

UN-Energy

Background Note

ENERGY: A BRIEF DISCUSSION ON GOALS, TARGETS AND INDICATORS



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UN-Energy is the United Nations’ mechanism for inter-agency collaboration in the field of energy. It provides the platform to promote system-wide collaboration in the area of energy with a coherent and consistent approach. Its role is to increase the sharing of energy information, encourage and facilitate joint programming and develop action-oriented approaches to coordination.

This **Background Note** is the result of a technical consultation process among UN-Energy member organizations and partners. It discusses a set of potential targets or target areas and indicators to support a dedicated global Sustainable Development Goal (SDG) on energy. It is conceived as a contribution to the SDGs consultation process as well as to the discussions on the post-2015 development agenda. The Background Note draws upon multiple sources and outcomes of numerous thematic, national, regional and global stakeholder consultations. It has benefited from inputs from, among others: ESCWA, FAO, IAEA, IRENA, UNDESA, UNDP, UNECE, UNEP, UNIDO, WHO and the World Bank.

1. WHY IS ENERGY SO IMPORTANT?

Sustainable Energy is a key enabler of sustainable development for all countries and all people. Energy is vital for alleviating poverty, improving human welfare and raising living standards. Energy has been a central concern to humankind throughout its long history. The adequate provision of energy services has become especially important for economic development since the industrial revolution. Providing energy services at affordable costs, in a secure and environmentally benign manner, and in conformity with the needs for social and economic development is an essential element for poverty eradication and sustainable development. Countries will not be able to achieve their development goals without full access to reliable and affordable modern sustainable energy services.

In addition, reliable energy services are a precondition for investments that bring about economic growth and social development. The availability of energy services is a strong factor determining investments in the industrial, transport, service and all other major sectors of a country's economy. Modern energy services also allow major enhancements in education and health. These are two crucial factors in the development of human capital. The availability of sustainable energy promotes equity and enhances opportunities facilitating empowering and improvement of the well-being of the population.

The provision of energy services also raises other important sustainability concerns at the global, national and local levels. The production, distribution and consumption of energy have environmental implications. At the global level, the choice of fuels in energy systems is a major determinant in the generation of greenhouse gas (GHG) emissions with strong implications for climate change.



A major transformation of global energy systems is a necessary pre-requisite for meeting the main challenges facing humanity, including poverty eradication and sustainable development. Energy stands at the center of global efforts to induce a paradigm shift that will put the world into an appropriate track towards sustained prosperity. Major changes in the current trends are required so that future energy systems are affordable, clean, safe, secure, environmentally sound and available everywhere and for everyone. Major challenges related to global energy systems include:

- The need to provide access to affordable and reliable modern energy services for improving living conditions and health, and for enhancing economic opportunities for 2.8 billion people (about 40% of the world population) who use unsustainable solid fuels (including wood, agricultural waste and animal waste) primarily for cooking and heating and for 1.2 billion people who still live without access to electricity.
- The need to satisfy rapid growth in energy demand for the well-being of over 7 billion people today and a projected world population of 9 billion by 2050. This is critical, particularly in developing countries and emerging economies where a large share of the population is moving towards higher economic strata demanding more and better energy services. This trend, in combination with the very high levels of energy being consumed today by many developed countries, is putting stress on global energy resources, forcing the world to look into energy efficiency measures and innovative ways to help us move towards a more optimal use of energy resources.

- The need to reduce negative impacts associated with energy systems at the global, national and local levels. At the global level, energy and climate change are strongly related. Reducing GHG emissions from energy systems is urgently needed to limit global warming to less than 2°C above pre-industrial levels. It is also urgent to decrease indoor and outdoor air pollution from fuel combustion and its impacts on human health and ecosystems, as well as to reduce other adverse effects and ancillary risks associated with some energy systems.

Therefore, a coordinated, sustained and comprehensive global energy strategy needs to be adopted, in conjunction with consistent and stable national policies, to be able to tackle these major challenges.

2. GOAL, TARGETS AND INDICATORS

It is expected that the post-2015 development agenda will include a framework of Sustainable Development Goals (SDGs), targets and indicators. Some of the key attributes¹ of this framework are characterized as:

- Aspirational and with specific desired results or outcomes
- Transformational
- Time-bound with a delineated date of completion
- Easy to understand, with clear and intuitive links between goals, targets and indicators, which can be clearly communicated

When defining an energy goal and corresponding targets under a future Sustainable Development Goal framework, it is important to keep two practical considerations in mind. First, it must be possible to measure the targets in a meaningful way that enjoys widespread consensus among practitioners. Second, sufficient data must be available – ideally for all countries globally – to report and monitor on progress towards the target over time. These attributes are necessary in the definition of indicators that allow the monitoring and measuring of progress on targets supporting a specific SDG.

2.1 A GLOBAL GOAL: SECURING SUSTAINABLE ENERGY FOR ALL BY 2030

This goal follows the declaration of Rio+20, where world leaders stated that “We are all determined to act to make sustainable energy for all a reality and, through this, help to eradicate poverty and lead to sustainable development and global prosperity.” The General Assembly further embraced “sustainable energy for all” by declaring 2014-2024 the United Nations Decade of Sustainable Energy for All. The goal fulfils the overall requirements for a sustainable development goal. It is aspirational with the ambitious commitment of addressing the overall energy challenges. It is also global in its scope, transformational, comprehensive, operational and easy to communicate and understand.

2.2 THREE SUPPORTING TARGETS, WITH CORRESPONDING INDICATORS

¹ For more information on SDGs attributes please see: IRF2015, Background papers 2 and 3, Sonia Suter, Independent Research Forum, Feb.2014.

TARGET 1: ENSURING UNIVERSAL ACCESS TO MODERN ENERGY SERVICES BY 2030

Indicator 1.1: Percentage of population with electricity access.

Indicator 1.2: Percentage of population with primary reliance on non-solid fuels.

TARGET 2: DOUBLING THE GLOBAL RATE OF IMPROVEMENT IN ENERGY EFFICIENCY BY 2030

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Indicator 2.1: Rate of improvement in primary energy intensity of GDP measured in purchasing power parity terms.

TARGET 3: DOUBLING THE SHARE OF RENEWABLE ENERGY IN THE GLOBAL ENERGY MIX BY 2030

Indicator 3.1: Renewable energy share in the total final energy consumption.

These targets are specific, measurable, attainable and time-bound outcomes that will contribute to the achievement of the overall goal of securing sustainable energy for all by 2030. These targets embrace the three-dimensional nature of sustainable energy for all, as an enabler within the economic, social and environmental dimensions of sustainable development. All three targets would contribute towards the overarching goal as supporting pillars. The comprehensive Global Tracking Framework (GTF)² provided by the World Bank, the International Energy Agency (IEA) and 14 other organizations, states that *'it is more feasible to achieve all three jointly than it would be to pursue any one of them individually'*. The three above targets are compatible with the climate change target of keeping global temperature rise below 2°C as compared to pre-industrial levels, according to a study published by the journal Nature Climate Change: *'We find that achieving the three energy objectives could provide an important entry point to climate protection, and that sustainability and poverty eradication can go hand in hand with mitigating climate risks'*³. All three targets were extensively explored in the Global Tracking Framework, which concluded – based on both technical dialogue and public consultation – that it was indeed possible to measure energy access, energy efficiency and renewable energy use in a reasonably rigorous way that could be supported by existing global datasets.

As with the Millennium Development Goals (MDGs), targets of SDGs will likely be supplemented by indicators, making specific what will be measured. Indicators should hence be based on solid data that not only tell us where we are, but also where to go. The foundation for the indicators should also provide a tool for monitoring progress. The information and data already exist for the indicators supporting the proposed goal on sustainable energy for all. For the three targets above, the indicators are drawn from the World Bank/ESMAP and the International Energy Agency's Global Tracking Framework (GTF).

ENSURING UNIVERSAL ACCESS TO MODERN ENERGY SERVICES BY 2030

The target of “ensuring universal access to sustainable modern energy services by 2030” addresses major critical issues in all the dimensions of sustainable development. The target is very relevant in the social dimension due to the importance of energy to ensuring social inclusion, supporting gender equity and inducing the highest global priority of poverty eradication. The target also recognizes the global obligation of attending to the poorest segments of the population without energy access, particularly those in rural areas. Furthermore, it recognizes that the attainment of universal access by 2030 will entail providing affordable access to a combination of energy services, including those for productive uses and

² World Bank/ESMAP, IEA, 2013; 'Sustainable Energy for All Global Tracking Framework'; <http://www.se4all.org/tracking-progress/>

³ Nature Climate Change, 2013; <http://www.nature.com/nclimate/journal/v3/n6/full/nclimate1806.html>

community services (e.g. health clinics and schools). Energy accessibility and equity among communities within and across countries are issues that need to be further addressed. Two closely related issues include affordability and reliability of energy supply, especially electricity. Access is of little use if people cannot afford to pay for modern energy services. Studies indicate that reliability of electricity supply (in terms of hours per day or outage ratios) makes significantly larger contribution to increasing income than being connected, but at a low and random availability rate.

In the case of energy access, a feasible indicator for monitoring progress is to look at: (i) the percentage of people who have electricity at home and; (ii) the percentage of people who rely primarily on modern fuels for cooking. Modern fuels for cooking include electricity or gaseous fuels (including liquefied petroleum gas) or solid/liquid fuels paired with stoves exhibiting overall emission rates at or near those of liquefied petroleum gas.⁴ Most of this information is widely available from household surveys.

This approach relies on the fact that over the last 20 years, there has been major progress in standardizing household survey questionnaires and implementing them at a high quality standard on a regular basis across all countries. The advantage of obtaining access information from households directly is that they are the ultimate beneficiaries of interest and are best able to report on the real situation they face.

Included in the Global Tracking Framework are the World Bank's Global Electrification Database and the World Health Organization's Global Household Energy Database. These databases extract and compile the relevant energy access data from hundreds of country level surveys that have been conducted since 1990. The databases cover more than 180 countries and are being maintained by both institutions.

While the existing global household survey evidence base provides a good starting point for tracking household energy access, it also presents a number of limitations that will need to be addressed over time. In many parts of the world, the presence of an electricity connection in the household does not necessarily guarantee that the energy supplied is adequate in quality and reliability or affordable in cost and it would be desirable to have fuller information about these critical attributes of the service. When it comes to cooking, the type of fuel a household uses does not by itself reflect the social and economic implications of home energy practices. It is also important to have information about the quality and performance of cookstoves as well as the fuels and technologies used for space heating and lighting.

Methodologies that are currently being developed and piloted aim to capture these broader dimensions of service quality and would make it possible to go beyond a simple yes/no measure of energy access to a more refined approach that recognizes different levels of energy access. One advantage of these approaches is that they can be applied not only to measuring energy access at the household level, but also its availability to support enterprises and deliver critical community services, such as health and education.

DOUBLING THE GLOBAL RATE OF IMPROVEMENT IN ENERGY EFFICIENCY BY 2030

The target of "Doubling the global rate of improvement in energy efficiency by 2030" impacts all sectors of the economy, including households, industrial, transport, services, energy, agriculture and commercial. All sectors of the economy require modern energy services that are indispensable to securing economic growth and to powering industrialization processes. Providing modern energy services

⁴ World Bank/ESMAP, IEA, 2013; 'Sustainable Energy for All Global Tracking Framework'; <http://www.se4all.org/tracking-progress/>

to all sectors of the economy in many countries is a major expense that may commit a considerable part of the country's revenues, in particular if the fuels and energy resources need to be imported.

Energy efficiency concerns the relationship between energy inputs and service outputs. In practice, it is very challenging to measure all the different outputs that energy can produce. Thus, a widely used proxy indicator of energy efficiency is energy intensity, or the amount of energy needed to produce a monetary unit of GDP. The rate of change in energy intensity over time provides some indication of improvements in energy efficiency. For example, over the period 1990-2010, global energy intensity fell by 1.3 percent annually, from 10.2 to 7.9 megajoules per US dollar at 2005 prices. The indicator for this target can be formulated using as the baseline the global decrease of 1.3 percent annually in energy intensity for the 1990-2010 period. Doubling the global rate of improvement in energy efficiency by 2030 will imply a global decrease in energy intensity at a compound annual rate of 2.6 percent for the 2010- 2030 period.

At the national level, opportunities to make progress with energy efficiency vary significantly across countries; therefore, targets would need to be sensitive to national circumstances. The scope for progress will depend on the structure of the economy and its stage in the industrialization process. A country that has already made substantial progress on energy efficiency may have less opportunities to take energy reducing measures in the future. Individual countries can devise ambitious energy efficiency targets based on their national contexts. All the national targets, taken as an aggregate, will contribute to achieve the overall global target of doubling the rate of improvement in energy efficiency by 2030.

The efficiency of the energy system (supply side) is important as well. Improving conversion efficiency, reducing transmission and distribution losses, etc. would not only affect the price (hence affordability) and environmental impacts (emissions) and other aspects of energy supply but would also contribute to another sustainable development criterion: the efficient use of natural resources, especially depletable ones.



In the long-term, it is critically important to improve the availability of data on energy inputs and service outputs of key economic sectors and processes, particularly in developing countries, in order to more accurately monitor energy efficiency. Only this kind of information will allow countries to pinpoint the nature of their energy efficiency challenges. Getting there will not be possible without a concerted global effort to improve energy efficiency statistics.

DOUBLING THE SHARE OF RENEWABLE ENERGY IN THE GLOBAL ENERGY MIX BY 2030

The target of “doubling the share of renewable energy in the global energy mix by 2030” impacts all three dimensions of sustainable development. Renewable energy technologies represent a major element in strategies for greening economies everywhere in the world and for tackling the critical global problem of climate change.

A number of definitions of renewable energy exist; what they have in common is highlighting as renewable all forms of energy that are replenished more rapidly than they are consumed. These include solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels.

A viable indicator for renewable energy is to look at the share of the world's final energy consumption that comes from renewable sources. This takes into account renewable energy used for power generation, heating or transportation. Importantly, it focuses on the amount of renewable energy actually consumed rather than the capacity for renewable energy production, which cannot always be fully utilized. By focusing on consumption by the end user, it avoids the distortions caused by the fact that conventional energy sources are subject to significant energy losses along the production chain. The indicator for this target can be formulated using as a baseline the global renewable energy share in 2010, which was 18%. Doubling this share will imply increasing the renewable energy share to 36% by 2030.

At the national level, opportunities to make progress with renewable energy vary significantly across countries; therefore, targets would need to be sensitive to national circumstances. The scope for progress will depend on natural endowments of renewable energy resources that differ substantially across countries and regions. A country that has already made substantial progress on increasing its renewable energy share may have less renewable energy resources remaining to exploit or may face greater technical challenges in further increasing renewable energy penetration. Individual countries can devise ambitious renewable energy targets based on their national contexts. All the national targets, taken as an aggregate, will contribute to achieve the overall global target of doubling the share of renewable energy in the energy mix by 2030.

Data on renewable energy consumption are available through national Energy Balances produced by the International Energy Agency and the UN Statistics Division for more than 180 countries. The energy balances make it possible to trace all the different sources and uses of energy at the national level. Additional data on renewable energy are available from the International Renewable Energy Agency (IRENA)⁵.

A limitation with existing renewable energy statistics is that they are not able to distinguish whether renewable energy is being sustainably produced. For example, a substantial share of today's renewable energy consumption comes from the use of wood and charcoal by households in the developing world, which sometimes may be associated with unsustainable forestry practices. There are efforts underway to improve the ability to measure the sustainability of bio-energy, although this remains a significant challenge.

2.3 OTHER DISCUSSED TARGET AREAS⁶

Among other important target areas being discussed, the following two have attracted most attention:

- Increasing the share of clean and low- or zero-emission energy technologies
- Phasing out fossil fuel subsidies that encourage wasteful consumption

INCREASING THE SHARE OF CLEAN AND LOW- OR ZERO-EMISSION ENERGY TECHNOLOGIES

Renewable energy is an important source of low carbon energy, but not the only one. Nuclear energy also offers minimal carbon emissions. At the same time, switching from more carbon intensive fossil fuels

⁵ For more information on renewable energy data please see: IRENA, "Remap 2030: A Renewable Energy Roadmap," International Renewable Energy Agency, 2014. <http://irena.org/remap/>

⁶ For an overview of other discussed issues, please see updates of the OWG-SDG at: <http://sustainabledevelopment.un.org/owg.html>; and the Technical Support Team (TST)'s issues brief on Energy at: http://sustainabledevelopment.un.org/content/documents/2077Energy%20Brief_Final_20_Nov_edits.pdf

such as coal to less carbon intensive fuels such as gas has the potential to considerably reduce the associated carbon footprint. Furthermore, the technology to capture and store the carbon dioxide produced by conventional thermal generation exists, although this remains costly at present.

An indicator that would allow all of these different approaches to low carbon energy to be jointly captured is the carbon intensity of energy consumption (i.e. carbon dioxide emissions for each unit of energy consumption). Using available data from Energy Balances and well known carbon multipliers, it is relatively straightforward to calculate this indicator. For example, over the period 1990-2010, the global carbon intensity of electricity consumption has remained relatively stable at around 0.5 kilogrammes of carbon dioxide per kilowatt-hour.

PHASING OUT FOSSIL FUEL SUBSIDIES THAT ENCOURAGE WASTEFUL CONSUMPTION

Fossil fuel subsidies may be broadly defined as forms of financial or in-kind support provided by governments to fuel producers or consumers. Subsidies provided for electricity and heat produced from fossil fuels would be included in this. Support to producers lowers the cost of energy production or raises the revenue received and retained by them, while support to consumers lowers the price charged or helps them pay for consumption.

Because there are many ways to subsidize energy, it is difficult to obtain the information necessary to estimate the overall size of subsidies for fossil fuels, particularly for cross-country comparison. Furthermore, it may be difficult to reach worldwide consensus on which fossil fuel subsidies are the ones that “encourage wasteful consumption.”

A range of mechanisms exists for delivering subsidies, including price controls, tax reductions, cash payments, subsidized loans and grants, import or export restrictions, preferential treatment for access to subsidy reimbursement and preferential treatment for access to or acquisition of land and other assets. Data are relatively easy to obtain where subsidies appear explicitly as budget line items. But information is not always available, and in most cases there is no consolidated database for many forms of producer subsidies, such as subsidized loans and guarantees or support given to state-owned enterprises involved in energy production and delivery.

Two common methods for estimating subsidies are the price-gap approach and the inventory approach. Both require significant amounts of data. The price-gap approach defines a subsidy as the difference between the domestic price for a particular source of energy and its reference price. For internationally traded commodities such as oil, the reference price is the sum of the international price, applicable taxes, and the costs of transportation, storage, and distribution. For electricity, the reference price usually needs to be calculated using benchmark generation, transmission, and distribution costs in each market. The inventory approach involves constructing an inventory of government support policies affecting energy production and consumption. It covers direct budgetary transfers and tax expenditures that provide a benefit or preference for energy production or consumption, either in absolute terms or relative to other activities or other forms of energy.

A number of agencies currently document and analyse fossil fuel subsidies internationally based on different definitions and methodologies. They include, among others, the IEA, the IMF, the OECD and the World Bank⁷.

⁷ For more information on definitions and methodologies used by different agencies please see:

3. CROSS-CUTTING ISSUES

It is well recognized that strong linkages and interactions exist between energy and other development factors and sectors. Therefore, there is broad support for the development of cross-cutting energy targets with respect to other development factors including: health, gender, education, water, food security, environment, etc. These targets have the potential to clearly demonstrate the extraordinary benefits and synergies for poverty eradication and sustainable development that can be derived from the more holistic approach to energy programmes and projects all over the world. Some cross-cutting targets have already been proposed⁸. Although thorough discussions, extensive analysis and integrated assessments are necessary to define these cross-cutting energy targets, illustrative examples can be envisioned as listed in the following subsection.



3.1 INTER-LINKAGES: ENERGY AS AN ENABLER

1. ENERGY AND HEALTH

- Securing sustainable energy for all healthcare facilities of the world
- Eliminating all premature deaths due to air pollution from cooking and heating

2. ENERGY AND EDUCATION

- Securing sustainable energy for all schools of the world

3. ENERGY AND GENDER

- Minimizing all risks that affect women due to energy-related activities including collection of energy resources, cooking, heating, lighting, etc.

4. ENERGY AND WATER

- Minimizing the use of water in energy systems (in all steps of the production cycle)
- Maximizing sustainable energy access in all water and sanitation systems

5. ENERGY AND FOOD SECURITY

- Reducing the intensity of fossil fuel use in food systems and increasing access to modern energy services while meeting individual and national food requirements

6. ENERGY AND ENVIRONMENT

http://www.iisd.org/gsi/sites/default/files/ffs_methods_estimationcomparison.pdf

⁸ SE4All, "What a global sustainable energy for all goal could look like post-2015?" 18 March 2014.

- Minimizing all of the discharges of contaminants from energy systems to land, atmosphere and water bodies
- Minimizing the rate of deforestation attributed to energy use
- Minimizing GHG emissions from energy systems

7. ENERGY AND INDUSTRIALISATION

- Reducing industrial energy intensity
- Increasing the share of renewable energy use in manufacturing processes
- Providing access to reliable energy services to support structural change and industrialisation

The targets specified above are just illustrative examples of possible energy cross-cutting targets that would need further assessment and could be associated with specific quantitative values or indicators within a specific time frame.

3.2 MONITORING PROGRESS: THE GLOBAL TRACKING FRAMEWORK

The Sustainable Energy for All Global Tracking Framework is a global data platform and monitoring system designed to support the Secretary-General's Sustainable Energy for All initiative and to allow rigorous and transparent monitoring of progress towards the three 2030 objectives on energy access, energy efficiency and renewable energy. In that sense, it provides the energy sector with a tracking capability equivalent to that developed by the WHO-UNICEF Joint Monitoring Program for the Water and Sanitation Millennium Development Goal.

The original Global Tracking Framework published in May 2013 was produced by a consortium of 15 agencies co-led by the World Bank/ESMAP and the International Energy Agency⁹. This consortium remains committed to publishing regular biennial updates, with the next report scheduled for publication in May 2015. The second report will also begin to explore more formally the issue of linkages between energy and other key development sectors – including food, gender, health, and water – and a number of additional agencies have joined the consortium to cover these issues¹⁰. In addition, the consortium is collaborating with the UN system on broader efforts to identify and improve the availability and quality of data for measuring energy development outcomes.¹¹

⁹ Specifically, the agencies are: the Global Alliance for Clean Cookstoves (GACC), the International Institute for Applied Systems Analysis (IIASA), the International Partnership for Energy Efficiency Cooperation (IPEEC), the International Renewable Energy Agency (IRENA), Practical Action, the Renewable Energy Network for the 21st Century (REN21), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), United Nations Foundation, United Nations Industrial Development Organization (UNIDO), the World Energy Council (WEC), and the World Health Organization (WHO).

¹⁰ Specifically, Energia, the Food and Agricultural Organization (FAO), the Global Water Partnership (GWP), the Stockholm International Water Institute (SIWI), United Nations Women, and UNEP Risoe Center.

¹¹ Specifically through the participation of the Division for Sustainable Development and the Statistics Division of the United Nations Department of Economic and Social Affairs (UNDESA).