

# Global Energy Assessment

Toward a Sustainable Future



# THE GLOBAL ENERGY ASSESSMENT

Energy is essential for human development, and energy systems are a crucial entry point for addressing the most pressing global challenges of the 21st century, including sustainable development, poverty eradication, adequate food production and food security, improved public health, climate protection, conservation of ecosystems, and even peace and security.

Yet, more than a decade into the 21st century, energy systems are not transforming rapidly enough to meet these challenges.

The Global Energy Assessment (GEA) is a major, multi-year initiative designed to assess these integrated global challenges in our rapidly changing world.

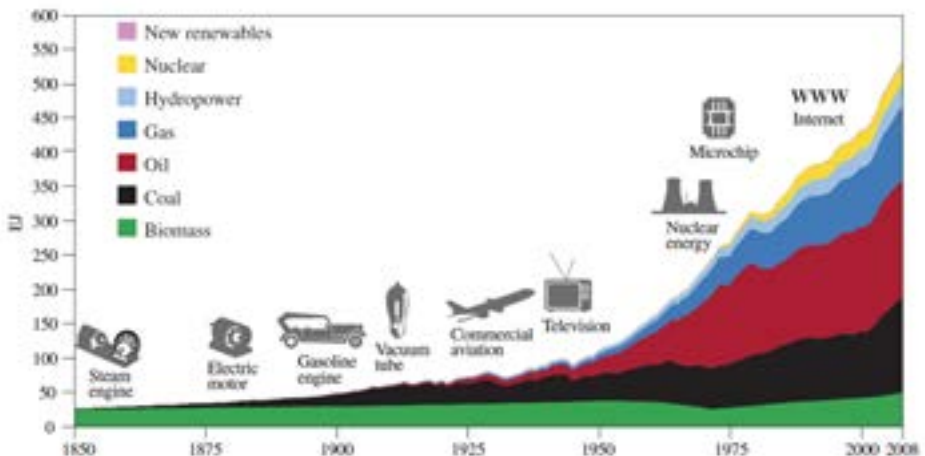
The GEA report has been called an “encyclopedia of the future of the planet.” It brings together assessments of the energy and development challenges facing the world with a plausible structure of future energy systems most suited to addressing the century’s challenges.

Both the report and the global community of experts who contributed to the analyses provide critical resources for the development of policies to meet the challenges.

Most importantly, the GEA shows that this major transformation of energy systems worldwide is feasible, if the political will is there to bring it about.

## SUMMARY FOR POLICY MAKERS

Figure SPM-1 and GEA Chapter 1 Figure 1.9



“Figure SPM-1 Evolution of primary energy shown as absolute contributions by different energy sources in exajoules (EJ)”

## NO TIME FOR DELAY

The GEA analysis found that energy transformations must be initiated without delay, gain momentum rapidly, and be sustained for decades.

Improving efficiency is the most immediate and cost-effective option for reducing adverse environmental and health impacts.

Achieving efficiency goals will however require a change from current energy demand patterns and updating of obsolete technologies.

The GEA shows how renewable energy technologies (biomass, hydro, wind, solar and geothermal) could grow to over a half of the global energy supply by 2050.

Half the world's new electric generating capacity added during 2008–2010 was renewable, the majority in developing countries.

The report assesses policy options and timetables for governance changes required to accomplish the technological advances and energy system changes needed.

These policies integrate global concerns, such as climate change, into local and national policy priorities, with an emphasis on energy options that can address multiple challenges simultaneously.

Innovative economic policies would be needed to attract investments that will finance the new technologies and systems.

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## REQUIREMENTS FOR FUNDAMENTAL CHANGE

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GEA finds common requirements for transformation across the many areas of intervention. Research, development, demonstration, and deployment must be accelerated. Investment must be enhanced and reoriented.

Capacity building is essential to ensure that countries, regions, and policymakers are able to design and implement policies.

Changes in lifestyles and patterns of consumption and production are essential. New methodologies (such as green accounting practices) and policy tools can offer opportunities to influence public thinking, opinion, and behavior on energy questions.

The GEA brings analysis of all of these issues together in a single volume, offering a foundation for future work and analyses by energy researchers and policy makers around the world.

## BENEFITS AND COST OF CHANGE

The transformation required to meet all these goals will touch all elements of the energy system, and the GEA analyses offer sustainable pathways forward for fossil fuels in combination with improvements in efficiency and carbon capture and storage (CCS) technologies.

Sustainable energy can bring health benefits from improved systems that pollute less. Broader energy access can offer societal benefits in terms of increased opportunities for economic development.

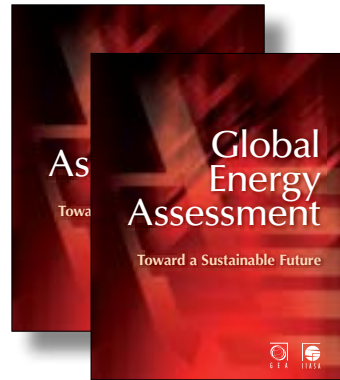
The GEA pathways describe transformation that will come at a cost, but not an insurmountable cost.

Present estimated spending in the energy sector (~US\$1.3 trillion) is about 2% of the world's annual GDP. GEA pathways suggest that transforming energy technologies and supply by 2050 would require that yearly spending to increase, reliably, to approximately US\$1.7-2.2 trillion – or approximately 2.6-3.3% of the world GDP.

In the immediate term, universal access could be achieved by 2030 with as little as an additional US\$40 billion per year, an increase of less than 3% in the current yearly spending on global energy systems.

This investment would provide modern energy services to the 3 billion people who rely on solid fuels for cooking or heating, and the 1.4 billion who are currently without access to electricity.

The GEA energy access strategies build on successful programs in a number of developing countries such as Brazil, Mexico, and South Africa.



Download the GEA at  
[www.GLOBALENERGYASSESSMENT.org](http://www.GLOBALENERGYASSESSMENT.org)

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# PATHWAYS TOWARD A SUSTAINABLE FUTURE

The Global Energy Assessment (GEA) is a state-of-the-art assessment that examines the energy aspects of some of the major challenges of the 21st Century, such as climate change, economic and social development, human well-being, sustainable development, and global security.

This assessment examines not only the major challenges of the 21st Century, and the importance of energy to each, but also the resources available and the various technological options, the integrated nature of the energy system and the various enablers needed, such as policies and capacity development.

The GEA explores 60 energy scenarios and finds that 41 of those are compatible with sustainable development criteria, but achieving these goals requires a radical transformation of the present energy system.

All of the GEA pathways include very strong efforts in energy efficiency improvement for buildings, industry, and transportation, offering much-needed flexibility to the energy supply system.

The GEA assessed a broad range of resources, technologies, and policy options for energy systems to address five interwoven challenges to a sustainable planetary future:

◇ AFFORDABLE GLOBAL ENERGY ACCESS

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◇ ENERGY SECURITY FOR ALL NATIONS AND COMMUNITIES

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◇ LIMITS TO GREENHOUSE GAS EMISSIONS

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◇ IMPROVEMENTS IN INDOOR AND OUTDOOR AIR QUALITY

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◇ ENHANCED GLOBAL ECONOMIC OPPORTUNITIES WITH REDUCED ENERGY SYSTEM-RELATED RISKS

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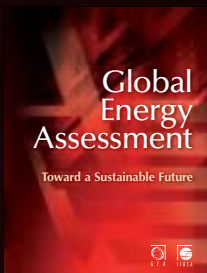
# GLOBAL ENERGY ASSESSMENT

The GEA is an independent and scientific analysis, authored by over 300 of the world's leading energy experts in research, academia, business, industry, and government, and reviewed by over 200 other energy authorities.

The 2000-page report, available for free download on the Web, comprises 25 Chapters in 4 Research Clusters:



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**Cluster I** Major global issues and energy (Poverty & Development, Environment, Health, Security, Economy)

**Cluster II** Energy resources and technological options (assessment of the components available to build future energy systems)

**Cluster III** Describing possible sustainable futures (pathways and linkages to key global transition challenges such as urban development, energy access, water and bioenergy, and lifestyles)

**Cluster IV** Realizing energy for sustainable development (policies to address the challenges)

Each chapter offers a thorough analysis of one critical element of the energy system, exploring in depth the options presented in the scenarios, linking to issues raised in other chapters, and including extensive references.

The GEA also includes ten Key Findings, a Summary for Policymakers, and a Technical Summary, which are available as a separate, 100-page booklet.