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Well below 2\degree C:
From ambition to action

What does the IPCC tell us?

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• If the trend continues, we reach 1.5ºC ~2040.

• 2ºC target in 2060.

• Dwindling carbon budget before the temperature targets are exceeded.

(IPCC Special report on 1.5C, 2018)
## Half a degree matters

<table>
<thead>
<tr>
<th>1.5°C</th>
<th>2°C</th>
<th>2°C IMPACTS</th>
<th>1.5°C</th>
<th>2°C</th>
<th>2°C IMPACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXTREME HEAT</strong>&lt;br&gt;Global population exposed to severe heat at least once every five years</td>
<td>14%</td>
<td><strong>2.6x WORSE</strong></td>
<td>7%</td>
<td><strong>13%</strong></td>
<td><strong>1.86x WORSE</strong></td>
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<tr>
<td><strong>SEA-ICE-FREE ARCTIC</strong>&lt;br&gt;Number of ice-free summers</td>
<td><strong>AT LEAST 1 EVERY 100 YEARS</strong></td>
<td>10x WORSE</td>
<td><strong>4.8 MILLION KM²</strong></td>
<td>6.6 MILLION KM²</td>
<td><strong>38% WORSE</strong></td>
</tr>
<tr>
<td><strong>SEA LEVEL RISE</strong>&lt;br&gt;Amount of sea level rise by 2000</td>
<td>0.40 METERS</td>
<td>0.46 METERS</td>
<td><strong>0.06 M MORE</strong></td>
<td></td>
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<tr>
<td><strong>SPECIES LOSS: VERTEBRATES</strong>&lt;br&gt;Vertebrates that lose at least half of their range</td>
<td>4%</td>
<td><strong>2x WORSE</strong></td>
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<tr>
<td><strong>SPECIES LOSS: PLANTS</strong>&lt;br&gt;Plants that lose at least half of their range</td>
<td>8%</td>
<td><strong>2x WORSE</strong></td>
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<tr>
<td><strong>ECOSYSTEMS</strong>&lt;br&gt;Amount of Earth’s land area where ecosystems will shift to a new biome</td>
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<tr>
<td><strong>PERMAFROST</strong>&lt;br&gt;Amount of Arctic permafrost that will thaw</td>
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<tr>
<td><strong>CROP YIELDS</strong>&lt;br&gt;Reduction in maize harvests in tropics</td>
<td>3%</td>
<td><strong>7%</strong></td>
<td><strong>2.3x WORSE</strong></td>
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<tr>
<td><strong>CORAL REEFS</strong>&lt;br&gt;Further decline in coral reefs</td>
<td></td>
<td></td>
<td><strong>99%</strong></td>
<td><strong>29% WORSE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>FISHERIES</strong>&lt;br&gt;Decline in marine fisheries</td>
<td></td>
<td></td>
<td><strong>1.5 MILLION TONNES</strong></td>
<td><strong>3 MILLION TONNES</strong></td>
<td><strong>2x WORSE</strong></td>
</tr>
</tbody>
</table>
1.5°C vs. 2°C emission pathways

(Luderer et al., 2016.)
Primary Energy sources for 1.5 - 2ºC

S1 – ‘Sustainability’
1.5C

S5 – ‘Fossil’
2C
• Unprecedented scale of change.
• Negative emission technologies, including Bio-CCS.
• Investments in CCS.
• Renewables, nuclear, phasing out of coal and fossil energy.
• Energy intensification. Change in use patterns. Multiple energy sources.
• Behavioral changes – fewer babies, less meat eating, reduced consumption and high carbon travel.
• Global cooperation.
• Adaptation will still be needed.
• Land area puzzle remains a challenge.
• Trade offs with the sustainability goals.
Annual global energy consumption, 2000–2017

Annual growth rates from 2012–2017

- Coal: -0.7%/yr
- Oil: +2.0%/yr
- Gas: +1.4%/yr
- Nuclear: +2.0%/yr
- Hydro: +13.9%/yr
- Other Renewables: +2.3%/yr

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How CO2 emissions and fossil fuel use change in 1.5C pathways

% change from 2010 levels, by 2030 and 2050

- CO2 emissions:
  - 21% (By 2030)
  - 9% (By 2050)

- Coal use:
  - -59% (By 2030)
  - -91% (By 2050)

- Gas use:
  - 6% (By 2030)
  - 6% (By 2050)

- Oil use:
  - 3% (By 2030)
  - 47% (By 2050)