

# EXPLORING ENERGY ACCESS AND ITS NEXUS



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Photo by: Marco Garofalo

## SUMMARY

Energy is a central element affecting many global challenges the world is facing today: climate change, rising global inequalities, unsustainable production models, international security, food insecurity... just to list a few. To overcome these challenges, global political and business leaders need to acknowledge the importance of clean and renewable energy sources and increase their use in all relevant sectors (housing, transport, production etc.). We can wait no longer to transition towards a more sustainable economy. The United Nations adopted the 2030 Development Agenda to effectively face these challenges and more, by identifying 17 areas of interventions (the Sustainable Development Goals - SDGs), to be enacted by 2030.

This publication aims to raise awareness about the importance of access to energy among young people, and provide a detailed analysis of the problem, its evolution and interconnection with other important challenges of our time. It also wishes to propose different solutions and every-day actions that we can take to save energy and fight climate change. The publication starts by introducing the concept of “sustainable development” and presenting a brief historical evolution of international political agreements and continues by explaining the main elements involved in the issue of “energy access” (Part 1). Part 2 examines the nexus between SDG 7: “Affordable and Clean Energy for All” and the other Goals, highlighting the importance of energy as a driver for global development, personal empowerment and economic growth.

## PART 1: SUSTAINABLE DEVELOPMENT

The concept of sustainable development was first popularized in 1987, with the publication of the UN [World Commission on Environment and Development](#) (WCED) report entitled “**Our Common Future**”, also known as the “Brundtland report”, in recognition of the former Norwegian Prime Minister Gro Harlem Brundtland, Chair of the WCED.

This report placed environmental issues firmly on the political agenda and defined sustainable development as:

“**development that meets the needs of the present without compromising the ability of future generations to meet their own needs.**”

In other words, as human beings we all strive to improve our lives. Some seek better homes and housing, while others want better schools, jobs, shops, transport, or cleaner and safer streets. This definition of sustainable development supports the idea of pursuing better lives, but highlights that while we make that happen, we have an individual and collective obligation to leave future generations with a planet that is also able to sustain their needs. Therefore, in our pursuit of better lives, we must make sure to avoid environmental degradation, over-exploitation or pollution.



Three fundamental components, as well as their interaction and interlinkages, are key to sustainable development: **environmental protection**, **economic growth** and **social equity**.

### Examples of sustainability from the real world

Governments play an important role in steering the path of development in a sustainable way. They are responsible for the interests of the whole community, now and in the future. If, for example, the government has the task of dealing with rising poverty levels in a certain district, they must not only provide short term solutions, such as food aid, to prevent malnutrition and associated illnesses. They also need to think longer-term so that people can break the vicious circle of poverty. This can be done by improving education and employment so people can provide for themselves in the future. People also need a safe environment with adequate homes, sanitation and drinking water, access to basic services like electricity and health centres so they can be informed and stay healthy.

Governments must make sure that people have an effective voice in deciding what happens in their community so they can take ownership and responsibility for its improvement. Taking a sustainable approach to development, therefore, means giving people the chance to properly take care of themselves without over-exploiting natural resources. It

allows for human development and economic growth and prosperity without compromising the environment. At the core, sustainable development is meeting people's needs – for a home, a decent job, education for their children, good health care, and a safe and healthy neighbourhood to live in, without environmental damage.

Governments can also influence individual choices to protect the interests of other people and of the common good: to this purpose governments have access to a range of policy tools that can make one direction more attractive than another.

## International agreements on sustainable development

### Framework Convention on Climate Change

The Brundtland Report was innovative at the time of its publication. It laid the groundwork for many of the international agreements that have been developed since. This is especially true for the Earth Summit, which took place in Rio de Janeiro in 1992. It provided a platform for UN Member States to collaborate on issues which were too immense for single Member States to handle on their own, like sustainability. This Forum became the place where the issue of climate change was first addressed.

During the following years, the issue of climate change emerged as a crucial aspect of environmental protection, and its threat became more and more disturbing. This resulted in the adoption of the international environmental treaty called the **Framework Convention on Climate Change**. In due course, it led to the adoption of the **Kyoto Protocol** in **1997**, (first commitment period from 2008 to 2012 and second commitment period from 2012 to 2020) and the **Paris Agreement** in **2015** (entered into force on 4<sup>th</sup> November 2016), the two main global agreements addressing climate change.

### Millennium Development Goals

**The Millennium Summit** took place in New York City in 2000 and brought together world leaders in order to outline the role of the United Nations at the turn of the 21st century. At this summit, 189 Member States of the United Nations agreed to help citizens in the world's poorest countries to achieve a better life by 2015. The framework for this progress derived from the Millennium Declaration and was outlined in the Millennium Development Goals (MDGs) that tried to achieve the following eight goals by 2015:

1. To eradicate extreme poverty and hunger
2. To achieve universal primary education
3. To promote gender equality and empower women
4. To reduce child mortality
5. To improve maternal health
6. To combat HIV/AIDS, malaria, and other diseases
7. To ensure environmental sustainability
8. To develop a global partnership for development

It is not a simple task to evaluate the success of the MDGs. Unprecedented progress was achieved from 2000 to 2015 in poverty reduction, access to education and improvements in child and maternal health. However, too many were still left behind. As the former UN Secretary General Ban Ki-moon claimed: *“The MDGs helped to lift more than one billion people out of extreme poverty, to make inroads against hunger, to enable more girls to attend school than ever before and to protect our planet”*, he then went on to say that: *“Yet for all the remarkable gains, I am keenly aware that inequalities persist and that progress has been uneven.”*<sup>1</sup> It is true that the success of the MDGs were largely possible due to huge progress on all levels in two main countries, namely China and India, and that at the end of 2015, there were still many unresolved problems in other parts of the world, especially in sub-Saharan Africa and in many countries afflicted by war.

## Sustainable Development Goals

In 2015, the 193 countries of the UN General Assembly adopted the **2030 Development Agenda** titled *“Transforming our world: the 2030 Agenda for Sustainable Development”* which includes 17 Sustainable Development Goals. The SDGs were developed to succeed the MDGs, and these new goals invited all Member States, as well as international organizations, businesses, local authorities, the scientific community and civil society, to join organisations in the collective action.

While having identified 17 distinct areas in which progress must be achieved, solutions and actions must also tackle their interconnection. A holistic view of the 2030 Agenda is important to identify the highest impact areas in order to maximise interventions<sup>2</sup>.



**People** - end poverty and hunger, in all forms and dimensions, and ensure that all human beings can realise their potential in dignity and equality and in a healthy environment.

**Planet** - protect the planet from degradation, through sus-

tainable consumption and production, sustainable management of natural resources and by taking urgent action on climate change, so that the planet can support the needs of present and future generations.

**Prosperity** - ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature.

**Peace** - foster peaceful, just and inclusive societies, which are free from fear and violence. There can be no sustainable development without peace and no peace without sustainable development.

**Partnership** - implement the UN's 2030 Development Agenda through a global partnership, based on a spirit of global solidarity, focused in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people.

<sup>1</sup> The Millennium Development Goals Report 2015, p. 2, foreword by Ban Ki-Moon

<sup>2</sup> The 5 Ps' were highlighted in the preamble of the official 2030 Development Agenda entitled: Transforming our world: the 2030 Agenda for Sustainable Development

## GOAL 7 – ensure access to affordable, reliable, sustainable and modern energy for all ... lies at the heart of the delivery of the SDGs

The UN explains that: *“Energy is central to nearly every major challenge and opportunity the world faces today. Be it for jobs, security, climate change, food production or increasing incomes, access to energy for all is essential.”*

*Transitioning the global economy towards clean and sustainable sources of energy is one of our greatest challenges in the coming decades. Sustainable energy is an opportunity – it transforms lives, economies and the planet.”*

The focus of this publication is the SDG7 on energy, and it includes many elements that must be clearly distinguished in order to understand its importance as well as its central role and impact on so many of the other SDGs.

The SDG7 includes four distinct elements<sup>3</sup> that need to be tackled and improved, in order to meet the universal access to energy:

### 1. Access to electricity

**Definition:** The proportion of population with access to electricity.

This is measured as the share of people with electricity access at the household level. It comprises electricity sold commercially, both on-grid (the main electricity network) and off-grid (producing decentralised electricity, mostly with innovative technologies).

**Goal:** By 2030 ensure universal access to affordable, reliable and modern energy services.

*This concerns 860 million people worldwide, mainly living in emerging economies where still many households, public buildings (schools, health clinics, local authorities offices) and businesses do not have access to electricity, and where services like lighting in public spaces are missing. It therefore requires that all homes, public institutions and businesses worldwide will have access to electricity by 2030.*

<sup>3</sup> To be precise, the Goal #7 includes three Targets: universal access (to electricity and to clean cooking solutions), diffusion of renewable energy, acceleration of energy efficiency. For each target, a number of indicators are used for continuous monitoring.

## 2. Access to clean fuels for cooking

**Definition:** The proportion of population with primary reliance on clean fuels and technology for cooking and heating.

This is measured as the share of the total population with access to clean fuels and technologies for cooking and heating. Access to clean fuels or technologies such as clean cookstoves reduce exposure to indoor air pollutants, a leading cause of death in low-income households.

**Goal:** By 2030 ensure universal access to affordable, reliable and modern energy services.

*This concerns around 2.6 billion people worldwide that continue to cook and heat their homes over an open fire. It requires that all homes have access to cleaner fuels, such as LPG (liquefied petroleum gases), and/or to modern technologies for cooking, such as improved cookstoves by 2030.*

## 3. Renewable energy

**Definition:** The share of renewable energy in the total final energy consumption.

This is measured as renewable energy (inclusive of solar, wind, geothermal, hydropower, bioenergy and marine sources), as a share of final energy consumption.

**Goal:** By 2030, substantially increase the share of renewable energy in the global energy mix.

*This requires that a substantial amount of the energy consumed in developed countries be replaced by renewable energy, and that a substantial amount of the households and business in emerging economies that gain first time access to electricity, do so through renewable energy.*

## 4. Energy efficiency

**Definition:** Refers to minimizing the amount of energy needed to obtain the same or better energy service through better technology.

Energy efficiency includes both an efficient transformation of primary energy into final energy (reduce losses in generation and transmission of electricity) and an efficient use of final energy (for personal and productive uses).

**Goal:** By 2030, double the global rate of improvement in energy efficiency.

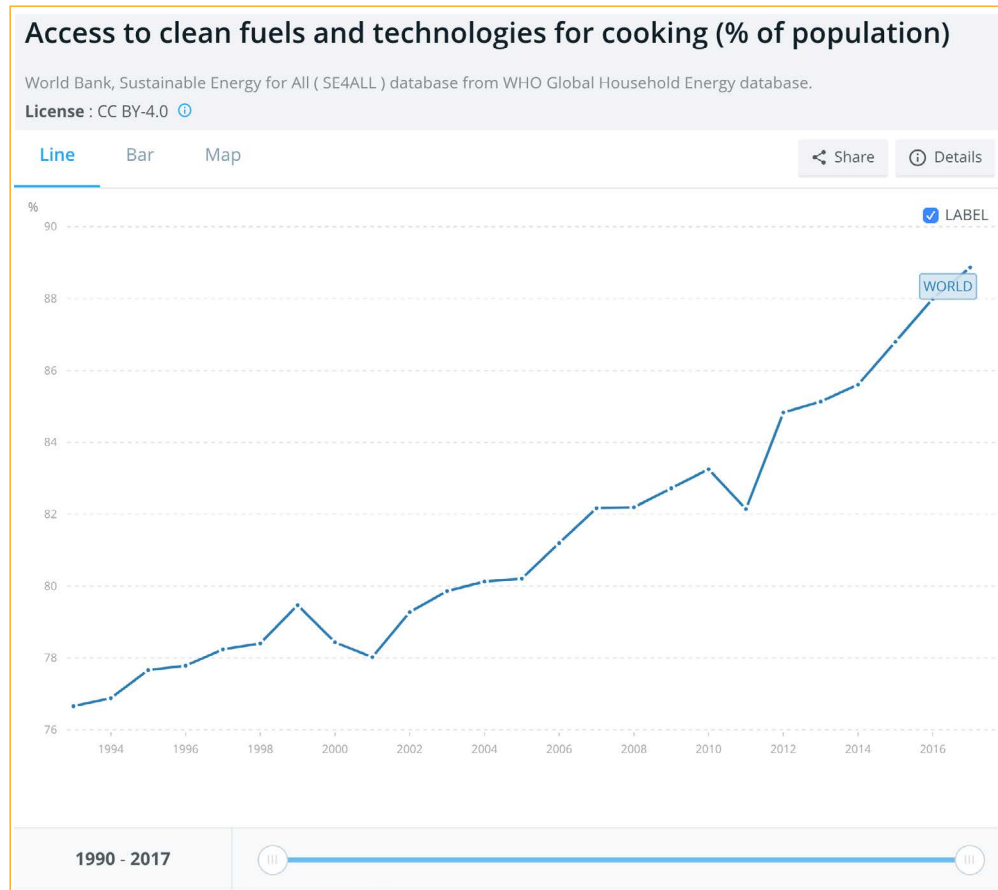
*This requires that we improve insulation of buildings and replace old, inefficient electric devices and vehicles with modern, energy efficient technologies, which should meet strict global energy efficiency standards.*



## Let's look at the numbers: Access to electricity

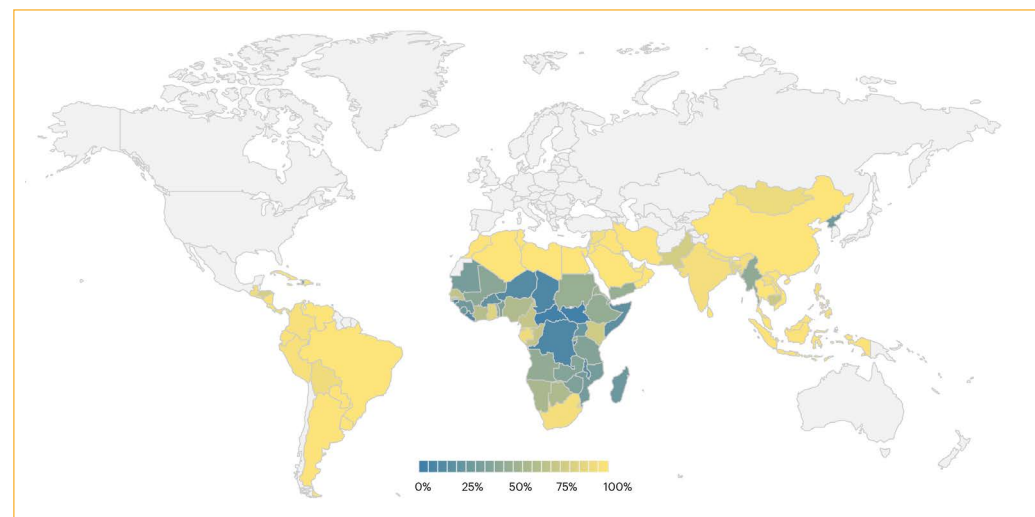
According to the latest statistics by the International Energy Agency (IEA), the number of people without access to electricity fell from 980 million in 2017 to 860 million (11,5% of the world population) in 2018. Yet, about 600 million of those still without electricity are in sub-Saharan Africa. (World Energy Outlook, 2019)

### Percentage of the world population with access to electricity, 1993-2017



Source: World Bank

### Percentage of the population with access to electricity, 2018

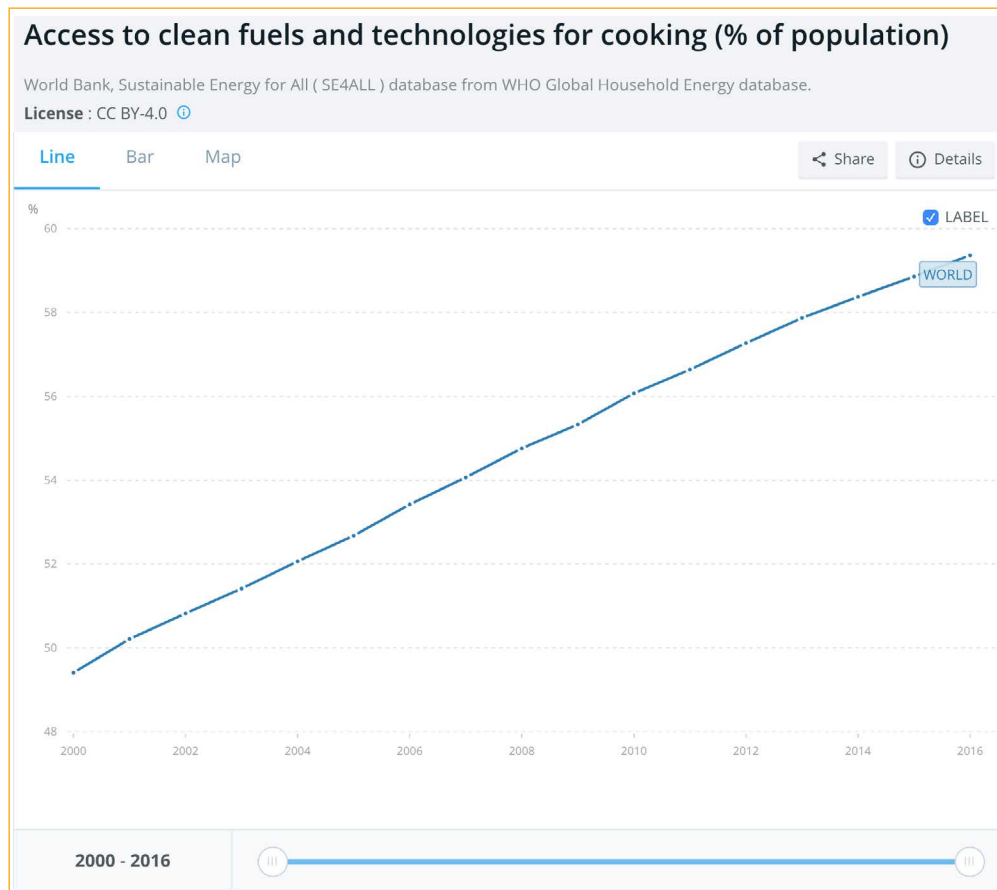


Source: IEA

## Let's look at the numbers: Access to clean cooking

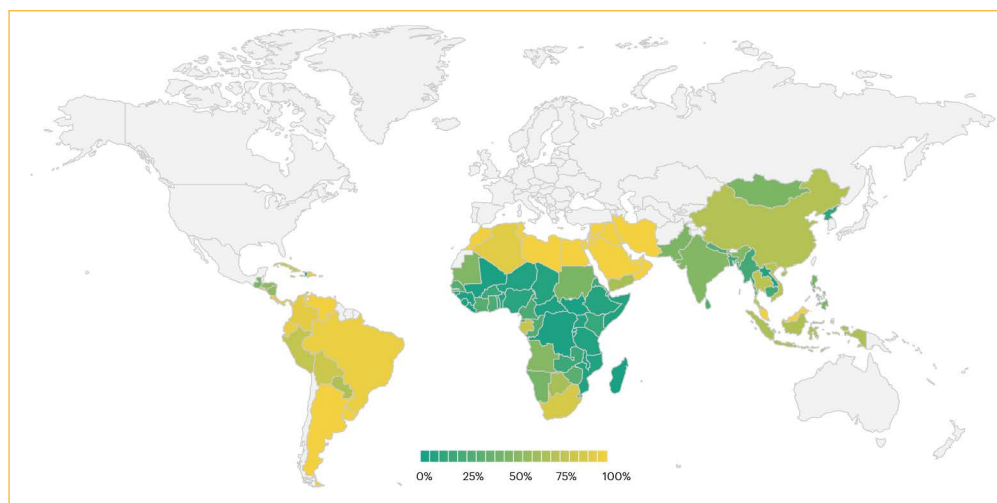
According to the IEA, progress on access to clean cooking facilities has been limited compared to progress on electricity access. In 2018, an estimated 2.6 billion people (36% of the world's population), continue to rely on the traditional use of biomass, coal or kerosene as their primary cooking fuel. (World Energy Outlook, 2019).

### Percentage of the world population with access to clean fuels and technology for cooking, 2000-2016



Source: World Bank

### Percentage of the population with access to clean cooking, 2018



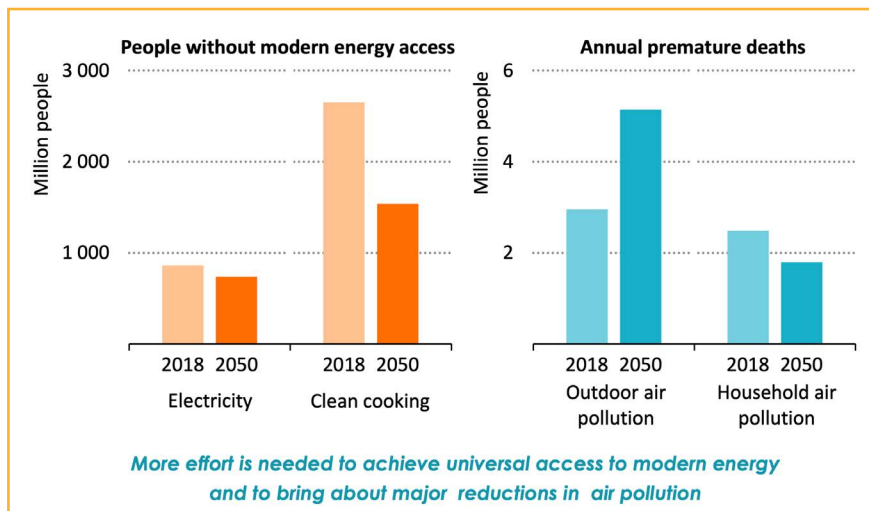
Source: IEA



## Predictions for 2030 - will we reach the goal?

Despite positive trends in many countries and sectors, we are not on track to meet the SDG7 in 2030. Based on current stated policies, in 2030 there would still be around 620 million people without access to electricity and around 2.3 billion people cooking with primitive stoves or without access to cleaner fuels. There will be a slight reduction of deaths caused by household air pollution but an increase in deaths caused by outdoor air pollution.

## Population without modern energy access and premature deaths due to air pollution in the stated policy scenario, 2018-2050



Sources: IIASA and IEA analyses, 2019

One major challenge in meeting the SDG7 by 2030 is the strong population growth that is expected over that period, particularly in countries where many people still lack access. This means that we not only have to reach those that are currently lacking access today, but also the growing population that will be born into poor, unelectrified homes in Africa over the coming 10 years.

While many will continue to be electrified with the traditional grid-connection, a cost-effective way to achieve electricity access, especially in poor rural areas, is decentralised renewable energy sources, thanks to the declining cost of small-scale solar photovoltaics (PV) and batteries. This is especially true in sub-Saharan Africa, home to around 60% of the global population still deprived of electricity access.

Achieving the clean cooking goals by 2030 will depend on cultural and economic factors, resources available locally and infrastructure development. LPG delivers access to clean cooking in about half of all cases – particularly in urban areas – with improved and more energy efficient biomass cookstoves playing a more significant role in rural communities. (World Energy Outlook, 2019)

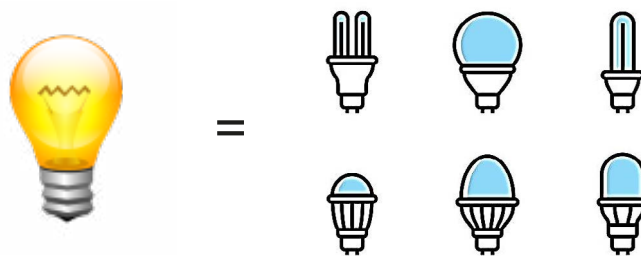
### Some solutions include energy efficiency and energy production from renewable sources

Smarter electricity usage can significantly reduce the demand for energy and help meet the SDG7. Energy efficiency measures are built into the equipment and allow us to have the same end product while using less energy.

In order to meet the SDG7 goals, the IEA estimates that energy intensity must improve (by going down, which is the same as saying that efficiency goes up) at an annual rate of 3,6% on average, however in 2018 we only observed a 1,2% improvement worldwide which falls far short of what is needed.

Electricity generation from renewables have grown considerably in the last years and accounts for more than a quarter of total power generation output today.

You save a lot of energy by changing the old incandescent light-bulb with a LED lamp which is approximately 6 times as efficient.  
Would you prefer to have one incandescent light-bulb available for lighting in your home or alternatively six LED lamps?



The two options use the same amount of energy.

Growth in output from solar photovoltaics (PV), wind and hydro, accounts for approximately 90% of the increase<sup>4</sup>. While great efforts are being made in most parts of the world to push renewables, greater efforts must be made everywhere to meet its potential, especially in Africa, where the plentiful renewable energy resources available are currently used only in a minimal part.

<sup>4</sup> Growth in output from solar photovoltaics (PV), wind and hydro, accounts for approximately 90% of the increase.

## PART 2: SDG7 AND THE NEXUS



Energy is recognised as one of the main drivers and essential conditions to economic and human development. Insufficient energy infrastructures can cause the marginalisation of entire villages or cities, as well as undermine educational and business opportunities for the individuals. Women and children are suffering the most from the lack of energy, as they are responsible for the household's energy and water supply, food preparation and cleaning. This causes physical drudgery, as well as the use of inadequate technology for cooking and heating. Biomass (wood, dung and agricultural waste) is in fact most frequently burned on inefficient traditional stoves and open fires. No – or limited – access to energy not only reduces women and children's empowerment and increases inequalities, but also affects the entire household's health, as toxic fumes are produced by inadequate combustions.

Nevertheless, we can accelerate the fight against energy poverty by examining interlinkages across the Sustainable Development Goals.



Image source: Jeff Mohr

For example, tackling climate change requires an energy transition, moving away from biomass reliance, and loss of forest, to implement renewable energies. It also means changing our consumption and production patterns to more sustainable systems that embrace reducing resource use, environmental degradation and pollution along the whole product life cycle. According to the UN, promoting sustainable agriculture can help in reducing both hunger and poverty, since close to 80% of those who are extremely poor live in rural areas. Increasing access to safe drinking water, sanitation and hygiene can save millions of lives per year and improve school attendance. Improving proficiency in reading and mathematics of some 200 million children who are falling behind in sub-Saharan Africa, will help them climb out of poverty and ultimately enable the region to better compete in the global marketplace<sup>5</sup>.

Given the strong connection between access to energy and development, progressing in the achievement of SDG7 also means impacting positively on the other SDGs and making sure that “no one is left behind” in this transition.

## Poverty | SDG1: “End poverty in all its forms everywhere”

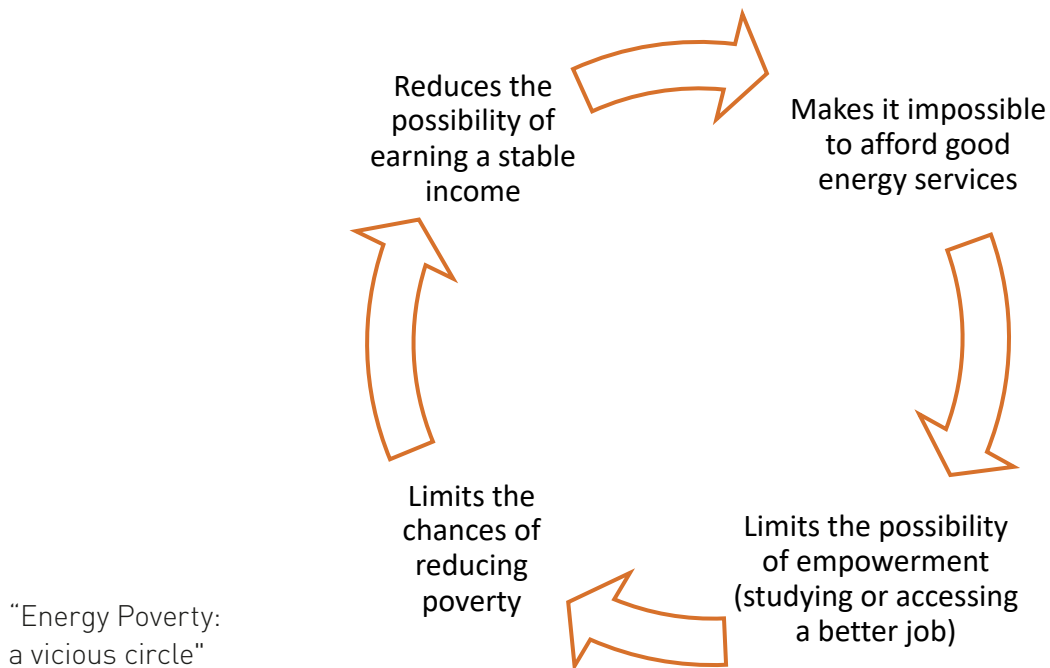
The International Poverty Line is set by the World Bank and is today fixed at 1.90\$ a day. It is important to emphasize that this is extremely low and people living well above the International Poverty Line may still be living in hardship and poverty. People living in poverty, especially extreme poverty, are often hungry, have no access to education or health services, and no access to light at night. Poverty cannot be addressed in isolation and it will take a holistic approach to assist people in rising out of poverty.

Access to energy has an important role to play in addressing poverty. Lack of energy is considered not only as a form of poverty, but also a consequence and a cause of it. Enhancing access to modern energy therefore, contributes to eradicating poverty and to the achieving SDG1: “No poverty”.

- Lack of energy is a **form** of poverty because it prevents people from meeting their basic needs, as well as empowering and developing on personal level. Just imagine how hard it is to study in the evenings without light or establishing a business without electricity!
- It is also a **consequence** of poverty, as low-income households often cannot afford energy services, although indispensable for daily living. As a result, they either do not manage to pay their bills (and their energy supply is interrupted) or opt for non-adequate, unhealthy and dangerous solutions to heat the house or to cook (just apparently cheaper, but expensive to maintain).

<sup>5</sup> The Sustainable Development Goals Report 2019

- It is also a **cause** of poverty because it precludes possibilities of income generation. With no or limited energy, it is difficult to develop at personal level (i.e. studying or reading at night, watching TV, etc...) or to run a business, and therefore the possibilities of rising from the poverty status are very limited.



In many parts of the world, women are responsible for supplying energy to the household and therefore are often disproportionately affected by this vicious circle. Not only do they not have access to modern energy services, but they often have to spend several hours every day to collect firewood to cook and heat the homes over an open fire. To break this vicious circle, modern energy services need to be affordable to low-income families, in a way that can be sustained in the long run (and not only for a short period, as in the case of a one-time discount). This principle applies both to developed and developing countries. For this purpose, specific policies and subsidies could be adopted to reduce energy prices for vulnerable consumers.

## Food | SDG2: “Zero Hunger”

SDG2 of the 2030 Sustainable Development agenda seeks to end hunger and all forms of malnutrition and double agricultural productivity. Malnutrition is the result of not having access to sufficient food, or not consuming adequate nutrients and can therefore be a result of poverty due to access to limited resources, or the result of inadequate calories consumption often leading to obesity (the other side of malnutrition).

Ensuring sustainable access to nutritious food universally will, on the one hand require sustainable food consumption and production throughout the world. On the other, it will require access to modern energy and cooking facilities that will allow families to prepare

their food adequately so they can be sure the quality and quantity of their every-day meals meet the nutritional needs of their family members. Just imagine how hard it is to prepare a meal without the possibility of boiling water, or baking bread?

Improving access to modern energy and cooking technologies contributes to achieving the SDG2: “Zero hunger”.

- Access to modern energy forms is important for small-scale farmers to produce enough food for their families. Giving farmers access to modern energy to irrigate their lands and using modern farming technologies, allow them to improve food security for themselves and their families. This reduces poverty and hunger in the short and long-term.
- Access to modern fuel types, such as electricity and LPG, makes the preparation of nutritious meals easier and avoids the problems related to fuelwood scarcity, which may lead to consuming foods that do not need cooking. More nutritious food is usually more elaborate and needs to be cooked to become digestible or safe enough to be eaten (think about meat, beans, eggs... or pizza!). If those options become inaccessible because of the lack of energy, the average consumption of proteins and carbohydrates will be reduced, leading to poor nutritional balance and malnutrition.
- In developing countries, collecting firewood for cooking and heating can be very time - and energy - consuming, as forests are often not close to villages. This physical drudgery requires a higher caloric intake that is not always possible to achieve, with the consequence of worsening the physical conditions. When wood or alternative fuels (like kerosene) must be purchased, energy has a strong effect on the family finances. In fact, a big part of their income must be used to purchase fuels for cooking, rather than food itself.
- Biofuels, such as crop residues and dung, are often burnt to fuel cooking in developing countries, when they could be used as fertilizers to increase land productivity.

## **Health | SDG3: “Ensure healthy lives and promote well-being for all at all ages”**

SDG3 aims to ensure healthy lives and promote well-being for all at all ages. Crucial to healthy lives is access to health facilities that can provide necessary services by qualified staff and the avoidance of unnecessary exposure to external factors that are bad for our health, like air pollution and inadequate managed water and sanitation. Having access to modern forms of energy and cooking facilities is important for both of these reasons. Far too many deaths continue to occur because health facilities do not have access to electricity and cannot provide the help needed. The lack of light during child-labor at night, lack of cooling facilities to store medication and immunization securely are an example of this.



According to the World Health Organisation (WHO), there are over 3.8 million premature deaths every year worldwide, caused by exposure to domestic smoke deriving from dirty cook stoves and fuels. Most of these victims are women and children, as they spend more time in the house and are responsible for collecting firewood, cooking and heating.

Providing access to modern energy will therefore contribute to achieving the SDG3: “Ensure healthy lives and promote well-being for all at all ages”.

- Electrification enables doctors and health workers to intervene during emergencies at any time. Hospital refrigerators allow storage of medicines and vaccines and make modern treatments and disease prevention accessible.
- When modern technologies and fuels are not available, traditional biomass (wood, agricultural residues, animal waste) is burned to cook. Similarly, when electricity is not accessible, candles, kerosene, or other highly polluting fuels are used for lighting. This, together with scarcely ventilated homes, leads to serious health consequences, in particular, lung diseases.
- Firewood collection is a drudgery that heavily affects people's health. The average firewood load varies from 25 – 50 kg, with damaging consequences to postures, as well as back and muscle pain.
- Without electricity is impossible to watch TV or make the fridge work. Having a functioning refrigerator in the house reduces the risk of food poisoning and makes food, vaccines and medicines last longer. Watching TV can expose people to higher hygiene standards and give access to more information about health, social norms and sexuality, topics that may be taboo in many countries due to a lack of information about them.



## Education | SDG4: “Quality Education”

Education enables upward socio-economic mobility and is a key to escaping poverty, especially in childhood but also in adult life when one must adapt to changing circumstances. Worldwide, 265 million children do not have access to education, and 22% of them are of primary school age. This is because most of these families cannot afford to send their children to school regularly, (think about the school fees, or the stationary, books and material you need to buy every year!). The family often needs the extra income the children generate from work. Children are also often responsible for firewood collection, meaning they have limited time to study and attend school. Having access to electricity at home and at school, allows students to extend studying hours, read at night, watch TV and have diversified sources of information. Enhancing access to energy therefore supports the achievement of SDG4: “Quality education”.

Learn more about the “Light Library”:  
the project provides solar lights to schools in rural Senegal,  
enabling students to borrow them to study after dark.  
This way students can study longer; families can save money  
and communities are more engaged.



[Read the full story](#)

- Lack of access to energy particularly affects women and young girls, as they are responsible for collecting firewood, cooking and heating the houses.



Women spend about **1.4 hours per day** collecting wood for their houses.



Fuel and wood collection can take up to **20 hours per week**.



Women switching to modern cookstoves save **70 hours per year!**

This time is taken from more educative and empowering activities, such as reading, studying and attending school.



Access to energy increases school attendance and educational levels. There is a **strong correlation** (above 66%) **with electricity consumption and higher educational scores**.



On the contrary, in countries where the **electrification rates are below 80%**, the **literacy rate tends to decrease**.

- Without electricity it is difficult to study, to do homework, to read in the evenings, and impossible to compete with other parts of the world or sectors of society that can turn on the computer, charge the phone and browse on the internet to get better informed. Sound like a nightmare? Imagine that only 69% of primary schools have access to electricity at global level. In Sierra Leone, this percentage goes down to 4%. Electrification also makes peripheral schools more attractive to more innovative teachers. Access to electricity, in fact, triggers innovation and increases the quality of teaching, allowing the usage of computers, tablets, mobile devices and internet connection.

## **Equality | SDG 5: Achieve gender equality and empower all women and girls & SDG 10: Reduce inequality within and among countries**

While most of us agree that men and women are born equal, there continues to be discriminatory laws, as well as social norms, which are obstacles to women having the same rights and opportunities as men. As a result, women continue to be underrepresented at all levels of political leadership and get less pay for the same work. As women and girls perform a disproportionate share of unpaid domestic work (as they are responsible for collecting fire-wood and water, food preparation, taking care of the very young and old family members and cleaning the house and clothes), they are often the most affected by the lack of modern energy. This has a strong impact on their health (because of the physical drudgery needed to collect firewood, as well as the inhalation of toxic fumes), but also on their empowerment possibilities (limited time to study, read, earn a salary, etc.). This also translates into long-term lower economic growth. If women do not have the chance or capability to earn a stable income, it means that around half of the national population cannot generate wealth and therefore economic growth. Improving access to energy will therefore contribute to achieving SDGs 5: “Gender equality” and 10: “Reduced inequalities”.

- As some girls have very little or no time at all to study, they suffer the most from illiteracy or inadequate education. A low level of education also means limited chances to earn a stable salary and be independent from the family of origin or from the husband. Formal education is a source of higher individual satisfaction and a healthier life.
- Because of the poverty status, families in developing countries make their children, especially girls, marry before they turn 18. This way, their families can benefit from a payment, favours or other benefits, granted by the husband (who is usually much older than the bride). However, child marriage can be prevented by improving access to modern energy. Given the positive correlation between access to electricity and higher educational outcomes, the first can be considered as a contributing factor in preventing child marriage. Girls in secondary school are up to 6 times less likely to marry, compared to those with no or little education.

## Water | SDG 6: Ensure access to water and sanitation for all

Humanity has always tried to settle close to water, as fresh water is a precious resource that is essential to human health and for the provision of food. Population growth is putting a huge strain on the limited resources of fresh water we have worldwide.



Over **2.1 billion people** drink polluted water and around **half of the global population** (4.5 billion people) lack access to proper **sanitation services**.



More than **1/3 of the global population** is affected by **water scarcity**.



**80%** of wastewater is **cleared unprocessed**, worsening the problem of water's pollution.



The energy sector is responsible for **10% of water's extraction** and **3% of global water consumption**.

In the future, both energy and water demand will increase. The IEA estimates that by 2040 the demand for water will increase by 60%, while the demand for energy will double over the same period. Both demands will grow, especially in developing countries, particularly in Africa, where the population is expected to double by 2050, because of many factors: population and economic growth, increased demand for food, industrial and agricultural products, heating, as well as first time access to energy, water and sanitation by a new wealthier segment of the population.

The energy sector is responsible for a high consumption of water, as it is needed for the generation of energy and for the extraction and processing of fossil fuels. On the other hand, energy is needed to extract, treat, and transport water to where it is most scarce. In

most developing countries, energy and water are also vital to growing the crops used as biofuels for heating or cooking. The connection between energy and water is indisputable: improving access to modern energy will also enhance the SDG 6: "Clean water and sanitation".

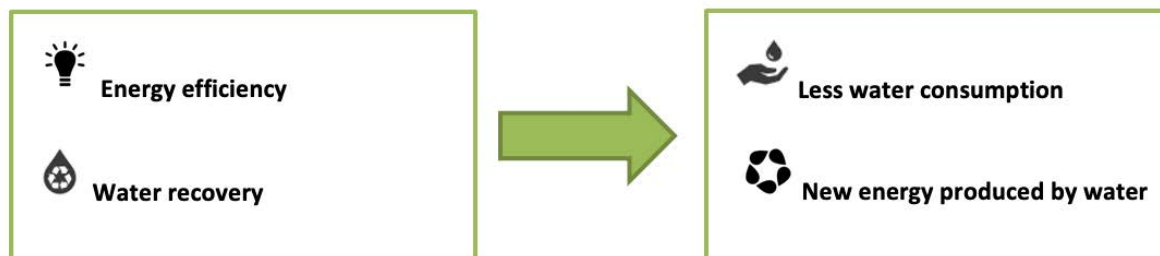


Picture by Tiffany DeNault



- Innovative and technological solutions will play an important role in reducing energy and water consumption and waste.

**Improving every step of energy's generation and consumption will be key to reduce the waste of water:**



To do so, combining renewable energy sources with extractions or filtering technologies will be key. For instance, photovoltaic solar panels (PVs), can be installed in peripheral areas with no access to energy and could be used to power automatic wells to extract water (instead of using a more polluting and expensive generator).

#### **The association “Energia per Lo Sviluppo”**

(*Energy for Development*) was founded in 2011 in Florence (Italy) to provide **energy to rural communities in Senegal**. But in reality, they not only bring solar- powered light to the rural communities, but also started a virtuous circle bringing water, increasing agricultural output and creating better jobs and health.



[Read the full story](#)

As another example, by linking a toilet with an anaerobic digester, you could be able to generate biogas that can be used for cooking and lighting the houses.

The Community Owned Biogas for Livelihood Enhancement (COBLE) Program, installs biogas units and offers maintenance and enterprise training to the community members. Once completed, units are filled with cow dung, which is then left to ferment. This produces methane gas which can be piped into the houses around the village, providing the community with a supply of energy for cooking, heating, and entrepreneurial tasks.



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## Economic Growth | SDG 8: Promote inclusive and sustainable economic growth, employment and decent work for all & SDG 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation

Sustainable and inclusive economic growth and strengthened infrastructure are important as they can drive progress and innovation in industrialization and therefore increase trade and create decent jobs that can improve living standards. Energy is instrumental for economic and human development. At the individual level, lack of energy leads to limited education and business opportunities, and therefore to a lower salary or unemployment and a poorer quality of life. Nationally, insufficient energy infrastructures can leave entire villages or cities in the dark, causing their marginalisation and economic stagnation. Therefore, there is a strong interconnection between access to energy and the achievements of both the SDG 8: “Decent work and economic growth” and SDG 9: “Industries, innovation and infrastructures”.

- Access to electricity increases industrial and agricultural productivity, as it makes productive processes faster and more effective, but also facilitates self-empowerment. Running a shop, a restaurant, a hairdresser or any other business activity would be difficult without electricity!
- Renewable energy represents an important resource for achieving access to energy in developing countries and at the same time creating new, sustainable, business opportunities. New jobs, such as the solar panel installer, or businesses (for instance, opening a shop dealing solar panels technologies, batteries, etc.) are created at the local level.
- Access to energy is also important for connecting to internet and mobile networks. Internet and mobile phones provide access to an infinite amount of information (that can inspire new opportunities) and new services (for instance paying energy bills by mobile phone with a reduction, or only when energy is really needed), even in marginalised rural areas.



## **Sustainable Communities and Consumption:** **SDG 11: Make cities inclusive, safe, resilient** **and sustainable & SDG 12: Ensure sustainable** **consumption and production patterns**

As more and more people look for better jobs and living conditions, migration from the countryside to the cities will be a continuing phenomenon in the coming decade. For this urbanisation process not to create any more social injustice and worsen environmental degradation, it is important that cities be planned and organised in the most sustainable way. This means that the urbanisation process, and the consequential economic growth and increased productive processes will have to consume resources sustainably. As much energy will be needed to meet these needs, renewable sources and technological innovations will play an important role to keep the cities, their populations and the environment in general health. Improving access to energy is therefore instrumental to meet the SDG 11: “Sustainable cities and communities” and SDG 12: “Responsible consumption and production”.

- As such, houses and buildings will need to be built according to higher standards in terms of energy efficiency and construction materials, heating, insulation etc., to have little dispersion and consumption of energy.
- All productive processes , in other words, all the steps needed to produce goods, should aim to improve energy efficiency and increase the usage of renewables, in order to have a smaller impact on the environment and society.
- It is important that the local governments provide the right incentives for their citizens to buy less polluting cars (electric or hydro cars, for instance), but also to renovate their fleets with hydrogen or solar busses.
- Governments should also be responsible for educating people to efficient waste collection and to the importance of recycling.

## Climate Change | SDG 13: Take urgent action to combat climate change and its impacts

The most urgent area for action today is climate change. If we do not cut record-high-greenhouse gas emissions now, global warming is projected to reach 1.5°C above the pre-industrial level in the coming decade.

As we are already seeing, the compounded effects will be catastrophic and irreversible: increasing ocean acidification, coastal erosion, extreme weather conditions, higher frequency and severity of natural disasters, continuing land degradation, loss of vital species and the collapse of ecosystems. These effects, which will render many parts of the globe uninhabitable, will also affect the poor the most. They will put food production at risk, leading to widespread food shortages and hunger, and potentially displace up to 140 million people by 2050. The exploration, development and deployment of all forms of renewable energy sources are key to ensure clean, affordable and sustainable energy, especially in marginal areas, while at the same time contributing to fight climate change and reduce greenhouse gas emissions. Improving access to energy is therefore crucial to meet the SDG 13: “Climate action”.

- To respect the commitment taken with the Paris Agreement and keep the global temperature increase well below 1.5°C, it is important that both developing and developed countries reduce energy consumption and improve energy efficiency in all productive sectors. It is also crucial to increase the usage of renewables, both at national level (generating energy from renewable sources, instead of fossil fuels), but also within the households (by producing the energy needed for the family with a solar panel on the rooftop, for instance).
- Studies have shown that achieving the universal access to modern energy by 2030 would increase CO<sub>2</sub> emissions by only 0.7%. This means that providing universal access to energy will have limited impact on the global increase of CO<sub>2</sub> emissions<sup>6</sup>. Nevertheless, it is important not to underestimate the effort, and ensure a clean and sustainable transition to a low-carbon economy, in both developed and developing countries.

<sup>6</sup> Chakravarty S., and Tavoni M.; Energy Poverty Alleviation and Climate Change Mitigation: Is there a Trade-off?, FEEM Note di Lavoro

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