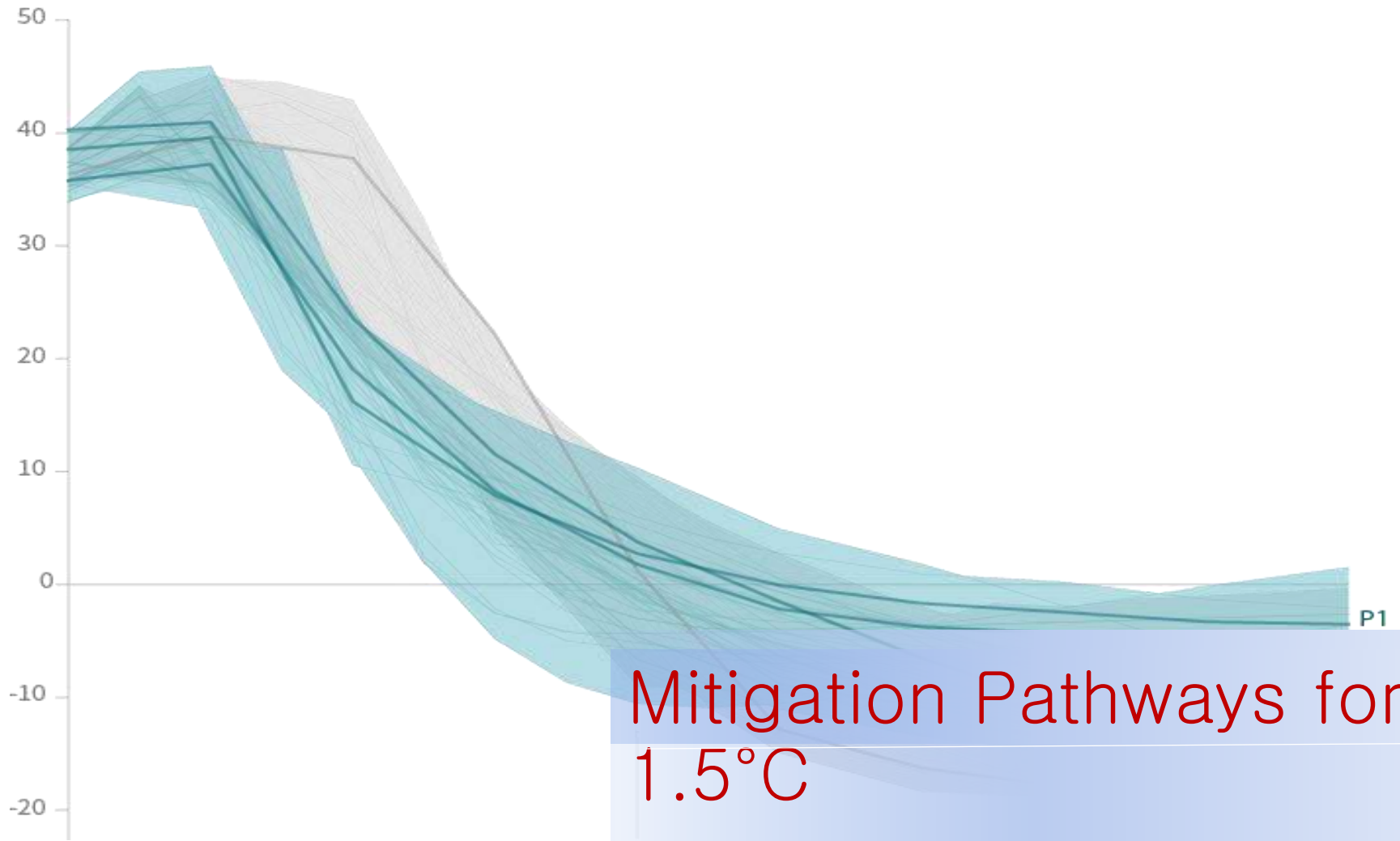
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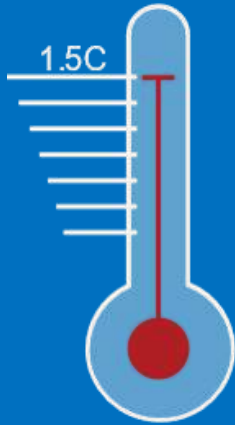


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Mitigation Pathways for 1.5°C

P1

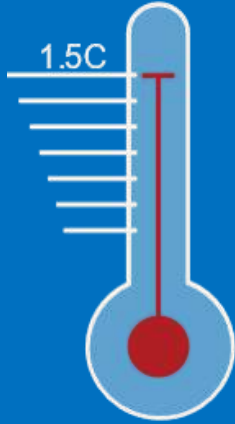


# Introduction

# Outline

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- High level messages on Mitigation Pathways
- Key Sector Transitions
- Implications for Companies / Science Based Targets



# Mitigation Pathways for 1.5°C: High level messages

# High level messages (SPM)

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- **Near term action:**
  - 40-60% CO<sub>2</sub> reductions by 2030 for 1.5°C (compared to 10-30% for 2°C)
  - 35% reductions in methane and black carbon
- **Different pathways are possible**, leading to different implications
- **Transitions must be very rapid and system-wide.** Rates of change are not unprecedented but scale is; all sectors must play their part
- **Investments** must shift to low-carbon tech and energy efficiency
- **All pathways involve some CO<sub>2</sub> removal (CDR)**, but levels vary substantially and depend on near term action and 'overshoot'. Most CDR measures have significant tradeoffs

# Messages from >200 reviewed pathways

- Report examined pathways “consistent with limiting warming to 1.5°C above preindustrial”, in year 2100
- Reviewed 90 1.5°C scenarios and 132 2°C scenarios
- Pathways are split by temperature target and level of overshoot
- Very few scenarios (9) available that limit warming to 1.5C with now overshoot

<i>Pathway Group</i>	<i>Pathway Class</i>	<i>Pathway selection criteria and description</i>	<i>Number of scenarios</i>	<i>Number of scenarios</i>
<i>1.5°C or 1.5°C-consistent</i>	<i>Below-1.5°C</i>	<i>Pathways limiting peak warming to below 1.5°C during the entire 21<sup>st</sup> century with 50-66% likelihood*</i>	9	90
	<i>1.5°C-low-OS</i>	<i>Pathways limiting median warming to below 1.5°C in 2100 and with a 50-67% probability of temporarily overshooting that level earlier, generally implying less than 0.1°C higher peak warming than Below-1.5°C pathways</i>	44	
	<i>1.5°C-high-OS</i>	<i>Pathways limiting median warming to below 1.5°C in 2100 and with a greater than 67% probability of temporarily overshooting that level earlier, generally implying 0.1–0.4°C higher peak warming than Below-1.5°C pathways</i>	37	
<i>2°C or 2°C-consistent</i>	<i>Lower-2°C</i>	<i>Pathways limiting peak warming to below 2°C during the entire 21<sup>st</sup> century with greater than 66% likelihood</i>	74	132
	<i>Higher-2°C</i>	<i>Pathways assessed to keep peak warming to below 2°C during the entire 21<sup>st</sup> century with 50-66% likelihood</i>	58	

Source: SR1.5 Table 2.1





# 1.5°C Pathways: Near Term Action

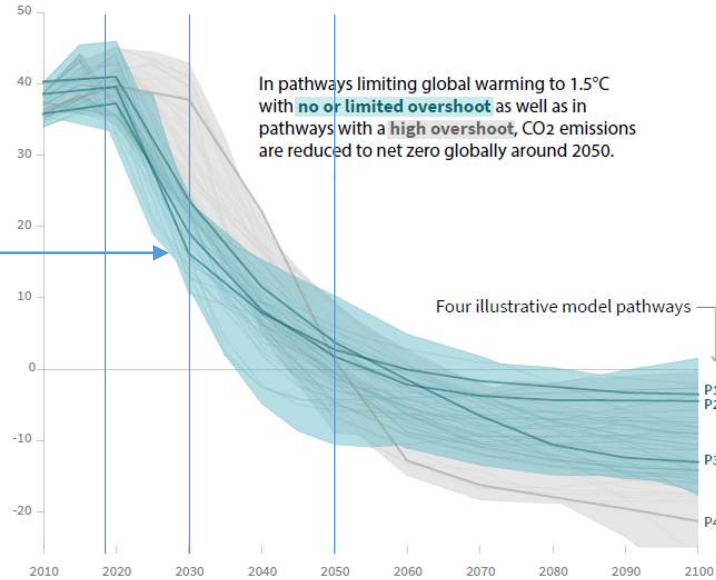
1.5C compliant scenarios reduce CO<sub>2</sub> and non-CO<sub>2</sub> emissions substantially:

CO<sub>2</sub>: 40-60% by 2030, net zero by ~2050

While also reducing Methane and Black Carbon substantially by 2030-2050

Global total net CO<sub>2</sub> emissions

Billion tonnes of CO<sub>2</sub>/yr



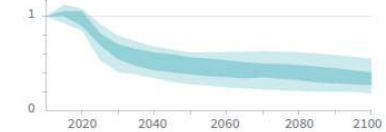
In pathways limiting global warming to 1.5°C with no or limited overshoot as well as in pathways with a high overshoot, CO<sub>2</sub> emissions are reduced to net zero globally around 2050.

Four illustrative model pathways

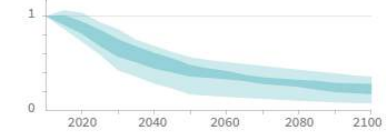
Non-CO<sub>2</sub> emissions relative to 2010

Emissions of non-CO<sub>2</sub> forcers are also reduced or limited in pathways limiting global warming to 1.5°C with no or limited overshoot, but they do not reach zero globally.

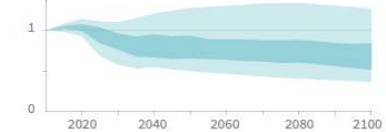
Methane emissions



Black carbon emissions



Nitrous oxide emissions



Timing of net zero CO<sub>2</sub>  
Line widths depict the 5-95th percentile and the 25-75th percentile of scenarios

Pathways limiting global warming to 1.5°C with no or low overshoot  
Pathways with high overshoot  
Pathways limiting global warming below 2°C (Not shown above)

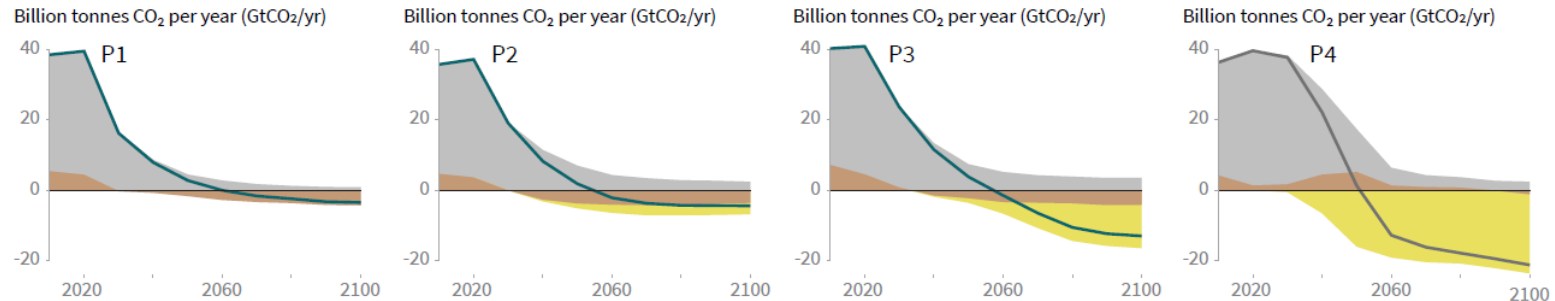
Source:  
SR1.5  
Figure  
SPM2

# 1.5°C Pathways: Different Pathways

Tradeoff between near term action, CDR, and behavior, illustrated through 'archetype' pathways

Breakdown of contributions to global net CO<sub>2</sub> emissions in four illustrative model pathways

● Fossil fuel and industry ● AFOLU ● BECCS



**P1:** A scenario in which social, business, and technological innovations result in lower energy demand up to 2050 while living standards rise, especially in the global South. A down-sized energy system enables rapid decarbonisation of energy supply. Afforestation is the only CDR option considered; neither fossil fuels with CCS nor BECCS are used.

**P2:** A scenario with a broad focus on sustainability including energy intensity, human development, economic convergence and international cooperation, as well as shifts towards sustainable and healthy consumption patterns, low-carbon technology innovation, and well-managed land systems with limited societal acceptability for BECCS.

**P3:** A middle-of-the-road scenario in which societal as well as technological development follows historical patterns. Emissions reductions are mainly achieved by changing the way in which energy and products are produced, and to a lesser degree by reductions in demand.

**P4:** A resource and energy-intensive scenario in which economic growth and globalization lead to widespread adoption of greenhouse-gas intensive lifestyles, including high demand for transportation fuels and livestock products. Emissions reductions are mainly achieved through technological means, making strong use of CDR through the deployment of BECCS.

Source:  
SR1.5  
Figure  
SPM2

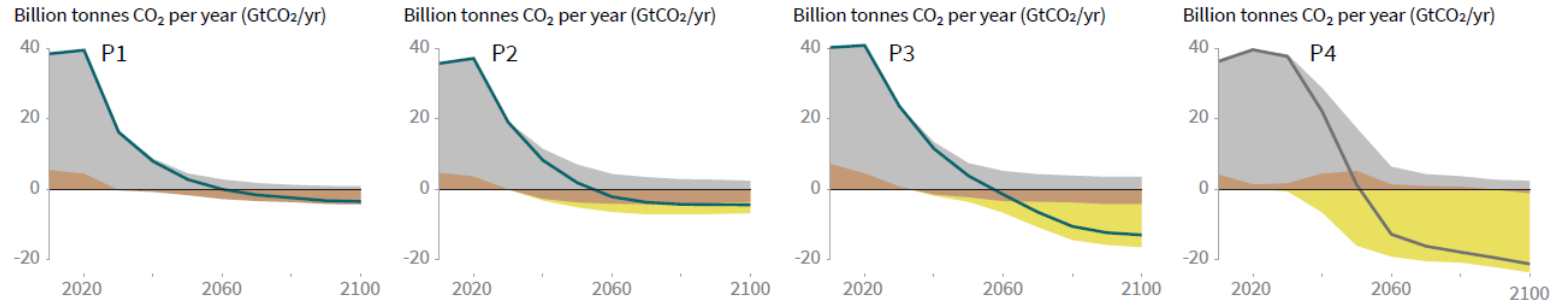


# 1.5°C Pathways: Different Pathways

Tradeoff between near term action, CDR, and behavior, illustrated through 'archetype' pathways

Breakdown of contributions to global net CO<sub>2</sub> emissions in four illustrative model pathways

● Fossil fuel and industry ● AFOLU ● BECCS



Very Low Energy Demand due to high energy efficiency

Sustainable Consumption (low population, low energy/food demand)

“Middle of the Road” (medium population, resource intensive; medium energy/food demand)

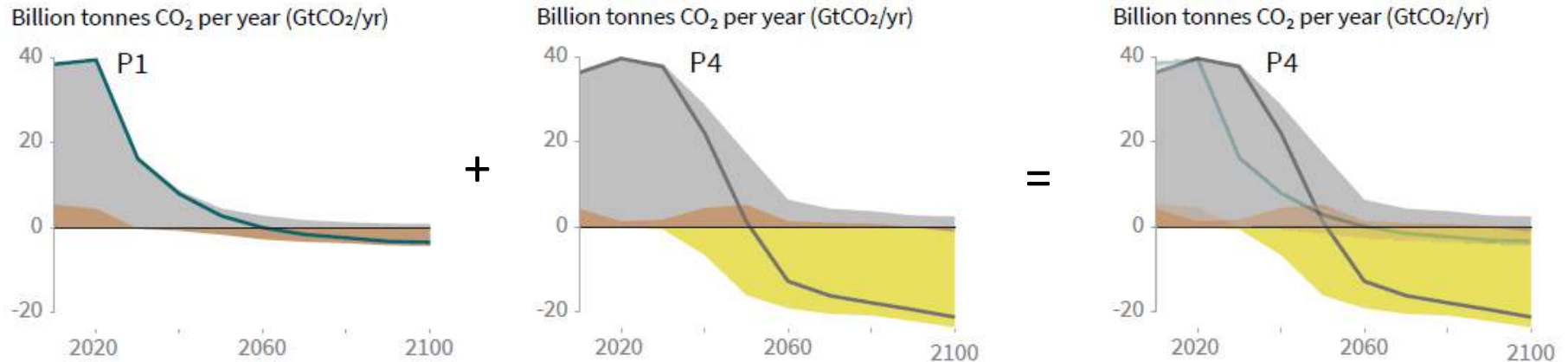
Resource-intensive Consumption (high growth; resource intensive; high energy/food demand)

Source: SR1.5 Figure SPM2



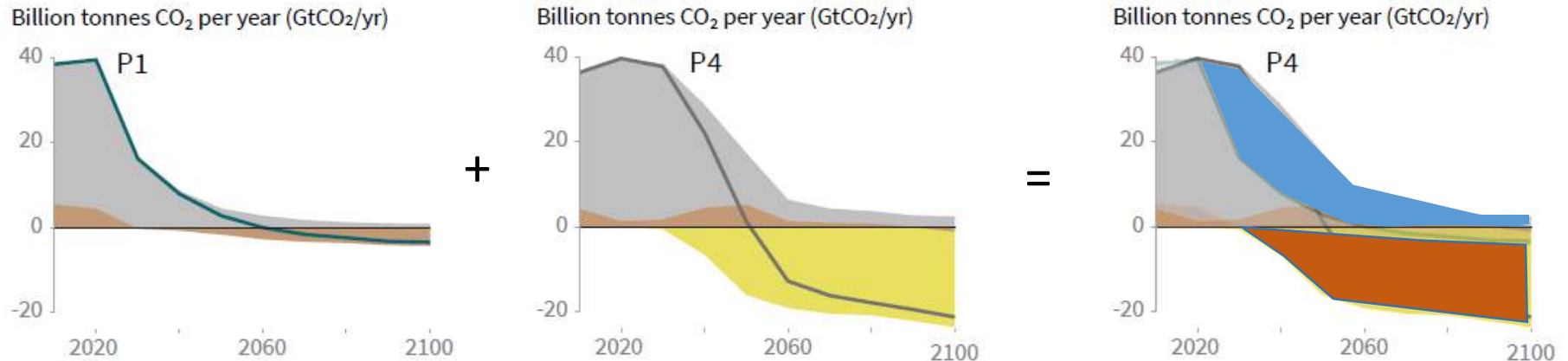
# 1.5°C Pathways: Near-term Action vs. CDR

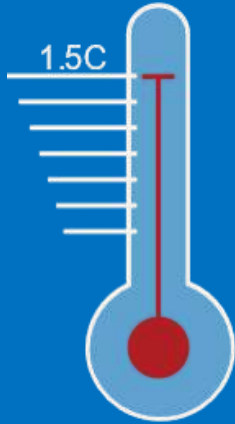
Reducing emissions less before 2030 means removing more GHGs later in the century



# 1.5°C Pathways: Near-term Action vs. CDR

Reducing emissions less before 2030 means removing more GHGs later in the century ('what goes up must come down')





# Mitigation Pathways for 1.5°C: Key Transitions

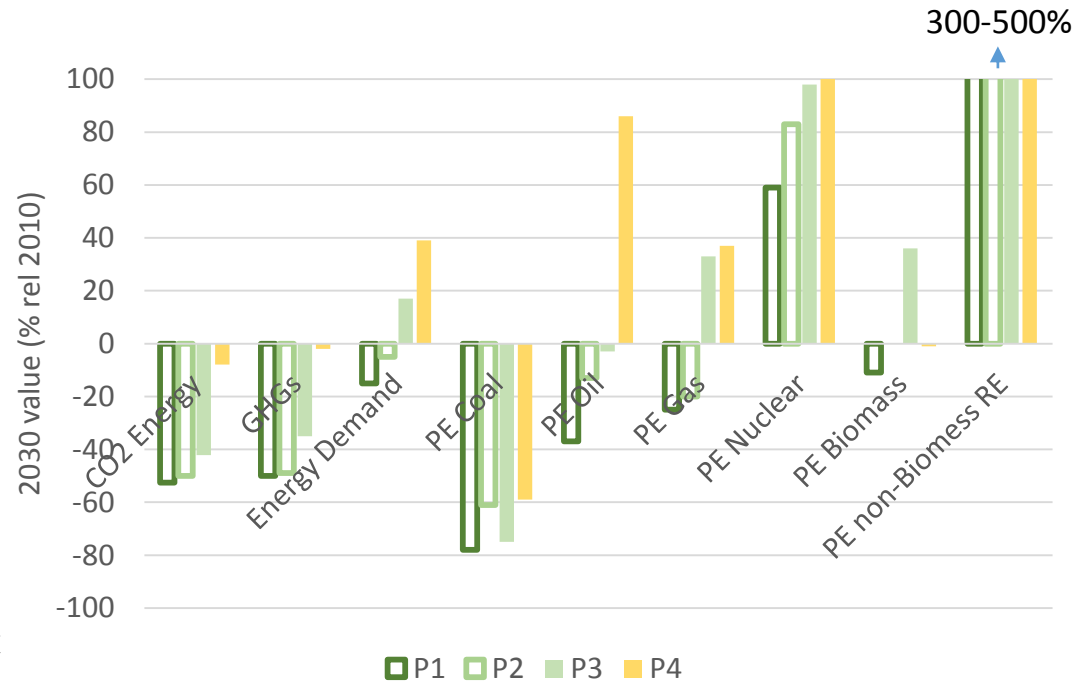
# Transitions: Energy (supply)

By 2030 (12 years!)\*

- CO<sub>2</sub>/GHGs cut 40-60%
- Coal declines 60-80% in all pathways
- Renewables increase 3X-5X
- Total energy demand reduces in low-no OS
- Oil & gas vary substantially by pathway, declining in low demand pathways
- Nuclear increases substantially (But faces barriers)

Trends continue to 2050

\*in low/no overshoot pathways



Source: SR1.5 Table 2.1



# Transitions: Urban systems

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- Buildings:
  - Total energy use increases slightly or decrease, balancing access, increased demand (e.g. A/C) and efficiency
  - Significant growth in electrification (appliances, cooling)
  - Very large increases in efficiency (lighting, cooling/heating, appliances)
- Transportation:
  - Total energy use balances significant increases in demand and efficiency
  - Deep reductions require a combination of several factors:
    - Electrification
    - Energy efficiency
    - Avoided/shifted demand (e.g. greater public transport, walk/bike)
    - Biofuels in modes difficult to electrify (aviation/shipping, heavy duty road)

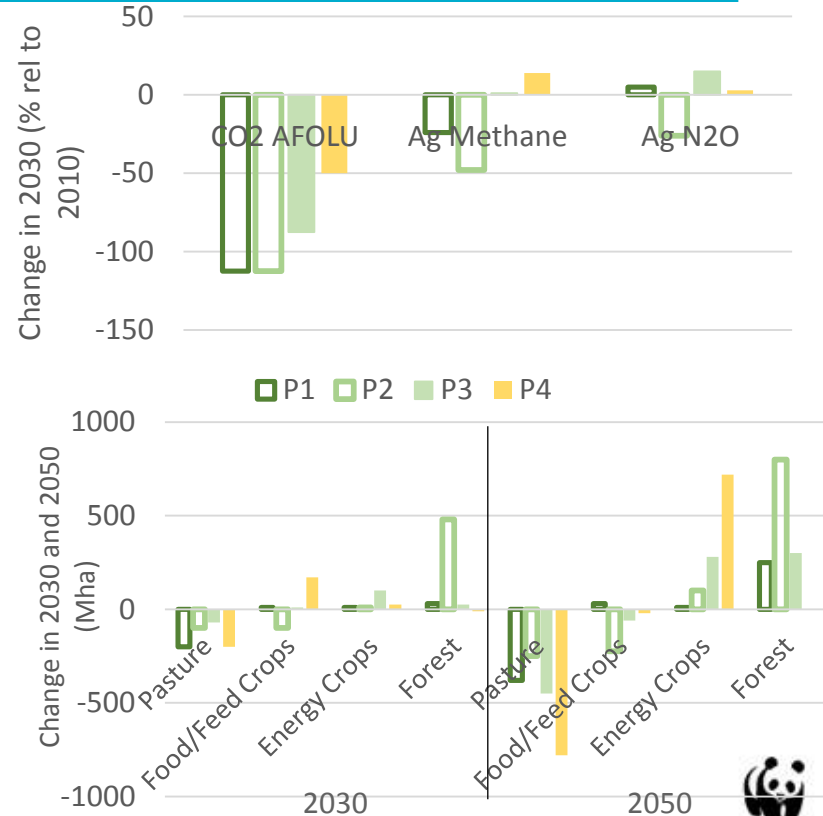


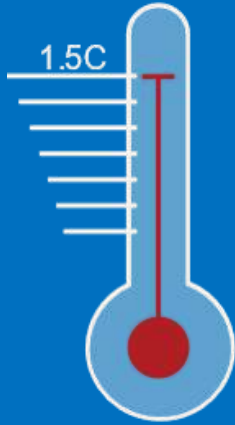
# Transitions: Land and Food

## By 2030 (12 years!)

- CO<sub>2</sub> from land (AFOLU) cut 80% to >100% (net sink) -> zero deforestation by 2030
- Agricultural emissions (CH<sub>4</sub>/N<sub>2</sub>O) cut by much less and mostly driven by diet changes, because:
  - Not all models assess agriculture mitigation
  - Agricultural emissions generally seen as more difficult to cut
- Land use changes depend heavily on pathway
  - By 2050 tradeoffs between land for food (pasture/crops and land for mitigation (energy crops/forest)
  - Choice between forest and energy crops depends on overshoot

Land will be covered in detail in Special Report on Land (2019)





# Implications for Companies and Science Based Targets

# Implications for companies

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- Companies increasingly interested in mitigation pathways for several reasons:
  - Climate-related financial risk (e.g. TCFD)
  - Aligning business with 1.5°C-2°C future: Science Based Targets
- Corporate decisions play a key role in the needed transitions
- SR1.5 provides key tools around 1.5°C-2°C transitions:
  - Updated 2°C pathways (relevant to TCFD) given requirement for a “2°C scenario analysis”
  - Key scenario data will be made available (much already public at [IIASA portal](#))



# Science Based Targets Update

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- Nearly 500 companies already signed up to set GHG reduction targets in line with Paris Agreement goals
- The Science Based Targets initiative (SBTi) recognizes the urgency in SR1.5 and supports its call for unprecedented transitions
- In coming months SBTi will:
  - Update underlying scenarios, in consultation with new Scientific Advisory Group
  - Update tools to allow companies to set 1.5°C compliant targets
- Revisions in early 2019

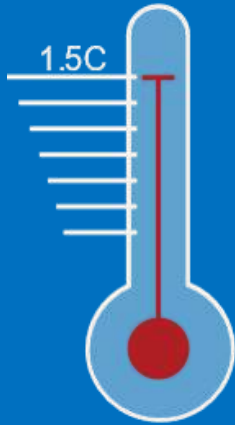


SCIENCE  
BASED  
TARGETS



# Thank You!

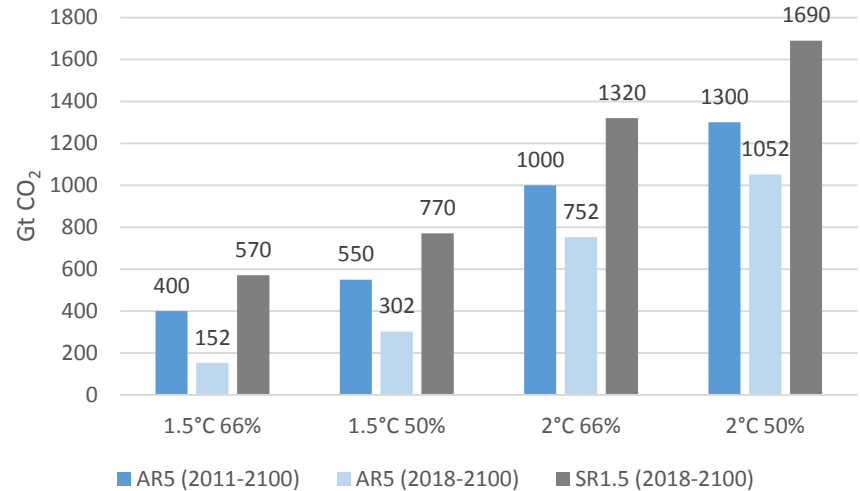




Backup slides

# Carbon Budget Update

- Carbon budgets relative to AR5 have increased
  - ~155-275% for 1.5°C
  - ~60-75% for 2°C
- This is due to a variety of factors, including:
  - **Updated methods:** using warming to date to constrain 'remaining' budget
  - **Definitional changes:** how temperature is measured, how budget is calculated
  - **Non-CO<sub>2</sub> emissions:** more advanced modeling
- Significant uncertainty remains
- Changes are not a reason for delay; urgency is required!



Source: SR1.5 Table 2.2;  
AR5 WG3 Chapter 6