UNECE

Delivering the 2030 Agenda
and the Paris Agreement

A Push to Pivot

Three long-term initiatives are needed to secure the 2030 Agenda for Sustainable Development while mitigating climate change:

1. achieve carbon neutrality by 2030
2. ensure a just transition to remove social obstacles to real transformative action
3. enable a hydrogen ecosystem

Carbon Neutrality

National commitments made to date to address climate change are insufficient to keep global warming below a 2°C increase above pre-industrial temperatures. With the acceleration of climate change there are growing calls to take serious action to reduce the carbon intensity of the energy system. The window of opportunity to prevent climate change with a smooth transition has narrowed and more radical policy options are becoming necessary. Delivering carbon neutrality will require some combination of improving energy efficiency and productivity, shifting to low or no carbon primary energy sources, controlling greenhouse (GHG) emissions, removing CO_2 directly from the air, deploying smart technology for systemic decarbonisation, and managing carbon sinks.

Countries should commit to carbon neutrality in their plans and targets.

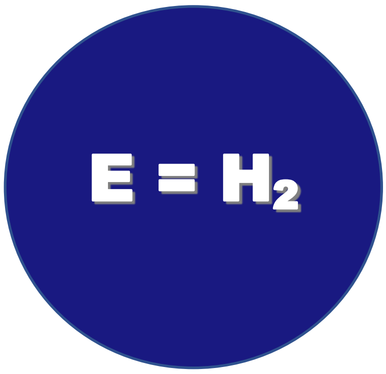
Just Transition

Coal-based infrastructure is at the heart of industrial complexes that include mines, power stations, steel production, other affiliated industries, and urban areas. The substantial industrial and urban ecosystems that have developed around the coal facilities represent an important socio-economic and hence political barrier to diversifying away from coal mining. United Nations Economic Commission for Europe (UNECE) member States could support a just transition through industrial modernisation to address short-term political drivers, notably employment in coal mining regions, that impede real action on energy for sustainable development, including climate change.

Countries should take steps to ensure a just transition.

Hydrogen Ecosystem

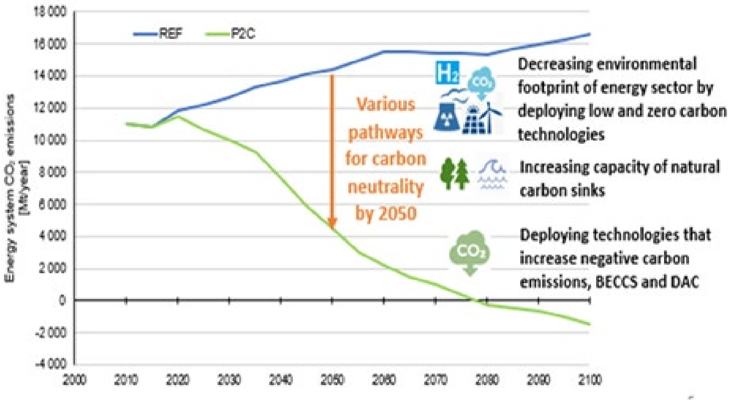
Hydrogen is recognized as a possible approach to decarbonizing the energy system. Despite its potential, high costs and regulatory uncertainties are major barriers. There is need for coordinated action on national, subregional, and regional levels to establish the full industrial ecosystem of policy and infrastructure to enable a hydrogen ecosystem that contributes to decarbonisation.



Countries should work to enable a hydrogen ecosystem in the future.

Carbon Neutrality

Temperature rises above 1.5-2°C above pre-industrial levels are considered a tipping point beyond which the natural carbon cycle will become a source of GHGs. The World Meterological Organization (WMO) has issued a report warning that average global temperatures will have risen by 1.5°C within the next 5 years. It would appear that the sands of time have run out.



"Carbon neutrality" is defined as a balance of anthropogenic emissions of GHGs and their removal. Achieving such a balance requires that all anthropogenic GHGs emitted be offset by an equivalent amount of GHGs removed, either through natural sinks or removal technologies such as Carbon capture and storage (CCS)/ Carbon capture, use and storage (CCUS), Bioenergy with carbon capture and storage (BECCS), direct air capture, and the like[1]. This perspective assumes that the natural carbon cycle will remain stable and will not become a net emitter of GHGs. Ensuring such stability would require that global warming be limited to 1.5-2°C above pre-industrial levels.

National commitments made to date to address climate change are insufficient to keep global warming below a 2°C increase above pre-industrial temperatures. With the acceleration of climate change there are growing calls to take serious action to reduce the carbon intensity of the energy system. The window of opportunity to prevent climate change with a smooth transition has narrowed and more radical policy options are becoming necessary and require financing. Many countries and regions consider achieving carbon neutrality by the end of this century as a stepping-stone to delivering on their climate commitments, but there has yet to be a full reckoning of the implications of that approach for delivering on the 2°C objective let alone the remainder of the 2030 Agenda for Sustainable Development. UNECE considers that integrated solutions are possible but that they involve bold action on resource management, reducing the environmental footprint of existing systems, and pursuing fundamental transitions. Continuing with current market models means that achieving the 2030 Agenda will involve making trade-offs among the various goals. The pressure on policymakers to weigh the trade-offs in one direction or another will intensify as there is growing tension between delivering on energy security and enhanced quality of life expectations and mitigating climate change.

There are several non-exclusive possible approaches to delivering carbon neutrality:

1. improve end-use energy efficiency and productivity cost-effectively to minimize the primary energy supply needed to meet demand (covering all sectors based on energy and resource services provided, including organization of urban environments and rationalization of subsidies and institution of a real price on GHG emissions);

2. reduce losses in transformation, transmission, and distribution (reduce methane emissions, improve power generation efficiencies, improve total system efficiency);

3. shift to low or no carbon primary energy sources;

4. capture CO_2 emissions through faster deployment of carbon capture, use and storage (CCUS) and direct air removal technologies;

5. promote research and innovation in clean hydrogen and develop hydrogen infrastructure;)

6. broad deployment of smart technology for systemic decarbonisation that meets quality of life criteria; and/or

7. manage carbon sinks, notably forests and oceans.

In each of these areas there will be a set of technology and policy options, and the costs of the options will vary for each country. In an ideal world the options will accumulate to a point at which carbon neutrality is achieved at least cost for the region.

[1] https://unece.org/sustainable-energy/cleaner-electricity-systems/technology-interplay-under-carbon-neutrality-concept

Just Transition

International policy debates on climate change are centred on limiting emissions of greenhouse gases by reducing fossil fuel consumption, whereas the energy challenge for the 2030 Agenda is driven by national priorities such as development, quality of life, employment, energy security and trade balances. Arguments for reducing fossil fuel use originate in wealthy countries that can afford and have access to low carbon alternatives, but most of the world is not so fortunate. The world is on a path to increase global average temperatures by 4-6ºC above pre-industrial levels, species-threatening levels well above the 1.5-2ºC target to which countries are committed. It therefore is an urgent, near-term imperative to align national and global interests with solutions that enable sustainable development while reducing atmospheric concentrations of greenhouse gases to meet global climate objectives[2].

Fossil fuels comprise 80% of the energy mix in the region, and UNECE countries produce 38% of the world's coal. Coal-fired power represents 40% of electric generation, and electricity demand represents 20% of the total. Coal-based infrastructure is at the heart of industrial complexes that include mines, power stations, steel production, other affiliated industries, and urban areas. The substantial industrial and urban ecosystems that have developed around the coal facilities represent an important socio-economic and hence political barrier to diversifying away from coal mining. Aggressive moves away from coal would lead to legacies of significant social upheaval and blighted urban ghettos without accelerating attainment of 2ºC. Many countries remain committed to using coal for those reasons. Prominent coal users in the UNECE region include Germany, Poland, Kazakhstan, Russian Federation and the US. Even under a scenario that meets the 2ºC objective, in 2050 fossil fuels still will represent an important share of the primary energy mix.

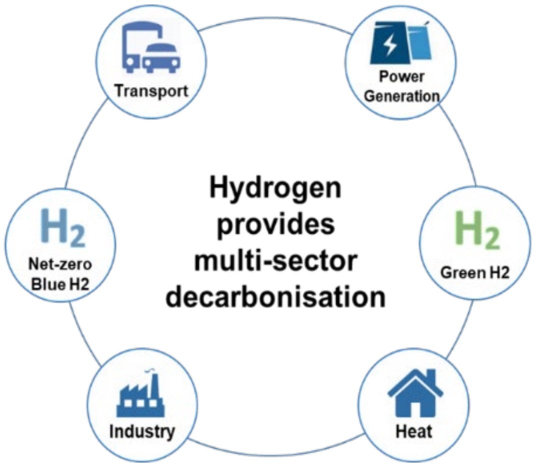
The 2 ºC objective can be met with today's technology, but it is imperative to limit net emissions in the near term (to 2050) and, thereafter, it will be equally imperative to reduce atmospheric concentrations of greenhouse gases. Tightening legislation on efficiencies and emissions will require coal generators either to construct new state-of-the-art power plants as replacements, retrofit pollution control technologies at existing facilities, or shut plants down. Coal mining also is the source of 9% of anthropogenic methane emissions. Even if the mines are closed, methane emissions from the closed mines will remain an important legacy source of GHGs.

It is recommended that UNECE member States support a just transition through industrial modernisation to address short-term political drivers, notably employment in coal mining regions, that impede real action on energy for sustainable development, including climate change. Likewise, it is recommended that mine closure standards be developed that address not only the technical issues associated with mine closure and direct employment-related issues, but also the social, economic, and environmental impacts on the surrounding communities. There is a need to develop a case-specific model to demonstrate how to modernize an industrial complex that evolved over time to embrace up-stream energy production, industrial facilities, and accompanying residential/urban infrastructure. The work would involve managing methane accumulations, efficient energy production from coal and gas, improving industrial and end-use energy efficiency, optimizing resource management, and enabling the introduction of renewable energy technology to enhance the environmental, social, and economic performance of such sites in line with the 2030 Agenda.

[2] https://unece.org/sustainable-energy/coal-mine-methane/mandate-group-experts-coal-mine-methane

Hydrogen Ecosystem

Hydrogen contains no carbon and deploying a hydrogen ecosystem could be an effective means of cutting GHG emissions and delivering the energy needed for sustainable development. Implemented properly hydrogen could decarbonise otherwise hard-to-abate sectors such as heavy industry or transportation and can provide a solution for long-term energy storage. It is not new – it has been produced and used in huge quantities for many years. In a future "hydrogen ecosystem", it would be used even more in transport, homes, industry, and power generation as part of an integrated, service-based society. By 2050, hydrogen could meet up to 24% of the world's final energy demand and, if produced from zero carbon energy sources, could deliver significant decarbonisation of the energy system.[3]



Despite its vast potential to decarbonise energy, high costs and unclear policy and regulatory frameworks are obstacles to institution of a hydrogen ecosystem. There is need for coordinated action within and among UNECE member States to enable full commercialization of hydrogen projects and infrastructure.

Hydrogen does not exist in nature as a free element and must be produced, transported and stored before being converted to electricity, heat, or feedstocks. 95% of hydrogen is produced from natural gas or other hydrocarbons and is used to make fertilizers and other chemicals. Significant quantities of CO_2 are released during production but could be captured and stored (CCS). Hydrogen also can be produced by electrolysis of water. Low or no carbon electricity used for the electrolysis can produced from renewables or from nuclear power.

None of the types of hydrogen is truly zero carbon, but they can contribute to achieving carbon-neutrality. To find the most cost-effective, least-emissions pathway, the world would need to find an optimum combination. Such an inclusive approach suggests a need to deploy renewable and nuclear energy capacity for various 'power to X' processes, including water electrolysis, and to develop large-scale carbon capture, use and storage (0) projects for the coal and gas that is the source of current hydrogen production.

Five key regulatory challenges have been identified:

1. for a hydrogen ecosystem to develop, a shared vision including carbon pricing is essential;

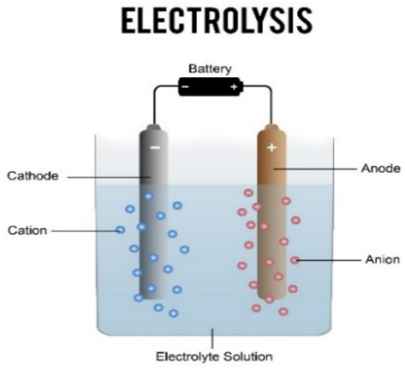
2. hydrogen's categories should not be defined arbitrarily, but through life cycle analysis;

3. policies must de-risk commercial hydrogen projects to attract project finance;

4. procurement standards and clear targets can jump-start hydrogen uptake;

5. work on international alignment and standards harmonization must accelerate.

Enabling a hydrogen ecosystem will require development of consistent and coherent regulations and standards to allow the distribution of hydrogen through natural gas pipelines, to address use of hydrogen for process industries, distributed electricity generation, home heating, and mobility, and to enable its transport through pipelines. There also is a need to promote safety, familiarity, education, informed decision-making, engaging communities and providing economic incentives for people to switch to sustainable hydrogen.



Existing gas infrastructure is key for hydrogen to emerge as a new fuel. There is large potential to enhance the interplay between renewable energy and natural gas as renewable energy sources are abundant and gas infrastructure is well developed. Many integrated energy models suggest that the future energy system will rely on efficient interplay between electrons (electricity) and molecules (gas). It will be important to identify potential opportunities for sector coupling and integration to better understand how and where hydrogen can be produced cost-effectively.

[3] https://unece.org/task-force-hydrogen