INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS

IIASA

Professor Dr. Pavel Kabat
IIASA Director General and Chief Executive Officer
Professor Earth System Science
Wageningen, Netherlands
THE EARLY 1970s

Sources: nuclearweaponarchive.org, The Guardian
... today - addressing the global challenges of the 21st century
International, independent, interdisciplinary

Research on major global problems

Solution oriented, integrated systems analysis
GROWING IIASA MEMBERSHIP & INTERACTIONS WITH CURRENT MEMBERS
22 COUNTRIES - NATIONAL MEMBER ORGANIZATIONS

25 expected by end of 2015
(See IIASA membership strategy)
CURRENT NEGOTIATIONS ON JOINING IIASA

• UK (visit 11 and 12 Dec 2014)
• Israel (visit 7-9 December 2014)
• Czech Republic, Slovakia, Poland, Italy, Qatar, Saudi Arabia, Iran, Jordan, Turkey
• New: Denmark, France, Switzerland
Portfolio of activities within and across member countries
## Member Countries Networks: Example USA (2008-2014)

<table>
<thead>
<tr>
<th>National Member Organization</th>
<th>National Academy of Sciences (NAS)</th>
</tr>
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<tbody>
<tr>
<td>Membership start date</td>
<td>1972 (founding member)</td>
</tr>
<tr>
<td>Research partners</td>
<td>59 organizations in the US</td>
</tr>
<tr>
<td>Areas of research collaborations</td>
<td></td>
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</tbody>
</table>
  - Advancing Energy and Integrated Assessment Modeling in the US  
  - Global Energy Assessment and the US  
  - Curbing the Release of Black Carbon and Methane  
  - Projecting Changing Population in the US  
  - Improving the Use of Land for Food and for Combating Climate Change  
  - Advising Countries with Economies in Transition  
  - Increasing the Resilience of Vulnerable Communities  
  - Analyzing Ecological and Evolutionary Dynamics |
| Capacity Building            | 68 young scientists from the US have participated in IIASA’s Young Scientists Summer Program  
                                  3 in IIASA’s Postdoctoral Fellowship Program  
                                  3 in the Southern African Young Scientists Summer Program |
| Publication output           | 605 publications                  |
| Staff                        | Over 40 US nationals have been employed by IIASA every year |
# Summary UK (2006-2014)

<table>
<thead>
<tr>
<th>Former membership</th>
<th>Royal Society (1972-1982) and funded by Department of Environment</th>
</tr>
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<tbody>
<tr>
<td>Research partners</td>
<td>57 UK organizations</td>
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</tbody>
</table>
| Areas of research collaborations                       | • Enhancing UK expertise in developing and applying integrated assessment models  
• Working with the UK to analyze and project the future  
• Smarter ways to manage development  
• Feeding a future global population of 9 billion  
• Advancing the research methods of systems analysis |
| Scientific exchange                                    | • Over 340 UK nationals have participated in IIASA events; over 150 researchers from the UK have visited IIASA; while IIASA scientists have visited the UK over 400 times  
• On average 20 UK nationals have been employed by IIASA every year |
| Joint research grants                                  | Between 2006 and 2013, IIASA almost doubled its income by winning research grants that amounted to €62.5 million—22% of which funded projects with 27 UK and other research partners |
| Publication output                                     | 186 publications have resulted from IIASA-UK collaborations     |
SOME LEADING US PERSONALITIES FROM GOVERNMENT AND ASSOCIATED WITH IIASA

McGeorge Bundy

Steven Chu

E. William Colglazier

John P. Holdren

Robert S. McNamara

Norman Neureiter
SOME LEADING US PERSONALITIES FROM ACADEMIA AND ASSOCIATED WITH IIASA

George Dantzig  Nathan Keyfitz  Tjalling Koopmans  Donella & Dennis L. Meadows

William D. Nordhaus  Jeffrey Sachs  Thomas C. Schelling
IIASA: TRULY INTERNATIONAL

- ~300 researchers in house include researcher scholars, research assistants, postdoctoral research scholars, and young scientists from more than 50 countries
- ~25% of IIASA alumni (3,475 people worldwide) remain actively involved in IIASA research
- Active and formalized collaboration with over 300 institutions worldwide
- 900 visitors (science & science diplomacy) coming to IIASA and 180 international meetings hosted in 2013
- ~2050 researchers from some 65 countries involved in IIASA’s research network in 2013
INTERDISCIPLINARY

- Natural Scientists & Engineers: 28%
- Social Scientists: 35%
- Mathematicians and others: 37%
NOBEL PRIZE WINNERS

Professor Tjalling Koopmans and Professor Leonid Kantorovich
Nobel Prize in Economics (1975)
NOBEL PRIZE WINNERS

Professor Paul Crutzen
Nobel Prize for Chemistry (1995)
NOBEL PRIZE WINNERS

Professor Thomas C. Schelling
Nobel Prize for Economics (2005)
NOBEL PRIZE WINNERS

Intergovernmental Panel on Climate Change
Nobel Peace Prize (2007)
IIASA’s DISTINGUISHED VISITING SCHOLARS PROGRAM
CAPACITY BUILDING AND ACADEMIC TRAINING through *research triplets* concept
REGIONAL YSSP: SOUTHERN AFRICA

- 36 participants represent 21 countries (citizens or residents)
- 80+ applicants
- 18 research themes with paired supervisors from IIASA and South Africa
- 9 NMOs funding travel for 15 participants from their countries
POSTDOCTORAL STUDENTS

Artem Baklanov (Russia)
Fulvio di Fulvio (Italy/ Sweden)
Daniel Jessie (US)
Luzma Nava Jiménez (Mexico)
Wei Liu (China)

Carl Salk (US)
Henrik Sjödin (Sweden)

Matthias Wildemersch (Austria) Starting next week
Lisa Scholten (Germany) Starting in 2015

- Funded by: IIASA, Kempe Foundations (Sweden), Colosio Fellowship
- New upcoming funding from: Peter de Janosi Fellowship, Academy of Finland Mobility Postdoctoral Fellowship
Shall I Compare Thee To A Summer’s Day?

by William Shakespeare

Shall I compare thee to a summer’s day?
Thou art more lovely and more temperate.
Rough winds do shake the darling buds of May,
And summer’s lease hath all too short a date.
Sometime too hot the eye of heaven shines,
And often is his gold complexion dimm’d;
And every fair from fair sometime declines,
By chance or nature’s changing course untrimm’d;
But thy eternal summer shall not fade
Nor lose possession of that fair thou ow’st;
Nor shall Death brag thou wander’st in his shade,
When in eternal lines to time thou grow’st:
So long as men can breathe or eyes can see,
So long lives this, and this gives life to thee.
IIASA’S SYSTEMS SCIENCE APPROACH
RESEARCHING GLOBAL CHALLENGES

- Integrated
- Interdisciplinary
- International
- Independent
- Solution-oriented
- Long term
- Trade offs

= Systems Analysis
ADVANCED SYSTEMS ANALYSIS

PAST SUCCESSES

• Dynamic Systems
• Multi-criteria decision analysis
• Adaptive dynamics theory
• Game theory
• Agent-based modeling
• Stochastic optimization

NEW RESEARCH

• Advances in Modeling Dynamic Systems
• Extreme events, Systemic Risks and Robust Solutions
• Integrated Modeling and Decision Support
• Advanced Systems Analysis Forum
SCIENTIFIC OUTPUT
### JOURNAL ARTICLES & CITATIONS

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014*</th>
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<tbody>
<tr>
<td>Peer-reviewed journal articles according to SCOPUS</td>
<td>129</td>
<td>150</td>
<td>175</td>
<td>254</td>
<td>205</td>
</tr>
<tr>
<td>Citations of IIASA publications according to SCOPUS</td>
<td>3544</td>
<td>4590</td>
<td>6467</td>
<td>8867</td>
<td>7514</td>
</tr>
</tbody>
</table>

* Jan to Oct 2014
H-INDEXES

<table>
<thead>
<tr>
<th>SCOPUS</th>
<th>93</th>
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<tr>
<td>Web of Science</td>
<td>98</td>
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</table>

This h-index measures the productivity and impact of the journal articles by IIASA authors in different databases of peer-reviewed literature. An h-index of 93 means that of all IIASA journal articles, 93 articles have been cited more than 93 times.
IIASA AS THE EXPERT ADVISOR

IIASA researchers take part in 80 advisory boards and steering committees, including:

– Leadership Council of the Sustainable Development Solutions Network (SDSN) – input to define Sustainable Development Goals (SDGs)
– UN Secretary General Technical Group on Sustainable Energy for All
– Advisory Council of the German Government on Global Change (WBGU)
– Arctic Council
– UN Food and Agriculture Organization Land and Water Division
Benefits of Systems Approach (Example 1)

- 2006-12: Global Energy Assessment involving 500 experts around the world
- 2009 to date: GEA provides critical input to Un Secretary-General’s Sustainable Energy For All Initiative including defining the aspirational yet feasible objectives:
  1. Ensure universal access to modern energy services
  2. Double the global rate of improvements in energy efficiency
  3. Double the share of renewable energy in the global energy mix
Benefits of Systems Approach (Example 2)

- 2011: IIASA model GAINS identifies 16 measures to curb the release of either black carbon or methane (pollutants that harm human or plant health while simultaneously exacerbating climate change).
- Feb 2012: US State Secretary Hillary Clinton launched the Climate and Clean Air Coalition to Reduce Short Lived Climate Pollutants.
- Today, CCAC has 33 member countries, 39 International Organizations and IIASA’s Markus Amann on scientific committee.

DOI: 10.1126/science.1210026
Jan 2014: European Commission announce 2030 climate and energy goals for a competitive, secure and low-carbon EU economy. These include:

- A reduction in greenhouse gas emissions by 40% below the 1990 level
- An EU-wide binding target for renewable energy of at least 27%

Goals were informed by an extensive impact assessment, for which IIASA researchers contributed data and model results to help policymakers understand future emissions, as well as the potential benefits and costs of various climate policies.
TACKLING AIR POLLUTION IN INDIA

• GAINS ASIA identified advanced air pollution measures for India for next 20 years which will:
  • Increase life expectancy by 2.8 years
  • Avoid 2.5 million premature deaths
  • Pay for themselves by improving health, reducing lost work days, and increasing productivity

DOI: 10.1021/es402867r
**UN**

80% probability that world population, now 7.2 billion, will increase to between 9.6 and 12.3 billion in 2100, with the median at 10.9 billion.

**IIASA**

Most likely scenario indicates that world population will increase to 9.2 billion by 2050, peak at 9.4 billion around 2070 and start a slow decline to 9.0 billion by the end of the century.
...and more than 2000 research associates and fellows world wide as "IIASA external faculty"
Between 2006 and 2014, IIASA’s research was awarded grants that amounted to €69 million. This was part of a total funding portfolio of €329 million of the external projects in which IIASA was and is involved in collaboration with its member countries.
External Funding – Recent Successes

European Research Council Grants - 7 in total including one this week and four since Summer 2013:

• Energy and Emissions Thresholds for Providing Decent Living Standards for All
• Reassessing Ageing from a Population Perspective (€2.2m)
• Crowdsourcing and Ground Data Collection on Land-use and Land Cover (€1.4m)
• IMBALANCE-P explores the Worsening Environmental Problems Related to Nitrogen, Phosphorus, and Carbon (€13m)
SOME IIASA NEW INITIATIVES and NETWORKS: new opportunities for collaborations
NEW INTEGRATED RESEARCH INITIATIVES

- Accounting for social heterogeneity in IIASA models
- Equitable governance of common goods
- Next-generation vegetation models
- Systemic Risk and Network Dynamics
- Unconventional and Shale Gas: A possible bridge to sustainable futures?
- Arctic
- Tropics
- Water Futures and Solutions
New Partnerships

• New Global Think Tank (Alpbach – Laxenburg Group) announced by IIASA and European Alpbach Forum in Sept 2013
• To initiate a new dialogue and partnership between top-academia, governments, businesses and civil society for an integrated systematic approach to fair globalization
ALPBACH LAXENBURG GROUP
MEMBERS INCLUDE

Petr Aven  Ian Chubb  Ralph Cicerone  Tarja Halonen
Chen Jining  Rajendra Pachauri  Mary Robinson  Jeffrey Sachs
EURASIAN ECONOMIC INTEGRATION

- Challenges and benefits of greater economic integration between Russia, Belarus and Kazakhstan
- Future collaboration between Ukraine, Russia and EU
- Scenarios of Eurasian integration from Shanghai to Lisbon, its global integration, and future roles of key players including China, EU, Japan and Russia

Partners include:
- Administration of the President of the Russian Federation,
- European Commission
- Russian Academy of Sciences,
- Eurasian Development Bank,
- Vienna Institute for International Economic Studies
Estimated shale gas resource

14,803 TCF ≈ 15 ZJ → 100 yr of current gas use → 250 PgC

IIASA holistic approach

- Integrating stakeholders, disciplines, issues, information, methods, globally
- For a holistic understanding for all stakeholders
WATER FUTURES & SOLUTIONS (WFaS)

• New book: Water and the Future of Humanity
• Budapest Water Summit
• Changes in water availability and water temperature under climate change are likely to lead to higher electricity prices for most of Europe (Environmental Research Letters)

DOI: 10.1088/1748-9326/8/3/035010
SIX SHOCKS AND KOREA
Low probability but high impact events
- a collapse of the internet
- radical energy price change
- nuclear accident (in a neighboring country)
- food crisis
- a pandemic
- discontinuous transition in retirement age (up to 75 years)
INTERNATIONAL GRADUATE SCHOOL OF EXCELLENCE

- Global network of 35–45 postdoctoral, across-disciplines fellows working at IGSE-affiliated institutions
- Coordinated 5-year program of work on one complex issue
- Issue proposed by IIASA Global Think Tank
- Postdoc group spends 3–4 months per year at IIASA

Target launch: early 2015
Thank you and welcome at IIASA!!