



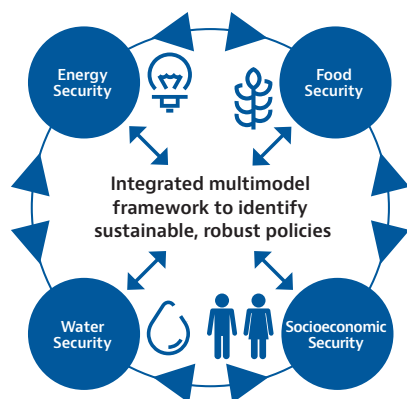
## Robust food, energy, water, and land management

Food, energy, water, and land: secure provision of these resources is essential for the survival of humankind. Moreover, they are closely linked, and policies that alter one sector can have large impacts on the others. IIASA has developed methods to improve integrated management and help policymakers design robust, sustainable policies, which take into account trade-offs and synergies between all four sectors. This work has fed into national policy in Ukraine.

Food, energy, water, and the environment have often been governed independently, and the impact of one policy on the other systems is inadequately considered—if at all. Ignorance of these interdependencies causes food crises and environmental degradation. Intensifying agriculture to produce more food can deplete and pollute the water supply, for instance, putting water security at risk. Using land to grow biofuels for energy may impinge on land needed for growing food. In addition, climate change and global trade are tightening these links, leaving the supply of these essential resources ever more open to systemic risks.

resolutions to be integrated, showing policymakers exactly where the trade-offs or synergies of the policy options may lie.

The project has also helped to ensure that policies are robust in the face of an uncertain future, by incorporating both long-term, strategic policies that anticipate rare events (severe floods, for instance) and short-term, operational policies.



### Ukrainian national policy

Ukraine has suffered from the lack of integrated policies. In fact, it has led to uncontrolled agricultural intensification in the country, and accompanying soil, water, and air pollution. Land ownership is concentrated into the hands of a few, profit-led enterprises. Together, these issues have caused migration from rural to urban areas, increased unemployment, and a growing divide between rich and poor.

The IIASA project—Integrated Modeling of Robust Solutions for Food, Energy, and Water Security Management—has provided advice that has led to real improvements in sustainable management in Ukraine. For the project, IIASA partnered with its National Member Organization the National Academy of Sciences of Ukraine (NASU), and a network of institutes and policymakers. The project has produced a “multi-model framework,” which allows models developed for different

### Impacts

- In the run up to the 2015 Paris climate agreement, the IIASA-NASU project provided the Ukrainian government with crucial advice on low-carbon energy sector reform, and the costs of the policy options for climate change mitigation and adaptation. This helped inform the Ukrainian position in the negotiations and set the country's nationally determined climate contributions.
- The IIASA-NASU project contributed evidence for the Ukrainian “National inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases”—part of a larger report for the UN Framework Convention on Climate Change.
- The IIASA-NASU project helped develop the Ukrainian “Common Cross-cutting Strategy of Agriculture Development,” detailing agricultural policy based on the principles of the sustainable development. It highlights the need for proper financial support for small-scale farms, which are crucial to food security in the country but increasingly vulnerable in the face of trade liberalization, increasing competition, as well as production and market risks.
- Recommendations from the IIASA-NASU project on effective carbon trading (a requirement of the EU-Ukraine Association Agreement) were included in the “National Energy Strategy of Ukraine-2035.”
- Methods developed by the IIASA-NASU project for ensuring robust policy in the face of uncertainty were used in the sustainable development plans for major Ukrainian cities.



**Further information:**  
[www.iiasa.ac.at/impacts/integratedmodeling](http://www.iiasa.ac.at/impacts/integratedmodeling)