Mapping the Renewable Energy Sector to the Sustainable Development Goals: An Atlas

December 2018

Consultative Draft

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

EQUITABLE ORIGIN

Columbia Center on Sustainable Investment
A JOINT CENTER OF COLUMBIA LAW SCHOOL AND THE EARTH INSTITUTE, COLUMBIA UNIVERSITY

Business & Human Rights Resource Centre

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The Columbia Center on Sustainable Investment (CCSI), a joint center of Columbia Law School and the Earth Institute at Columbia University, is the only university-based applied research center and forum dedicated to the study, practice and discussion of sustainable international investment. Our mission is to develop critical understanding, practical approaches and governance tools for governments, investors, communities and other stakeholders to maximize the benefits of international investment for sustainable development.

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Equitable Origin is the world´s first stakeholder-led, independent, voluntary standards system designed to enable high social and environmental performance, transparency and accountability in energy development. Equitable Origin works with communities, companies and governments to deliver practical tools and guidelines, disseminate best practices, and provide independent recognition of social and environmental performance of energy projects. The Equitable Origin System drives positive change that reduces the social and environmental impact of energy development operations by fostering stakeholder dialogue and helping companies measure and benchmark their performance against the EO100™ Standard.

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The Business & Human Rights Resource Centre is an international NGO that tracks the human rights impacts (positive & negative) of over 8000 companies in over 180 countries making information available on its eight language website. We seek responses from companies when concerns are raised by civil society. The response rate is around 75% globally.

About the Sustainable Development Solutions Network

The UN Sustainable Development Solutions Network (SDSN) has been operating since 2012 under the auspices of the UN Secretary-General. SDSN mobilizes global scientific and technological expertise to promote practical solutions for sustainable development, including the implementation of the Sustainable Development Goals (SDGs) and the Paris Climate Agreement.

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Executive Summary

The renewable energy industry is instrumental to the achievement of the UN Sustainable Development Goals (SDGs), which aim to realize a better and more sustainable future for all. Renewable energy is core to the implementation of SDG 7, which focuses on access to affordable, reliable, and sustainable energy, and SDG 13, which centers on urgent action to combat climate change. Renewable companies can also make critical contributions to the other 15 SDGs, including alleviating poverty; fighting hunger; increasing access to healthcare, education, and clean water; and protecting life on land and in water. At the same time, some renewable energy projects have also been linked to human rights allegations, undermining the achievement of the SDGs.

Given the urgency and scale at which renewables must be deployed to meet the world's sustainable development and climate goals, it is especially critical that the industry understand its potential impacts—both positive and negative—on all of the SDGs, to maximize the positive potential of the industry, enable a fast transition to a low-carbon economy, and to ensure that contributions to some goals do not come at the expense of others.

This Atlas intends to serve as a guide for renewable energy developers and operators to maximize their contributions to the SDGs. The Atlas recommends specific actions that companies can take to advance each SDG by incorporating responsible practices into their core business operations and collaborating with other stakeholders to amplify impact.

To positively contribute to the SDGs, renewable energy companies should:

- **Share the benefits of renewable development** with local communities in the form of access to electricity, cost savings, rents and fees, and infrastructure.
- **Train and employ local workers and source goods and services domestically** to contribute to economic development.
- **Collaborate with governments** and other stakeholders to reduce reliance on fossil fuels.
- **Adopt strong labor rights policies** in line with the ILO Core Conventions, that include paying workers living wages and providing benefits, protecting employees from discrimination and work-related safety risks, preventing child and forced labor, and upholding the rights to collective bargaining and freedom of association.
- **Adopt and promote human rights policies and due diligence practices** in line with the UN Guiding Principles on Business and Human Rights.
- **Treat affected communities as partners, conduct inclusive community consultations** prior to project development and **respect land tenure and rights to free prior and informed consent.**
- **Conduct comprehensive local environmental, social, community, and human rights impact assessments** prior to project development and **create management plans** (in collaboration with other stakeholders when appropriate) to mitigate negative impacts and externalities.
- Develop systems to **identify and monitor supply chains** for human rights impacts and **introduce human rights clauses in supplier contracts and business partner agreements.**
- **Introduce accessible grievance mechanisms** in line with the UN Guiding Principles on Business and Human Rights' effectiveness criteria, designed and monitored with communities and workers. The grievance mechanisms must be made consistent with local community capabilities to engage the process.

By committing to integrate the SDGs and human rights principles into core business, renewable energy companies can:

- Minimize environmental, social, and regulatory risk;
- Manage uncertainty and improve project planning efficiency;
- Bolster company and sector reputations to find new market opportunities; and
- Attract and hold investors.

Those that fail to engage meaningfully with the SDGs and do not respect human rights may put both their own projects as well as the broader clean energy transition at risk.

SDG Specific Recommendations

SDG 1: End Poverty

- Pay taxes and other fees to governments and fair rent or tariffs to households or community owners of land or generation capacity, as appropriate
- Champion inclusive employment policies and practices
- Procure goods and services locally
- Respect tenure rights
- Support non-renewable livelihood options for affected communities
- Broaden implementation of anti-poverty strategies via Community Benefit Agreements

SDG 2: Zero Hunger

- Explore synergies with food systems
- Avoid competition for food-producing land
- Refrain from contaminating water and farmland
- Partner with the agricultural sector and/or food distribution systems
- Strengthen watershed management

SDG 3: Good Health and Well-Being

- Champion occupational health and safety
- Ensure that project development does not adversely affect community health
- Promote employee wellness
- Combat infectious diseases among employees
- Support community health programs
- Support electrification of healthcare services
- Participate in programs for response to, and recovery from, epidemics and disasters

SDG 4: Quality Education

- Assess and upgrade the local skills base
- Train and educate workers
- Support electrification of schools
- Collaborate with universities to design curricula and provide scholarship opportunities
- Participate in classrooms and workshops

SDG 5: Gender Equality

- Provide equal opportunities for women and establish gender-sensitive work environments
- Remove barriers to women's participation in both the workforce and consultation processes and support their involvement through project lifecycles.
- Provide coverage of sexual and reproductive healthcare benefits for employees
- Make gender-inclusive social investments and commitments, including provision of gender-specific educational scholarships and health monitoring

SDG 6: Clean Water and Sanitation

- Manage water holistically and develop a company water use policy
- Conserve and recycle water
- Reduce or eliminate pollution
- Monitor and disclose water quality and usage
- Leverage power generation for desalination, groundwater pumps, and sanitation systems
- Share benefits of water infrastructure
- Support local capacity-building in water and sanitation

SDG 7: Affordable and Clean Energy

- Deploy distributed generation to improve access to reliable electricity
- Diversify power sources to reduce outages
- Educate customers about consumption patterns to optimize renewable energy use
- Share benefits of transmission expansions associated with renewable generation to connect off-grid communities
- Support local energy initiatives
- Share benefits of energy infrastructure and projects with local and affected communities
- Ensure the inclusion of affected communities, and especially indigenous communities, in electrification efforts
- Share knowledge with governments, communities, and civil society about electrification initiatives
- Reduce reliance on fossil fuels
- Work with governments to address intermittency challenges and invest in research and development on more modern storage mechanisms
- Integrate renewable generation capacity into local electrification schemes

SDG 8: Decent Work and Economic Growth

- Establish strong labor rights policies that cover all fundamental labor rights in own operations and supply chains.
- Pay taxes and royalties to governments and compensate communities and households fairly for project land or generation capacity from community-owned developments
- Drive economic growth through local procurement
- Promote worker, consumer, and community ownership of companies and projects
- Collaborate with local chambers of commerce, finance institutions, and NGOs
- Establish business incubators
- Connect suppliers with external markets
- Support a just transition to a low-carbon society through employment training for former fossil fuel industry employees

SDG 9: Industry, Innovation and Infrastructure

- Support industrialization through local hiring, procurement, and training and skills development
- Support advanced industrialization by providing zero greenhouse gas and non-polluting clean electricity
- Share infrastructure
- Conduct transparent and meaningful consultation processes for every project and respect rights to free, prior, and informed consent
- Partner with governments to power new industrial development through access to zero greenhouse gas and non-polluting clean electricity
- Collaborate with governments and other sectors to create renewable innovation spillovers
- Use convening power to create business clusters
- Explore potential collaborations with domestic research and development initiatives

SDG 10: Reduced Inequalities

- Engage in human rights due diligence and provide access to remedy
- Champion inclusivity
- Anticipate inequality-related risks
- Support community ownership of renewable energy projects
- Work with local partners to target social investments to marginalized populations
- Encourage participatory budgeting in local communities

SDG 11: Sustainable Cities and Communities

- Deploy renewable energies to provide for disaster resilience for vulnerable and coastal populations
- Pursue ownership models tailored to urban communities
- Collaborate with local authorities to develop and increase green space
- Share workforce requirements and planned operations early so local authorities can assess adequacy of local services
- Collaborate for increased resilience through participation in microgrids

SDG 12: Responsible Consumption and Production

- Minimize inputs and waste
- Source materials and products responsibly
- Plan for technology recycling from early stages of project development, especially for solar panels
- Partner with other renewable companies to encourage adoption of governmental and sectoral recycling programs
- Work with mining companies to improve or implement responsible practices around mining of minerals needed for renewables

SDG 13: Climate Action

- Reduce operating and supply chain emissions
- Account for climate change in planning and investment
- Consider emissions reduction potential in site selection
- Work with governments to mitigate climate change
- Participate in climate-related research and development and pilots
- Engage in intra- and cross-industry climate dialogues

SDG 14: Life Below Water

- Incorporate life under water into impact assessments and mitigate habitat destruction (especially for offshore wind, solar, hydroelectric, bioenergy, and tidal)
- Collaborate with local authorities to establish conservation areas and marine reserves
- Develop multi-stakeholder coastal zone management plans

SDG 15: Life on Land

- Complete environmental impact assessments and prioritize projects siting on brownfields
- Preserve ecosystems and achieve net-positive or no-net-loss impact
- Support projects that link communities and biodiversity
- Encourage and participate in landscape-level planning
- Restore historic habitats and engage in reforestation and anti-poaching efforts
- Collaborate on research initiatives

SDG 16: Peace, Justice and Strong Institutions

- Preempt and address grievances and conflict
- Respect tenure and rights to free, prior, and informed consent, and human rights generally
- Publicly disclose information regarding the project, including project-related payments and contracts
- Conduct transfer pricing of intra-company transactions via arm's-length rule
- Facilitate peaceful working environment and good community relationships
- Promote the rule of law

SDG 17: Partnerships for the Goals

- Mobilize financial resources and technology
- Support development of other industries and infrastructure needed to grow the renewable sector
- Engage in dialogue with governments, civil society, and development partners
- Strengthen coordination between initiatives
- Join with bottom-up grassroots movements and top-down leadership initiatives
- Incorporate SDGs into company policies, and apply SDG indicators

Acronyms

CBRES – Community-Based Renewable Energy Systems

DESCOs – Decentralized Energy Services Companies

FAO – Food and Agriculture Organization of the United Nations

FPIC – Free Prior and Informed Consent

GHG – Greenhouse Gas

HRIA – Human Rights Impact Assessment

HVAC – Heating, Ventilation, and Air Conditioning

kW – Kilowatt

kWh – Kilowatt hour

IRENA – International Renewable Energy Agency

LDCs – Least Developed Countries

MW – Megawatt

NCD – Non-Communicable Disease

NREL – National Renewable Energy Laboratory

OHS – Occupational health and safety

PACE – Property Assessed Clean Energy

PAYG – Pay-As-You-Go

PPM – Parts Per Million

SDGs – Sustainable Development Goals

SEIA – Solar Energy Industries Association

TFEC – Total Final Energy Consumption

UNDP – United Nations Development Programme

Introduction

The Sustainable Development Goals and Their Relevance for the Renewable Energy Industry

In 2015, the 193 United Nations member states unanimously adopted a set of 17 Sustainable Development Goals (SDGs), thereby establishing a consensus development agenda, and accompanying targets, to be met by the year 2030. The SDGs built upon the successes of the Millennium Development Goals to create a common framework for equitable, inclusive, and environmentally sound economic development. The SDGs "seek to realize the human rights of all," and the 2030 Agenda is grounded in the Universal Declaration of Human Rights and international human rights treaties, among other instruments.[1]

In committing to achieve the goals by 2030, the international community called for a new era of collaboration among all stakeholders, including the private sector, to improve global wellbeing. SDG 17 explicitly recognizes that a "successful sustainable development agenda requires partnerships between governments, the private sector and civil society," and that "[u]rgent action is needed to mobilize, redirect and unlock the transformative power of trillions of dollars of private resources to deliver on sustainable development objectives."[2]

The renewable energy industry is instrumental to the success of SDGs. Renewable energy is core to the implementation of SDG 7, which focuses on access to affordable, reliable, and sustainable energy, and SDG 13, which centers on urgent action to combat climate change. Accelerated deployment of renewable energy technologies—solar, wind, hydroelectric, and geothermal, among others—can help to bring modern, affordable, and clean energy to the nearly 1.1 billion people around the world who lack access to electricity and the 2.8 billion people who rely on biomass, coal, or kerosene for cooking.

The SDGs are also by nature "integrated and indivisible," as the 2030 Agenda recognizes.[3] Alleviating energy poverty is instrumental to achieving many of the other SDGs: for example, increasing access to energy can help increase productivity, therefore potentially contributing to the achievement of SDG 1 on ending poverty, SDG 8 on promoting sustainable economic growth, and SDG 10 on reducing inequalities (assuming that productivity gains benefit the poor). Electrification of (or otherwise providing clean energy for) agricultural equipment, health centers, and schools can also help to achieve SDGs 2 (eradicating hunger), 3 (healthcare for all), and 4 (education for all).

Also critically important, renewable energy sources are necessary to displace climate-destabilizing fossil fuels in the global energy system, which in 2015 provided more than 80% of global energy supply and 66% of electricity generation.[4] In addition to contributing to SDG 13 on climate action, reducing use of fossil fuels can prevent environmental degradation and social disruption from fossil hydrocarbon and coal extraction. This fossil fuel displacement, possible through collaboration with governments, electric utilities, and other stakeholders, may also indirectly support the achievement of other SDGs. Indeed, ending hunger (SDG 2), ensuring good health and access to clean water (SDGs 3 and 6), protecting life below water and on land (SDGs 14 and 15), and providing the opportunity to reduce inequalities and foster global peace (SDGs 10 and 16) all depend to some degree on our ability to maintain a livable climate and transition away from fossil fuel dependence.

Finally, renewable energies present an unprecedented opportunity to promote equitable and inclusive economic development through democratization of energy generation capacity. In contrast to fossil fuel-based energy sources, which are unusually consolidated and lend themselves to large-scale deployment to achieve economies of scale because of their global supply chains and the nature of their upstream and end-use technologies, the modular nature of some renewable energy technologies could allow for the provision of rents to institutions, communities, or actors that have not yet profited from the energy industry. Renewables may also provide economic development benefits, as cost savings from near-zero marginal cost generation frees up public and private funds for other uses. But, like other contributions mentioned above, these potential benefits also depend on government policy and planning to encourage shared benefits from the energy transition.

Unfortunately, renewable energy projects have at times undermined the achievement of the SDGs and have been linked to allegations of human rights abuses.[5] Renewable projects have also been found to disrupt both terrestrial and aquatic ecosystems, and the renewable energy sector's reliance on minerals sourced from companies with poor governance and human rights records can threaten the rights of workers and communities, especially given most countries' lack of supply chain responsibility policies. As more projects are developed in countries with weak land tenure systems and poor enforcement of human rights protections, some worry that these risks will only grow more acute.[6] However, many of the human rights risks associated with renewable energy development can be mitigated and avoided through increased due diligence, risk assessment, and engagement with workers and affected communities, as well as effective remedy where abuses do occur, in line with the UN Guiding Principles on Business and Human Rights.

Given the urgency and scale at which renewables must be deployed to meet the world's sustainable development and climate goals, it is especially critical that the industry understand its potential impacts—both positive and negative—on all of the SDGs, to ensure that contributions to some goals do not come at the expense of others or violate the human rights of impacted communities and workers.

This Atlas, focused largely on project developers and operators who work with solar and wind, and to a lesser extent hydroelectric, biomass, and geothermal, intends to serve as a guide for companies to maximize contributions to the SDGs and to align company policies to the UN Guiding Principles on Business and Human Rights. For each goal, it recommends specific action to help companies incorporate responsible practices into their core business operations and to leverage resources and collaborate with other stakeholders to amplify impact.

There is a strong business case for companies to adopt the recommendations presented here, and otherwise integrate the SDGs and human rights principles into core business. In doing so, companies stand to:

- **Minimize environmental, social, and regulatory risk:** By introducing robust safeguards and mapping their linkages to SDGs, renewable companies can reduce some project risks including risks of cancellation of licenses or permits, bad press, unintended environmental impacts, environmental or economic liabilities, and increased remediation costs. Reduced environmental, social, and regulatory risks increase project bankability and attractiveness to investors.

- **Manage uncertainty and improve project planning efficiency:** By consulting with stakeholders from the early stages of project planning and design, companies can identify important considerations that might influence project design before investments are made, and reduce the risk of project opposition by communities. Inclusive project design can reduce costs and potentially lead to new business and revenue models.

- **Bolster company and sector reputations and find new market opportunities:** By integrating the SDGs and human rights principles into core business and mapping and reporting SDG contributions, renewable energy companies can differentiate from other renewable energy providers to gain a competitive advantage, thereby potentially attracting new energy customers looking to procure energy from inclusive, environmentally sound projects. These benefits may also allow companies to benefit from improved employee recruitment and morale.

- **Attract and hold investors:** Investors are increasingly concerned about the social and environmental impacts of their investors and expect that companies they support will adhere to international principles and standards such as the UN Guiding Principles on Business & Human Rights, IFC Performance Standards, Equator Principles, and others. By integrating the SDGs and human rights principles into core business and by mapping and reporting SDG contributions, renewable energy companies can be better prepared to meet investor needs and expectations and may be able to attract more favorable financial terms than they would otherwise.

As companies align practices to the SDGs and human rights principles, it may be helpful to first take stock of company policies, priorities, and strategies. This exercise may begin with questions like:

- What is my company's progress to date in aligning conduct to the SDGs and human rights principles?

- Based on my company's core business, on which SDGs does or could my company have the greatest impact (positive and negative)?

- Given the key SDGs identified, how can my company change practice to prioritize recommendations enclosed in this Atlas to mitigate negative impacts and maximize positive contributions?

How is the Atlas Organized?

Each chapter in this Atlas corresponds to one of the 17 SDGs, and includes the following:

- A brief **overview of the Sustainable Development Goal** in question and an **explanation of how the renewable energy sector relates.**
- A list of **key goal sub-targets** related to renewables.
- A description of potential opportunities for renewable energy companies to **integrate the goal in question into their core business** (see below for discussion of what is meant by "core business").
- A description of potential opportunities for renewable energy companies to **collaborate with other stakeholders and leverage resources** to achieve the SDGs (see below for discussion of what is meant by "collaborate and leverage").
- Case studies highlighting existing innovative initiatives and best practices.
- Suggested further reading.

This Atlas includes 92 of the 169 SDG associated targets. The targets included were chosen for direct links to renewable energy sector practice. However, as noted previously, all goals are interrelated. Renewables can therefore have an impact on many of the targets not discussed here. The original SDGs document, "Transforming Our World: the 2030 Agenda for Sustainable Development," includes a comprehensive list of all SDGs and targets.[7]

Multi-Stakeholder Roles and Responsibilities in Implementing the SDGs

The 2030 Development Agenda requires cooperation and collaboration to ensure sustainable, climate-conscious, and rights-respecting global development for all. That said, it also recognizes that different actors have different roles to play in achieving the SDGs.

Governments are responsible for creating laws, standards, and regulations relating to all SDGs, including on environment, education, and equality. They also control public expenditures to reduce poverty and hunger, provide education and health, and plan infrastructure for sustainable development. **Governments should tailor policies to encourage renewable energy investment aligned with the SDGs and should encourage investment through coordinating policy among regions and branches of government.** This is necessary because renewable energy projects otherwise may not result in all desired results. For example, installation of a renewable energy project often will not inherently provide energy access to communities that need it nor displace climate-destabilizing fossil fuel combustion. Companies will have to collaborate with governments in order to ensure that potential contributions of renewable energy projects are realized. Governments must also enforce regulations, ensure that human rights are respected and protected, and manage revenues responsibly and in the interest of sustainable development.

Companies are responsible for carrying out core business operations while complying with regulations, respecting human rights, and preventing negative social and environmental externalities and remedying them when they occur. The World Economic Forum has estimated a $2.5 trillion funding gap to achieve the SDGs; leveraging private capital can critically help to fill this gap. The private sector also contributes to the achievement of the SDGs through employment generation and tax, royalty, or other fee payments. While companies should consider their potential contributions to each SDG, this Atlas does not suggest direct company delivery of social services that should be provided by governments. Rather, the relationship between companies, local and national governments, and communities in the provision of various services and infrastructure requires a careful and coordinated approach.

Civil society organizations often engage with governments and the private sector to fill governance gaps and help actors maximize their contributions to sustainable development. This may include advocating policy or practice change, assisting in monitoring and enforcement, facilitating partnerships, or providing direct services.

Development partners are responsible for seeding project financing, providing capacity development and support, and assisting with knowledge sharing across countries. They should empower governments, communities, and companies to maximize their contributions to the SDGs.

Integrating the SDGs into Core Business

This Atlas intends to encourage companies to consider how they can maximize contributions to the SDGs through **core business practices** (as opposed to contributing through corporate philanthropy, for example). Each chapter considers opportunities for renewable energy companies to support achievement of the SDGs through their broader business mission of deploying renewable energy. It also clarifies actions that companies can take to fulfill their human rights obligations under the UN Guiding Principles on Business & Human Rights, including mitigating negative risks and providing access to effective remedy when abuses occur.

"Core business" refers to the range of activities required to conduct primary business activities. This Atlas suggests best practices related to many core business activities that may also help companies to increase profits, meet sustainability or other goals, and maintain their social licenses to operate. While companies may define core business activities differently, common activities in addition to project development or operation may include:

- **Policies, standards, and monitoring systems:** Companies likely already have policy frameworks that provide for contribution to the SDGs, such as through community consultation, prevention and mitigation of environmental damage, and workplace safety protections.

- **Social and environmental baseline and impact assessments:** Companies often use impact assessments to anticipate and manage risks for communities and surroundings. Greater integration and potential explicit inclusion of the SDGs and human rights into assessments can help companies to more comprehensively plan for and mitigate negative impacts.

- **Risk and opportunity management assessments and planning:** Companies typically use risk and opportunity management assessments to consider and plan for factors that could impede the long-term viability of projects. Companies can use similar processes to consider SDG and human rights risks and opportunities in order to do no harm and contribute to local communities' development where possible. Companies can also extend risk management considerations to supply chains and sourcing decisions and implement corrective actions when abuses occur.

Ways to Collaborate with Stakeholders and Leverage Resources

Each chapter also contains a section outlining opportunities for companies to contribute to the SDGs by collaborating with other key stakeholders and leveraging company resources. While many contributions can be made through companies' core business practices, some contributions are outside of companies' direct control and therefore require multi-stakeholder coordination to achieve maximum impact.

While opportunities to "collaborate and leverage" might include formal partnerships or regular and ongoing multi-stakeholder dialogues, companies can also leverage their role and resources to:

- Convene people, organizations, and institutions to close communications gaps

- Share information, data, and analyses on tax and royalty payments, landscapes, ecosystems, watersheds, health challenges, and safety statistics, among others

- Participate in collaborative initiatives to help realize the SDGs

- Help implement social impact initiatives by mobilizing resources through social investment programs

Dialogue and Engagement with Communities and Stakeholders

To successfully integrate the SDGs into their core business activities, companies must prioritize dialogue and consultation with communities that could be affected by their operations.[8] To better understand the potential impacts and human rights risks and to confirm that the company has a social license to operate, these consultations should be transparent, inclusive, accessible, and meaningful, including by creating opportunities for communities to participate in and influence decision-making about the project. Meaningful consultations and participation should take place prior to the development of renewable energy projects and continue throughout the project lifespan. International law, and some domestic laws, require that host governments obtain the free, prior, and informed consent (FPIC) of indigenous and tribal peoples prior to authorizing any investment project that will use their lands or resources.[9] Industry bodies, certifica-

tion schemes, and companies in other industries have also made commitments to obtain the FPIC of affected communities, including non-indigenous ones, that may be affected by their proposed investments.[10]

Community engagement requires sustained conversation with a wide array of local and national stakeholders to build trust, share information, and find consensus solutions to common problems. This exchange must be transparent and premised upon mutual respect.

Industry-Related Aspects to Consider

This Atlas focuses on the ways that renewable energy companies can contribute to the achievement of the SDGs. That said, the characterization "renewable energy company" can apply to a vast array of private sector actors, including manufacturers, distributors, developers, and operators, not to mention renewable energy financiers, companies that supply the raw materials used for renewable energy technology production, or utility companies that dispatch grid-connected renewable installations. Further, the term "renewable energy" itself contains myriad diverse sources, among them solar photovoltaic, concentrated solar, onshore wind, offshore wind, hydroelectric, geothermal, bioenergy, and ocean energy.

The recommendations in this Atlas are directed primarily to solar and wind project developers and operators, although many apply to hydroelectric, biomass, and geothermal companies and companies at other points along supply chains as well. Companies not covered in this scope nevertheless still have a responsibility to align their practices to the SDGs, and the Atlas includes ways that project developers and operators should work to partner with companies upstream or downstream to prioritize responsible business practices throughout the renewable generation value chain.

While substantial differences exist by renewable energy source, and therefore every recommendation herein included will not necessarily apply to every company, recommendations are included side by side for general applicability. Where possible, the Atlas specifies if a given recommendation applies particularly to specific renewable sources.

Finally, some project impacts depend upon whether a renewable energy project intends to connect to centralized utility grids or to provide electricity off-grid. For example, the type of infrastructure involved in on-grid renewable installation as compared to off-grid projects will greatly affect the types of infrastructure that can be shared between companies and communities. Again, the Atlas specifies where possible if recommendations apply only to off- or on-grid renewable projects where possible.

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6. Ibid.

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SDG 1: End Poverty

End Poverty in All Its Forms, Everywhere

According to the 2030 Agenda for Sustainable Development, "eradicating poverty in all its forms and dimensions... is the greatest global challenge and an indispensable requirement for sustainable development."[11] While significant progress has been made reducing extreme poverty—the number of people living on less than US$1.25 per day was halved between 1990 to 2015—over 800 million people remain too poor to meet basic human needs.[12] Poverty is highest among people with traditionally marginalized identities, including women, racial and ethnic minorities, indigenous peoples, people with disabilities, and those living in the Global South. The commitment to end poverty by 2030 intersects with all other SDGs, particularly those on food security, health, education, the environment, and access to affordable, reliable, and sustainable energy sources.

All renewable energy companies can contribute to ending poverty through increasing access to electricity, supporting local economic development through local procurement of goods and employment, and payment of appropriate taxes and other fees to governments and communities.

The potential to expand access to power can critically enable new productive activities through improved and increased lighting, refrigeration, communications, and machinery motor drive, that can in turn increase income. New renewable developments and grid connection can also contribute to cost savings by lowering the marginal cost of power for formerly unconnected communities, thus increasing effective income. Companies must also pay fair rent, tariffs, or other fees for the services they receive if either project land or generation technologies are owned by communities or individuals. Companies should also contribute to local economic development by championing inclusive employment practices, providing decent work with a living wage, and supporting local businesses through procurement of goods for business operations. Finally, companies must respect land tenure rights and consult with communities about all project aspects early to ensure that they do not undermine livelihoods.

Key Targets Related to SDG 1 and Renewables

1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day

1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.

1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.

SDG 1 RECOMMENDATIONS

INTEGRATION INTO CORE BUSINESS

- Pay taxes and other fees to governments and fair rent or tariffs to households or community owners of land or generation capacity, as appropriate
  - › Honor fair and previously agreed upon rates for land use or generation capacity
  - › Use arm's-length rule for transfer pricing
  - › Publicly disclose details of payments to and from governments
  - › Deploy innovative models to enable the poorest in communities to benefit from renewables, focusing on direct employment and skills building in addition to electrification and compensation for land use
- Champion inclusive employment policies and practices
  - › Facilitate equitable and gender-sensitive access to employment opportunities
  - › Offer training and apprenticeship programs
  - › Provide decent work and a living wage
- Procure goods and services locally
  - › Develop local supplier capacity
  - › Strengthen local value chains where possible
- Respect tenure rights
  - › Begin land access planning early in projects
  - › Conduct inclusive and participatory community consultations
  - › Continue open dialogue and consultations with communities throughout project's operations
- Respect affected community tenure rights (including rights to natural resources), including when not documented or legally recognized
  - › Avoid community displacement
  - › Provide adequate compensation for resettlement to resettled communities agreed on during consultations

COLLABORATION AND LEVERAGE

- Support non-renewable livelihood options for affected communities
- Broaden implementation of anti-poverty strategies via Community Benefit Agreements

Integrate SDG 1 Into Core Business

Pay taxes and other fees to governments and fair rent or tariffs to households or community owners of land or generation capacity, as appropriate

Renewable energy companies can contribute to government revenues through the payment of relevant fees and taxation. When handled transparently, revenues from all required taxation can increase economic growth—providing resources for the realization of economic, social, and cultural rights—as well as supporting poverty reduction programs (if revenues are used appropriately). Conversely, avoidance of tax by companies can exacerbate poverty and limit the resources available for states to realize human rights. Tax avoidance can also damage the company and industry's reputations. Renewable energy companies should also promote responsible taxation practices in supply chains and should be aware that the extraction of materials to manufacture renewable energy technologies has been linked to tax avoidance.[13] Companies should establish tax planning policy processes, undertake public and transparent reporting following standards such as the Global Reporting Initiative,[14] and engage in open dialogue about tax strategies and practices with stakeholders across their supply chains.[15] Similarly, companies should be transparent about the fiscal arrangements they make with governments to adequately inform public discussions about government budgets, energy subsidies, and the solvency of publicly-owned utilities.

Companies must also adequately compensate communities and households for use of land or electricity generation, depending on generation capacity ownership model. Companies can support poverty alleviation and preempt potential future conflict by encouraging communities to use participatory tools to determine the value that community members get from their land before contract negotiation.[16]

Champion inclusive employment policies and practices

Renewable energy companies can contribute to poverty reduction through direct and indirect employment, the payment of living wages, and the development of transferable skills, especially for women[17] and youth (see SDG 4 for more information on education and SDG 8 for more information on labor). Where possible, companies should prioritize permanent employment, which addresses poverty more effectively than temporary employment, offering job security, health care, and development opportunities. Companies should not only adhere to, but also aim to exceed, the minimum requirements of national labor laws through their own policies, procedures, and training related to occupational health and safety, labor rights, workplace discrimination, and sexual harassment.[18] The UN Guiding Principles on Business and Human Rights and the UN Global Compact (see additional resources) offer a basis for companies to embed these responsibilities into their policies. Renewable energy companies should also monitor and engage with their workforces to prevent accidents, violations of labor rights, and discriminatory practices. Companies should also monitor labor practices throughout supply chains and include labor standards clauses in supplier contracts and business partner agreements.

Procure goods and services locally

Renewable energy companies can leverage their activity to increase economic development impacts by prioritizing local procurement of goods and services in their supply chains, thereby inducing growth by contributing to the development of other sectors of host country economies. Where local provision of goods in question is not available, companies can work with local suppliers and civil society actors to build capacity for the adequate provision of goods, similar to initiatives to increase local employment. Local sourcing can include anything from equipment and manufactured goods to raw materials (as needed), food, and lodging for employees. If capacity is built for these suppliers, they can then service other businesses as well.

Respect tenure rights

Renewable energy companies should establish and adhere to policies to respect legal tenure rights. These policies should ensure respect for traditionally-recognized tenure of both local landowners and users, including respect for the collective customary rights of indigenous communities that inhabit, rely on, or otherwise have claims to land suitable for renewable projects. Companies must identify the women, men, and children who use or otherwise rely on potential project land and resources in order to avoid infringing on their legitimate land rights, including rights that may not be formally documented. Ensuring that renewable energy projects do not displace communities or undermine communities' legitimate tenure rights, cultural heritage, and access to land is one way that companies can avoid contributing to poverty, food insecurity, and human rights abuses. Furthermore, companies that respect legitimate tenure rights can establish beneficial long-term relationships and reduce costs from legal action, protests, and damage to infrastructure that have resulted from questionable land acquisition.[19]

In addition, renewable energy companies should meaningfully involve all affected communities in consultations from the early stages of projects, including in project design and location. Consultations should include dialogue on whether or not the affected community wishes to negotiate a benefit agreement as a means to establish clear rules to regulate company interaction with the community and provide fair compensation for the use of the land and potential adverse impacts on affected communities. This has the added benefit of contributing to the development of a long-term "social license to operate" and community support. Even if companies have government permits or concessions for project land, early and collaborative consultation with local communities is essential, and can help companies provide for local economic development while preserving local communities' rights and cultural practices. Companies that seek to operate on indigenous or tribal lands are often required by the host country's laws to obtain indigenous or tribal peoples' free, prior and informed consent[20] before proceeding; they should also ensure that all affected individuals are involved throughout the human rights due diligence process. Companies should be aware that communities have different definitions of resource and land rights, and that some have a strong traditional socioeconomic, cultural, and/or spiritual connection to lands and resources.[21] The Ixtepec and Jeffreys Bay Case Studies below provide examples of community consultation, partnership, and benefit sharing practices that can be pursued as part of efforts to achieve long-term collaborative relationships between community and company.

Collaborate and Leverage

Support non-renewable alternative livelihood options for affected communities

Similar to efforts to strengthen local economies through the procurement of local goods and services, companies can look for other indirect opportunities to support job creation within communities. This can be strategic for companies in places where expectations of job creation exceed realistic projections. Potential initiatives could include investment in agricultural technologies to increase production, support of microfinance initiatives to seed local entrepreneurship, or infrastructure development to connect local goods to markets, for example.

Broaden implementation of anti-poverty strategies via Community Benefit Agreements

Communities, governments, and civil society organizations may already have existing initiatives to alleviate poverty underway. Companies can enter into formal agreements with affected communities to support these efforts; indeed, local communities may require a benefit sharing arrangement as a condition of providing their FPIC to the project. Community agreements can include environmental, social, and health protections; obligations to share financial and other benefits with the community; and rules and processes to govern the ongoing relationship between the community and the company. Such agreements should be legally enforceable. In addition, project developers can look for opportunities for communities to benefit directly from renewable project developments, for example through

community ownership of generation technologies, which would thereby provide direct cost savings or income to communities. Especially if negotiated and implemented only when the community is ready, organized, informed, and capacitated, with funds for the community to hire lawyers and experts, such community partnerships can foster trust and form the basis of strong community-company relationships.

Case Studies and Initiatives

Ixtepec wind project impacts communities: Oaxaca, Mexico[22]

The proposed Ixtepec wind farm is the product of a collaboration between the Indigenous Zapotec community of Ixtepec and the non-profit Yansa Group. Since 2009, the community and Yansa have been working to establish a wind farm on a site with minimal impact on local agriculture and the environment. The 30,000-member Zapotec community of Ixtepec will control the wind farm once the project becomes operational; the farm will provide the community with electricity and income, with excess power sold to the national electricity grid. Under the arrangement between the two parties, the Zapotec community will receive half of the wind farm's profits, which will be used for community development programs. According to Yansa, funds will be "devoted to strengthening quality of life, diversifying economic opportunities and advancing environmental sustainability within the community in order to avoid creating a dependence solely on wind power income acquired by selling the energy to the national grid."[23] Yansa will receive the other half of the profits, which it can then reinvest in other community renewable energy projects. This collaboration provides a useful model for private sector wind and other renewable energy companies on how to engage communities and non-profit stakeholders when seeking to establish equitable value sharing and improve economic conditions.

Jeffreys Bay Wind Farm: South Africa[24]

The Jeffreys Bay Wind Farm is a 60 turbine, 3,700 hectare project, based in the Eastern Cape of South Africa.[25] Before breaking ground on the wind farm, the company conducted a full stakeholder consultation and environmental impact assessment, with an emphasis on the importance of community engagement and open communication. Environmental and planning authorities then assessed community concerns and created various socio-economic programs to address them. Now operational, the project has worked to help reduce poverty by employing local community members to maintain the wind farm. In addition, the wind farm is also partly owned by the community's Amandla Omoya Trust (a 6% shareholder in the project), which uses 80% of its budget for education projects in the low-income area of Port Elizabeth.

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SDG 2: Zero Hunger

End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Regular, permanent, and unrestricted access to food is a fundamental human right.[26] While the global rate of undernourishment fell from 15% to 11% from 2000 to 2015,[27] the number of undernourished people grew by 38 million in 2016 to reach 815 million.[28] The UN Food and Agriculture Organization (FAO) attributes this increase partially to increased conflict and extreme climate events like droughts and floods in food insecure regions.[29] Meanwhile, the rate of stunted growth—a proxy for childhood chronic malnutrition—continues to fall globally, though an estimated 155 million children under the age of five are still too short for their age.[30] Like poverty, food insecurity is unevenly distributed across regions, with Asia and Africa suffering most from health issues caused by food shortages.[31] The fight against hunger appears likely to remain a development priority as the FAO projects global agricultural output may need to increase by 50% from 2012 levels by 2050 in order to keep up with population growth-driven food, feed, and bioenergy demands.[32] Agriculture is the world's largest single employer, providing income to 40% of the world's population.[33]

Renewable energy companies' contributions to SDG 2 will therefore largely relate to impacts on food systems, and predominantly local agriculture. The provision of electricity, especially in remote areas, can increase agricultural productivity and allow for refrigeration to preserve food and allow it to reach new markets. Renewable energy can also support local farmers by supplementing income through land-leasing and co-siting of renewable technologies and farms. But the fact that many renewable energy technologies are well tailored for use on farmland also creates risks, including competition for arable land and potential for land-intensive renewable sources like solar or bioenergy to displace land formerly used for food production. Hydroelectric projects can also disrupt food production by flooding land or altering watersheds, and some projects, especially biofuels and drilling to tap geothermal energy, can contaminate water sources and farmland. Companies must avoid practices that destabilize local food systems.

Key Targets Related to SDG 2 and Renewables

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.

2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and that progressively improve land and soil quality.

2.3 By 2030 double the agricultural productivity and the incomes of small-scale food producers, particularly women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets, and opportunities for value addition and non-farm employment.

2.a Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries.

SDG 2 RECOMMENDATIONS

Integration into Core Business

- Explore synergies with food systems
  - › Manage water resources transparently
  - › Seek out partnerships with small farms to provide additional income and strengthen economic viability
  - › Share land and infrastructure benefits with agriculture communities
- Avoid competition for food producing land
  - › Minimize land take
  - › Avoid arable land competition between food products and land-intensive renewables like bioenergy, by siting projects on abandoned or degraded land.
- Refrain from contaminating water and farmland
  - › Conduct baseline and ongoing geochemical surveys
  - › Monitor water quality and soil fertility regularly

Collaboration and Leverage

- Partner with the agricultural sector and food distribution systems
- Strengthen watershed management

Integrate SDG 2 Into Core Business

Explore synergies with food systems

Renewable energy companies can contribute to ending hunger through the development of shared landscapes and associated infrastructure. For example, crops can be grown alongside renewable projects like solar and wind farms. Wind farms are particularly well-suited for grazing of livestock,[34] and some solar projects have planted pollinator plant ground cover underneath arrays to maintain soil quality, reduce runoff, and attract pollinators.[35] Collaborative landscape management plans for food and energy can improve the provision of services while respecting traditional land rights and local farming practices. Companies should consult with local stakeholders, including marginalized individuals and groups, to identify opportunities where infrastructure or land can be shared. This can enable companies to build long-term sustainable relationships with communities. Companies can also look for opportunities to produce and share (or sell) co-products at a low cost with communities. Products such as press cakes (the solids produced following biofuel production), can be used as livestock feed[36] and biogas from livestock manure can be used locally for energy.[37] Bioenergy produced from agricultural wastes, such as the bagasse from sugar production, can also be burned for heat or electricity to power food production. Using agricultural wastes, as opposed to crops, as a form of bioenergy can also help to reduce land use change and contribute to the achievement of SDG 15 (life on land). However, the use of agricultural waste as a bioenergy should not compromise farmers' ability to use waste as animal feed and/or to maintain soil quality, if they so choose.[38]

Avoid competition for food-producing land

Renewable energy companies can reduce the displacement of communities and slow the effects of land use change by using brownfields, abandoned, or degraded lands for project siting or bioenergy crop production. Before developing projects on active or potential farmland, companies should explore possibilities to develop projects on alternative, less fertile sites. This applies to bioenergy developers as well, since many bioenergy crops can thrive in areas with low soil quality and water availability.[39] However, selecting a less-fertile project site does not guarantee that there will be no other land-use conflicts, and so prioritization of less fertile lands for project development cannot substitute for early and participatory community consultation practices.

Refrain from contaminating water and farmland

Renewable energy project developers and operators must also ensure that their installations do not jeopardize farms' abilities to produce by contaminating neighboring farmland. For example, isoprene, a biogenic volatile organic compound, is produced at a high rate by the fast-growing trees planted in Europe for bioenergy production. These fast-growing trees emit more isoprene than the crops they tend to replace. When the compound mixes with others in the atmosphere it raises ozone levels, having a negative effect on crop yields and human health, and accelerating climate change. Scientists recommend that biomass plantations be sited far from cities where the isoprene will be less likely to interact with other pollutants and form ozone.[40]

Collaborate and Leverage

Partner with the agricultural sector and food distribution systems

Companies can leverage their resources and expertise in myriad ways to support local farmers, including by buying agricultural products from local farms and by supporting policies and practices that strengthen agricultural productivity and local food systems. For example, agricultural waste products like straw, sawdust, and corn cobs can be sold to the bioenergy industry to create an additional revenue source for farmers.[41] Bioenergy companies can also buy harvested cover crops (the crops that restore soil during field rotation), thus providing further incentive and revenue for sustainable soil management. Planting cover crops confers

long-term soil management advantages, including reducing erosion, polluted runoff, and nutrient loss.[42] Companies can also work with small farmers to provide or fund farmer training or help to source agricultural equipment or fertilizer to improve productivity.

Strengthen watershed management

Especially for bioenergy and hydroelectric, companies should collaborate with local stakeholders to ensure responsible and sustainable watershed management to safeguard availability for agricultural needs. Where avoidable, bioenergy crop production should not compete with farms for resources like farmland and water. To manage this potential for competition, companies, governments, and communities can engage in regional planning for land and water management systems to ensure that bioenergy crops are not produced at the expense of food security.[43]

Case Studies and Initiatives

Intercropping with Gliricidia: Malawi[44]

In Malawi, the intercropping of maize with gliricidia, a nitrogen-fixing tree used for bioenergy, has helped to increase local crop yields. On average, this intercropping yields 3.7 tons of maize per hectare, compared to 0.5 - 1 tons per hectare without intercropping. Such an increase in yield can contribute to food security either by providing food to farmers directly, or by increasing income for discretionary spending on food. The World Agroforestry Center is testing this technique with partners in Malawi in order to improve soil fertility and increase crop production. Gliricidia branches also serve as feedstock for a small power plant that provides electricity to smallholder farmers in the area, with excess sold to the national electricity grid. Intercropping thus simultaneously can increase crop yields, access to electricity, and community income. Biomass companies can encourage use of this technique to promote food security alongside electricity generation.

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SDG 3: Good Health and Well-Being

Ensure healthy lives and promote well-being for all at all ages

Access to health is a human right, dependent on the realization of other human rights like access to food, housing, work, education, sanitation, information, and participation.[45] Like efforts to fight extreme poverty, access to basic health services has improved significantly in recent decades, but progress remains uneven. For example, while the under-five mortality rate has decreased by 44% globally to 40.8 deaths per 1,000 live births since 2000,[46] in sub-Saharan Africa the mortality rate remained more than twice that in 2015.[47] Further, the UN reports that children born into poverty are more than twice as likely to die as their wealthier peers and that "only half of women in developing regions receive the recommended amount of health care they need."[48]

Renewable energy companies can contribute to the achievement of SDG 3 in several ways. Off-grid renewable energy developments can help bring power to remote healthcare providers, and on-grid access can increase the reliability and affordability of access to energy by hospitals and other providers. Renewable sources with more flexible infrastructure needs can also provide critical electricity in response to epidemics and disasters if electrical grids go down or prove insufficient. Renewable energy provides a cleaner, less polluting alternative to burning fossil fuels or indoor cooking fuels, which can in turn reduce negative health effects from air and water pollution. In addition, renewable energy companies have a responsibility to mitigate negative health impacts from project development and operation. This will involve efforts to anticipate and manage potential project-related harm, including in supply chains and disposal, and to ensure that employees work in healthy and safe environments and have access to preventative healthcare. This includes creating company health and safety policies, offering occupational health and safety training for workers, and providing healthcare benefits for employees. In order to realize these benefits, companies must also conduct human rights due diligence, and, especially in the case of flooding from hydroelectric projects, ensure that projects do not threaten the safety of surrounding communities.

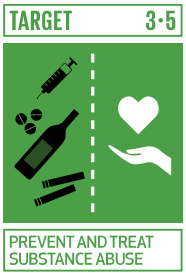
Key Indicators Related to SDG 3 and Renewables

3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.

3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.

3.4 By 2030, reduce by one-third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and wellbeing.

3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.



3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol.

3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.

3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents.

SDG 3 RECOMMENDATIONS

Integration into Core Business

- Champion occupational health and safety
  - › Promote workplace health and safety
  - › Establish rigorous workplace health and safety monitoring and reporting
- Ensure that project development does not adversely affect community health
  - › Perform supply chain due diligence and do not source from companies with records of environmental contamination
  - › Consider and combat project-related changes in community diet or hygiene with the potential to cause harm
- Promote employee wellness
  - › Provide healthcare benefits for employees
  - › Screen for non-communicable diseases (NCDs)
  - › Provide healthy canteen food options and good hygiene protocols
- Combat infectious diseases among employees
  - › Run HIV/AIDS education, prevention, and counseling programs for employees

Collaboration and Leverage

- Support community health programs
- Support electrification of healthcare services
- Participate in programs for response to, and recovery from, epidemics and disasters

Integrate SDG 3 Into Core Business

Champion occupational health and safety

First and foremost, companies should contribute to SDG 3 by minimizing potential health and safety risks for workers. The development of health impact assessments, prior to and throughout project implementation, can help companies to create health and safety policies tailored to risks. Appropriate clothing and equipment and access to health care should also be provided for all workers. Renewable energy companies can further promote worker health by providing occupational health and safety (OHS) training for workers. Because renewable energy is a recent and rapidly growing industry, there may be a lack of collective awareness of potential work-related risks and hazards, including those related to electric shock, arc flash, or working from height. In order to manage the industry's rapid growth responsibly, companies must also ensure that inexperienced workers are not placed in risky situations for which they have not been adequately trained.[49]

Ensure that project development does not adversely affect community health

Companies must anticipate and mitigate potential project-related harm to community health and wellbeing. Ideally, this would include measuring baseline community health metrics against which to identify impacts. Efforts to avoid adverse health impacts include safeguards against exposure of employees or communities to toxic contamination. Notably, solar panels are manufactured using potentially harmful metals, including lead, chromium, and cadmium. Solar operators and developers should perform due diligence on manufacturers and not source panels from firms with records of environmental pollution.[50] They should also plan for end-of-life management from the beginning of project development to avoid the potential for toxics to leach into the soil or groundwater sources while in e-waste dumps.[51]

In addition, project developers and operators should consider the potential for projects to alter community diet or hygiene in a way that negatively impacts health. For example, sugarcane is a common crop for producing bioenergy; where bioenergy companies encourage farmers to increase sugarcane production, they should be cognizant of potential increases in sugar consumption in local diets and take efforts to mitigate health impacts.

Promote employee wellness

Workforce health is essential for company productivity. Companies should provide health benefits to employees where not provided by the state and create and implement company wellness programs to promote employee health and wellbeing. Such programs can include those to promote good lifestyle hygiene, serve healthy canteen food, and offer and encourage regular preventative health screenings.

Combat infectious diseases among employees

Renewable energy projects can drive an influx of new residents to neighboring communities in search of employment opportunities. This can exert pressure on local water, sanitation, and health infrastructure, which can increase the risk of infectious disease transmission. The construction phase of renewable energy projects in particular can attract a high volume of temporary workers, which can also increase the risk of sexually transmitted diseases outbreaks. Companies must establish prevention and response strategies, such as vaccination programs and sexual health education, to protect workers and maintain community health. The inclusion of local stakeholders in such healthcare initiatives can help to build relationships between companies and communities and can reduce the risk of disease for both the workforce and communities by increasing overall understanding of risks and the steps that can be taken to prevent transmission.[53]

Collaborate and Leverage

Support electrification of healthcare services

Energy access is particularly crucial for health facilities, as electricity is needed to store vaccines and perform life-saving tests and operations. However, according to the World Health Organization, as many as one in four health facilities in some regions lack access to electricity, and many more suffer reliability challenges.[54] Companies can help to promote health and wellbeing by providing renewable energy for local health clinics and education centers, especially through off-grid projects in remote areas. Health clinics can also serve to anchor microgrids and promote community electrification. Because health clinics and hospitals need reliable and consistent energy sources, hydroelectric technology has often been used for electrification of health services in water-rich regions.[55] Nevertheless, solar, geothermal, and wind energy can also supplement traditional energy sources with storage technologies to minimize intermittency.

Support community health programs

In addition to health programs focused on employee wellbeing, companies can sponsor or support healthcare provision to other community members as part of social investment programs. This support may be especially impactful in areas where company resources allow for the provision of far more extensive services to employees than surrounding community members typically receive. Company contributions can also include public health campaigns, distribution of mosquito netting, or spraying of insecticide to prevent malaria.

Participate in programs for response to, and recovery from, epidemics and disasters

In remote areas suffering from epidemics or post-disaster areas cut off from centralized electricity grids, renewable modularity, especially solar panels, can critically provide the electricity necessary for essential health services at a lower cost and with less pollution than diesel-powered generators. For large, energy consumptive hospitals, renewable energy can provide additional flexibility and resilience in the event of an extended outage from a natural disaster, especially if damage prevents the transportation of fossil fuels traditionally used to power backup generators.

Case Studies and Initiatives

Powering Health Clinics with off-grid solar: Sarguja, India[56]

In Surguja, a district in India's central Chhattisgarh state, the National Health Mission and Chhattisgarh Renewable Energy Development Agency have installed 2kW off-grid solar photovoltaic systems (with a battery backup) in over 570 primary health centers since 2012. These renewable systems were designed to address power deficits plaguing one in three health centers in the state. The facilities now equipped with solar arrays have performed significantly better than those without, treating 50% more out-patients each month and providing services 24-hours. This performance is particularly impressive for "power-deficit" health centers that on a typical day receive less than 20 hours of electricity from the grid. These centers also experienced fewer power disruptions throughout the day, and 80% reported electricity cost savings. While this program was implemented by a public agency, it can nevertheless serve as an instructive model for private sector developers hoping to share benefits from electrification or find new business opportunities.

Off-grid solar photovoltaic power: Zambia[57]

The United Nations Development Programme (UNDP) offers another potential model for the private sector. In the Eastern Province of Zambia, the Ministry of Health and UNDP identified three primary health care clinics that are inaccessible during the six-month rainy season to install off-grid solar photovoltaic power systems. The solar arrays

have allowed the hospitals to improve equipment sterilization and safely maintain cold-chain storage for antiretroviral treatments and vaccines. The solar panels also power diagnostic equipment for malaria, tuberculosis, and HIV patient monitoring, as well as pumps for water purification. Private sector renewable companies can partner with public agencies on similar projects to earn and maintain a social license to operate and increase market penetration while also improving public health.

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SDG 4: Quality Education

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Access to universal quality education is crucial to sustainable development.[58] Education is essential to countries' long-term development, civic and political discourse, health, and peace and security.[59] The human right to education requires states to provide for equal, available, and accessible education.[60] However, while global education enrollment has increased, as of 2014, 263 million children and adolescents between the ages of 6 and 17 did not attend school.[61] For many more, poverty, low educational quality, or unsuitable or unsafe learning conditions leave them at risk of dropping out. As is true for all SDGs, the achievement of SDG 4 is tied to the achievement of all 17 goals; in 2018, as many as half of all out-of-school children lived in conflict-affected areas, and disparities remain in access to education by gender.[62]

The renewable energy sector's most direct contribution to SDG 4 will likely be through offering workforce education and providing electricity to support students to attend school and to study at night. The renewable energy workforce is growing rapidly; potential employees need skills training in order to meet demand for many renewable jobs. Companies can contribute to this capacity development directly through provision of training programs, but can also collaborate with schools and universities to develop curricula relevant for renewable jobs preparation. In addition, renewable energy companies can contribute to SDG 4 by partnering with local governments and civil society organizations to provide power to schools and homes, thereby helping to improve learning environments.

Key Indicators Related to SDG 4 and Renewables

4.3 By 2030, ensure equal access for all women and men to affordable quality technical, vocational and tertiary education, including university.

4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.

4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations.

4.7 By 2030, ensure all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development.

4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all.

4.b By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries.

SDG 4 RECOMMENDATIONS

Integration into Core Business

- Assess and upgrade the local skills base
  - Conduct routine baseline skills assessments and gap analyses
  - Sponsor apprenticeships, scholarships, and graduate programs
- Train and educate workers
  - Train workforce in technical and management skills
  - Ensure training opportunities are made available to employees at all levels and across all backgrounds

Collaboration and Leverage

- Support electrification of schools
- Collaborate with universities to design curricula and provide scholarship opportunities

Integrate SDG 4 Into Core Business

Assess and upgrade the local skills base

To analyze skills gaps in the available workforce, renewable companies can assess and document skills baselines as part of workforce planning. In some cases, governments or other organizations may already be collecting and sharing data on skills and education of the population. Companies can work with these organizations or partner with schools, universities, or job-training providers to assess skills and better match potential workers with available jobs, identify skills gaps, design future training programs, and sponsor apprenticeships, scholarships, and graduate education.

Train and educate the workforce

Companies can contribute most directly to the achievement of SDG 4 through workforce training and education programs. Especially for jobs that require technical skills—from electrical technicians in the field to researchers in laboratories and lawyers to negotiate contracts—workforce training programs may allow companies to enhance local capacity, hire more local employees, and thus meet local content requirements (where applicable) or build trust with communities. Innovative workforce training programs can expand on workers' existing skill sets and interests,[63] or increase opportunities for target groups like former fossil fuel workers,[64] veterans,[65] and women.[66] Training programs can also support the development of management skills required for upward mobility within the company. These skills will crucially improve workforce productivity for companies, but also contribute to

longer-term economic development as workers are able to use transferable skills in future employment opportunities. In some cases, governments may offer tax or other financial incentives to encourage workforce development.

Collaborate and Leverage

Collaborate with universities to design curricula

Renewable energy companies can partner with governments and universities to improve education curricula and alignment with business workforce needs. Global employment in the renewable energy sector grew by 5.3% from 2016 to 2017, to reach 10.3 million jobs. However, in the US, employers are struggling to fill vacancies, with 75% of employers in the solar industry reporting difficulties recruiting qualified candidates.[67] Renewable energy companies can also create work-study programs and traineeships that help to train the next generation of renewable energy practitioners. Community education can be key to the success of renewable energy operations, ensuring the provision of a local, skilled workforce, and allowing companies to meet local content requirements, where applicable.[68] By establishing links with local education institutions, companies can also establish long-term relationships with communities and help to increase graduate employment.

Support electrification of schools

Renewable energy companies can help to increase access to education by partnering with governments to provide energy to schools, contributing to the creation of a positive and safe learning environment. Approximately 188 million children globally attended schools that lacked electricity in 2014. In the same year, close to 90% of children in Sub-Saharan Africa attended schools without electricity, and fewer than half the schools in Peru, for example, had electricity.[69] Electrified schools outperform non-electrified schools and have higher staff retention. Further, electricity can be crucial for adults pursuing continuing education, as many work during the day and it allows schools to teach classes after dark. In addition it can help community members complete homework or independent study at night.[70] Renewable energy can also power technological education, which can help students to acquire requisite skills for the digital economy. If companies choose to support community electrification efforts, they should consult with communities to assess needs and create plans to sustainably manage and repair these technologies.

Case Studies and Initiatives

Enel and Barefoot College: Brazil[71]

Multinational electricity producer and distributor Enel generates nearly half of all electricity sold from zero- or low-carbon sources, including solar, wind, bioenergy, and hydroelectric.[72] The company also provides technical training on wind and solar technologies around the world. In collaboration with the Indian NGO Barefoot College, Enel trains women in remote areas of Latin America to become solar engineers, equipped to install, operate, and maintain solar panel systems in their local communities.[73] This program improves gender equity and access to job opportunities for people living in isolated areas.

Enel has also donated hundreds of solar lamps to schools in the Amboseli National Park in Kenya as part of their Powering Education program to support inclusive education and increase literacy rates in Africa.

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SDG 5: Gender Equality

Achieve gender equality and empower all women and girls

Achieving gender equality and empowering women and girls requires that women and girls are able to acquire and use productive assets, have access to education, healthcare, and employment, and have an equal voice in economic and political decision-making. In most countries around the world, gender-based discrimination and inequality continue to critically impede sustainable development. Realizing gender equality requires efforts to ensure equal rights to economic resources, full participation of women in decision-making processes, and the eradication of gender-based violence.

Renewable energy companies can contribute to gender equality by providing gender inclusive work environments and by identifying and managing gender-specific project impacts. These contributions entail ensuring women's full and effective participation in business and project-related decisions, including in community consultations and benefit-sharing agreements, and implementing steps to achieve gender parity in employment and management positions. To the extent possible, renewable companies should work to guarantee that women receive and are able to exercise control over their fair share of revenues associated with renewable projects. With respect to discussions regarding community lands, it is critical for community-company negotiations to enable all community members to participate in decision-making. Companies can, for example, avoid scheduling meetings during times when women are unavailable to join, emphasize the importance of inclusive discussions, and organize separate meetings for women to encourage them to speak more freely.[74]

Companies must also create policies and take action to reduce the risk of gender-based violence, both internally and with external operations. Gender-sensitive grievance mechanisms should be established to provide channels for women to seek remedy for complaints or grievances associated with a project's negative impacts, or for employee misconduct.

Key Indicators Related to SDG 5 and Renewables

5.1 End all forms of discrimination against all women and girls everywhere.

5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life.

5.2 Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation.

5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws.

5 GENDER EQUALITY

SDG 5 RECOMMENDATIONS

Integration into Core Business

- Provide equal opportunities for women and establish gender-sensitive work environments
  - › Recruit more women and expand opportunities for women in traditionally male professions like construction and engineering
  - › Pay women and men equally
  - › Promote more women to visible leadership positions
  - › Provide gender-sensitive career development planning
  - › Adopt flexible schedules to accommodate childcare
- Remove barriers to women's participation in both the workforce and consultation processes and support their involvement through project lifecycles.
  - › Ensure women's full and effective participation in business and project-related decisions
  - › Establish gender-sensitive grievance mechanisms
  - › Remain vigilant on gender-based violence
- Provide coverage of sexual and reproductive healthcare benefits for employees

Collaboration and Leverage

- Make gender-inclusive social investments and commitments, including provision of gender-specific educational scholarships and health monitoring

Integrate SDG 5 Into Core Business

Provide equal opportunities for women

Women remain underrepresented in renewable energy sector employment, especially for larger and grid-connected renewable energy projects.[75] While there may be many causes for this gender disparity, including a broader societal failure to encourage greater gender inclusion in STEM and construction fields, renewable energy companies can do more to promote gender parity in employment, and should establish proactive initiatives to recruit and retain female employees. These efforts should start with an honest assessment of factors that might impede overall workforce gender parity and equal representation in company leadership. Companies should then establish interventions to promote improved company gender equity, including creating formal anti-harassment policies, trainings, and grievance mechanisms; offering flexible work schedules to accommodate childcare; and providing specific career development planning opportunities for women. In addition, companies should commit to equal pay for equal work, and should promote women to visible leadership positions.

Remove barriers to women's participation in both the workforce and consultation processes and support their involvement through project lifecycles.

Gender norms and discrimination create a number of disparate impacts throughout many stages of renewable project development. Renewable energy companies must be sensitive to and manage specific impacts on women throughout project development and implementation. When renewable companies first propose projects to project-affected communities, they must ensure that women participate fully in company-community interactions. Conducting gender-sensitive consultations requires companies to schedule meetings at times when women will not be busy with other work or tasks and in a location easily accessible by women in the community. If women are less likely than men to be literate, companies should ensure that information about the project is made available in other ways that women can access. Gender-sensitive consultations may also require separate meetings for women to identify the resources women traditionally own or use and to weigh in on decisions. In some communities, women may be hesitant to speak freely where men are also present, but may be candid in all-female meetings.[76] If project development requires compensation for communal lands, renewable companies should work to ensure that compensation is gender-equitable.[77] For example, compensation schemes that involve payments to both spouses (rather than only the heads of households) may help to address inequities between women and men.[78]

Once project development and operations are underway, companies must establish strong protections against project-related gender-based violence that can sometimes result from an influx of male workers into a community. Companies must establish a culture of respect for women with clear policies and procedures regarding sexual misconduct and harassment. If projects are guarded by private security forces, these security forces must be trained against gender-based violence.

Provide coverage of sexual and reproductive healthcare benefits for employees

Like efforts to provide workforce preventative healthcare to promote employee health and well-being, companies should include sexual and reproductive healthcare in benefit packages. In addition to improving employee health and wellness, provision of such benefits can reduce the risk of unplanned pregnancy and the incidence of sexually transmitted infections.

Collaborate and Leverage

Make gender-inclusive social investments and commitments

Renewable energy projects have traditionally offered greater employment opportunities to men and had more severe negative impacts on women.[79]

Renewable energy companies should therefore tailor social investment to ensure that women and girls share in the benefits of renewable development. These efforts can include scholarships for education, employment, or vocational training offered specifically to women, or support for women's health programs. Where women have less say in political, economic, and social decision-making, companies can work with civil society organizations and local leaders to support culturally-sensitive opportunities that promote equal participation and leadership.

Case Studies and Initiatives

Supporting female entrepreneurs through geothermal: El Salvador[80]

LaGeo is an electric generation company whose geothermal fields and power plants generate 27% of El Salvador's electricity with renewable energy. The company created a program for women neighboring its geothermal fields to use waste heat from the geothermal steam to dehydrate fruit for subsistence and for sale. They also grow and sell plants watered with geothermal condensates. Dozens of women from 15 rural communities surrounding the geothermal field have participated in the initiative so far, and more than 45,000 people benefit indirectly from the initiative.

Achieving new standards for equal gender participation: Morocco[81]

The ACWA Power project, associated with Khalladi Wind Farm in Morocco, is intended to increase incomes, improve the livelihoods of communities, and empower women. The project provides trainings in cooperative management and focuses on the importance of engaging women in decision-making processes, both as participants and decision makers. This project complies with the W+ standard, developed by Women Organizing for Change in Agriculture and Natural Resource Management, that certifies projects that increase social and economic benefits for women.

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SDG 6: Clean Water and Sanitation

Ensure availability and sustainable management of water and sanitation for all

The human right to safe and clean drinking water and sanitation[82] is critical for the realization of other human rights, and is inextricably linked to public health. However, providing safe drinking water and adequate sanitation remains a significant development challenge globally.[83] At present, 2.1 billion people lack access to safe drinking water and 4.5 billion people do not have access to safely managed sanitation services. Unsafe hygiene practices are widespread, and more than 340,000 children under five die each year from diarrheal diseases due to poor sanitation or hygiene, or unsafe drinking water.[84] Alongside health concerns, access to water and sanitation also intersect with other inequalities, including gender inequality. Ensuring availability and sustainable management of water and sanitation for all can help reduce water-related illness, create safer living environments, and create resilient communities.[85]

While some renewable energy sources like wind and solar allow for the generation of electricity in a far less water-intensive manner than traditional fossil fuel energy sources—which can require substantial quantities of water to act as working fluids in power plants or to assist in hydrocarbons extraction—renewable energy companies must nevertheless monitor their impacts on local water systems and establish policies and practices for sustainable water use. Companies should consider community needs in project siting and work with communities to plan watershed management and monitor water quality. They should also support governments, communities, and civil society to develop renewable energy projects to power desalination plants with large-scale grid-connected projects, or ground water pumps off-grid.

Key Indicators Related to SDG 6 and Renewables

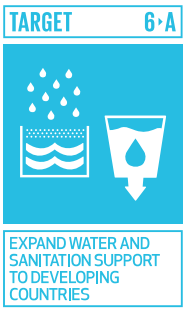
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally



6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

6.b Support and strengthen the participation of local communities in improving water and sanitation management

SDG 6 RECOMMENDATIONS

Integration into Core Business

- Manage water holistically and develop a company water use policy
  - › Comply with government water management policies
  - › Integrate technical, social, economic, and political water concerns
  - › Identify high-value water areas
  - › Maintain long-term water balance throughout projects
- Conserve and recycle water
  - › Consider community water needs in project siting
  - › Reduce water consumption throughout all stages of the value chain
  - › Use alternative water sources (greywater, seawater)
- Reduce or eliminate pollution
- Monitor and disclose water quality and usage
  - › Monitor water sources both near the project site and downstream
  - › Involve the community in monitoring and share water data openly

Collaboration and Leverage

- Leverage power generation for desalination, groundwater pumps, and sanitation systems
- Share the benefits of water infrastructure
- Support local capacity-building in water and sanitation

Integrate SDG 6 Into Core Business

Manage water holistically and develop a company water use policy

Renewable energy companies can help ensure the availability and sustainable management of water and sanitation by developing a company water use policy that promotes holistic management of water resources. This involves assessing water availability, monitoring water quality, and managing competing demands. Companies should also adhere to the water management requirements and environmental regulations of the country within which they are operating. Strategies such as reducing water use, recycling water resources, and improving water storage facilities can help to improve water security. Renewable energy companies can further contribute to the achievement of SDG 6 by monitoring water quality adjacent to their projects and reporting on their water use. While some technologies like wind turbines have lower water needs, bioenergy projects can require significant water inputs depending on the type of feedstock used.[86] Projects can therefore explore alternative feedstocks, such as residue-based bioenergy, which is less water intensive. They should also be sensitive to local climatic conditions, particularly if operating in areas that are water scarce: for example, in arid environments, operators of large solar voltaic farms may want to consider water-conserving methods to clean panels, either by alternating dry cleaning with efficient wet systems, or investing in electrostatic cleaning and robotic systems that eliminate the need for water to clean all but hard deposits.[87]

Conserve and recycle water

One of the most consequential decisions that a company can make to minimize impact on water systems is the siting of projects. In conducting feasibility studies and environmental and social impact assessments, companies should consider the impact that projects could have on local water systems, and avoid siting in high-impact areas. For renewable energy sources like bioenergy and hydroelectric that have larger impacts on water systems, companies should adopt practices to reduce water consumption and mitigate any potential contamination of community water sources. While solar and wind projects are less water intensive once in the development and operations stages of projects, companies should be aware of the potential water impacts of project construction and supply chains, and prioritize sourcing from responsible manufacturers.[88] Finally, where possible, renewable companies should meet their water needs through non-potable water sources like grey water or seawater.

Reduce or eliminate pollution

Bioenergy companies can reduce contamination to watersheds and protect human health by closely managing or eliminating pesticide use[89] and employing fertigation (injecting fertilizer into irrigation systems).[90] Brazil, the world's second-largest producer of bioenergy,[91] has been accused of failing to protect its people from the dangerous impacts of pesticide spraying. Ninety people, many of them children, were hospitalized following aerial spraying over a school in 2013. An opponent of pesticide spraying was killed in 2010, and other opponents fear retaliation from land owners for their advocacy.[92]

Monitor and disclose water quality and usage

For renewable energy sources requiring water, such as bioenergy, hydro, concentrated solar, and geothermal, companies must work to mitigate any potential contamination of water sources. To improve transparency and knowledge-sharing around resource management, companies should work with relevant agencies and organizations to monitor water quality and share results. Community trust and confidence could also be improved by working with civil society and community representatives to collaboratively monitor water quality.

Collaborate and Leverage

Leverage power generation for desalination, groundwater pumps, and sanitation systems

Renewable energy-powered technologies like solar pumps offer cost-effective alternatives to grid-connected or diesel groundwater pumps. These pumps can support the expansion of irrigation and reduce dependence on traditional energy sources for water access.[93] However, these technologies are underutilized due to high capital costs and the lack of adequately trained system installers and operators. Companies should look for opportunities to collaborate with governments, communities, and civil society organizations to increase capacity through trainings or provision of other instructional materials and explore financing options to distribute costs over the project lifespan, thereby increasing the use of renewable energy and expanding access to water. Where these pumps are installed, partners should be aware of the risk that pumps might facilitate excessive water withdrawal because of low marginal operating costs.

Collaborate with other stakeholders to plan watershed management

Renewable energy companies should work with local communities, civil society organizations, and other stakeholders when considering project impacts and creating water use management plans. As for other types of consultations, companies should ensure all impacted stakeholders are represented in management conversations. Companies' convening power around watershed management is especially important when projects have transboundary impacts, a major challenge for hydroelectric projects. Inclusive participation can help to reduce potential friction caused by water and energy management in both upstream and downstream countries and reduce the risk of project development delays.[94]

Share benefits of water infrastructure

In areas where companies must build new infrastructure to meet project water needs (either to pump groundwater or transport water from elsewhere), companies should work with governments to alleviate water competition and enable third party (e.g. local community) access to and use of improved water supply. Company projects can critically bring fresh water to areas otherwise lacking reliable access.

Case Studies and Initiatives

Strengthening water distribution and storage: Tanzania[95]

In Tanzania, insufficient water distribution and storage infrastructure has left approximately 85% of the population without access to safe drinking water. In 2016, the TATU Project, a Tanzanian sustainable development organization, partnered with Energy for All (E4A) to implement a water access project in northern Tanzania. The two villages supported by this project are in the Pangani River Basin, where agricultural use and a hydroelectric dam have stressed the region's surface water supply. Women in the community walk upwards of an hour each day to collect water, limiting time available for education and work. E4A and the TATU Project are working with the local community to install a well and irrigation system that will use solar panels to pump 30,000 liters of fresh, clean groundwater daily. After they are trained, local technicians will operate and maintain the well, creating local jobs. Project materials will also be sourced from local manufacturers. Finally, E4A and the TATU Project will educate community members on healthy water, sanitation, and hygiene practices. This model can be adapted and implemented by private renewable companies to improve water distribution and access.

Leveraging existing infrastructure to enhance water-power synergies: The United States and South Africa[96]

In 2009, the Valley Center Municipal Water District in California installed a 1.1 MW solar power system, which now offsets nearly 20% of the utility's largest pumping station's electricity needs. Just south of Valley Center, the Idyllwild Water District (IWD) near Palm Springs, California, has deployed a 44.1 kW solar PV system that now provides 83% of the district's electricity. This system has also helped to increase the reliability of the water supply. Before its installation, when high winds caused outages, the IWD was unable to pump drinking water without backup diesel power generation.

Similarly, in South Africa, eThekwini Water and Sanitation serves the more than 3.5 million residents of Durban. eThekwini Water and Sanitation works to identify opportunities to install mini-hydroelectric plants to supply electricity from existing water supply infrastructure. By maximizing benefits from existing infrastructure, they hope to provide a replicable model for other regional water managers, including in rural areas of northern Kwazulu-Natal where water and power availability is limited.

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SDG 7: Affordable and Clean Energy

Ensure access to affordable, reliable, sustainable and modern energy for all

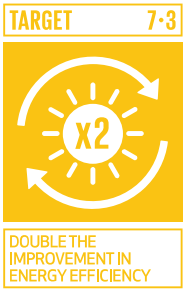
Access to energy is directly or indirectly linked to all 17 SDGs. Around the world, approximately 1.1 billion people did not have access to electricity in 2017. 2.5 billion do not have access to modern energy sources and instead rely on solid biomass for their heating and cooking needs, which degrades air quality and has negative implications for the environment and human health.[97] As noted in other chapters, access to sustainable and modern energy contributes to reducing poverty and hunger (SDGs 1 and 2); supporting long-term economic growth (SDG 8); improving provision of healthcare, education, and clean water (SDGs 3, 4, and 6); and bridging gender and socioeconomic inequalities (SDGs 5 and 10). In short, lack of access to energy is a major impediment to the achievement of the 2030 Agenda.

The renewable energy industry is therefore instrumental to the success of the SDGs, and the achievement of SDG 7 in particular. Because many renewable energy technologies like solar, wind, and micro hydro can be deployed modularly, renewable energies are uniquely positioned to expand electricity access off-grid in remote areas where it is expensive to connect communities to centralized electricity grids (while 97% of urban populations have access to electricity, only 77% of rural populations do).[98] In addition, on-grid renewable energies can contribute to the achievement of SDG 7 by replacing polluting fossil fuels in the energy mix with clean, sustainable energy supply.

Key Indicators Related to SDG 7 and Renewables

7.1. By 2030, ensure universal access to affordable, reliable and modern energy services.

7.2. By 2030, increase substantially the share of renewable energy in the global energy mix.



7.3 By 2030, double the global rate of improvement in energy efficiency.

7.a. By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.

7.b. By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and landlocked developing countries, in accordance with their respective programmes of support.

7 AFFORDABLE AND CLEAN ENERGY

SDG 7 RECOMMENDATIONS

Integration into Core Business

- Deploy distributed generation to improve access to reliable electricity
- Diversify power sources to reduce outages
- Educate customers about consumption patterns and usage to optimize renewable energy use

Collaboration and Leverage

- Share benefits of transmission expansions associated with renewable generation to connect non-grid connected communities
- Support local energy initiatives
- Ensure the inclusion of affected communities, and especially indigenous communities, in electrification efforts
- Share knowledge with governments, communities, and civil society about electrification initiatives
- Reduce reliance on fossil fuels
- Work with governments to address intermittency challenges and invest in research and development on more modern storage mechanisms
- Integrate renewable generation capacity into local electrification schemes

Integrate SDG 7 Into Core Business

Deploy distributed generation to improve access to reliable electricity

Renewable energy technologies, especially solar, are uniquely well-positioned for distributed generation of electricity, which can crucially expand power access to remote or other energy poor communities. Distributed energy installations allow for more efficient, flexible, and empowering provision of electricity. Such systems, like solar arrays, allow for generation of energy near to electricity demand, thereby avoiding electricity losses from resistance over long transmission distances. This can translate to financial savings and improved efficiency for the energy system.

These systems can be grid connected, or, where grid connection is prohibitively expensive, deployed off-grid as integrated systems designed to oper-

ate with minimal or no diesel power. These off-grid projects should incorporate means to address intermittency challenges from renewables, through source balancing, installation of battery storage, and education to align load demand to supply (see below).[99]

Modular systems can also provide end users with greater control over how electrical currents are directed, for example allowing system operators to prioritize flow to certain electrical loads like medical equipment or refrigerators. Further, modular renewable installations can allow communities and households to own generation technologies themselves, benefiting directly from cost savings or profits from energy production.

Despite these potential benefits, more investment is needed to deploy distributed generation technologies at greater scale. Some of these projects struggle to attract private financing because investment volumes are relatively small and risk-return profiles are less favorable than utility-scale installations.[100] Business models to translate the high up-front investment costs into cash flows that low income communities can support are also rare. Companies should therefore explore innovative financing models to expand into new markets where there is unmet demand, particularly in isolated and low-income communities. One such model that has worked well in East and West Africa uses a "pay-as-you-go" structure. After customers pay an initial installation fee, decentralized energy services companies ("DESCOs") collect payment at regular intervals through their customers' mobile phones. Users can choose to increase their plans as needed.[101]

Diversify power sources to reduce outages

While renewable energy technologies can critically expand electricity access and decrease environmental impact, intermittency remains an important challenge for those who rely exclusively on renewable energy sources for power. Wind turbines or solar panels, for example, do not generate electricity when the wind is not blowing or sun is not shining, respectively. Renewable energy companies can manage and reduce risk of outages by diversifying power sources to create robust systems with buffers to prevent power losses. This can include complementary power sources, like wind and solar, in addition to integration of dispatchable technologies like biomass, geothermal, pumped hydroelectric, or battery storage. In addition, operators can mitigate damage caused by power outages by using automated switches to direct power to essential services like hospitals, critical infrastructure, emergency shelters, senior housing, schools, and then progressively release power to end-uses of lesser importance.

Educate customers about consumption patterns and usage to optimize renewable energy use

Despite rapid technological advancements, many renewable energy sources still suffer from intermittency challenges. Technological solutions to intermittency, including storage, alone are not the only or most cost-effective means to address challenges. In many cases, it may be cheaper to adapt consumption patterns to electricity availability. Renewable energy companies can educate customers about managing their electricity use to maximize deferrable loads during the day, when the sun is shining. While not all loads are deferrable, many high-consumption tasks are time-flexible, including water heating, phone charging, computer charging, cooking, and washing clothing.

Collaborate and Leverage

Share benefits of transmission expansions associated with renewable generation to connect non-grid connected communities

Land-intensive renewable energy projects are often sited in rural areas, where land is more accessible, but serve urban population centers. Meanwhile, the rural residents who live next to renewable developments are much less likely than their urban counterparts to have access to electricity. Renewable energy companies should look for opportunities to share infrastructure with neighboring communities, and ensure that the communities most affected by renewable projects also are able to reap the benefits of electrification from said projects, where

possible. For example, if an on-grid renewable energy project is being developed in a remote area with poor access to electricity, the development company could coordinate with local government and utility company officials to allow neighboring communities to connect to project transmission infrastructure. Or, for off-grid projects, companies should be open to using projects to anchor microgrids, and allow other community stakeholders to connect or increase the size of developments for greater electrification. This is especially true for indigenous communities, which comprise a disproportionate number of the world's rural and energy poor.[102]

Support local energy initiatives

Renewable energy companies and industry organizations can leverage their expertise to support local initiatives that are led by and benefit local communities. For example, companies can encourage local governments or community groups to explore initiatives that provide for greater economies of scale in modular installations. One such model to increase community installation is community shared solar, whereby a community or community members share ownership over a solar array. Another model to manage costs is the Solarize model, in which home and building owners have banded together to negotiate group rates for grid-tied solar energy systems. This model, often organized by municipalities, addresses common barriers to solar adoption, namely up-front costs, perceived complexity, and customer inertia. These programs tend to make use of a tiered pricing structure, whereby rates decline as more customers join the program. In addition to increasing demand for panels and increasing access, the increased visibility of solar panels on roofs in urban and suburban landscapes may increase interest in and support for renewable energy.[103] Given the opportunity to acquire new customers, companies compete for these Solarize contracts. When Solarize partnerships run multiple campaigns, they tend to spread the contracts to multiple companies to provide opportunities for industry growth.

Companies can support these programs through sponsorships or providing staff for technical advisory or capacity building on a pro-bono basis. They can also support community and government efforts to lower costs and therefore barriers to entry for renewable energy installation. Renewable industry organizations can also fill similar gaps, and provide valuable research and connections to contractors.[104] Partnering with communities that have traditionally had less access to energy, like indigenous peoples, can help ensure equity in access to energy services and make progress toward achieving SDG 7.[105]

Share knowledge with governments, communities, and civil society about electrification initiatives

Companies can work with local governments and leverage human and institutional capacity to overcome barriers to energy access. Capacity building, knowledge sharing, and technology transfer can enable faster uptake of renewable energy globally, increasing renewable energy market shares while building and maintaining relationships with other stakeholders. Companies can map resources, help to develop databases of best practice, provide institutional support for local governments, and train policy makers through the organization of workshops on renewable energy opportunities.

Renewable energy companies should also ensure that these knowledge-sharing projects include marginalized groups. For example, projects should also seek to extend energy access through gender-inclusive policies and planning. The UN reports that men use 22% more energy than women and are less willing to alter their consumption behaviors.[106] By providing training on energy planning and improving women's skills and access to financial resources, companies can increase the uptake of renewable energy. This will also help to ensure access to sustainable and modern energy for all, as well as contributing to SDG 5.[107]

Reduce reliance on fossil fuels

Fossil fuel combustion remains the most significant driver of climate change. Even as the price of renewables like wind and solar continues to drop, and renewable penetration in the global energy mix continues to grow, nonrenewable energy sources such as oil, natural gas, and coal accounted for 80% of global primary energy supply and 66% of electricity generation in 2015.[108] Where possible, all stakeholders (companies, governments, civil society, and development partners) should collaborate to prioritize the deployment of renewable technologies to meet growing electricity demand and

to replace fossil fuel generation. Further, because building heating and transportation still account for approximately 70% of global direct energy use, governments should encourage investment to electrify those sectors, thereby allowing for their eventual transition to renewable and other clean power as well. This transition will require large infrastructure investments, for example in electric heat pumps in buildings and electric vehicle charging stations, in addition to large investments in actual generation infrastructure. Off-grid renewables can also reduce reliance on fossil fuels where they supplant the need for diesel generators.

Work with governments to address intermittency challenges and invest in research and development on more modern storage mechanisms

Renewable developments can build critical resilience into unreliable, underinvested electricity grids, helping to patch intermittency challenges resulting from fuel shortages or inability to meet peak demand. However, as mentioned previously, many renewable energy sources themselves face intermittency challenges. Where renewable companies are not best positioned to address intermittency through diversification of energy sources themselves, they should encourage governments to consider installation of complementary energy sources and dispatchable technologies, like hydro or battery storage, as well as efficient and fair market mechanisms to recover their cost. Companies can also encourage governments or civil society to research modern storage technologies to decrease costs and improve efficiency.

Case Studies and Initiatives

Microgrids as a driver for community-based development: Chile and Kenya[109]

In 2017, Enel built the world's first high-altitude microgrid in Ollague, Chile. This microgrid is powered by a mini-wind turbine, a solar PV plant, and a small fossil fuel cogeneration generator. These sources are integrated into an electrochemical storage system, and provide energy to a community of 300 people. The hybrid system also heats the local school. In addition to this project in Chile, Enel is working to build solar microgrids in Kenya to bring clean and sustainable energy to 20,000 homes, businesses, healthcare centers, and schools. This project will connect 90,000 people to the electrical grid. To facilitate further ease of payment, customers will be able to pay electricity bills through a mobile phone prepayment application.

Community-Based Renewable Energy Systems (CBRES): Cordillera, The Philippines[110]

Community-Based Renewable Energy Systems (CBRES) are small, decentralized energy supply systems, including micro hydro, solar, and wind technologies, that drive community-based sustainable development in rural communities. These systems are part of an initiative launched in 1994 by the Filipino NGO SIBAT Network, and are established through multi-stakeholder agreements with communities. Local community organizations own, manage, and maintain the systems, which provide household electricity as well as power for food and crop processing. CBRES projects increase access to sustainable energy and clean water while reducing dependence on wood for heating, cooking, and lighting.[111] These energy systems are financed through local community payments, NGO partner investments, and the local government. In such initiatives, there is an opportunity for private collaboration to improve project infrastructure and capacity.

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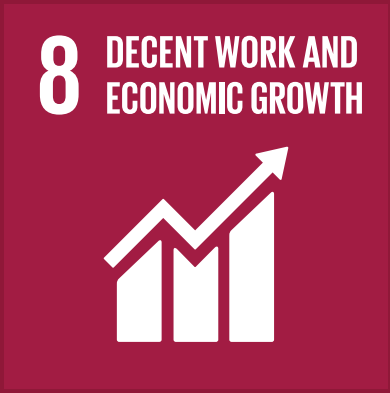

SDG 8: Decent Work and Economic Growth

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Inclusive growth and the right to work are core to the mission of sustainable development. By many metrics, the global economy has grown stronger in the years since the 2008 economic collapse: the average annual growth rate of GDP per capita increased to 1.6% annually from 2010 - 2015, compared to only 0.9% from 2005 - 2009,[112] and household income and average annual earnings have increased cumulatively by 8% and 7%, respectively, since 2005.[113] Meanwhile, the global unemployment rate was 5.5% in 2017, holding roughly steady since 2011.[114] But these topline figures betray a more complex reality. Household debt has risen since the pre-crisis years in most countries, and the financial net worth of governments has fallen.[115] The International Labour Organization (ILO) estimates that 42% of workers—more than 1.4 billion worldwide—are in vulnerable forms of employment, including self-employment (own-account workers) or familial employment.[116] This work is often characterized by low wages and difficult working conditions, and in the absence of formal work arrangements, these workers frequently lack labor protections. Women, youth, migrant workers, and people living in developing countries are disproportionately likely to be underemployed or in vulnerable forms of employment.[117] Decent work and economic growth are also critical to the achievement of SDG 1 (end poverty) and 10 (reduce inequality).

Renewable companies stand to contribute most directly to SDG 8 through their core business practices. That includes adopting strong and fair labor policies and practices, making tax payments to governments and rental or other payments to communities or households, and driving economic growth through local procurement and other indirect economic activity. Recent research by the Business & Human Rights Resource Centre indicates that commitment to labor rights within the renewable energy sector is currently uneven. A survey and analysis of 59 solar, geothermal, and bioenergy companies revealed that while about half had public policies on anti-discrimination, followed by the prohibition of child labour (42%), only one-third had policies on the rights to freedom of association and collective bargaining.[118]

As the renewable energy industry grows larger and potentially displaces fossil fuel employment, renewable energy companies can also support SDG 8 by supporting a “just transition” to a low-carbon economy. This might include engaging in social dialogue with workers and unions and partnering with governments to re-train and employ laid off workers, among other actions.

Key Indicators Related to SDG 8 and Renewables

8.2. Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value-added and labor-intensive sectors.

8.6. By 2020, substantially reduce the proportion of youth not in employment, education or training.

8.3. Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services.

8.7. Take immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour, eradicate forced labour and, by 2025, end child labour in all its forms, including the recruitment and use of child soldiers.

8.4. Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead.

8.8. Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.

8.5. By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.

8.10. Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all.

8 DECENT WORK AND ECONOMIC GROWTH

SDG 8 RECOMMENDATIONS

Integration into Core Business

- Establish strong labor rights policies that cover all fundamental labor rights in own operations and supply chains.
  - › Respect workers' right to collective bargaining and freedom of association
  - › Adopt anti-discrimination policies
  - › Prohibit forced or child labor throughout the company's operations and supply chain
- Pay taxes and royalties to governments and compensate communities and households fairly for project land or generation capacity from community-owned developments
- Drive economic growth through local procurement
  - › Work with local suppliers to build capacity and increase product quality

Collaboration and Leverage

- Collaborate with local chambers of commerce, finance institutions, and NGOs
- Establish business incubators
- Connect suppliers with external markets
- Support a just transition to a low-carbon society through employment training for former fossil fuel industry employees

Integrate SDG 8 Into Core Business

Establish strong labor rights policies that cover all fundamental labor rights in own operations and supply chains.

Companies' most direct contribution to SDG 8 is through employment. Companies must adopt strong, fair, and inclusive labor policies and practices grounded in human rights. This includes respecting workers' right to bargain collectively and unionize, committing to pay a living wage, and adopting strong anti-discrimination and anti-harassment policies. Promoting worker ownership of companies through a cooperative structure can have positive labor and social impacts (see case study below). Companies must also comply with local labor laws and ensure the absence of child labor in their operations and supply chains. Where possible, companies should employ local labor on projects, and offer capacity development for local communities.

Pay taxes and royalties to governments

As with SDG 1, a major contribution of renewable energy companies to sustainable economic growth will be through the payment of relevant fees and taxation to governments. The provision of public goods like research, education, infrastructure, and social protection programs rely largely on government expenditures, which in turn depend on tax payments.[119] Renewable energy companies should also promote responsible taxation practices in supply chains, and should be aware that the extraction of materials to manufacture renewable energy technologies has been linked to tax avoidance.[120] Companies should establish tax planning processes, undertake public and transparent reporting following standards such as the GRI,[121] and engage in open dialogue about tax strategies and practices with stakeholders across their supply chains.[122]

Drive economic growth through local procurement

In addition to employment, renewable energy companies can contribute to economic growth and employment through the sourcing of local goods and services. This will require companies to create a working definition for goods that they define to be "local" and to assess local capacity to provide needed goods early in project planning. Local procurement will of course be most important where local content requirements apply or where local procurement is written into requests for proposals. Companies should also report on their experience engaging with local content policies to expand awareness of the benefits that local labor and procurement can provide and draw attention to local skills and supply gaps that the renewable energy sector can help to address.[123]

Collaborate and Leverage

Collaborate with governments, local chambers of commerce, finance institutions, and NGOs

In addition to providing fair payment to workers, governments, and local suppliers of goods and land, renewable energy companies can partner with governments, business-oriented lobbying groups like chambers of commerce, finance institutions, and NGOs to promote further economic linkages, which can then induce greater economic development benefits from projects. Further, to the extent that renewable projects allow customers or owners to save on electricity, cost savings can be saved or spent elsewhere, also providing economic benefits to the governments, companies, or communities that commission them.

Establish business incubators

In some places, renewable companies are not able to procure goods locally because of insufficient or nonexistent supplier capacity. Where this is true, companies can support business incubators to build local capacity and entrepreneurship, thereby building local capacity and helping to guide the creation of local businesses toward renewable project needs.

Work with governments to plan for a just transition to a low-carbon society, including through providing training for former fossil fuel industry employees

Rapidly replacing fossil fuels with renewable energy sources in our global energy system will be essential to avoid catastrophic climate change (see SDG 13 for further information). However, such a shift may result in employment changes for millions of workers—the US Department of Energy reports that in 2017, the fossil fuel industry employed 1.1 million workers in the US alone.[124] Renewable energy companies can help to ensure a just transition to a low-carbon economy—and create valuable political capital for the renewable energy industry—by creating initiatives to prioritize employment of these former fossil fuel workers, especially in communities where fossil fuel extraction was the largest local employer.

Case Studies and Initiatives

Sustainable local procurement: The United Kingdom[125]

In the UK, the Brigg Renewable Energy Plant buys 250,000 tons of straw from 40 local farmers each year, which is burned to generate electricity for 70,000 households. In doing so, the Briggs Renewable Plant helps to support local economic growth and wean dependence on fossil fuels.

Employee owned solar: Colorado, The United States[126]

Namasté solar is an employee owned cooperative in Colorado that shares the profits from solar installations among its more than 100 worker-owners. Upon completing a one-year candidacy period, employees are eligible to purchase a share of the company and become voting members of the cooperative. The company's model is people-centered, choosing co-ownership over hierarchy, democratic decision-making over centralized leadership, and collaboration over competition. At the end of each financial year, extra earnings are divided among the worker-owners. Benefits for employee-owners include sharing rewards like profits and having agency in the business. The business model also offers advantages for the company that include better designs, installations, and customer experiences.

Boost economic growth in emerging markets: East Africa[127]

From 2016 to 2017, Kenyan solar companies Solinc East Africa and M-KOPA manufactured and sold more than 100,000 solar PV panels. Solinc's PV module factory began operations in 2011 and currently distributes to markets in Kenya, Uganda, and Tanzania. The company employs 130 Kenyans and has been predominantly Kenyan-owned since 2015. M-KOPA aims to source all its panels from Kenya and plans to buy over 500,000 more panels over the next two years. By purchasing panels locally, M-KOPA improves quality control, shortens supply chains, and provides jobs to local citizens. Solinc, in turn, plans to hire an additional 30 engineers to meet M-KOPAs demand.

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SDG 9: Industry, Innovation and Infrastructure

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

The processes of industrialization, innovation, and infrastructure development are inextricably intertwined. Sound and sustainable infrastructure is necessary to kick start industrialization, while innovation ensures the constant updating of technology and skills necessary to sustain industrialization processes. In identifying the ongoing need to build resilient infrastructure, promote industrialization, and foster innovation, SDG 9 recognizes that countries continue to underinvest in public infrastructure projects and struggle to integrate the goals of infrastructure development, industrialization, and innovation into their respective growth strategies. For example, more work needs to be done in many countries to build the necessary infrastructure to provide electricity to rural citizens. According to the UN, as of 2014 only 44.8% of those living in Least Developed Countries (LDCs) had access to electricity, compared to the global average rate of 87.4%.[128]

As the costs of renewable technologies like solar and wind continue to drop, emerging and frontier economies have increasingly turned to renewable energies to accelerate electrification, especially in rural communities. Nonetheless, market penetration of "modern renewables" like hydroelectric, solar, wind, and geothermal is still relatively low, comprising only 9.3% of Total Final Energy Consumption (TFEC) in LDCs. In contrast, solid biofuels comprise 56.5% of TFEC.[129] While renewables can provide cheaper solutions to fill infrastructure gaps than traditional centralized electrical grids, widespread deployment nevertheless requires new and substantial capital investments. Renewable companies can hasten infrastructure development through innovative technical solutions like off-grid or micro-grid electrification, innovative financial models like Property Assessed Clean Energy financing, or public private partnerships like green banks. Companies can further hasten deployment by taking advantage of existing de-risking mechanisms to develop and finance projects that advance universal energy access in LDCs. This access is undoubtedly necessary for the facilitation of other aspects of SDG 9, including industrialization and innovation processes.

Key Indicators Related to SDG 9 and Renewables

9.3. Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets

9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

9.5. Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

9.a. Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States

9.b. Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities

SDG 9 RECOMMENDATIONS

Integration into Core Business

- Support industrialization through local hiring, procurement, and training and skills development
- Support advanced industrialization by providing zero greenhouse gas and non-polluting clean electricity
- Share infrastructure
  - › Establish co-funding arrangements with governments
  - › Harness economies of scale and economies of scope
- Conduct transparent and meaningful consultation processes for every project and respect rights to free, prior, and informed consent

Collaboration and Leverage

- Partner with governments to power new industrial development through access to zero greenhouse gas and non-polluting clean energy
- Collaborate with governments and other sectors to create renewable innovation spillovers
- Use convening power to create business clusters
- Explore potential collaborations with domestic research and development initiatives

Integrate SDG 9 Into Core Business

Support industrialization through local procurement and skills development

In support of SDGs 1, 4, and 8, renewable companies can contribute to local industrialization through local procurement of goods and labor. This increased demand and guidance can help companies to build capacity, and skills gained through renewable employment can be transferred to other businesses post project development. For more information on local procurement and employment, see SDGs 8 and 4.

Share infrastructure

Renewable projects themselves contribute to the building of infrastructure, inherently contributing to SDG 9 by their nature. Renewable companies can further maximize impact by allowing infrastructure sharing, thereby allowing renewable projects to anchor greater electrification. For more information on infrastructure sharing, see SDG 7.

Collaborate and Leverage

Partner with government, industrial firms, and communities to power new industrial development through renewable targets

Renewable energy companies can encourage national, state, and regional governments and industrial firms to adopt renewable energy transition plans. Such plans would include assessments of local renewable resources and potential competitive advantages; existing facilities and labor forces; and investment, training, and supporting institutional needs. These thoughtful and carefully developed plans should be flexible and allow for adaptation to new information and future uncertainty. For governments, these plans should include renewable uptake targets but more importantly planning and zoning requirements in advance of industrial development.

Advocate for financial mechanisms administered by local government

Municipalities have helped provide the financial infrastructure for renewable energy projects by adding loans as a line item on property taxes. This financing mechanism, Property Assessed Clean Energy (PACE), often requires the property owner's annual savings from energy generated to exceed the annual loan payment. Twenty states in the United States currently have programs offering PACE financing.[130] State, county, and other municipal government officials must agree to run the program. Renewable energy companies and property owners are therefore essential to build the political will to seed such initiatives.

Collaborate with governments and other sectors to create renewable innovation spillovers

While renewable companies have economic incentives to build capacity and sponsor innovation within the renewables sector, incentives to support cross-sectoral linkages and spillovers in other sectors may be less direct. Nevertheless, renewable companies should collaborate with governments and other sectors to promote research and development to adapt renewable innovations for use in other sectors.

Use convening power to create clusters

Business clusters can drive growth through knowledge sharing, reduced transaction costs, and innovative collaboration. Clusters of renewable energy companies utilizing different sources or at different business development stages can build partnerships, foster low-cost consultations, and disseminate good practices. Business clusters can also be valuable for cross-sectoral collaboration, as renewable companies depend on several other types of businesses to operate and thrive, and other businesses may be able to install renewable energy systems for cost savings. Renewable companies can approach governments to help plan helpful business clusters.

Explore potential collaborations with domestic research and development initiatives

Renewable energy companies can promote innovation by working with research and development initiatives to test new programs and technology. In the United States, the National Renewable Energy Laboratory (NREL) partners with 29 utilities and energy companies on projects like using smart inverters to increase grid stability.[131] In China, the Energy Research Institute (ERI) of the National Development and Reform Commission (NDRC) focuses its work on modelling emission reduction strategies to improve air quality and mitigate climate change.[132]

Case Studies and Initiatives

Providing financing for solar energy to off-grid consumers: Emerging Markets[133]

Greenlight Planet markets solar home energy systems for off-grid consumers. Through its off-grid Sun King program, Greenlight Planet has provided nearly 600,000 solar home systems to remote communities in over 60 countries across Africa and Asia. Greenlight Planet is the "world's largest direct-to-consumer, pay-as-you-go (PAYG) solar product distribution business." Their "Easy Buy" PAYG service allows customers to finance installations without large upfront costs by paying off solar installations over time through mobile-phone payments. Customers can choose between 10- and 12-week payment plans for as little as $0.25 per day with no upfront cost. After six to eight months of payments, customers can fully pay off their systems.

Conversion of mine to renewable power plant: France[134]

The municipality of Fontoy is converting a former iron mine in Lorraine, France, for use as part of a geothermal system. Water that has collected in the mine over time will be used as a working fluid in a geothermal heat pump that will heat municipal buildings. This network should reduce municipal gas consumption by 348 MWh annually and avoid 87 tons of carbon dioxide emissions. The heating network also supplements geothermal heating with biomass; the first such combination in France.

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SDG 10: Reduced Inequalities

Reduce inequality within and among countries

Structural inequality and discrimination against certain groups because of race, ethnicity, gender, nationality, socioeconomic status, age, and sexual orientation, among other characteristics, critically impede achievement of sustainable development for all. Globally, the wealthiest top 10% of adults own 88% of global assets while the bottom half of adults collectively own less than 1% of total wealth.[135] Moreover, after declining for much of the first decade of the 21st century, the share of wealth owned by the richest 1% of adults has grown in the wake of the financial crisis, from 43% of all assets in 2008 to half of all household wealth in 2017.[136] Of course, vast inequalities also exist among countries: North America and Europe, which together account for 17% of the global adult population, hold 64% of total household wealth, while Africa and India, together accounting for near 30% of the global adult population, hold less than 5% of household wealth.[137] Energy poverty reflects other global inequalities; 84% of the those who lacked electricity access in 2017 lived in rural areas,[138] a disproportionate number of whom are indigenous people and the world's extremely poor.[139] Energy poverty in turn places the heaviest burden on women and girls, who often spend long hours collecting water and fuel for cooking and inhaling indoor air pollution.[140]

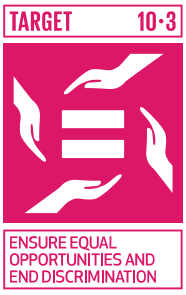
As is true for SDG 1, renewable energies can contribute to bridging these inequalities. Those living in poverty and those that are most marginalized can benefit from renewable energy projects through increased energy access, employment, project co-ownership, and other means. Renewables may also provide economic development benefits in the form of potential cost savings, as the value of the electricity produced frees up public and private expenditures for other purposes. That said, these potential benefits are not inherent to renewable development; instead, they depend on government and company policies to encourage shared opportunities from the energy transition. In order to promote inclusive development, renewable companies should engage in human rights due diligence, champion inclusivity, and collaborate with government and civil society to ensure that renewable energy benefits those with the least access to energy and resources.

To the extent that renewable energy requires new infrastructure, equipment, and systems, the energy transition presents opportunities to correct and prevent social and economic inequality. For example, it is becoming increasingly common for states to "leapfrog" traditional fossil fuel infrastructure and deploy renewable energy to electrify their countries. This allows them to bypass hydrocarbon- and coal-fueled industrialization, avoiding air, land, and water pollution and helping to safeguard natural resources and public health.

Key Indicators Related to SDG 10 and Renewables

10.1. By 2030, progressively achieve and sustain income growth of the bottom 40% of the population at a rate higher than the national average.

10.2. By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.



10.3. Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard.

10.4. Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality.

10.b. Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes.

SDG 10 RECOMMENDATIONS

Integration into Core Business

- Engage in human rights due diligence and provide access to remedy
  - Assess human rights risks and impacts
  - Integrate and act upon findings
  - Track responses and communicate about how impacts are addressed
  - Provide effective access to remedy for abuses that occur
  - Respect tenure rights
- Champion inclusivity
  - Train, recruit, and employ marginalized populations
  - Include marginalized groups in local procurement and supply chains
  - Explore alternative financing and ownership models to promote access to benefits for low-income households
- Anticipate inequality-related risks
  - Be sensitive to local wage disparities
  - Establish baseline welfare statistics before project development
- Promote worker, consumer, and community ownership of companies and projects

Collaboration and Leverage

- Support community ownership of renewable energy projects
- Work with local partners to target social investments to marginalized populations
- Encourage participatory budgeting in local communities

Integrate SDG 10 Into Core Business

Engage in human rights due diligence and provide access to remedy

One of the most important things that companies can do to not exacerbate inequality is respect human rights throughout their operations and supply chains. This is the responsibility of all companies. It includes thoroughly assessing not only the potential human rights risks, but also the communities potentially affected by a project. Communities must be consulted and indigenous communities must give consent before a project can move forward. They must have access to remedy through established grievance mechanisms, which have ideally been designed by and with community members. It is the obligation of companies to communicate with affected communities, including those affected throughout supply chains. This process applies to every project a company undertakes.

One of the most salient human rights issues for the renewable energy sector is displacement. As has been discussed in relation to other SDGs, companies must respect community tenure rights, including when those rights are not formally documented or legally recognized. This will require companies to begin land access planning early and complete inclusive and participatory community consultations. Further, in cases where resettlement is necessary, companies must fully restore and adequately compensate communities for displacement. Failure to do so violates human rights and risks serious harm to livelihoods.

Champion inclusivity

The benefits of renewable energy do not inherently contribute to reducing income inequality. Other chapters have discussed practices to stimulate local economic development through local procurement of goods and services (SDG 8) and investment in local skills development (SDG 4). In addition, renewable companies should look for opportunities to ensure that economic benefits of renewables are shared by all members of society by championing inclusivity.

This might include efforts to promote workforce diversity and low-income or community ownership of renewable deployments. In the US for example, African-Americans, Latinos, and Asians together make up only 33% of the solar workforce, while women account for only 28% of employees.[141] Furthermore, only slightly more than a quarter of solar employers in the US formally track workforce demographic statistics. Many organizations like Green for All,[142] the NAACP,[143] and the Solar Energy Industries Association (SEIA)[144] are working to promote and improve workforce diversity.[145]

Meanwhile, some have argued that because rooftop solar and other household-owned renewable energy installments require substantial upfront capital investments and land ownership, they are only available to the wealthy. Renewable energy companies can counter these assertions by pursuing alternative finance and ownership models like third party ownership (which allows households to install solar for little upfront cost, to be paid off through cost savings over the installation's lifespan), full community ownership, and community shared solar (which allows ratepayers to own solar arrays not necessarily installed on their own land).

Anticipate inequality-related risks

Companies should conduct human right risk assessments, that include consideration of inequality-related risks, prior to project development, and plan to manage these risks. For example, companies should establish baseline welfare statistics before projects begin to understand communities' level of development and how the project's distributional impacts may either alleviate or entrench local inequalities. This includes consideration of the impact of wage disparities between external and local workers, and between local employees and other community members. Anticipating inequality-related risks also involves consideration and mitigation of project impacts that could harm community members, especially those already marginalized, including indigenous peoples and ethnic minorities. Efforts to manage inequalities can help companies to prevent conflict and contribute to economic and social inclusion, therefore also contributing to SDG 16 (peace, justice, and strong institutions).

Promote worker, consumer, and community ownership of companies and projects

Cooperative ownership of companies and projects can help to ensure that benefits are shared by affected stakeholders. Worker owned cooperatives, as noted in SDG 8, combat inequality by providing for profits to be shared among employees. Because these cooperatives are also governed through worker participation, there is some evidence that cooperatives can be particularly inclusive employers, empowering socially disadvantaged community members, including indigenous peoples[146] and people with disabilities.[147] Similarly, as noted in SDG 1, cooperative ownership of renewable energy installations, for example through community shared solar initiatives, allow community members to share cost savings or profits from projects equitably. This model can be particularly impactful to combat inequality where it allows those who do not themselves own suitable land to install renewable technologies share in renewables' benefits by owning a share of generation capacity on public or other private land.

Collaborate and Leverage

Support community ownership of renewable energy projects

Communities are the best authorities on their own energy needs. Companies can help meet those needs by facilitating processes for communities to organize collective ownership models. Potential models for community ownership include renewable energy cooperatives (like those supported by the European Foundation of Renewable Energy Cooperatives),[148] democratically managed municipally owned energy, and "solar community gardens," where owner-members purchase shares at fixed rates lower than typical electrical bills. This expands access to solar energy to renters, who would otherwise not be able enjoy cost-savings from solar.

Support marginalized populations through social investment

Companies should consider targeting social investments to benefit those marginalized in communities. This can include efforts to support women and girls as discussed in SDG 5, as well as efforts to empower racial and ethnic minorities, those living in poverty, or youth. Companies hoping to support marginalized populations with social investment should first consult with these populations about their own needs, rather than imposing programs based on the companies' own perceptions about what is needed.

Encourage participatory budgeting in local communities

Where companies pay substantial revenues to communities through rent and taxes, they can encourage community leadership to engage in participatory budget planning for those revenues. Participatory budgeting can help raise awareness about the on-the-ground results of project revenues and increase the potential for revenues to address community needs. While companies can use their convening power to support participatory budgeting, the companies themselves should not attempt to plan the end use for revenues.

Case Studies and Initiatives

Solar for refugees: Jordan[149]

In late 2017, Jordan launched the world's largest solar plant inside a refugee camp. The 12.9 MW solar plant at Zaatari refugee camp was funded by the German government and will provide electricity to 80,000 Syrian refugees. According to the United Nations High Commissioner for Refugees (UNHCR), in addition to reducing carbon emissions by over 13,000 tons per year, the 40,000 solar panels will save the agency $5.5 million annually. Savings will be invested back into the camp. Solar and other renewable companies can work with development and aid organizations to deliver clean energy and cost savings to marginalized communities to reduce inequalities.

Manungurra Aboriginal Corporation: Australia[150]

The Manungurra Aboriginal Corporation has partnered with Indigenous Business Australia (IBA) to provide electricity to the Aboriginal communities of Ngurrara and Kurnturlpara. IBA provided $240,000 in financing, 36 kW of solar panels, and 67 kWh of gel battery storage. The project was installed by the Aboriginal-owned business Allgrid, giving greater project participation to its indigenous consumers. The Manungurra Aboriginal Corporation and residents share the lease repayments, which quantify as significant savings for them since they are less than half of what they had previously spent on diesel generators. The switch from diesel to solar has also reduced health impacts from diesel fumes and removed the need to drive long distances to refuel.[151] Reduced power costs have also allowed many families to return to ancestral lands and re-establish agricultural livelihoods. The communities' population has grown from two permanent adults to 30-40 adults and children.

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SDG 11: Sustainable Cities and Communities

Make cities and human settlements inclusive, safe, resilient and sustainable

Urbanization is one of the most significant phenomena of the past century, and will continue to shape the world in the century to come. By 2050, the UN expects the proportion of the global population living in urban areas to grow to 68%, up from 55% in 2018 and just 30% in 1950.[152] Urbanization can be a critical force for sustainable development. For example, population density has been linked to economic dynamism[153] and more efficient use of resources.[154] However, the rapid growth of cities has strained existing infrastructure and has created a need for new investment to promote cities that are environmentally sustainable and resilient, socially inclusive, safe, and economically prosperous. The achievement of SDG 11 will require planning and investment to ensure universal access to housing, transportation, safe and efficient waste management systems, and disaster resilience.

Renewable energy will be an important part of the future's sustainable cities; in fact, more than 100 cities around the world already meet more than 70% of power needs from renewables,[155] and 70 more in the US alone have committed to transition to 100% renewable energy.[156] Such a transition will improve air quality, especially if renewable-powered electric vehicles replace many internal combustion engine vehicles currently on the road. Renewable energy integrated into microgrids can also provide for improved grid resilience and reliability. Municipal buildings can also likely be retrofitted with onsite PV that can feed power back to the grid when supply exceeds demand. Companies can contribute to SDG 11 through careful land use planning and by looking for opportunities to collaborate with governments and utilities to deploy renewables for cities.

Key Indicators Related to SDG 11 and Renewables

11.1. By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums.

11.6. By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

11.3. By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.

11.b. By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels.

11.5. By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

SDG 11 RECOMMENDATIONS

Integration into Core Business

- Deploy renewable energies to provide for disaster resilience for vulnerable and coastal populations

Collaboration and Leverage

- Pursue energy system models tailored to urban communities
- Share workforce requirements and planned operations early so local authorities can assess adequacy of local services
- Collaborate with local authorities to develop and increase green space
- Collaborate for increased resilience through participation in microgrids connected by well planned, increasingly webbed, and resilient utility transmission that allows access to remote renewable generation sources

Integrate SDG 11 Into Core Business

Deploy renewable energies to provide for disaster resilience for vulnerable and coastal populations

Renewables can also contribute to the achievement of SDG 11 by helping to increase disaster resilience and relief, especially in hurricane- and flooding-vulnerable coastal communities. As noted also under SDG 3, renewable energy's potential for modularity and flexibility, and its ability to integrate into microgrids, makes it well positioned to increase electricity resilience and reliability in the event of natural disasters by buffering disruptions.

Planning for disaster response involves identifying critical loads, such as hospitals, clinics, and housing for senior citizens, and designing electrical systems that direct power to those sites first once grid service is restored. This can be bolstered by off-grid power sources that serve as back-ups. As climate change-exacerbated natural disasters increase, it is in the interest of governments to develop plans and invest in technologies to adapt. One way they can do this is to offer financial incentives to building owners in disaster-vulnerable areas to adopt renewable energy sources.

To maximize contributions to SDG 11, companies must also integrate disaster resilience into project design, even if the companies that sell renewable equipment are not responsible for system survival after installation. Disaster resilient project design

includes conducting climate modeling and scenario planning and incorporating climate resilience into project design to improve performance during and after extreme weather events, especially in areas vulnerable to hurricanes. It could also include pairing generation technologies with microgrids or storage capacity to allow for continued use in the event that grid service is disrupted. When planning for disaster resilience, all stakeholders should consider the durability of renewable energy equipment under extreme conditions. Salt water in particular can have a corrosive effect on metal, which should be accounted for when retrofitting energy infrastructure in coastal communities.

Collaborate and Leverage

Pursue ownership models tailored to urban areas

Models for renewable projects that may work well in areas with ample space may not be suited for more densely populated cities. That said, cities still provide opportunities for renewable companies to develop projects and earn profits, and should not be ignored. Renewables can further break into urban electricity markets by using alternative business models for projects that allow for more installations distributed over several properties while still enjoying economies of scale, like community shared solar or community aggregation.

For example, “remote net metering” is the practice of siting solar panels near, but not on, the site of the electrical demand. The consumer is then credited for the power produced at the remote site. This model is helpful in cities where some buildings’ electricity demand far outstrips roof space. In this case, a high-rise building located near a warehouse with a large roof and relatively lower demand could install a solar energy system on the larger roof and send the credit to inhabitants of the high-rise. Companies can encourage policy-makers to allow for remote net metering, and pitch installations where opportunities exist.

Collaborate for increased resilience through participation in microgrids

In urban areas where space is more constrained, renewable companies should look for opportunities to collaborate with local governments, utilities, and civil society groups to integrate distributed generation into micro grids and smart grids to improve resilience and efficiency. Smart grids are a particularly good match for renewable technologies because the potential for demand response can help grid operators to manage challenges from renewable intermittency.

Share renewable project workforce requirements and planned operations early so local authorities can assess adequacy of local services

To maximize direct and induced economic impacts from renewable projects, companies should share workforce requirements and project plans with local officials early, so that they can assess opportunities for local supply and employment. This information may also be helpful to assess potential infrastructure gaps and make plans for them to be filled.

Collaborate with local authorities to develop green space

Renewable companies can participate in local and regional planning efforts. While it is important for companies to share their plans with governments to allow for adequate responsive planning, companies can also work with governments to provide for shared-use of infrastructure and to promote policies to develop needed housing, transportation, and green space.

Case Studies and Initiatives

Utilizing Solar and Storage Technologies for Disaster Resilience: Puerto Rico[157]

Sonnen is a German start-up that focuses on the deployment of solar and storage technologies for residential solar voltaic arrays. Since Hurricane Maria caused massive outages in fall 2017, the company has worked on a number of projects in Puerto Rico to restore the island's electricity system. These projects have included installation of an off-grid capable solar and storage microgrid at a remote school in Orocovis, that has been called a "model for the resiliency created by [solar and storage] technologies."[158] The company, alongside its Puerto Rican partner Pura Energía, was also commissioned in April 2018 to install another microgrid at a healthcare facility in Utuado, Puerto Rico. These microgrids contribute to Puerto Rico's restoration of electricity, while also increasing resilience to future hurricanes.

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SDG 12: Responsible Consumption and Production

Ensure sustainable consumption and production patterns

The current trajectory of human consumption and production are deeply unsustainable. According to the World Wildlife Fund, we consume resources at a rate more than 50% faster than they are replenished by the earth.[159] Unsustainable consumption and production practices are made worse by widespread resource waste and inefficiency. For example, in the U.S., in 2015, 61% of all energy produced was lost in transmission or transformation.[160]

Renewable energy can substantially improve the sustainability of production and consumption, primarily by allowing for electricity to be generated from renewable resources (like sunlight, wind, and gravity) in place of finite fossil fuel resources. Furthermore, the modularity of renewable energy can allow for its generation closer to consumption centers, potentially increasing efficiency by decreasing transmission losses. However, the process of generating renewable energy also relies on use of non-renewable materials, especially in manufacturing. Renewable developers and operators should encourage responsible sourcing of materials in supply chains and establish technology recycling programs. They should also assess the sustainability of business operations and look for opportunities to improve efficiency.

Key Indicators Related to SDG 12 and Renewables

12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment

12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle

12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production

12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

SDG 12 RECOMMENDATIONS

Integration into Core Business

- Minimize inputs and waste
- Source materials and products responsibly
- Plan for technology recycling from early stages of project development, especially for solar panels

Collaboration and Leverage

- Partner with other renewable companies to encourage adoption of governmental and sectoral recycling programs
- Work with mining companies to improve or implement responsible practices around mining of minerals needed for renewables

Integrate SDG 12 Into Core Business

Minimize inputs and waste

Renewable energy companies crucially contribute to SDG 12 by replacing or supplanting use of non-renewable fuels in our energy system. That said, the generation of renewable energy still relies on consumption of non-renewable inputs, including minerals and energy in manufacture as well land and water in project operation. Companies should assess project needs with respect to energy, water, land, and materials, and create management plans to reduce project footprint whenever possible (see, for example, SDGs 2 and 6).

Source materials and products responsibly

In addition to minimizing non-renewable resource consumption, renewable energy companies should adopt responsible sourcing policies and integrate environmental and social considerations and requirements into procurement processes. This may involve performing due diligence on suppliers, establishing social and environmental performance criteria, and including sustainability clauses in supplier contracts and business partner agreements.

Plan for technology recycling from early stages of project development, especially for solar panels

Solar panels and wind turbines have a projected useful life of roughly 20 - 30 years. Project developers and operators can improve renewable efficiency and sustainability by considering their footprint throughout the life-cycle of a renewable installment and planning to minimize project end-of-life waste. As the number of installed wind farms, solar arrays, and other renewable installations climb in the coming years, the question of how to dispose of these technologies once taken out of service will become ever more pressing: the International Renewable Energy Agency (IRENA) projects that annual solar PV waste will grow at least 2100% by mid-century, from between 43,500 and 250,000

metric tons in 2016 to between 5.5 and 6 million metric tons in 2050.[161] At present, if panels are recycled at all, they are recycled in general glass recycling facilities where only glass and aluminum are recovered.[162] Companies should research renewable-specific recycling options and provide for technology recycling after retirement, especially to create a market and economy of scale for recycling companies. Some promising models to date include designing products to facilitate modular reuse of parts in keeping with "design for disassembly" and other circular economy principles, and providing for take-back of panels at the end of projected useful life to give companies responsibility for recycling and responsible waste management.

Collaborate and Leverage

Partner with other renewable companies to encourage adoption of governmental and sectoral recycling programs

Renewable recycling requires policy frameworks and infrastructure planning to reach scale and economic viability. As of 2016, the European Union was the only government entity requiring solar manufacturers to finance end-of-life PV waste.[163] Companies should coordinate with peer companies to organize recycling initiatives and encourage governments to adopt renewable recycling initiatives and programs. Companies can also work with industry organizations to create or strengthen existing recycling programs, as the Solar Energies Industry Association (SEIA) has done in the United States.[164] SEIA "aggregates the services offered by recycling vendors and PV manufacturers" and evaluates vendors to connect members with Preferred Recycling Partners.[165] Companies should also adhere to voluntary standards on renewable energy sustainability, like the American National Standards Institute's NSF/ANSI 457-2017: Sustainability Leadership Standard for Photovoltaic Modules.[166] The standard evaluates product and company sustainability based on seven performance categories: "management of substances, preferable materials use, life cycle assessment, energy efficiency & water use, end-of-life management & design for recycling, product packaging, and corporate responsibility," and awards participating companies bronze, silver, or gold medals depending on adherence to mandatory and optional criteria.[167]

Case Studies and Initiatives

Comprehensive PV recycling: Malaysia, Germany, and the United States[168]

First Solar is a solar module manufacturer that claims to have spearheaded the "first global and comprehensive module recycling program in the PV industry."[169] The company operates recycling facilities near manufacturing sites in Malaysia, Germany, and the United States. The facilities produce laminate material, clean glass cullet, tellurium, and cadmium products from recycled panels. The company boasts high recovery rates, with 95% of semiconductor material from its modules and 90% of glass material recaptured for use in new products.

Improving water-use efficiency: France[170]

Electricité de France (EDF) has worked to ensure synergies across water, energy, and food demands near its Serre-Ponçon hydroelectric plant. EDF's Serre-Ponçon hydroelectric system is comprised of 21 hydroelectric plants that generate 6,500 GWh per year. In order to minimize negative impacts on neighboring farmers, EDF developed a "Water Saving Convention" agreement on the allocation of water resources between the hydroelectric plant and the two main irrigators nearest to the dam. The agreement, which is reviewed annually, provides that EDF compensate the irrigators for their commitments to reduce water consumption. As a result, irrigators have reduced consumption through technological innovation and better water use management, resulting in a more than 25% decrease in consumption from 2006 to 2015. This conservation has, in turn, allowed EDF to generate more electricity during peak demand periods.

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SDG 13: Climate Action

Take urgent action to combat climate change and its impacts

United Nations Secretary-General António Guterres has called climate change the world's "most systemic threat to humankind."[171] Global CO2 levels have risen by nearly 50% since the Industrial Revolution, averaging 406.5 parts per million (ppm) in 2017.[172] While the 2015 Paris Climate Agreement is already facilitating critical international coordination on climate change mitigation, current commitments are insufficient to hold warming to 2°C above pre-industrial levels, let alone the 1.5°C target.[173] Urgent action is therefore needed to prevent catastrophic climate distortion, and massive deployment of renewable energies will be central to any such effort.[174]

Renewable energy companies' main contribution to SDG 13, and perhaps to the sustainable development agenda more generally, will be to displace fossil fuels in the global energy supply. IRENA projects that, in order to hold warming to 2°C, renewable energy will need to grow from 15% of global primary energy supply to 67% by 2050, accounting for 85% of electricity generation.[175] This will involve the installation of an additional 14,000 GW of renewable energy capacity[176] on top of the 2,179 GW installed through 2017.[177] Such a transition, paired with aggressive gains in energy efficiency, would avoid a cumulative 470 gigatons of CO2 emissions through 2050.[178]

The installation of renewable generation capacity does not itself displace fossil fuel consumption; deep decarbonization of energy systems relies on planning and integration by governments and utilities. Renewable energy companies should therefore partner with governments and electric utilities to maximize the fossil fuel displacement impacts of renewable projects. They should also advocate for climate mitigation policy to hasten the transition to a low-carbon society, and invest in research and development to make renewable energy technologies cheaper, more productive, and more reliable.

Importantly, renewable energy companies can also work with suppliers to manage climate change-exacerbating practices in their supply chains and adapt investments to make projects climate resilient.

Key Indicators Related to SDG 13 and Renewables

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.

13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities.

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

13 CLIMATE ACTION

SDG 13 RECOMMENDATIONS

Integration into Core Business

- Reduce operating and supply chain emissions
- Account for climate change in planning and investment
  - Use scenario planning and climate modeling to inform views on climate and energy risks and opportunities
  - Use climate projections in the design and placement of operations and infrastructure
  - Adopt corporate climate change, carbon management, and disclosure policies
  - Use shadow carbon prices to inform portfolio evaluation and investment decisions
- Consider emissions reduction potential in site selection

Collaboration and Leverage

- Work with governments to mitigate climate change
- Participate in climate-related research and development and pilots
- Engage in intra- and cross-industry climate dialogues

Integrate SDG 13 Into Core Business

Reduce operating and supply chain emissions

While renewable energies are essential to reduce reliance on fossil fuels and thereby combat climate change, renewable energy technologies like solar and hydro have been associated with significant GHG emissions in manufacture and operations, respectively.[179] As for all other companies and institutional actors, renewable energy companies should work to reduce emissions, incorporate emissions and energy management practices throughout their operations, and maximize efficiency. Companies can increase climate impact and save money by installing energy-efficient technologies in lighting, transportation, water use, and heating, ventilation, and air conditioning (HVAC) systems. Companies can also explore opportunities to promote energy efficiency improvements directly to customers.

Consider emissions reduction potential in site selection

While developers may need to work with governments and utilities to reduce reliance on fossil fuels (see the Collaborate and Leverage section), they can also maximize GHG emissions reductions potential in site selection. Importantly, developers can maximize climate impact by prioritizing projects on sites with the greatest GHG emissions reduction potential, for example on grid nodes that are heavily reliant on generators, or in off-grid applications where customers currently rely on diesel.

Account for climate change in planning and investment

Around the world, climate change will have important impacts on infrastructure. Companies should engage in climate modeling and scenario planning and account for climate change in project installation and operations design. This will involve incorporating climate resilience into project design to improve performance during and after extreme weather events. It could also include pairing generation technologies with microgrids or storage capacity to allow for continued use in the event that grid service is disrupted. Companies can also work to minimize their contribution to negative climate externalities by implementing shadow carbon prices in operations to inform business decisions, which can also allow for greater business resilience and first-mover advantages should companies become subject to carbon pricing policies.

Collaborate and Leverage

Work with governments to mitigate climate change

Renewable energy is a critical tool in the fight against climate change. Nevertheless, effective climate mitigation ultimately also relies upon decisive action by governments. Renewable energy companies should work with governments and lobby them to adopt comprehensive and ambitious climate change plans and regulations. Regulations should (1) promote the rapid deployment of renewable energy, (2) reduce fossil fuel dependence by encouraging utilities to dispatch renewable energies to their fullest extent and electrifying transportation and building infrastructure, (3) implement carbon prices, and (4) strengthen energy efficiency measures.

Participate in clean energy research and development and pilots

According to IRENA, the cost of photovoltaic panels has decreased by 72% since the end of 2009, while the cost of onshore and offshore wind has dropped by 25% and 18%, respectively.[180] Such declines were driven in large part by massive advances in technology research and development, and have enabled renewable energy to be cost competitive with other generation sources, depending on context. Companies should support these initiatives by investing in research, supporting academic institutions, and partnering with researchers to pilot new technologies and innovative models to hasten market penetration.

Case Studies and Initiatives

Neighborhood collective purchasing programs: The United States[181]

Solarize campaigns in the US are locally organized community outreach efforts to achieve economies of scale through aggregated installation contracts. As more households join purchasing contracts, installation and panel prices drop. These campaigns tackle three major market barriers: cost, complexity, and customer inertia. Highly visible rooftop installations then raise awareness of solar and encourage further deployment, and therefore emissions reductions.

Improve energy efficiency of renewable energy: Global[182]

Iberdrola is a publicly-listed multinational utility that owns the largest renewable energy asset base in the world. In addition to Iberdrola's lead-

ership in installing renewable generation capacity, the company has adopted a three-pronged strategy to improve energy efficiency. First, Iberdrola has implemented a program to improve its own operating efficiency, including by retrofitting its office buildings. Second, the company has worked with clients and customers to provide information, education, and training on ways to improve their own energy efficiency and shrink their footprint. Finally, Iberdrola is working with manufacturers to decrease project life cycle emissions, including by sourcing 80% of products locally to cut transportation emissions.

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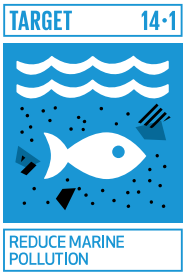
SDG 14: Life Below Water

Conserve and sustainably use the oceans, seas and marine resources for sustainable development

The world's oceans are the lifeblood of the global economy. The United Nations Development Programme (UNDP) reports that more than 3 billion people rely on both marine and coastal biodiversity for their livelihoods.[183] Thus, the sustainable preservation of marine ecosystems is central to ensuring that these livelihoods are secure. Pollution, habitat destruction, and over-fishing pose significant threats to marine health. By some measures, human activity has impacted as much as 40% of the ocean's area.[184] We need improved regulations and processes for sound ocean management to address these impacts and prevent further harm.

Various types of renewable energy, especially offshore wind and hydro, can have substantial impacts on aquatic ecosystems. Renewable energy companies can contribute to marine sustainability by identifying marine-related impacts and mitigation strategies, and supporting the fishery sector in reducing displacement due to energy generation activities. Companies can also partner with other stakeholders to develop multi-stakeholder coastal management plans and with local authorities to establish conservation areas and marine reserves. Finally, as increasing demand for clean energy technology drives the growth of deep-sea mining, companies should work to ensure supply chain sustainability.

Key Indicators Related to SDG 14 and Renewables



14.1. By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

14.2. By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.

14.5. By 2020, conserve at least 10 percent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

14.7. By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism.

14.b. Provide access for small-scale artisanal fishers to marine resources and markets.

14 LIFE BELOW WATER

SDG 14 RECOMMENDATIONS

Integration into Core Business

- Incorporate life under water into impact assessments and mitigate habitat destruction (especially for offshore wind, solar, hydroelectric, bioenergy, and tidal)
  - Assess environmental and social impacts on fishing- and marine-based livelihoods
  - Map breeding grounds and migration routes of underwater species
  - Minimize sound pollution for marine species that navigate using SONAR
  - Include fish ladders or similar mechanisms in dams to ensure ability of local species to breed
  - Avoid impacts on aquatic ecosystems when sourcing minerals for solar panels, especially from deep-sea mining

Collaboration and Leverage

- Collaborate with local authorities to establish conservation areas and marine reserves
- Develop multi-stakeholder coastal zone management plans

Integrate SDG 14 Into Core Business

Incorporate life under water into impact assessments and mitigate habitat destruction

Renewable companies' environmental impact assessments should account for the effects of project development and operations on life below water and work to mitigate harm to aquatic ecosystems and environments throughout the lifetime of a project. These assessments should include both direct and indirect impacts. Energy sources with direct impacts (e.g. offshore wind, hydro, and tidal) should consider impacts such as underwater sound pollution,[185] disruption to migration routes,[186] and microplastic discharge.[187] All projects should consider indirect impacts, such as material sourcing, especially for minerals mined from the sea floor.[188] These assessments should inform impact mitigation plans, including with respect to project siting and supply chain sourcing decisions.

Incorporate impacts on coastal communities and livelihoods into impact assessments

In addition to assessing environmental impacts of project development, companies should account for project impacts on communities, especially those that rely on fishing to sustain themselves. Like companies developing or operating projects near communities on land, project developers should conduct inclusive and participatory consultations with fishing communities whose livelihoods may be affected by conduct offshore or upstream.[189] Once companies have noted potential impacts, they should consider potential impacts in project siting and develop impact management plans, as well as compensate affected communities where impacts are unavoidable.

Collaborate and Leverage

Develop multi-stakeholder coastal zone management plans

Companies can leverage their resources and networks to convene local governments and fishing communities to ensure the sustainable management of coastal ecosystems. This may include establishing conservation areas or marine reserves to ensure that project development and operations as well as community fishing and other marine activity do not excessively strain aquatic habitats.

Case Studies and Initiatives

Pioneering Gravity-Support Structures to Reduce Noise Pollution: UK[190]

The 100 MW Blyth Offshore Wind Farm is a first-of-its-kind project, developed by EDF Energy Renewables. Unlike other offshore wind farms that require disruptive pile driving to install, the Blyth Wind Farm is equipped with Gravity Based Foundations (GBF), which are held in place through extreme weight and gravity. Most notably, this technique eliminates the need for noise polluting hammering during installation, which can be disruptive, especially for animals that navigate and communicate using SONAR.

Compensation for Impacts on Fisheries: SWancor Formosa[191]

SWancor Formosa is Taiwan's first offshore wind farm. During the planning stages of the project, developers met often with the Nanlong District Fishermen's Association to negotiate the SWancor Offshore Wind Farm Project's Fishery Economy Memorandum of Cooperation, which included "specific and practicable action items such as revisions to environment protection initiatives to meet conformity with current regulations, the will of the fishermen's association and fishermen, and the feasibility of monitoring progress."[192] The Memorandum of Cooperation provided for the company to share weather data and hire association members, among other efforts to manage impact. The two parties also negotiated a legally binding agreement for SWancor to compensate for impacts on fishery rights.

Additional Resources

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185. Building wind farms involves pile driving in order to fasten turbine foundations to the seafloor. This process is loud, and can disrupt local ecosystems, especially for animals that rely on SONAR for navigation. Companies can reduce this pollution by erecting turbines with drilling or gravity base foundations. See Helen Bailey, Kate L. Brookes, and Paul M. Thompson. September 2014. “Assessing Environmental Impacts of Offshore Wind Farms: Lessons Learned and Recommendations for the Future” Aquatic Biosystems https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4172316/ Accessed 29 August 2018.

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SDG 15: Life on Land

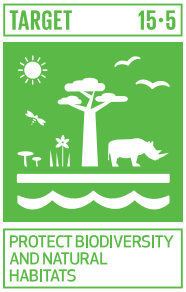
Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

The United Nations estimates that 1.6 billion people depend on terrestrial ecosystems for subsistence or livelihood.[193] Forests provide food, water, shelter, medicine, fuel, and income. UN initiatives and agreements on deforestation,[194] desertification,[195] and biodiversity loss[196] have slowed but not yet reversed the trend of ecosystem degradation. The health of terrestrial ecosystems is essential to species preservation, climate mitigation through carbon sequestration, and human prosperity.

Renewable energy companies can contribute to SDG 15 by ensuring that project development and operations do not threaten local ecosystems. This involves adopting environmentally-friendly practices and considering environmental impacts in project siting decisions. Renewable energy companies can also work with other stakeholders to ensure responsible land management to preserve ecosystem sustainability.

Key Indicators Related to SDG 15 and Renewables

15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.



15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species.

15.3 By 2020, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land-degradation-neutral world.

15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.

SDG 15 RECOMMENDATIONS

Integration into Core Business

- Complete environmental impact assessments and prioritize project siting on brownfields
  - › Preserve ecosystems and achieve net positive or no net loss impact
  - › Apply mitigation hierarchy to minimize impact
  - › Recognize the dynamic nature of habitats
  - › Conduct comprehensive baseline and follow-up environmental impact assessments

Collaboration and Leverage

- Support projects that link communities and biodiversity
- Encourage and participate in landscape-level planning
- Restore historic habitats and engage in reforestation and anti-poaching efforts
- Collaborate on research initiatives

Integrate SDG 15 Into Core Business

Prioritize project siting on brownfields and minimize impact on or displacement of existing ecosystems

Renewable energy companies should complete comprehensive environmental and human rights impact assessments and account for ecosystem interdependence prior to project implementation. Companies should always consult with communities that rely on animal husbandry, local crops, or forest products to ensure that the project will not adversely affect livelihoods and cultural practices.[197] Often, impact-sensitive project siting will lead renewable energy companies to prioritize project development away from fragile and valuable diverse ecosystems. In order to do so, companies should map ecological sensitivity of prospective project sites before selection, and when possible, plan projects on brownfields or other sites that will not require land or forest clearing, like in deserts.[198] Companies will nevertheless need to conduct inclusive community consultations and respect indigenous communities' right to free, prior, and informed consent. Reducing environmental impact will also help companies to build trust and maintain their social licenses to operate, as land clearance has led to conflict with communities in several projects.[199]

Preserve ecosystems and achieve net positive or no net loss impact

In addition to considering environmental impact in project siting, renewable companies should incorporate other good practices and technologies to mitigate environmental impact in project operations.[200] For example, to reduce the risk of harm to low-flying bird and bat species, wind companies

can increase the visibility of turbine blades, align turbine configuration to flight paths, or not operate turbines during critical migration times. For bioenergy companies that risk causing biodiversity loss, landscape change, and soil degradation, companies can help to protect ecosystems and combat desertification through the creation of habitat corridors and by setting aside conservation areas with native vegetation. This will not only help to preserve biodiversity, but also increase crop productivity, by attracting pollinators.

Collaborate and Leverage

Support projects that link communities and biodiversity

Where renewable companies develop or operate projects near communities that rely on ecosystem services for subsistence or livelihood, companies can support initiatives to ensure the sustainable management of natural resources. This can include measuring and sharing biodiversity data, supporting reforestation efforts, or working with local authorities to promote compliance with environmental regulations and anti-poaching efforts.

Collaborate in research initiatives

In many areas, there may already be substantial efforts to research and protect biodiversity and ecosystem resilience. Companies can partner with local NGOs, governments, and academic institutions to support this research and pilot innovative solutions to environmental problems. This support can include company funding of research, but could also be comprised of partnerships on research initiatives or data sharing.

Case Studies and Initiatives

Mapping the environmental value of renewable projects: WWF Canada[201]

In 2016, WWF-Canada developed a tool to simultaneously map the economic opportunities and environmental value that renewable energies can provide. The interactive digital tool, Renewables for Nature, encourages companies to consider habitat protection early in project development so that potential disruption to wildlife can be prevented. Renewable companies can use it to better understand the degree to which projects may conflict with conservation and community needs. While this tool is not a replacement for environmental assessments and impact monitoring, it helps developers better project risks before investments are made. The tool was piloted in New Brunswick and the neighboring Bay of Fundy in Canada. It incorporated 75,000 individual data points on more than 700 at-risk species, including 35 datasets covering environmental attributes and related community uses, and overlaid it all with potential for wind, offshore wind, solar, tidal, hydro, and biomass. Renewables for Nature is still in the early deployment stages, but it can help companies minimize their effect on life on land if adopted.

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SDG 16: Peace, Justice and Strong Institutions

PROMOTE PEACEFUL AND INCLUSIVE SOCIETIES FOR SUSTAINABLE DEVELOPMENT, PROVIDE ACCESS TO JUSTICE FOR ALL, AND BUILD EFFECTIVE, ACCOUNTABLE AND INCLUSIVE INSTITUTIONS AT ALL LEVELS.

Peaceful and just societies, along with accountable institutions, are critical for sustainable development. SDG 16 aims to promote peace and justice for all through the strengthening of institutions and good governance norms to reduce violence and lawlessness (including state violence and government corruption), promote the rule of law and access to justice, and protect human rights.

Renewable energy companies can contribute to SDG 16 by preempting and addressing project-related grievances and conflict, and by promoting a culture of accountability both within the company and in the societies in which they operate. This includes conducting inclusive and participatory community consultations, respecting communities' rights to tenure security and free, prior, and informed consent, and establishing formal and accessible grievance mechanisms. Contributing to SDG 16 also requires companies to ensure that employees respect human rights, implement good practices regarding responsible business conduct, and promote accountability for project-related harms. To contribute to inclusive and transparent decision-making around renewable energy projects, and to discourage corruption, companies should publicly disclose information regarding the project, including project-related payments and contracts.

Key Indicators Related to SDG 16 and Renewables

16.1 Significantly reduce all forms of violence and related death rates everywhere.

16.6 Develop effective, accountable and transparent institutions at all levels.

16.3 Promote the rule of law at the national and international levels and ensure equal access to justice for all.

16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels.

16.4 By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime.

16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements.

16.5 Substantially reduce corruption and bribery in all their forms.

SDG 16 RECOMMENDATIONS

Integration into Core Business

- Preempt and address grievances and conflict
  - › Listen and respond early to stakeholder concerns
  - › Include local communities in pre-project planning in such a way that allows for meaningful participation
  - › Conduct human rights impact assessments
  - › Establish formal and accessible complaint and grievance mechanisms
  - › Develop human rights policies and ensure adherence throughout supply chains
  - › Hold security contractors and other subcontractors to high standards
  - › Promote a company culture of accountability among employees
- Respect tenure and rights to free, prior, and informed consent, and human rights generally
  - › Conduct inclusive and participatory community consultations before commencement of detailed project planning
  - › Incorporate both regulatory requirements and local community objectives and priorities into decisions

Collaboration and Leverage

- Publicly disclose information regarding the project, including project-related payments and contracts
- Conduct transfer pricing of intra-company transactions via arm's-length rule
- Facilitate peaceful working environment and good community relationships
- Promote the rule of law

Integrate SDG 16 Into Core Business

Preempt and address conflict

Companies should take preventative measures to ensure that project impacts do not seed conflict. Before project development, companies should conduct human rights impact assessments (HRIAs) and develop policies to ensure respect for human rights throughout project implementation. These policies should include the establishment of formal, accessible, and effective complaint and grievance mechanisms. Beyond formal complaints, companies should listen and respond early to stakeholder claims and build trust with affected community members. Companies must also hold employees, security contractors, and other subcontractors to high standards of conduct within communities and take responsibility for any adverse impacts that a company's presence in a community may have. Finally, companies should perform human rights due diligence throughout their supply chains, and introduce human rights clauses in supplier contracts and business partner agreements, especially to ensure responsible sourcing of minerals. In addition to minimizing impact on communities, efforts to prevent and preempt conflict can also help businesses avoid potential costs associated with conflict, including high insurance premiums and damages incurred to site infrastructure during disputes.[202]

Respect tenure rights and FPIC

As is true for many of the SDGs (see 1, 2, 5, and 10), SDG 16 requires renewable energy companies to conduct inclusive and participatory community consultations and respect rights to tenure security and free, prior, and informed consent (FPIC). This includes effectively engaging with marginalized groups in communities, including women, youth, and ethnic or religious minorities, to ensure that their interests are represented in resulting agreements. Achieving representation may further require companies to conduct separate, group-specific meetings, like all-female meetings, so that underrepresented people feel comfortable expressing themselves candidly. Company decisions must honor these consultations and incorporate local community objectives and priorities into plans and operations.

Collaborate and Leverage

Promote the rule of law

Renewable energy companies can help to build effective, accountable, and inclusive institutions at all levels. Companies can encourage good governance by complying with local regulations and anti-corruption rules and paying taxes. They should also promote financial transparency by publicly disclosing information regarding the project, including project-related payments and contracts, and screen for corruption risks. As transparency initiatives are more advanced in the extractives sector, renewable energy companies can learn important lessons from those initiatives, such as the Extractive Industries Transparency Initiative, and seek to implement best practices developed on the basis of experience in the extractives sector to date. By promoting good governance, companies can build better relationships with host countries and communities. In addition, responsible companies benefit from the stability provided by jurisdictions that respect the rule of law. For more information, see the UN Global Compact's guide on how to promote the rule of law through core business, advocacy, and partnerships.[203]

Case Studies and Initiatives

Solar for Peace: Eldoret, Kenya[204]

The Solar for Peace Initiative has piloted a project in Eldoret, Kenya, the site of past inter-ethnic violence, to promote reconciliation through a solar lamp distribution project. Solar for Peace partnered with the solar company Greenlight Planet and local community members, bringing communities together to improve energy access. Such collective decision-making has reduced divisions among different ethnic and religious groups and promoted social, educational, and economic development. The community is now working together to finance the purchase of more solar lamps. The

model piloted in Eldoret is being used by other communities throughout Kenya; near 900 families in 16 counties participated in 2016. The project has expanded to facilitate education opportunities for residents, which similarly aim to strengthen relationships across ethnic groups. Producers and distributors of solar retail products can play a role in conflict resolution by identifying markets in post-conflict settings where their products would be useful.

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SDG 17: Partnerships for the Goals

STRENGTHEN THE MEANS OF IMPLEMENTATION AND REVITALIZE THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT

More than most sectors, renewable energy companies contribute to the SDGs through their core business activity. This Atlas has provided a number of recommendations to help renewable energy companies maximize direct contributions through the provision of electricity, displacement of fossil fuel combustion, and payment of wages, rent, and taxes, all while respecting human rights.

However, more often, contributions to the SDGs depend on strong partnerships. Whether on-grid or off, renewable developments require companies to build strong relationships with communities to safeguard human rights and earn a social license to operate. Displacing fossil fuels requires collaboration with governments and utility companies. Maximizing economic development impacts is conditioned upon the presence of strong schools, workforce training, and agreements with local businesses. The future growth prospects for the renewable energy industry itself will depend on government policies and partnerships, private and international development finance, and the ability of technological advances to continue to decrease renewable prices. Without multi-stakeholder collaboration, the renewable industry's contribution to the SDGs will not reach its full potential.

Key Indicators Related to SDG 17 and Renewables

17.3. Mobilize additional financial resources for developing countries from multiple sources.

17.9. Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation.

17.6. Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism.

17.16. Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technologies, and financial resources.

17.7. Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed.

17.17. Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships.

17 PARTNERSHIPS FOR THE GOALS

SDG 17 RECOMMENDATIONS

Integration into Core Business

- Mobilize financial resources and technology
  - › Make project bid processes, company-government agreements, and data on payments to governments transparent
  - › Build data collection and statistical analysis capacity
  - › Transfer technologies to host countries
  - › Engage in responsible public-private partnerships and civil society-private partnerships
- Support the development of other industries and infrastructure needed to grow the renewable sector

Collaboration and Leverage

- Engage in dialogue with governments, civil society, and development partners
- Strengthen coordination between initiatives
- Join with bottom-up grassroots movements and top-down leadership initiatives
- Incorporate the SDGs into company policies, and apply SDG indicators

Integrate SDG 17 Into Core Business

Mobilize financial resources and technology

While rapid technological advances and economies of scale have allowed for drastic reduction in the price of renewables, much more work needs to be done to allow for a full transition to a clean energy economy. Companies should work with governments, development organizations, civil society, and financiers to mobilize resources for the urgent installation of renewable energy capacity. This can include innovative finance models previously discussed, including Property Assessed Clean Energy (PACE) loans, third party ownership, community shared solar, or public-private or civil society-private partnerships.[205] Companies should also share data and technology in order to allow for knowledge sharing and rapid diffusion of the best available technology.

Support the development of other industries and infrastructure needed to grow the renewable sector

Renewable energy companies should increase functional project partnerships beyond power generation as part of an explicit strategy to grow the sector. The interconnected nature of the needs and opportunities in developing economies requires parallel investment in generation, transmission, distribution, and productive use. Investments in

other fields will not precede the availability of reliable power, and renewable energy companies cannot invest in the absence of firm demand and a delivery infrastructure. Renewable energy companies will therefore increasingly need to either lead or participate in multi-thematic partnerships and consortiums that develop the electricity transportation and load to grow renewable demand. This may entail tactics such as increased and more flexible investments in project development and taking equity in and enabling finance for the other components, both energy related and productive use.

Collaborate and Leverage

Each previous SDG chapter has presented a number of opportunities and recommendations for companies to partner with external stakeholders—including governments, communities, civil society, academia, and other companies—to contribute to the achievement of the sustainable development agenda. Below are some strategies to further find opportunities to collaborate and leverage resources for the SDGs.

- Convene people, organizations, and institutions to close communications gaps
- Share information, data, and analysis on tax and royalty payments, landscapes, ecosystems, watersheds, health challenges, and safety statistics, among others
- Participate in SDG initiatives
- Help to implement initiatives by mobilizing resources through social investment programs
- Build partnerships with governments, civil society, and academia to maximize impact

Case Studies and Initiatives

The Right Energy Partnership with indigenous peoples: Global[206]

In 2018, the Indigenous Peoples Major Group for Sustainable Development launched a multi-stakeholder initiative to ensure that renewable energy projects hosted on indigenous land respect human rights, and to facilitate the provision of renewable energy to 50 million energy-poor indigenous people by 2030. Partners who agree to work towards these goals must commit to shared principles, including equitable benefit sharing and the full inclusion and empowerment of indigenous women. The Right Energy Partnership seeks to fill a gap in existing energy partnerships that do not adequately address indigenous peoples' needs and aspirations. Joan Carling of the Indigenous Peoples Major Group explains: "As the international community calls for leaving no one behind in achieving the [Sustainable Development Goals], renewable energy companies and investors have the opportunity to partner with indigenous peoples under a rights-based framework through the Right Energy Partnership initiative led by indigenous peoples. This initiative can lead to transformational contributions, not only in combating climate change, but also in reducing poverty and hunger, and in achieving rural development wherein indigenous peoples are regarded as key development actors and equal partners."

Multi-stakeholder collaboration for shared economic and social benefits: Denmark[207]

In the 1970s, Denmark relied heavily on coal as a source of power. In an effort to diversify their economy, the government facilitated social dialogue between Danish employees, unions, and government officials to produce a strong industrial and policy climate that led to energy independence and the transition of the power sector from coal to wind. Today, Denmark's wind industry includes Vestas, the world's second largest wind turbine manufacturer, and Ørsted, the world's largest offshore wind company, employing 31,251 people and delivering 42% of Denmark's total electricity. Companies can collaborate with governments and workers to increase market penetration and uptake.

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205. While public-private partnerships (PPPs) are often characterized as a panacea for, among other things, addressing the gap in financing required for achieving the SDGs, this model is far from risk-free. PPPs, much like other types of models for large-scale investments, require effective regulation, and careful consideration should be given as to the appropriateness of this form of finance to the relevant context. See e.g., Brooke Guven and Lise Johnson. 24 May 2018. "PPPs and ISDS: A Risky Combination" UNCTAD Investment Policy Hub Blog http://investmentpolicyhub.unctad.org/Blog/Index/65 Accessed 16 October 2018; United Nations Office of the High Commissioner for Human Rights. 6 July 2017. "Baseline Study on the Human Rights Impacts and Implications of Mega-Infrastructure Investment" https://www.ohchr.org/Documents/Issues/Development/DFI/MappingStudyontheHRRiskImplications_MegaInfrastructureInvestment.pdf Accessed 16 October 2018.

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Conclusion

Many of the recommendations included in this Atlas have already been implemented to varying degrees by renewable energy companies. As this makes clear, company expertise and capacity can readily be leveraged (and is already being leveraged) to support the achievement of the Sustainable Development Goals. By further aligning company policies and practices to Agenda 2030 and the UN Guiding Principles on Business and Human Rights, companies can amplify positive contributions to the SDGs and ensure that contributions to some SDGs do not come at the expense of others.

As countries and companies continue to chart a path forward on sustainable development, companies should share good practices, participate in cross-sectoral and multi-stakeholder dialogues on the SDGs, and encourage peer companies and suppliers to adopt responsible business practices.

Renewable energy is a linchpin to the Sustainable Development Agenda. This Atlas has enumerated concrete steps that renewable energy companies can take to maintain a social license to operate, build political support for pro-renewable energy policies, and promote corporate citizenship. In addition to their normative value, responsible conduct will be crucial to the renewable energy industry's long-term success, and therefore to the achievement of the SDGs.

Acknowledgements

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