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Sustainable Energy for all

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UN Photo/R Kollar

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PREFACE

Energy enables. The historic energy transitions – first from human power to animal power, and then from animal power to mechanical power – were major shifts in the human journey toward greater productivity, prosperity, and comfort. It is unimaginable that today's economies could function without electricity and other modern energy services. From job creation to economic development, from security concerns to the status of women, energy lies at the heart of all countries' core interests.

Today the world faces two urgent and interconnected challenges related to modern energy services – based on where they are available and where they are not. One out of every five people on Earth lives without access to electricity and the opportunities it provides for working, learning, or operating a business. Twice as many – nearly 3 billion people – use wood, coal, charcoal, or animal waste to cook their meals and heat their homes, exposing themselves and their families to smoke and fumes that damage their health and kill nearly 2 million people a year. Without access to energy, it is not possible to achieve the Millennium Development Goals.

Where modern energy services are plentiful, the challenge is different. Emissions of carbon dioxide and other greenhouse gases from fossil fuels are contributing to changes in the Earth's climate, to the detriment of those who depend on the planet's natural systems for survival. Extreme weather events may grow more frequent and intense, in rich and poor countries alike, devastating lives, infrastructure, institutions, and budgets. Climate change threatens food and water security for hundreds of millions of people around the world, undermining the most essential foundations of local, national, and global stability. Competition for scarce resources is increasing, exacerbating old conflicts and creating new ones. As lands degrade, forests fall, and sea levels rise, the movement of people driven from their homes by environmental change may reshape the human geography of the planet.

A special report by the International Energy Agency (IEA) released in October 2011 indicates the scale of the challenge. The IEA estimates that:

- More than 1.3 billion people lack access to electricity, and at least 2.7 billion people are without clean cooking facilities. More than 95% of these people are either in sub-Saharan Africa or developing Asia.
- Investment of $48 billion per year will be needed to provide universal energy access by 2030. This is more than five times the level of investment in 2009 to expand energy access ($9.1 billion) but represents only 3 percent of total global energy investment. Only $4-5 billion per year of that total is needed for clean cooking facilities.

Scientists warn that if the world continues on the current path, global temperatures could rise by more than four degrees Celsius by the end of this century. That will affect everything from the world economy to the health of our citizens and the health of the ecosystems that sustain life on Earth, from energy,

food, and water security to international security. We know now that we cannot continue to burn our way to prosperity.

We can choose a different path. Rapid advances in technologies that produce energy from renewable sources and use it more efficiently have made clean energy more affordable than ever, and technologies are being developed that promise cleaner ways of using fossil fuels. Another major shift is at hand – a transformation of the world's energy systems that will benefit people everywhere.

> "...energy lies at the heart of all countries' core interests."

Growing up as a child during the Korean War, I knew poverty firsthand. I saw it around me every day; I lived it. I studied by candlelight. Conveniences like refrigerators and fans were unknown.

Today, I have seen a brighter energy future in a deeply impoverished region of Malawi, where low-cost solar energy mini-grids are powering modern technologies, such as smart phones and mobile broadband, the latest in drip irrigation, and modern diagnostic tests for malaria, that have the potential to advance human well-being in ways that were not feasible even a few years ago.

Next year the world will gather in Rio de Janeiro for the UN Conference on Sustainable Development, or Rio+20. Rio+20 represents an important opportunity for new and decisive steps to mobilize support for clean energy investment – an approach that emphasizes practical answers – and places the social, economic, and environmental pillars of sustainable development more equally at the center of policy-making. In Rio the world must connect the dots between growth, energy, water, and food security, poverty, climate change, biodiversity, health, and women's empowerment. Energy can lead the way. I urge the leaders of governments, civil society, communities, and the private sector to turn this vision into reality with concrete commitments to action. With the right actions, world leaders can improve the lives of billions of people.

At a time when so many economies are struggling, some may claim that sustainability is a luxury we cannot afford. But the opposite is true: Depleting our natural resources will deplete our chances of true prosperity. We need to reduce global emissions, conserve the wealth of nature, empower the world's most vulnerable populations, and catalyze low-carbon prosperity for all. None of this will be possible without a clean energy revolution.

Sustainable development is the imperative of the 21st century. Protecting our planet, lifting people out of poverty, advancing economic growth – these are different aspects of the same fight. We endeavor to create new business and market opportunities, new jobs, and new possibilities for human advancement. We will not achieve any of these goals without energy – sustainable energy for all.

The Energy and Resources Institute

THE GOAL

To defeat poverty and save the planet, we can, and must achieve sustainable energy for all by the year 2030. Reaching this goal will require action by all countries and all sectors to shape the policy and investment decisions needed for a brighter energy future. Industrialized countries must accelerate the transition to low-emission technologies. Developing countries, many of them growing rapidly and at large scale, have the opportunity to leapfrog conventional energy options in favor of cleaner energy alternatives that will drive growth and enhance economic and social development.

In my view, three linked objectives underpin the goal of achieving sustainable energy for all by 2030:

- Ensuring universal access to modern energy services.
- Doubling the rate of improvement in energy efficiency.
- Doubling the share of renewable energy in the global energy mix.

These three objectives, each one important in its own right, reinforce each other in many instances: increasingly affordable renewable energy technologies are bringing modern energy services to rural communities where extension of the conventional electric power grid would be prohibitively expensive and impractical. More efficient devices for lighting and other applications require less energy and thus reduce the amount of power needed to support them. Increased efficiency in the production and use of electricity relieve strained power grids, allowing them to reach more households and businesses. All energy sources and technologies have roles to play in achieving universal access in an economically, socially and environmentally sustainable fashion. Achieving the three objectives together will maximize development benefits and help stabilize climate change in the long run.

WHY ACT NOW?

Technological change is bringing longstanding and broadly held goals within reach in many areas, including energy. Achieving sustainable energy for all is an ambitious but achievable goal, which is becoming increasingly affordable with the rapid advance of technology. If the world is to achieve the Millennium Development Goals (MDGs) and keep global temperatures from rising by more than two degrees Celsius, concrete steps to achieve sustainable energy for all are not only necessary and urgent but very likely represent the lowest-cost energy path forward.

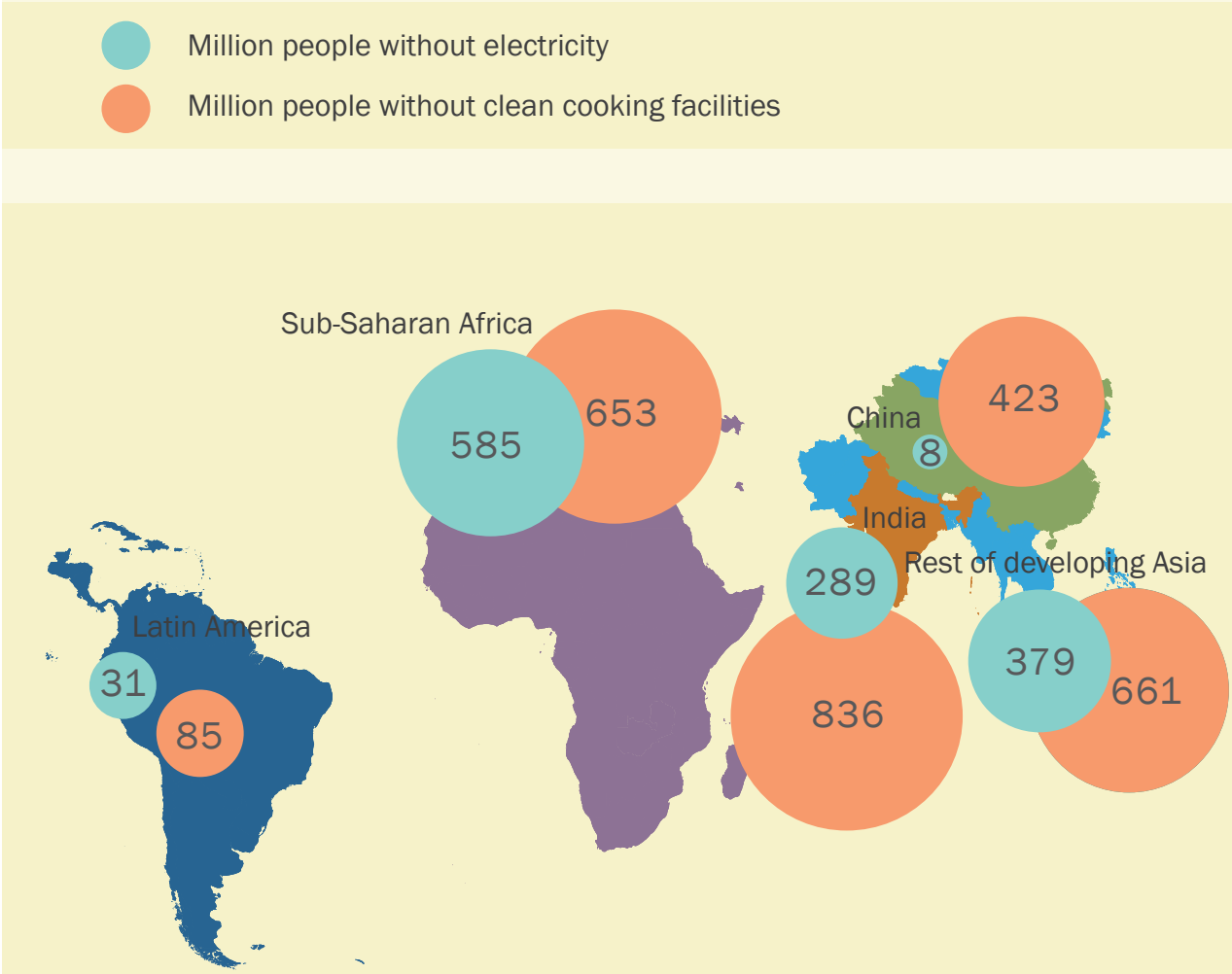
For a model of transformative change that has reached every corner of the world, we can look to the mobile phone. Twenty years ago, the idea of universal access to mobile communication would have seemed preposterous. Yet rapidly falling costs from improved technology, coupled with conducive national regulatory systems, allowed entrepreneurs to pioneer innovative business models in the most unlikely places and attract many billions of dollars of investment capital. The results are astonishing. At the end of 2010, according to the International Telecommunications Union, there were 5.3 billion mobile phone subscriptions worldwide, including 4 billion in developing countries. On a per-capita basis, mobile phone penetration has now reached 70 percent in developing countries, driven by energetic entrepreneurs, pre-paid calling plans, and vast networks of small resellers. From mobile banking in Kenya to crop price data in India, from language lessons in Bangladesh to health information in Ethiopia, this new technology is breaking down barriers and giving people new tools to improve their lives.

A similar paradigm may next emerge in distributed energy generation. During the last five years, the renewable energy industry has seen tremendous growth, with capacity expanding, prices declining, and performance improving. At least 118 countries — half of them developing countries — have put in place some form of policy target or renewable support policy at the national level, as have a number of state and local governments, with increasingly impressive results. The rapid expansion of wind power has enabled Denmark, for example, to obtain 20 percent of its total energy from renewable sources. Bangladesh installed more than 500,000 solar home systems in three years. Countries with abundant biomass resources, like Sweden and Brazil, now get 50 percent of their energy from renewable resources. In 2009 renewable energy supplied an estimated 16 percent of global energy consumption.

The International Renewable Energy Agency (IRENA) was officially established in April 2011 to promote the increased adoption and sustainable production and use of renewable energy, and now includes nearly 85 members and around 70 additional signatories. Global investment in renewable energy reached a record $211 billion in 2010, according to an analysis commissioned by the UN Environment Programme, and for the first time, over half of this investment occurred in developing countries.

> “Achieving sustainable energy for all is an ambitious but achievable goal”

Investments in access to modern energy services in many cases pay for themselves and deliver additional economic dividends. A 2006 study by the World Health Organization (WHO), for example, found that introducing cleaner cookstoves, in addition to improving health and reducing illness-related expenditures, improves family livelihoods, stimulates development, and contributes to environmental sustainability. These benefits include time savings due to fewer days of illness and less time spent on fuel collection and cooking. Making improved stoves available over a 10-year period to half of the households worldwide that are still



Source: International Energy Agency, "Energy for All: Financing for the Poor," October 2011.

using traditional fuels and stoves would save those families $34 billion per year and generate an economic return of $105 billion per year, according to the WHO report. In addition, achieving universal access to modern energy services was projected by the International Energy Agency (IEA) to cause only a negligible increase (less than 1 percent) in global carbon dioxide emissions.

The benefits of investing in energy efficiency have been extensively documented. Opportunities exist everywhere in the world to increase energy efficiency in power generation and the industrial, buildings, commercial, and transport sectors. According to the IEA, each additional $1 spent on more efficient electrical equipment, appliances, and buildings avoids more than $2, on average, in energy supply investments. Capturing all cost-effective energy efficiency measures could reduce the expected increase in global energy consumption over the next two decades by 55 to 75 percent. These savings would be split fairly evenly between industrialized countries and the rest of the world.

BARRIERS TO OVERCOME

Many factors, including the technological and economic readiness of clean energy solutions, have impeded progress toward sustainable energy for all. Key issues include:

Path dependence caused by the existing global energy infrastructure, built at great cost and with substantial benefit to the world over the past century. Policies and politics too often favor the status quo in government and industry, locking in institutional frameworks and protecting existing arrangements even where better alternatives exist.

Financial obstacles caused by the high initial costs of clean energy technologies, including advanced fossil fuel technologies, particularly when these costs are paid directly by consumers, even if low operating costs yield net savings in the long run. Sources of financing – including multilateral institutions, bilateral assistance, national development banks, the private sector, and carbon markets – are limited and not well coordinated. Small-scale renewable energy and energy efficiency projects can be particularly difficult to finance because of their high transaction costs relative to their size.

Pricing and regulatory policies and practices that diminish returns on capital and impede private investment in energy or that ignore the external costs of conventional energy sources – for example, the environmental and health costs of pollution, or the economic and security costs of dependence on imported fuels. According to the IEA, the less developed countries will pay 5 percent of their GDP for imported oil in 2011, four times the level in 2000. Yet some of these same countries impose high import duties and taxes on clean energy alternatives. In addition, national governments subsidized fossil-fuel use in 2010 at a cost of more than $400 billion. Good governance and strong internal capacity reduce risk to private-sector investors; however, many countries lack the human resources and technical capacity to evaluate alternative energy options and develop appropriate policies.

Business models that are based on the long history of public and private monopolies in the energy sector. Building out a national electricity grid has historically been a successful strategy for achieving high rates of energy access in many countries, but it is not as well suited to serving sparsely populated or remote areas. The IEA estimates that 70 percent of these areas will first be connected through stand-alone mini-grid or off-grid technologies. Such solutions will require business models that are commercially viable, global markets for distributed energy systems, entrepreneurial supply chains that can reach remote areas, increased consumer acceptance, community-based service delivery models, and innovative financing mechanisms. These elements are beginning to emerge but have a long way to go to reach global scale.

SCALING UP SUCCESS

Increasing numbers of success stories are emerging that address the obstacles to expanding energy access, energy efficiency, and renewable energy. In order to build on these examples and scale up required actions, we will need:

Leadership and Commitment: Individual leaders – whether in business, finance, government, or civil society – can embrace the need for energy transformation, direct their organizations to get engaged,

communicate the benefits to key constituencies, and spur innovation and results. At the country level, a clear articulation of national goals provides the basis for effective policies and engagement with the private sector.

Stable Policy and Regulatory Frameworks: Proper incentives are needed to stimulate markets to do what they do best—spur innovation to drive down the cost curve, invest in business-led solutions, and satisfy demand. Experience has shown that several factors enable the successful deployment of clean energy solutions. These include supportive policy, legal, and institutional frameworks; active public-sector engagement (including research funding and government procurement); policies that ensure social and environmental sustainability; elimination of inefficient fossil fuel subsidies (as called for by the G20); innovative public-private partnerships; and support for renewable energy industries and energy entrepreneurs.

Financing the Transformation: According to the IEA, universal access to modern energy services can be achieved for less than $50 billion per year. This should be within reach. Already $9 billion is being invested annually in this area, and the poor themselves spend $38 billion per year on costly, dirty, and inefficient fuel-based lighting alone, according to a 2005 analysis by a Lawrence Berkeley National Laboratory scientist. The incremental cost of doubling the rate of change in energy efficiency and the global share of renewable energy, however, each may be 10 times larger than the cost of universal access, namely $500 billion per year. Such sums are far more than governments can provide alone but could be mustered in a sector that invests more than $1 trillion annually and collects more than $5 trillion in revenues. A report by the McKinsey Global Institute in 2008 concluded that investing $170 billion annually in energy efficiency worldwide could generate an average internal rate of return of 17 percent and produce energy savings of up to $900 billion per year. More innovative coordination and use of limited public funds could reduce risk through better policies and regulation and spur the much larger flows of private investment needed for a global energy transformation. Financial institutions in developing countries could also play a larger role as their economies expand.

Strengthened Capacity: Developed and developing countries alike need stronger human and institutional resources to implement effective policies, market-based mechanisms, business models, investment tools, and regulations with regard to energy. Additional capacity is also needed on the ground to support innovative, bottom-up solutions and to finance, deliver, operate and maintain new energy systems. This is a business opportunity that will create jobs and spur development, but training and technical assistance will be required to take it to scale. An analysis by the UN Development Programme in 2010 found that successful off-grid energy projects in developing countries invest significantly in capacity building – as much as half of the project cost during the initial years.

“We must think and act not only for the moment but for our time.”

Innovation: Increased support for research and development is needed from governments and the private sector to reduce the cost and improve the performance of clean energy technologies and ensure that they are designed to meet the needs of consumers in all parts of the world. Many clean technologies are cost effective, and with additional research and development, could become the rule, not the exception.

Communication and Awareness: All stakeholders need to understand not only the challenge, but also the opportunity. Access to information and knowledge facilitates policy-making, guides investment decisions, and orients individual choices and behaviors. Increased cooperation and sharing of best practices, especially among developing countries, will be crucial.

THE SUSTAINABLE ENERGY FOR ALL INITIATIVE

Recognizing the importance and urgency of energy challenges, the United Nations General Assembly last year declared 2012 the International Year of Sustainable Energy for All. In so doing, the General Assembly noted "the efforts of the UN system to work toward ensuring energy access for all and to protect the environment through the sustainable use of traditional energy resources, cleaner technologies and newer energy sources." Additionally, the General Assembly, in deciding to organize the UN Conference on Sustainable Development in 2012 (Rio+20), decided that one of the principal themes of the conference would be "a green economy in the context of sustainable development and poverty eradication" – for which sustainable energy must be a central element.

The Secretary-General's *Sustainable Energy for All* initiative seeks to identify and mobilize action by all stakeholders in support of energy access, energy efficiency and increasing the share of renewable energy. To organize these efforts, I have formed a new High-Level Group on *Sustainable Energy for All*, led by Kandeh Yumkella, Chair of UN-Energy and Director-General of the UN Industrial Development Organization, and by Charles Holliday, Chairman of Bank of America and former CEO of DuPont.

The immediate task of the Group will be to recommend an Action Agenda on the basis of which all stakeholders can make concrete commitments to move the world toward sustainable energy for all by 2030. The Group will also design processes for shared learning and accountability – to enable participants to communicate about successes and failures and to ensure that commitments are kept and progress is tracked in an open and transparent way.

The *Sustainable Energy for All* initiative will also provide a global platform for existing and planned initiatives to reinforce one another. Ongoing initiatives include Energy for All (Asian Development Bank), the Clean Energy Ministerial, the Low-Emissions Development Strategies (LEDS) Global Partnership, Lighting Africa (World Bank Group), Energy+ (Norway), Energy for the Poor (OPEC Fund for International Development), the Paris-Nairobi Climate Initiative, the Africa-EU Energy Partnership, the Small Island Developing States Sustainable Energy Initiative, the Global Alliance for Clean Cookstoves, as well as the EU's decision to make access to sustainable energy a development priority through its "Agenda for Change."

Countries such as China, India, Nepal, Brazil, and South Africa are also leading the way with national initiatives. At the same time, the UN Global Compact and United Nations country teams on the ground will seek to facilitate public-private partnerships to scale up investment and accelerate progress.

Commitments can take many forms. Direct financial support and assistance will be one of many commitments needed. Many emerging economies are undertaking major domestic programs to achieve sustainable energy for all. Countries can contribute by preparing a sustainable energy investment plan and committing to create a favorable environment for private investment, for example, by removing unproductive tariffs and inefficient subsidies.

The private sector too will be central in achieving the goal of sustainable energy for all. Leaders of business and industry can contribute by making their companies and practices and supply chains more efficient, and by joining in public-private partnerships to expand the deployment of sustainable energy products and services.

The work of achieving sustainable energy for all will not be completed in a single year, or even in the five-year term of a Secretary-General. But we must begin. As the U.S. President John F. Kennedy said 50 years ago, "We must think and act not only for the moment but for our time."

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