UN Conference on Human Environment, 1972
(1st Earth Summit)
Villach Conferences 1985 & 1987
IIASA Climate Change Related Reports

Scientific Assessments: Credible, Salient and Legitimate.
What was the policy impact of these and many other science reports?

Source: Alex Röhrl, UN DESA
2030 GEA Goals and Targets

- Universal Access to Modern Energy
- Double Energy Efficiency Improvement
- Double Renewable Share in Final Energy

Aspirational & Ambitious but Achievable
Global Primary Energy

Historical Evolution

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

Historical timeline from 1850 to 2000 with key technological advancements:
- Dampfmachine
- Elektrischer Motor
- Ottomotor
- Vakuumröhre
- Kommerzielle Luftfahrt
- Fernseher
- Nuklearenergie
- Mikrochip
- Renewables

Evolution of energy sources from biomass to nuclear and renewables.

Nakicenovic
Global Primary Energy
A Transformational Pathway

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

Savings
Other renewables
Nuclear
Gas
Oil
Coal
Biomass

Source: Riahi et al, 2012
Global Water Withdrawals
A Transformational Pathway

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

Nakicenovic  Source: McCollum et. al, 2012; IPCC, 2014  2017  #10
Japan – SDG Implementation Guiding Principles & Specific Measures to Achieve SDGs

Nakicenovic

2017 #11
“Science must be at the heart of this process so as to help achieve synergies and avoid conflicts among the 17 SDGs.”
10 Member Group in support of the Technology Facilitation Mechanism

Source: Alex Röhrl, UN DESA
Independent group of 15 scientists to draft the quadrennial GSDR (since Jan 2017)

Source: Alex Röhrl, UN DESA
How to achieve global development within a safe and just operating space

“Safe space” of interaction among SDGs: sustainability narratives and integrated models e.g. SSP1, GEA, DDPP

Multiple-benefits and tradeoffs of transformation toward sustainable futures
The World in 2050 Consortium

- Analysis, Integration and Modelling of the Earth System (AIMES)
- Brazilian Federal Agency for the Support and Evaluation of Graduate Education (CAPES)
- Centre for Integrated Studies on Climate Change and the Environment (CIRED)
- Climate Center Service Germany (GERICS)
- Commonwealth Scientific and Industrial Research Organization (CSIRO)
- Earth League, whole Earth system modelling initiative
- Earth Institute, Columbia University
- Energy Planning Program, COPPE, Federal University of Rio de Janeiro
- Environmental Change Institute (ECI) at the University of Oxford
- Fondazione Eni Enrico Mattei (FEEM)
- Future Earth
- Future Ocean
- German Development Institute / Deutsches Institut für Entwicklungspolitik (DIE)
- 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 Research Centre, European Commission
- Joint Global Change Research Institute at Pacific Northwest National Laboratory (JGCRI/PNNL)
- Millennium Institute
- MIT Joint Program on the Science and Policy of Global Change
- National Center for Atmospheric Research (NCAR)
- National Institute for Environmental Studies (NIES)
- National Renewable Energy Laboratory (NREL)
- Organisation for Economic Co-operation and Development (OECD)
- Potsdam Institute for Climate Impact Change (PIK)
- PBL - Netherlands Environmental Assessment Agency
- Research Institute of Innovative Technology for the Earth (RITE)
- Stockholm Resilience Centre
- Sustainable Development Solutions Network (SDSN)
- Tsinghua University
- UN DESA
- UNEP
- World Bank
Vision: Sustainable Future

Growing number of actors of change:
- green businesses
- cities
- civil society
- science
- IGOs (UN etc.)

Incremental Transformation Diffusion

New values and norms

2030: Achievement of SDGs

2050: Sustainability transformation

Legitimacy of BAU eroding

“Doing More with Less” within Planetary Boundaries

Source: After WBGU, 2011
The World in 2050 (TWI2050.com)

“Doing More with Less” within Planetary Boundaries

Vision: Sustainable Future

→ New values and norms

→ 2050: Sustainability transformation

→ 2030: Achievement of SDGs

Transformation Diffusion

Legitimacy of BAU eroding

Incremental  Radical  Transformational

Source: After WBGU, 2011
Easter Parade on Fifth Avenue, New York, 13 years apart

1900: where’s the car?  
1913: where’s the horse?

Source: Campanale, Carobntracker
THANK YOU

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