1.5°C domestic emissions pathways and key sectoral implications

July 2021
Welcome

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• If you encounter technical issues please submit your questions in the Q&A chat – our team will get back to you

• Questions:
  • Please submit your questions and comments along the webinar in the Q&A chat section – our speakers will address them after the presentations.
Who we are

Climate Analytics is a non-profit climate science and policy institute based in Berlin, Germany with offices in New York, USA, Lomé, Togo and Perth, Australia.
Agenda

• About the 1.5°C national pathways project
• Regional overview: Asia Pacific
• Case studies: Bangladesh, Japan, Pakistan, Singapore
About the project: 1.5°C national pathways

Key gaps

• **Global** Paris Agreement compatible pathways have been published, however, **national** pathways are not available for many countries

• Current NDCs and policies are insufficient to limit warming to 1.5°C

Goals

• Provide key resources to stakeholders:
  • Support for NDC and LTS development
  • Provide national benchmarks which can support the development of sectoral policies
What do we look at?

• Global models assessed by the IPCC SR1.5 and other lines of evidence
• Regional to national level

• Global cost-effective pathways:
  • Technical and economic feasibility

• We analyse:
  • Economy-wide emission pathways: GHG and CO₂ emissions, excluding LULUCF
  • Sectoral decarbonisation pathways: power
    • Fuel shares
    • Carbon intensity
    • Fossil fuel phase out dates
What is Nepal’s pathway to limit global warming to 1.5°C?
Asia Pacific is a key region

- Japan 3rd emitting country in the region, after China and India. 10th is Pakistan (Source: PRIMAP 2021)

- 27 countries in the Asia Pacific account for about 76% of current global coal generation capacity

- The region accounts for almost the entire (94%) global pipeline of new coal plants

- Public finance for coal expansion in Southeast Asia

- The main recipients of this support are countries in South and Southeast Asia: Bangladesh, Indonesia, Pakistan, and Viet Nam
Asia Pacific: key benchmarks and policies

Key Paris compatible benchmarks

- Non-OECD Asia:
  - Reduce coal generation by 63% below 2010 levels by 2030
  - Phase out coal by 2037
  - Complete a global coal phase out before 2040

- In Southeast Asia:
  - 50-85% share of renewable energy by 2030 in South and Southeast Asia by 2030
  - 100% renewable electricity generation by 2050.

Key policy recommendations

1. Adopt best practice policies – phase out fossil fuel subsidies, carbon pricing, renewable energy support, encourage shift in investment through green recovery

2. Ratcheting up NDC targets and adopt Long-Term Strategies in line with the Paris Agreement

3. Avoid more stranded assets – moratorium for new coal and phase out plans for coal before 2040

4. Financial support and capacity building informed by Paris Agreement benchmarks

5. Regional and international cooperation

6. Transboundary grid transmission and integration
1.5°C scenarios see drastic reductions in coal and gas generation

Coal power generation must:
- Peak by 2020 and,
- Rapidly decrease to 80% below 2010 levels by 2030 and,
- Be phased out by 2040 at the latest

Unabated gas lags only slightly behind:
- Peak by 2020 and,
- Rapidly decrease to 80% below 2010 levels in 2040s and,
- Be phased out in 2050s

Unabated coal and gas in power generation in 1.5°C low and no-overshoot scenarios (SR1.5, interquartile range)
Recent regional updates

The good:
• G7 committed to phase out coal by 2030 and end investments in unabated coal immediately.
• Bangladesh scrapped 9 coal power plants as finance dries up.
• IEA (2021) calls for an end to new fossil fuel developments in 2021.
• Australian court ruled that the federal environmental minister has a duty of care to young people when considering approving new coal mines.
• Australia (QLD) coal plant exploded and batteries stepped in.
• Asian Development Bank (ADB) plans to end financing of new coal power generation.

The bad:
• Russia spending US$10b on railroad upgrades to boost coal exports.
IEA Report: Net Zero by 2050

Climate pledges fall far short of reaching global net zero by 2050.

• **Key messages:**
  • End to new fossil fuel developments in 2021
  • No final investment decisions for unabated coal plants
  • No sales of fossil fuel combustion cars by 2035
  • Net zero GHGs for the global electricity sector by 2040

The IEA claims that its pathway is consistent with keeping below 1.5°C with **no overshoot**. We assess this claim and find that (depending on our assumptions about non CO₂ greenhouse gases), the scenario would be either a low/high overshoot pathway.

https://www.iea.org/reports/net-zero-by-2050
IRENA Report: New renewable energy beating most operational coal

- 2010 to 2020 saw RE generation becoming the economic choice for new capacity.

- New solar and wind projects are increasingly undercutting even the cheapest and least sustainable of existing coal-fired power plants.

- 800 GW of existing coal-fired capacity has operating costs higher than new utility-scale solar PV and onshore wind, including USD 0.005/kWh for integration costs.

- Replacing these coal-fired plants would cut annual system costs by USD 32 billion per year and reduce annual CO₂ emissions by around 3 Gigatonnes of CO₂.
Progress is being made but more and faster is needed
Bangladesh: snapshot

- Bangladesh GHG emissions dominated by energy and agriculture
- Emission from agriculture - mainly from rice cultivation and enteric fermentation
- 55% of primary energy mix and around 75% of power mix from natural gas
- Bangladesh scraps 90% of coal expansion plans due to increase in import costs
- High share of traditional biomass in primary energy mix
- Renewables playing a small role in power mix

Sources: Primap-Hist 2019 and IEA CO2 Fuel 2019
• Conditional NDC target is **15% below BAU level (2011) by 2030** (sectors covered: power, transport and industry)

• Conditional NDC of Bangladesh translates in **115% above 2011 levels** (excluding LULUCF)

• Bangladesh’s **1.5°C domestic emissions pathway** show emissions reductions of **8-30% below 2011 levels**

• With international support, Bangladesh will be able to implement mitigation action that will close the gap between its fair share level and domestic emissions level.

• No update in NDC targets in interim NDC submitted in 2020
Bangladesh: power sector transformation

• **1.5°C compatible pathways:**
  - Increase share of renewable energy (accounting for 2% in 2017) to 24-36% by 2030
  - Phase out of natural gas by 2040
  - Full decarbonisation by around 2040

• **Risk:** Stranded assets in fossil-based generation

• **Opportunities:**
  - Bangladesh’s ambition to be developed country by 2040
  - Less dependency on energy import and improved energy security
  - Electrification of end-use sectors, leapfrogging in cooking
  - Diversified and climate resilient electricity generation
  - Reduction of agricultural emissions
Japan: snapshot

- Energy sector accounts for 88% of emissions, with power alone accounting for 40%.
- Oil makes up the largest share of TPES, primarily used in transport and industry.
- Historically, nuclear, gas, and coal each made up around a quarter of power supply.
- Following Fukushima accident in 2011, gas share in power increased to 40%, coal to 34%.
- Japan is the world’s largest importer of LNG. As of 2017, imported LNG makes up 23% of TPES. Imports have declined in recent years however.

Sources: Primap-Hist 2019 and IEA CO2 Fuel 2019
Japan: 1.5°C emissions trajectory

- Current NDC (excl. LULUCF): 23% reduction below 2013 by 2030
- Proposed NDC: 46% reduction below 2013 by 2030
- 1.5°C cost-effective pathways (excl. LULUCF):
  - GHG emissions 60-73% below 2013 by 2030
  - GHG emissions 95-100% below 2013 by 2050
- PM announcement in October 2020: Net zero GHG and carbon neutrality by 2050
- To reach net-zero GHG by 2050, Japan will need to balance remaining emissions with sinks of around ~29MtCO₂e by 2050
- Japan will need to go further than its domestic target, and provide substantial support for emission reductions to developing countries.
Japan: power sector transformation

• Japan has historically relied on energy efficiency and nuclear power to meet increasing demand and ensure security of supply

• 1.5°C compatible pathways:
  • RE contributing 51-84% of power generation by 2030
  • At least 60% RE by 2030 to avoid reliance on nuclear energy
  • Zero emissions power by around 2040
  • Coal phase out by 2030
  • Gas phase out by 2038-2040

• Decarbonised power: what are the opportunities?
  • Energy efficiency measures
  • Solar PV on buildings and offshore wind, paired with geothermal and hydropower, are technologies most readily available
Pakistan: snapshot

• Energy sector accounts for 47% of emissions, mostly CO$_2$.
• Agriculture accounts for 42% of emissions, mostly CH$_4$.
• Pakistan benefits from a diversified energy mix but fossil fuels
  • make up around 60% of primary energy
  • >60% of electricity generation.
• In recent years, country has met growing energy demand mostly through new coal fired plants and gas imports.
• Pakistan plans to meet growing energy demand by expanding coal capacity: risk of stranded assets.

Sources:
- Primap-Hist 2019 and IEA CO2 Fuel 2019
- National Pathway Explorer, IRENA 2021, Global coal plant tracker 2021
- IEA WEB 2019
- ADBInstitute 2019
Pakistan: 1.5°C emissions trajectory

- Estimate Pakistan NDC to 206-225% above 2015 levels excl. LULUCF
- 1.5°C compatible pathway show that Pakistan reduce emissions
  - 30-48% below 2015 levels by 2030,
  - 66-71% below 2015 levels by 2050.
- Towards net zero, remaining emissions will need to be balanced by negative emissions.
Pakistan: power sector transformation

- Pakistan targets to increase
  - share of RE (excl. large hydro) by 30%
  - large scale hydro by another 30% by 2030.

- 1.5°C compatible pathways:
  - RE contributing 48-85% of power generation by 2030,
  - Zero emissions power by around 2036-2038

- Decarbonised power: what are the opportunities
  - New green industries for job creation (e.g. electric vehicle industry)
  - Cheaper electricity, ease burden of circular debt
  - Decouple emissions from economic development
Singapore: snapshot

- Energy sector accounts for majority (94%) of emissions,
  - mostly from electricity (40%)
  - energy use from the industry sector (36%)
- Singapore does not produce oil or gas, but serves as a major oil refining and petrochemical hub.
- Fossil fuel dominates Singapore energy system:
  - 96% of power mix from natural gas.
  - 80% of primary energy from oil, remainder mostly gas
- Low Emissions Development Strategy focuses on natural gas in the short term
  - stranded assets risk (LNG terminal)
  - job losses and economic disruption
  - Gas dependent on international markets = energy and economic insecurity.

Sources: Primap-Hist 2019 and IEA CO2 Fuel 2019
Singapore: 1.5°C emissions trajectory

- In March 2020, Singapore updated its NDC
  - by changing its intensity target to an absolute target of 65 MtCO$_2$e/yr by 2030
  - CAT estimate 24% increase above 2015 levels

- Target of net zero emissions
  - in the second half of the century
  - halving its GHG emissions to 32 MtCO$_2$e/yr by 2050.\(^1\) Estimate of 38% below 2015 levels.

- A 1.5°C pathway would require Singapore to reduce GHG emissions
  - by 52–61% below 2015 levels by 2030
  - by 98% below 2015 levels by 2050

- Decarbonising the energy sector will drive down CO$_2$ levels, particularly energy combustion

\(^1\) 32 MtCO$_2$e calculated in AR4 values by Climate Action Tracker. Policy cites 33 MtCO$_2$e/yr in AR5 GWP values.
Singapore: power sector transformation

- 1.5°C compatible pathways require SGP
  - to accelerate RE uptake from 2% of the current power mix to
    - 8-13% in 2030
    - 95-97% in 2050
  - Reach a zero emissions power by 2040
- SGP’s high reliance on natural gas would need to be phased out in the 2040s

Policy measures that could support energy transformation include:

- accelerating shift in transport sector to electric mobility
- upgrading and electrifying the building and industry sectors, improving material efficiency,
- significant scaling up of RE including exploring options for imports, and use or export of zero emission fuels e.g. green hydrogen
Q&A

https://1p5ndc-pathways.climateanalytics.org/