UNECE

POLICY BRIEF:
COVID-19 and SUSTAINABLE ENERGY

Introduction

It is unclear how long the health, social, and economic repercussions of the COVID-19 pandemic will last nor how deep they will go in the UNECE region. Beyond the tragic loss of life, the enduring repercussions include the implosion of many economic sectors with associated job losses and the fraying of social psychology. Ongoing restrictions and clampdowns intended to slow the progress of the infection will affect normal life for an undetermined period and will strain all sectors of the economy, including provision of food, energy and water. Global pandemics such as the current health crisis will be more frequent as the climate changes. Anticipating them requires systematic, coordinated preparation and investment in resilience, including in the energy system.

The consequences for the energy system in UNECE members States in terms of pricing, operations, inventories and links among connected supply chains have been significant as demand has plunged across the spectrum of energy services. As the slowdown endures it will deter longer-term investment because of the demand it destroys and the uncertainty it instils.

The UNECE region has important opportunities to undertake a pivot to a more sustainable economic and energy model, but to achieve this pivot, member States must re-orient investment framework conditions to sustainable outcomes and re-launch economies with jobs programmes aligned with the objectives of the 2030 Agenda for Sustainable Development.

Energy Context in the UNECE region

The UNECE region is falling short of its member States' commitments and objectives on sustainable energy. For energy to make an optimal, enduring contribution to the region's economies and its peoples' quality of life, including climate change, the starting point is recognition that:

- energy services are critical inputs to all economic sectors as they enable food production and distribution, access to clean water, development of needed materials, mobility, communications, sanitation, health care, heating and cooling, refrigeration, lighting, education, and so forth.
- the current energy system is not delivering, in aggregate, on access, affordability, efficiency and productivity, quality of service, security and resilience, or environmental performance, including greenhouse gas (GHG) emissions.
- transformation of the energy system to one that delivers the services needed for the 2030 Agenda faces important barriers:
  - the existing system is based on fossil energy and represents both significant investment in and commitment to physical infrastructure and interconnected supply chains;
  - industrial/urban complexes often are associated with primary energy production – e.g., power generation and steel production – and shifts away from the primary energy source will have consequences for jobs and the social fabric of associated communities;
  - investment and operational decisions on resource development, transformation, and consumption are driven by economics determined by supply and demand for products and services with monetary value, to the detriment of resources without explicit monetary value; and
  - the political and regulatory infrastructure underpinning energy will be unable to respond to the imperatives of the 2030 Agenda unless and until there is alignment among constituent stakeholder interests, including a willingness to consider all policy and technology options in an agnostic and pragmatic manner.

The desired outcome is an energy system that supports environmental, economic, and social objectives in an integrated way – deep transformation is an imperative despite the notable barriers.

The UNECE region is diverse and encompasses countries that are high and low income, energy rich and energy poor, and economies in transition. The region produces and consumes 40% of primary energy and produces 40% of global economic output. 80% of primary energy in the UNECE region is fossil, and the region accounts for half of global GHG emissions. Even if the region succeeds in contributing to efforts to limit global warming to 2ºC by 2050, fossil fuels still will represent over 50% of the region's energy mix in 2050. The region remains dominant in the global financial system and is home to important energy industries.

A stepping-stone on the path to a sustainable future that meets development and climate objectives is attainment of climate neutrality – balancing sources and sinks for GHGs. Achieving carbon neutrality will require an "all technology" strategy involving accelerated deployment of energy efficiency, renewable energy, carbon capture, use and storage, high efficiency/low emissions technology, low carbon gases (natural gas. decarbonized gases, renewable gases, and hydrogen), nuclear power, and CO_2 removal or other approaches such as increasing forests' absorptive capacity.

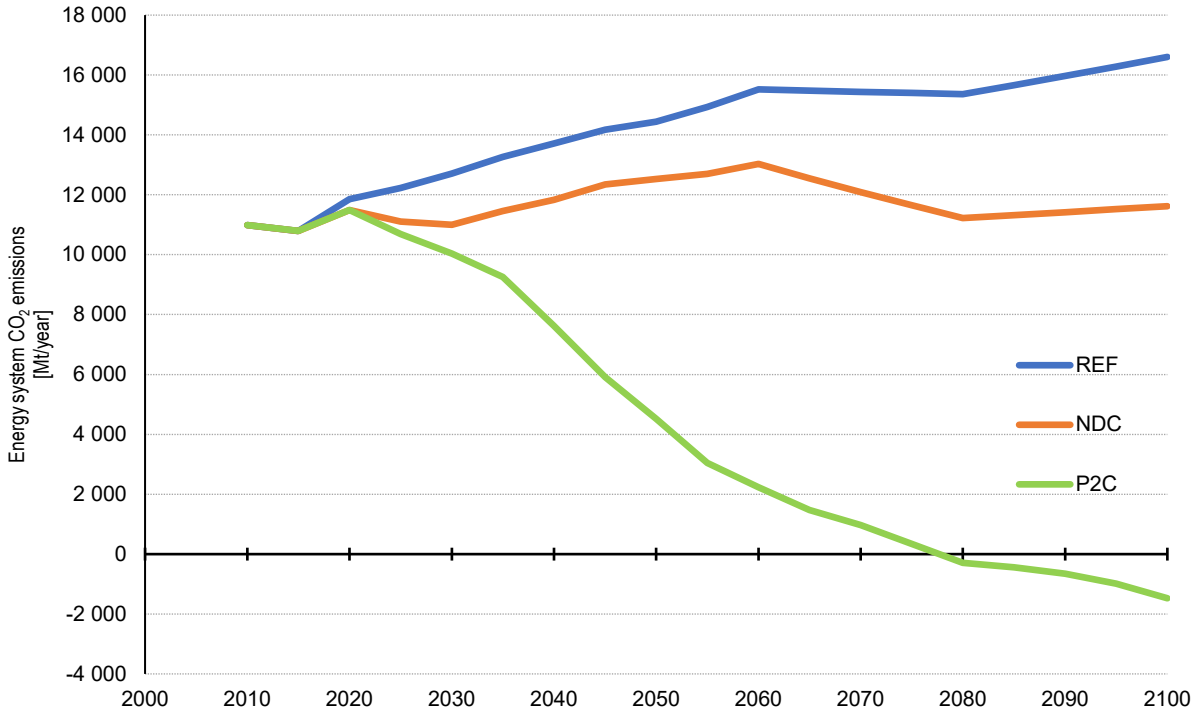
These actions fall into a hierarchy of categories:

- improving end-use energy efficiency cost-effectively;
- reducing losses in transformation, transmission, and distribution (reduce methane emissions, improve power generation efficiencies, improve total system efficiency);
- reducing CO_2 emissions (Carbon Capture and Storage);
- shifting to low or no carbon primary energy sources;
- deploying smart technology to decarbonise systemically;
- removing CO_2 directly from the atmosphere; and
- managing carbon sinks, notably forests and oceans.

In each of these categories there will be a panoply of technology and policy options. The costs and availabilities of the options will vary by country as each has its own unique endowment of natural resources and its own cultural, regulatory, and legislative heritage. It is the collective outcome of countries' actions that will deliver on carbon neutrality on the path to meeting the 2ºC objective while delivering citizens' quality of life aspirations. These aspirations now include addressing the current and future issues associated with the COVID-19 pandemic.

Emissions in the UNECE Region by Policy Scenario

Difference between REF and P2C - approx. 90Gt cumulative CO_2 emissions 2020 - 2050



Current climate pledges do not meet 2°C.
UNECE countries must cut/capture at least 90Gt of CO_2 by 2050 to meet 2°C.
Immediate action is needed!

Adapting to the post-COVID-19 environment

The coronavirus pandemic and the global economic crisis it is causing have changed important conditions for the region's actions on sustainable energy. Pandemic-related issues now crowd national agendas and are changing perceived priorities. The pandemic has been notable for the shortcomings in resilience that it has exposed – a lack of capacity in materials and infrastructure, insufficient sharing and coordination of resources and methods across national boundaries, and losses of critical personnel to operate facilities (not only hospitals, but power plants, for example). These shortcomings point to the urgent need for progress across the full breadth of the 2030 Agenda.

From an energy perspective, the following changes are ongoing:

- **Lower emissions.** These are a consequence of demand destruction and would not be expected to endure once the pandemic has been contained.
- **Energy industry collapse.** Given the drops in demand and prices, smaller companies are likely to suffer, whereas larger companies with stronger finances and more diverse portfolios may survive and rebound based on investments aligned with future socioeconomic imperatives.
- **Challenges for renewable energy.** Wind and solar companies warn of disrupted supply chains and tax uncertainties stemming from closed borders and related economic slowdowns.
- **Changing energy patterns.** The way we work has changed dramatically with virtual meetings and telecommuting, with consequences for local urban transport, air travel, energy demand in city-centre buildings, and the value of quality network connections. As the world learns how to function differently, these changes could have a lasting impact on energy use.
- **Recession worries.** As the world has cratered into a recession verging on depression, longer-term problems, including climate change, are at risk of moving to the back burner if there is not concerted government action. Governments around the world are starting to incorporate clean energy into their economic stimulus plans.

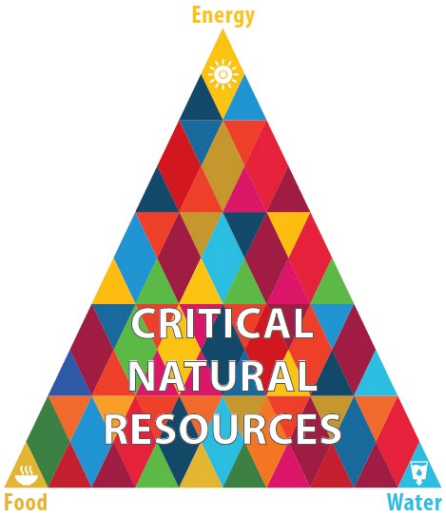
The energy system has done reasonably well since the start of the pandemic despite the challenges mentioned previously. The energy value chain — mining, power plants (renewable, fossil, nuclear), energy transmission lines, gas pipelines, distribution network etc. — has not suffered major interruptions in service and it has provided critical support by adapting to the emerging patterns in electricity consumption and consumer behaviour, for example by powering increased Internet traffic and ensuring that key medical facilities remain operational. However, as the pandemic continues into 2021 and possibly beyond with more crises looming on the horizon, the resilience, reliability, and operability of the energy system should not be taken for granted. Short-term performance drawing on surge capacity might be compromised by longer-term fatigue that erodes the capacity of the energy system to meet demand.

The pandemic has highlighted the importance of electricity in driving energy transformation. The electrification of energy services has been a long-term, secular trend, but the trend has now intensified as a consequence of COVID-19. The trend obliges power plants to be ever more flexible and capable of buffering varying output rapidly. Advances in energy storage technologies also have accelerated. Electrification and advances in energy storage together will accelerate decentralization of the energy system through the emergence of so-called 'prosumers' in member States that choose to create an enabling regulatory environment. The new post-COVID-19 reality provides an opportunity to rethink energy management in a smart urban ecosystem. Innovations in decarbonisation technology for power generation and transportation led to major cost reductions in, for example, solar photovoltaic modules and electric vehicles (EVs). Going forward, these efforts will be supplemented by faster deployment of smart technology. The existing gas infrastructure delivers high storage and transmission capacity efficiently and cost-effectively. In response to the pandemic, the overall efficiency of energy transmission, usage and storage must be further improved. Complementing smart power grids with smart gas grids will improve the outlook for networked renewable energy and better accommodate intermittent energy production.

Building Back Better

The crises such as droughts, floods, hurricanes, forest fires and now the ongoing COVID-19 pandemic are putting severe pressure on the planet. The crises have a significant and immediate bearing on how resources are produced, distributed and consumed, revealing significant stresses on supply chains and the industries they serve when the personnel that service them get sick or incapacitated. Such extreme events are difficult to predict by traditional methods, and the need is clear for a new paradigm for managing stretched human and technical resources during complex acute events. A new paradigm could enhance the effectiveness of our immediate responses but should also offer the prospect of better enabling us to limit the exposure to such events in the future through better planning and preparedness.

The economic downturn the COVID-19 has triggered is requiring a massive fiscal response. Many such measures have been announced by numerous countries and multilateral financial institutions. If the world is to attain the 2030 Agenda, it is crucial that the related massive investments be directed towards a "green", and not a "brown" recovery. A build back better strategy should:



- **Embrace a Food-Water-Energy Nexus Approach**: Integrating the security, accessibility and affordability of energy underpins sustainable development.
- **Secure the critical raw materials required for sustainable energy**: The metals and minerals required for technologies such as solar photovoltaics, batteries, electric vehicle motors, wind turbines, and fuel cells face key sustainability challenges, and the strain put on supply chains by the COVID-19 pandemic has increased the challenges.
- **Adopt Circular Economy Principles**: Energy use based on closed-loop systems ensure that resources are conserved within given product lifecycles. Unhindered production and consumption patterns will not be an option for the future. Cutting down on waste and reducing carbon emissions should be the basis for resource use.
- **Obtain Social License to Operate:** Respect for human rights and the interests, cultures, customs and values of employees and communities is an integral part of sustainable development and is stressed in the United Nations Guiding Principles on Business and Human Rights. Such an approach will need continual improvement to contribute to social, economic and institutional development.
- **Build resilience through Micro, Small and Medium Sized Enterprises:** Micro, Small, and Medium Enterprises (MSMEs) are drivers of economic development in most countries yet are particularly severely affected by the pandemic. Supporting MSMEs to extend their networks, embrace digitalization and access international supply chains will be crucial to allow them to play their role in improving countries' resilience.

To support MSMEs, UNECE is conducting two studies under the UNDA project "Global Initiative towards post-Covid-19 resurgence of the MSME sector":

  - Guidelines and best practices for MSMEs to assure resilience and progress towards a circular economy in sustainable resource management and critical raw material supply chain solutions
  - Guidelines and best practices for MSMEs in delivering energy efficient products and in providing renewable energy equipment

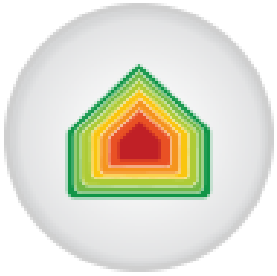
Based on the findings of these studies, UNECE will develop online training courses that will run in September-October 2020, with customized versions for Tajikistan and Ukraine (circular economy) and for Georgia and North Macedonia (energy efficiency and renewable energy).

UNECE's Strategic Energy Response

UNECE's strategic energy response to the COVID-19 pandemic has three main pillars:

- **Extending Sustainable Resource Management.** Resource production, transformation and use, if properly managed, can ensure beneficial social and environmental outcomes. Extending the UN Framework Classification for Resources to a full-fledged management system for resources will align investment frameworks with the needs of a sustainable world, notably in the development of critical raw materials to support efforts in health, decarbonisation, and the like.
- **Reducing GHG emissions through Methane Management.** Reducing methane emissions offers significant health benefits by improving local air quality and climate change benefits, especially in the near term, as there is a large economic reduction potential and cost-effective mitigation technologies are readily available. UNECE's work on methane focuses on developing and deploying best practice guidelines to address monitoring and mitigating methane emissions in the oil, gas, and coal sectors and to reduce atmospheric methane concentrations by eliminating or avoiding anthropogenic sources for example by increasing the share of hydrogen in natural gas networks.
- **Improving Building Performance.** UNECE's high performance buildings initiative aims to transform buildings: how they are conceived, built, operated, and maintained and how integrated building systems and services ultimately deliver quality of life. It is based on the wide dissemination of proven best practices through a network of partners.

UNECE'S STRATEGIC ENERGY RESPONSE



Sustainable Resource Management	Methane Management	High-Performance Buildings
▪ Optimizing primary resource use ▪ Reducing enviromental and social impacts ▪ Fostering circular economic development	▪ Monitoring, reporting and verifying emissions ▪ Controlling losses of methane in all sectors ▪ Replacing methane progressively with hydrogen	▪ Improving Building Performance ▪ Reducing embedded carbon but increasing "stored" carbon ▪ Reducing waste & increase recovery of materials from decommissioned buildings

Extending Sustainable Resource Management

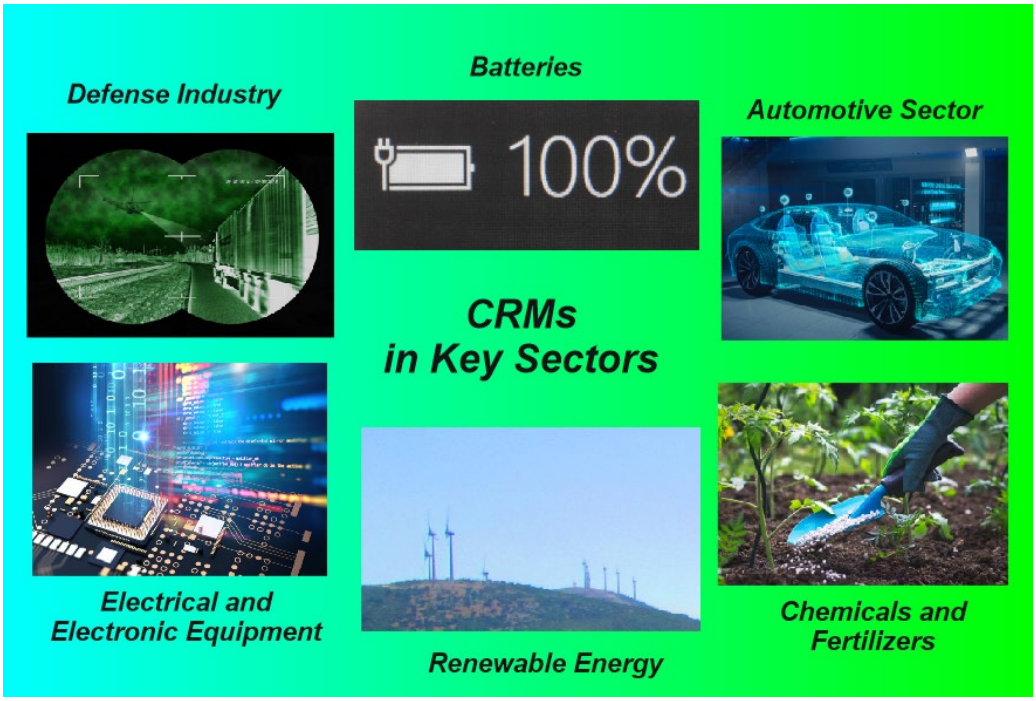
Sustainable management of the planet's natural resources is fundamental to attainment of the 2030 Agenda. The availability of natural resources is at the core of attaining all the SDGs:

- Since 1970, global production of natural resources has tripled to about 90 billion tonnes in 2018
- Population and economic growth have decelerated but the use of resources has accelerated.

Growth in resource use cannot continue inexorably given environmental impacts, waste challenges and carbon emissions. The social and environmental impacts of the so-called "extractive industries" were not sufficiently addressed in the past, which has caused a significant breach in public trust. Under pressure from public sentiment, investment funds have begun withdrawing from activities such as mineral and petroleum production.

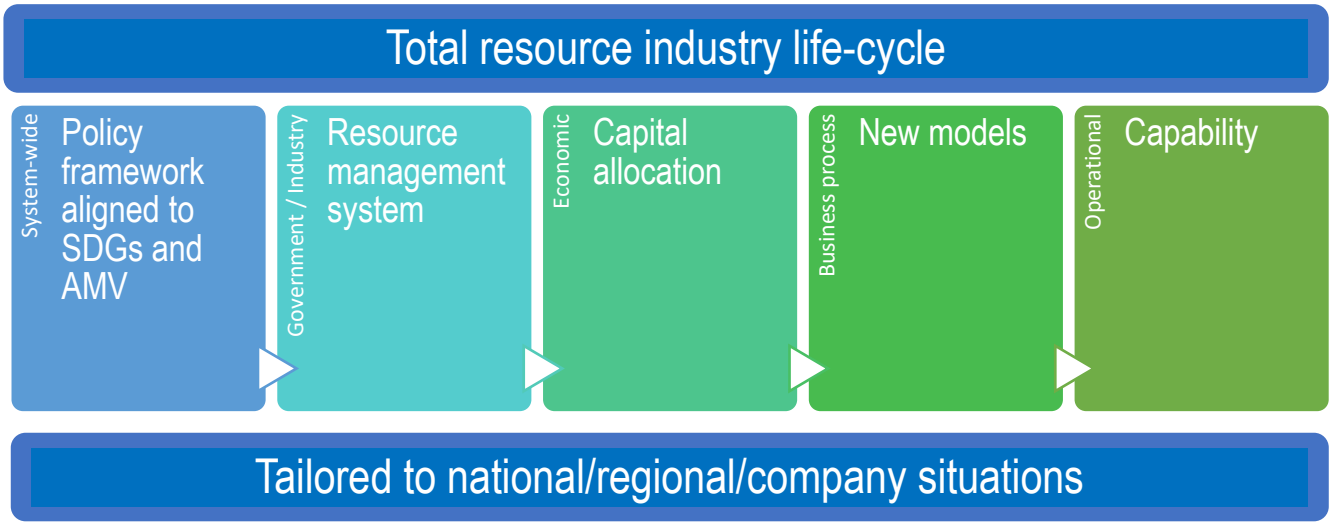
These limitations also pressure the supply of the critical raw materials required for the future energy system. There is an urgent imperative to frame resource management in the context of social, environmental and economic viability to assure sustainable outcomes.

There currently is no natural resource management system that can support this goal. Such a need was only identified in 2015 when the 2030 Agenda called for "bold and transformative" action in the way natural resources are managed – in effect a step-change in the resource management paradigm and reimagining resource management.



UNECE recognised the resource implications of the 2030 Agenda and has engaged actively with all stakeholders to strengthen and widen application of the United Nation Framework Classification for Resources (UNFC) as the basis for a United Nations Resource Management System (UNRMS). The social licence to operate is an important issue, so social and environmental guidelines have been developed and the scope of UNFC has been extended to include all primary and secondary (anthropogenic) resources.

Together, UNFC and UNRMS provide a unified, comparable, interoperable and harmonised approach to resource assessment and management that can be used for governmental, statistical, social, corporate and financial purposes. They provide a robust set of standards, guidelines, protocols and best practices for putting attainment of the 2030 Agenda at the core of sustainable resource management. Rebuilding economies after the pandemic will require massive amounts of critical raw materials for green energies.



Support for a comprehensive resource management system is intended to address risks such as:

- Inadequate or inaccurate inventories of national resources if data are not accessible to government administrations (planners, policy- or decision-makers).
- Lack of harmonised resource statistics.
- Misaligned or unrealistic expectations from governments and stakeholders as to the contribution natural resources can make to socio-economic development.
- Poor communication that leads to lack of awareness, acceptance and trust between government, companies and host communities in many natural resource development projects.
- Loss of trust with local communities hampers policies and practices with regard to social and environmental outcomes.

Countries and companies adopting sustainable resource management aligned to UNFC and UNRMS will improve the socio-economic viability and technological readiness of resource development projects and ensure responsiveness and resilience to regional and global challenges. The action will trigger opportunities for governments, industry and financiers to reimagine their businesses and put themselves firmly in the sustainable development discourse.

- This transformation will include improved environmental management of the projects, for example, a vastly reduced impact on land, soil, water and air and significant waste reduction.
- The projects will be socially responsible and will increase local community impact that would deliver higher benefits to the local communities, including indigenous populations.

Global Reach of UNFC

UNFC is used directly by

Bulgaria, Finland, India, Norway, Romania, Sweden, Thailand, and Ukraine,

and indirectly by

Australia, Brazil, Canada, Chile, the European Union, Mongolia, South Africa and the USA.

The Russian Federation and China bridge their resource management systems to UNFC.

Several continent-wide initiatives to deploy UNFC are underway:

- *Europe, led by the European Commission, is using UNFC to manage critical raw materials needed for battery production;*
- *Africa, led by the African Union Commission;*
- *Eurasia, through a pilot project in the Russian Federation; and*
- *the Americas, led by Mexico.*

Fundamental Principles of Sustainable Resource Management

1 **RESPONSIBILITY TO THE PLANET**
The primary responsibility of sustainable resource management shall be the continued well-being of the earth, its inhabitants, and the environment.

2 **INTEGRATED, INDIVISIBLE MANAGEMENT OF RESOURCES**
Sustainable resource management shall be undertaken within the framework of public, public-private and civil society partnerships, in an integrated and indivisible manner consistent with its social, environmental and economic viability.

3 **SYSTEMS VIEW**
Sustainable resource management shall integrate a systems view at all stages.

4 **SOCIAL LICENSE TO OPERATE**
Sustainable resource management shall ensure obtaining and keeping the social license to operate.

5 **FULL LIFE CYCLE VIEW**
Resources shall be managed with a life cycle view encompassing resource discovery to production, final use, reuse, and recycling.

6 **SERVICE ORIENTATION**
Resources shall be produced primarily as a service to society.

7 **COMPREHENSIVE RESOURCE RECOVERY**
Sustainable resource management shall facilitate and support the knowledge-base and systems for comprehensive recovery of value at all stages of operation.

8 **CIRCULARITY**
Sustainable resource management shall facilitate and support the knowledge-base and systems for responsible design, use, reuse and recycling.

9 **ZERO WASTE**
Sustainable resource management shall facilitate and support the knowledge-base and systems that promote the target of eliminating all wastes as reasonably achievable.

10 **ZERO HARM**
Sustainable resource management shall facilitate and support the knowledge-base and systems that pursue continual improvement in health and safety performance with the ultimate goal of zero harm as reasonably achievable.

11 **HYBRIDIZATION**
Sustainable resource management shall facilitate and support the knowledge-base and systems that promote the uptake of hybrid technologies and diversification in production and use.

12 **CONTINUOUS STRENGTHENING OF CORE COMPETENCIES AND CAPABILITIES**
Sustainable resource management shall ensure continuous strengthening of core competencies and capabilities that are required for cross-disciplinary research, development, demonstration, deployment and operations.

Source: Expert Group on Resource Management (2020) United Nations Resource Management System Concept Note: Objectives, requirements, outline and way forward (ECE/ENERGY/GE.3/2020/4)
https://www.unece.org/fileadmin/DAM/energy/se/pdfs/egrm/egrm11_apr2020/ECE_ENERGY_GE.3_2020_4.pdf

Immediate response

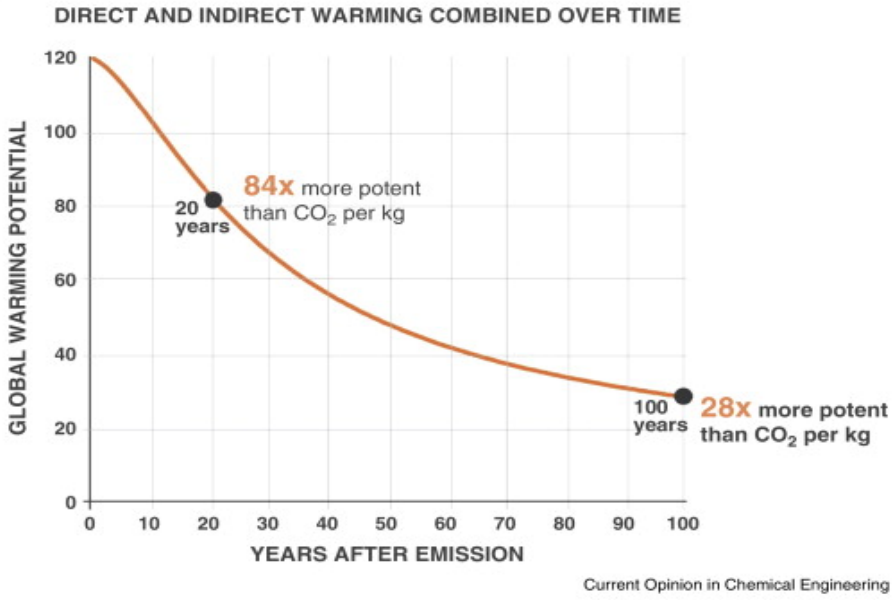
To provide immediate support to its member countries, UNECE is implementing several initiatives:

- UNECE is appraising Women entrepreneurship in natural resource management: Challenges and opportunities for the MSME sector in the post-COVID-19 socio-economic recovery, upon request from the Kyrgyz Republic. The study, funded by RPTC, is expected to be completed in October-November 2020.
- UNECE is also assessing the impact of COVID-19 on critical raw material supplies needed for the healthcare sector and possible mitigation actions. This work is undertaken under the UNDA project “Integrated energy and water resource management in support of sustainable development in South-East Europe and Central Asia.” The study will be completed in early 2021.

Reducing GHG emissions through Methane Management

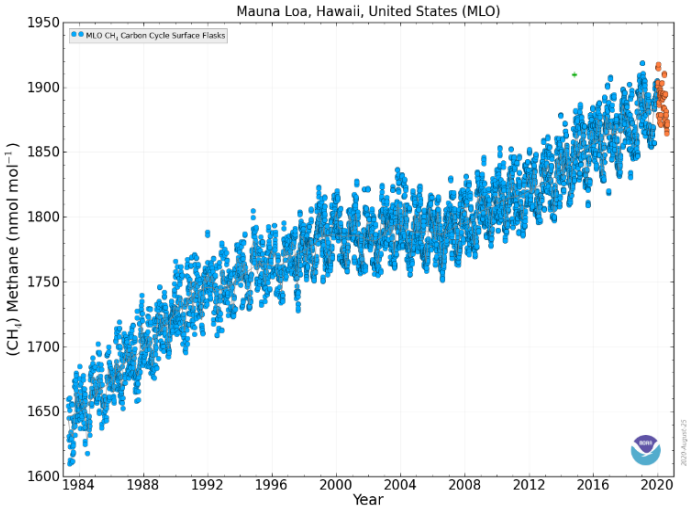
Methane is a potent greenhouse gas with a 100-year global warming potential 25 times that of carbon dioxide (CO2). Although methane is a relatively short-lived climate pollutant, as it remains in the atmosphere for a relatively brief period of time, its atmospheric volumes are replenished continuously. As a consequence, its high warming potential makes effective methane management an imperative part of climate change mitigation strategies. Measured over a 20-year period, its global warming potential is 84 times that of CO2 and on an instantaneous basis the figure rises to 120. Inasmuch as global atmospheric concentrations of methane are rising, there are arguments that the higher figures are more appropriate for consideration in climate change mitigation.

Global Warming Potential of Methane

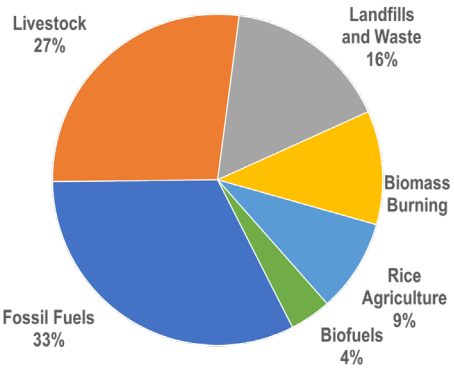


Methane is the primary component of natural gas, with some emitted to the atmosphere during its production, processing, storage, transmission, distribution, and use. It is estimated that around 3% of total worldwide natural gas production is lost annually to venting, leakage, and flaring, resulting in substantial economic and environmental costs.

Rising Atmospheric Concentrations of Methane



About 60% of global methane emissions are a result of human activity. The main sources of anthropogenic methane emissions are the oil and gas industries, agriculture, landfills, wastewater treatment, and emissions from coal mines. Fossil fuel production, distribution and use are estimated to emit 110 million tonnes of methane annually.



Coal mining related activities, such as extraction, crushing, distribution, and the like also lead to the release of a substantial amount of methane that is trapped in the coal seam. Methane is emitted from active underground and surface mines, as well as from abandoned mines and undeveloped coal seams.

As of today, there is neither a common technological approach to monitoring and recording methane emissions, nor a standard method for reporting them. Available information regarding methane emissions from extractive industries is relatively sporadic and often based on estimates. Therefore, the extent of the challenge and opportunity to manage such emissions remains largely undefined.

To remedy that situation UNECE is developing normative instruments based on current practices and technologies along the value chain in key energy-related extractive industries, namely coal, natural gas and oil.

In 2020 UNECE published guidance on developing and implementing effective monitoring, reporting and verification (MRV) practices and on mitigating methane emissions from the oil and gas sectors. The forthcoming publication is "principles-based," recognizing that conditions vary greatly across oil and gas facilities, and that legal, political and institutional aspects differ by jurisdictions. It is intended to serve as a resource for a broad audience, including owners and operators of oil and gas facilities and policymakers at all levels of government.

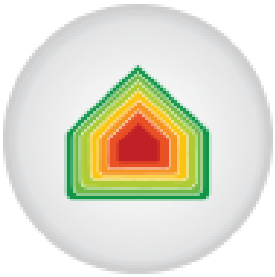
In addition, UNECE is collaborating with major partners (Global Methane Initiative, UN Environment Programme, and Climate and Clean Air Coalition) to:

- Increase awareness across all sectors of the challenge and the solutions to growing concentrations of methane in the atmosphere
    - Monitoring, reporting and verifying emissions
    - Controlling losses of methane in all sectors
    - Replacing methane progressively with hydrogen
- Work with member States to consider tightened commitments on methane management
- Deliver real action with measurable results in terms of reduced methane concentrations in the atmosphere (anthropogenic, all sources)
- Preparation of detailed best practice guidance for all sectors, possibly leading to standards or protocols
- Disseminate, demonstrate, and deploy methods and technology for monitoring and remediating emissions
- Organize training, regulation, and outreach to optimize the global response to the methane challenge.

Immediate response

UNECE has begun implementation of the project entitled "Improving the capacity of the Government of Ukraine to develop infrastructure for production and use of hydrogen to support green post-covid-19 recovery". The project, funded by RPTC, is expected to be completed in December 2020.

Improving Building Performance



Transforming the built environment can drive sustainability and deliver quality of life in the broadest terms. It also can impact the effectiveness of the world's responses to multiple crises across environmental, social, health, and economic facets. Buildings are responsible for 40% of global CO_2 emissions by virtue of the energy services they require. They also represent an important share of "embedded carbon", emissions that occur when making the materials used in buildings. Reducing energy needs in buildings is at the heart of delivering quality of life globally as expressed in the 2030 Agenda and the Paris Climate Agreement.

Beyond energy, the multifaceted services that buildings provide are critical to the 2030 Agenda. Advocates of high-performance buildings have long concentrated on energy efficiency improvements, but they now are turning to broader imperatives. Shifting to dramatically higher performance standards for new and existing buildings can make a major contribution to the transition to sustainability and the buildings community is equipped to deliver on a wide range of performance metrics.

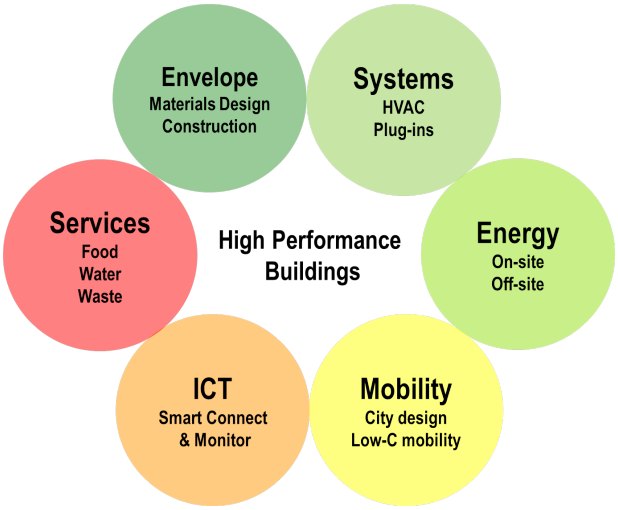
Engaging all of the professions involved in and connected to buildings and the built environment is the core mission of UNECE's High-Performance Buildings Initiative, which is conceived to apply the UN's Framework Guidelines for Energy Efficiency Standards in Buildings with proven best practice methods and focused technical capacity to improve building performance and reduce embodied carbon and energy.

The initiative aims to improve the effectiveness of the entire building sector supply chain across multiple metrics to enhance the complete lifecycle performance of buildings. The initiative connects building performance to country commitments and targets and addresses the readiness of industry to deliver the needed materials, techniques, and equipment. The initiative aims to move the dial on building performance, reduce GHG emissions and improve indoor air quality, and improve the global supply chain for buildings. The initiative will help develop building performance regulations (as well as corresponding policies, funding instruments and investment conditions); promote best practices in the building sector's supply chain; deploy materials, techniques and equipment; and implement readily available technical solutions for industry.

What is a high-performance building?

UNECE's high performance buildings involve getting the building envelope correct – design, materials, and perfect construction techniques.

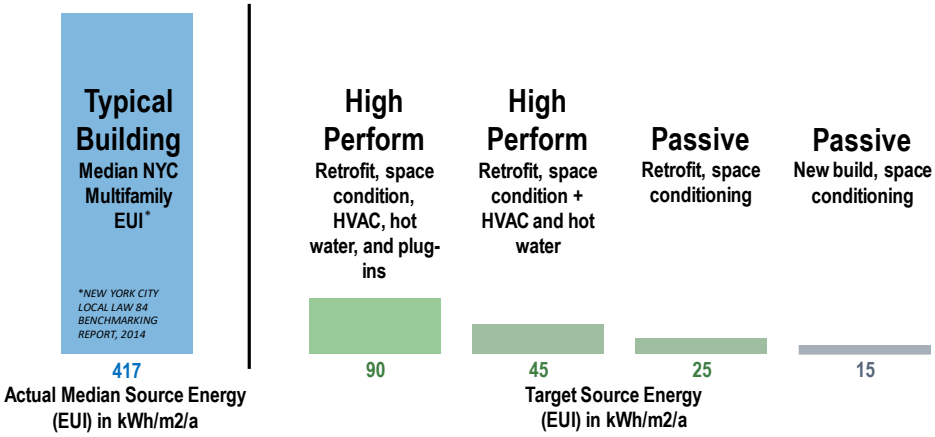
Done right, energy requirements in the building can be reduced to very low levels, levels at which the remaining energy requirements can be met with low or no carbon energy sources. Building materials should feature both reduced embedded carbon and energy and components that can be recovered in the future.



High Performance Buildings
Deliver Quality of Life:
Comfort, Health, Affordability, Efficiency, Sustainability

High performance buildings feature best practices in the conception and installation of systems -- heating, ventilating, and air conditioning as well as water heating and plug-in equipment. The challenges are sizing the equipment to the building's needs and ensuring both reduced embedded carbon and energy and components that can be recovered in the future.

A critical element of the high performance building of the future is the energy needed to drive the systems – rooftop solar, storage in the basement, or a connection to the wind farm down the road. It is possible to source a building's energy service requirements from low or no carbon energy sources because energy requirements have been minimized.



High Performance Buildings

Connecting buildings to the built environment can contribute to reducing the carbon intensity of mobility. It begins with proper design of urban transport systems but connects to the buildings equation through coordination of building sites with transport infrastructure and through connection of buildings energy and energy storage systems with mobility options.

A building is a complex system embedded in a community that is in a city that is part of a national network. If those systems and information can communicate seamlessly with information and communications technology (ICT), suddenly system optimization brings distributed generation, smart energy use, energy service providers, and consumers to deliver an efficient set of outcomes. Further, with ICT the monitoring and control of the systems, indoor air quality, and comfort levels is enabled. Demonstrably healthy and comfortable homes attract higher valuations that can support financing options.

The final aspect of high-performance buildings relates to the services they provide to occupants, including water, food, and waste removal or treatment. Properly conceived, buildings can contribute substantially to each through waste re-use and recycling, water recovery and treatment, and eventually on-site food production.

Delivering on high performance buildings represents a multitude of completely distinct communities of professionals that, when connected, can deliver outcomes far superior to and more resilient than current practice.

Immediate response

Channelling part of the national recovery funds into high-performance buildings and the refurbishment of the building stock has the capacity to reinvigorate local economies rapidly, supporting or creating jobs – architects, engineers, carpenters, electricians, plumbers and other jobs through the entire building supply chain - while delivering on long-term quality of life for everyone (climate, affordability, health, comfort).

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