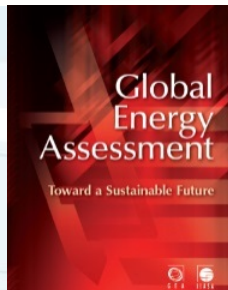




International Institute for
Applied Systems Analysis
www.iiasa.ac.at

science for global insight



Nebojsa Nakicenovic

Deputy Director General

International Institute for Applied Systems Analysis

Professor Emeritus of Energy Economics

Vienna University of Technology

Institutional Review, IIASA – 27 February 2017

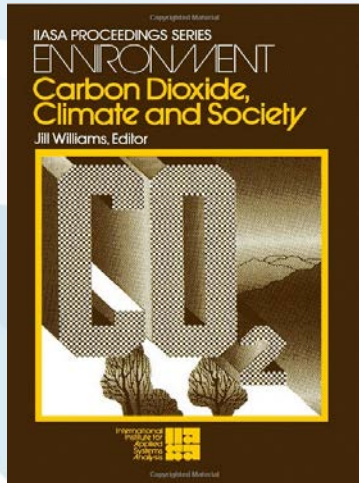


IIASA, International Institute for Applied Systems Analysis

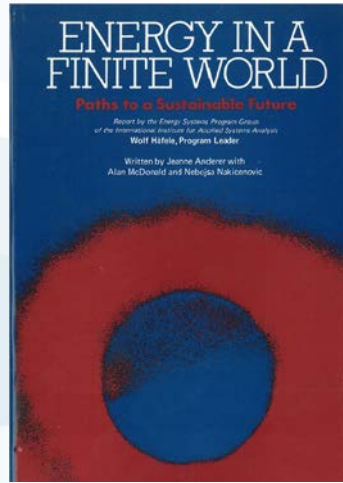
UN Conference on Human Environment, 1972 (1st Earth Summit)

Villach Conferences 1985 & 1987

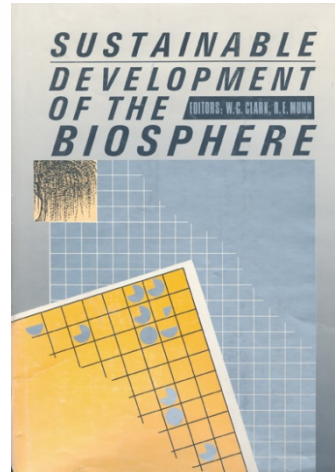
IIASA Climate Change Related Reports



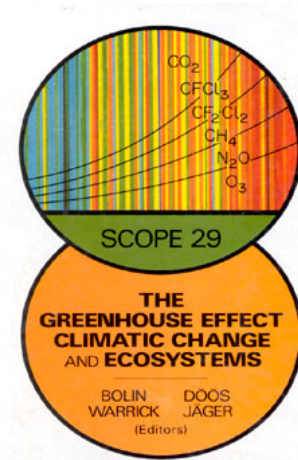
1978



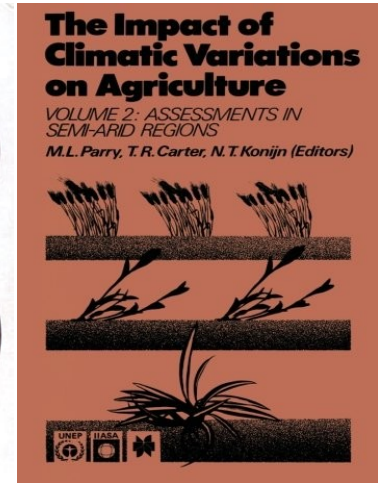
1981



1986



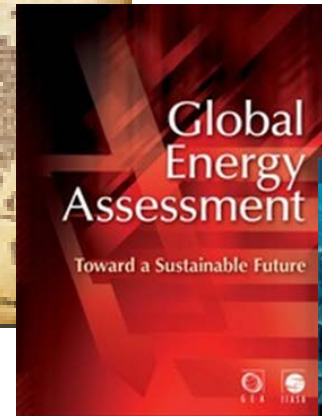
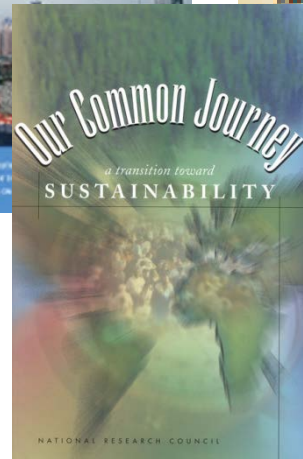
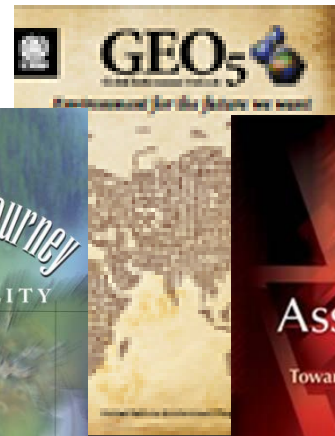
1986

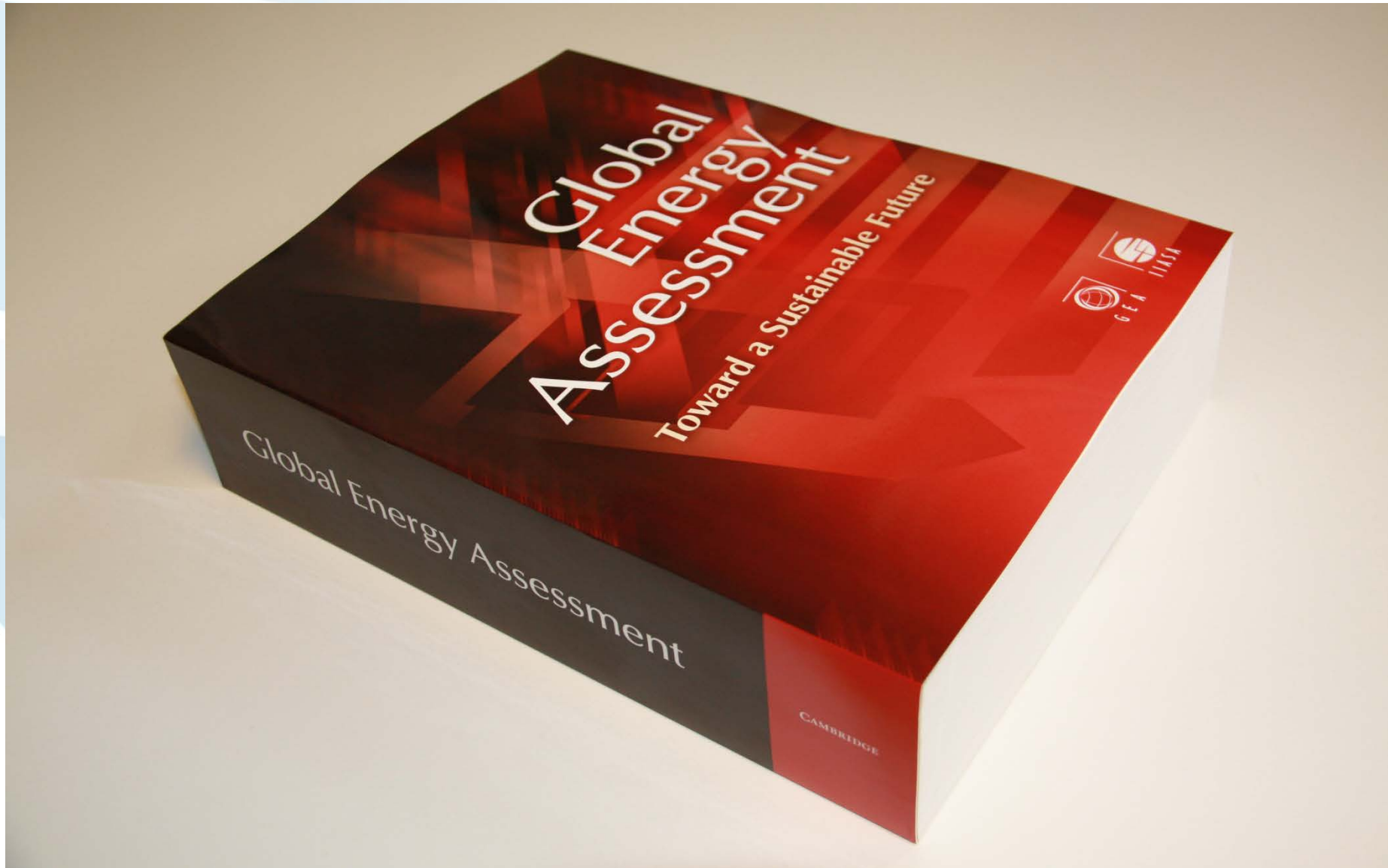


1988

Scientific Assessments: Credible, Salient and Legitimate.

What was the policy impact of these and many other science reports?





Global Energy Assessment

Toward a Sustainable Future



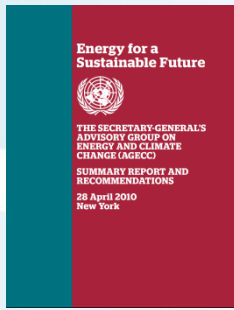
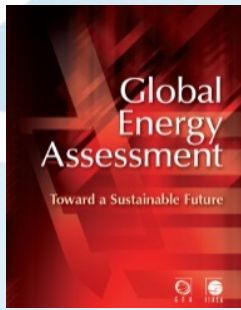
Energy for a Sustainable Future



**THE SECRETARY-GENERAL'S
ADVISORY GROUP ON
ENERGY AND CLIMATE
CHANGE (AGECC)**

**SUMMARY REPORT AND
RECOMMENDATIONS**

**28 April 2010
New York**



SUSTAINABLE ENERGY
FOR ALL

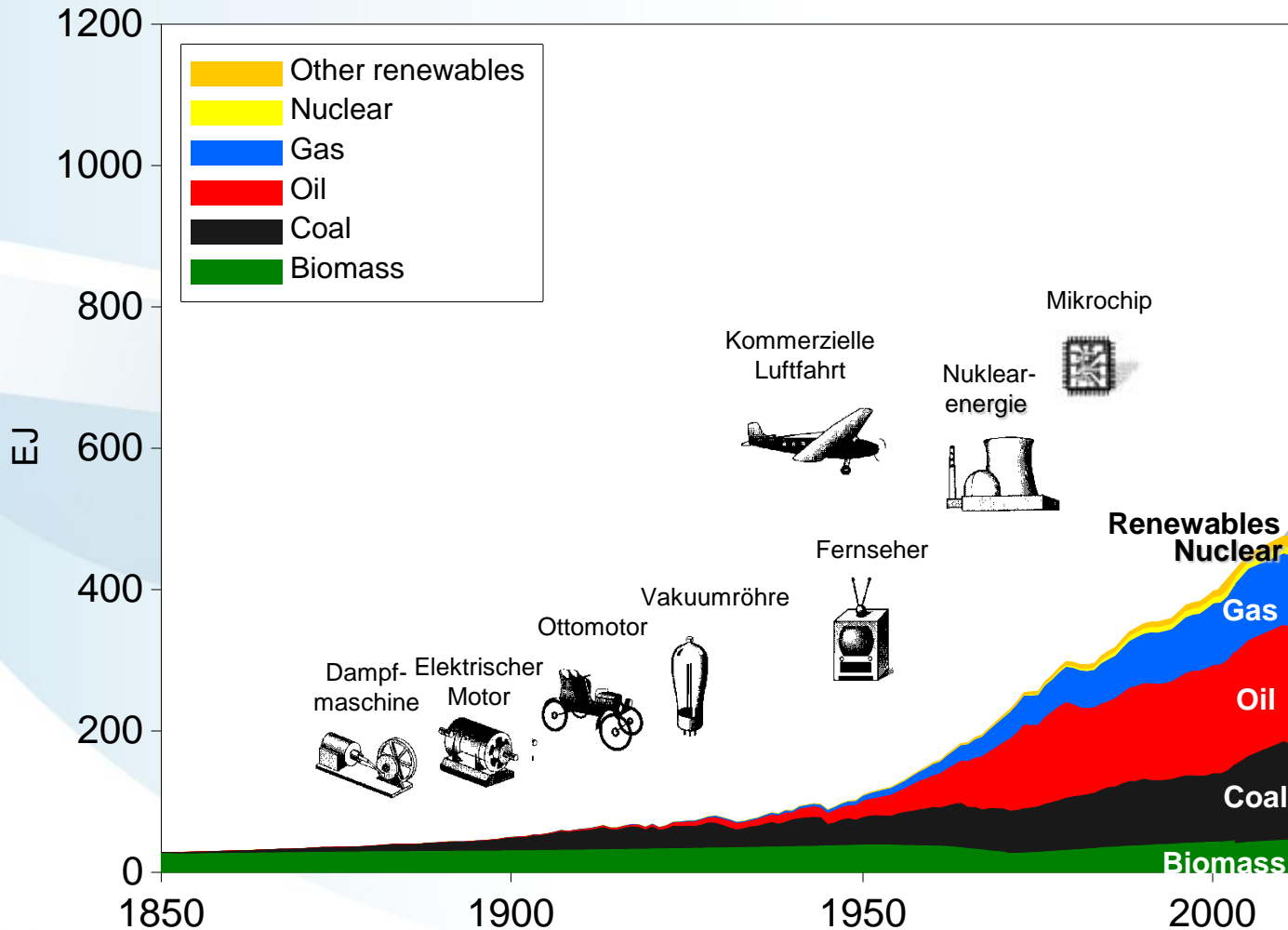
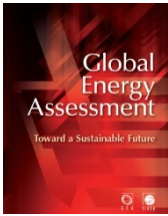


2030 GEA Goals and Targets

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

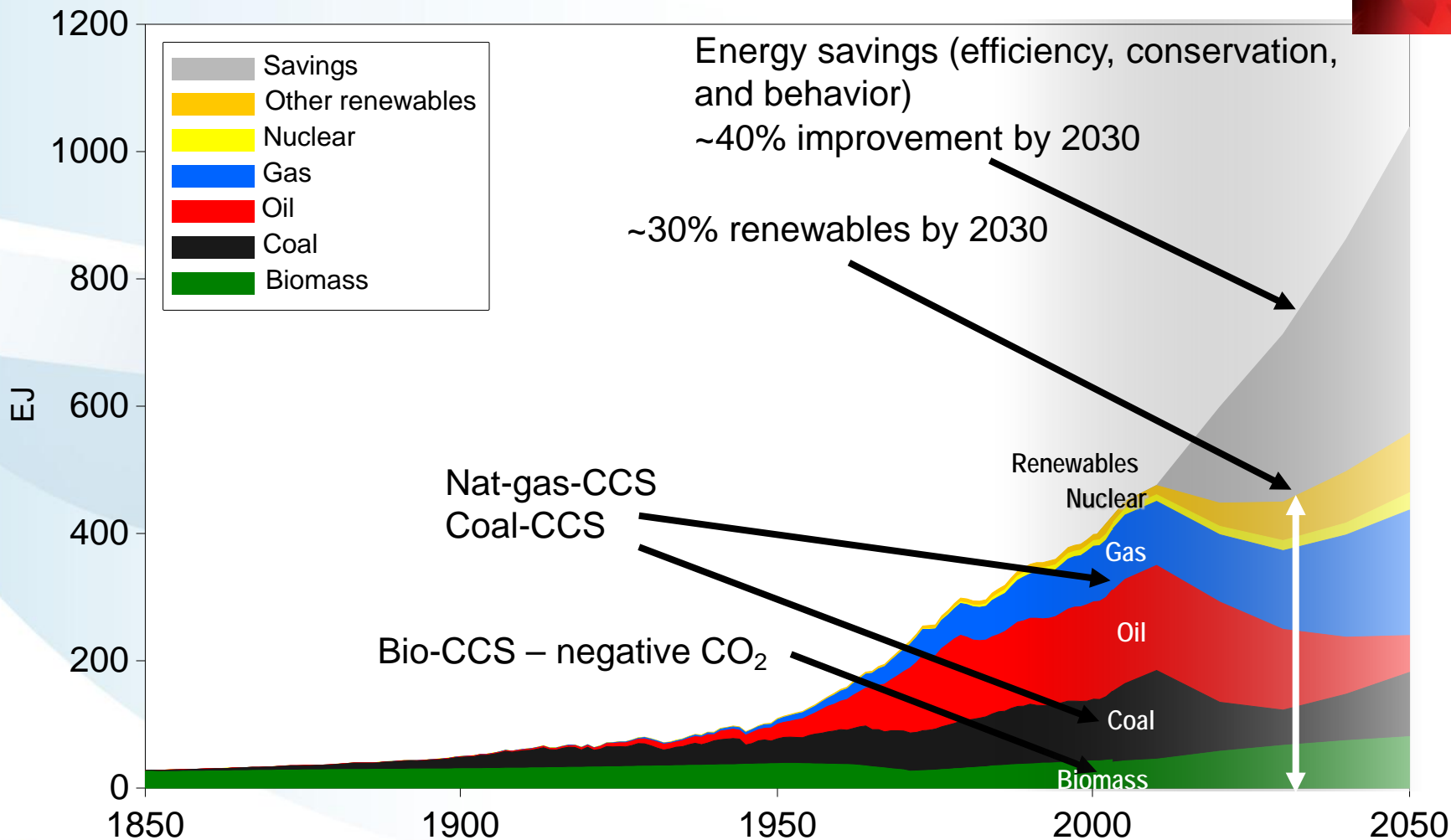
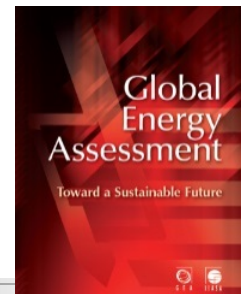
Aspirational & Ambitious but Achievable

Global Primary Energy Historical Evolution



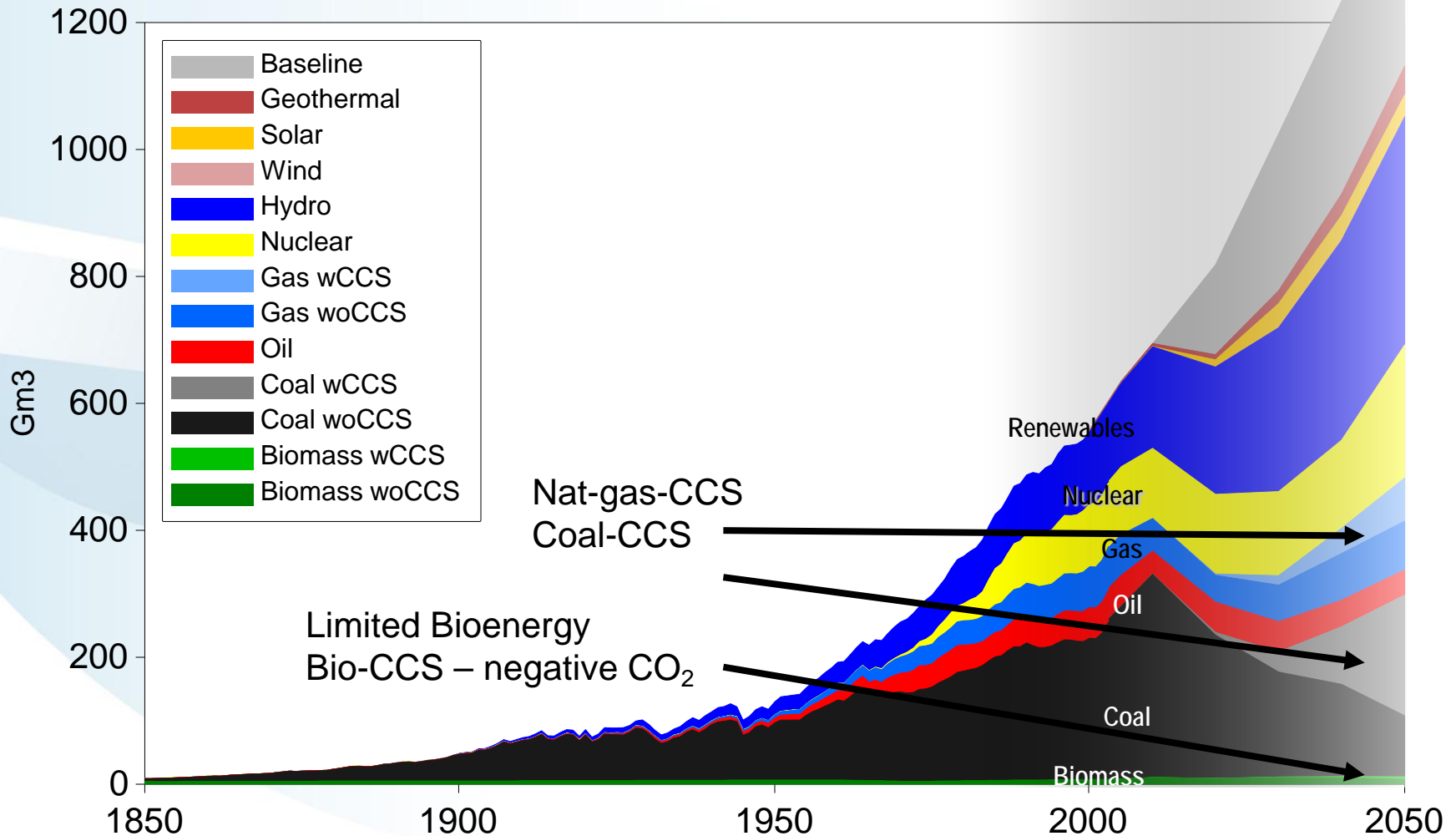
Global Primary Energy

A Transformational Pathway

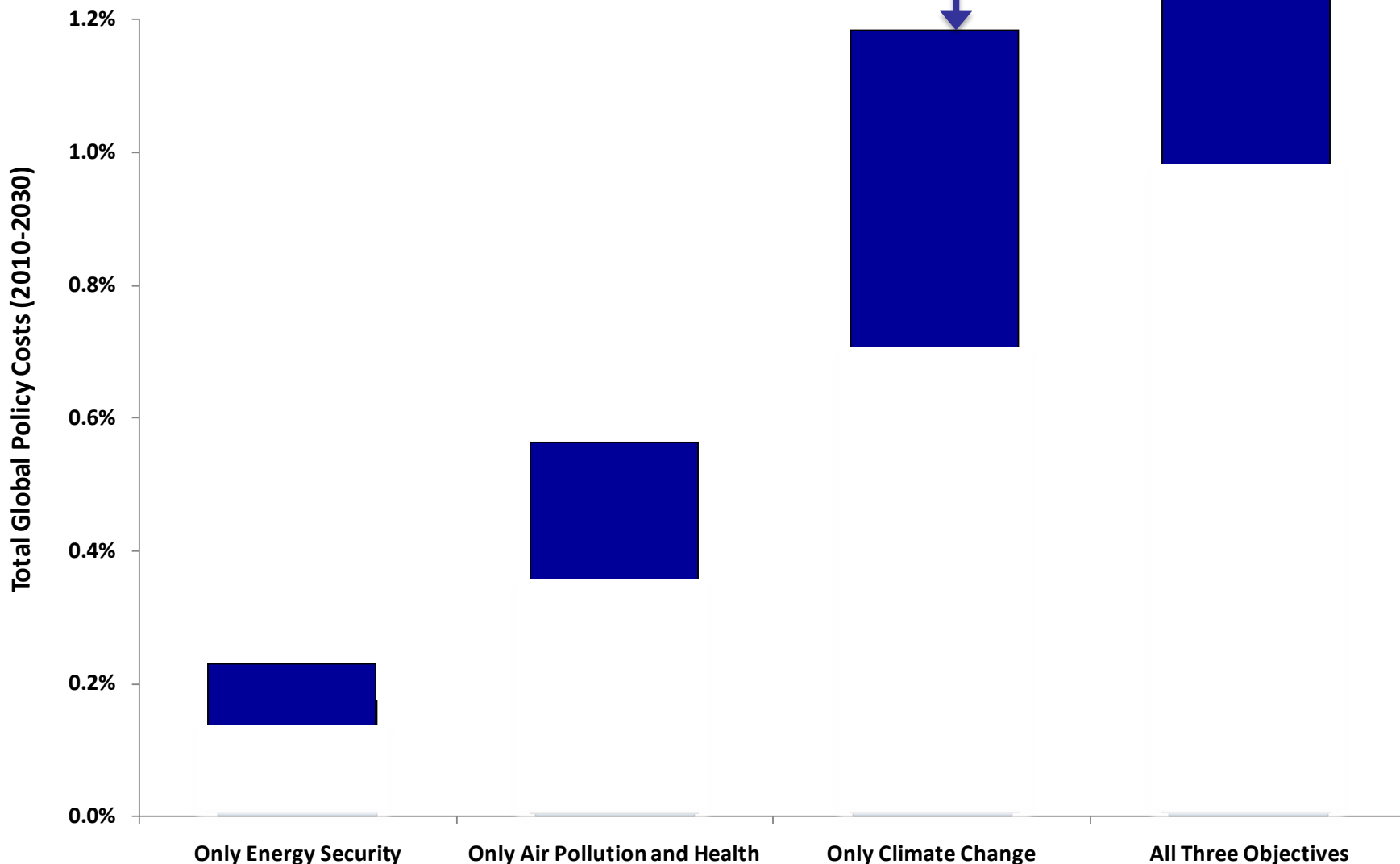


Global Water Withdrawals

A Transformational Pathway



Multiple Benefits of Integrated Policies





SUSTAINABLE DEVELOPMENT GOALS



➔ Japan – SDG Implementation Guiding Principles & Specific Measures to Achieve SDGs



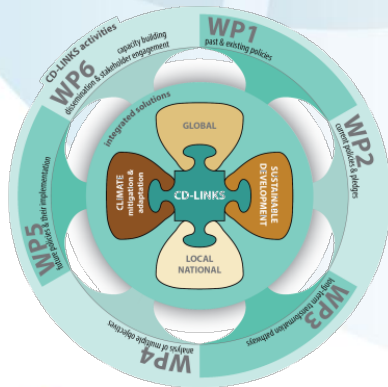
SUSTAINABLE DEVELOPMENT GOALS

IIASA Research

“Science must be at the heart of this process so as to help achieve synergies and avoid conflicts among the 17 SDGs.”

nature

CD-LINKS



IIASA Partnerships



The World In 2050

Stockholm Resilience Centre
Sustainability Science for Biosphere Stewardship



THE EARTH INSTITUTE
COLUMBIA UNIVERSITY

Global Commons

Nexus Solutions Partnership

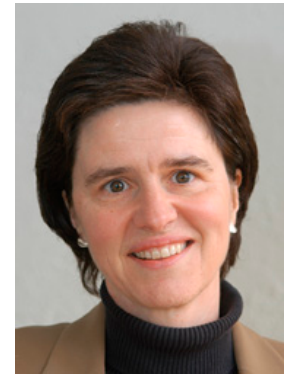


10 Member Group in support of the Technology Facilitation Mechanism



Source: Alex Röhrli, UN DESA

Independent group of 15 scientists to draft the quadrennial GSDR (since Jan 2017)



Source: Alex Röhrli, UN DESA

The World in 2050 (TWI2050.com)

- ➔ 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

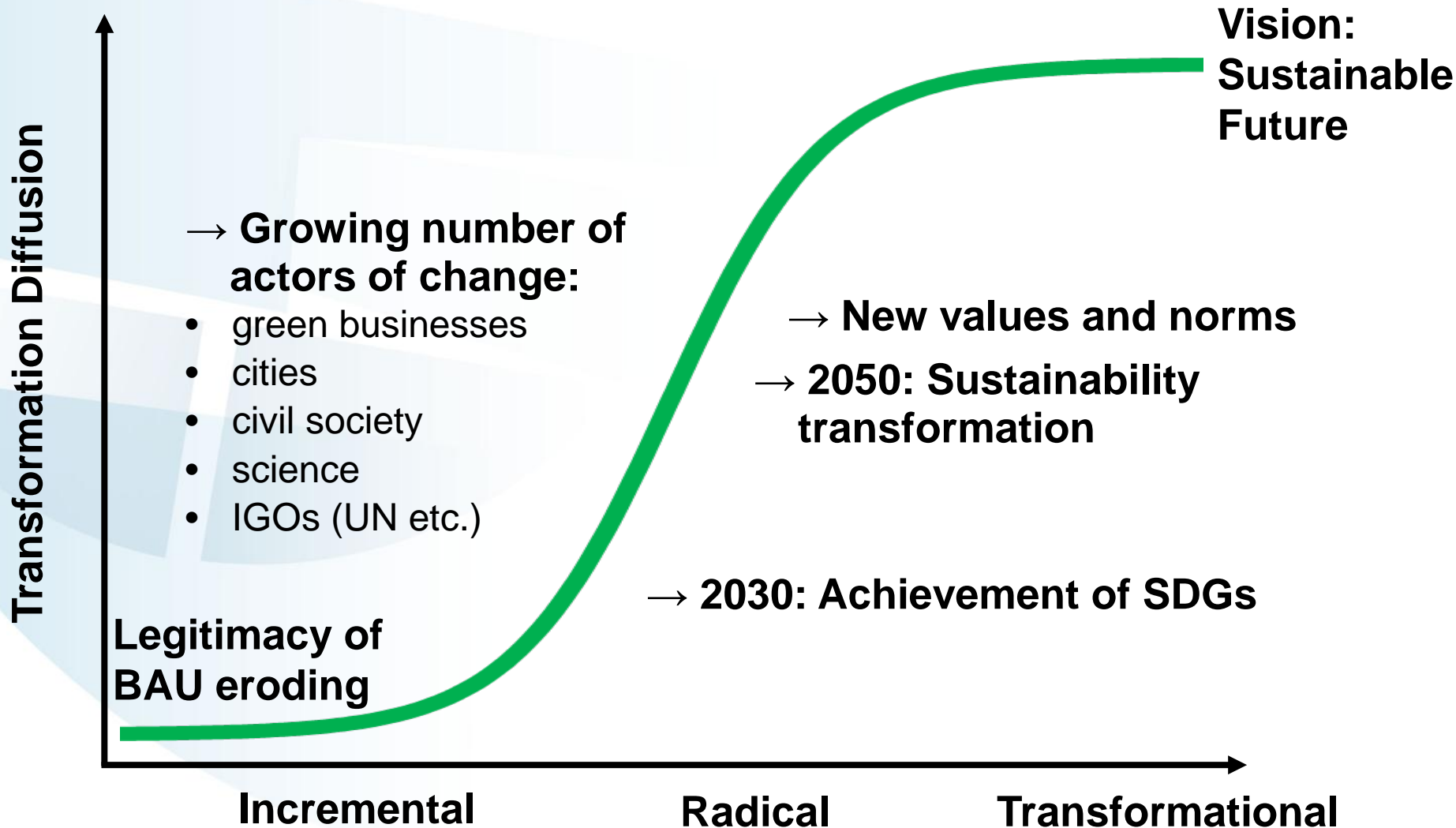
The World in 2050 Consortium

- 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



The World in 2050 (TWI2050.com)

“Doing More with Less” within Planetary Boundaries



The World in 2050 (TWI2050.com)

“Doing More with Less” within Planetary Boundaries



Disruptive Change

Easter Parade on Fifth Avenue, New York, 13 years apart

1900: where's the car?

1913: where's the horse?



Images: L, National Archive, www.archives.gov/research/american-cities/images/american-cities-101.jpg
R, shorpy.com/node/204.

Inspiration: Tona Seba's keynote lecture at AltCar, Santa Monica CA, 28 Oct 2014,
<http://tonyseba.com/keynote-at-altcar-expo-100-electric-transportation-100-solar-by-2030/>

Select region(s), scenario(s), and variable to define your query

(1.) Regions:

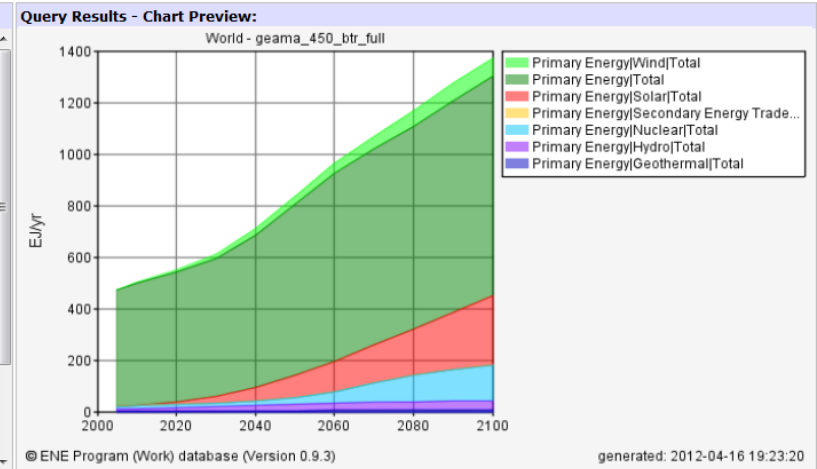
- World
- 2 Regions
 - North
 - South
- 5 Regions
 - OECD
 - REF
 - ASIA
 - MAF
 - LAC
- 11 Regions
 - AFR
 - CPA
 - EEU
 - FSU
 - LAC
 - MEA
 - NAM
 - PAO
 - PAS
 - SAS

(2.) Scenarios:

- Illustrative GEA pathways
 - MESSAGE
 - GEA-Supply
 - GEA-Mix
 - IMAGE
 - GEA-Supply
 - GEA-Mix
 - GEA-Efficiency
- Baselines
 - MESSAGE
 - IMAGE
- Restricted supply pathways
 - GEA-Supply
 - Conventional transport
 - Full Portfolio
 - No Nuclear
 - Advanced transport
 - Full portfolio (see illustrati
 - No BioCCS
 - No Sink

(3.) Variables:

- Population
- Economy
- Resource
- Primary Energy
 - Total
 - Fossil
 - Coal
 - Oil
 - Gas
 - Biomass
 - Nuclear
 - Hydro
 - Wind
 - Solar
 - Geothermal
 - Secondary Energy Trade
- Primary Energy (substitution method)
- Secondary Energy
- Final Energy
- Bunker Fuels
- Trade
- Climate



Query Results:

Region	Scenario	Variable	Unit	2005	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
World	GEA - geama_450_btr_full	Primary Energy Geothermal Total	EJ/yr	0.354	0.496	0.679	1.144	2.387	3.499	4.958	6.014	7.081	8.207	7.732
World	GEA - geama_450_btr_full	Primary Energy Hydro Total	EJ/yr	10.413	12.162	14.659	17.950	22.359	26.914	29.043	30.204	32.004	33.173	33.613
World	GEA - geama_450_btr_full	Primary Energy Nuclear Total	EJ/yr	9.967	10.275	12.518	14.336	16.746	25.441	43.742	76.686	101.343	122.339	137.720
World	GEA - geama_450_btr_full	Primary Energy Secondary Energy Trade Total	EJ/yr											
World	GEA - geama_450_btr_full	Primary Energy Solar Total	EJ/yr	0.332	0.973	8.735	26.160	51.177	84.471	116.473	146.978	178.382	221.821	272.185
World	GEA - geama_450_btr_full	Primary Energy Total	EJ/yr	449.980	475.175	505.887	535.493	593.650	664.524	730.073	760.521	788.541	820.772	849.980
World	GEA - geama_450_btr_full	Primary Energy Wind Total	EJ/yr	0.385	1.207	5.933	14.226	23.540	31.025	40.862	48.223	60.498	68.765	69.815

© ENE Program (Work) database (Version 0.9.3) generated: 2012-04-16 19:23:19

Output Options:

- Microsoft Excel
- Portable Network Graphics
- Scalable Vector Graphics

Notes:

- Direct equivalent is an accounting method for primary energy; direct equivalent primary energy of noncombustible renewables and nuclear is equal to their secondary energy output.
- Regional primary energy use does not include use of or losses incurred in international shipping and transport in pipelines. Shipping fuel consumption and emissions are separately accounted for at the global level.



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THANK YOU



naki@iiasa.ac.at



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