

Climate Change 2022

Mitigation of Climate Change



Report by numbers



278 Authors



65 Countries



41 % Developing countries
59 % Developed countries



354 Contributing
authors



29 % Women / 71 % Men



More than
18,000 scientific papers



59,212 Review comments

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INTERGOVERNMENTAL PANEL ON climate change

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Mitigation of Climate Change



WGIII

Working Group III contribution to the
Sixth Assessment Report of the
Intergovernmental Panel on Climate Change

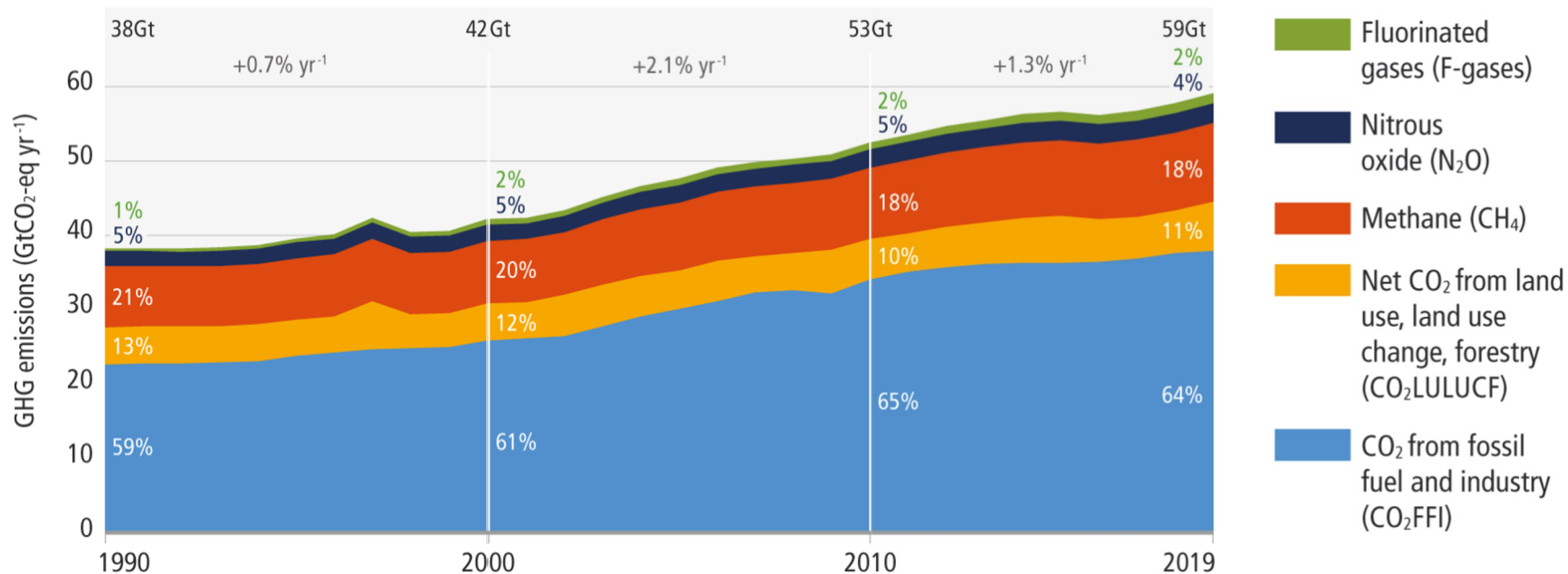


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**2010-2019:
Average annual
greenhouse gas
emissions at
highest levels in
human history**

We are not on track to limit warming to 1.5 °C.



...but there is
increased evidence of
climate action



“

Unless there are immediate and deep emissions reductions across all sectors, 1.5°C is beyond reach.

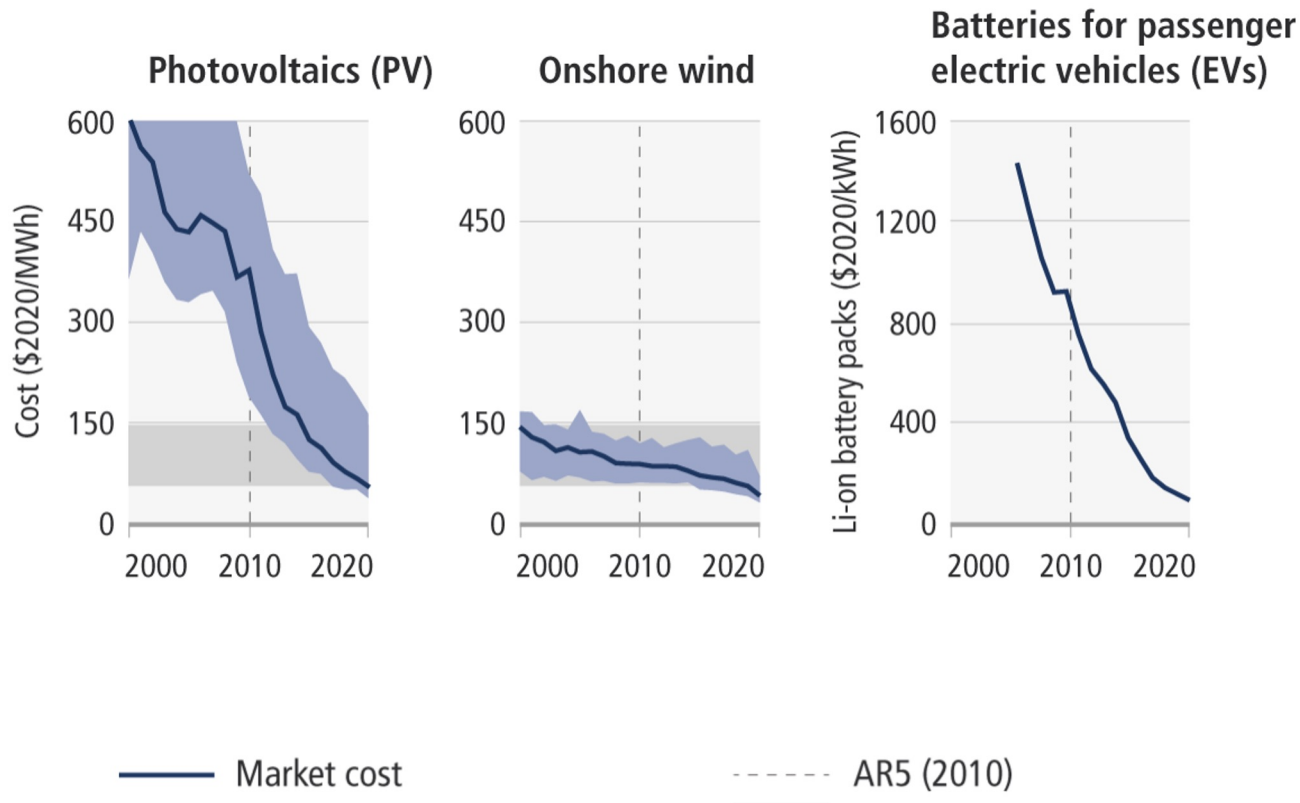
Increased evidence of climate action



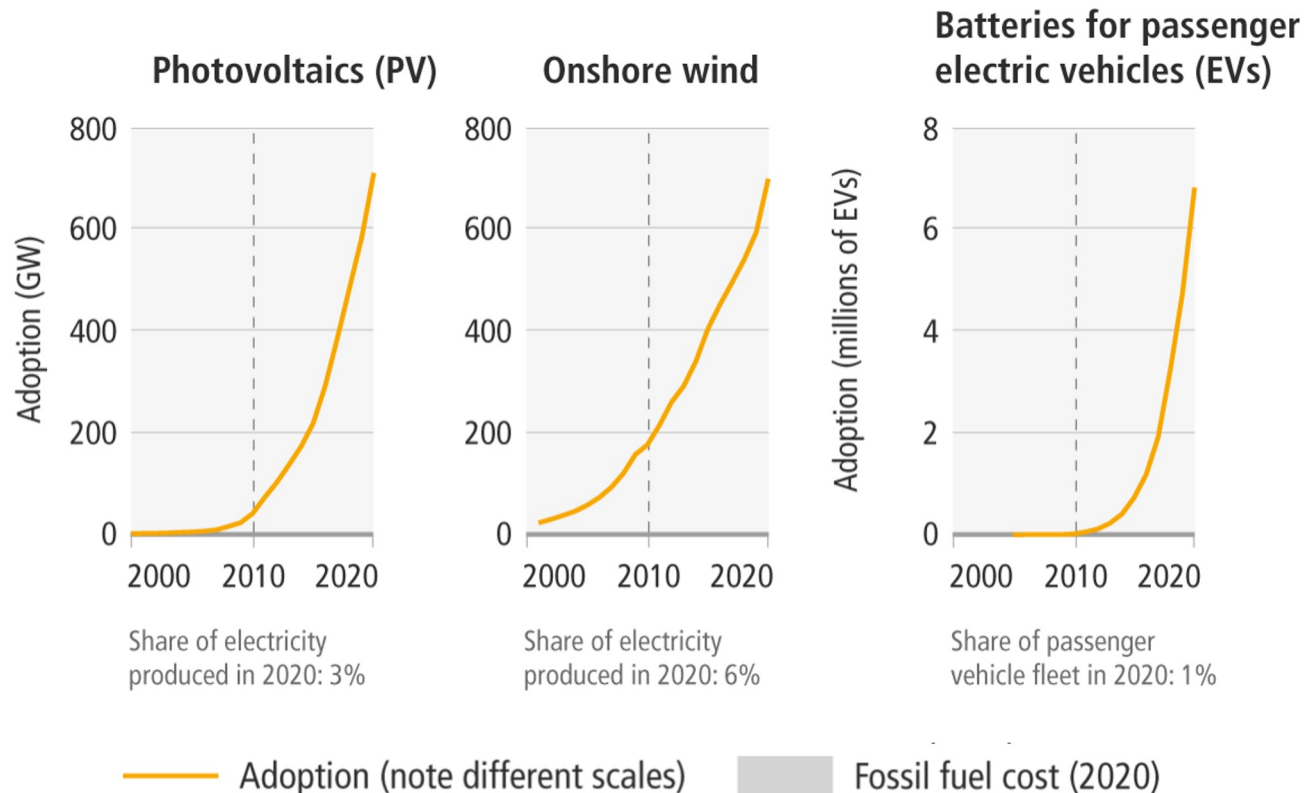
Some countries have achieved a **steady decrease** in emissions **consistent** with limiting warming to **2°C**.



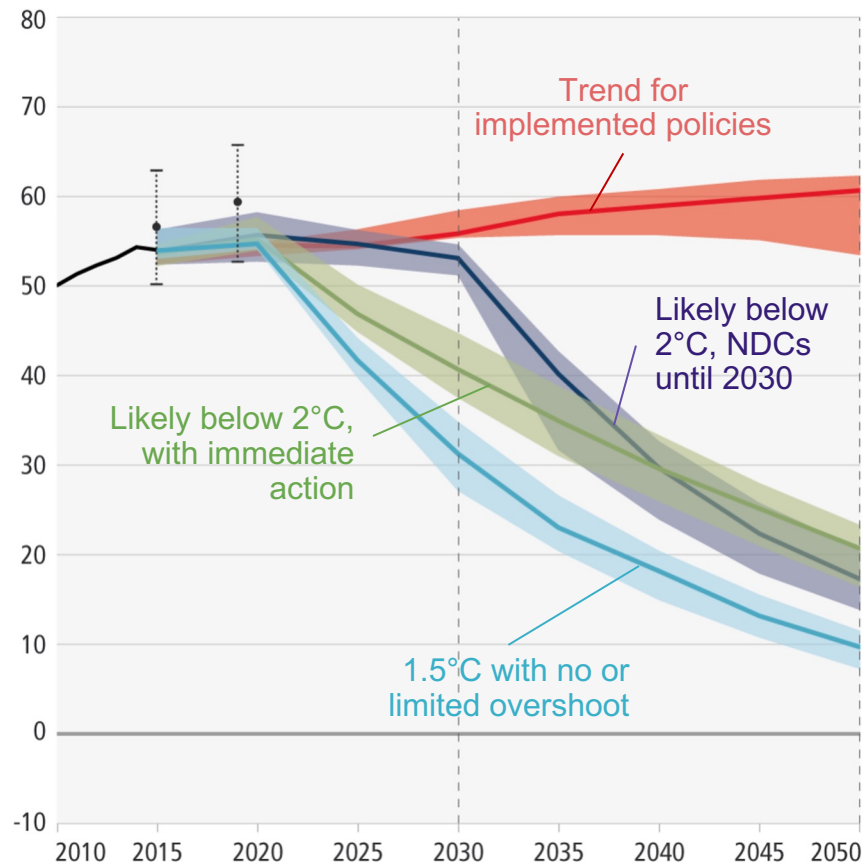
Zero emissions targets have been adopted by at least **826 cities** and **103 regions**



In some cases, costs for renewables have fallen below those of fossil fuels.



Electricity systems in some countries and regions are already predominantly powered by renewables.



Limiting warming to 1.5 °C

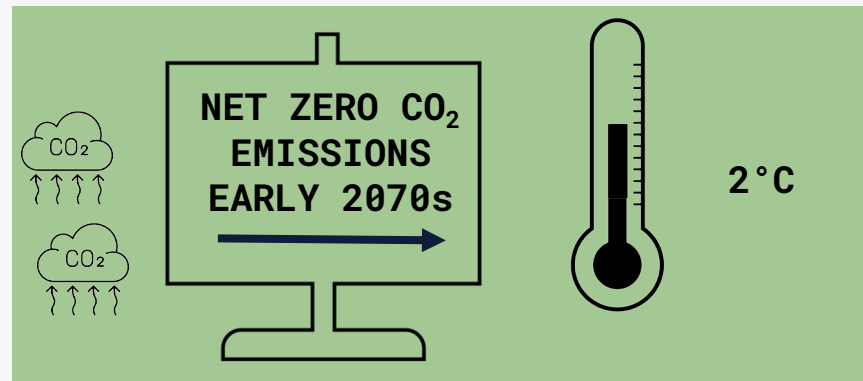
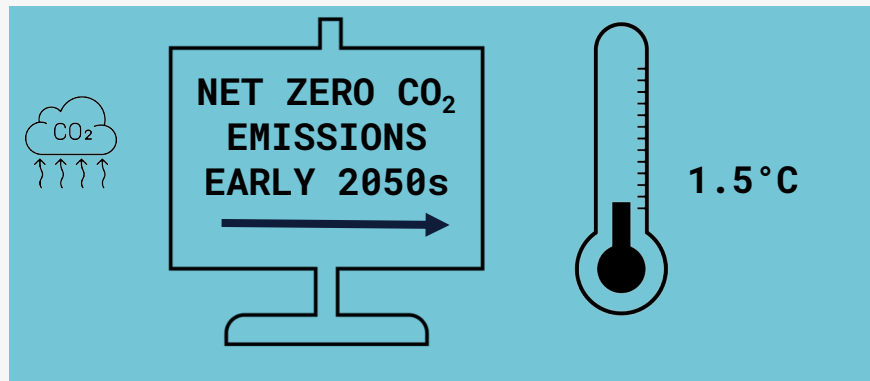
- Global GHG emissions peak before 2025, reduced by 43% by 2030.
- Methane reduced by 34% by 2030

Limiting warming to around 2°C

- Global GHG emissions peak before 2025, reduced by 27% by 2030.

(based on IPCC-assessed scenarios)

The temperature will stabilise when we reach net zero carbon dioxide emissions



(based on IPCC-assessed scenarios)

There are options available **now** in every sector that can at least **halve** emissions by 2030



Demand and services



Energy



Land use



Industry



Urban



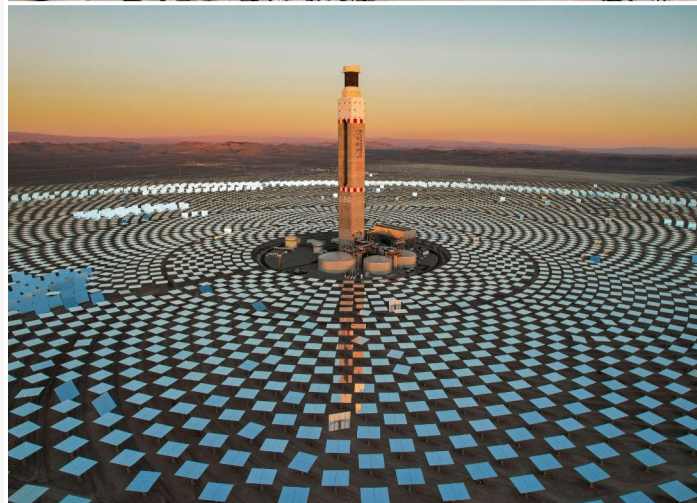
Buildings



Transport

Energy

- **major transitions** are required to limit global warming
- reduction in fossil fuel use and use of carbon capture and storage
- low- or **no-carbon** energy systems
- widespread **electrification** and improved energy **efficiency**
- **alternative fuels**: e.g. hydrogen and sustainable biofuels



[Portland General Electric CC BY-ND 2.0, Harry Cunningham/Unsplash, Stéphane Bellerose/UNDP in Mauritius and Seychelles CC BY-NC 2.0, IMF Photo/Lisa Marie David, Tamara Merino CC BY-NC-ND 2.0]

Demand and services

- potential to **bring down** global **emissions** by **40-70%** by 2050
- walking and cycling, electrified transport, reducing air travel, and adapting houses make large contributions
- **lifestyle changes** require **systemic changes** across all of society
- **some** people require additional **housing, energy and resources** for human wellbeing



Transport

- **reducing demand** and **low-carbon** technologies are key to reducing emissions
- **electric vehicles**: greatest potential
- **battery technology**: advances could assist electric rail, trucks
- **aviation** and **shipping**: alternative fuels (low-emission **hydrogen** and **biofuels**) needed
- Overall, substantial potential but depends on **decarbonising the power sector**.



Cities and urban areas

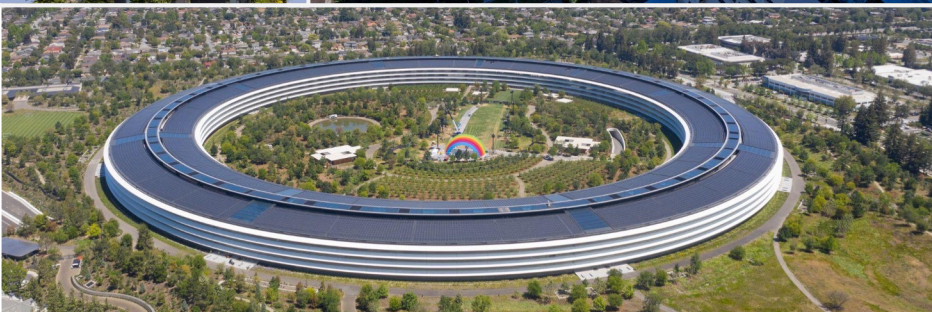
- better urban planning, as well as:
- sustainable production and consumption of goods and services,
- **electrification** (low-emission energy),
- enhancing **carbon uptake and storage** (e.g. green spaces, ponds, trees)

There are options for existing, rapidly growing *and* new cities.



Buildings

- buildings: possible to reach net zero emissions in 2050
- action in this decade is critical to fully capture this potential
- involves retrofitting existing buildings and effective mitigation techniques in new buildings
- requires ambitious policy packages
- zero energy and **zero-carbon** buildings exist in new builds **and retrofits**



Industry

- using materials more **efficiently**, **reusing**, **recycling**, **minimising waste**; currently **under-used** in policies and practice
- **basic materials**: low- to zero-greenhouse gas production processes at **pilot** to **near-commercial** stage
- achieving **net zero** is challenging



Carbon Dioxide Removal

- required to **counterbalance hard-to-eliminate** emissions
- through **biological** methods: reforestation, and soil carbon sequestration
- **new technologies** require more **research**, up-front **investment**, and proof of concept at **larger scales**
- **essential to achieve net zero**
- **agreed methods** for measuring, reporting and verification required

[Forest Service Northern Region CC BY 2.0, Fiston Wasanga/CIFOR CC BY-NC-ND 2.0, Climeworks]



Land use

- can provide large-scale emissions reductions **and** remove and store CO₂ at scale
- protecting and restoring **natural ecosystems** to remove carbon: forests, peatlands, coastal wetlands, savannas and grasslands
- competing demands have to be **carefully managed**
- **cannot compensate** for **delayed** emission **reductions** in other sectors



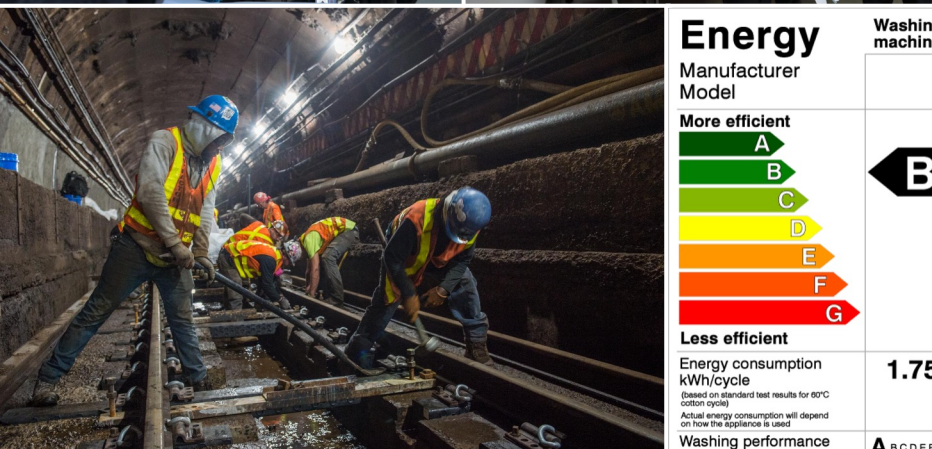
Closing investment gaps

- financial flows: **3-6x lower** than levels needed **by 2030** to limit warming to below 1.5°C or 2°C
- there is **sufficient global capital** and liquidity to close investment gaps
- challenge of closing gaps is widest for developing countries

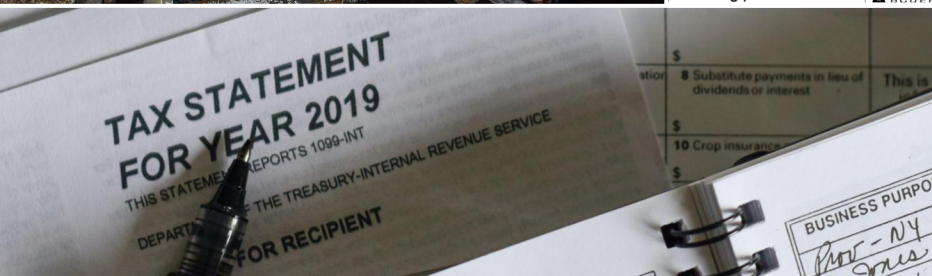




Policies, regulatory and economic instruments



- regulatory and economic instruments have **already proven effective** in reducing emissions
- **policy packages** and **economy-wide packages** are able to achieve **systemic change**
- ambitious and effective mitigation requires **coordination across government and society**

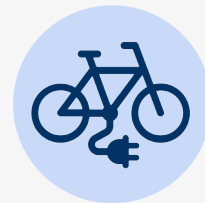
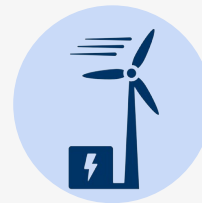
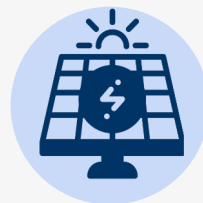


[World Bank/Simone D. McCourtie, Dominic Chavez CC BY-NC-ND 2.0, Trent Reeves/MTA Construction & Development CC BY 2.0, IMF Photo/Tamara Merino CC BY-NC-ND 2.0, Olga Delawrence/Unsplash.]

Technology and Innovation

- investment and policies **push forward low emissions** technological **innovation**
- **effective decision making** requires assessing potential benefits, barriers and risks
- **some options** are technically **viable**, rapidly becoming **cost-effective**, and have relatively **high public support**. Other options face barriers

Adoption of low-emission technologies is slower in most developing countries, particularly the least developed ones.

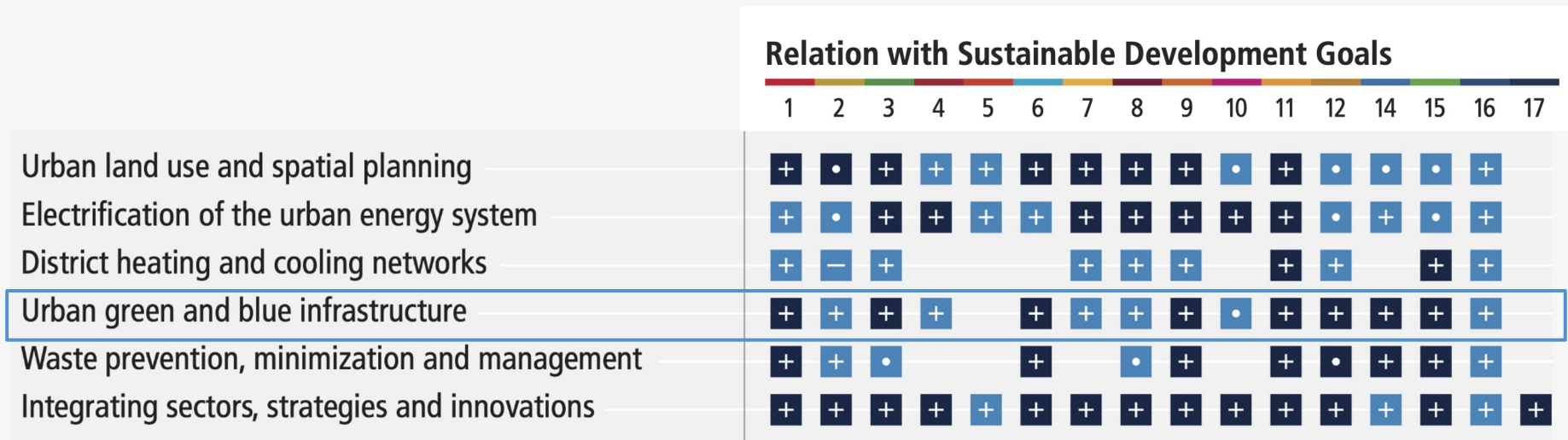




Accelerated climate action is
critical to sustainable development

SUSTAINABLE DEVELOPMENT GOALS





Mitigation options in agriculture and forestry

Relation with Sustainable Development Goals

	1	2	3	4	5	6	7	8	9	10	11	12	14	15	16	17
Carbon sequestration in agriculture ¹	+	+	•			+		+				•	+	+	+	
Reduce CH ₄ and N ₂ O emission in agriculture		•	+			•			•			+	+	+		
Reduced conversion of forests and other ecosystems ²	•	–	+			+		•			•		+	+	•	•
Ecosystem restoration, reforestation, afforestation	+	•	+			•		–		•	+		+	+		
Improved sustainable forest management	+	•	+			+	•	+	+	•	•		+	+		
Reduce food loss and food waste	+	+	+			+	+			+	+	+	+	+	+	
Shift to balanced, sustainable healthy diets	•	+	+			+	+		•	+	+	+	+	+		
Renewables supply ³	•	•	•			•	•	+	+				•	•		

“ The evidence is
clear:
The time for
action is now

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