



SDG7 Energy Compact of World Meteorological Organization
A next Decade Action Agenda to advance SDG7 on sustainable energy for all, in line with the goals of the Paris Agreement on Climate Change

SECTION 1: AMBITION

1.1. Ambitions to achieve SDG7 by 2030. *[Please select all that apply, and make sure to state the baseline of each target]*

(Member States targets could be based on their NDCs, energy policies, national five-year plans etc. targets for companies/organizations could be based on their corporate strategy)

<input type="checkbox"/> 7.1. By 2030, ensure universal access to affordable, reliable and modern energy services.	Target(s): Time frame: Context for the ambition(s):
<input type="checkbox"/> 7.2. By 2030, increase substantially the share of renewable energy in the global energy mix.	Target(s): Time frame: Context for the ambition(s):
<input type="checkbox"/> 7.3. By 2030, double the global rate of improvement in energy efficiency.	Target(s): Time frame: Context for the ambition(s):
<input type="checkbox"/> 7.a. By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.	Target(s): Time frame: Context for the ambition(s):
<input type="checkbox"/> 7.b. By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programs of support.	Target(s): Time frame: Context for the ambition(s):

1.2. Other ambitions in support of SDG7 by 2030 and net-zero emissions by 2050. *[Please describe below e.g., coal phase out or reforming fossil fuel subsidies etc.]*

Target(s): Improved estimates of greenhouse gas emissions from the energy sector by upscaling of observations-based WMO methodology.

Time frame: 2021 – 2030

Context for the ambition(s): Systematic observations of atmospheric composition in the latter half of the twentieth century showed increasing global concentrations of greenhouse gases. These measurements were the initial cause of concern about global warming and climate change. Today, as nations submit and enhance their national determined contributions to the Paris Agreement to reduce their greenhouse gas (GHG) emissions, these same systematic observations of atmospheric greenhouse gas concentrations are the only unequivocal way to determine whether the emission reduction policies and actions taken are having the desired effect. National emission inventories that are used to support SDGs have substantial uncertainties that can be reduced while the actions to reduce emissions can be much better targeted (https://www.washingtonpost.com/climate-environment/interactive/2021/greenhouse-gas-emissions-pledges-data/?itid=hp_Climate%20box).

After COP26, 74 parties – or signatory countries – to the Paris Agreement have communicated net-zero targets. These parties cover a total of 81 countries, since the EU's net-zero target includes within its purview multiple EU countries that have not put forth separate targets of their own (<https://www.wri.org/insights/how-countries-net-zero-targets-stack-up-cop26>). While the number of countries announcing pledges to achieve net-zero emissions over the coming decades continues to grow, the pledges by governments to date fall short of what is required to bring global energy-related carbon dioxide emissions to net zero by 2050 and give the world an even chance of limiting the global temperature rise to 1.5 °C. Energy sector makes a substantial contribution to the global levels of CO₂ and CH₄. According to the CCAC Methane Assessment, most human-caused methane emissions come from three sectors: fossil fuels, waste, and agriculture. In the fossil fuel sector, oil and gas extraction, processing, and distribution account for 23 per cent, with significant portion of it due to leaks in the oil & gas distribution system. Studies have shown that methane emissions from oil and gas production are often much higher than previously assumed, and an investigation by the Clean Air Task Force (CATF) earlier this year found that methane leakage from oil and gas infrastructure is well spread across Europe. A lack of effective policy to tackle methane stems partially from poorly implemented monitoring and reporting systems. At COP26 over 100 countries joint Global Methane Pledge launched by the United States and the European Union to reduce methane emissions, but these actions must be based on the robust data.

Continuous, consistent, and accurate GHG concentration measurements at local, national, and global scales combined with the analysis tools can substantially improve knowledge of the emissions and identify the most efficient emission reduction opportunities. . Thus, WMO initiated the development of an Integrated Global Greenhouse Gas Information System (IG³IS) to help guide GHG emission-reduction actions in response to climate change.

WMO lead IG³IS (<https://ig3is.wmo.int>) combines accurate atmospheric concentration measurements with enhanced socioeconomic activity data and model analyses to better quantify and locate greenhouse gas emissions. Implementation of this observation-based technology to get better quantitative estimates of emissions, and identifying the largest sources can serve as guidance to updated/enhanced NDCs.

Utilization of information that can be delivered through IG³IS approach allows to:

- 1) Quantify the baseline (current) emissions at national, sub-national and facility scale;
- 2) Identify previously unknown emission reduction opportunities, such as hot spots and super emitters (leakages);
- 3) Track progress towards emission reduction goals to manage and correct the measures during their implementation;
- 4) Identify cost-effective mitigation actions and carbon removal opportunities.

Currently observations-based emission estimates are produced and reported by the research institutions in partnership with their national inventory compiling agencies by the United Kingdom, Switzerland, Australia (for halogenated industrial gases only), and New Zealand for carbon dioxide in LULUCF sector. A growing number of other countries are initiating programs to merge observations-based emission information with traditional inventory including Germany, Japan, South Korea, France and the United States. WMO IG³IS is developing good-practice guidelines for the methodologies for producing observations-based emissions estimates for nations as well as guidelines for estimating emissions from cities and states in support of subnational contributions to the Paris Agreement.

Some of the cities already implementing observations-based emission estimates are Paris, Los Angeles, Tokyo, Beijing, Zhengzhou, Indianapolis, Toronto, Montreal, San Francisco, Baltimore, Washington, DC, Seoul, Mexico City, London, Munich, Vienna, Salt Lake City, Boston, and many other cities have programs in development. There is great interest in addressing emission from industrial sectors with a large uncertainty and with large contribution to GHG forcing such as emissions from the short-lived climate pollutants (SLCPs) such as methane and HFCs. Therefore, WMO IG³IS is also developing good-practice guidelines for implementing observations-based methods to locate and quantify intermittent super-emitters of methane. These are responsible for more than 50% of total anthropogenic methane emissions but are associated with less than 5% of potential sources (from the global oil & gas supply chain, from solid waste and wastewater facilities and from agricultural activities like large dairy farm digesters). A number of successful efforts are being implemented around the world such as in North American oil and gas production regions, and the state of California has used such methods to locate and quantify its state-wide emissions of methane from all industrial sources.

In June 2019 the 50th session of SBSTA welcomed the adoption by the WMO of the IG³IS Science Implementation plan and recognized IG³IS as an innovative science-based framework that supports the needs of a broad range of users and encouraged the use of the framework by Parties. The IPCC Task Force on National Greenhouse Gas Inventories (TFI) has included the use of IG³IS methods in their recently published 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories in section on verification.

The advantage of the observations-based methodology is that it ensures the consistency of emission estimates across sectors and scales. The same observations and modelling tools can be used to assess emissions from the oil and gas facility, the forest or the agricultural land providing an opportunity to objectively quantify the fluxes of GHG. Feasibility of IG³IS utilization in support of energy sector, respective guidance materials and pilot and demonstration projects have to be established to support and guide energy sector efforts in reducing its greenhouse gas emissions. As there are some plans developed by the energy sector on achievement of carbon neutrality, atmospheric observations represent the ultimate verification tool for such neutrality. Planned carbon capture and storage facilities or the extension of the forest cover for the uptake would need objective quantification of their potential which can be assessed utilizing IG³IS approach.

Efficient and effective emission reductions are key to reach net-zero emissions. Observations-based emission estimates can both guide their reduction and demonstrate the success of taken measures or reveal the need to adjust the measures. Thereby, the technology can support and accelerate mitigation measures that imply preventing socio-economic impacts that would happen as a result of unabated climate change.

The efficient and effective transition to net-zero emissions supported by observations-based emission estimates, and additional co-benefits related to improved air quality will particularly benefit local communities and most vulnerable groups who are particularly affected by environmental disasters. To achieve this, it is crucial to implement integrated approaches and involve all relevant stakeholders from the beginning of the project design.

SECTION 2: ACTIONS TO ACHIEVE THE AMBITION

2.1. Please add at least one key action for each of the elaborated ambition(s) from section 1. *[Please add rows as needed]*.

<i>Description of action (please specify for which ambition from Section 1)</i>	<i>Start and end date</i>
2.1.1 – Raise awareness of observations-based tools for GHG emission estimates in the context of the energy sector (For ambition 1.2)	July 2021 – December 2022
2.1.2 – Assist interested partners in the implementation of the IG ³ IS methodology, and provide capacity building support (For ambition 1.2)	July 2021 – December 2030
2.1.3 – Include energy sector specific information in the IG ³ IS Guidelines for National and Urban contexts (For ambition 1.2)	July 2021 – December 2030
<i>Description of action (please specify for which ambition from Section 1)</i>	<i>Start and end date</i>

SECTION 3: OUTCOMES

3.1. Please add at least one measurable and time-based outcome for **each** of the actions from section 2. *[Please add rows as needed]*.

<i>Outcome</i> Number of energy-focused events with IG ³ IS experts participating and promoting the methodology Number of energy experts invited to IG ³ IS events (For action 2.1.1)	<i>Date</i> December 2022
<i>Outcome</i> Number of new partners implementing IG ³ IS methodology to quantify emissions in the energy sector	<i>Date</i> December 2030

Number of people trained for the use of observations-based information to quantify energy sector emissions (For action 2.1.2)	
<i>Outcome</i> Number of workshops conducted to include energy sector in the IG ³ IS National & Urban guidelines SDG7 annexes created for each of the guidelines containing specific information for decision makers (For action 2.1.3)	<i>Date</i> December 2030

SECTION 4: REQUIRED RESOURCES AND SUPPORT

4.1. Please specify required finance and investments for **each** of the actions in section 2.

Actions 2.1.1 and 2.1.3 can be easily implemented with a little investment from partners, expecting successful outcomes from an investment of USD 10,000.00 that would include exchanges and travel of experts over a period of 6 months. For action 2.1.2 (Assist interested partners in the implementation of the methodology and provide capacity building support, evaluation of costs and feasibility shall be conducted prior to implementation)

2.1.1 – Raise awareness of observational-based tools in the context of the energy sector:

There is a lack of cooperation between the experts using atmospheric observations to quantify emissions and experts and policy makers from the energy sector. While IG³IS initiative aims to build the bridge between communities, raising awareness among the energy sector about the capabilities of atmospheric observations is paramount to make better informed decisions. The oil & gas sector facilities and infrastructure could largely benefit from atmospheric observations to evaluate their potential for emissions reduction from leakages. This action requires financial support for the participation of IG³IS experts in SDG7-related events and vice versa.

2.1.2 – Assist interested partners in the implementation of the methodology and provide capacity building support:

This action would need financial support to build capacity on the use of atmospheric observations and inverse modelling for the quantification of emissions. IG³IS experts are available to provide consultancy services to interested partners and strengthen their capabilities. With limited financial support IG³IS has been developing several activities in developing countries, including a feasibility study, gap analysis, network design, modelling & infrastructure requirements, and capacity building. These activities are intended to create an enabling environment for countries to request financial support to donors and climate financing mechanisms for the full implementation of an observational network and establishment of the modelling tools to make IG³IS operational. IG³IS as a user-driven methodology does not have a universal recipe for all cases and each project is carefully evaluated by the expert community to provide the solution that meets requirements of users and stakeholders.

2.1.3 – Include energy sector specific information in the IG³IS Guidelines for National and Urban contexts:

IG³IS experts are developing Guidelines that compile best practices worldwide towards an international standardized approach. Currently, urban guidelines are being finalized and national guidelines production will commence soon. The integration of the energy sector experts in the development and update of such guidelines are critical to ensure that they address effectively all the sectors at these scales. This action requires financial support for workshops and travel of experts in order to develop SDG7 specific information within the IG³IS National & Urban Guidelines for the use of decision-makers.

4.2. [For countries only] In case support is required for the actions in section 2, please select from below and describe the required support and specify for which action.

[Examples of support for Member States could include: Access to low-cost affordable debt through strategic de-risking instruments, capacity building in data collection; development of integrated energy plans and energy transition pathways; technical assistance, etc.]

<input type="checkbox"/> Financing	<i>Description</i>
<input type="checkbox"/> In-Kind contribution	<i>Description</i>
<input type="checkbox"/> Technical Support	<i>Description</i>
<input type="checkbox"/> Other/Please specify	<i>Description</i>

SECTION 5: IMPACT

5.1. Countries planned for implementation including number of people potentially impacted.

The tool can be applied at a different scale. While it can be used to quantify GHG emissions from specific facilities, it is recommended that IG³IS methodology is utilized to complement national inventories and is implemented at a national scale, permitting to identify not only major emission sources but also cost-effective mitigation actions and carbon removal opportunities.

5.2. Alignment with the 2030 Agenda for Sustainable Development – Please describe how **each** of the actions from section 2 impact advancing the SDGs by 2030.

[up to 500 words, please upload supporting strategy documents as needed]

Each of the actions described in the section 2 will promote the use of atmospheric observations to quantify GHG emissions and will allow decision makers to make informed decisions and cost-effectively implement mitigation actions and policies. The use of such methodology will also enhance transparency of inventory reporting and maximize the capabilities to monitor emission trends in a timely manner. Given some GHG are at the same time air pollutants, and the IG³IS methodology can be used for the detection and monitoring of air pollutants, improvement of air quality is a co-benefit that can be leveraged with the adoption of IG³IS methodology.

The use of IG³IS and the implementation of the actions proposed in section 2 would contribute to the advancement of the following SDGs:

SDG 3. Ensure healthy lives and promote well-being for all at all ages *(Major impact if air quality objectives included in the adoption of the methodology)*

Target: 3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

SDG 7. Ensure access to affordable, reliable, sustainable and modern energy for all *(indirect impact)*

Target 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation *(indirect impact)*

Target 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable *(Major impact if air quality objectives included in the adoption of the methodology)*

Target 11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

SDG 13. Take urgent action to combat climate change and its impacts *(Major impact)*

Target: 13.2 Integrate climate change measures into national policies, strategies and planning

5.3. Alignment with Paris Agreement and net-zero by 2050 - Please describe how **each** of the actions from section 2 align with the Paris Agreement and national NDCs (if applicable) and support the net-zero emissions by 2050.

[up to 500 words, please upload supporting strategy documents as needed]

The implementation of the Paris Agreement will require countries and sub-national entities to take actions to reduce emissions of greenhouse gases in an optimal way. To assist the countries in meeting their commitments the World Meteorological Organization (WMO) and its partners have initiated the development of an Integrated Global Greenhouse Gas Information System (IG³IS). IG³IS utilizes atmospheric observations to evaluate GHG emissions and serves as a supplementary tool that strengthens the Measuring, Reporting, Verification (MRV) process and support transparency. Utilization of the atmospheric observations is a unique way to establish carbon neutrality (when amounts of emitted GHG equals to the uptake by the sinks, the atmospheric concentration does not change). Energy sector is an important contributor to the achievement of the Paris agreement goals and this sector requires improved information about its emissions, especially the ones that can not be easily taken into consideration in the inventory (e.g. gas leakages). So far, energy sector had very limited knowledge about the opportunities to better quantify its emissions and raising awareness about IG³IS approach will help energy sector to raise its mitigation ambition. Moreover, those partners in the energy sector who will engage in IG³IS not only raise their ambition. Being trained on the IG³IS implementation they will be capable of objectively assessing their emission reduction and hence quantify their contribution to the goal of the Paris agreement.

The Paris agreement also requires the consistency of the methods and information that is used in its support. For example, the emission reporting is done following strictly standardized IPCC guidelines. To make IG³IS such a standardized tool for all implementing partners, the contribution of the energy sector in the good practice documents will be essential.

SECTION 6: MONITORING AND REPORTING

6.1. Please describe how you intend to track the progress of the proposed outcomes in section 3. Please also describe if you intend to use other existing reporting frameworks to track progress on the proposed outcomes.

IG3IS Steering Committee (SC) meetings are held every 4-6 weeks. All IG³IS endorsed projects must go under the Steering Committee approval. The SC frequently revisits ongoing projects and activities and addresses potential risks that could jeopardize the successful implementation of IG³IS methodology. Additionally, all IG³IS related activities are presented to the Committee, and recorded in video and captured in the minutes after each meeting by the IG³IS Office. The IG³IS Office is normally in charge of monitoring day-to-day advances of each of the IG³IS initiatives and keeps a monitoring framework updated and accessible to members of the SC. Equally, IG³IS projects can be consulted and visited in the IG³IS website (<https://ig3is.wmo.int/>). Finally, the [endorsement criteria](#) of an IG³IS project observes a reporting mechanism to the IG³IS SC, guaranteeing the adequate progress of activities and alignment with the methodology.

SECTION 7: GUIDING PRINCIPLES CHECKLIST

Please use the checklist below to validate that the proposed Energy Compact is aligned with the guiding principles.

I. Stepping up ambition and accelerating action - Increase contribution of and accelerate the implementation of the SDG7 targets in support of the 2030 Agenda for Sustainable Development for Paris Agreement

I.1. Does the Energy Compact strengthen and/or add a target, commitment, policy, action related to SDG7 and its linkages to the other SDGs that results in a higher cumulative impact compared to existing frameworks?

Yes No

I.2. Does the Energy Compact increase the geographical and/or sectoral coverage of SDG7 related efforts? Yes No

I.3. Does the Energy Compact consider inclusion of key priority issues towards achieving SDG7 by 2030 and the net-zero emission goal of the Paris Agreement by 2050 - as defined by latest global analysis and data including the outcome of the Technical Working Groups? Yes No

II. Alignment with the 2030 agenda on Sustainable Development Goals – Ensure coherence and alignment with SDG implementation plans and strategies by 2030 as well as national development plans and priorities.

II.1. Has the Energy Compact considered enabling actions of SDG7 to reach the other sustainable development goals by 2030? Yes No

II.2. Does the Energy Compact align with national, sectoral, and/or sub-national sustainable development strategies/plans, including SDG implementation plans/roadmaps? Yes No

II.3. Has the Energy Compact considered a timeframe in line with the Decade of Action? Yes No

III. Alignment with Paris Agreement and net-zero by 2050 - Ensure coherence and alignment with the Nationally Determined Contributions, long term net zero emission strategies.

III.1. Has the Energy Compact considered a timeframe in line with the net-zero goal of the Paris Agreement by 2050? Yes No

III.2. Has the Energy Compact considered energy-related targets and information in the updated/enhanced NDCs? Yes No

III.3. Has the Energy Compact considered alignment with reaching the net-zero emissions goal set by many countries by 2050? Yes No

IV. Leaving no one behind, strengthening inclusion, interlinkages, and synergies - Enabling the achievement of SDGs and just transition by reflecting interlinkages with other SDGs.

IV.1. Does the Energy Compact include socio-economic impacts of measures being considered? Yes No

IV.2. Does the Energy Compact identify steps towards an inclusive, just energy transition? Yes No

IV.3. Does the Energy Compact consider measures that address the needs of the most vulnerable groups (e.g. those impacted the most by energy transitions, lack of energy access)? Yes No

V. Feasibility and Robustness - Commitments and measures are technically sound, feasible, and verifiable based a set of objectives with specific performance indicators, baselines, targets and data sources as needed.

V.1. Is the information included in the Energy Compact based on updated quality data and sectoral assessments, with clear and transparent methodologies related to the proposed measures? Yes No

V.2. Has the Energy Compact considered inclusion of a set of SMART (specific, measurable, achievable, resource-based and time based) objectives? Yes No

V.3. Has the Energy Compact considered issues related to means of implementation to ensure feasibility of measures proposed (e.g. cost and financing strategy, technical assistant needs and partnerships, policy and regulatory gaps, data and technology)? Yes No

SECTION 8: ENERGY COMPACT GENERAL INFORMATION

8.1. Title/name of the Energy Compact

Integrated global greenhouse gas information system (IG³IS)

8.2. Lead entity name (for joint Energy Compacts please list all parties and include, in parenthesis, its entity type, using entity type from below)

World Meteorological Organization

8.3. Lead entity type

- | | | |
|--|---|---|
| <input type="checkbox"/> Government | <input type="checkbox"/> Local/Regional Government | <input checked="" type="checkbox"/> Multilateral body /Intergovernmental Organization |
| <input type="checkbox"/> Non-Governmental Organization (NGO) | <input type="checkbox"/> Civil Society organization/Youth | <input type="checkbox"/> Academic Institution /Scientific Community |
| <input type="checkbox"/> Private Sector | <input type="checkbox"/> Philanthropic Organization | <input type="checkbox"/> Other relevant actor |

8.4. Contact Information

Oksana Tarasova, Head Atmospheric Environment Research Division, WMO, otarasova@wmo.int,
Roberta Boscolo, Climate and energy scientific officer, rboscolo@wmo.int,
Hamid Bastani, Energy consultant, hbastani@wmo.int

8.5. Please select the geographical coverage of the Energy Compact

- Africa Asia and Pacific Europe Latin America and Caribbean North America West Asia Global

8.6. Please select the Energy Compact thematic focus area(s)

- Energy Access Energy Transition Enabling SDGs through inclusive just Energy Transitions Innovation, Technology and Data Finance and Investment.

SECTION 9: ADDITIONAL INFORMATION (IF REQUIRED)

Please provide additional website link(s) on your Energy Compact, which may contain relevant key documents, photos, short video clips etc.

Website: <https://ig3is.wmo.int/>

Science Implementation Plan: https://library.wmo.int/index.php?lvl=notice_display&id=21595#.YMnSlGgzY2w

Explanatory video - Monitoring the atmosphere to reduce urban greenhouse gas emissions: <https://www.youtube.com/watch?v=jREJ-IMzpvk>

Explanatory video - Measuring national emissions: <https://www.youtube.com/watch?v=km0rgQfnNvs>