



The IAEA Framework for Integrated Assessment of Climate, Land, Energy and Water

What should I know?

Responding to climate change and ensuring universal access to food, energy and water are among the most important global development challenges faced today. These challenges are highly interdependent, and responding in one area (e.g. energy access) can have positive or negative impacts on others (e.g. climate change mitigation). To support Member States in developing integrated strategies to address these challenges and achieve

the United Nations Sustainable Development Goals (SDGs), the IAEA has developed the CLEW (climate, land, energy and water) framework in cooperation with other United Nations organizations and academic partners. The CLEW framework links different resource assessment approaches and methodologies to address SDG 2 (zero hunger), SDG 6 (clean water and sanitation), SDG 7 (affordable and clean energy), SDG 13 (climate action) and SDG 15 (life on land).

CLIMATE

Increasing emissions and impacts



LAND

820 million people are undernourished globally



WATER

840 million people are living without access to safe water



ENERGY

Almost 1 billion people lack access to electricity



Hundreds of millions of people do not have access to basic food and water supplies, and almost one billion lack access to electricity, affecting many aspects of human development. At the same time, there is a need to mitigate and adapt to climate change. (Infographic: IAEA)



The CLEW framework integrates different assessment methods and facilitates collaboration between climate, land, energy and water experts. (Infographic: IAEA)

What is the CLEW framework?

The CLEW framework is an analytical system for integrating different assessment approaches and methodologies and facilitating collaboration between policy analysts and planners dealing with climate, land, energy and water. It can analyse complex interactions and linkages between:

- Energy and water, such as energy used for water processing, pumping, treatment and desalination, and water used for hydropower, power plant cooling and fuel production;
- Energy and land, such as energy used for fertilizer production, field preparation and harvesting, and land used for biofuel production, power plants and mining; and
- Water and land, such as water used in agriculture for food, animal feed, fibre and bioenergy crops, and land used for reservoirs.

The CLEW framework can also analyse how climate, including changing temperatures and precipitation, affects water availability, energy supply and demand, and land and agriculture. Equally, it can help investigate the impact of energy and land use on greenhouse gas emissions.

The CLEW framework is designed to support planners and decision makers in developing effective policies and strategies. The methodology is flexible and can be applied at global, regional, national and local scales — for example, to assess resource planning in a province, river basin or city.



Benefits and applications of the CLEW framework

The CLEW framework aims to improve understanding of the interdependencies, trade-offs and co-benefits between climate, land, energy and water and provide a data-driven methodology that can be used by countries to assess their domestic challenges. The focus of the framework on integration across resource systems adds value to traditional single resource planning approaches.

The CLEW framework has been used in over 20 Member States for policy, technology and scenario assessments at the regional, national and local levels. Potential applications include:

Identifying policy synergies and avoiding conflicting policies

- For example, policies supporting water efficiency in agriculture can reduce both water consumption and electricity requirements for

irrigation; conversely, electricity subsidies for irrigation can accelerate aquifer depletion, in turn increasing electricity use and water scarcity.

Assessing the impact of technologies on multiple resources

- For example, a switch from coal-fired electricity generation to hydropower can reduce greenhouse gas emissions, local pollution and cooling water requirements at power plants, but it can also disrupt land use and water availability.

Exploring scenarios to identify robust development pathways

- For example, alternative development options for agriculture and industry imply different requirements for water, land and energy, while rising household incomes create additional challenges for resource management.

CLEW Case Studies

Cuba faces several challenges in adapting to the impacts of climate change, including effects on crop yields, water supply and demand, and the energy sector. Energy planners in Cuba used the IAEA's MAED (Model for Analysis of Energy Demand) and MESSAGE (Model for Energy Supply Strategy Alternatives and their General Environmental Impacts) energy planning tools to show that some of these impacts — particularly lower biomass yields and lower power plant efficiencies, along with higher demand for air conditioning — could increase greenhouse gas emissions from energy by around 15% in 2050 and exacerbate Cuba's dependence on imports of both food and energy.

Lithuania is seeking to reduce energy import dependence and greenhouse gas emissions by increasing the use of renewable energy sources. Biomass from crops and forests is a promising renewable energy resource, but it competes with agriculture for land and water resources. Researchers in Lithuania extended the IAEA's MESSAGE tool to incorporate agriculture and forestry. They showed that additional biomass could be supplied from existing and new forests, without adversely affecting agricultural production, as part of a larger switch to low carbon energy sources.



IAEA Support

The CLEW framework builds on the IAEA's suite of energy modelling tools and technical assistance for sustainable energy development. The IAEA offers a wide range of training programmes, technical assistance and information resources to

help Member States build capacity and develop skills in integrated CLEW analysis and planning. These include workshops and training (including e-training), technical cooperation projects, expert missions and coordinated research projects.



Today, about 150 countries and 21 international organizations are using the IAEA's analytical tools for developing sustainable energy strategies. (Infographic: IAEA)

The CLEW framework is supported by:

the International Atomic Energy Agency (IAEA); the United Nations Department of Economic and Social Affairs (UNDESA); the United Nations Development Programme (UNDP); the United Nations Industrial Development Organization (UNIDO); the International Institute for Applied Systems Analysis (IIASA); the Stockholm Environment Institute (SEI); and the Royal Institute of Technology, Sweden (KTH), among others.

For more information on the CLEW framework and other IAEA energy planning tools and assistance, visit www.iaea.org/topics/energy-planning

or contact

PESS.Contact-Point@iaea.org



IAEA Factsheets are produced by the Office of Public Information and Communication

Editor: Aabha Dixit • Design and layout: Ritu Kenn

For more information on the IAEA and its work, visit www.iaea.org or follow us on    

or read the IAEA's flagship publication, the *IAEA Bulletin*, at www.iaea.org/bulletin

IAEA, Vienna International Centre, PO Box 100, 1400 Vienna, Austria

Email: info@iaea.org • Telephone: +43 (1) 2600-0 • Facsimile +43 (1) 2600-7