Integrated Research: Energy and The World in 2050 Collaborative Initiative

Nebojsa Nakicenovic
Deputy Director General
International Institute for Applied Systems Analysis
Professor Emeritus of Energy Economics
Vienna University of Technology

The Key Energy Challenges

Energy Access

Climate Change

Energy Security

Air Pollution

Health Impacts

Nakicenovic
SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all

- 7.1 by 2030 ensure universal access to affordable, reliable, and modern energy services
- 7.2 increase substantially the share of renewable energy in the global energy mix by 2030
- 7.3 double the global rate of improvement in energy efficiency by 2030
- 7.a by 2030 enhance international cooperation to facilitate access to clean energy research and technologies, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technologies, and promote investment in energy infrastructure and clean energy technologies
- 7.b by 2030 expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, particularly LDCs and SIDS
The World in 2050
Integrating knowledge on SDSN pathways to global sustainable development

Inaugural Meeting – 10-12 March 2015
The World in 2050

- Global development within a safe and just operating space and planetary boundaries
- “Safe Space” of interaction among SDGs: integrated models to sustainability narratives
- Transformational pathways based on existing literature e.g. SSPs, GEA, SDSN’s DDPP
- Co-benefits of transformation toward the “safe space” and how to achieve sustainable futures
The World in 2050 “Consortium”

- AIMES
- Future Earth
- Centre for Integrated Studies on Climate Change and the Environment
- Earth League, whole Earth system modelling initiative
- Earth Institute, Columbia University
- Global Ocean Ecosystem Dynamics (GLOBEC)
- Indian Institute International Futures
- Indian Institute of Technology (IIT)
- International Energy Agency (IEA)
- International Food Policy Research Institute (IFPRI)
- International Monetary Fund (IMF)
- International Institute for Applied System Analysis (IIASA)
- Joint Global Change Research Institute at Pacific Northwest National Laboratory (PNNL JGCRI)
- National Center for Atmospheric Research (NCAR)
- National Institute for Environmental Studies (NIES)
- UN Population Division
- UNEP- World Conservation Monitoring Centre (UNEP-WCMC)
- World Bank
- Organisation for Economic Co-operation and Development (OECD)
- Potsdam Institute for Climate Impact Change (PIK)
- PBL - Netherlands Environmental Assessment Agency
- Stanford University
- Stockholm Resilience Centre
- The City University of New York (CUNY)
- Tsinghua University

Nakicenovic
Cumulative Carbon Emissions

RCP 2.6
Global Primary Energy
Historical Evolution

- Other renewables
- Nuclear
- Gas
- Oil
- Coal
- Biomass

1850 - 2000

Nakicenovic
2015 #9
Global Primary Energy
A Transformational Pathway

- Energy savings (efficiency, conservation, and behavior)
  ~40% improvement by 2030
- ~30% renewables by 2030

Source: Riahi et al, 2012

Nakicenovic

Savings
Other renewables
Nuclear
Gas
Oil
Coal
Biomass

Nat-gas-CCS
Coal-CCS
Bio-CCS – negative CO₂

Renewables
Nuclear
Gas
Oil
Coal
Biomass
European Primary Energy
A Transformational Pathway

- Savings
- Other renewables
- Nuclear
- Gas
- Oil
- Coal
- Biomass

- Renewables
- Nuclear
- Gas
- Oil
- Coal
- Biomass

Nakicenovic

Global Energy Assessment
Toward a Sustainable Future

2015 #11
Russian Primary Energy
A Transformational Pathway

Nakicenovic

2015 #12
Global Water Withdrawals
A Transformational Pathway

Source: Fricko et al, 2014
Multiple Benefits of Integrated Policies

Added costs of ES and PH are comparatively low when CC is taken as an entry point.

Source: McCollum, Krey, Riahi, 2012
THANK YOU

naki@iiasa.ac.at