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**SUMMARY EDITION**

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HOW 100% RE SUPPORTS THE



**SUSTAINABLE DEVELOPMENT GOALS**

This publication is a summary of the report “*100% Renewable Energy for Sustainable Development*” published in June 2017.

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## **PHOTO CREDITS**

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# INTRODUCTION

## WHY IS THIS ANALYSIS TIMELY AND RELEVANT?

Transitioning to 100% Renewable Energy (RE) is possibly the biggest and least cost catalyst for achieving sustainable development. In fact, 100%RE is about more than just replacing fossil fuels with renewable sources in today's energy system. It can serve as a means for socio-economic development and help create equitable societies for today's and future generations. Hereby, it can support the implementation of each sustainable development goal (SDG). The wide-range of co-benefits linked to RE development reveal once again the strong interdependency among all aspects of sustainable development and therefore the need for a comprehensive, cross-silo and integrated policy approach for the attainment of any SDG.

Energy is a prerequisite for development and for a life with dignity. Access to energy is essential to overall human progress, social welfare, technological advancement and essential to human rights. Without reliable access to energy, societies would have never reached the standards of living that many countries across the world enjoy today. While it would be naïve to understate the vital role that fossil fuel energy has played in improving livelihoods, it would be irresponsible, short-sighted and dangerous to ignore the threats of climate change, environmental degradation and concentration of political and economic power that this type of fossil-fuel-dependent development has produced. To ensure that energy can continue to play its fundamental role in driving development, supporting human progress and improving livelihoods across the world, a fundamental shift is needed.

Fortunately, signs of this shift are increasingly evident today. In 2013, for the first time the world added more capacity for renewable power (143GW) than coal, natural gas, and oil combined (141 GW)<sup>1</sup>. Only two years later, in 2015, in another unprecedented development, total investment in renewable power and fuels in the Global South exceeded that in the Global North. The Global South, including China, India and Brazil, committed a total of USD 156 billion



SOLAR POWER IS OFTEN THE CHEAPEST OPTION FOR OFF-GRID, RURAL ELECTRIFICATION. THIS IS ALSO THANKS TO THE IMPRESSIVE FALL IN THE COST OF SOLAR PV.

to RE deployment (up 19% compared to 2014). By contrast, RE investment in the Global North as a group declined by 8% in 2015 to USD 130 billion<sup>2</sup>. As the world undergoes an inevitable transformation towards a renewable future, an analysis of the relationship between 100%RE and sustainable development becomes extremely relevant and timely, especially as other major international provisions such as the Agenda 2030, including the SDGs, and the Paris Agreement start to get implemented.

This report summary of “100% Renewable Energy for Sustainable Development” demonstrates how a transition to 100% RE can contribute to the achievement of the 17 Sustainable Development Goals. While the need to transition to 100%RE, and in so doing, harvesting the many benefits in meeting many of the SDGs equally applies to the industrialised world, this paper focuses on the social, economic and political context of the Global South.

[1] T. Randall, “Fossil Fuels Just Lost the Race Against Renewables,” *Bloomberg*, 14 April 2015. [Online]. Available: <https://www.bloomberg.com/news/articles/2015-04-14/fossil-fuels-just-lost-the-race-against-renewables>. [Accessed 20 February 2017]. [2] REN 21, “Renewables 2016: Global Status Report,” REN21, Bonn, Germany, 2016.

100% RE DEVELOPMENT REQUIRES STRONG  
CROSS-SECTORAL, TRANSREGIONAL AND  
TRANSNATIONAL PARTNERSHIPS

17 PARTNERSHIPS  
FOR THE GOALS



100% RENEWABLE ENERGY PROMOTES JUST,  
PEACEFUL AND INCLUSIVE SOCIETIES



100% RENEWABLE ENERGY IS ESSENTIAL TO  
MANAGE FORESTS SUSTAINABLY, COMBAT  
DESERTIFICATION AND HALT AND REVERSE  
LAND DEGRADATION AND BIODIVERSITY LOSS



100% RENEWABLE ENERGY IS  
INEVITABLE FOR CONSERVING AND  
SUSTAINABLY USING OCEANS,  
SEAS AND MARINE RESOURCES



ANY MEANINGFUL ACTION AGAINST  
CLIMATE CHANGE WILL BE DRIVEN BY A MAJOR  
RESTRUCTURING OF THE CARBON INTENSIVE  
ENERGY SECTOR TOWARDS 100%RE



100% RENEWABLE ENERGY ALLOWS  
SUSTAINABLE AND EFFICIENT NATURAL  
RESOURCE MANAGEMENT



CITIES ARE THE PIONEERS AND THE  
MOST PROMISING CHANGE AGENTS  
OF THE 100% RE MOVEMENT



THE DECENTRALISED NATURE OF 100%  
RENEWABLE ENERGY HELPS REDUCING  
INEQUALITIES WITHIN AND AMONG COUNTRIES

10 REDUCED  
INEQUALITIES



# SUPPORTING THE TRANSITION TO 100% RE IS BOTH A NECESSARY CONDITION AND A DRIVER FOR SUSTAINABLE DEVELOPMENT THAT LEAVES NO ONE BEHIND



100% RENEWABLE ENERGY CAN PROVIDE RELIABLE ACCESS TO ENERGY AT THE LOWEST POSSIBLE COSTS



RE CAN PROVIDE ENERGY FOR ALL SEGMENTS OF THE FOOD CHAIN AND PROVES TO BE BENEFICIAL ESPECIALLY FOR REMOTE AND RURAL AREAS



RE IS ONE OF THE MOST VIABLE OPTIONS TO PROVIDE ENERGY TO HOSPITALS, HEALTH FACILITIES AND HEALTH POSTS, WHICH HAS A DIRECT IMPACT ON MANY PEOPLE'S HEALTH



RE IS FUNDAMENTAL IN SUPPORTING STUDENTS BY PROVIDING ELECTRICITY DURING DARK HOURS OR FREEING UP TIME FROM CHARCOAL COLLECTION



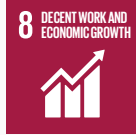
100% RE CAN ENHANCE SUBSTANTIVE AND PROCEDURAL RIGHTS FOR WOMEN AND GIRLS AND ACHIEVE GENDER EQUALITY



BUILDING A 100% RE INFRASTRUCTURE IS A MEAN AND A PREREQUISITE TO ENSURE ACCESS TO CLEAN WATER AND SANITATION FOR ALL



ACCESS TO 100% RENEWABLE ENERGY IS A PREREQUISITE FOR DEVELOPMENT AND A LIFE OF DIGNITY



100% RE BOOSTS INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, CREATES EMPLOYMENT AND DECENT WORK FOR ALL



PROMOTING INCLUSIVE AND SUSTAINABLE INDUSTRIALIZATION ENTAILS EXPANDING RENEWABLE ENERGY INFRASTRUCTURE

**1** NO  
POVERTY



## **SDG 1** **END POVERTY IN ALL** **ITS FORMS EVERYWHERE**

### **LEAST COST**

It is estimated that consumers save about \$3.15 for every dollar spent on small solar PV (smaller than 10W) in Africa, thanks to the massive price reduction in the years since 2009<sup>3</sup>. Based on a levelized cost of electricity perspective, which takes into account life-cycle costs, cost values for electricity in the 100%RE scenario range from 56 €/MWh to 62€/MWh, which is less than other existing alternatives<sup>4</sup>. Therefore, off-grid RE systems are the cheapest and fastest way to provide reliable access to energy.

**RENEWABLE ENERGY  
ENABLES ENTERPRISE  
DEVELOPMENT IN RURAL  
COMMUNITIES PROVIDING THEM  
WITH THE RESOURCES TO ESCAPE  
EXTREME POVERTY AND HUNGER.**



### **POVERTY ERADICATION**

In 2000, the Government of Bangladesh set the target to provide 100% energy access through cheap and reliable electricity by 2020. This target was seen as a strategic articulation of the government's aspiration to fight against chronic poverty and attain middle-income status. To do so, more than 7 million Solar Home Systems have been installed in the country, benefitting over 24 million rural people, most of whom (62%) now have access to electricity. This has immense benefits for economic life, people can now work more efficiently, due to access to reliable energy, and also improve their business models. Meanwhile, the economy has grown at nearly 6 percent per year in the past decade and extreme poverty has dropped by nearly a third<sup>5</sup>. Therefore, decentralised RE off-grid solutions are the cheapest way to eradicate poverty.

#### **LIFTING MILLIONS OUT OF POVERTY**

89 MILLION PEOPLE IN AFRICA AND ASIA ARE GETTING ACCES TO ENERGY THROUGH OFF-GRID SOLAR POWER. THIS PROVIDES ENOUGH POWER TO LIFT 21 MILLION INDIVIDUALS TO THE FIRST RUNG OF THE ENERGY LADDER.



#### **INCLUSIVE MARKET**

THE BOOMING MARKET OF OFF-GRID SOLAR SYSTEMS IN AFRICA DEMONSTRATED HOW FAST RENEWABLE ENERGY COULD GROW AND REACH EVEN THE REMOTEST RURAL COMMUNITIES.



#### **PRODUCTIVE ENERGY**

RE CAN BECOME A TOOL TO GENERATE INCOME FOR RURAL HOUSEHOLDS AND ENTERPRISES.



[3] I. Orlandi, N. Tyabji and J. Chase, "Off-Grid Solar Market Trends Report 2016," Bloomberg New Energy Finance and Lighting Global, New York, 2016. [4] go100%re.net, "Global 100%RE," [Online]. Available: <http://www.go100re.net/>. [Accessed 18 February 2017]. [5] World Future Council, "100% renewable energy and poverty reduction in Tanzania with learnings from Bangladesh," World Future Council, Hamburg, Germany, 2016.



**SDG 2**

**END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE**

**WATER PUMPING**

In many countries, water pumping for agriculture often puts stress on the electricity demand and poses dangers to food security. De-centralised RE-based pumping options have significantly improved food security and family incomes in Kenya. In Colombia, small hydropower for rice crop irrigation instead of diesel generators brought farmers considerable savings<sup>6</sup>.

**OFTEN SEEN AS HAVING NEGATIVE IMPACTS, BIOENERGY, WHEN MANAGED SUSTAINABLY, LOCALLY AND EFFICIENTLY CAN PROVIDE A LOCALISED SOLUTION TO ENHANCING ENERGY AND FOOD SECURITY.**



**RESILIENT FOOD SYSTEMS**

While it may be counter-intuitive, production of bioenergy in integrated food-energy systems can improve livelihoods, conserve the environment, advance economic growth and enhance food production and nutrition security. One such example is intercropping Gliricidia with maize in Malawi or coconut in Sri Lanka<sup>7</sup>.

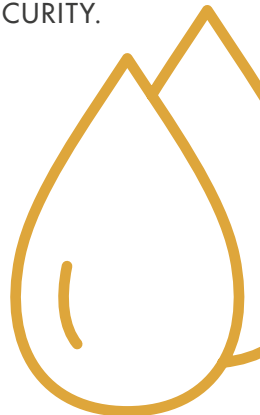
**EVERY STEP OF THE FOOD CHAIN**

100%RE TECHNOLOGIES HELP COMMUNITIES PROVIDE ENERGY FOR PRIMARY PRODUCTION, FOOD PROCESSING AND PRESERVATION AS WELL AS COOKING.



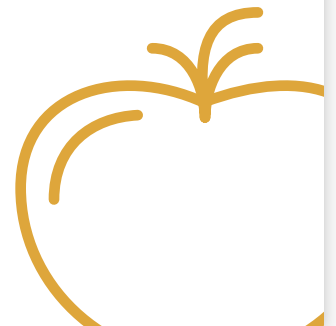
**WATER PUMPING STRESS**

WATER PUMPING FOR AGRICULTURE OFTEN PUTS STRESS ON THE ELECTRICITY DEMAND, ESPECIALLY DURING PEAK TIMES AND HENCE DANGERS FOOD SECURITY.



**RESILIENT FOOD SYSTEMS**

DECENTRALIZED RE-BASED PUMPING OPTIONS CAN CREATE MUCH MORE RESILIENT COMMUNITIES AND AVOID BLACKOUTS DUE TO EXCESSIVE ELECTRICITY DEMAND, ESPECIALLY DURING EXTREME DRY SEASONS.



[6] D. Lecoque and M. Wiemann, "The Productive Use of Renewable Energy in Africa," European Union Energy Initiative, Eschborn, Germany, 2015. [7] IRENA, "Renewable Energy in the Water, Energy and Food Nexus," International Renewable Energy Agency (IRENA), Abu Dhabi, 2015.



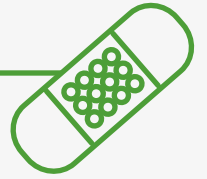
**SDG 3**

**ENSURE HEALTHY LIVES AND PROMOTE WELL-BEING FOR ALL AT ALL AGES**

**RENEWABLE COOKING**

Around 3 billion people heat their homes and cook using solid fuels (i.e. wood, charcoal, dung) on open fires or traditional stoves. These inefficient cooking and heating practices produce high levels of indoor air pollution as they increase levels of damaging pollutants such as fine particles and carbon monoxide<sup>8,9</sup>. The WHO estimates that about 4 million people annually die prematurely from illness attributable to indoor air pollution from cooking. In poorly ventilated dwellings, the level of harmful particles can exceed 100 times the acceptable levels for fine particles. More than 50% of premature deaths due to pneumonia among children under five are caused by particulate matter inhaled from indoor air pollution<sup>10</sup>.

**ON-SITE RE GENERATION FOR HEALTH CENTERS PLAYS A KEY ROLE IN ENSURING ECONOMICALLY VIABLE AND RELIABLE ELECTRICITY TO PROVIDE HEALTH SERVICES FOR ALL.**



**RELIABLE ACCESS**

One in four sub-Saharan health facilities has no access to electricity. And only 8% of health facilities and 34% of hospitals have what could be called “reliable” access to electricity, according to the WHO<sup>11</sup>. RE proved to be one of the most viable options to provide reliable energy access to health facilities, especially in remote areas in the Global South which can use onsite PV solar either as a primary or backup electricity source. In Liberia, a country with little grid coverage, the pace of solar electrification has exceeded that of other power sources; in 2012, more first-line public health clinics used PV solar than generators as their primary energy source<sup>12</sup>.

**OUTDOOR AIR POLLUTION**

OUTDOOR AIR POLLUTION, A HEALTH CHALLENGE THAT WAS ESTIMATED TO CAUSE 3 MILLION PREMATURE DEATHS WORLDWIDE IN 2012, CAN BE ADDRESSED BY TRANSITIONING FROM FOSSIL FUEL COMBUSTION TO RE.



**INDOOR AIR POLLUTION**

INDOOR AIR POLLUTION RESULTS IN 4 MILLION PREMATURE DEATHS. TRANSITIONING TO MORE EFFICIENT COOKSTOVES AND RE BASED COOKING METHODS CAN PLAY A CRUCIAL ROLE IN MITIGATING THIS HEALTH IMPACT.



**ENERGY FOR HEALTH CENTERS**

HEALTH WORKERS IN ELECTRIFIED CLINICS HAVE REPORTED RESULTS SUCH AS FEWER INFECTIONS, FEWER DELAYS IN PROVIDING LIFE-SAVING CARE, MORE TIMELY BLOOD TRANSFUSIONS, AND MORE SUCCESSFUL CHILD DELIVERIES.



[8] WHO, “Household (Indoor) Air Pollution,” WHO, [Online]. Available: <http://www.who.int/indoorair/en/>. [Accessed 15 February 2017]. [9] IEA, “World Energy Outlook 2006: Energy For Cooking in Developing Countries,” International Energy Agency, Washington DC, 2006. [10] WHO, “Household air pollution and health Fact Sheet n. 292,” WHO, February 2016. [Online]. Available: <http://www.who.int/mediacentre/factsheets/fs292/en/>. [Accessed 14 February 2017]. [11] WHO, World Health Organization, Geneva, 2015. [12] WHO, “Access to Modern Energy Services for Health Facilities in Resource-Constrained Settings: A Review of Status, Significance, Challenges and Measurement,” World Health Organization, Switzerland, 2015.





**SDG 4**

**ENSURE INCLUSIVE AND QUALITY EDUCATION FOR ALL AND PROMOTE LIFELONG LEARNING**

**INDEPENDENCE**

In Littoral in Cameroon, solar kits were installed in all houses of the village. Children subsequently gained independence from daylight to do their homework and chores. This led to a significant improvement of the children's school performance with a recorded rise in scores from E to C<sup>13</sup>.

**INFORMATION ACCESS**

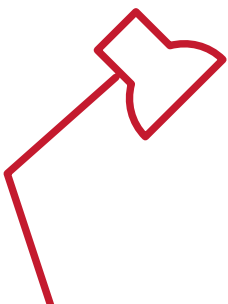
RE provides a low cost option for electricity production to power computers and other devices to access information and facilitate communication. In the Surkhet District in Nepal, a project completed in 2013 demonstrated how the use of PV systems for lightning and computers helped to improve homework and information exchange<sup>14</sup>.

**ACCESS TO RE OPTIONS FOR COOKING AND ELECTRICITY CAN FREE UP TIME FOR STUDYING AND ENSURE SAFETY FOR MANY CHILDREN WHO DEDICATE THEIR TIME TO WOOD AND CHARCOAL COLLECTION.**



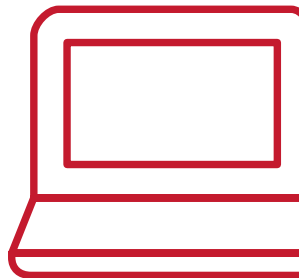
**IT'S ALL ABOUT ACCESS**

RENEWABLE ENERGY CAN PROVIDE ACCESS TO MILLIONS OF STUDENTS IN A FAST AND AFFORDABLE WAY, WITHOUT HAVING TO WAIT FOR THE NATIONAL INFRASTRUCTURE TO BE EXPANDED OR UPGRADED.



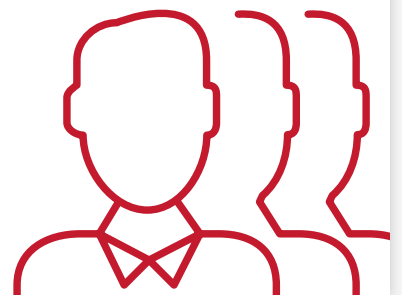
**INFORMATION AND POWER**

RE PROVIDES LOW COST ELECTRICITY PRODUCTION TO POWER COMPUTERS AND OTHER DEVICES TO ACCESS INFORMATION AND FACILITATE COMMUNICATION.



**ENERGY TO RECRUIT TEACHERS**

THE RELIABLE AND AFFORDABLE SOURCE OF ELECTRICITY PROVIDED BY RE CAN MOTIVATE TEACHERS AND QUALIFIED PROFESSIONALS TO CONSIDER MOVING TO THESE COMMUNITIES.




[13] D. Lecoque and M. Wiemann, "The Productive Use of Renewable Energy in Africa," European Union Energy Initiative, Eschborn, Germany, 2015. [14] Global Sustainable Electricity Partnership, "Nepal — Energy for Education Project," Global Sustainable Electricity Partnership, [Online]. Available: <http://www.globalelectricity.org/en/index.jsp?p=121&f=373>. [Accessed 12 February 2017].



## GENDER EQUALITY AND EMPOWER ALL WOMEN AND GIRLS

### ENTREPRENEURSHIP

In the RE sector, women represent an average of 35% of the workforce, compared to only 20-25% of the overall energy industry's workforce<sup>15</sup>. For instance, a pilot project in West Bengal has helped women to become solar entrepreneurs by providing them with training to manage and operate solar lantern charging stations. The region showed a huge demand for service facilities, but a gap in their provision because the technically skilled male youth often migrated to the cities. The project therefore trained women on technical aspects of PV and troubleshooting; entrepreneurial issues such as need assessment, market research, and managing micro-enterprises and institutional issues like networking, among others. Women have reported feeling empowered to become skilled solar entrepreneurs who can contribute to household income and wellbeing<sup>16</sup>.



**AS A SECTOR THAT  
REQUIRES A VARIETY  
OF SKILLS ALONG THE  
ENTIRE VALUE CHAIN,  
RENEWABLES CAN GIVE  
WOMEN A GREATER ROLE  
TO PLAY COMPARED TO  
TRADITIONAL ENERGY  
SCENARIOS.**

### CHILDREN RIGHTS

Many children, especially girls in rural areas, are withdrawn from school to attend to domestic tasks such as collection of fuel wood among other things, thereby not getting an education and thus having their economic opportunities restricted<sup>17</sup>. Therefore, fuel collection reduces the time children can spend on a thorough education. By transforming to off-grid RE solutions such as roof-PV installations, children free up time from fuel wood collection for other activities.

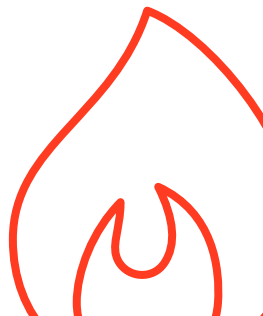
#### TIME OF COLLECTION

A RELIABLE ACCESS TO ENERGY THROUGH RE WOULD GREATLY DECREASE THE AMOUNT OF TIME WOMEN AND GIRLS SPEND PROVIDING ENERGY FOR THE HOUSEHOLD, WHICH WOULD INCREASE THE AMOUNT OF TIME THEY SPEND ON THEIR EDUCATION.



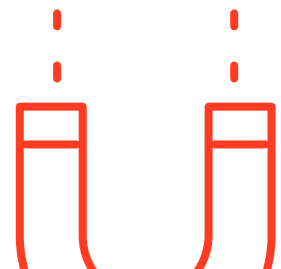
#### EXPOSURE TO SMOKE

THE ADOPTION OF CLEAN COOK STOVES USING CLEAN AND RENEWABLE FUEL CAN PREVENT THE MAJORITY OF DEATHS AND DISEASES ATTRIBUTABLE TO INDOOR AIR POLLUTION, WHICH MAINLY AFFECT WOMEN AND CHILDREN.



#### INCLUSIVE ENERGY

AS THE ENERGY SECTOR TRANSITIONS FROM FOSSIL-FUEL DOMINATED SYSTEMS TOWARD MORE EFFICIENT, SUSTAINABLE RENEWABLE-BASED SYSTEMS, NEW OPPORTUNITIES FOR A MORE INCLUSIVE ENERGY JOB MARKET ARE EMERGING.





**SDG 6**  
**ENSURE ACCESS TO WATER AND SANITATION FOR ALL**

**ACCESS TO WATER**

Renewable energy-based water pumping is an economic and resilient option from drinking to agricultural irrigation in even the most remote and driest regions<sup>18</sup>. In the Sahel region of Africa, a programme deployed solar-based water pumping solutions which helped nearly 3 million people to benefit from the use of these pumps for drinking and irrigation<sup>19</sup>.

**FROM A LIFE-CYCLE PERSPECTIVE POWER GENERATION AND PROCESSING THROUGH RENEWABLE SOURCES ARE UP TO 200 TIMES LESS WATER-INTENSIVE THAN FROM FOSSIL-FUELS.**

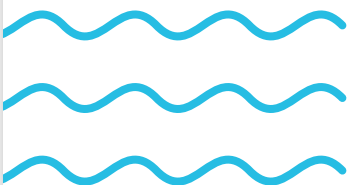


**WATER DESALINATION**

In India, a 1MW solar plant stretching over 750 metres of a canal system was developed. The plant produces 1.53GWh of electricity annually, saving 9 million litres of water from evaporation every day. Covering 10% of the 19,000 kilometre canal network with solar panels could potentially conserve 4,400 hectares and save about 20 billion litres of water every year<sup>20</sup>.

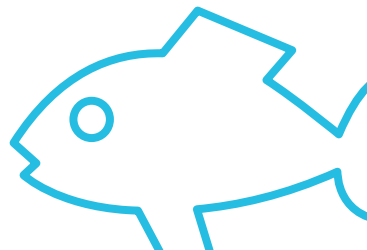
**WATER PUMPING WITH RENEWABLES**

RENEWABLE ENERGY-BASED TECHNOLOGIES CAN BE AN ECONOMIC AND RESILIENT OPTION TO ACCESS, TREAT AND PUMP WATER FOR MULTIPLE PURPOSES FROM DRINKING TO AGRICULTURAL IRRIGATION, EVEN IN THE MOST REMOTE AND DRIEST REGIONS.



**AQUATIC LIFE AND WATER QUALITY**

COAL MINING CAN HAVE DETRIMENTAL IMPACTS ON AQUATIC LIFE AND THE LIVELIHOODS OF LOCAL POPULATIONS. LOCALLY PRODUCED RENEWABLE ENERGY CAN SIGNIFICANTLY IMPROVE THE QUALITY OF WATER.



**MINE TAILINGS POLLUTANTS**

SURFACE-MINED COAL PRODUCES LARGE VOLUMES OF MINE TAILINGS CONTAINING POLLUTANTS THAT CAN LEACH INTO GROUNDWATER.



[18] IRENA, "Renewable Energy in the Water, Energy and Food Nexus," International Renewable Energy Agency (IRENA), Abu Dhabi, 2015. [19] IRENA, "Renewable Energy in the Water, Energy and Food Nexus," International Renewable Energy Agency (IRENA), Abu Dhabi, 2015. [20] IRENA, "Renewable Energy in the Water, Energy and Food Nexus," International Renewable Energy Agency (IRENA), Abu Dhabi, 2015.



## SDG 7

# ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

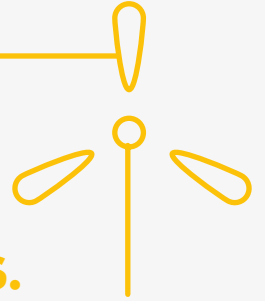
### ENERGY ACCESS

Access to energy is a prerequisite of development and for a life of dignity. Energy services include lighting and electricity, cooking, heating and cooling, mechanical energy and mobility. The decentralised nature of RE projects allows even the most remote and marginalised communities to install a small PV system on their roof for instance, giving them access to energy and all its services.

### CO-BENEFITS

As shown in this report, various expected benefits of a transition to 100%RE are presumed to be closely aligned with the drivers that motivate it. This includes macro-economic effects such as investments and industry turnover, but also system-related benefits like avoided environmental costs as well as distributional effects.

**MORE THAN ONE BILLION PEOPLE DO NOT HAVE ACCESS TO ENERGY SERVICES. OVERCOMING THIS IS ESSENTIAL TO OVERALL HUMAN PROGRESS, SOCIAL WELFARE, TECHNOLOGICAL ADVANCEMENT AND HUMAN RIGHTS.**



### SUSTAINABLE IS RENEWABLE

SUSTAINABLE ENERGY MUST BE DEFINED AS RENEWABLE ENERGY, WHICH SAFEGUARDS HUMAN RIGHTS, RESPECTS PLANETARY BOUNDARIES, SUPPORTS LOCAL COMMUNITIES, AND ENSURES A JUST DISTRIBUTION OF BENEFITS.



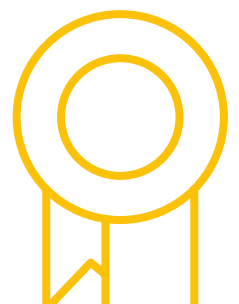
### ONLY WAY FORWARD

IT IS SHORT-SIGHTED AND DANGEROUS TO IGNORE THE THREATS OF CLIMATE CHANGE, ENVIRONMENTAL DEGRADATION AND CONCENTRATION OF POLITICAL AND ECONOMIC POWER LINKED TO FOSSIL-FUEL-DEPENDENT DEVELOPMENT.



### DRIVERS OF CHANGE

GOVERNMENTS ACROSS THE DEVELOPING WORLD ARE PIONEERING THIS PARADIGM SHIFT AND ARE LEADING THE CHARGE WITH STRONG COMMITMENTS AND DECISIVE ACTION TOWARDS 100% RENEWABLE ENERGY.





**SDG 8**

**PROMOTE INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, EMPLOYMENT AND DECENT WORK FOR ALL**

**JOB OPPORTUNITIES**

According to an IRENA study, the RE sector accounted for 8.8 million jobs worldwide in 2017 (without large-scale hydropower which accounted for 1.5 million jobs)<sup>21</sup>. The study also estimated that doubling the share of Renewables by 2030 could increase employment in the sector to beyond 24 million people compared to a ‘Business as usual’ scenario (13.5 Mio)<sup>22</sup>. In fact, several studies reveal how the employment potential for each MW of installed capacity for renewable energy technology is consistently higher than for fossil fuels. If India alone meets its target of installing 100GW of solar, 1.1 million jobs are expected to be created in the process<sup>23</sup>.

**LOCAL INDUSTRY**

RE development creates opportunities to leverage local industries to create value that benefits local communities, due to its decentralised nature and therefore RE is a critical tool in leaving no one behind<sup>24</sup>. In 2015 alone, Bangladesh added an estimated 700,000 solar home systems, raising the total cumulative installations in the country to 4.5 million. The workforce in this sector has increased by 13% to reach 127,000 jobs. A quarter of which are in manufacturing, with the remaining spread across distribution, installation and after-sales services<sup>25</sup>.

**UNLIKE TRADITIONAL CENTRALIZED FOSSIL FUEL DEVELOPMENT RE CREATES HUGE OPPORTUNITIES FOR EMPLOYMENT IN REMOTE RURAL AREAS REACHING IN AN INCLUSIVE MANNER THE MOST MARGINALIZED COMMUNITIES.**



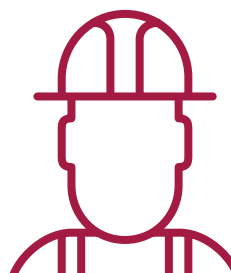
**A TRANSITION TO MORE JOBS**

THE EMPLOYMENT POTENTIAL FOR EACH MW OF INSTALLED CAPACITY FOR RENEWABLE ENERGY TECHNOLOGY IS CONSISTENTLY HIGHER THAN FOR FOSSIL FUELS. FOR EVERY JOB LOST DUE TO A PHASE OUT OF FOSSIL FUELS, MORE JOBS EMERGE IN THE RE SECTOR.



**GOOD LOCAL JOBS**

EACH SECTION OF THE RE VALUE CHAIN REQUIRES SKILLS AND WORKFORCE CAPABILITIES, WHICH STIMULATES LOCAL BUSINESS AND EMPLOYMENT. IN INDIA, SOLAR PV CREATES MORE JOBS PER UNIT OF ENERGY PRODUCED THAN ANY OTHER ENERGY SOURCE.



**ENHANCING HUMAN WELL-BEING**

RE ALSO INCREASES HUMAN WELL-BEING, TAKING INTO ACCOUNT ENVIRONMENTAL, SOCIAL AND ECONOMIC DIMENSIONS. DOUBLING THE SHARE OF RENEWABLES WOULD INCREASE THIS INDICATOR BY 3.7%.



[21] IRENA, “Renewable Energy and Jobs: Annual Review 2018,” International Renewable Energy Agency, Abu Dhabi, 2018. [22] IRENA, “REthinking Energy 2017: Accelerating the global energy transformation,” International Renewable Energy Agency (IRENA), Abu Dhabi, 2017. [23] IRENA, “Renewable Energy Benefits: Measuring the Economics,” International Renewable Energy Agency, Abu Dhabi, 2016. [24] IRENA, “Renewable Energy Benefits: Leveraging Local Industries,” 12 November 2016. [Online]. Available: [http://remember.irena.org/sites/Documents/Shared%20Documents/12th\\_Council/Thematic%20presentations/RE%20Benefits%20-%20Leveraging%20Local%20Industries%20Wind%20and%20Solar.pdf](http://remember.irena.org/sites/Documents/Shared%20Documents/12th_Council/Thematic%20presentations/RE%20Benefits%20-%20Leveraging%20Local%20Industries%20Wind%20and%20Solar.pdf). [Accessed 12 February 2017]. [25] IRENA, “Renewable Energy and Jobs: Annual Review 2016,” International Renewable Energy Agency, Abu Dhabi, 2016.



**SDG 9**

**BUILD RESILIENT INFRASTRUCTURE, PROMOTE SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION**

**LEAPFROGGING**

RE already attracts considerable amounts of investments which in turn inevitably thrusts innovation, industry and infrastructure development. In 2015, investments in RE (excluding large hydro) in the Global South countries outweighed that in industrialised economies. The Global South including China, India and Brazil committed a total of \$156 billion, up 19% from 2014, while industrialised countries invested \$130 billion, down 8%. Therefore, countries in the Global South could pioneer low-carbon technologies, decoupling carbon emissions from industrialisation<sup>26</sup>.

**INNOVATIVE BUSINESS MODELS**

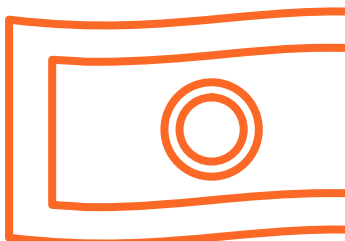
A transition to 100%RE means innovative business models that can also drive the expansion of off-grid renewable energy markets. In Africa, several new businesses are driving innovation by providing alternative solutions to allow communities to access RE. For instance, Soling is the East Africa's first solar-panel manufacturing plant. It makes solar panels with a capacity from 20W to 300W. Beyond being the first of its kind in the region, the company also started to assemble complete home solar kits that include batteries, phone chargers and LED lights. It also sells to companies such as M-KPA and Mobisol, which sell to customers using pay-as-you-go models.

**A 100%RE FUTURE WILL REQUIRE DECENTRALISED DEVELOPMENT DRIVEN BY SMALL SCALE INVESTMENTS THAT ALLOW COMMUNITIES TO CREATE THEIR OWN ENERGY, USE IT AND SHARE IT.**



**ATTRACTIVE INVESTMENT**

RE ATTRACTS CONSIDERABLE AMOUNTS OF INVESTMENT ESPECIALLY IN GLOBAL SOUTH COUNTRIES WHICH IN RETURN INEVITABLY THRUSTS INNOVATION, INDUSTRY AND INFRASTRUCTURE DEVELOPMENT.



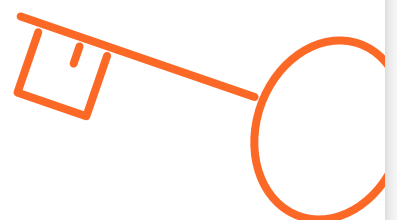
**LEAPFROGGING IN THE GLOBAL SOUTH**

IN 2015, INVESTMENTS IN RENEWABLES IN GLOBAL SOUTH COUNTRIES OUTWEIGHED THOSE IN INDUSTRIALIZED ECONOMIES. CHINA, INDIA AND BRAZIL COMMITTED A TOTAL OF \$156 BILLION, UP 19% IN 2014, WHILE INDUSTRIALIZED COUNTRIES INVESTED \$130 BILLION, DOWN 8%.



**INNOVATIVE BUSINESS MODELS**

DECENTRALISED RE SOLUTIONS CAN CREATE VALUE LOCALLY AND BOOST LOCAL ENTERPRISES, WHICH CAN PROGRESSIVELY PLAY AN IMPORTANT ROLE IN EXTENDING ACCESS THROUGH THE ADOPTION OF INNOVATIVE BUSINESS MODELS.



[26] Frankfurt School-UNEP Centre/BNEF 2016, "Global Trends in Renewable Energy Investments 2016," Frankfurt School of Finance & Management, Frankfurt, Germany, 2016.

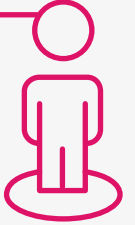


## SDG 10 REDUCE INEQUALITY WITHIN AND AMONG COUNTRIES

### FAIR GROWTH

The district of Kasese in Uganda with approximately 130,000 households is radically transforming. By 2020, Kasese will supply the energy needs of its population by only renewable sources. This target will be achieved by adopting a people-centred approach, with a wide variety of renewable sources such as biomass, solar, geothermal and mini-hydroelectric technologies. By doing so, several clean energy businesses have been set up since 2012, creating jobs for locals who have been trained in the process<sup>27</sup>. In sum, the district is successfully implementing an energy democracy approach in which every person has a say in it and can directly influence the district's economic and social livelihoods.

**THE TRANSFORMATION TOWARDS A 100%RE FUTURE MUST FOLLOW A UNIVERSALLY COHESIVE PEOPLE-CENTERED, COMMUNITY-DRIVEN AND FUTURE-JUST APPROACH.**



### POLITICAL POWER

Particular countries or specific corporations that control the monopolised available fossil fuel resources concentrate the benefits in the hands of a few<sup>28</sup>, often without accounting for the social and environmental damage on local communities<sup>29 30</sup>. As the political power is usually with those monopolists, externalities are not regulated, which leads to enormous inequalities<sup>31 32</sup>. 100%RE can break up these dependencies due to its modular and decentralised nature.

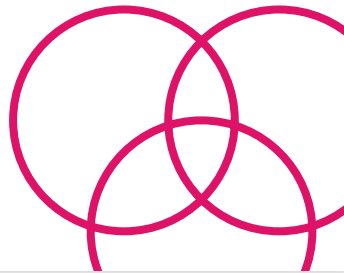
#### ENERGY PROSUMERS

WITH RE TECHNOLOGIES ANYONE CAN BECOME A PROSUMER, WHICH ENABLES CITIZENS TO BECOME INDEPENDENT FROM OTHER ENERGY PROVIDERS AND PROVIDE ACCESS TO ENERGY AT THE NECESSARY SPEED AND SCALE AS WELL AS LOCATION



#### A FAIRER DISTRIBUTION

THE DECENTRALISED NATURE OF RE CAN PLAY A MAJOR PART IN DECREASING THE INEQUALITY BETWEEN URBAN AND RURAL AREAS AND INEVITABLY LEAD TO A MUCH FAIRER AND EQUITABLE DISTRIBUTION OF RESOURCES ACROSS REGIONS.



#### INTERGENERATIONAL JUSTICE

WITH 100%RE, CURRENT GENERATIONS INVEST IN THE FUTURE PROVIDING CHEAP AND SUSTAINABLE ENERGY FOR DECADES TO COME AND IT ALLOWS INTERGENERATIONAL JUSTICE BY ENSURING EQUAL ACCESS TO COMMON RESOURCES.



[27] A. Leidreiter, "A global shift to 100% renewables is not just cleaner – it's about equality," 4 November 2015. [Online]. Available: <https://www.theguardian.com/public-leaders-network/2015/nov/04/100-renewables-cleaner-equality-fossil-fuels-energy>. [Accessed 1 March 2017]. [28] P. Bosshard, "Infrastructure for Whom? A Critique of the Infrastructure Strategies of the Group of 20 and the World Bank," International Rivers, Berkeley, 2012. [29] M. Steele and N. Schulz, "Water hungry coal: Burning South Africa's water to produce electricity," Greenpeace Africa, Johannesburg, South Africa, 2012. [30] M. Ruffalo, "To Fight Inequality, Turn On Clean Energy Everywhere," The Huffington Post, 15 September 2015. [Online]. Available: [http://www.huffingtonpost.com/mark-ruffalo/to-fight-inequality-turn-on-clean-energy-everywhere\\_b\\_8135046.html](http://www.huffingtonpost.com/mark-ruffalo/to-fight-inequality-turn-on-clean-energy-everywhere_b_8135046.html). [Accessed 6 March 2017]. [31] D. Ganser, "Swiss Institute for Peace and Energy Research," SIPER, [Online]. Available: <https://www.siper.ch/en/>. [Accessed 15 February 2017]. [32] International Monetary Fund (IMF), "OIL SCARCITY, GROWTH, AND GLOBAL IMBALANCES," 2011. [Online]. Available: <https://www.imf.org/external/pubs/ft/weo/2011/01/pdf/c3.pdf>. [Accessed 1 March 2017].



**SDG 11**

**MAKE CITIES INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE**

**TRAFFIC CONGESTION**

Cities in Global South countries are the ones most affected by traffic congestions which have a wide range of negative effects both on local economic growth and productivity as well as on health, safety and well-being. 100%RE transport can have a hugely beneficial impact on improved public transportation, and reduced health-risks.

**AIR QUALITY**

Cities are often the most affected by the polluting use of fossil fuels to run their industries, to heat and cool their homes and to fuel their cars, especially in Global South countries. According to a WHO estimate, 98% of cities in low- and middle income countries with more than 100,000 inhabitants do not meet WHO air quality guidelines. Most of the 3 million premature deaths worldwide every year - which is more than deaths from Malaria and HIV combined<sup>33</sup> - are caused by outdoor pollution, caused by small and fine particulate matter, which occur more frequently in cities and urban areas<sup>34</sup>. 100%RE can significantly reduce emissions and outdoor pollution associated with industry, heating/cooling as well as transportation. Thereby reducing greenhouse gas emissions and the rate of premature deaths.

**RENEWABLE ENERGY CAN INCREASE THE RESILIENCE OF CITIES AND MAKE THEM LESS DEPENDENT FROM EXTERNAL RESOURCES.**



**REDUCING POLLUTION**

RENEWABLE ENERGY CAN SIGNIFICANTLY REDUCE POLLUTION IN CITIES. 98% OF CITIES IN LOW- AND MIDDLE INCOME COUNTRIES WITH MORE THAN 100'000 INHABITANTS DO NOT MEET WHO AIR QUALITY GUIDELINES.



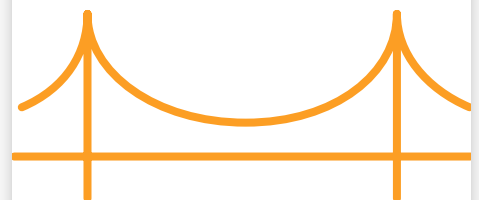
**SUSTAINABLE TRANSPORT**

A SHIFT TO 100%RE TRANSPORT CAN HAVE A HUGE BENEFICIAL IMPACT ON CITIES. TRAFFIC CONGESTION, WHICH AFFECTS GLOBAL SOUTH COUNTRIES THE MOST, HAS A WIDE RINGE OF NEGATIVE EFFECTS ON ECONOMIC GROWTH, PRODUCTIVITY, HEALTH AND WELL-BEING.



**RURAL-URBAN SYNERGIES**

LARGE CITIES HAVE THE KNOW-HOW WHILE RURAL AREAS COUNT ON LARGE AREAS TO PRODUCE RE. COOPERATION BETWEEN A CITY AND ITS SURROUNDING AREA HELPS BOTH IN TERMS OF SUSTAINABLE ENERGY DEVELOPMENT AND CLIMATE PROTECTION.



[33] Lelieveld, J., et al., "The contribution of outdoor air pollution sources to premature mortality on a global scale", Nature 525, 367-371, 17 September 2015. [34] WHO, "Air pollution levels rising in many of the world's poorest cities," World Health Organization , 12 May 2016. [Online]. Available: <http://www.who.int/mediacentre/news/releases/2016/air-pollution-rising/en/>. [Accessed 2 March 2017].




# SDG 12 ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS

## RENEWABLE COOKING

In Dar es Salaam, Tanzania, kitchen waste amounts to about 42% of the household waste and is a potentially valuable source for the production of biogas, an important source for 100%RE in Global South countries. Assuming that in Tanzania a household produces 1kg of food leftovers and 1 kg of fruit and vegetable peelings per day, this 2 kg of kitchen waste should be able to generate roughly 170 L of biogas per day, equivalent to a 45-minutes burning period<sup>35</sup>. By re-using kitchen waste, the transition to 100%RE can be accelerated while significantly reducing indoor air pollution.

**WITH HIGH RATES OF POPULATION GROWTH, WOOD-BASED PRODUCTS WILL BECOME LESS AND LESS SUSTAINABLE REGARDLESS OF HOW EFFICIENTLY IT IS HARVESTED, PRODUCED, OR CONSUMED.**

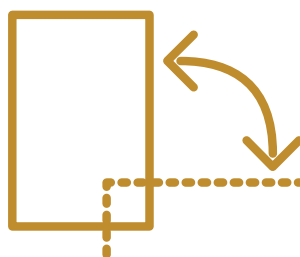


## RESOURCE MANAGEMENT

A circular economy approach to the production and distribution of RE technologies will be fundamental to ensure their long-term viability. A study by the WWF published in 2014<sup>36</sup> examined carefully the most critical supply bottlenecks of non-energy raw materials related to the transition to a 100%RE future. Some critical supply restrictions were identified for materials such as lithium and cobalt, used abundantly for batteries. Although alternatives exist, resources should be carefully managed to avoid future shortages. Rare earth metals which are needed for wind turbines, are expected to exceed the demand. Yet their availability is considered critical for geopolitical reasons, as they are concentrated in certain areas such as China.

### TURNING WASTE INTO RESOURCES

IN LOW-INCOME COUNTRIES 65% OF THE WASTE IS ORGANIC. THERE IS A LOT OF POTENTIAL FOR THESE COUNTRIES TO CREATE RENEWABLE ENERGY FROM WASTE, WHICH CAN BE TREATED TO PRODUCE BIOGAS AND BE USED AS A SOURCE OF ENERGY.



### DOMESTIC BIOGAS SYSTEMS

DOMESTIC BIOGAS PRODUCTION SYSTEMS HAVE DEMONSTRATED A WIDE RANGE OF POSITIVE IMPACTS: THEY DECREASE GHG AND POLLUTANT EMISSIONS, THEY ARE COST-EFFECTIVE, AND, WHEN USED FOR COOKING, REDUCE FIREWOOD USAGE SIGNIFICANTLY.



### ENHANCING FOOD SECURITY

WITH ADDITIONAL LOGISTICAL AND OPERATIONAL EFFORTS TO SUPPORT DOMESTIC BIOGAS SYSTEMS, THE DAILY FEEDING RATE IN SOME COUNTRIES COULD GRADUALLY BE INCREASED FROM 2 TO 5 KG, TO PRODUCE 150 MINUTES OF COOKING TIME.



[35] Eawag, "Anaerobic Digestion of Biowaste in Developing Countries: Practical Information and Case Studies," Eawag – Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, 2014. [36] WWF, "Critical materials for the transition to a 100% sustainable energy future," WWF-World Wide Fund for Nature, Gland, Switzerland, 2014.



**SDG 13**

**TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS**

**DECARBONISATION**

According to recent reports, to stay below 2°C, emissions need to reach net zero by around 2070, and for 1.5°C they must do so by 2050. In both cases, emissions need to fall steeply, starting immediately<sup>37</sup>. This can be done only through a complete decarbonisation and a shift to RE sources across sectors.

**A MAJOR RESTRUCTURING OF THE CARBON INTENSIVE ENERGY SECTOR IS NEEDED AND RE OFFERS AN IMMEDIATE SOLUTION TO REDUCE GHG EMISSIONS CONSIDERABLY.**



**RESILIENCE**

A 100%RE future increases local resilience in the face of the growing risks related to climate change. First, by decreasing local communities' dependence on far off remote resources and their vulnerability to extreme weather events interrupting power supply. Second, deployment of RE increases diversity of energy sources and hence increases flexibility and its resistance to central shocks. In short, the larger variety of energy sources used, the higher the number of supply corridors<sup>38</sup>.

**EMISSIONS MUST FALL STARTING NOW**

TO KEEP GLOBAL WARMING BELOW 2 DEGREES CELSIUS, EMISSIONS NEED TO REACH NET ZERO BY 2070 AND THEY MUST FALL STEEPLY, STARTING IMMEDIATELY. THIS CAN BE DONE ONLY THROUGH A COMPLETE SHIFT FROM FOSSIL FUELS TO RE SOURCES.



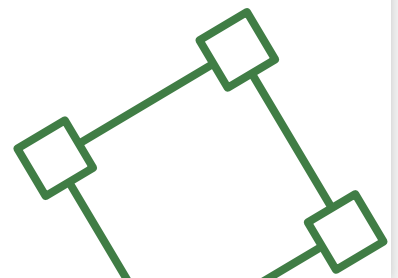
**EMISSIONS FROM THE ENERGY SYSTEM**

CO2 EMISSIONS FROM FOSSIL FUEL USE ARE THE MAIN CONTRIBUTOR TO TOTAL GHG EMISSIONS AND, THE GLOBAL ENERGY SYSTEM ACCOUNTS FOR APPROXIMATELY THREE-FIFTHS OF ALL ANTHROPOGENIC GHG EMISSIONS.



**BUILDING RESILIENCE BY DIVERSIFICATION**

100%RE INCREASES RESILIENCE IN THE FACE OF CLIMATE CHANGE, BY DECREASING THE DEPENDENCE FROM REMOTE ENERGY RESOURCES OR INCREASING ENERGY DIVERSITY THROUGH A DISTRIBUTED AND DECENTRALIZED GENERATION.



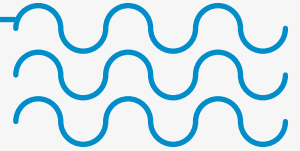
[37] Oil Change International, "The Sky's Limit," [http://gognablog.com/wp-content/uploads/2017/02/Ricalcolare-Matematica-Climatica-160900-OCI\\_the\\_skys\\_limit-ridotto-1.pdf](http://gognablog.com/wp-content/uploads/2017/02/Ricalcolare-Matematica-Climatica-160900-OCI_the_skys_limit-ridotto-1.pdf), 2016. [38] R. Hoggett, "Technology scale and supply chains in a secure, affordable and low carbon energy transition," *Applied Energy*, vol. 123, no. 0, pp. 296-306, 2014.



## SEA LIFE

A report published in 2013 by the International Geosphere-Biosphere Programme<sup>39</sup> examined the impacts of ocean acidification and marine biodiversity. The unprecedented rate of acidification, caused by the immense uptake of carbon dioxide from the atmosphere, has deleterious consequences on shellfish, molluscs, warm water corals and fisheries. These can affect food security and lead to revenue declines, loss of employment and livelihoods, and indirect economic costs. Transitioning to 100%RE can stop the amount of CO<sub>2</sub> in the atmosphere from increasing, and thus stop the increasing ocean acidification, and loss of biodiversity.

**TRANSITIONING TO 100%RE IS FUNDAMENTAL TO CONSERVE AND USE OCEANS, SEAS AND MARINE RESOURCES SUSTAINABLY.**



## ECOSYSTEM

The Niger Delta region is today one of the five most severely petroleum damaged ecosystems in the world. Studies have shown that the quantity of oil spilled over 50 years is up to 13 million barrels<sup>40</sup>. An estimated 5 to 10% of Nigerian mangrove forest, which are especially susceptible to oil, have been destroyed - either by settlements or oil spills. The rainforest, which previously occupied some 7,400 km of land, has disappeared as well. By completely phasing out of fossil fuels and oil explorations, and transitioning to 100%RE, this ecosystem will have the chance to regenerate. This in will eventually to re-forestation of forests and mangroves which are also functioning as carbon sinks.

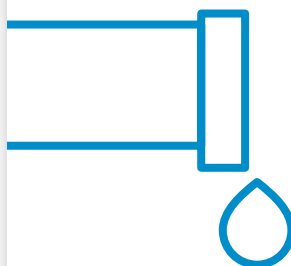
### OCEAN ACIDIFICATION

100%RE HAS A CONSIDERABLE BENEFICIAL EFFECT ON LIMITING OCEAN ACIDIFICATION AND THEREFORE IN PRESERVING MARINE ECOSYSTEMS.



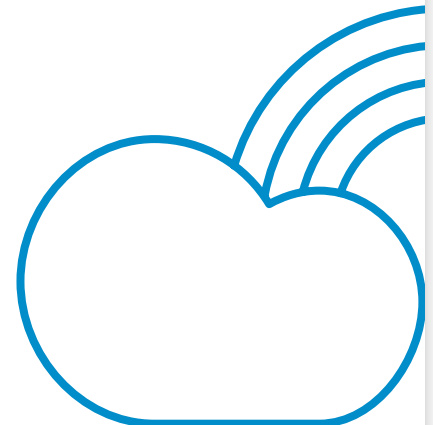
### EXPLORATORY OIL POLLUTION

100%RE HELPS REDUCING OIL POLLUTION. CURRENTLY, OIL EXPLORATION CONTAMINATES STREAMS AND RIVERS, DESTROYS FORESTS AND LEADS TO BIODIVERSITY LOSS.



### A MUCH NEEDED TRANSITION

100% RENEWABLE ENERGY PROTECTS COMMUNITIES WHOSE EMPLOYMENT AND LIVELIHOODS DEPEND ON MARINE RESOURCES.



[39] IGBP, IOC, SCOR, "Ocean Acidification Summary for Policymakers – Third Symposium on the Ocean in a High-CO<sub>2</sub> World," International Geosphere-Biosphere Programme, Stockholm, Sweden, 2013. [40] Wikipedia, "Oil spill," Wikipedia, [Online]. Available: [https://en.wikipedia.org/wiki/Oil\\_spill](https://en.wikipedia.org/wiki/Oil_spill). [Accessed 1 March 2017].



## SDG 15 SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, HALT AND REVERSE LAND DEGRADATION, HALT BIODIVERSITY LOSS

### DESERTIFICATION

Studies suggest that, if climate change is not mitigated, a transformation of 5-20% of Earth's terrestrial ecosystems would be the consequence<sup>41</sup>. 100%RE is a key prerequisite to achieve climate change mitigation and the 1.5°-target. If we do not transition to 100%RE by 2050 at latest, a large portion of the Amazonian rainforest could be replaced by tropical savannahs and increased temperatures and decreased rainfall will lead to desertification of some regions. This in turn will have huge impacts on biodiversity and land use. Soil degradation in drylands exacerbates the problem even more and leads to a decline in the fertility of land, reduces crop production and can trigger further environmental degradation.

**IT HAS BEEN PROVEN THAT RENEWABLE ENERGY TECHNOLOGIES HELP CONSERVING BOTH WATER AND LAND ECOSYSTEMS.**



### DEFORESTATION

Unless the transformation towards a 100%RE future gains further momentum, deforestation will eradicate large parts of the world's biggest forests and carbon sinks will be destroyed by future fossil fuel extractions as sources will shift to more remote and previously undisturbed areas. Unconventional sources such as coal seam gas and tar sands threaten currently undeveloped regions that are extremely biodiverse<sup>42</sup>. In many rural areas, people often rely on biomass, e.g. wood for their energy demands. Sub-Saharan Africa continues to have the highest average per-capita wood consumption in the world; highly forested countries like the Democratic Republic of the Congo have an even higher estimate<sup>43</sup>.

#### MITIGATING CLIMATE CHANGE

100%RE IS ESSENTIAL TO REDUCE GLOBAL WARMING. CLIMATE CHANGE CAN SHIFT BETWEEN 5 TO 20% OF THE EARTH'S TERRESTRIAL ECOSYSTEMS, IN PARTICULAR COOL CONIFER FORESTS, TUNDRA, SCRUBLAND, SAVANNAHS, AND BOREAL FOREST.



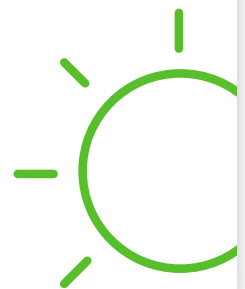
#### MITIGATE DESERTIFICATION

100%RE HELPS MITIGATING CLIMATE CHANGE INDUCED DESERTIFICATION, WHICH HAS HUGE IMPACTS ON BIODIVERSITY.



#### ENHANCE SUSTAINABLE COOKING

RENEWABLE BASED SOLUTIONS FOR COOKING ARE ALREADY AVAILABLE AND CAN PROVIDE A BETTER OPTION FOR COMMUNITIES TO ALLEVIATE THE STRESS THAT THE USE OF WOOD, CROP RESIDUES AND UNTREATED COAL PUTS ON THEIR ECOSYSTEMS.



[41] C. Bellard, C. Bertelsmeier, P. Leadley, W. Thuiller and F. Courchamp, "Impacts of climate change on the future of biodiversity," *Ecol Lett*, vol. 15, no. 4, pp. 365-377, 2012.  
 [42] N. Butt, H. Beyer, J. R. Bennett, D. Biggs, R. Maggini, M. Mills, A. R. Renwick, L. M. Seabrook and H. P. Possingham, "Biodiversity Risks from Fossil Fuel Extraction," *Science*, vol. 342, no. 6157, pp. 425-426, 2013. [43] B. O. Bolaji, "Effects of Unsustainable Use of Biomass Energy for Cooking and Strategies for Their Reduction in Developing Co.," *Developing Country Studies*, vol. 2, no. 3, 2012.


## SDG 16 PROMOTE JUST, PEACEFUL AND INCLUSIVE SOCIETIES

### GOVERNANCE

A transition to 100%RE can support the creation of more effective localised institutions and governance structures through what is known as energy democracy. Energy democracy goes beyond national security of energy supply to bridging energy resources and infrastructure under public or community ownership or control.

### PEACE

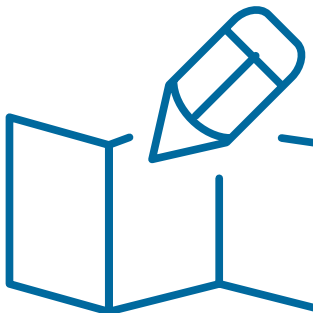
Tensions and conflicts over the possession and exploitation of oil and gas resources have considerable influence over international geopolitical dynamics. The high dependence on oil constantly frames foreign policies, which has dramatic consequences. In some cases, the need of covering the energy requirements justified acts of intervention or even war declarations to countries with vast oil and gas reserves: the war in Iraq is but one example<sup>44</sup>.



**ENERGY SYSTEMS  
SHOULD SERVE THE  
NEEDS OF THE  
WORLD'S PEOPLE, AN ENERGY  
TRANSITION TO 100%RE WILL  
BE ADVANCED BY A SHIFT TO  
PUBLIC AND COMMUNITY  
CONTROL.**

#### SUPPORTING ENERGY INDEPENDENCIES

100%RE RENEWABLE ENERGY CHANGE THE STATIC CONCEPT OF ENERGY EXPORTER VS. ENERGY IMPORTER AND TRANSITION COUNTRIES. COUNTRIES CAN BE PRODUCERS OF THEIR OWN ENERGY DEMAND.



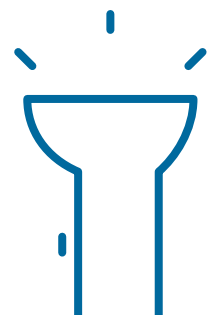
#### REDUCING DOMESTIC CONFLICTS

100% RENEWABLE ENERGY PROMOTE LOCAL DEVELOPMENT, SELF-DETERMINATION AND IDENTITY, WHILE ENSURING COMMUNITIES' CONTROL OVER LOCAL ENVIRONMENTAL IMPACT MITIGATION AND MANAGEMENT.



#### BUILDING ENERGY DEMOCRACIES

THE FLEXIBLE AND MODULAR NATURE OF RE ALLOWS GOING BEYOND NATIONAL SECURITY OF ENERGY SUPPLY AND RATHER BRINGING ENERGY RESOURCES AND INFRASTRUCTURE UNDER PUBLIC OR COMMUNITY OWNERSHIP OR CONTROL.



[44] L. Shall, "Oil, Politics and Resource Wars," LarsShall.com, 20 July 2012. [Online]. Available: <http://www.larsshall.com/2012/07/20/oil-politics-and-resource-wars/>. [Accessed 1 March 2017].



**SDG 17**

**REVITALIZE THE GLOBAL PARTNERSHIP  
FOR SUSTAINABLE DEVELOPMENT**

**REVITALISING PARTNERSHIPS**

RE development requires strong cross-sectoral, transregional and transnational partnerships as well as a continuous exchange of solutions, best practices and lessons learned. In fact, the effective and rapid implementation of a 100%RE target depends on a strong collaboration between local actors and other regional, national and international stakeholders and governments.

**SDGS**

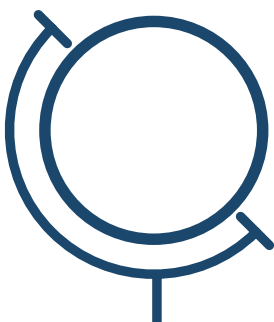
RE development can also be a connector between the climate targets such as the ones of the Paris Agreement and all the SDGs. As demonstrated, there are several points of intersection between RE development and the implementation of SDGs. A transition to 100%RE can thus function as a unique catalyser, bringing together the interests of different groups ranging from gender equality to children rights and from food security to biodiversity.

**THE CAPACITY  
BUILDING  
OPPORTUNITIES  
NEEDED TO BRING RE  
TARGETS FORWARD  
CAN BE BENEFICIAL FOR  
SDGS IMPLEMENTATION  
AND VICE VERSA.**



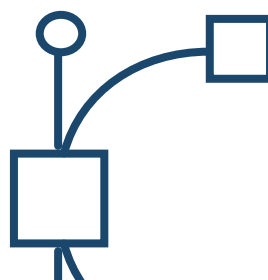
**CONNECTING GLOBAL  
FRAMEWORKS**

RE DEVELOPMENT AND ALL RELATED INITIATIVES AND PROJECTS CAN SERVE AS A CONNECTOR BETWEEN THE CLIMATE TARGETS SUCH AS THE ONES OF THE PARIS AGREEMENT AND ALL THE SDGS.



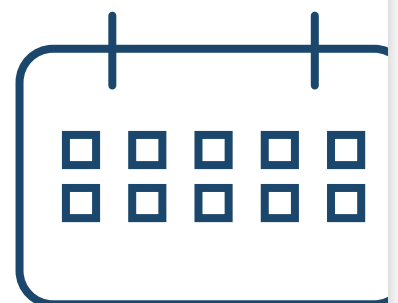
**IMPLEMENTING  
POINTS OF CONTACT**

FINANCE, INFORMATION AND COMMUNICATION TECHNOLOGY, CAPACITY BUILDING, DATA, MONITORING AND ACCOUNTABILITY ARE ESSENTIAL TO BOTH THE FORMATION OF PARTNERSHIP FOR THE GOALS AND RE DEVELOPMENT TARGETS.



**TRACKING AND  
MONITORING**

SEVERAL RE PROJECTS NEED SPECIFIC MONITORING STRATEGIES TO ENSURE ENERGY TARGETS ARE MET ON TIME, WHICH CAN ALSO BENEFIT THE ESTABLISHMENT OF TRACKING PROCESSES FOR SDGS MONITORING.



# POLICY RECOMMENDATIONS

**TO ACHIEVE 100% RENEWABLE ENERGY AND SUSTAINABLE DEVELOPMENT AT THE SAME TIME**



**SET A 100% RE TARGET AND EMBED IT ACROSS POLICY AREAS AND IN SDG PROCESSES**



**SET A "LEAVE NO ONE BEHIND" APPROACH TO ENERGY POLICY**



**ENSURE ADEQUATE CIVIL SOCIETY PARTICIPATION AND CAPACITY BUILDING**



**ENHANCE RENEWABLE ENERGY IN THE COOKING SECTOR**



**PRIORITIZE ENERGY EFFICIENCY**



**RE-DIRECT FOSSIL FUEL SUBSIDIES**



**STRENGTHEN CHANGE AGENTS AND PIONEERS**

100% RENEWABLE ENERGY

 **100%**  
**RENEWABLES**