



EXECUTIVE SUMMARY



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In declaring 2012 the “International Year of Sustainable Energy for All,” the UN General Assembly (2011) established—at the personal initiative of the UN Secretary General—three global objectives to be accomplished by 2030. Those goals are to ensure universal access to modern energy services (including electricity and clean, modern cooking solutions), to double the global rate of improvement in energy efficiency, and to double the share of renewable energy in the global energy mix. Some 70 countries have formally embraced the Sustainable Energy for All (SE4ALL) initiative, while numerous corporations and agencies have pledged tens of billions of dollars to achieve its objectives. As 2012 drew to a close, the UN General Assembly announced a “Decade of Sustainable Energy for All” stretching from 2014 to 2024.

Sustaining momentum for the achievement of the SE4ALL objectives will require a means of charting global progress over the years leading to 2030. Construction of the necessary framework has been coordinated by the World Bank/Energy Sector Management Assistance Program (ESMAP) and the International Energy Agency (IEA), in collaboration with 13 other agencies (see logos on final page). The process has benefited from public consultation with more than a hundred stakeholder groups.

A new framework for tracking progress toward the goal of “Sustainable Energy for All”

The Global Tracking Framework described in this report provides an initial system for regular global reporting based on indicators that are both technically rigorous and feasible to compute from current global energy databases, and that offer scope for progressive improvement over time. Although the identification of suitable indicators required for the framework posed significant methodological challenges, those challenges were no more complex than those faced when attempting to measure other aspects of development—such as poverty, human health, or access to clean water and sanitation—where global progress has long been tracked. In all these aspects of development, a sustained effort of building analytical capability and data capacity has been required across most countries.

For energy access, household survey evidence is used to determine the percentage of the population with an electricity connection and the percentage of the population who primarily use non-solid fuels for cooking. Aggregate energy intensity has long been used as a proxy for energy

efficiency. The framework adopts this approach but moves beyond this initial proxy, using statistical analysis to get closer to underlying energy efficiency, as well as complementing national energy intensity indicators with equivalent indicators for four key economic sectors. For renewable energy, the indicator is the share of total final energy consumption¹ derived from all renewable sources (bioenergy, aerothermal, geothermal, hydro, ocean, solar, wind).

To make it possible to track progress, SE4ALL has compiled a global data platform from the full range of available household surveys and national energy balances. Those sources encompass a large group of countries—ranging from 181 for clean energy and 212 for modern energy services—that cover an upwards of 98 percent of the world’s population over the period 1990–2010. Indicators for individual countries can be found in a data annex to the Global Tracking Framework, as well as online through the World Bank’s Open Data platform: <http://data.worldbank.org/data-catalog>.

¹ Though technically energy cannot be consumed, in this report the term energy consumption means “quantity of energy applied”, following the definition in ISO 50001:2011 and the future standard ISO 13273-1 Energy efficiency and renewable energy sources - Common international terminology Part 1: Energy Efficiency.



> Electricity powers a garment factory in Guatemala. Photo: Maria Fleischmann / World Bank

Recent progress has been too slow to reach the new objectives

By the indicators identified above, the world made major advances on the energy front during the last 20 years. An additional 1.7 billion people (equivalent to the combined population of India and Sub-Saharan Africa) gained the benefits of electrification, while 1.6 billion people (equivalent to the combined population of China and the United States) secured access to generally less-polluting non-solid fuels. Energy intensity has dropped significantly, avoiding the cost of developing 2,300 exajoules of new energy supply over the past 20 years, cutting cumulative global energy demand by more than 25 percent over 1990–2010, and leaving 2010 consumption more than a third lower than it would otherwise have been. Renewable energy supplied a cumulative total of more than 1,000 exajoules globally over 1990–2010, an amount comparable to the cumulative final energy consumption of China and France over the same period.

Yet rapid demographic and economic growth over the last 20 years has to some extent diluted the impact of these advances. For example, the population with access to electricity and non-solid fuels grew respectively at 1.2 and 1.1 percent annually over 1990–2010, yet this was slightly

behind global population that grew at 1.3 percent per year over the same period. This held back the growth of energy access rates to around just one percentage point of population annually. While renewable final energy consumption grew at 2 percent annually over 1990–2010, this was only slightly ahead of the 1.5 percent annual growth rate in total final energy consumption. As a result, the corresponding share of renewable energy increased only slightly from 16.6 percent in 1990 to 18.0 percent in 2010.

The Global Tracking Framework has set starting points against which progress will be measured under the SE4ALL initiative (table ES.1). The rate of access to electricity and of use of non-solid fuel as the primary fuel for cooking will have to increase from their 2010 levels of 83 and 59 percent, respectively, to 100 percent by 2030. The rate of improvement of energy intensity will have to double from –1.3 percent for 1990–2010 to –2.6 percent for 2010–30. The share of renewable energy in the global final energy consumption will have to double from an estimated starting point of at most 18 percent in 2010, implying an objective of up to 36 percent by 2030.

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	OBJECTIVE 1		OBJECTIVE 2	OBJECTIVE 3
	Universal access to modern energy services		Doubling global rate of improvement of energy efficiency	Doubling share of renewable energy in global energy mix
Proxy indicator	Percentage of population with electricity access	Percentage of population with primary reliance on non-solid fuels	Rate of improvement in energy intensity*	Renewable energy share in TFEC
Historic reference 1990	76	47	-1.3	16.6
Starting point 2010	83	59		18.0
Objective for 2030	100	100	-2.6	36.0

TABLE ES.1 SE4ALL OBJECTIVES IN HISTORICAL PERSPECTIVE

SOURCE: AUTHORS.

NOTE: TFEC = TOTAL FINAL ENERGY CONSUMPTION

*MEASURED IN PRIMARY ENERGY TERMS AND GDP AT PURCHASING POWER PARITY

Groups of “high-impact” and “fast-moving” countries hold the key

While progress in all countries is important, achievement of the *global* SE4ALL objectives will depend critically on the efforts of certain *high-impact countries* that have a particularly large weight in aggregate global performance. Two overlapping groups of 20 such countries in Asia and Africa account for about two-thirds of the global electrification deficit and four-fifths of the global deficit in access to non-solid fuels (figure ES.1). Meeting the universal access

objective globally will depend critically on the progress that can be made in these countries. A third group of 20 high-income and emerging economies accounts for four-fifths of global energy consumption. Thus, the achievement of the global SE4ALL objectives for renewable energy and energy efficiency will not be possible without major progress in these high-impact countries.



> Electricity use in classroom to support use of information technology in Namibia. Photo: John Hogg / World Bank

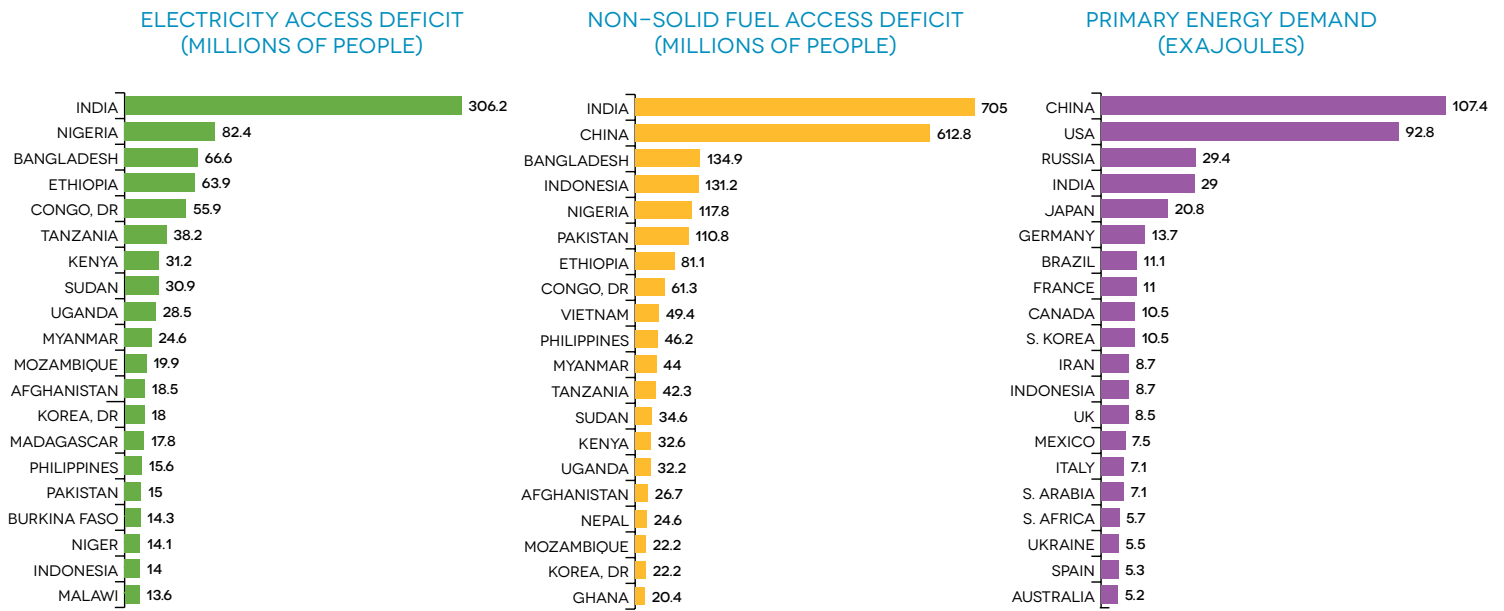


FIGURE ES.1 OVERVIEW OF HIGH-IMPACT COUNTRIES, 2010

SOURCE: AUTHORS.

NOTE: DR = "DEMOCRATIC REPUBLIC OF."

In charting a course toward the achievement of the SE4ALL objectives, it will also be important to learn from the experience of *fast-moving countries* that made particularly rapid progress on the three energy indicators over the period 1990–2010. In the case of electrification and cooking fuel, the most fast-moving countries have expanded access by around 3–4 percentage points of their population each year. The most rapid improvements in energy intensity, amounting to a compound annual growth rate of minus 4–8 percent, have been achieved in countries that began with high levels of energy intensity, where efficiency gains were

relatively easy to make. In the case of renewable energy, the fastest-moving countries have experienced compound annual growth rates of 10–15 percent in the consumption of energy from renewable sources (excluding traditional biomass), albeit from a very low base.

On all three aspects of energy sector development, China, and to a lesser extent India, stand out as being both high-impact *and* fast-moving countries.

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> Electric lighting supports evening commerce in Morocco. Photo: Arne Hoel / World Bank

Gauging the scale of the sustainable energy challenge ...

What will it take to achieve SE4ALL's three energy objectives globally by 2030? Scenarios based on global energy models make it possible to gauge the scale of the global effort required to meet the three objectives. Those scenarios make it plain that business as usual will not remotely suffice. With regard to universal access, business as usual would leave 12 percent and 31 percent of the world's population in 2030 without electricity and modern cooking solutions, respectively. With regard to energy efficiency, implementing all currently available measures with reasonable payback periods would be enough to meet or even exceed the SE4ALL objective. However, barriers hold back the adoption of many of those measures, with the result that their current uptake is relatively low, ranging from about 20 percent for power generation and building construction to about 40 percent for manufacturing and transportation. With regard to renewable energy, few scenarios point to renewable energy shares above 30 percent by 2030.

Actual global investment in the areas covered by the three SE4ALL objectives has been estimated at about \$400 billion in 2010. The investments required to *achieve* the three

objectives are tentatively estimated to be at least \$600–800 billion per year *over and above* existing levels, entailing a doubling or tripling of financial flows over current levels. The bulk of those investments are associated with the energy efficiency and renewable energy objectives, with access-related expenditures representing a relatively small percentage of the incremental costs (10–20 percent). Achieving such a steep increase in financing for energy is unlikely to be possible without substantial investment from the private sector.

The global energy models also help to clarify the kinds of policy measures that would be needed to reach the three sustainable energy objectives. The IEA's *World Energy Outlook* (WEO) and the Global Energy Assessment (GEA) of the International Institute for Applied Systems Analysis (IIASA) coincide in highlighting the importance of phasing out fossil fuel subsidies, pricing energy to fully reflect all the associated local and global environmental costs, embracing consistent global technology standards for energy efficiency, and carefully designing targeted subsidies to increase access to electricity and clean cooking fuels.

Business as usual will not remotely suffice ... achieving the three global SE4ALL objectives will require bold policy measures to stimulate a doubling or tripling of financial flows over current levels.

... and the shortest paths to the goal

The Global Tracking Framework also clarifies the likely pattern of efforts across geographical regions toward the achievement of the three objectives, based on their starting points, their potential for improvement, and their comparative advantage. For energy efficiency, the highest rates of improvement—about minus 4 percent annually—are projected for Asia (particularly China) and the countries of the former Soviet Union. For renewable energy, Latin America and Sub-Saharan Africa (the latter owing to its strong reliance on traditional biomass) emerge as the regions projected to reach the highest share of renewable energy in 2030—in excess of 50 percent, while much of the rest of the world will be in the 20–40 percent range.

Moreover, the global energy models clarify how the three SE4ALL objectives interact with each other (generally in a complementary way) and how they affect climate change and other global concerns. The achievement of the renewable energy objective, for example, will be facilitated by strong progress on energy efficiency that dampens growth in overall energy demand. Moreover, the IEA finds that

neither energy efficiency nor renewable energy measures alone will be sufficient to contain global warming to within two degrees Celsius by 2030, but that the two, in tandem, could bring that objective much closer. At the same time, achieving universal access to modern energy would raise global carbon dioxide emissions by a negligible 0.6 percent over business as usual. The GEA estimates that the probability of limiting global warming to two degrees Celsius increases to between 66 and 90 percent when the SE4ALL objectives for renewable energy and energy efficiency are *simultaneously* met—higher than if either objective were met individually. The achievement of the universal access objective for modern cooking, which would increase reliance on typically fossil-based non-solid fuels for cooking, would have a small offsetting effect, reducing the share of renewable energy in the global mix by some two percentage points, with a negligible impact on the probability of achieving the two degree Celsius target.

Better statistical methods for better tracking

Looking ahead, while the methodology of the SE4ALL Global Tracking Framework provides an adequate basis for basic global tracking, the framework could be vastly improved. To effectively monitor progress through 2030, incremental investments in energy data systems will be essential, both at the global and national levels. These cost-effective, high-impact improvements could be implemented over the next five years contingent on the availability of financial resources. For energy access, the focus will be to go beyond binary measures to a multi-tier framework that better captures the quantity and quality of electricity supplied, as well as the efficiency, safety and convenience of household cookstoves, including those that make use

of biomass. For energy efficiency, the main concern is to strengthen countries' capacity to produce disaggregated data on sectoral and subsectoral energy consumption that are fully integrated with measures of the output of those same sectors. In the case of renewable energy, the main priority will be to improve the ability to gauge the sustainability of various forms of renewable energy, particularly traditional biomass. All of these statistical improvements are required to support the conception and execution of policies that produce tangible results. Developing the capacity of countries to develop and respond to improved indicators is in itself a significant task.





> Electricity powers critical health equipment to support delivery of newborn baby in Argentina. Photo: Nahuel Berger / World Bank

Bold policy and an enabling environment for investment and innovation

Finally, given the scale of the challenge of meeting the three SE4ALL objectives for energy, it is clear that bold policy measures, combined with a regulatory and institutional environment that supports innovation and encourages investment, will be required to produce the requisite increases in the energy sector's capacity to widen access, boost the output derived from a given unit of energy, and raise the share of renewable energy in the overall energy

mix. A detailed analysis of the policy environment at the country level lies beyond the immediate scope of this Global Tracking Framework, which has focused on the monitoring of global progress toward the stated SE4ALL objectives. However, it will be an important focus for future work in support of the critical social, economic, and environmental goals that the SE4ALL initiative addresses.