



Executive Summary

Electricity Sector Report for the World Summit on Sustainable Development

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Prepared by the E7
and its world-wide partners
at the request of the United Nations
Environment Programme

Electricity sector's progress and challenges in fostering sustainable development



Since the 1992 Earth Summit, the electricity sector has made steady progress towards sustainable development. In a sustainable world, everyone will have access to electricity. On a voluntary basis, electric companies have adopted many practices that contribute to the social, environmental and economic dimensions of sustainable development. Today, the sector has the opportunity to accelerate these efforts with new advances in technology and a more interconnected society. This report documents the electricity sector's progress and challenges in fostering sustainable development. On the basis of this experience, the e7 proposes two goals to help overcome the challenges of making electricity available, accessible and affordable. First, electric power companies should implement *Guidelines for Best Practices* to guide their operations in a sustainable manner. Second, all electricity stakeholders including governments and non-governmental organisations, financial and development institutions, and technology providers should focus their sustainable development activities on expanding access to electricity for all people.

Key points of the electricity sector report are as follows:

- Energy is intrinsically linked to environmental, social and economic dimensions of sustainable development. Providing reliable and secure electricity supplies, reducing environmental impacts, and providing access to electricity to people currently without it are key challenges of the electricity sector;
- Residential, commercial and industrial demands for electricity have increased with rising economic prosperity. While the electricity sector has met these demands, it has strived to, and will continue to, promote efficient use of natural resources, protect the global and local environment, and improve quality of life for both present and future generations; and
- Two billion people do not have access to electricity. Expanded access to affordable electricity could be accelerated, and higher levels of environmental protection could be attained, if 1) electric companies implemented *Guidelines for Best Practices*, and 2) government, financial and development institutions; technology developers and non-governmental organisations; and the sector focused their partnerships on sustainable electric power development.

The United Nations Environment Programme (UNEP) invited the e7 to prepare this report on behalf of the global electricity sector for the 2002 World Summit on Sustainable Development.

The e7 is a non-profit group comprised of nine leading electricity companies working together for sustainable energy development. The e7's members are Hydro-Quebec and Ontario Power Generation (Canada), Electricité de France (France), RWE (Germany), Enel (Italy), Kansai Electric Power Co. (Japan), and Tokyo Electric Power Co. (Japan), ScottishPower (UK), and American Electric Power (USA). Its mission is to "play an active role in protecting the global environment and in promoting the efficient generation and use of electricity."

With its expertise in electricity generation, the e7 implements renewable energy projects and provides electricity-related capacity building assistance to developing countries. Since its creation in the wake of the Rio Summit in 1992, the e7's Network of Expertise has completed more than 30 human capacity building and technical assistance projects in developing countries, as well as two AIJ (Activity Implemented Jointly) projects in Indonesia and Jordan. Through the e7 Fund for Sustainable Energy Development (an accredited NGO established in 1998), the e7 has initiated projects in Bolivia, Ecuador, Zimbabwe and Western Africa that promote sustainable energy development.

The e7's Working Groups examine specific policy issues of interest to the global electricity industry (e.g., Climate Change, Social Trust, Internationalisation, Regional Electricity Cooperation and Nuclear Energy) and facilitate exchange with NGOs and international organisations, government officials and electric utilities from developing countries. For more information, please visit www.e7.org.

Electricity is an essential component of sustainable development. In preparing this report following UNEP guidelines, the e7 analysed historical data related to the generation and delivery of electricity (Section 2) and past approaches to electrification (Section 3). The e7 concludes that unless stakeholders representing governments, financial and development institutions, technology developers, and other non-governmental organisations focus their efforts, extending electricity to the two billion people who do not now have it will occur very slowly, or perhaps not at all. Electric companies alone cannot provide electricity where it currently is not commercially available. Two goals and the means to achieve them are fully described in Section 4 of this report and on the e7 web site.

The e7 has served in a leadership role in the sector's sustainable development activities by sharing its expertise with partners in many countries. The e7 looks forward to joining forces with stakeholders and other electric companies to achieve the sustainable development goals described in this report.

Contributing to Sustainable Development

The e7 subscribes to the definition of sustainable development resulting from the World Commission on Environment and Development in 1987 as: "...development that meets the needs and aspirations of the present generation without compromising the ability of future generations to meet their own needs."

In the context of the electricity sector, sustainable development means: promoting available, accessible and affordable electricity to benefit the environment, the economy and society; making economical end use of energy sources; maximising economic use of low- and zero-carbon emitting generation; and maximising the efficiency and minimising the environmental impacts of the generation, transmission, distribution and use of the electricity in a cost-effective manner.

Electricity can be an economically affordable, technically and environmentally sustainable form of energy. Economic growth typically requires an increasing use of electricity, which may contribute to an increase in emissions.

Over the past decade, the electricity sector has steadily contributed to making development sustainable by helping people achieve environmental protection, social progress and economic growth.

Environmental Protection

- Improvements in electricity generation, transmission efficiency and pollution control technologies have reduced primary fuel consumption, and associated emissions and waste;



- Many electric companies have adopted life cycle analysis to evaluate environmental performance of generation options, and they have improved environmental impact assessments with stakeholder consultations;
- Electricity sector investments in research and development have resulted in the development and deployment of new generation and distribution technologies, and improvements to existing technologies, including renewable energy technologies;
- Environmental management has improved due to the development of international standards for environmental management systems (EMS). Many electric companies have achieved the ISO 14001 international standard for EMS;
- Electricity generation has substantially increased to meet demand, yet emissions per kilowatt-hour have significantly decreased, due to improvements in efficiency and combustion control technologies; and
- Electric companies have helped slow the increase of CO₂ emissions through appropriate fuel choices, continued technological development, end use energy efficiency (demand-side management), and carbon sequestration projects, despite growing energy consumption.



Social Progress

- Improved healthcare, agricultural practices and food storage, telecommunications and education have resulted from the increased availability and supply of electricity;
- Secure employment and its ancillary benefits have been fostered by electricity supply;
- Processes for involving stakeholders in electricity projects have been improved, resulting in more informed decision-making; and
- The e7 capacity building activities have provided host country utilities and institutional entities with the skills, knowledge and training to meet their own sustainable energy development objectives while implementing sound environmental practices.

Economic Growth

- Electricity has an increasingly critical role in energising industrial processes and commercial activities;
- In many countries, growth in electricity consumption and economic productivity (Gross Domestic Product) are closely linked. Furthermore, electricity consumption frequently rises even faster than the GDP, particularly in developing countries;

- Electricity has enabled revolutionary efficiency and productivity improvements in both developing and industrialised economies; and
- Market mechanisms for reducing pollution such as tax credits, emission fees and emission trading, have been used to achieve compliance while reducing costs and spurring technological innovation.

Most citizens and businesses enjoying the benefits of electricity now consider it to be a necessity, so basic that few pause to think about it, except when power is in short supply or is interrupted.

Specific examples from the e7 companies show how the sector has advanced sustainable development through power systems utilising the full complement of energy sources, energy efficiency, electrotechnologies and generation, transmission and distribution infrastructures (see Annex 1 of the full sector report).

Remaining Challenges

Despite the substantial progress achieved to date, three key challenges remain for the electricity sector in collaboration with governments and other stakeholders: the availability, accessibility and affordability of electricity for all people.

Availability

- All forms of energy should be considered to achieve mass availability. In terms of sustainable development, no electricity should be unacceptable;
- Solar, wind and geothermal technologies remain relatively high priced. Moreover, the first two technologies alone cannot provide sufficient electricity to meet demand and must be coupled with storage facilities and/or other means of electricity generation;

- To address climate change without compromising the goal of expanding economic growth and access to electricity, it is imperative that market penetration of low-carbon emitting energy systems and zero-carbon emitting technologies occur. Low-carbon emitting energy systems include existing efficient gas combined cycle, and new advanced fossil fuel generation technologies such as coal gasification, fuel cells and biomass. Zero-carbon emitting technologies include wind, nuclear, geothermal, hydro and solar as well as future fossil fuel plants that capture and permanently dispose of carbon emissions in geologic formations; and
- Global demand for electricity will increase. With focused initiatives, this demand can be met with low- and zero-carbon emitting technologies.

Accessibility

- The most important challenge is to provide electricity to the two billion people who do not yet have access to it. The electric industry should help to provide a stable supply of electricity in an environmentally friendly, efficient and sustainable manner;
- Electric companies experience public concern to proposed plans and decisions involving fuel choice, facility siting, mitigation of environmental and social impacts, and tariffs. The concerns have at times resulted in projects being cancelled; and
- An appropriate institutional framework is needed to create a level playing field and to reap the full benefits that liberalised electricity markets can provide.

Affordability

- In many developing countries, limited economic resources have hampered electrification, especially the financing of energy infrastructures that require a long-term return on investment; and

- It is sometimes difficult to provide low-income customers with affordable tariffs. In the absence of a strong regulatory framework, companies often utilise only the cheapest available fuel.

Goals to Overcome these Challenges

The electricity sector believes that the following two goals will support relevant sustainable development initiatives identified for this Summit by the United Nations Commission on Sustainable Development. The initiatives are: sustainable consumption and production, energy, and technology transfer and capacity building.

Goal 1

Electric companies should implement Best Practices to guide their operations.

The e7 has already adopted guidelines to enhance sustainable development, based on the principles set by policy makers at the Rio Earth Summit. The *Guidelines for Best Practices* should serve as a universal guide for electricity providers around the world (see Annex 2 of the full sector report). By adopting these best practices, the electricity sector will use indigenous energy resources in each country and region to efficiently generate and deliver electricity while protecting the environment.

Goal 2

Electric companies should share their expertise in partnership with governments and non-governmental organisations, financial and development institutions and technology providers from around the world to help focus their sustainable development activities on expanding access to electricity for all people.

Given the importance and complexity of the electrification challenges that the sector faces, cooperation with all stakeholders is vital. Therefore, the electricity industry should make every effort to reach out to all

stakeholders, explain the need for focused and coordinated initiatives, and seek their participation.

Governments have the authority to establish policy priorities, legal structures and governance systems necessary for electrification. Development of an appropriate regulatory framework is absolutely essential to attract the foreign investment needed to expand electrification. Investments could create an efficient and large enough transmission network to pool demand and supply in most regions of the world. In less densely populated rural areas, distributed generation solutions would be implemented.

Key to expanding access to electricity is the right and intention of nations to use their indigenous energy resources, including fossil fuels. By capitalising upon regional initiatives for economic integration and fostering the deployment of new energy technologies, the electricity sector can help to optimise the use of these resources, increase economic development, and protect the environment. For sustainable development, it is essential that the most efficient technologies are employed for each fuel. This will not happen without the appropriate framework conditions. The electricity industry needs to contribute its technical expertise and experience to the development of public policies related to electricity and advocate strong legal structures to support financial investment.

The financial world plays a key role in leveraging the capital resources necessary for large-scale investments typically associated with electrification. Through cooperative partnerships, the electricity sector can work with banks, funding agencies and other investors to develop innovative financing mechanisms to reduce investment risks that have so far proven prohibitive, and support the goal of expanding access to electricity.

Technology developers have access to options for energy conversion that can provide fuel

flexibility and pollution control, and lead to efficient use of resources. The electricity sector must work with developers to:

- Upgrade electric power systems currently in operation around the world;
- Introduce sustainable electric technologies to currently unconnected or underpowered areas; and
- Allocate and focus adequate resources for research and development to accelerate timelines for the commercial use of new technologies.

Finally, representatives from non-governmental organisations can provide knowledge of local needs related to electrification and sustainable development.

The e7 has identified four priorities that could form the basis for a strategy that leads to greater access to affordable, reliable, and environmentally sound electricity (see Annex 3 of the full sector report).

The full version of the electricity sector report describes the contributions of the electricity sector to sustainable development and many remaining challenges. The e7 encourages the electricity sector and its stakeholders to join forces in working to address these challenges.



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United Nations Environment Programme Disclaimer

In a multi-stakeholder consultation facilitated by the United Nations Environment Programme, a number of groups (including representatives from non-governmental organisations, labour unions, research institutes and national governments) provided comments on a preliminary draft of this report prepared by the e7. The report was then revised, benefiting from stakeholder perspectives and input. The views expressed in the report remain those of the authors, and do not necessarily reflect the views of the United Nations Environment Programme or the individuals and organisations that participated in the consultation.

This report is part of a series facilitated by UNEP DTIE as a contribution to the World Summit on Sustainable Development. UNEP DTIE provided a report outline based on Agenda 21 to interested industrial sectors and co-ordinated a consultation process with relevant stakeholders. In turn, participating industry sectors committed themselves to producing an honest account of performance against sustainability goals. The full set of reports is available from UNEP DTIE's website (www.uneptie.org/wssd), which gives further details on the process and the organisations that made it possible.