



MONITORING EMISSIONS FROM SPACE: RATIONALE AND WAY FORWARD

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Evgeniia Drozhashchikh

Deputy Head of Asia Pacific Division,

Department of Multilateral Economic Cooperation and Special Projects,

Ministry of Economic Development of the Russian Federation

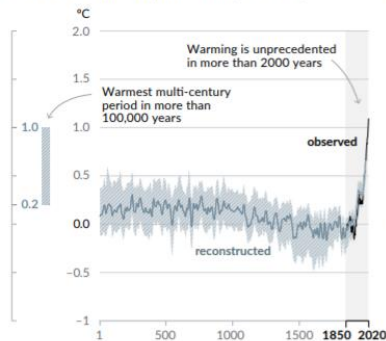
Drozhashchikhev@economy.gov.ru

URGENCY OF CLIMATE ACTION

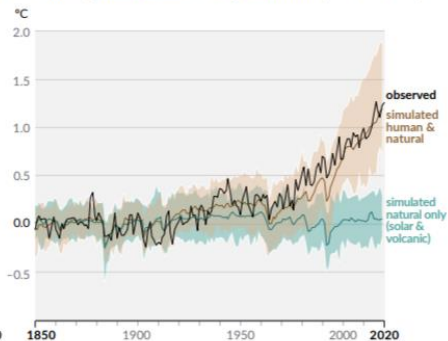
Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

Changes in global surface temperature relative to 1850–1900

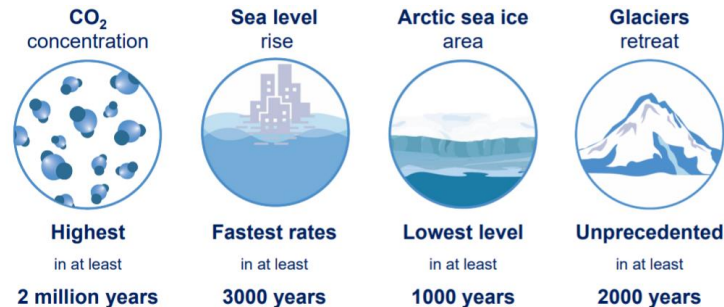
(a) Change in global surface temperature (decadal average) as reconstructed (1–2000) and observed (1850–2020)



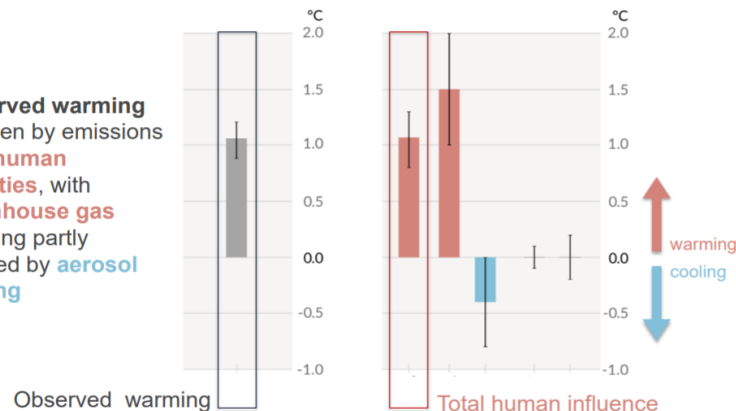
(b) Change in global surface temperature (annual average) as observed and simulated using human & natural and only natural factors (both 1850–2020)



*Climate Change 2021: The Physical Science Basis
Working Group I Contribution to the Sixth Assessment Report of the
Intergovernmental Panel on Climate Change, October 2021*



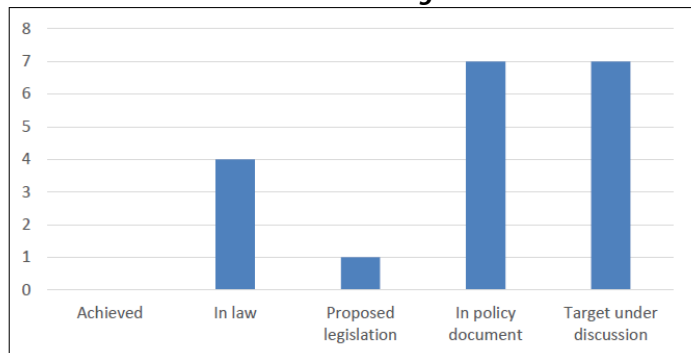
Observed warming is driven by emissions from **human activities**, with **greenhouse gas** warming partly masked by **aerosol cooling**



Recommendation 1: Look at emerging climate regulation as a window of opportunities

GLOBAL RESPONSE TO CLIMATE CHANGE

Net-zero commitments among APEC economies



Note: No data available for Brunei Darussalam and the Philippines.

Source: Energy & Climate Intelligence Unit, "Net Zero Tracker," accessed 29 October 2021, <https://eciu.net/netzerotracker>; economy policy pronouncements.

APEC Regional Trends Analysis: APEC's Climate Change Challenge, November 2021

Russia's goal: carbon neutrality by 2060

- ✓ "Low carbon development strategy" setting national GHG emissions reduction goals by 2030 and 2050
- ✓ Federal law "On greenhouse gas emissions limitation"
 - ✓ National climate change adaptation plan

Types of instruments for regulating GHG emissions



Non-market-based (direct limitation of harmful anthropogenic impact on the ecosystem)

- ▽ Technical regulation
- ▽ Resource expenditure rate (gasoline consumption standards, building energy efficiency standards, etc.)
- ▽ Best Available Technologies (compiling a list of technologies that are both technologically accessible and best meet the goals of environmental protection. Technologies from these directories are gradually becoming mandatory for companies)
- ▽ Voluntary environmental agreements between industry and government
- ▽ Quantified emission limitation



Economic or market

Influencing incentives for emissions reduction:

- ▽ Carbon tax
- ▽ Emissions trading system
- ▽ Subsidies for emissions reduction (including subsidies for the use of renewable energy sources and other low emissions energy sources)
- ▽ Fossil fuel subsidy reforms (balanced by the requirement to provide those in need with essential energy services)
- ▽ Crediting schemes

Ministry of Economic Development, Russia



64

Carbon pricing initiatives in the world (IMF)



12.3%

Emissions could be reduced if carbon price made international (PwC, WEF)

Recommendation 1: Look at emerging climate regulation as a window of opportunities

GLOBAL RESPONSE TO CLIMATE CHANGE

Article 6.2 of the Paris Agreement

Parties shall, where engaging on a voluntary basis in **cooperative approaches** that involve the **use of internationally transferred mitigation outcomes towards nationally determined contributions, promote sustainable development and ensure environmental integrity and transparency**, including in governance, and shall apply robust accounting to ensure, inter alia, the avoidance of double counting, consistent with guidance adopted by the Conference of the Parties serving as the meeting of the Parties to this Agreement.

Article 6.4 of the Paris Agreement

A **mechanism** to contribute to the mitigation of greenhouse gas emissions and support sustainable development is hereby **established under the authority and guidance of the Conference of the Parties** serving as the meeting of the Parties to this Agreement for use by Parties on a voluntary basis. It shall **be supervised by a body designated by the Conference of the Parties** serving as the meeting of the Parties to this Agreement, and shall aim

Key similarity of mechanisms:

require systems ensuring accurate validation, monitoring and verification of emissions reduction

Recommendation 1:

Look at emerging climate regulation as a window of opportunities

EMISSIONS MONITORING

"... All the while, it is **important to monitor the emission and absorption of greenhouse gases based, among other things, on observations from outer space, digital technologies, and AI methods.**"

President V. Putin at SPIEF 2021

Earth Observation system at the core



Currently operating Russian EO satellites, ROSCOSMOS website
(*not reflecting upcoming "Sphere" constellation)

To be amplified with GHG monitoring capabilities

(with both public and private endeavors, the latter also presented at COP26)

Matters of concern:

- 1) Initiated worldwide activities range in geographical scope, gases tracked, frequency of data publication, customers served
- 2) There is lacking unanimity in regard to methodology of processing and interpreting data received from outer space

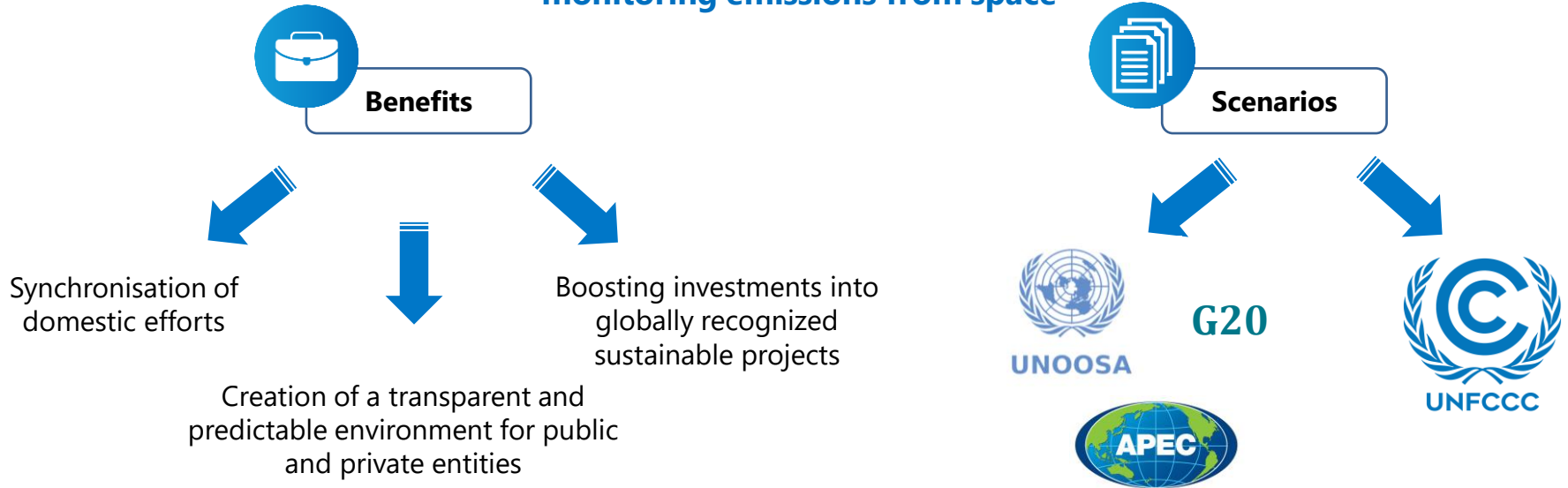
Recommendation 2:

Cooperate to objectively and comprehensively measure the progress

EMISSIONS MONITORING

Recommendation 3:

Strive towards converging approaches to monitoring emissions from space





THANK YOU FOR ATTENTION!

