The Energy Program

Current and Future Research Directions

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In the context of diverse objectives.
Science-policy Contribution and Leadership

MESSAGE (IIASA)

Representative Concentration Pathways (RCPs)

Shared Socioeconomic Pathways (SSPs)

IPCC Scenario Database

Global Energy Assessment
Toward a Sustainable Future

Energy Savings

Primary Energy, EJ per year

GEA-Efficiency

2012 INTERNATIONAL YEAR OF SUSTAINABLE ENERGY FOR ALL
Post-Paris climate policy analysis

With INDCs...

How do we get here?

Energy transformation in the context of Human Development

Deeper Sectoral Linkages

Energy-Land-Water-Food Nexus

SDGs

Well-being

Infrastructure

Water

Food

Global

National

Household

Waage et al. 2015, The Lancet
Few IAM-SDG applications exist

**Air quality & health**

Global PM2.5 concentrations ~30.4 µg/m³

Riahi & Rao et al, 2012

**Energy Security**

Jewell et al, 2013; IPCC 2014

**Food security**

Havlik et al

**Thermal water pollution**

Fricko et al, 2016
Global ↔ national ↔ sub-national

Global energy++ system representation
MESSAGE

Detailed sub-national energy++ system
MESSAGE-Brazil

Detailed sub-national energy++ system
MESSAGE-India

Income Distributions and Behavior
Energy for Decent Living (ERC)

Decent Living

Energy Needs

Climate Change Scenarios

India

Brazil

S.Africa

Indonesia

China

Rao & Baer, 2012
Energy for Decent Living

Eradicating “hidden hunger” can reduce GHG affordably for all but the poorest Indians

Durable shelter will require an energy infusion equivalent to 1/3rd annual use

~50 million sub-standard homes
UK Collaborations

Post-Paris Climate
- Adaptive mitigation pathways
- Climate research/curriculum
- IPCC/WGIII (J. Skea) Scenario database

Integrated Assessment
- Tyndall Centre for Climate Change Research
- Transport behavior, End-use technology diffusion
- AMPERE, ADVANCE
- Mitigation pathways

Energy and Human Development
- ‘Low-carbon’ well-being
- Basic needs
- Multidimensional poverty indicators