

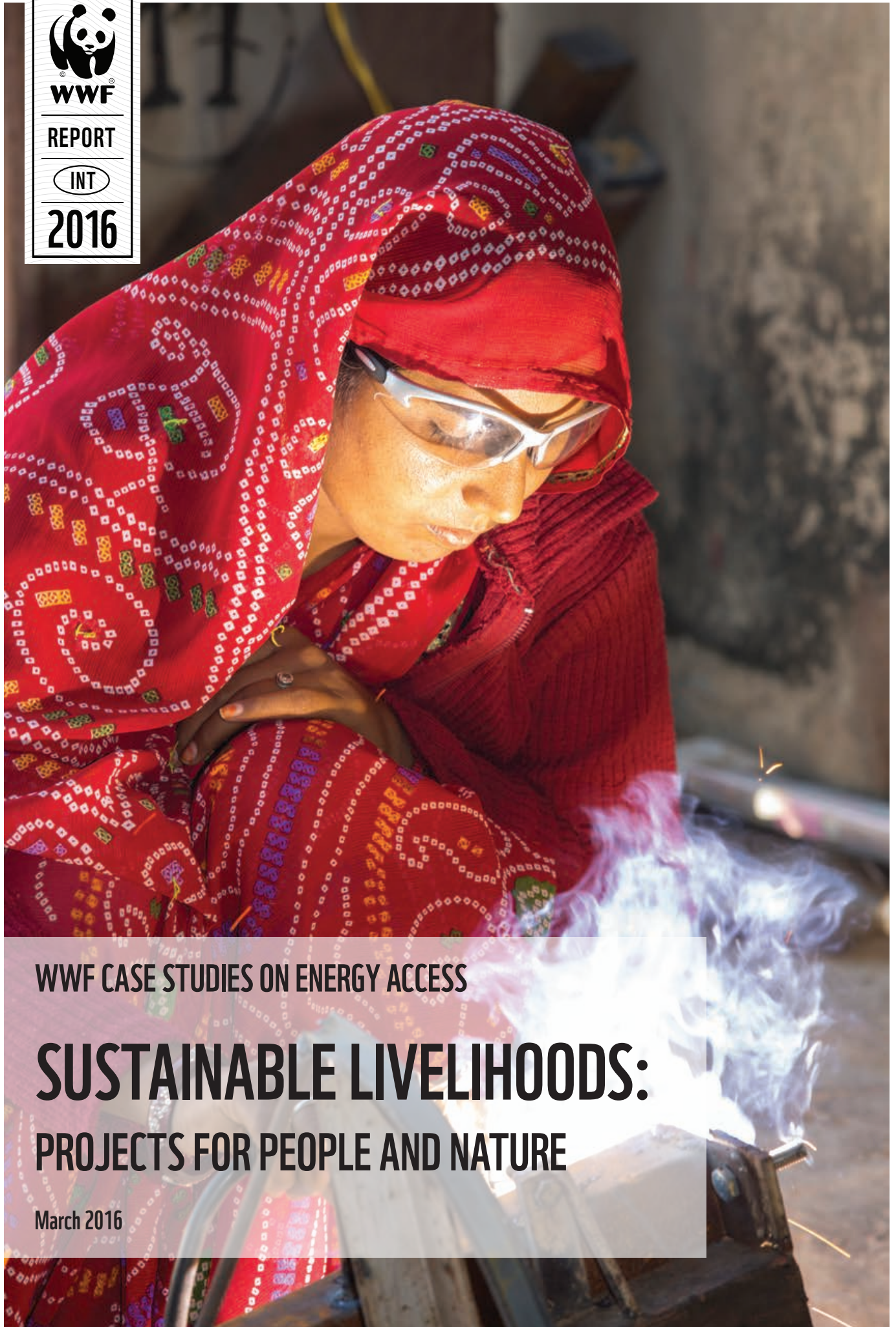


WWF

REPORT

INT

2016



WWF CASE STUDIES ON ENERGY ACCESS

SUSTAINABLE LIVELIHOODS: PROJECTS FOR PEOPLE AND NATURE

March 2016



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"It is more than just bringing light to houses. It is providing families with the means to improve their daily living: better health, more time to learn, to begin various craft activities, to have family discussions."

**Florette Vonjiniaina, Barefoot College/WWF
Madagascar, Women of Light programme**

About WWF

WWF's mission is to stop the degradation of the Earth's natural environment and to build a future in which people live in harmony with nature.

The Global Climate and Energy Initiative is WWF's global programme addressing climate change through promoting renewable and sustainable energy, scaling up green finance, engaging the private sector and working nationally and internationally on implementing low-carbon, climate resilient development.

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FOREWORD

Clean, affordable and reliable energy access is one of the most important requisites for decent livelihoods, next to water and food. Unfortunately, our current energy system excludes a major portion of world's population from this fundamental right. In several poor energy importing countries, the high costs of fossil fuels now eat up more than 10 per cent of their GDP. This makes conventional energy unaffordable for 1.3 billion people, mainly in sub-Saharan Africa and South-Asia, who have only erratic or no access to electricity.

In the same regions, some 2.6 billion people depend on unsustainable biomass and dung for heating and cooking, with major impacts on ecosystems, human health and women. People who suffer most from climate change are often energy poor. Sadly, about 4 million people are dying annually from indoor pollution by using biomass and fossil fuels for electricity and heating inefficiently in outdated equipment. Overcoming energy poverty with clean and efficiently used renewables will enhance economic development of the poorest, reduce deforestation and protect biodiversity. Providing clean and renewable energy services for the poor also avoids a growth of greenhouse gas emissions.

It is an issue that connects the environment, sustainable economic growth and human well being. Positive social and economic impacts for local communities can go hand in hand with environmental benefits, improving health and livelihoods, providing reliable energy sources, and helping to alleviate poverty.

We believe the future of energy is renewable

To help accelerate the process of achieving a world powered by 100 per cent renewable energy by 2050, WWF is engaging with key governments around the world to encourage them to agree to take steps to end energy poverty by 2030. The essence of this strategy is to demonstrate that there are viable, sustainable energy access solutions for energy-poor people in developing countries – and to encourage these solutions to be replicated and scaled up in different areas.

This can help build a world where countries are committed to focusing on energy access and taking a renewable energy / zero carbon path. In that spirit, WWF strongly welcomes and supports Goal 7 of the Sustainable Development Goals, which contains the phasing-out of energy poverty in developing countries by 2030 at the latest.

We only have one planet. We need to live on it sustainably. This requires combined action which tackles poverty, climate change and ecosystems. Energy access cuts through all three issues – and renewable energy can provide an answer.



Gaurav Dahal
Coordinator, Energy Access for
Developing Countries,
WWF International Global Climate and
Energy Initiative



Gabriella Roscher
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1. ACCESS FOR ALL

In an effort to solve the problem of energy access, WWF welcomes the UN's 'Sustainable Energy for All' (SE4ALL) Initiative. WWF strongly supports the first objective of this initiative – ensuring modern energy access for all by 2030. We believe that it should be a binding global and national target and based primarily on sustainable renewable energy (including highly efficient and clean biomass energy).

WWF IS ENGAGED WITH OVER 30 PIONEERING 'ON THE GROUND' PROJECTS IN DEVELOPING COUNTRIES AROUND THE WORLD

WWF has concerns with the other two objectives – 1) doubling the share of renewable energy in the global energy mix and 2) doubling the global rate of improvement in energy efficiency by 2030. These objectives, though meant to trigger clean energy, are indeed not ambitious enough and probably misleading. They are adjusted to an ambition level that suits all actors, and ends up choosing the lowest common denominator in an attempt to appeal to all.

For instance, in the case of renewable energy, just doubling the amount of renewable energy produced (currently 19 per cent contribution of total energy produced), would not guarantee the growth of sustainable renewables. We do not believe that doubling conventional biomass or contentious hydropower is the way forward. Rather, sustainable, highly efficient biomass, sustainable hydropower as well as solar, wind, geothermal should triple and quadruple in next 15 years to deliver social development and keep the world under 2 degrees of global warming.

2. CLIMATE CHANGE: AN URGENT AND GLOBAL THREAT

ENERGY ACCESS FOR THE POOR - USING RENEWABLE ENERGY - IS NOT AN ENVIRONMENTAL POLICY ALONE. IT IS A FUNDAMENTAL HUMAN RIGHT. GENERATING DIGNIFIED LIVELIHOODS FOR THE POOR BASED ON CLEAN, RELIABLE ENERGY ACCESS IS ESSENTIAL PART OF ECONOMICALLY SOUND SUSTAINABLE DEVELOPMENT - AND MORE SO, A PRECONDITION FOR A FAIR, EQUITABLE JUST TRANSITION TOWARDS A FULLY RENEWABLY-POWERED PLANET."

DR STEPHAN SINGER,
DIRECTOR OF GLOBAL ENERGY POLICY
FOR WWF INTERNATIONAL.

Ecosystem health is closely linked to social systems, as people directly and indirectly depend on the diversity of services that nature provides. They, in turn, impact the ecosystem – either positively or negatively.

Many of the world's vulnerable ecosystems and areas of high biodiversity that are under threat are also home to rural communities and indigenous people whose livelihoods and cultures are dependent on the natural environment. Those rural communities and indigenous people are the closest guardians of the integrity of those ecosystems – but forced by poverty and social hardship they might contribute to the destruction of those ecosystems. Because of this, conservation efforts need to not only maintain and preserve biodiversity and ecosystems, but also ensure equitable and sustainable development for the wellbeing of the people who connect with them.

Climate change is affecting people around the planet, but is particularly wreaking havoc on developing nations and the world's poorest communities. Erratic rainfall patterns, severe drought, increased flooding and warmer temperatures are putting serious pressure on people who rely on agriculture and natural resources for their livelihood. Improving the wellbeing of these people is the best way to help them adapt to climate change and be resilient. Energy access and climate issues can be positively linked. For instance, non-polluting and highly efficient cook stoves and other advanced biomass systems for cooking could reduce the rate of traditional biomass-related deforestation and degradation significantly.

They might reduce the need for woody and other biomass by more than 50 per cent compared to traditional cook stoves. This would also avoid major emissions of black carbon from inefficient biomass burning, responsible for indoor pollution, additional global warming and ice-melting in particular.

Energy poverty is one of the most important obstacles to social and economic developments of the poor, next to lack of access to clean water and food. Our current energy system leaves a major portion of the world's population behind. In many poor energy importing countries, the high costs of fossil fuels now eats up more than 10 per cent of the GDP and makes conventional energy increasingly unaffordable for the poor.

About 1.3 billion people (mainly in sub-Saharan Africa and South-Asia) only have erratic or no access to electricity. In the same regions, some 2.6 billion people depend on unsustainable biomass and dung for heat and cooking, which has major impacts on ecosystems and human

health. Girls and women are particularly affected since in many developing countries they spend lots of time collecting regionally available bioenergy sources — time they cannot use for education or jobs.

Clean, highly efficient renewable energy is one key pillar to better livelihoods and health, improved education and gender balance and better learning conditions, which in turn can facilitate environmental protection.

Sustainable energy access, through the adoption of renewable energy, sustainable practices and energy efficiency, will help the conservation of ecosystems, the adaptation of communities to climate change, and in the global effort to lower emissions. Not only are people who suffer most from climate change often energy-poor, but the way billions of people will access modern sources of energy will have a long lasting impact on the energy sector and climate as well. Access to renewable and sustainable energy will benefit energy-poor people and the planet. The right of every person on Earth to have immediate access to clean, affordable and reliable energy is non-negotiable. And it has been shown that most of that will be renewable energy — simply because it is the most economic option.

3. WWF IS ACTIVELY RESPONDING TO CLIMATE CHANGE

A comprehensive response to climate change requires ambitious mitigation action, whilst also adapting and building resilience to the changing climate. Important progress is currently being made on renewable energy, energy conservation and efficiency and on low carbon development, but much more needs to be done to ensure a climate safe future for all. This publication focuses on WWF's practical climate change mitigation work, particularly in developing countries, addressing access to energy.

WWF is calling for ambitious and urgent action on mitigation and adaptation and is working to influence both policy and practice at local, national and international levels.

INFLUENCING POWER

WWF's robust research, scientific basis and recognized expertise built from long term policy engagement and sound practical experience gives it credibility and influence at international, national, and local levels. WWF's mitigation focus is on driving action and commitment to close the so called "gigatonne" emissions gap. This is the difference between the greenhouse gas 'budget' that the world needs to stick to by 2020 and the actual emissions we are on course to produce, which are much higher.¹ The Sustainable Development Goals urge the eradication of energy poverty by 2030 and the Paris Agreement — a global climate deal struck at COP21 held in Paris in December 2015 — confirms the need to promote universal access to sustainable energy in developing countries, particularly in Africa, through the enhanced deployment of renewable energy.



© WWF

"WWF engages in the UNFCCC because we believe it is an important platform to address the global equitable sharing of efforts needed to deal with the climate change crisis. Agreements reached at a global level can help influence national policies and practices."

Tasneem Essop, head of low carbon frameworks for WWF's Global Climate and Energy Initiative and WWF's head of delegation to the UNFCCC.

¹ The UNEP Emissions Gap Report 2013 shows that the actual trajectory of global emissions is much higher than emissions pathways needed to keep global temperature rise below 1.5/2 degrees C. We are now at annual emissions of 49 gigatonnes of CO₂, when we should be at no more than 44 gigatonnes. On current trends, the gigatonne gap could increase from 5 gigatonnes per annum to 12 gigatonnes or more unless the world takes effective action. UNEP 2013. The Emissions Gap Report 2013. United Nations Environment Programme (UNEP), Nairobi

WWF's energy access projects are part of conservation projects and programmes, which support social development and nature conservation and can contribute to local, national, and international policy change. Having project experience makes it possible for WWF to “talk to the top” with evidence and authority. This is used to influence significant international processes and institutions.

WWF is actively influencing international processes and institutions:

- **UNFCCC:** WWF is active in discussions on global climate policy, especially at the UN level through the UN Framework Convention on Climate Change. WWF contributed to influencing the final outcomes of the annual Conference of the Parties (COP) meeting held in Paris in December 2015, where a new global climate deal was agreed.
- **Post 2015 development agenda:** In September 2015, Heads of States agreed to a new global development agenda – the Sustainable Development Goals (SDGs). Along with the Financing for (Sustainable) Development Process, this new framework will guide international aid and investments to 2030. WWF is actively influencing this process, where current final text includes SDG 7: to ensure universal access to sustainable and modern energy and its targets to double energy efficiency and increase renewables, in line with the SE4ALL initiative.³
- **UN Sustainable Energy for All (SE4ALL) initiative⁴:** WWF serves on the Advisory Board of this initiative, which brings together top-level leadership from all sectors of society – governments, business and civil society. WWF is working to ensure modern energy access for all by 2030, stressing that this should be a binding target based primarily on sustainable renewable energy. WWF is also pushing for more renewable energy in the global energy mix and continuous improvements in energy efficiency.⁵

4. WWF DELIVERS ACCESS TO ENERGY FOR ALL

Universal access to reliable, sustainable and affordable energy is a human right, and an essential prerequisite to a healthy planet.

WWF is working to ensure an equitable zero-carbon, climate resilient development and has a bold vision to transition the world to 100 per cent renewable energy by 2050. One essential component of this is universal access to affordable, reliable, and sustainable energy services by 2030. This will help alleviate poverty, reduce emissions and deforestation, and result in improved protection of biodiversity.

At least 3 billion, mainly poor people in developing countries, are deprived of both access to electricity and safe cooking services. Roughly 4 million people annually die from indoor air pollution due to inefficient biomass burning for cooking purposes. Energy poverty has a negative impact on human livelihoods, health, gender, biodiversity, climate change, and resource use. WWF therefore works to address these social injustices and conservation threats by promoting access to energy for all.

Key countries include India, Nepal, Madagascar, Indonesia, South Africa and Uganda, with energy access work also taking place in Tanzania, Kenya, the Democratic Republic of Congo, China and the Greater Mekong. These countries and regions host a major share of the global poor without access to clean, affordable energy, and suffer from deforestation, soil erosion, and biodiversity loss linked to meeting their energy needs.

Access to Energy: WWF demonstrates viable, sustainable energy access solutions in developing countries. It also promotes replication and scaling-up to foster enabling conditions and national commitments to energy access and renewable energy and low carbon strategies. This contributes to WWF's overarching Global Climate and Energy Initiative.

See: http://wwf.panda.org/what_we_do/footprint/climate_carbon_energy/energy_solutions22/energyaccess/

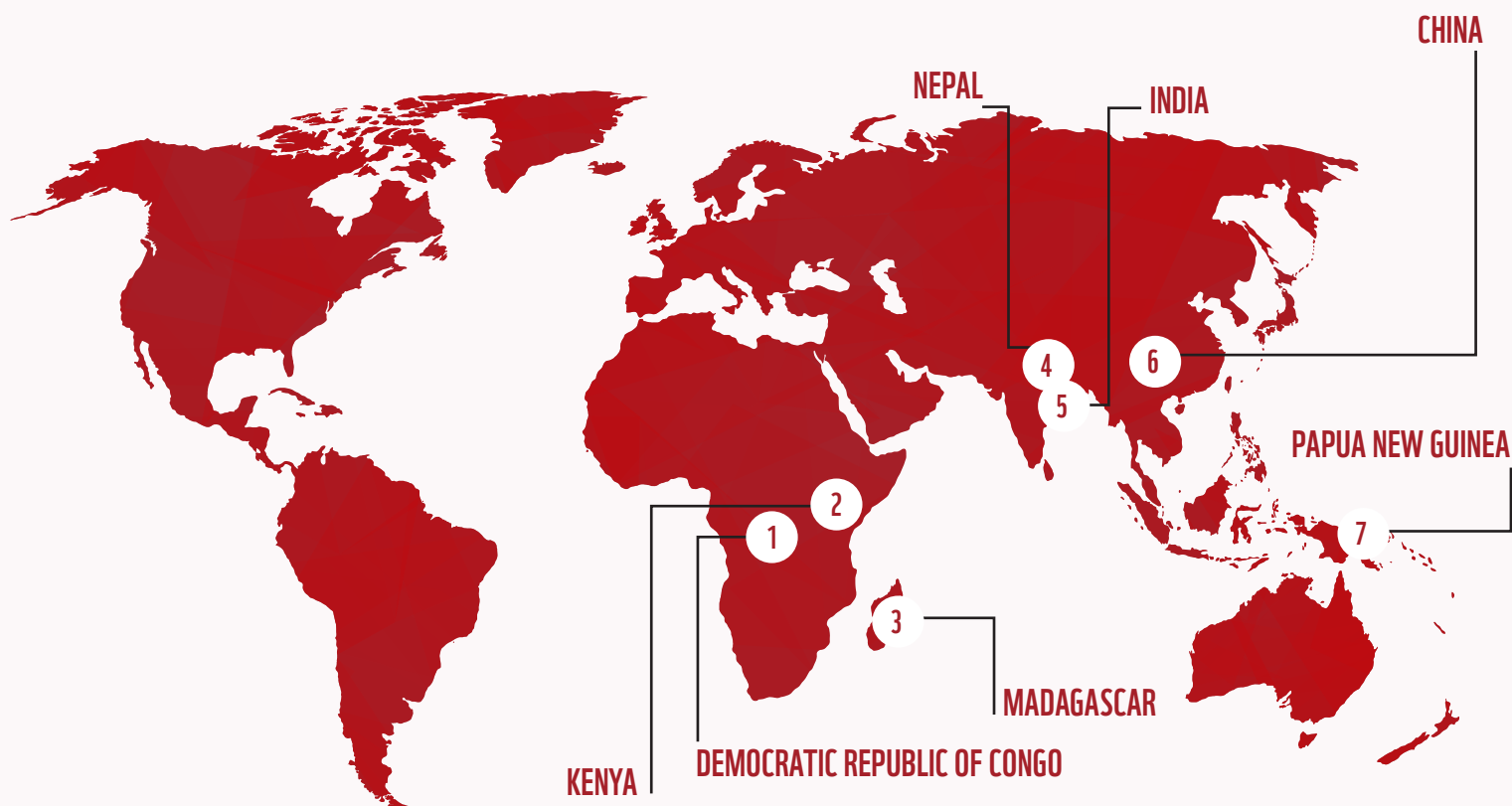
² See http://wwf.panda.org/what_we_do/footprint/climate_carbon_energy/cop_21/

³ See http://wwf.panda.org/what_we_do/how_we_work/policy/post_2015/ and <http://careclimatechange.org/publications/twin-tracks/>

⁴ See <http://www.se4all.org/about-us/>

⁵ See <http://www.iied.org/26-ngos-call-for-universal-energy-access-new-york-gathering>

5. CASE STUDIES: ACCESS TO ENERGY IN DEVELOPING COUNTRIES



CASE STUDY 1: SUSTAINABLE WOODSTOVES IN MAMIZE NATURE RESERVE, SICHUAN PROVINCE, CHINA

THE PROBLEM: Many isolated poor rural communities living in and around Sichuan's mountainous, subtropical Mamize Nature Reserve, a Giant Panda habitat, have no access to electricity. They rely on firewood for cooking and heating. Each family collects some 26 tons of firewood per year, resulting in forest loss and livelihood impacts. Cooking with traditional stoves causes health threatening air pollution, especially for women and children who typically spend more time in the kitchen than men. Deforestation affects this panda habitat, causes biodiversity loss and contributes to climate change. People cannot afford to upgrade their stoves without outside financial support.

WWF'S SOLUTION: In 2010, with the support of the Swiss retailer Coop⁶, WWF initiated a Firewood Saving Cookstoves project in Cooperation with the Nature Reserve, the forest authority, and South Pole Group⁷, which greatly reduces firewood use, and so saves trees.

⁶ <http://www.coop.ch/pb/site/common/node/50465/Len/index.html>

⁷ <http://thesouthpolegroup.com/>

OUTCOMES AND BENEFITS – THE FACTS AND FIGURES (2010-2014):

- 1) 1,600 stoves distributed so far with over 9,000 people benefitting from clean and efficient cooking. This is currently being expanded to 2,800 stoves. The estimated overall demand is 20,000 stoves.
- 2) Firewood consumption reduced from 26 tons per year to 11 tons per year after stove installation, resulting in 17,440 tons of wood saved per year in the project area. A firewood saving stove can save as much as 50-70 per cent firewood.
- 3) 30,442 tons of CO₂ emission reductions have so far been generated. One stove reduces 12.5 tons of CO₂ per year – the highest number in the world!
- 4) Thanks to improved indoor air, the project prevents 2.75 deaths every year.⁸
- 5) Enhanced livelihoods through less time spent on collecting firewood (an estimated 433 hours saved per year) and fewer resources spent on costly fuel alternatives. Financial savings per year have been calculated as USD 374 per family, scaling to USD 600,000 per year.
- 6) Biodiversity conservation with an estimated 224 ha of forest preserved per year (an area equivalent to 314 football fields), and protection of ecosystem services valued at USD 349,000 per year.⁹
- 7) Overall, the project has generated social and environmental values corresponding to USD1.43 million per year.

**FUEL EFFICIENT,
FIREWOOD SAVING
COOK STOVES REDUCE
DEFORESTATION AND
CARBON EMISSIONS,
HELP CONSERVE
BIODIVERSITY AND
IMPROVE PEOPLE'S
HEALTH.**



© Zeyin Jiang / WWF-China

With a traditional stove, each family needs to collect considerable amounts of firewood causing forest loss and impacting panda habitat.



© Bernard De Wetter / WWF-Canon

The stove's design with a chimney and a proper air supply system maximises thermal efficiency, ensures fuel is fully burnt, and waste gas and smoke are extracted out of the kitchen.

⁸ See 'The Real Value of Robust Climate Action. Impact Investment Far Greater Than Previously Understood. A Net Balance Report for The Gold Standard Foundation' (page 27-28) for methodology and calculation. <http://www.goldstandard.org/report-the-real-value-of-robust-climate-action>

⁹ Based on USD1,560 per year as the value per hectare (ha) for a temperate forest protected. According to the Assessment Report of Forest Ecological Services in China (2010), however, the forest can provide ecological services average RMB 42,600 per ha per year, which translates to approximately USD6,800, a much higher value.

CASE STUDY 2: EFFICIENT COOK STOVES IN THE LAKE NAIVASHA REGION OF KENYA'S GREAT RIFT VALLEY

THE PROBLEM: The Maasai people living in the Lake Naivasha region have relied on firewood for cooking and heating for centuries. Traditional open fires use significant amounts of wood and cause indoor air pollution. Now, there is little forest left, firewood collection takes time and includes travelling great distances, negatively affecting women's livelihoods and keeps children out of school. Indoor smoke-related chest and eye infections are pernicious and common.

WWF'S SOLUTION: Since 2013, WWF has been working with the COOP, who sources Fairtrade flowers from Oserian¹⁰, a company which farm cut flowers near Lake Naivasha. Working together, through COOPERation made possible by the South Pole Group¹¹, fuel efficient cook stoves have been made available to local Oserian staff and the Maasai communities in the area.

OUTCOMES AND BENEFITS - THE FACTS AND FIGURES (2013-2014):

1. Some 28,000 local people are so far benefitting from clean and efficient cooking.
2. To date, over 5,700 stoves have been sold to Maasai families at a subsidised price of USD 3.25 (the real cost is approximately USD 32).
3. Each stove saves up to 6 tons of CO₂ per year compared to the conventional open fireplaces, which has led to around 20,000 tons of CO₂ saved since the project started.
4. Each stove consumes about 60 per cent less wood than an open fire.
5. About 3.2 tons of firewood is saved per household per year.
6. Overall demand for firewood has decreased by 50 per cent.

**FUEL EFFICIENT STOVES
REDUCE DEFORESTATION,
SUPPORT BETTER
LIVELIHOODS, AND
IMPROVE HEALTH FROM
REDUCED INDOOR AIR
POLLUTION.**



© Charly Rappo

"Before we had this stove, I had to spend three hours a day searching for firewood. It took a lot of time and effort. Now going twice a week is enough". Helen Masasi, farmer, Kenya

Source: http://www.coopzeitung.ch/Oefen+_eine+gute+Sache (in German)

¹⁰ <http://www.oserian.com/>

¹¹ <http://thesouthpolegroup.com/>

CASE STUDY 3: ENERGY EFFICIENCY AND SUSTAINABLE FUELWOOD IN MADAGASCAR

THE PROBLEM: Madagascar has an energy crisis linked to unsustainable choices and practices. It is heavily dependent on oil imports and handicapped by decaying infrastructure. The electricity power supply is inadequate and expensive; and only around 15 per cent of the population are connected to the grid. Wood still provides 80 per cent of people's energy needs for cooking. The fuelwood supply accounts for nearly 90 per cent of wood levies on Malagasy forests.

Deforestation is the biggest threat to the unique biodiversity of Madagascar and is a root cause of many of the environmental and social problems facing the country, including climate change. This situation hinders sustainable development of both communities and the economy.

WWF'S SOLUTION: WWF has developed a strategic approach that orientates Madagascar towards energy independence through sustainable management and use of existing natural resources, such as biomass, wind, solar and water, all undertaken in the global context of combating climate change. In line with this approach, WWF projects include:

- (i) Sustainable management of the fuelwood production chain, influencing policy and regulatory frameworks for charcoal production. It also includes reforestation pilots and the promotion and adoption of locally produced solar and fuel efficient cook stoves, focusing on the southwestern part of the country, where forests close to the city of Toliara are the most threatened by exploitation.
- (ii) Promotion of national energy efficiency measures and distribution of energy saving lightbulbs to households in the capital of Antananarivo, to mitigate greenhouse gas emissions, lower the peak load, reduce household electricity expenditure, and create a market for affordable energy efficient lightbulbs. The long term aim is to establish a recycling facility, and to ban incandescent lightbulbs country wide. For this, WWF is partnering with the Ministry of Energy, the national utility JIRAMA, the Telma Foundation¹², and myclimate.¹³

DEVELOPING AND
PROMOTING
SUSTAINABLE ENERGY
SOLUTIONS

OUTCOMES AND BENEFITS - THE FACTS AND FIGURES:

Sustainable management of the fuelwood production chain since 2008.

- 1) A regional legal decree on the fuelwood chain has been adopted including taxation rules.
- 2) The Regional Forest Administration is operationalising this regulatory framework.
- 3) 22 charcoal production associations have been established in the southwest, including training to improve production practices, monitoring, registration, and distribution.
- 4) 10,000 ha of forests dedicated to sustainable production of fuelwood equivalent to 3 per cent of the south western forests.
- 5) 336 forest controllers have been trained to monitor the wood harvest within this area.
- 6) 18 local selling points established to overlook and control sales, and road checks set up at the entrance of Toliara.
- 7) A monitoring database available at the Regional Forest Administration.

¹² <http://www.1001fontaines.com/en/node/1937>

¹³ <http://www.myclimate.org/>

REFORESTATION AND ASSOCIATED TRAINING SINCE 2008:

- 1) 1,000 ha have been reforested with a success rate 60 per cent. 1 ha can produce at least 42 m³ of wood or 2 tons of charcoal after seven years.
- 2) Achievements to date are the equivalent of substituting the exploitation of 4,000 ha of natural forest.
- 3) Beneficiaries include 760 tree planters from 19 villages, organized in three associations with the necessary organisational, technical and administrative competence to conduct a reforestation project.
- 4) Partnership development for collaboration with the private sector is underway.
- 5) Reforestation carbon potential evaluated, for 500 ha as 29,950 tons of CO₂ sequestered, equivalent to USD 223,000.



© WWF -Madagascar

“For Earth Hour 2014, WWF-Madagascar subsidised the sale of 2,000 high-efficiency cook stoves in the region. These stoves reduce consumption of fuelwood by at least 50 per cent. Combined, the 2,000 stoves will help preserve 350 ha of forest annually.”

Source: http://wwf.panda.org/wwf_news/successes/?227997/cook-stoves-project-combating-deforestation-in-madagascar-get-an-earth-hour-boost

ENERGY EFFICIENT WOOD STOVES AND SOLAR COOKERS IN AND AROUND TOLIARA SINCE 2008:

- 1) 28,000 people benefitting from clean and efficient cooking.
- 2) 5,550 energy efficient stoves and 100 solar cookers distributed in the town of Toliara. This corresponds to 15 per cent of Toliara's 33,000 households.
- 3) 950 ha of natural forest saved per year (6 per cent of Toliara natural forests needs for fuelwood).
- 4) Awareness raising efforts for solar energy and efficient technologies reaching 50,000 people.
- 5) Permanent employment created for 150 people in Madagascar.
- 6) Around 66,500 tons of CO₂ emission reductions generated since project start.
- 7) Emission reductions per stove per year: 4 tons of CO₂ equivalent.
- 8) Firewood saved per household per year: 2.5 tons.

ENERGY SAVING LAMPS SINCE DISTRIBUTION BEGAN IN 2013:

- 1) 486,000 people benefitting from efficient lighting.
- 2) 518,000 lamps distributed in Antananarivo.
- 3) Reduced electricity demand resulting in saved fossil fuel imports to the value of USD6 million per year.
- 4) Average net electricity savings of 12.6 gigawatt hours per year.
- 5) 50,000 tons of CO₂ expected emission reductions over seven years.

- 6) 100 kg CO₂ equivalent in emission reductions per lamp over seven years.
- 7) 134 kilowatt hours energy saved per household per year.
- 8) USD 18 saved per household per year.
- 9) 41 temporary staff employed during 15 months and 2 permanent jobs created.



© WWF Madagascar

“Our last energy bill was AR 40,000 (USD13.25). Even if we share the cost with two other families, the bill is always very hard to pay because of our low income. Thanks to the three light bulbs I received, at this rate in a year’s time I will have been able to save AR 34,000 (USD11.25), a significant amount of money that would surely improve my family’s well-being.” Eugénie Rabetakalo, who lives in the district of Ampitantsena.

Source: <http://www.wwf.mg/ourwork/sustainability/sustainabilitystories/?202640/low-energy-light-bulbs-in-madagascar---a-significant-step-towards-energy-efficiency>

CASE STUDY 4: METHANE CAPTURE FROM PALM OIL PROCESSING IN PAPUA NEW GUINEA (PNG)

CAPTURING METHANE, A POWERFUL GREENHOUSE GAS, FROM WASTE WATER

THE PROBLEM: Palm oil is an international commodity, found in everything from foods to soaps and cosmetics. In PNG, palm oil represents one of the country’s most important cash crops, accounting for around 40 per cent of agricultural export earnings over the last decade. Grown in large plantations, palm oil is associated with deforestation. Palm oil expansion along with illegal logging threatens PNG’s unique wildlife and indigenous communities. In addition to forest loss, waste water from the processing of palm oil, when treated anaerobically in open ponds, creates significant amounts of methane. Methane is a greenhouse gas that is some 25 times more harmful than CO₂.

WWF’S SOLUTION: WWF is partnering with COOP, myclimate and New Britain Palm Oil Limited (NBPOL)¹⁴; WWF, COOP and NBPOL are members of the Roundtable for Sustainable Palm Oil (RSPO)¹⁵. By identifying jointly where high conservation value forests are located around the palm oil plantations, WWF and the company have agreed on measures for sustainable management of some of these forests and full protection of others. Covering open waste water ponds, NBPOL also captures large quantities of methane. This results in fewer greenhouse gases being emitted into the atmosphere and biogas (produced from the methane) for electricity production. In addition, NBPOL is planning to support an extension of the grid and thus electrify remote parts of the island communities, using the biogas generated from the project.

OUTCOMES AND BENEFITS – THE FACTS AND FIGURES (SINCE 2012)

- 1) Total emissions reductions per year approximately 90,000 tons of CO₂.
- 2) Wastewater processed total approximately 544,000 m³.
- 3) Approximately 9,488,000 kilowatt hours of electricity produced.
- 4) Permanent employment has been created for eight people.

¹⁴ <http://www.nbpol.com.pg/>

¹⁵ <http://www.rspo.org/>

CASE STUDY 5: HOUSEHOLD BIOGAS PRODUCTION IN THE TERAI ARC LANDSCAPE, NEPAL

THE PROBLEM: The Terai Arc Landscape is located along the Himalayan foothills of India and Nepal and is of critical importance for people and wildlife. Notably, it is home to the largest surviving populations of the Bengal Tiger and the Greater One Horned Rhinoceros. This densely populated area is under extreme ecological pressure. This is to the detriment of both wildlife and people, especially the rural poor. Deforestation is a major issue from unsustainable fuelwood extraction. 61 per cent of all households here rely on fuelwood for cooking – an average family uses 1.3–2.5 kg wood every day. Firewood collection takes time that could be better spent on other activities. In addition, traditional cooking methods are inefficient and cause smoke related health problems.

WWF'S SOLUTION: In 2007, working with various local and international partners including COOP, WWF initiated a biogas programme to promote more sustainable livelihood alternatives. Biogas plants have been constructed in homes across the Terai Arc. Each household produces its own biogas whereby cow manure, and in some cases toilet waste, is mixed with water in an airtight underground pit. Under anaerobic conditions, methane forms and is piped to a gas stove in the kitchen. Methane when lit burns much more effectively than wood. Replacing wood with biogas helps conserve the local forests. Unlike with firewood, cooking with biogas is soot and smoke free; there is no indoor air pollution. In addition, time is freed up, resulting in greater household income and other development benefits such as improved literacy. Building on this success, WWF is planning to install 20,000 biogas plants by 2020.

BIOGAS PLANTS CHANGE LIVES AS WELL AS CONSERVE FORESTS.

OUTCOMES AND BENEFITS – THE FACTS AND FIGURES (SINCE 2007)

- 1) 7,500 biogas units have been constructed so far.
- 2) Over 48,000 people are benefitting from clean and efficient cooking.
- 3) Permanent employment has been created for 2,900 people in Nepal.
- 4) Around 100,000 tons of CO₂ emission reductions have been generated since project start.
- 5) Emission reductions per biogas unit per year are estimated as 4 tons of CO₂.
- 6) Some 3-5 tons for firewood is saved per household per year.



“We are actively promoting biogas installation through microfinance schemes in 13 sites in the Terai Arc, particularly for the poorer, more marginalized communities. There is a great potential for biogas villages like Badreni to be replicated throughout Nepal.”

Anil Manandhar, Country Representative, WWF-Nepal



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“Now he doesn’t have to spend time gathering firewood, Mohan Tharu has more time for productive activities such as vegetable farming. The dung residue, or slurry, from the biogas unit is an excellent bio fertiliser, while also improving soil quality. Mohan today makes US\$2000 annually from vegetable farming alone and his overall income has doubled. He has also paid back the loan he took from the local Cooperative.”

From "Biogas comes to Madhuban – a story of change" (2012).
Source: http://wwfnepal.org/about_wwf/conservation_nepal/tal/project/biogas/

CASE STUDY 6: ECOMAKALA REDD+ PILOT PROJECT IN NORTH KIVU PROVINCE, DEMOCRATIC REPUBLIC OF CONGO (DRC)

REDUCED DEFORESTATION,
BIODIVERSITY
CONSERVATION, RURAL
DEVELOPMENT, AND
CLIMATE CHANGE
MITIGATION IN THE AREA
SURROUNDING GOMA
CITY AND THE VIRUNGA
NATIONAL PARK.

THE PROBLEM: Situated at the border of the Virunga National Park in North Kivu province, eastern DRC, the city of Goma has nearly one million inhabitants. 97 per cent of the population is poor and dependent on firewood and charcoal for energy. About 80 per cent of this charcoal is produced illegally in the nearby Virunga National Park – home to over half the world’s population of highly endangered mountain gorillas. Poor management of timber resources, a lack of alternatives to deforestation, and increasing demand for charcoal fuel the problem and exacerbate poverty.

WWF’S SOLUTION: Since 2007, WWF has been working to reduce the pressure on the National Park by:

- Establishing woodlots around the National Park, with smallholders, in order to supply Goma with more responsible charcoal from these woodlots.
- Reducing demand for charcoal through the promotion, production and commercialization of energy efficient cookstoves made by local associations. These use 50 per cent less charcoal than the traditional stoves.

In 2013, both components were included in a bigger REDD+¹⁶ pilot program working with various partners. This program, focused in and around the southern part of the Virunga National Park, will contribute to the development of a REDD+ strategy for the DRC, expand forest cover, reduce deforestation and reduce poverty, supporting community development and improving the living conditions of local people.

OUTCOMES AND BENEFITS – THE FACTS AND FIGURES (UP TO NOW – JUNE 2015)

- 1) Over 8,000 ha of wood-lots have been planted – representing 15 per cent of the current charcoal demand of Goma¹⁷.
- 2) More than 66,000 households in Goma are benefitting from improved stoves, sold since 2008. The stove cost, USD 5-10, is recovered in less than two weeks from charcoal savings.
- 3) More than 7,000 farmers living in the surroundings of the Park and other concerned communities have established micro-reforestation and are benefitting from additional revenue from the sale of forest products (charcoal, wood, etc).

¹⁶ Reducing Emissions from Deforestation and Forest Degradation (REDD) <http://www.un-redd.org/>

¹⁷ Sustainable Energy and Energy Access Initiatives by WWF in Africa (2007-2014), WWF Regional Office for Africa (ROA) Brief (2015) pdf



© ashden.org

Stoves that use less charcoal save households money, and reduce pressure on forests

"It's really exciting that a conservation charity is stimulating the clean cookstove market to reduce deforestation. It's even more impressive that WWF has achieved such swift penetration of the market in Goma despite the recent conflict."

Ashden judging panel.¹⁸

CASE STUDY 7: BAREFOOT COLLEGE AND WWF TRAIN GRANDMOTHERS FROM RURAL AFRICA AS SOLAR ENGINEERS

**WWF AND INDIA'S
BAREFOOT COLLEGE
WORKING TOGETHER ON
SUSTAINABLE ENERGY
ACCESS IN AFRICA.**

THE PROBLEM: Sub-Saharan Africa's population is growing faster than in the rest of the world, and all need access to sustainable energy sources. Africa has lots of potential for clean and cheap energy, but much work is needed to harness this. Currently, many rural households either have no power or only unsustainable and often expensive energy sources, such as firewood or charcoal, kerosene, diesel, and old or disposable batteries. It is estimated that rural households in Madagascar, for example, use approximately 1.5 - 2 gallons of kerosene per month for their lighting and cooking needs. This contributes to environmental, health and economic development problems.

WWF'S SOLUTION: Since 2013, WWF and the Indian NGO Barefoot College have been working with women from the poorest communities in rural Africa to train them to become solar engineers. The objective is to develop clean sustainable energy systems that improve livelihoods, energy security and education for their communities, whilst protecting the environment. Seven grandmothers from three villages in Madagascar were selected to be part of the first group of women to be trained. They attended the the Barefoot College in India for six months, learning how to assemble, install, and maintain small photovoltaic systems, bringing solar electricity to homes in their communities.

OUTCOMES AND BENEFITS - THE FACTS AND FIGURES (START DATE: 2013)

- 1) So far, Barefoot College trained grandmothers have installed and maintained more than 380 solar panels, bringing light to more than 2,500 villagers in Madagascar.
- 2) Empowerment of rural women for sustainable development within their community.
- 3) Financial savings from replacing lamp oil with solar lighting.
- 4) Additional revenue for women doing handicrafts thanks to access to solar power.
- 5) Possibility for adults and children to study in the evenings.
- 6) Health and hygiene improvement (e.g. no inhaling of fumes from lamp oil).

¹⁸ <https://www.ashden.org/winners/drcwwf13> (see Case Study) .



“Reliable solar power in rural areas not only reduces the need for inefficient governmental subsidies for more expensive fossil fuels, but also provides improved livelihoods for poor communities, enhances opportunities for education and development in, particularly for women.”

Jean-Philippe Denruyter, energy specialist for WWF’s Greater Mekong Programme

Source: <http://wwf.panda.org/?2207917/Indian-scheme-turning-grandmothers-into-solar-engineers-in-Madagascar#sthash.0ExEE1FV.dpuf>

CASE STUDY 8: SOLAR POWER IN THE INDIAN SUNDARBANS

THE PROBLEM: The Sundarbans is an archipelago in the Bay of Bengal, between India and Bangladesh, famous for its mangrove forests. Measuring about 40,000 km², this vast delta has the only mangroves in the world where tigers are found. The Sundarbans is an ecologically fragile and climatically vulnerable region, which not only supports wildlife, but is also home to more than 4.5 million people.

Access to safe, clean energy is fundamental to poverty eradication, to stopping deforestation, and to addressing climate change. In India today, however, thousands of villages are remote, off-grid, without access to safe and clean energy. Standalone power systems offer the only solution for these villages to be electrified. Most people in these locations depend on biomass, such as fuelwood, agricultural waste and dung for energy. Many also use kerosene. This contributes to climate change, deforestation, and biodiversity loss. Collecting firewood is also time consuming and can lead to human-wildlife conflict, when people collect wood in the forests.

WWF’S SOLUTION: WWF demonstrates renewable energy applications in key landscapes throughout India to enhance energy access, provide models for decentralized energy generation, reduce impacts on natural resources, improve livelihoods, and influence policy.

THE FOLLOWING ACTIVITIES ARE BEING IMPLEMENTED IN THE SUNDARBANS:

- (i) In 2012, in a tribal hamlet adjoining the Sundarbans Tiger Reserve, WWF installed a 4.1 kilowatt peak solar photovoltaic charging station along with Energy Access Kits (EAKs) in every household.¹⁹ This station, operated and managed by a tribal women users’ group, helps the community access modern energy at an affordable price.²⁰
- (ii) WWF and the Centre for Appropriate Technology Projects (Australia) installed a 9.63 kilowatt peak solar power station with mini grid at Rajat Jubilee on Satjelia Island. The station is owned and managed by a consumer COOPERative.²¹
- (iii) A third project, “Light up India”, aims to light-up some 1,000 households through installing micro grid solar power plants in the hamlets of Satjelia. Satjelia shares around 22km of its boundary with the Sundarbans Tiger Reserve and has an approximate population of 40,000 people.²²

Scaling up, there is now a proposed project to study and prepare an energy access plan for an additional 46 villages spreading across five island sub-districts of the Sundarbans.

¹⁹ Tipligheri village, Lahiripur Gram Panchayat, Gosaba block of the Sundarbans

²⁰ and ²¹ See http://www.wwfindia.org/about_wwf/reducing_footprint/cce/our_work/renewable_energy_at_scale/

²² India Unplugged – part of the WWF-India Earth Hour 2015- <http://www.thehindubusinessline.com/news/wwf-joins-with-ebay-india-to-light-up-sundarbans/article7018945.ece>

OUTCOMES AND BENEFITS – THE FACTS AND FIGURES (START DATE: 2011)

Centralized Solar PV Charging Station

- 1) 95 tribal households and shops now have access to solar power.
- 2) Replacing kerosene with solar power reduces 322 kg of CO₂ per month. So far, 10,300 kg of CO₂ have been reduced.
- 3) 74 per cent of houses in this hamlet use mobile phones. Charging phones at home saves the cost of charging them at the local market.
- 4) Significant reductions in kerosene use as households no longer depend on this for lighting.
- 5) The tribal women users' group has so far accumulated USD 1,749 after meeting all operational costs.

**DEMONSTRATING
RENEWABLE ENERGY IN
THE INDIAN SUNDARBANS,
BENEFITTING PEOPLE
AND NATURE.**

MINI GRID SOLAR POWER STATION

- 1) 50 households, 13 commercial establishments and three community buildings have access to electricity from the power station.
- 2) 18,576 kg of carbon emission avoided so far.
- 3) Significant reductions in kerosene use as households no longer depend on this for lighting.
- 4) Local residents now able to draw up energy budgets through education and training.
- 5) 19 per cent increase in mobile phone penetration in the community, with cell phones now charged at home saving the cost of charging them at the local market.
- 6) Better access to information and communication technology (from TV and cell phones).
- 7) New shops and increased opening hours in the evening market.
- 8) Each consumer is a shareholder and collectively they have so far accumulated USD 3,162 after meeting all operational costs.

LIGHT UP INDIA

- 1) Some 4,000-6,000 people will benefit from this initiative, by obtaining three LED lamps, one fan, one battery and provision to power a 30-watt television set.

6. SUMMARY

Energy access clearly interconnects WWF's agenda on the environment, human wellbeing and sustainable economic growth. WWF's present focus is on providing scalable, clean and affordable energy solutions to communities, and through this gaining enough expertise to promote "the voices of the field" at different international, regional and national policy debates to influence wider policy and action. The combination of these areas of expertise is what makes WWF unique in addressing the energy access challenges for the global poor, whilst also creating a fairer, more sustainable and climate safe future for all.

SOURCES FOR BACK COVER BULLETS.

- 1.3 BN (source: <http://climate-energy.blogs.panda.org/2015/04/23/sustainable-energy-access-from-policy-to-the-people/>)
2.6 BN (source: <http://climate-energy.blogs.panda.org/2015/04/23/sustainable-energy-access-from-policy-to-the-people/>)
4 MIL (source: World Health Organization <http://www.who.int/mediacentre/factsheets/fs292/en/>)
200 000 (source: Sustainable Energy and Energy Access Initiatives by WWF in Africa (2007-2014), WWF Regional Office for Africa (ROA) Brief (2015) pdf)
2 500 (source: Case Study 7 Madagascar)
6.4 MIL (source: Sustainable Energy and Energy Access Initiatives by WWF in Africa (2007-2014), WWF Regional Office for Africa (ROA) Brief (2015) pdf)

ENERGY ACCESS MATTERS

1.3 BILLION

1.3 billion people, mainly in sub-Saharan Africa and South Asia, have no or only erratic access to electricity.

2.6 BILLION

2.6 billion people, mainly in sub-Saharan Africa and South Asia, depend on unsustainable biomass and dung for heating and cooking, with major impacts on ecosystems, and people's health, especially women and children.

6.4 MILLION

6.4 million trees per annum saved from the use of some 100,000 energy efficient cook-stoves distributed by WWF in Africa

4 MILLION

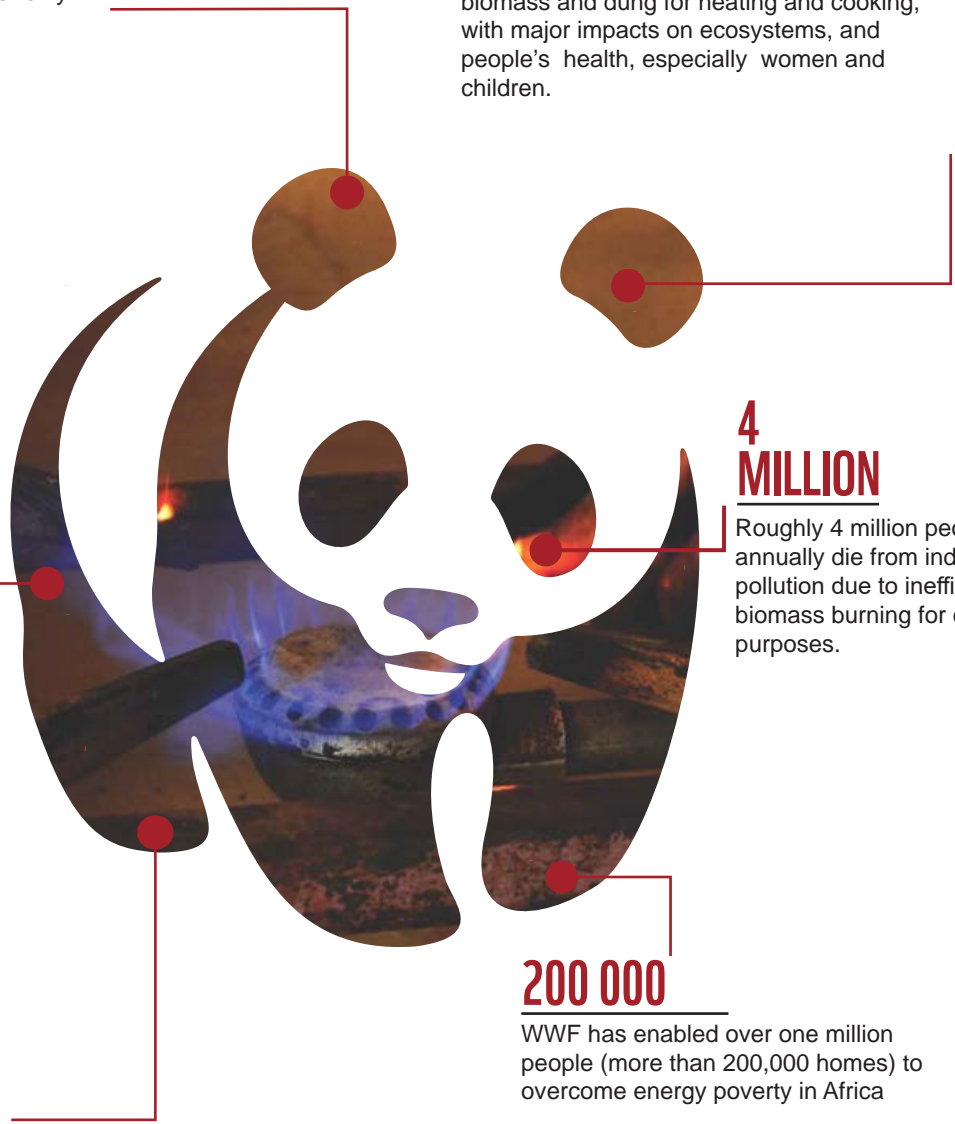
Roughly 4 million people annually die from indoor air pollution due to inefficient biomass burning for cooking purposes.

2 500

Over 2,500 villagers in Madagascar are benefiting from solar power systems installed and maintained by seven Barefoot College trained grandmothers

200 000

WWF has enabled over one million people (more than 200,000 homes) to overcome energy poverty in Africa



Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

panda.org/climateandenergy