International Institute for
Applied Systems Analysis
Schlossplatz 1
A-2361 Laxenburg, Austria

Tel: +43 2236 807 0
Fax: +43 2236 71313
E-mail: info@iiasa.ac.at
Web: www.iiasa.ac.at

Value of IIASA Membership

IIASA benefits countries with IIASA membership by helping them to:

1. Better understand and find solutions to the complex global systems that are integrally connected to and impinge on their country's economy, environment, government, and society by applying systems analysis to strategic issues of member country development and transformational agendas and policies in their regional and global contexts.
2. Develop the research and science-to-policy base for system analytical approaches in their country through international scientific collaborations and capacity development and training programs in order to contribute to a country's scientific excellence and international R&D competitiveness.
3. Establish new multilateral scientific relationships that contribute to a country's soft power through science diplomacy and scientific input to international negotiations.

So the "value proposition" for each individual IIASA member country or clusters of member countries resides in a combination of global, regional and national system analytical collaborative projects and capacity development and training activities. With the focus on multilateral projects that add value to all member countries and that are too large for individual countries to carry out on their own.

This paper explains how IIASA benefits its member countries and vice versa, how these benefits are unique, and how member countries through their NMOs can maximize the value of membership.

1. IIASA helps its member countries better understand and find solutions to the complex global systems that are integrally connected to and impinge on a member country's economy, environment, government, and society by applying systems analysis to strategic issues of member country development and transformational agendas and policies in their regional and global contexts.

COUNTRY CHALLENGES: Many of the most serious problems that confront humanity—including climate change, global food security, and sustainable energy—are complex and interconnected. A country's national interests are tightly connected to these complex global systems. Resolving such challenges requires an understanding not only of the detailed components of each element (disciplinary research) but also their dynamic and interconnecting elements (integrated multidisciplinary research). Systems analysis is one of the few research tools that has both the breadth and depth to truly understand global change, and only through this understanding can a country navigate smart pathways through these global challenges and avoid being simply swept along by them. Further to truly understand major global transformations, it is necessary to understand regional dynamics, particularly of those so-called hotspot regions that are undergoing rapid transitions across multiple sectors and having a major determining role on global systems.

WHAT IIASA OFFERS MEMBER COUNTRIES:

RESEARCH

1. IIASA provides its member countries with over forty years of expertise in applying systems analysis. This research uniquely combines a problem-driven and solution-oriented focus with an approach that is interdisciplinary, international, independent, and of the highest scientific quality.
2. As countries become increasingly interconnected, the complexity and scale of the research questions and challenges grow. But large-scale international interdisciplinary research is expensive. IIASA is one of the few international research institutions that enable member countries to pool their research resources to undertake interdisciplinary research into global change at a fraction of the cost of doing it individually. Further, IIASA adds to these resources through successfully raising funds from third parties (€69 million between 2006 and 2014).
3. As members of IIASA's governing Council, NMOs can steer the Institute's research agenda toward areas of national interest that lay within IIASA's scope of studying global and universal problems.
4. IIASA also works with NMOs to co-design projects that apply systems analysis to global, regional, and national problems. Priority is given to global and regional issues of interest to multiple members, and to national issues that are universal and applicable to many countries.

SCIENCE TO POLICY

1. IIASA benefits member countries through its role as a trusted independent advisor to national and international institutions. Its advice provides options for policymakers that are uniquely based on high-quality science and from a neutral source, particularly important

when investigating contentious issues that cross national borders such as climate change or pollution.

2. The positive economic and social impact at the global, regional, and national level that results from IIASA's systems analysis (see examples below) contributes to the wellbeing of people and protection of the environment in member countries.

EXAMPLES OF IIASA'S VALUE TO MEMBER COUNTRIES:

The following examples show how IIASA has added value to national and international policies in member countries:

i. Getting 33 European countries to agree and implement an international treaty to cut air pollution requires international consensus on the evidence and policies to reduce the pollutants. The independence and quality of the scientific evidence which underpins the international decision making is key. In the 1990s IIASA's RAINS model provided reliable evidence that had been developed by IIASA's multinational and multidisciplinary team. IIASA's model was chosen to be at the center of an international treaty to cut air pollution, the Convention on Long-range Transboundary Air Pollution of the United Nations Economic Commission for Europe. By 2010, the Convention had reduced sulfur dioxide emissions in Europe by over 60%.

ii. A foresight study (2011-12) between IIASA and researchers and policymakers in Finland investigated how to increase the resilience of Finland to seven extreme events ranging from the collapse of the European Monetary Union to major flash floods in Europe. Findings from the project have informed Finnish government policy on the security of supply . Increasing resilience is a common theme that runs through much of IIASA research from developing pest management systems for Canada's forests that adapt to changing environmental conditions; to demonstrating that funding universal education should be a top priority for enhancing societies' adaptive capacity vis-à-vis future climate change.

iii. IIASA analysis supported the Mexican government in preparing financially for the occurrence of a major natural disaster. The research identified the financial shortfall that the government would experience to fund rescue, recovery, and rebuilding following a major earthquake or hurricane. The researchers advised on how this catastrophe risk could be transferred to the international reinsurance and capital markets. As a result, Mexico became the first transition country to issue catastrophe bonds in 2006.

These examples show how IIASA's multinational approach offers value for money:

iv. By pooling expertise of over 500 energy experts from 48 countries, IIASA coordinated a Global Energy Assessment from 2006-12 on behalf of its member countries—far more cost-effectively than if each country had conducted the assessment individually.

v. By combining resources IIASA member countries share the costs of IIASA's research and together invested €11.3 million in the Institute in 2014.

vi. Partnerships with IIASA have helped multiple institutions in member countries win funding from international research funders. For example, between 2006 and 2014, IIASA and Norwegian research partners won over €5 million in research funding from third parties.

2. Develop the research and science-to-policy base for system analytical approaches in a member country through international scientific collaborations and capacity development and training programs in order to contribute to a country's scientific excellence and international R&D competitiveness.

COUNTRY CHALLENGES: Many countries are investing heavily in research and innovation as they are key drivers of economic growth (e.g. China: 2.2% of GDP in R&D, Germany: 3%, Japan: 4% by 2016, Sweden: 4%, and UK: 2.5%). But how can countries maximize the return on this investment? Getting international research exposure for a country's researchers has been shown to be particularly effective in increasing research productivity, equipping researchers with the skills that employers want, and increasing the economic benefits of research to the country. In addition, many countries do not have a large home-grown research base for systems analysis. IIASA provides a cost effective mechanism for a country to enhance its capability in systems analysis by leveraging on IIASA's expertise in this field.

WHAT IIASA OFFERS MEMBER COUNTRIES:

1. IIASA provides a range of incentives, as well as structures, for international research collaboration and encourages the mobility of global scientific talent. Working with researchers from all corners of the globe at IIASA gives a country's researchers access to complementary knowledge, new perspectives, new methodologies, new data, new partnerships, and new sources of funding. Taking a country's research overseas can increase the impact of the research, drive new advances, and create a virtuous cycle of research excellence. Short-term stays, seasonal contracts, sabbaticals, and full- and part-time contracts provide a range of opportunities for researchers to spend time at IIASA and develop more productive and impactful partnerships. IIASA gives preference to researchers from its member countries in research and capacity-building activities. A range of online tools help researchers maintain contact at a distance complementing the personal contacts that are key to developing and cementing relationships. IIASA also encourages visitors. In 2014, over 1400 visitors and event participants came to Laxenburg.
2. Starting with its Young Scientists Summer Program (YSSP) and Postdoctoral Programs, IIASA helps researchers develop international and interdisciplinary research skills as well as forge international research relationships early in their careers—and many of these collaborations and contacts prove to be productive throughout the scientist's career (see YSSP testimonials).
3. IIASA develops, hosts, and maintains a range of databases and models used by scientists and policy makers across the globe. As part of the new Strategic Outlook to 2025, IIASA will develop a policy that articulates issues relating to access, intellectual property rights, and ongoing maintenance and user support with clear added benefits to member countries of these databases and models.
4. Institutions in member countries can establish strategic partnerships directly with IIASA in order to build international research teams with particular expertise. In October 2014, for instance, IIASA and Tsinghua University, China, signed a cooperation agreement. Recently IIASA agreed a partnership with Brazil's National Council for Scientific and Technological Development to fund Brazilian postdoctoral scholars at IIASA. Since 2011 the joint multidisciplinary problem-oriented Ukraine-IIASA project "Integrated modelling of management solution for robust food, energy,

and water security for economic, environmental and social development" has successfully developed skills and expertise on sustainable development in the Ukraine. Since 2012 IIASA has worked with academic and governmental partners in South Africa to run a regional version of the Institute's Young Scientists Summer Program.

EXAMPLES OF IIASA'S VALUE TO MEMBER COUNTRIES:

The following examples show how the research bases in member countries have benefitted:

i. Membership facilitates deeper and more productive research collaborations. For example, IIASA has worked with 73 organizations in Germany which resulted in 691 joint publications between 2008 and 2014.

ii. Membership develops strengths in research methods. For example, collaborations between IIASA and research organizations in two of its member countries—Japan and USA—has advanced the development of integrated assessment models. Cooperation has been formalized by the Integrated Assessment Modeling Consortium which is led by IIASA, Japan's National Institute for Environmental Studies, and Stanford University's Energy Modeling Forum. Recent work includes the Representative Concentration Pathways (RCP) database that provide greenhouse gas emission and other projections for the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

iii. Membership develops research expertise in applying systems analysis to national problems. For example, researchers in the Dutch government worked with IIASA to develop a Dutch version of the IIASA GAINS model. The new model helps ministries to identify cost-effective measures to improve air quality and reduce greenhouse gas emissions in the Netherlands while complying with the country's obligations under European air quality agreements. National versions of GAINS have been developed or are being developed for a number of IIASA member countries including China, Japan, Republic of Korea, Russia, and Sweden. In another example from Asia, researchers and policymakers from the Indonesian government and universities are accessing new data and new methodologies from IIASA in order to develop an Indonesian version of the IIASA GLOBIOM model. IIASA and the Indonesian project team are using the model to negotiate the competing uses of land (agriculture, energy sources, forestry, mining) in Borneo with local stakeholders to develop long-term sustainable policies. The GLOBIOM model is also used in numerous IIASA member countries including for an analysis of the agricultural sector in the Ukraine.

iv. IIASA has enhanced international and interdisciplinary research skills among young researchers in member countries as well as enlarging their global network of collaborators:
    a. Young scientists from China and the USA have particularly benefited from the YSSP with 54 doctoral student from China and 77 from the USA taking part since 2008.
    b. Again since 2008, ten postdoctoral fellows from Sweden have participated in IIASA's postdoc programs.
    c. Between 2007 and 2013, IIASA and TIFAC (the Indian National Member Organization) held 17 training workshops for Indian researchers and policymakers in areas as diverse as mathematical modeling and disaster risk reduction.

3. Establish new multilateral scientific relationships that contribute to a country's soft power through science diplomacy and scientific input to international negotiations.

COUNTRY CHALLENGES: A country's future research success will depend on its ability to collaborate with excellent research and innovation wherever in the world it is. Today, this high-quality science is taking place in more countries than ever before and is reflected in the growing membership of IIASA which now includes the world's five largest economies, and the five BRICS countries (Brazil, Russia, India, China, and South Africa).

Further as the world becomes increasingly globalized and interconnected, the need for scientists to work together to achieve consensus on complex issues and for science to become a more important component of diplomacy and foreign relations is greater than ever. Indeed, the challenges associated with preventing, managing, and resolving natural resource-induced conflicts may well come to define global peace and security in the twenty-first century. Science can play a key role in avoiding these conflicts.

WHAT IIASA OFFERS MEMBER COUNTRIES: IIASA is one of the few international research institutes that offer opportunities for a member country to establish multilateral scientific relationships with 22 other leading scientific nations and their scientific institutions. Each of IIASA's member countries, through their seats on the IIASA governing Council, help create and guide IIASA's research strategy every ten years and research plan every five years. Council discussions have helped shape new projects that focus on issues of strategic interest for member countries involved and enable new scientific relationships to be forged. For example: China, Finland, Norway, Russia, Sweden, and the USA are collaborating on a holistic, integrative assessment of plausible futures for the Arctic. While researchers and policymakers from Austria, the European Commission, Finland, Germany, and Russia, are jointly analyzing the challenges and opportunities for greater economic integration in Eurasia.

Few research organizations have IIASA's experience in science diplomacy. Initially established in 1972 to bring together scientists from either side of the Iron Curtain to research problems common to all advanced economies, IIASA has demonstrated the value of international and interdisciplinary research collaborations such as through conducting one of the first international assessment of climate change in 1978. This approach has been widely adopted, for example by the Intergovernmental Panel on Climate Change. Today, IIASA continues to build international and interdisciplinary consortia to find solutions to some of the greatest societal challenges of our time: feeding the world, smarter management of water, building a sustainable energy system, tackling inequality. And it provides its members with an alternative 'soft power' route to these debates and to the international research which helps underpin them.

EXAMPLES OF IIASA'S VALUE TO MEMBER COUNTRIES:

The following examples show how IIASA has contributed to the foreign policy goals of some of its member countries:

i. In the early 1990s, IIASA's member countries established the Economic Reform and Integration project to bring together leading economists from Eastern and Western Europe,

Japan, USA, and Russia to formulate plans for transforming the former Soviet economy to a market system. Findings from this project underpinned many of the economic reforms that helped Russia make the transition to a market economy.

ii. A key objective of South Africa's foreign policy is to promote greater unity among all the peoples of the Southern African region and to ensure it develops in conditions of peace, security, and stability. In 2012 IIASA launched its first expansion of the successful YSSP with the Southern African Young Scientists Summer Program (SA-YSSP) at the University of the Free State in Bloemfontein, South Africa to develop international and interdisciplinary research skills of young researchers from the countries of the Southern African Development Community.

iii. In 2012 US Secretary of State Hillary Clinton launched the Climate and Clean Air Coalition to Reduce Short Lived Climate Pollutants, which was the first international effort to treat these pollutants as a collective challenge. Research by IIASA and international partners, most notably a paper in *Science*, provided intellectual underpinnings for this coalition through evidence of multiple benefits from targeted measures to reduce methane and black carbon. The international coalition, which initially included IIASA member countries Sweden and USA, now has 46 member countries which are all taking action on short-lived climate pollutants. Dr Markus Amann of IIASA is on the scientific advisory panel.

Examples of the Added Value of Membership

IIASA Activity	Member Country	Member Country	Non-Member Country
Capacity Development Participants in Young Scientists Summer Program 2008-2015	**54 (China)**	**77 (USA)**	**4 (France)**
Research Productivity Publications from country collaborations 2008-2014	**691 (Germany)**	**1052 (Austria)**	**3 (Israel)**
Research Collaborations Partnerships (formal and informal) with organizations in country	**40 (India)**	**45 (Netherlands)**	**1 (Jordan)**
Research Interactions Participants from country at IIASA events in 2015 (to Oct)	**38 (Japan)**	**42 (Sweden)**	**2 (Denmark)**
Developing National versions of IIASA models GAINS	**Republic of Korea**	**Russia**	
Developing new system analytical research methods Founders of the Integrated Assessment Modeling Consortium along with IIASA	**NIES (Japan)**	**Stanford University (USA)**	

OVERVIEW: How IIASA benefits its member countries and how these countries can maximize the value of membership.

What IIASA offers member countries		Interface	What member countries & NMOs offer IIASA
Research focus on systems analysis	Application of systems analysis to major global and universal problems	Council setting of IIASA's strategic research direction through approval of strategic outlook and research plan.	Identification of research priorities for global and universal problems from national perspective
	Pooling of research resources to analyze large, complex global research problems		IIASA membership contributions
	Application of systems analysis to regional or national problems	Bilateral and multilateral NMO and IIASA agreement	Co-design of research problems that are applicable and transferable to a range of other member countries
Science to policy & policy to science	Trusted independent advisor to national and international institutions tasked with implementing solutions to global and universal problems	IIASA roles on relevant national and international advisory bodies	Linking of IIASA to relevant national institutions
	Economic and social impact resulting from IIASA research that has helped shape effective and efficient policies at both national and multinational levels	The final results of IIASA work	Use of impacts to demonstrate the value of IIASA membership to the national funders of NMOs
Capacity development & training & human capital in systems analysis			
	Capacity development among a member country's researchers (PhDs and above) to conduct systems analysis	YSSP, Postdocs, ad-hoc training workshops, research collaborations, ISE	Promotion of capacity development activities in member country and enabling the participation, especially of young scientists, in these programs. Additional targeted capacity development activities will require additional funding.
	Opportunities for researcher mobility and getting international exposure for a member country's researchers in international and interdisciplinary systems analysis	Range of employment and collaboration opportunities at IIASA	Awareness raising of opportunities at IIASA for researchers and facilitation of the international mobility of its researchers
	Access to IIASA data and tools by researchers in member countries	Data made freely available on IIASA	Promotion of tools and data to relevant research groups in member country

		website. Tools available through capacity development activities	
Science diplomacy & international negotiations	Integration of science and foreign policy through multilateral research efforts to address global problems	Council setting of IIASA's strategic research direction	Identification and development of research activities that integrate a country's scientific and foreign policy goals
	Strengthening international scientific relations thereby contributing to a country's soft power	Research collaborations between researchers at IIASA and in member countries	Supporting the development of international research collaborations with IIASA
	Use of IIASA as a neutral venue for multinational events	Events at IIASA	Bring delegations of national experts to relevant IIASA events
Ambassador for systems analysis	Leadership in systems analysis as a research field, development of its tools and methodologies, and advancing of its science	Events, publications, tools & databases	Connecting IIASA with relevant research groups in member country
	Advocacy for and communication of the integrated system analytical approach as a highly effective method to finding solutions for global and universal problems	IIASA communication channels (website, publications, events, etc)	Further dissemination of IIASA materials that demonstrate the value of the systems analysis approach
	Association with a global public good and its multinational scientific approach	Membership of IIASA	Association with prestigious national academy, national research funder or other national organization that acts as NMO
	Access to a global scientific network of systems analysts (researchers and users)	Shared contact database (under development)	Contacts of national IIASA networks