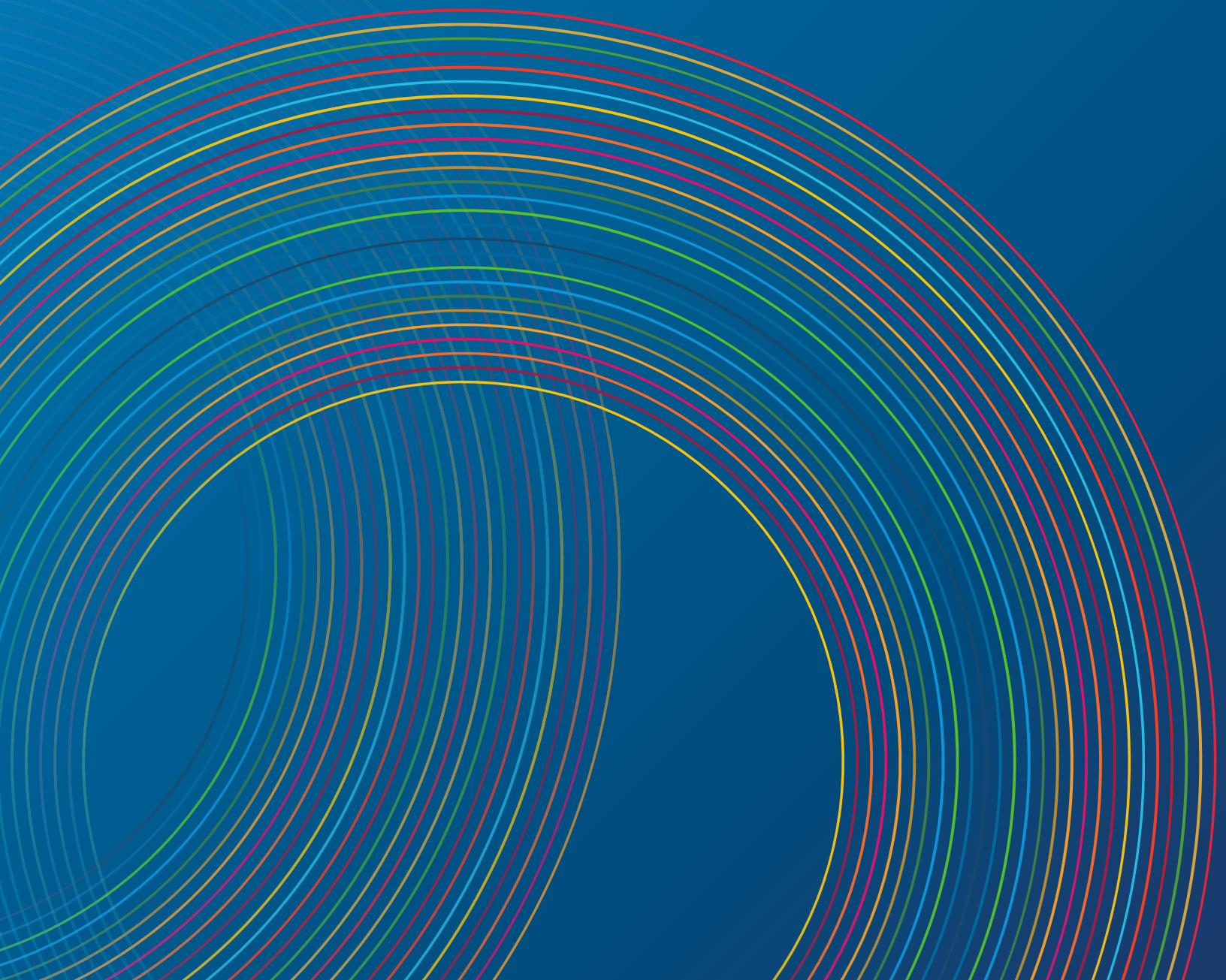
SDG7 POLICY BRIEFS IN SUPPORT OF THE UN HIGH-LEVEL POLITICAL FORUM 2025

Maximising the Benefits of Energy Action for Good Health, Gender Equality and Decent Work to Leave No one Behind



SDG7 POLICY BRIEFS IN SUPPORT OF THE UN HLPF 2025

This document is part of a series of policy briefs compiled by the multistakeholder SDG7 Technical Advisory Group (SDG7 TAG) in support of the review of SDG7 at the High-level Political Forum (HLPF) 2025. Convened by UN DESA, the SDG7 TAG is composed of over 40 experts from governments, UN organizations, international organizations and other stakeholders. The HLPF is the central United Nations platform for the follow-up and review of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) at the global level. More information on the SDG7 TAG, including previous editions of the annual SDG7 Policy Briefs, is available here.

This work is a joint product of various SDG7 Technical Advisory Group members. The findings, interpretations, and conclusions expressed in this publication do not necessarily represent those of the United Nations or the organizations represented in the SDG7 Technical Advisory Group.

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- Foreign, Commonwealth and Development Office, UK
- ENERGIA International Network on Gender and Sustainable Energy
- Global Platform for Action (GPA)
- Ministry of Foreign Affairs, Denmark
- Humanist Institute for Development Cooperation (HIVOS)
- The German Federal Ministry of Economic Cooperation and Development (BMZ)
- International Energy Agency (IEA)
- Ministry of Energy, Kenya
- International Institute for Applied Systems Analysis (IIASA)
- Ministry of Foreign Affairs of the Netherlands
- Global Women's Network for the Energy Transition (GWNET)
- Ministry of Foreign Affairs, Pakistan
- International Renewable Energy Agency (IRENA)
- Ministry of Foreign Affairs, UAE
- PowerForAll
- European Commission (EC)
- Clean Cooking Alliance (CCA)
- Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ)
- The World Bank
- African Development Bank (AfDB)
- SDG7 Youth Constituency
- Modern Energy Cooking Services (MECS)
- United Nations Framework Convention on Climate Change (UNFCCC)

United Nations Children's Emergency Fund (UNICEF)

United Nations Entity for Gender Equality and the Empowerment of Women (UN WOMEN)

United Nations Development Programme (UNDP)

United Nations Environment Programme (UNEP)

United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP)

United Nations Industrial Development Organization (UNIDO)

United Nations Economic and Social Commission for Western Asia (UN ESCWA)

United Nations Institute for Training and Research (UNITAR)

United Nations Economic Commission for Africa (UN ECA)

The United Nations Human Settlements Programme (UN HABITAT)

United Nations Economic Commission for Europe (UN ECE)

World Health Organization (WHO)

Sustainable Energy for All (SEforAll)

United Nations Economic Commission for Latin America and the Caribbean (UN ECLAC)

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International Atomic Energy Agency (IAEA)

Food and Agriculture Organization (FAO)

United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and the Small Island Developing States (UN-OHRLLLS)

The Swedish International Development Cooperation

Gender and Energy Compact

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Preface

The *High-level Political Forum 2025* comes at a pivotal moment in our shared journey towards the 2030 Agenda for Sustainable Development:

We face profound global turbulence. Geopolitical tensions, economic uncertainty, climate disruption, and widening inequalities are testing our shared resolve—and placing unprecedented strain on multilateral cooperation. Yet these challenges remind us of an enduring truth: global problems demand global solutions. The 2030 Agenda remains our guiding light to a better future.

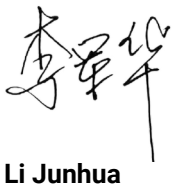
Energy lies at the heart of sustainable development and climate action. Clean, affordable, and reliable energy powers hospitals, schools, jobs, and economic transformation. It drives opportunity, fosters social inclusion, and protects our planet for generations to come.

This compilation of *SDG7 Policy Briefs* provides timely insights and recommendations to accelerate progress on sustainable energy, highlighting opportunities for collective action in this decisive decade. The insights will also inform upcoming milestones, including the *SDG7 Action Forum* at the UN General Assembly in September, *COP30* in Belém, and the *SDG7 review at the HLPF 2026*.

The UN General Assembly's decision to extend the UN Decade of Sustainable Energy for All through 2030 underscores the importance of sustained and coordinated efforts.

UN DESA is committed to strengthening these efforts, including by supporting the Technical Advisory Group on Sustainable Development Goal 7 (SDG7 TAG). The Group provides an excellent platform for technical discussions on energy and its interlinkages in support of international dialogue and cooperation.

Finally, it is my pleasure to once again commend the leadership and dedication of the co-facilitators of the SDG7 TAG, Ms. Sheila Oparaocha and Mr. Hans Olav Ibrekk. I express my sincere gratitude for their unwavering engagement



Li Junhua
Under-Secretary-General for Economic and Social Affairs
United Nations

Foreword

It is with great pleasure that we introduce this compilation of Sustainable Development Goal (SDG) 7 Policy Briefs. Entitled "Maximising the Benefits of Energy Action for Good Health, Gender Equality and Decent Work to Leave No one Behind," this is the seventh edition of this compilation prepared by the SDG7 Technical Advisory Group (SDG7 TAG).

In a world of worsening climate crisis, increasing uncertainty and inequality, escalating conflicts and geopolitical tension, we must now double down on the 2030 Agenda for Sustainable Development. A global guiding light towards a better future, the agenda's remaining five years provide an opportunity to catalyse a final push towards achieving the SDGs.

SDG7 on clean and affordable energy is key to this, as it is a goal that can lead to particularly high benefits in other areas of sustainable development. Indeed, implementation of SDG7 can generate a cascade of interconnected impacts, amplifying progress across the broader development agenda. These impacts include those in the areas under review by the High-Level Political Forum (HLPF) 2025: SDG3 on good health and well-being; SDG5 on gender equality; and SDG8 on decent work for all.

To accelerate progress in these areas, it is crucial to step-up our efforts on SDG7. This has to include extending energy access to the 666 million people, worldwide, who live without electricity. It must also include the 2.1 billion people who still have to rely on polluting and unhealthy cooking fuels and technologies. In addition, an energy transition based on renewables and energy efficiency is not only key to climate action. Such a transition can also strengthen economies, improve energy security, increase resilience and boost well-being.

The benefits of clean and affordable energy, however, do not come about automatically. Rather, we need clear and instructive analysis of policies that can enable progress in the respective areas of sustainable development, while also being mutually catalysing.

The SDG7 Policy Briefs in Support of the HLPF 2025 help in this analysis by providing crucial insights and recommendations on how to achieve benefits in energy on the one hand, and health, gender and jobs on the other. At the same time, they also shed light on the special situation of the least developed countries (LDCs), landlocked developing countries (LLDCs) and small island developing states (SIDS).

We firmly believe that policymakers and other stakeholders will find these briefs immensely useful in support of accelerating progress on the SDGs. The review of SDG7 at next year's HLPF will be an important opportunity to take stock and mobilize action on clean and affordable energy.

We would like to express our sincere gratitude to all members of the SDG7 TAG for their strong commitment and engagement – including their ongoing contributions to the SDG7 Policy Briefs – and to the United Nations Department of Economic and Social Affairs (UNDESA) for their consistent support and coordination of the SDG7 TAG.

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This document was prepared in support of the review of the SDGs at the United Nations High-Level Political Forum 2025. The views expressed in this publication are those of the experts whose contributions are acknowledged and do not necessarily reflect those of the United Nations or the organizations mentioned in this document.

This document, including the Policy Briefs and the Summary for Policymakers, was developed under the auspices of the multi-stakeholder SDG 7 Technical Advisory Group, convened by UN DESA. Under the leadership and able facilitation of two co-facilitators of the group, Sheila Oparaocha and Hans Olav Ibrekk, the members of the group have demonstrated exemplary commitment and a true spirit of multi-stakeholder collaboration.

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The development of each policy brief was led by a group of organizations, which served as the lead coordinators to facilitate numerous iterations among themselves and with other contributing organizations and multi-stakeholder contributors. Their excellent efforts, and the quality and timely delivery of the products, are gratefully acknowledged.

The Division for Sustainable Development Goals (DSDG) at UNDESA provided secretariat services, conceptualized the processes and products, mobilized resources, led the drafting of the Summary for Policymakers and the compilation of the policy briefs. The work was spearheaded by the energy and climate team led by Minoru Takada with Martin Niemetz as task manager and support by Bahareh Seyedi, Nadine Salame, Dominika Zahrer, Pragati Pascale, Veronika Ruskova, and under the overall guidance of Juwang Zhu, Director of DSDG. The Capacity Development Office at UNDESA provided overall support during the process. Special thanks are extended to Jonathan Gorvett who copy-edited the policy briefs and the summary for policymakers, ensuring accuracy, consistency and readability, and also to Camilo Salomon for the excellent work on the graphic design and production of the report.

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While the document was a product of collective, multi-stakeholder collaborative efforts, special thanks are due to the following individuals who provided significant contributions: Hans Olav Ibrekk (MFA of Norway); Sheila Oparaocha, Elizabeth Cecelski and Naimat Chopra (Energia); Sarah Ahlrichs (BMZ); Sofja Giljova, Lydia Canals, and Mara Braun (GIZ); Roland Mollerus, Adbul Alim, Rita Ruohonen, Eman Aboaldahab Ali, Lisbeth Nordmeyer and Varun Thotli (UN OHRLLS); Heather Adair-Rohani and Wenlu Ye (WHO); Celia García-Baños, Michael Renner, Mirjam Reiner, Nadia Mohammed, Kamlesh Dookayka, Iman Abdulkadir Ahmed, Francis Field, and Stephanie Clark (IRENA); Nicolina Angelou, Samantha Constant, Michelle Hallack, H. Stephen Halloway, Sandeep Kohli, and Fanny Missfeldt-Ringius (World Bank); Riad Meddeb and Stefano Pistolese (UNDP); Irene Giner-Reichl (GWNET); Rosemary Idem, Luc Severi and Rahul Srinivasan (SEforALL); Leonardo R. Souza and Jessica Ying Chan, (UN Statistics Division); Rana Ghoneim, Martin Lugmayr, Katharina Pröstler and Carmen Schuber (UNIDO); Hongpeng Liu, Michael Williamson, and Sergey Tulinov (ESCAP); Radia Sedaoui and Sean Ratka (ESCWA); Branko Milicevic (ECE) Ginette Azcona, Carla Kraft, Seemin Qayum and Papa Seck (UN Women); Michela Morese and Ioannis Vaskalis (FAO); Mark Gibson, Amy Jenks, Katherine Patterson and Sadiq Zafrullah (UNITAR); Jillene Connors Belopolsky (CCA); Paul N. Mbuthi (Energy for Life Ltd); Ed Brown, Yesmeen Khalifa, Paula Griffiths, Malcolm Bricknell, Jose Ortega-Moreno, Richard Sieff and Rihab Khalid (MECS); Esther Kalkman, Sepeedah Saleh and Dan Pope (University of Liverpool); Cristiana La Marca (CEET).

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Key Messages for Policymakers in Support of the High-Level Political Forum 2025

Achieving Sustainable Development Goal (SDG) 7 presents a tremendous opportunity for people, the planet and prosperity. In today's uncertain geopolitical landscape, marked by conflicts, disruptions and growing inequalities, access to clean, affordable and reliable energy is more critical than ever. The clean energy transition can deliver major gains in terms of economic resilience, energy security and human well-being, while also accelerating progress on the SDGs and the Paris Agreement on climate change.

In line with the focus of the High-Level Political Forum (HLPF) 2025, this year's SDG7 Policy Briefs highlight energy's vital interlinkages with health (SDG3), gender equality (SDG5), decent work and economic growth (SDG8). They also highlight the urgent needs of least developed countries (LDCs), landlocked developing countries (LLDCs) and small island developing states (SIDS).

Evidence

1. **SDG7 is off track**. In 2023, 666 million people still lacked electricity, with sub-Saharan Africa accounting for 85 per cent of the total. Worldwide, around 2.1 billion people still rely on polluting cooking fuels and technologies. Despite the record growth of renewables in recent years, we are still far behind in meeting the SDG7 targets. This is particularly so in regard to significantly increasing the share of renewables and doubling the global rate of improvement in energy efficiency.

   To deliver on the United Nations Framework Convention on Climate Change (UNFCCC) COP28 agreement, including the goal to triple global renewable power capacity by 2030, action must be urgently and dramatically scaled up. Significant action to expand the adoption of clean energy is needed, especially in the heating, cooling and transportation sectors. We are not progressing fast enough and need to urgently step up action.

2. **Clean energy saves millions of lives (SDG3).** Energy production and use are the primary sources of household and ambient air pollution. They are responsible for 7 million premature deaths annually, with 3.2 million of these fatalities mainly due to unhealthy cooking practices. Women and children bear the brunt of this burden, especially in countries within the low- and middle-income categories.

Equally critical for protecting health and reducing climate-related health risks are the energy-health interlinkages that extend beyond air pollution. These include reliable energy for health facilities – including cold chains for food, vaccines and other medicine, and clean cooking – and climate-resilient cooling.

3. **Gender equality is essential for a just energy transition (SDG5).** Despite clear linkages, SDG7 lacks gender targets and indicators, masking disparities and limiting inclusive solutions. Women are vital agents of change as members of the energy workforce, entrepreneurs, users, decision-makers and leaders. Enabling a just, inclusive and equitable energy transition requires systematically mainstreaming gender considerations. This must be backed by strong political will and gender-disaggregated data.

4. **Clean energy creates jobs (SDG8).** In 2023, the renewable energy sector employed 16 million people. By 2030, that could reach 30 million jobs in renewables and another 40 million in energy efficiency and system flexibility. Decentralized renewables generate local employment, including among marginalized groups. Just transition policies must promote decent work, labour rights and diversity across gender, youth, disability and minorities, allowing the industry to tap into a greater pool of talent.

5. **Closing the energy access gap and transitioning to decarbonized energy systems and climate-resilience remain major challenges for the LDCs, LLDCs and SIDS.** With the current rate of growth, it will take the LDCs 21 years to reach universal access to electricity, the LLDCs 27 years, and the SIDS a staggering 67 years. Financing in LDCs, LLDCs and SIDS also remains utterly insufficient. In US dollar (US$) terms, in 2023, international public financial flows to LDCs reached only US$ 3 billion. This was far below the recent peak in 2016, when public investment flows to LDCs reached US$ 8.5 billion.

Recommendations for action:

6. **Now more than ever, bold action on energy is needed to galvanize a final push to achieve the SDGs by 2030.** We therefore call upon all countries and stakeholders to:

   i) **Urgently prioritize and implement measures to achieve universal access to clean cooking solutions and electricity for all**. Eradicating energy poverty and ensuring energy security must be at the centre of these efforts.

   ii) **Rapidly accelerate the global clean energy transition towards net-zero emissions in a just, orderly, inclusive and equitable manner**. This should be achieved via a tripling of global renewable energy capacity and a doubling of the global average annual rate of energy efficiency improvement by 2030. Enhanced Nationally Determined Contributions (NDCs) must integrate and prioritize the just energy transition.

iii) **Dramatically scale up finance and investments, especially in support of the most vulnerable countries.** These include the African countries, the LDCs, LLDCs and SIDS.

iv) **Strengthen interlinkages and synergies to maximize the benefits to other SDGs of action on energy.** This includes the SDGs on health (SDG3), gender equality (SDG5) and decent jobs (SDG8).

v) **Empower women and close gender gaps.** Adopting gender indicators is critical for highlighting gender disparities, promoting inclusive solutions and ensuring equitable access and outcomes in advancing SDG7.

7. **Partnerships must deliver concrete impacts.** Governments, the private sector, civil society and the United Nations must work together to turn pledges and commitments into tangible progress. The Energy Compacts platform, launched at the 2021 High-level Dialogue on Energy, has mobilized over US$ 1.4 trillion in commitments. This momentum must continue, with stronger accountability, implementation support and the tracking of impacts.

8. **Multilateral cooperation must meet the moment.** We urge the United Nations General Assembly to adopt an ambitious plan of action for the extended United Nations Decade of Sustainable Energy for All through 2030. The UNFCCC COP30 must not only reaffirm commitment to a just and inclusive energy transition but also facilitate concrete action and measurable progress. We also call on the United Nations system, through UN-Energy, to enhance coordination and coherence, enabling scaled-up action that effectively supports Member States in achieving SDG7.

9. **The 2026 SDG7 review is a pivotal opportunity.** The review of SDG7 during the HLPF in 2026 must serve as a springboard to accelerate universal energy access and the clean energy transition by the 2030 target date. At the same time, the review must also serve to inform future discussions on a sustainable development agenda beyond 2030. We urge Member States, the United Nations system and all stakeholders to seize this moment and deliver a bold, action-oriented outcome.

Clean Energy for Healthy Lives Addressing a Critical Burden on Global Health: Air Pollution from Energy Systems

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World Health Organization (WHO)

The German Federal Ministry of Economic Cooperation and Development (BMZ)

Modern Energy Cooking Services (MECS)

United Nations Development Programme (UNDP)

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United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP)

Energy for Life Ltd

Food and Agriculture Organization (FAO)

Council of Engineers for the Energy Transition (CEET)

United Nations Institute for Training and Research (UNITAR)

Sustainable Energy for All (SEforAll)

KEY MESSAGES

- Energy production and use are the dominant sources of anthropogenic air pollution—the top environmental risk factor for health globally.
- Air pollution is responsible for 6.4 million deaths every year, with the greatest burden falling on low- and middle-income countries.
- Immediate and substantial health gains can be delivered by a just and inclusive energy transition. This is especially so in regard to sectors such as power generation, household cooking, heating and lighting, transport, industry, agriculture, and waste.
- Reducing air pollution from energy sources improves health now, while also supporting longer-term environmental and climate goals.
- The benefits of achieving the targets set by Sustainable Development Goal (SDG) 7 extend beyond reductions in exposure to air pollution. They also include other aspects related to health, such as enhanced safety, clean cooking, delivery of quality health services through solar-powered facilities, and climate-resilient cooling for communities, buildings, and food.
- Equity must guide all actions, ensuring that the most affected communities benefit from feasible, scalable, cleaner, safer, and more affordable energy.
- Health-centred energy planning creates triple-win solutions: it simultaneously advances SDG3 (health), SDG7 (energy), and SDG13 (climate).

1. Introduction

Air pollution from inefficient energy is a universal health risk. Worldwide, it leads to millions of deaths, as well as hundreds of millions of years of productive life being lost to illness. By ensuring affordable, reliable, sustainable, and modern energy for all via a reduction in energy demand and an increasing reliance on renewables, substantial health benefits can be provided. A just and inclusive energy transition targeting key polluting sectors, therefore, offers one of the most high-impact strategies available for the improvement of health, the advancement of climate goals, and the promotion of equity.

Priority Actions:

- Accelerate clean and sustainable energy transitions in the major polluting sectors – power generation, industry, transport, households, agriculture, and waste.
- As a key priority for protecting health in the energy transition, prioritize context-sensitive and equity-centred solutions, such as clean cooking access.
- Integrate health impact assessments into energy and development planning and implementation, including within Nationally Determined Contributions (NDCs), while strengthening cross-sector coordination to embed health protection across the energy value chain.
- Support energy transitions in and beyond health systems. These range from electrifying health care facilities and ensuring clean household energy use to the rollout of sustainable cooling infrastructure and developing 'health-wise' standards for energy efficiency and renewable technologies.
- In order to inform actions and demonstrate impacts, strengthen monitoring and accountability mechanisms for tracking emissions, exposure, health outcomes, and the progress of implementation.
- Ensure inclusive policies and financial schemes protect vulnerable populations, support affected workers, and enable sustained use of clean technologies.
- Scale up investment in both the energy and health sectors. This should include results-based financing (RBF) in which health impacts are explicitly accounted for.
- Strengthen the knowledge and capacity of health professionals, decision makers, and other stakeholders around health and energy linkages. Their trusted voices should be leveraged to advocate for and shape energy-related policies and investments.

2. Interlinkages Between SDG7 and SDG3: The Energy-Air Pollution-Health Nexus

2.1 The central role of air pollution

The most consequential linkage between the sustainable energy (SDG7) and human health (SDG3) goals is air pollution. Energy production and use—across power systems, industry, household, transport, agriculture, and waste—remain the largest source of harmful air pollution emissions globally.

Indeed, energy-related activities emit a wide range of health-damaging pollutants. These include fine particulate matter ($PM_{2.5}$), black carbon, carbon monoxide (CO), sulphur dioxide (SO_2), and nitrogen oxides (NO_x). Once released, these pollutants can travel long distances, enter the air people breathe and trigger or exacerbate serious health conditions, from acute lower respiratory infections in children to chronic obstructive pulmonary disease (COPD), heart disease, stroke, and lung cancer.[1] In 2021 alone, exposure to $PM_{2.5}$ was linked to approximately 6.4 million premature deaths globally.[2]

The causal pathway is clear: energy activities lead to emissions, emissions contribute to ambient and household air pollution, and polluted air causes ill health. This energy-air pollution-health nexus does, however, offer a strategic opportunity to design and implement integrated policies that advance both SDG7 and SDG3. Reducing air pollution by improving energy access and efficiency not only delivers immediate health gains but also addresses broader climate and equity goals.

In addition, beyond air pollution, other energy-related factors also pose direct health risks. A lack of reliable, safe, and sustainable energy access increases the risk of injury, limits access to clean water, and impedes the delivery of essential health services. Health facilities need stable electricity for lighting, cold chains, life-saving equipment, and digital health systems. Yet, many in low-resource settings face frequent power outages or shortages. Ensuring reliable, sustainable energy is therefore essential not only for health service delivery but also for building resilient systems that are able to respond to emergencies, climate risks, and future health challenges.

2.2 Sectoral contributors

Power generation

Much of electric power generation (EPG) relies on fossil fuels, especially coal. This poses significant risks to both health and the climate. In 2022, 61 per cent of global electricity generation was fossil fuel-based, particularly coal (36 per cent) and natural gas (22 per cent). Coal alone was responsible for 76 per cent of global carbon dioxide (CO_2) emissions, reaching nearly 10 gigatons annually.[3,4]

The public health case for coal-fired EPG transition is clear. Fossil fuel combustion emits significant amounts of $PM_{2.5}$, which is linked to severe health outcomes, including many noncommunicable (e.g., cardiovascular and respiratory) diseases.[2] Globally, approximately 200,000 deaths per year are attributable to $PM_{2.5}$ from coal-fired power plants alone.[5] The health benefits of replacing coal-fired power are therefore immediate and directly experienced by the affected communities.

Country-specific evidence reinforces these global findings. In Canada, a study of deaths related to air pollution in 2015 found that those deaths caused by the coal-fired electric power generation sector were equivalent, in Canadian dollar (C$) terms, to C$1 billion in annual economic losses.[6] Canada's coal phase-out combined strategic policy reforms, cleaner technology investment and worker transition support, including retraining and consumer protection measures.[7,8] The Canadian experience therefore shows that coordinated policies can maximize the health and climate benefits of the clean power generation transition, while also ensuring social equity.[9]

Industry

Industrial sectors—including mining, manufacturing, refining, chemical production—emit a wide range of air pollutants, such as $PM_{2.5}$, SO_2, NO_x, volatile organic compounds (VOCs), heavy metals, and dioxins that harm health and the environment. Industrial activities are often concentrated, creating high-exposure areas for nearby populations, where pollution levels and health risks are elevated. Although industries have reduced emissions in some regions, they remain a major source of SO_2, NO_x, and greenhouse gases globally.[10,11,12]

In addition, industrial pollutants such as benzene, arsenic and polycyclic aromatic hydrocarbons (PAHs) are linked to cancers, respiratory diseases and asthma, while they also impact child development.[13,14] Strong evidence also connects specific industries to particular health outcomes. Examples include petrochemical complexes linked to childhood respiratory diseases and adult cancers, and linkages between the steel industry and lung cancer.[15] Financially, in euro (€) terms, industrial air pollution cost Europe up to €433 billion in 2017.[16]

Addressing these major impacts requires stricter emission controls, the application of the best available technologies, transitions to cleaner energy, enhanced air quality and health monitoring, and health-centred industrial practices.[17]

Transportation

Relying predominantly on fossil fuels such as gasoline and diesel, the transport sector contributes substantially to air pollution and climate change. Transport-related air pollution (TRAP) is a significant source of $PM_{2.5}$, NOx, CO, black carbon and other harmful substances, particularly in rapidly urbanizing LMICs.[18,19,20,21]

Globally, transport generates approximately 20 per cent of particulate matter emissions, around 15 per cent of total GHG emissions, and around 23 per cent of energy-related CO_2 emissions.[18,19,20]

TRAP exposure is highest near busy roads and affects drivers, pedestrians, cyclists and nearby residents. Vulnerable populations include children, older adults, and low-income communities, which often face worse health impacts.[22] In 2015, around 385,000 premature deaths worldwide were attributable to transport-related $PM_{2.5}$ and ozone exposure.[23] Exposure to TRAP is strongly linked to cardiovascular disease, lung cancer, asthma onset, and acute respiratory infections in children.[21,24,25,26,27]

Reducing TRAP requires technological and behavioural solutions. Measures such as cleaner fuels, improved emission standards, and vehicle electrification can lower TRAP levels. Promoting public transit, active mobility – such as walking and cycling – and integrated urban planning can reduce vehicle use, enhance physical activity, and improve road safety.[27]

Household cooking and heating

Globally, around 2.1 billion people still rely on polluting fuels and inefficient technologies to meet their cooking needs. This results in high exposure to household air pollution.[28] Combustion of wood, charcoal, dung, and coal in poorly ventilated homes releases a mixture of health-damaging pollutants, including $PM_{2.5}$, black carbon, and CO.[29] $PM_{2.5}$ exposure levels in such settings can be more than 250 times higher[30] than the WHO's guideline value of 5 micrograms per cubic metre.

Evidence links household air pollution to a wide range of adverse health outcomes. These range from non-communicable diseases such as heart disease, strokes, COPD, and lung cancer, to emerging outcomes such as diabetes, cognitive impairment, and decreased renal function.[32] In 2021, household air pollution caused 3 million premature deaths, including about 310,000 children under five years old.[2]

Solid fuel combustion also contributes to poor outdoor air quality, accounting for around 20 per cent of global $PM_{2.5}$ pollution.[31,32] Unsafe cooking also causes burns and burn-related injuries. Women and girls face additional risks from fuel collection and cooking. These risks include gender-based violence and reduced time for education and income generation. Such risks are particularly high in displacement and fragile contexts, where around 81 per cent of displaced people rely on firewood, charcoal, and open fire for cooking.[33]

Clean household energy transitions that address all household energy needs offer a critical opportunity to deliver substantial health, environmental, and gender co-benefits. Policies and interventions must go beyond access and distribution and focus on enabling sustained, exclusive use of clean fuels and technologies at the point of use, such as electricity,

liquefied petroleum gas (LPG), biogas, and ethanol.[34] Policies should also be integrated to address affordability, access, and user preferences. While electricity from renewable sources remains the ideal long-term solution, it may not be achievable for many households immediately. A flexible "clean stack" approach – which combines multiple less-polluting fuels and technologies suited to different household energy needs – can help ensure immediate health gains while advancing toward longer-term energy and climate goals.

In addition to households, advancing clean energy solutions, energy efficiency, and improving ventilation in institutions such as schools, healthcare facilities, and workplaces bring additional health benefits.

Agriculture and waste burning

Agriculture and waste burning are closely linked to energy use and contribute significantly to air pollution and its health impacts. Agricultural activities often rely on fossil energy for machinery, irrigation, and fertilizer production, resulting in emissions of ammonia, methane, and $PM_{2.5}$.[35,36,37]

In addition, the widespread practice of crop residue burning emits $PM_{2.5}$, including black carbon and methane.[38,39] In India alone, agricultural residue burning is estimated to cause an average of 68,000 premature deaths per year due to exposure to particulate matter.[40]

Approximately 93 per cent of collected waste in LMICs is openly dumped or burned, releasing pollutants such as $PM_{2.5}$, CO, black carbon, and toxic chemicals, such as heavy metals and dioxins.[41,42,43] $PM_{2.5}$ exposure due to open waste burning has been linked to around 270,000 annual deaths globally[44] and is a major contributor to outdoor air pollution. In Lagos, Nigeria, for example, it accounts for more than 50 per cent of emissions.[45]

Addressing agricultural and waste-burning emissions requires an integrated response that combines cleaner on-farm energy solutions and sustainable waste management.[46,47] In agrifood systems, emissions and environmental impacts can be reduced by renewable energy solutions, such as solar-powered irrigation and cold chains, and bioenergy from residues. In this way, food security, rural livelihoods, and health can all be enhanced.[48]

2.3. Beyond air pollution: other energy-health linkages

While a major health benefit from clean and sustainable energy transitions is a reduction in air pollution, other energy-health linkages are equally important.

Reliable energy access in healthcare facilities, for example, is fundamental to safe, effective service delivery. From operating theatres to basic lighting and sterilization, electricity supports nearly every function of a modern health facility. Yet, more than 1 in 10 facilities in South Asia and sub-Saharan Africa lack any electricity, and many more face unreliable supply. This affects nearly 1 billion people in LMICs.[49] In sub-Saharan Africa, only half of hospitals are reliably electrified, while more than 90,000 healthcare facilities either

have no electricity access or only have access to unreliable electricity.[49] These gaps critically undermine maternal care, emergency services, and the safe delivery of vaccines and medicines.

Energy is also critical for public health cold chains, which maintain the safe storage and transport of temperature-sensitive vaccines and medications. Reliable and sustainable cold chain systems are essential in reaching remote populations, avoiding product spoilage, and maintaining the effectiveness of treatments, particularly during pandemics.

At the same time, global temperatures are rising, and climate-related weather extremes are becoming more frequent. Under these conditions, sustainable, climate-resilient energy solutions are becoming increasingly important in order to protect vulnerable populations from heat-related illnesses, as well as to maintain thermal comfort in care settings, safeguard supplies, and ensure uninterrupted health service delivery. Such sustainable, climate-resilient energy solutions include decentralized renewable energy, solar-powered refrigeration, energy-efficient air conditioning, passive building design, and nature-based cooling methods.

3. Policy Implications

Reducing air pollution through energy policies and actions is one of the most immediate ways to protect health, advance climate goals, and accelerate sustainable development.

At the same time, energy-related health risks and opportunities differ significantly across regions, depending on the levels of development, energy access, and regulatory capacity. To align SDG7 (energy) actions with SDG3 (health) outcomes, policy responses must therefore be integrated, equity-focused, and informed by contexts and evidence.

This section discusses important policy implications for maximizing the health co-benefits of clean and sustainable energy transitions.

- **Energy planning needs to prioritize health in order to deliver integrated air quality and climate benefits.** Moving beyond access and efficiency, energy planning and policies should explicitly address pollution reduction and health improvement. Incorporating health into energy strategy design and implementation enhances the effectiveness and sustainability of the clean energy transition.

- **Targeted actions in energy-related sectors are essential to reduce pollution and achieve health benefits.** Such actions include the promotion of clean household fuels and technologies for cooking, as well as for other domestic energy needs. These actions must also include coal phase-out in power generation and the replacement of diesel generators where power is unreliable. They should also include the improvement of urban transport systems with regulatory measures. Examples of such regulations include emissions and fuel quality standards, vehicle electrification, and bans on high-emission vehicles. In addition, targeted actions should include an end to the open burning of waste and crop residues, along with urban planning to reduce hotspots. Combining technical and fiscal tools, such as subsidies, taxes, and incentives, with social and cultural considerations is key to success.

- **Health considerations must be embedded in energy planning, regulation and investment.** This includes conducting full life-cycle health impact assessments of energy sources. Fossil fuels pose health risks at every stage, from extraction to combustion to waste. These risks must be assessed and considered when making planning and investment decisions. Governments should establish interministerial coordination to identify synergies, support joint planning across energy, health, environment, and urban development ministries, and scale solutions that provide multiple benefits.

- **A just and inclusive energy transition is essential.** Policy design should recognize and respond to diverse contexts, energy needs, and capacities at the regional and country level, with specific attention to vulnerable populations. Gender-responsive policies, targeted subsidies, retraining, and other forms of support for affected workers and communities all help ensure a fairer transition.

- **Mobilizing financing and partnerships is essential to implement clean energy-health solutions at scale.** Public-private partnerships, targeted subsidies, and innovative financing mechanisms – including carbon markets and results-based financing – can support implementation. Governments should engage international organizations, development banks, and the private sector to scale clean energy access, efficiency, and pollution control. This must also occur in fragile and conflict-affected settings.

- **Better data, monitoring and accountability mechanisms are key to track progress and guide actions.** Governments and partners must invest in robust monitoring systems for energy use, emissions, exposure and health outcomes. Public reporting of results and transparent indicators can help maintain momentum and ensure that policy translates into real-world improvements.

Box 1: Strong Commitments to Energy and Clean Air for Health

From 25 March to 27 March 2025, the 2nd WHO Global Conference on Air Pollution and Health was held in Cartagena, Colombia. This represented a pivotal moment in global efforts to align clean and sustainable energy transitions with public health priorities. The conference brought together over 700 government officials, partners and stakeholders from 100 countries and concluded with strong commitments to reduce the health impacts of air pollution by 2040. In achieving this, the importance of clean household energy, sustainable transport and fossil fuel phase-down was highlighted. Central to these efforts, too, was the recognition that energy policy. Shortly after, in May 2025, Member States at the 78th World Health Assembly unanimously adopted the Updated WHO Road Map for an Enhanced Global Response to the Adverse Health Effects of Air Pollution (2025–2030).[50] The roadmap sets an ambitious target: to achieve a 50 per cent reduction in mortality attributable to anthropogenic sources of air pollution by 2040, relative to 2015 levels. Together, the conference and roadmap sent a clear message: reducing air pollution through clean energy transitions is one of the most high-impact strategies for saving lives, improving well-being and accelerating progress across multiple SDGs.

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Gender Indicators for Sustainable Energy: A Call to Action

CONTRIBUTING ORGANIZATIONS

ENERGIA International Network on Gender and Sustainable Energy

United Nations Industrial Development Organization (UNIDO)

Energy Sector Management Assistance Program (ESMAP)

United Nations Statistics Division (UNSD)

International Energy Agency (IEA)

United Nations Entity for Gender Equality and the Empowerment of Women (UN Women)

International Renewable Energy Agency (IRENA)

The World Bank

Sustainable Energy for All (SEforAll)

World Health Organization (WHO)

United Nations Department of Economic and Social Affairs (UNDESA)

Global Women's Network for the Energy Transition (GWNET)

Gender and Energy Compact

KEY MESSAGES

- **With the links between energy and gender equality well-recognized, gender equality is fundamental to a sustainable energy transition. This makes tracking progress through gender indicators essential.** However, these crucial measures are currently absent within Sustainable Development Goal 7 (SDG7). This obscures critical inequalities and hinders the development of inclusive solutions.

- **Gender data highlights women's disproportionate vulnerability to energy poverty and their untapped potential as consumers, entrepreneurs, skilled workers and decision-makers**. Furthermore, greater participation of women in the energy workforce addresses skills gaps and enhances business performance. The underrepresentation of women in the political and regulatory frameworks for energy decision-making hinders gender-responsive energy policies. As a result, these often fail to adequately reflect the diverse needs and priorities of all segments of society.

- **Women's empowerment across the energy landscape is a strategic imperative for a thriving sector and for accelerating progress toward SDG7**. Gender data is vital for informing gender-responsive policies, shaping targeted project design, establishing measurable targets and tracking progress towards gender equality within the energy sector.

- **The pathway to adopting gender indicators in the energy transition hinges on existing foundations, a sound methodology and strong political commitment.** There is growing global recognition of the critical gender-energy nexus, with key initiatives highlighting the urgent need for sex-disaggregated data for an inclusive energy transition. The process proposed in this policy brief will leverage pioneering data collection by the International Energy Authority (IEA), the International Renewable Energy Agency (IRENA), the Multi-Tier Framework (MTF) and the Regulatory Indicators for Sustainable Energy (RISE), all of which are starting to bridge the gender data gap.

- **Moving forward requires a robust and inclusive methodology**. This must be built through consensus by a dedicated working group with a clear roadmap and a pragmatic agenda that prioritizes relevance, feasibility and national contexts.

- **Sustained political commitment is essential.** This crucial requirement necessitates fostering a broad consensus that is aligned with current priorities and engages key champions. It also requires the implementation of targeted communication and advocacy strategies. These are necessary in order to translate into concrete political action the need for gender indicators and, ultimately, foster a supportive environment for their adoption and utilization.

I. Integrating Gender Indicators Toward Sustainable Energy: Rationale and Imperative

Background

As the world struggles to meet SDG7 targets,[1] women's empowerment in sustainable energy offers a powerful, often overlooked solution that can unlock progress for everyone.

In 2023, the United Nations designated energy access a key investment priority, in order to try and revitalize progress across the SDGs.[2] At the same time, UN Women has long seen a gender-responsive and sustainable energy transition as a critical opportunity to advance gender equality and women's rights.[3] Mirroring this perspective, a 2019 United Nations General Assembly resolution highlighted the crucial nature of gender equality in accelerating sustainable energy access.[4]

Now, as we reflect on the Beijing Declaration's 30th anniversary,[5] a paradigm shift that explicitly recognizes and integrates the critical role of gender equality has become essential in order to course-correct and achieve sustainable energy targets.

Despite the widely-recognized interlinkages between energy and gender, SDG7 is one of the few SDGs lacking a dedicated gender indicator.[6] This omission partly stems from the 2015 adoption of the 2030 Agenda, when energy was a new stand-alone goal. At that time, macro-level, tested gender data for SDG7 was unavailable. Indeed, although there was evidence that highlighted women's needs and roles in energy, indicators regarding gender and energy remained largely conceptual and broadly unproven. This left the international community unprepared to propose a concrete gender indicator for SDG7.

Yet, while this goal lacked a dedicated gender indicator in 2015, the inclusion in SDG7 of Target 7.1.2 on Access to Clean Fuels and Technologies, driven by the World Health Organization (WHO), the Clean Cooking Alliance and ENERGIA, significantly expanded monitoring beyond electricity access.[7] The clean cooking indicator recognized the disproportionate impact on women of this issue and thus acted as a proxy gender indicator. This, in turn, increased women's visibility within SDG7. However, the multifaceted relationship between gender equality and energy extends beyond clean cooking, underscoring the need for a specific gender indicator.

Historically, the energy sector's technical and supply focus has also overshadowed the need to consider demand and integrate gender perspectives within SDG7. Evaluation has tended to centre on output-level results, such as power plant construction, transmission

line installation and large-scale infrastructure projects. This supply-centric approach has continued in decentralized energy solutions, emphasizing technical specifications and regulations for private investment.

More recently, though, the energy community has broadened its focus to the demand side, evaluating energy use and supply performance, through metrics like quality and reliability. Consequently, interventions have increasingly targeted last-mile connectivity and service delivery, incorporating outcome-level indicators, such as number of connections. Energy providers now recognize that affordable access to appliances is key to sustainable demand growth.[8]

Gender and energy interlinkages

As highlighted by the twin goals of the Gender and Energy Compact,[9] the energy-gender nexus centres on two key dimensions: access to energy; and economic opportunities in the energy sector (figure 1). Improving gender equality in each of these dimensions does not only empower women, but also boosts the performance of the sector as a whole, accelerating progress toward SDG7. It is therefore vital to understand that the relationship is both reciprocal and mutually beneficial.

FIGURE 1
Gender and energy interlinkages

	ACCESS TO ENERGY	ECONOMIC OPPORTUNITIES IN THE ENERGY SECTOR
BENEFITS FOR WOMEN	• Time poverty reduction • Mitigates health risks	• Job opportunities • Entrepreneurship in renewable energy
BENEFITS FOR THE ENERGY SECTOR	• Untapped consumer market • Knowledge for product design • Inclination for energy efficiency • Minimize risks and strengthen reputation	• Understand customer needs • Address skills gap • Improve business performance • Boost innovation

Energy access

Energy access transforms lives for both men and women by reducing labour time and enhancing well-being. Its impact on women, however, is potentially greater due to existing inequalities and differing roles. As primary household energy users, women in energy-deprived settings face severe time poverty. This is due to the physically demanding tasks they often have to undertake, such as firewood collection, water fetching and food processing – all significant components of unpaid care work.[10] Furthermore, as women and children are often tasked with cooking and firewood collection, they suffer disproportionately from health issues that arise from the use of polluting fuels.[11] Access to modern energy, through clean cooking solutions, water pumps and mills, can liberate women from these unpaid, time-consuming and often unsafe tasks, unlocking pathways to education, economic opportunity and community participation.[12,13,14]

The energy community, however, often assumes that all household members benefit equally from greater energy access. This overlooks unequal distribution. For example, even when electricity is available, kitchen lighting or food processing appliances may be lacking.[15] Existing gender roles and power imbalances, including men's decision-making and women's financial/mobility constraints, prevent women from automatically benefiting from improved energy access.[16] A gender-blind approach thus reinforces gender inequalities, making gender-responsive energy policies crucial for equal benefit distribution.

While the role of women in achieving SDG7 is vital, it remains underrecognized. Representing half of consumers and voters, women represent a substantial – yet often untapped – market. Energy companies that strategically engage women as both residential customers and, crucially, business owners requiring energy for productive uses, see increased profitability and market sustainability.[17] Ignoring these demographic factors risks missing key consumer insights and hindering the adoption of technology.

Women's first-hand knowledge of household energy use is also invaluable in designing effective, user-friendly energy products, such as clean cooking solutions.[18,19,20] Companies that prioritize women's perspectives gain a competitive edge through customer loyalty and market penetration.[21,22] Furthermore, women's inclination toward energy-efficient appliances aligns with SDG7.3 and offers opportunities for companies to expand sustainable offerings and enhance their corporate social responsibility.[23,24,25]

Meaningfully engaging women in energy project planning and implementation reduces the risk of failure by ensuring consideration of energy's social and practical aspects. This leads to greater efficiency and resource optimization. This strategic inclusion enhances project outcomes and reinforces a company's reputation as supporting gender equality and inclusion within the energy sector. Thus, engaging women is a strategic business decision for successful, sustainable energy solutions.

Economic opportunities in the energy sector

Despite comprising nearly half the global workforce, women are notably underrepresented in employment and leadership roles across the energy sector. Limited data suggests they represent just 22 per cent of the oil and gas workforce and 32 per cent of those employed in renewables.[26] Women are also often concentrated in lower-paid administrative roles, while their representation in technical, managerial and policy-making positions is minimal. Amongst utility board executives, for example, their representation is only around 5 per cent.[27] This stems from a combination of cultural norms, limited access for women to science, technology, engineering and mathematics (STEM) fields and workplace biases. The latter include perceptions about physical strength requirements and scepticism regarding women's abilities[28,29] Women also face hiring/promotion biases, lack of mentorship and safety concerns.

At the same time, the projected tripling of the renewables workforce by 2030[30] offers significant job opportunities for women across the value chain,[31] fostering their financial independence. Increasing women's participation, especially in technical and leadership roles, is also crucial for a sustainable energy transition. Women's representation in national parliaments leads countries to adopt more stringent climate change policies resulting in lower emissions. Furthermore, the energy transition will enable women to create businesses, such as distributing solar products or clean cooking solutions, which can boost economic empowerment and accelerate clean energy access.[32,33,34] Supporting women's entrepreneurship through business incubators, financing and skills development is therefore also essential.

In addition, the energy sector itself stands to gain in performance and sustainable growth through greater participation of women.[35] Indeed, gender diversity demonstrably boosts business performance, sustainability, and innovation.[36] Diverse perspectives deepen understanding of customer needs, directly improving marketing and product design to drive wider adoption. Women's strong connections, particularly with other women, also make them effective sales representatives and community leaders. Inclusive networks strengthen community ties and sales effectiveness, particularly improving outreach to historically underserved customer segments and building trust. Recognizing this, energy companies often strategically hire women to drive sales and energy access.[37]

With the renewable energy boom demanding skilled labour, the recruiting, retaining and promotion of women is crucial in bridging skills gaps, ensuring a sustainable, efficient energy transition.[38]

Globally, however, the persistent underrepresentation of women in energy-related political and regulatory decision-making significantly impacts policy development and outcome.[39] This imbalance, compounded by limited gender data and awareness among policymakers, can lead to energy strategies that fail to address diverse societal needs. Cultivating an enabling environment through gender-responsive energy planning, policymaking, regulation and progress monitoring is therefore essential in fostering women's participation in the energy sector.

Why gender data matters

For an effective, inclusive and sustainable energy transition – and the achievement of an SDG7 that also advances SDG5 on gender equality – gender data are crucial. Such information illuminates how women and men are represented in energy sector jobs and leadership roles. It also highlights their respective representation in entrepreneurship and their roles as beneficiaries of energy access, making otherwise invisible inequalities measurable.[40]

Gender data should therefore directly shape energy project design and policy in the following ways:

- **In support of policy formulation:** Gender data are pivotal for sound energy policy, enabling evidence-based approaches that translate goals into action.[41] Data on women's underrepresentation in technical roles, for example, should prompt policies promoting gender diversity through targeted recruitment and retention. By addressing women's specific constraints, gender data can thus help shape policies and translate objectives into actionable strategies for a more inclusive sector. Data on gender across the Economic Community of West African States (ECOWAS), for example, was crucial in developing the organization's Policy for Gender Mainstreaming in Energy Access. This data-driven analysis revealed how gender inequality hinders development and limits opportunities, providing evidence and a rationale for the policy's vision and objectives.[42]

- **In informing energy project design:** Gender data are fundamental to effective design, as they can reveal distinct energy needs and usage patterns, ensuring tailored and impactful solutions for all. By exposing disparities in access and representation – such as in employment, leadership and entrepreneurship – data enables targeted programme development. This can effectively promote inclusive access and foster a sustainable energy transition. For example, over 90 per cent of World Bank energy lending operations include a gender gap analysis. This is based on gender data and has resulted in the inclusion of specific actions that aim to close the gender gap.

- **In setting targets and tracking progress:** Gender data are essential in setting measurable targets and tracking progress towards gender equality. Strong monitoring, evaluation and reporting that is based on this data can secure high-level commitments to gender equality programmes. Without these data, identifying gaps and monitoring progress is impossible, hindering accountability and the development of an inclusive energy sector. As an example, the Ministry of Energy of the Republic of Chile now issues *Energia + Mujer* (Energy + Women) annual reports. Published by its Gender and Human Rights Office, these track key indicators such as the percentage of women in management and the gender pay gap in the energy sector.[43]

Gender data are therefore vital for a sustainable energy transition. By identifying inequalities, informing projects, shaping policies and enabling progress they reveal the reciprocal benefits of gender equality and sector performance. They also provide the perspective necessary to dismantle barriers to women's access, while also highlighting missed opportunities for sector growth.

II. Adopting Gender Indicators for a Sustainable Energy Transition: The Way Forward

This policy brief makes the following recommendations:

Build upon existing efforts

International initiatives are now increasingly highlighting the crucial connection between gender equality and energy, advocating for gender integration.

SDG7 tracking reports stress the need for gender-responsive policies and sex-disaggregated data for energy access and women's empowerment.[44] This is a point echoed by the Gender and Energy Compact,[45] while in 2024, the Group of 7 (G7) Climate, Energy and Environment Ministers' Meeting also committed to better gender data collection.[46]

The growing focus on strengthening gender indicators and sex-disaggregated data in the energy sector directly supports SDG7. This can be seen in the work of the Equality in Energy Transitions Initiative, for example, which recognizes that limited data impedes progress.[47]

Building on this global momentum, specific gender and energy data collection initiatives are gaining further traction. IRENA, for example, is actively researching gender balance in renewables through surveys and studies across various technologies. This has revealed persistent underrepresentation of women in key roles.[48,49,50,51] The IEA Gender and Energy Data Explorer tracks women's employment, leadership, entrepreneurship and patenting in selected countries. Elsewhere, the Multi-Tier Framework (MTF) for energy access[52] has been gathering gender-specific household energy data, while in 2022, the Regulatory Indicators for Sustainable Energy (RISE) framework[53] incorporated gender tracking across numerous countries, marking progress in understanding the gendered impacts of energy regulations.[54]

Develop a robust methodology

Building on these initiatives and as part of the effort to transition to universal access to sustainable energy, a robust and inclusive methodology is needed to effectively develop and track gender indicators. This requires collaboration, strategic planning and a pragmatic approach to indicator selection and data collection. This selection must also be sensitive to diverse national contexts.

Establish a working group: This dedicated working group should leverage diverse perspectives and sources of expertise to strengthen gender indicators, drawing on a variety of organizations.

The working group's members should include representatives from the custodian organizations of SDG7 and SDG5; national focal points; and experts from key government ministries, such as energy, gender, statistics and economic development. This will ensure national relevance and practical data collection. The group should also consult civil society, women's groups, academia and research institutions. It should prioritize geographical balance and broad expertise in order to establish a collaborative and impactful process. The group should then deliver a final report recommending gender indicators and data collection methods.

Create a roadmap: The working group should first establish a clear timeline and comprehensive work programme in order to ensure the timely and effective development of gender indicators. This roadmap will define key milestones, activities and responsible parties, providing a structured framework. The work programme should also encompass workshops for dialogue, knowledge-sharing and consensus on indicator scope, candidates and methodological challenges. The timeline should include deadlines for deliverables, such as a preliminary indicator list, cost-benefit analyses and a data availability assessment. The final report should detail the agreed indicators and the tracking framework. Regular progress reviews and communication strategies should be integrated to maintain progress and keep stakeholders informed.

Develop an agenda: The development of gender indicators requires a carefully structured agenda that prioritizes relevance, feasibility and national contexts. This process begins by identifying potential indicators. This, in turn, should be informed by a cost-benefit analysis and technical discussions that balance ambitious goals with data availability. The agenda must assess existing data sources and methodological challenges, including quality and disaggregation. It must also identify strategies for enhancing data collection and explore innovative methods. Furthermore, the agenda must explicitly strengthen country statistical capacities through technical assistance and standardized tools. Finally, the process must accommodate diverse Member State priorities and capacities, allowing flexibility in indicator adoption while potentially establishing a core set of universally applicable measures alongside those that are nationally relevant.

Strengthen political commitment

Achieving an inclusive and sustainable energy transition that integrates gender considerations demands strong political commitment. It must move beyond mere acknowledgment to active championing through targeted communication and advocacy.

Fostering broad consensus and partnerships: Building widespread political commitment will require actively engaging diverse stakeholders. These include government agencies, national statistical organizations (NSOs), non-governmental organizations (NGOs), community leaders, businesses and affected populations. Inclusive participation and strong coalitions are essential in ensuring that gender indicators in sustainable energy reflect shared understanding and commitment.

Align with existing agendas and priorities: Gaining political traction for gender indicators requires strategic alignment with national and global priorities. Demonstrating how gender-responsive data and policies contribute to economic goals, such as job creation, the care economy and the National Determined Contributions (NDCs), will strengthen the indicators' importance. Highlighting the political benefits enjoyed by champions of gender indicators, while also adopting a flexible approach that respects national contexts, can secure a broader buy-in.

Identify and engage key champions and stakeholders: Cultivating political commitment necessitates identifying and actively engaging with influential stakeholders. These include ministries of energy, utilities, renewable energy companies, women's energy cooperatives, international agencies and donors. To cultivate a strong network of advocates for gender-sensitive energy indicators, engagement efforts can be strategically targeted. This can be done by understanding a given stakeholder's influence on energy transition monitoring and policy. It also requires an assessment of the current political will for gender equality and an identification of opportunities within existing frameworks.

Implement a targeted communication and advocacy strategy: A communication and advocacy strategy is crucial in translating the need for gender indicators into concrete political action. This involves crafting clear, evidence-based messages for policymakers, industry leaders and civil society. These messages should emphasize the practical benefits of gender data in sustainable energy and alignment with initiatives such as the Gender and Energy Compact. Direct engagement with government officials, concise policy briefs and coordinated advocacy at national and international forums can help lobby for policy change. Alongside discussions on technical assistance for developing countries, such activity can also foster a supportive environment for the adoption of gender indicators in an inclusive and sustainable energy transition.

Endnotes

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[19] See endnote 16 on the previous page.

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[31] Potential areas of employment include design, manufacturing, marketing and customer support.

[32] See endnote 17 above.

[33] See endnote 12 on the previous page.

[34] Women-led enterprises can find significant entrepreneurial opportunities in clean cooking, including LPG distribution, electric cooking appliance sales, ethanol production, and biogas systems. Women are also crucial in the cookstove carbon market as distributors or project agents.

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[53] See Regulatory Indicators for Sustainable Energy (RISE) website, https://rise.esmap.org/.

[54] RISE evaluates national policy and regulatory frameworks for renewables, energy efficiency and electricity access. It also provides investment environment snapshots, identifies areas of SDG7 improvement and communicates global progress to policymakers and investors.

SDG7 Policy Brief on Energy's Interlinkages with Decent Work (SDG8)

CONTRIBUTING ORGANIZATION

IRENA
International Renewable Energy Agency

KEY MESSAGES

- **Renewable energy can be a driver of job creation.** According to IRENA's most recent assessment, the renewable energy sector employed 16.2 million people, worldwide, in 2023. Under IRENA's Paris Climate Agreement-compliant energy transition pathway, the 1.5°C Scenario, that number could nearly double by 2030, reaching some 30 million jobs. In addition, there would be around 68 million jobs in energy efficiency access to energy-linked jobs, especially in underserved regions. In 2023, most renewable energy sector jobs were concentrated in a small number of countries and sector.

- **Decentralized renewable energy (DRE) is key to accelerating progress on Sustainable Development Goals 7 (SDG7) and 8 (SDG8).** While such systems currently form a small share of deployed renewable energy capacity, they can create substantial local employment and support a large number of productive livelihoods. In particular, DRE provides opportunities for entrepreneurship that can be led by women in rural communities.

- **Holistic policy frameworks are not only necessary in driving structural shifts in the energy sector, but also in advancing a just energy transition and a decent work agenda.** These frameworks need to encompass a variety of fields, including: industrial policies; labour market measures; comprehensive educational and skilling efforts; strategies aimed at recruiting more women and individuals from other under-represented groups; and social protection measures for traditional energy sector workers, as they try to find decent new jobs. Well-designed and coordinated skilling, upskilling and reskilling programmes can help minimize misalignments and create a resilient workforce.

- **Workforce diversity is not only a matter of fairness – it also allows the industry to tap a greater pool of talen**t. Women need to be part of the workforce, not only in administrative functions, but also in decision-making positions. Likewise, the industry will benefit from the inclusion of racial and ethnic minorities, individuals from low-income backgrounds and those with disabilities.

I. Interlinkages between SDG7 and SDG8

Ensuring access to affordable, reliable, sustainable and modern energy is the goal of SDG7. Promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all is the aim of SDG8. These two goals are thus intrinsically linked. Coordinated policy action can therefore support the realisation of both SDGs, as well as the broader 2030 Agenda.

Access to affordable and reliable energy is a foundational requirement for all economic activity, powering industry and commerce and fostering economic development. In this regard, well-designed policies can address multiple challenges.

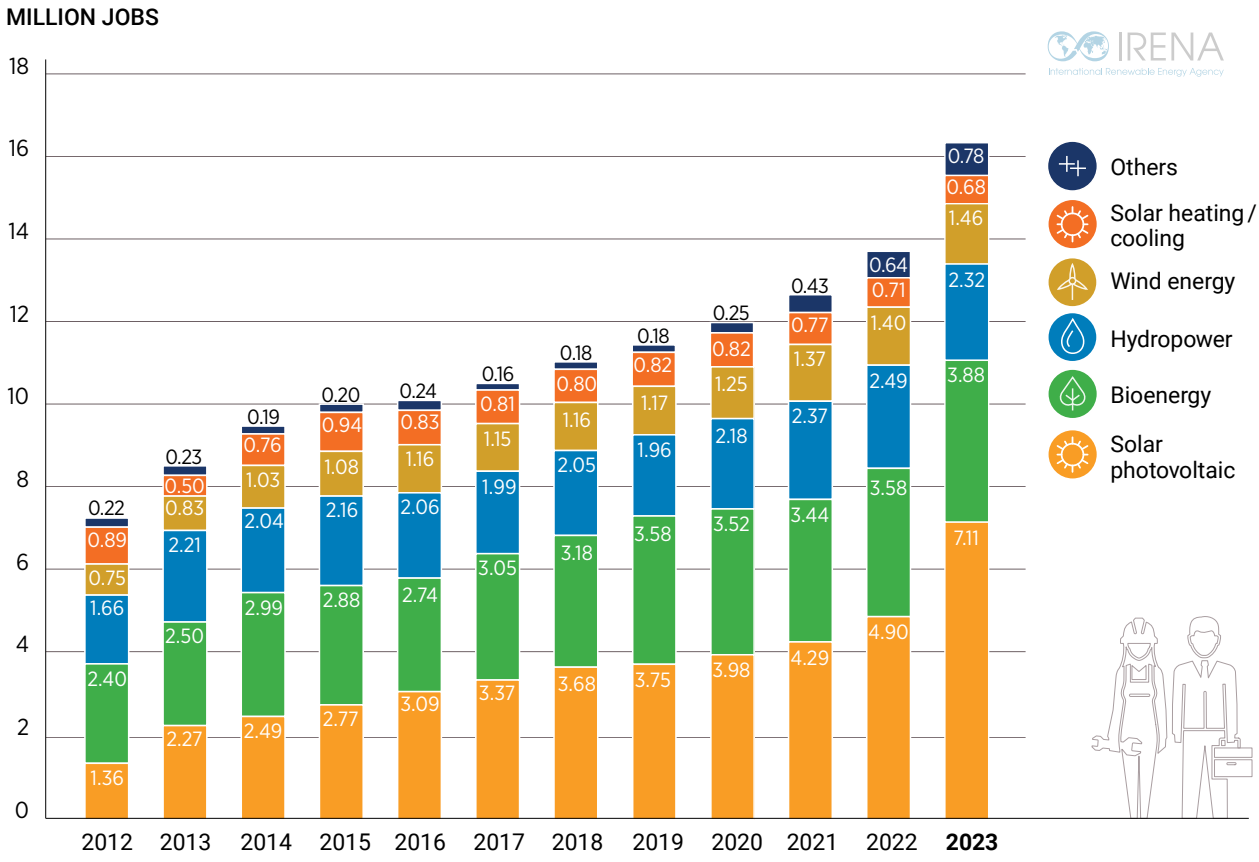
Renewable energy provides employment opportunities for people with a variety of backgrounds and skill sets, while helping to close the energy access deficit and support climate action. In addition to direct and indirect jobs in the energy sector and its supply chain, induced employment drives economic activity in other sectors. This can be a critical aspect, particularly in rural and remote regions. When people hold well-paying and secure jobs – predicated in part on adequate skilling – economic development is more sustained and more inclusive.

A total of 585 gigawatts (GW) of new renewable electricity capacity were installed globally in 2024. This was the largest annual increase on record and was 15 percent more than the additions seen in 2023. With these additions, renewables – led by solar photovoltaic (PV) panels – accounted for 92.5 per cent of total new power capacity installed in 2024. That year, cumulative renewable power capacity reached 4,448 GW, globally.[1]

Along with an expanding capacity for equipment manufacture, trends in deployment are key in shaping renewable energy employment. This is the case both in terms of overall employment numbers and the distribution of jobs around the world.

IRENA's most recent analysis of the renewable energy workforce shows that in 2023, the sector employed 16.2 million people worldwide. This was an increase from 13.7 million in 2022. Mirroring the record expansion of global solar PV capacity, the number of solar PV jobs saw the most significant increase during that period. This was followed by employment in biofuels, then hydropower followed by wind power (see Figure 1).[2]

FIGURE 1
Jobs in renewable energy, by technology, 2012-2023



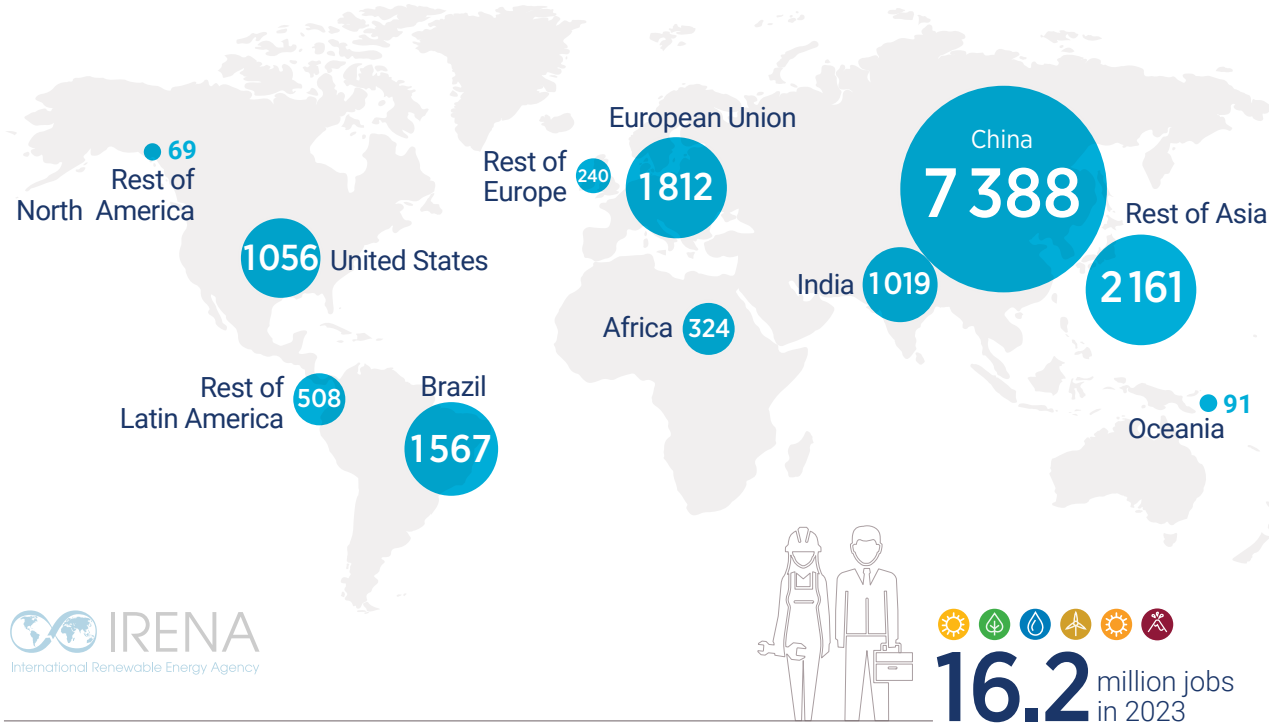
Source: IRENA and ILO 2024.

Smaller-scale technologies, including DRE solutions, employ fewer people, but nonetheless present great local economic opportunities. These include both formal and informal employment,[3] especially in countries where large numbers of people do not have access to electricity and/or clean cooking fuel.[4] In such places, employment also includes jobs providing clean cooking solutions, which are often distributed and serviced locally. Indeed, this field offers vast employment opportunities in manufacturing, assembly, distribution, retail and maintenance.[5]

DRE technologies can also help build domestic economies through productive end-use applications. This is particularly relevant in the agricultural value chain, as well as in fostering entrepreneurship, especially among women.[6]

FIGURE 2
Renewable energy employment in selected countries and regions, 2023

THOUSAND JOBS



Source: IRENA and ILO 2024.

Jobs in renewables are not evenly distributed across different regions and countries, however. China, Brazil, India, the United States and member states of the European Union continue to be by far the biggest employers in renewable energy, while other parts of the world, including Africa, have so far only benefited in limited ways (see Figure 2).[7]

The number of jobs in the renewable energy sector and their geographical distribution depends on several factors. These include: technological developments and cost trends; the ability to access affordable financing; overall market dynamics; the strength and location of supply chains; and the creation of a robust, skilled workforce. Government policies facilitating renewable energy deployment and industrial policy tools – such as domestic content requirements to build local supply chains – have a strong influence, as do corporate strategies.

Enhancing domestic value creation is particularly challenging for countries starting from a limited industrial base. Outcomes depend on sufficient economies of scale, the stability of local market demand and the ability to procure a portion of the required inputs domestically. Industrial policies can help in this regard. They can limit import dependence, shore up resiliency to external shocks and boost local or regional job creation. Access to qualified personnel is also a major consideration when deciding where to locate renewable energy production hubs. Training and skilling measures are therefore also critical.

If the world accelerates action in accordance with IRENA's 1.5°C Scenario in alignment with the Paris Climate Agreement, IRENA's socioeconomic modelling finds that renewable energy employment could reach about 30 million jobs by 2030, with another 40 million jobs in energy efficiency and system flexibility.[8] Globally, over the next few decades, job gains in renewable energy and other energy transition-related fields are likely to surpass fossil fuel job losses.

Labour market policies will need to address a range of existing and emerging challenges, however.

The jobs created in the energy transition need to be decent, addressing any adverse impacts that workers may experience. This includes those occurring as a result of the informal nature of many jobs in the Global South. Workforce misalignment may also arise, as the creation of new jobs may not take place on the same timescale as the loss of employment. Spatially, new jobs are not necessarily being created in the same communities, regions or countries where job losses may occur. Also, job gains and losses may affect different sectors of the economy, given the diverging sets of inputs needed in rising and declining industries.

In educational terms, a further challenge is that occupational patterns and the skills associated with declining areas of employment do not necessarily match those required by jobs in emerging fields. The renewable energy sector requires a set of highly diverse skills and occupations. These include project managers, scientists and engineers, but also technicians, electricians, welders, pipefitters, truck drivers, crane operators and many others. As countries adopt more ambitious energy transition targets, skill gaps that are already noticeable could grow. A nuanced understanding of evolving skill set requirements – and of potential gaps in fulfilling these – is essential. Comprehensive assessments of existing labour market strengths and weaknesses are needed. Finding ways to retrain and reorient workers in manufacturing and the traditional utility sector so that they can meet the specific demands of renewable energy technologies is also required. In addition, workforce development programmes need to ensure opportunities for groups that typically face discrimination. These include women, indigenous communities, people with disabilities, youth and the elderly. Such an awareness can result in broader workforce diversity and allows the renewable energy industry to tap into a broader talent pool.

It is also important that such population groups be given better access to technical and vocational education and training (TVET) and science, technology, engineering, and mathematics (STEM) programmes (see Box 1). Gender-sensitive policies and training opportunities are lacking in many countries, however, hindering women's equal participation.[9]

Box 1: Further interlinkages with other SDGs

Diversity needs to be taken into consideration as the renewable energy transition unfolds. IRENA's most recent analysis shows that while women hold an estimated 40 per cent of jobs in solar PV,[10] in other technologies, such as wind, their share is only half this level.[11] Meanwhile, across the renewable energy industry landscape, women's share in employment is only 32 per cent.[12] This was, however, still better than in the oil and gas industry, where their share was 22 per cent.

IRENA's analysis found that women held a significant share of the administrative positions in renewables. Yet, these were typically less well paid than equivalent jobs held by men, while they also offered limited career progression. In addition, the representation of women in senior management positions remained painfully small in both the wind and solar PV sectors. This was also the case when it came to women with higher education careers, both in STEM and non-STEM areas.

Women, however, play many critical roles in DRE and in access to modern energy, both as engaged end-users and as primary beneficiaries. Their involvement is therefore essential in ensuring that energy solutions address women's unique needs and challenges effectively.

Decentralised technologies can also be powerful enablers of socio-economic development, energy equity and the active participation of women in the workforce. Decentralised solar PV systems, for example, have been transforming the entrepreneurial landscape in underserved and remote areas. Entrepreneurship can thrive not only in the sale and deployment of solar PV solutions, but also through "productive use" in various types of enterprises. By providing reliable and affordable energy access, solar PV systems enable entrepreneurs to establish and grow businesses that were previously constrained by limited or unstable electricity supply.

Countries that expand DRE therefore also need to make more jobs in the sector accessible to women, who face many barriers when trying to develop such entrepreneurial initiatives.[13] Similarly, clean cooking markets offer unique avenues for women's entrepreneurship and employment, particularly in rural and peri-urban settings.[14]

Historically marginalised and underrepresented individuals and communities must also be given equal opportunities to participate meaningfully through roles at all levels. These range from that of consumer to that of producer and decision-maker. Fair ownership structures, workforce participation and leadership roles can help enable these opportunities.

Achieving universal access in the energy sector can be a key step toward reducing inequalities. This is the case not only within the industry itself, but also in other economic sectors and in society as a whole (SDG10). This involves being open to the participation of people with disabilities, ethnic minorities, LGBTIQ+[15] and other individuals from groups that have faced systemic barriers. This can ensure that they are empowered to thrive in the renewable energy transition workforce. Mainstreaming inclusion and diversity across the energy sector through policies, training programmes and equal opportunity approaches contributes to combatting discrimination and bias, whether conscious or unconscious.

II. Policy implications and recommendations

As countries move forward with the energy transition, they have to confront a variety of structural obstacles. Key among these is the transformation of economic structures. This involves changes that can impact employment in a number of ways, including by creating potential labour market misalignments and alterations in job quality.

With time and carefully-crafted policies that leverage country-specific strengths, however, these obstacles can be overcome. Such polices can strike a balance between demand-side initiatives focused on reducing costs and boosting renewables, and supply-side policies that localize manufacturing and job creation. A holistic policy framework is therefore required.

In addition:

- **Clear long-term plans are essential to effectively guide national and regional energy policies in concert with other policy objectives, such as economic diversification and development.** Ambitious targets and enabling policies create a framework for investors, businesses, communities and others that is conducive to action. Policy stability and predictability are essential in supporting investment decisions, preparing the workforce with the necessary skills and undertaking a myriad of other steps to advance the energy transition.

- **By addressing existing structural barriers, industrial policies can help countries build and enhance their domestic capabilities, shore up resiliency to external shocks, create value locally and boost job creation.** Access to qualified personnel is a major consideration when deciding where to locate renewable energy production hubs. Key measures include programmes that nurture fledgling businesses and develop viable domestic supply chains. These can include measures such as the provision of low-cost loans or land, targeted incentives and subsidies and domestic content requirements.

- **Governments can play a direct role.** They can design research and development (R&D) strategies for renewable energy; promote the adoption of renewables in order to create steady demand; facilitate technology transfers in renewables through targeted incentives; encourage local firms to join renewable energy supply chains and foster partnerships; and link policies to labour initiatives that turn goals into job opportunities.

- **Overcoming occupational and sectoral gaps requires policies and measures that keep up with growing demand for skills in renewable energy.** National climate and energy plans, such as Nationally Determined Contributions (NDCs), need to integrate renewable energy education and training. Strategic planning should entail

comprehensive assessments of relevant workforce skills, including the identification of skills synergies between declining and expanding industries and appropriate upskilling and reskilling efforts. Collaboration among governments, industries and educators is essential. Renewable energy concepts should be embedded in education curricula. International standards for renewable energy skills are also needed.

- **A decent jobs agenda is required.** This would ensure that benefits accrue to the workers whose time, skills, dedication and creativity underpin the success of any enterprise. This agenda includes establishing and enforcing labour standards, along with collective bargaining among governments, employers and unions. Social protection measures and initiatives need to be in place to protect vulnerable communities and laid-off workers, particularly as rapidly-growing applications of artificial intelligence (AI) may trigger significant disruptions.

- **Overcoming the lack of diversity in the workforce is not only a matter of fairness and equity, but also allows enterprises to tap a far broader pool of talents and ideas.** Businesses need to scrutinise their hiring practices, workplace policies and career and retention measures in order to raise the participation of underrepresented groups, including women and youth. This can be driven either by government policies, or undertaken voluntarily.

- **Inclusive decision making is key.** To sustain political support and public acceptance for the energy transition, meaningful public engagement is key in matters such as the design and implementation of renewable energy projects. Civil society actors (community energy groups, unions, gender mainstreaming advocates, environmentalists and many others) need to be active participants. Free, prior and informed consent is critical to a rights-based approach.

- **Adequate financing is required, not only in support of renewable energy deployment, but also in support of wider social and economic goals.** All too often, finance discussions are narrowly focused on the needs and interests of investors and project developers, without considering the ways in which these financing instruments may impact communities or workers negatively. Discussions on investment are often focused on the development and deployment of technology. While this is important, it is equally critical to secure financing – both public and private – to build skills and develop the workforce, as well as to support regional economic development and provide social protection.

Endnotes

[1] See *Renewable capacity statistics 2025,* International Renewable Energy Agency, Abu Dhabi 2025, www.irena.org/-/media/Files/IRENA/Agency/Publication/2025/Mar/IRENA_DAT_RE_Capacity_Statistics_2025.pdf.

[2] See *Renewable energy and jobs: Annual review 2024,* International Renewable Energy Agency, Abu Dhabi and International Labour Organization, Geneva 2024, www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Oct/IRENA_Renewable_energy_and_jobs_2024.pdf.

[3] Informal employment in the DRE sector refers to non-contractual engagements with incorporated companies in the industry. These include a variety of arrangements, including people involved in product retail (such as commissioned sales agents).

[4] See Renewable energy and jobs: Annual review 2024, International Renewable Energy Agency, Abu Dhabi and International Labour Organization, Geneva 2024, www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Oct/IRENA_Renewable_energy_and_jobs_2024.pdf; and Clean cooking as a catalyst *for sustainable food systems.* Clean Cooking Alliance STATUS REPORT 2023, https://cleancooking.org/wp-content/uploads/2023/11/CCA_Clean-Cooking-as-a-Catalyst-for-Sustainable-Food-Systems.pdf

[5] See *Decentralised solar PV: A gender perspective,* International Renewable Energy Agency, Abu Dhabi 2024, www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Oct/IRENA_Decentralised_solar_PV_Gender_perspective_2024.pdf and

[6] UNEP and FAO, *Sustainable Food Cold Chains: Opportunities, Challenges and the Way Forward*, United Nations Environment Programme, Nairobi and Food and Agriculture Organization, Rome 2022, https://openknowledge.fao.org/server/api/core/bitstreams/cf42e3c6-157e-4ea9-8873-8b3cc9242b96/content.

[7] See Renewable energy and jobs: Annual review 2024, International Renewable Energy Agency, Abu Dhabi and International Labour Organization, Geneva 2024, www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Oct/IRENA_Renewable_energy_and_jobs_2024.pdf

[8] These figures are predicated on the assumption that the world accelerates action in accordance with IRENA's 1.5°C Scenario, which is aligned with the Paris Climate Agreement. See *World energy transitions outlook 2023: 1.5°C pathway,* International Renewable Energy Agency, Abu Dhabi 2023, www.irena.org/-/media/Files/IRENA/Agency/Publication/2023/Jun/IRENA_World_energy_transitions_outlook_2023.pdf.

[9] See Renewable energy: A gender perspective, International Renewable Energy Agency, Abu Dhabi 2019, www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Jan/IRENA_Gender_perspective_2019.pdf.

[10] See IRENA (2022), Solar PV: A gender perspective, International Renewable Energy Agency, Abu Dhabi, www.irena.org/Publications/2022/Sep/Solar-PV-Gender-Perspective

[11] See *Wind Energy: A Gender Perspective,* International Renewable Energy Agency, Abu Dhabi 2020. www.irena.org/Publications/2020/Jan/Wind-energy-A-gender-perspective

[12] See *Renewable energy: A gender perspective,* International Renewable Energy Agency, Abu Dhabi 2019, www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Jan/IRENA_Gender_perspective_2019.pdf.

[13] See Decentralised solar PV: A gender perspective, International Renewable Energy Agency, Abu Dhabi 2024, www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Oct/IRENA_Decentralised_solar_PV_Gender_perspective_2024.pdf

[14] See Clean Cooking Alliance, 2023.

[15] LGBTIQ+ stands for lesbian, gay, bisexual, transgender, intersex and queer. See *Inclusion of lesbian, gay, bisexual, transgender, intersex and queer (LGBTIQ+) persons in the world of work: A learning guide,* International Labour Organization, Geneva 2022, https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@gender/documents/publication/wcms_846108.pdf

Advancing SDG7 in the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States

CONTRIBUTING ORGANIZATIONS

United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and the Small Island Developing States (UN-OHRLLLS)

United Nations Economic and Social Commission for Western Asia (UN ESCWA)

International Renewable Energy Agency (IRENA)

United Nations Industrial Development Organization (UNIDO)

United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP)

KEY MESSAGES

- For the least developed countries (LDCs), landlocked developing countries (LLDCs) and small island developing states (SIDS), closing the energy access gap, transitioning to decarbonized energy systems, and climate-resilience remain major challenges. Without urgent and scaled-up efforts in these countries, the world will fall short of its Sustainable Development Goal (SDG) 7 target of universal access to affordable, reliable and modern energy services by 2030.

- LDCs, LLDCs and SIDS are off track in achieving access to electricity by 2030. In 2023, 59 per cent of the population of the LDCs had access to electricity, 61 per cent of the population of the LLDCs and 77 per cent of the population of the SIDS. With the current rate of growth, it will take the LDCs 21 years to reach universal access to electricity and the LLDCs 27 years. The SIDS, meanwhile, will take a massive 67 years.

- In 2023, over 70 per cent of the global population without access to electricity lived in an LDC.

- Persistent disparities between urban and rural areas – as well as remote islands – further complicate progress. Electrification rates remain significantly lower in rural areas, reinforcing broader development inequalities.

- Advances in clean cooking in the LDCs, LLDCs and in some SIDS remain modest. Over the past 10 years, access to clean cooking in these countries has been increasing at a slower rate than electrification.

- The share of modern renewable energy in total final energy consumption (TFEC) remains relatively low in the LDCs, LLDCs and SIDS. This is despite the fact that renewables have the potential to bridge the significant energy access gap between urban and rural communities.

- Urgently addressing the current financing gap -especially so amid declining levels of official development assistance (ODA)- is crucial to scaling sustainable energy solutions and supporting a just energy transition.

- Ensuring that the energy transition is inclusive and benefits all segments of society is equally important. Engaging youth, women and marginalised communities – including the forcibly displaced – in this transition not only broadens employment opportunities, but also plays a crucial role in fostering inclusive growth within the green economy.

- Beyond their vital role in creating resilient and sustainable energy systems, renewables can unlock transformative socio-economic opportunities. They can also foster local value addition through enhanced agricultural productivity, agroprocessing, industrialization and the development of productive capacities.

- The Doha Programme of Action for LDCs, the Antigua and Barbuda Agenda for SIDS, and the Awaza Programme of Action for LLDCs, all place a strong emphasis on access to electricity, energy transition, as well as access to clean cooking.

1. Introduction

Encompassing the three dimensions of access, efficiency and renewable energy, sustainable energy is a key enabler in many SDGs. Yet, despite the enormous potential that sustainable energy has, a major acceleration in progress and financing among the LDCs, LLDCs and SIDS is still required, if they are to achieve SDG7 by 2030.

LDCs, LLDCs and SIDS, comprised of 92 countries and home to 1.4 billion people. These countries are also some of the most vulnerable in the international community. The 44 LDCs are characterized by low levels of socio-economic development and investment. The 32 LLDCs and 39 SIDS face particular challenges stemming from their geographical isolation and distance from global markets. Altogether, they each have their own, unique challenges.

Despite this, since 2015 the LDCs, LLDCs and SIDS have taken strides towards achieving the SDG7 targets. The importance that energy transition plays in these countries' overall development is reflected in the three programmes of action outlined below:

- **The Doha Programme of Action for LDCs (DPOA)**

  Adopted in 2022, the DPOA underlines the importance of access to affordable, reliable, sustainable and modern energy in achieving structural transformation. The DPOA also recognizes the challenges LDCs face in the generation, transmission and utilization of energy. It sets a target of ensuring universal access to affordable, reliable, sustainable and modern energy services by 2030. Furthermore, the DPOA aims to double financing from all sources in support of clean and renewable energy, while also enhancing capacities in energy production, trade and distribution.

- **The Antigua and Barbuda Agenda for SIDS (ABAS)**

  Adopted in 2024, ABAS identifies a just, inclusive, equitable and resilient energy transition as a key development priority through 2034. The agenda also emphasizes the need for investments and partnerships, calling on the international community to support sustainable energy transitions and energy efficiency. By strengthening support, investment and partnerships – while also creating enabling policy, legal, and regulatory frameworks – the agenda aims to improve access to affordable, reliable, sustainable and modern energy, particularly from renewable sources.

- **The Awaza Programme of Action for LLDCs (APOA)**

  Adopted in 2024, the APOA supports the development of inclusive and resilient energy systems to accelerate LLDCs' progress toward SDG7. Similar to the Doha Programme of Action for LDCs, it aims to achieve universal access to affordable, reliable and modern energy by 2030. It also highlights the importance of cross-border infrastructure and enhanced energy connectivity.

With 215 million people in LLDCs still lacking reliable energy, the APoA emphasizes just, inclusive and secure energy transitions, while highlighting the need to boost both capacity and funding for clean and renewable energy.

As highlighted by these three Programmes of Actions, the LDCs, LLDCs and SIDS all face different sets of energy challenges. The progress achieved also varies depending on which of the three dimensions of sustainable energy – access, efficiency or renewables – is being measured.

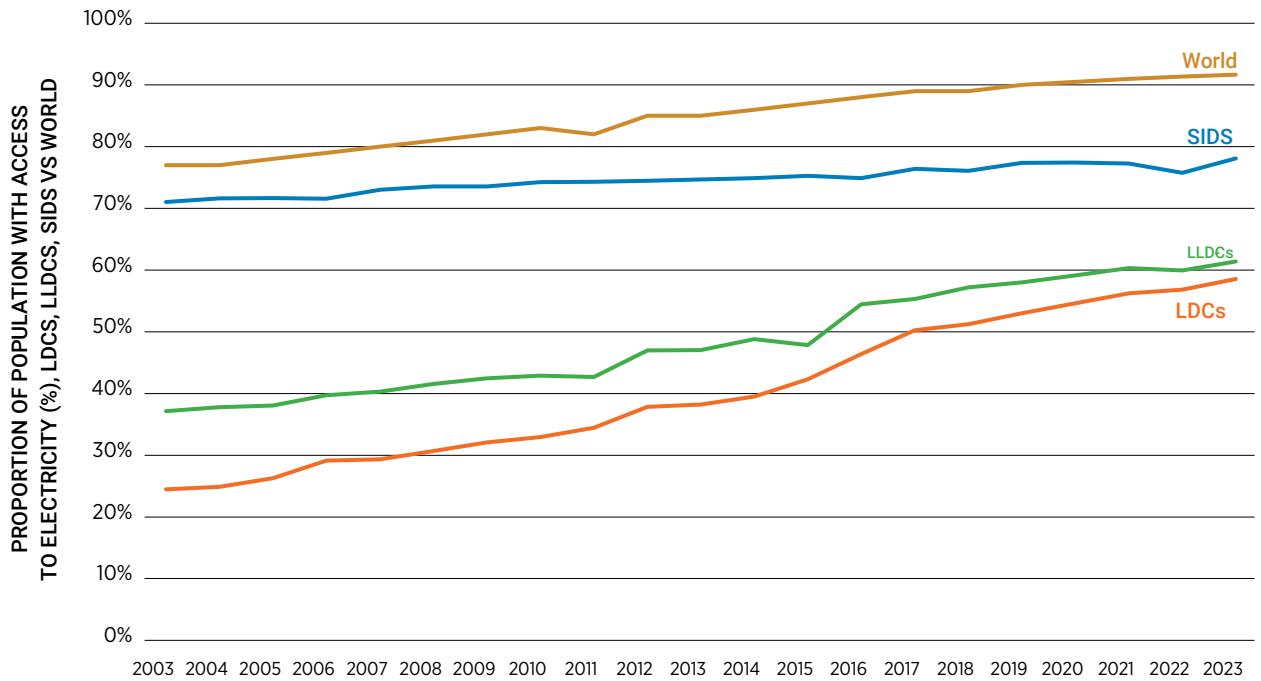
This policy brief provides a snapshot of how vulnerable countries are progressing towards achieving SDG7 and what is needed to accelerate their energy transition. This brief also provides some best practices from vulnerable countries that have made rapid progress in achieving the targets set by SDG7, while also identifying some key policy recommendations for fast-tracking progress and addressing key challenges.

2. Summary of Progress According to SDG7 Indicator

SDG7.1.1: Access to electricity

In the LDCs, after a decline in 2022, the electrification rate increased to 59% in 2023, up from 42% in 2015. In the LLDCs, 61 per cent of the population had access to electricity in 2023, up from 48 per cent in 2015.[1] In the SIDS, access to electricity has historically been higher than in the LDCs and LLDCs, standing at 77 per cent in 2023, and has remained largely unchanged since 2015. The majority of LDCs, LLDCs and SIDS have wide disparities between urban and rural access, calling for more targeted efforts to be made in reaching rural areas and, in the case of the SIDS, outer island communities.

FIGURE 1
Population with access to electricity



Source: The World Bank

SDG7.1.2: Access to clean cooking fuels and technologies

In terms of achieving this target by 2030, all three groups of countries are off track. In 2023, the World Health Organization (WHO) estimated that 74 per cent of the world's population relied primarily on clean cooking fuels and technologies.[2] In the LDCs and LLDCs, however, the access rates remained much lower, at 21 per cent and 28 per cent respectively. In the SIDS, access to clean cooking was at a higher rate in 2023 – 60 per cent – although this figure had shown no growth since 2015.[3]

SDG7.2: Substantially increasing the share of renewable energy

In 2022, renewable energy – including traditional uses of biomass – accounted for 17.9 per cent of global TFEC. This was an increase of 2.3 percentage points on 2015. The shares taken by renewables in the LDCs and LLDCs were significantly higher, at 69.1 per cent and 40.8 per cent, respectively. This was largely due to a continued reliance on the traditional use of biomass in these countries. In contrast, when including biomass, the SIDS had a renewable energy share of 16.6 per cent, which was roughly in line with the global average.[4]

While traditional biomass remains a major energy source, it often has negative health and environmental impacts. Transitioning to sustainable bioenergy solutions, such as the use of biogas and improved cookstoves, is therefore critical for all three groups of countries.

SDG7.3.1: Energy efficiency

Improving energy efficiency is also a priority for vulnerable countries and plays a significant role in accelerating the energy transition. Vulnerable countries, however, trail behind the global average when it comes to progress on SDG7.3.1, which calls for a doubling of the global rate of improvement in energy efficiency by 2030. Globally, in 2022, primary energy intensity – which is defined as the ratio of total energy supply to gross domestic product (GDP) – improved 2.1 per cent, from 2021ar. In the LDCs, it improved *(i.e.* decreased) 1.9 per cent, in the LLDCs 1.4 per cent and in the SIDS, 1.5 per cent.

SDG7.A.1: Increasing international financial flows to developing countries in support of clean energy research and development and renewable energy production, including hybrid systems

The rebound in international public financial flows after the COVID-19 pandemic has not reached the LDCs, LLDCs and SIDS. Financing for these vulnerable countries still lags behind their real needs. In 2023, in US dollar (US$) terms, the global level of international public financial flows reached US$ 21.6 billion. LDCs received US$ 3 billion, which was an increase on the US$ 1.7 billion received in 2020, but still far behind the peak achieved in 2016, when investment flows to LDCs reached US$ 8.5 billion.[5]

The LLDCs and SIDS have fared better in attracting public financial flows in support of renewable energy. In 2023, flows to the LLDCs reached US$ 3.62 billion, which was more than 30 per cent up on the previous year. Similarly, inflows to the SIDS increased by over 30 per cent over the same period, reaching US$ 401 million in 2023.

SDG7.B.1: Increasing installed renewable energy-generating capacity in developing and developed countries

When the LDCs, LLDCs and SIDS are compared to either developing countries or developed countries, it is clear that the renewable energy revolution has not yet reached the world's most vulnerable nations. It also becomes evident that the limited growth experienced by the LDCs, LLDCs and SIDS compared to other developing countries reflects the particular structural challenges these countries face.

When measured in terms of watts of renewable energy generating capacity per capita, in 2023, the developed countries averaged a figure of 1,162. That same year, the developing countries averaged 341. In the LDCs, however, the figure was a constant 40 in both 2022 and 2023. In the LLDCs, there was a slight increase – from 104 to 107 – while in the SIDS, the figure rose from 97 to 110 over the same period.

The renewable energy revolution has therefore not yet arrived in these most vulnerable countries. As a result, they are not reaping the benefits of the green energy transition. These benefits include curbs on emissions, the creation of new jobs and the enhancing of resilience to climate change.

3. Best Practices in Accelerating the LDC, LLDC and SIDS Energy Transitions

The energy sectors of the LDCs, LLDCs and SIDS have an extraordinary potential for growth. This, in turn, can have a wide range of impacts on the overall development of these countries.

Many of these vulnerable countries have also already tapped into this growth potential, with several success stories already emerging. This section highlights some of the best practices, ranging from enhancing regional collaboration to country-level innovation.

Improving regional collaboration

Regarding the LDCs, LLDCs and SIDS, the United Nations Industrial Development Organization (UNIDO) has given its support to the establishment and operation of Regional Sustainable Energy Centres (GN-SEC).[6] This has been done in order to enhance regional collaboration and accelerate just energy transitions on a region-wide basis. The centres now serve 120 member states – including 40 out of the 44 LDCs, 35 out of the 39 SIDS and many LLDCs.

The centres operate according to a "from the region for the region" approach and are key enablers of SDG7. This is because they facilitate the transfer of innovative technologies, business models and capacity to the Global South. In partnership with regional stakeholders — such as power pools, regulatory bodies and financial institutions — the centres support a wide range of activities related to policy and regulation, quality infrastructure, knowledge and skills development, awareness raising, and business and investment promotion.

Tailored support for the specific contexts of LDCs, LLDCs and SIDS

The Asia-Pacific region has seen substantial improvements in electricity access over the past decade. As part of this effort, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) has supported the development and implementation of SDG7 roadmaps – strategic planning tools designed to help countries achieve global and national targets on affordable and clean energy. These roadmaps are tailored to the specific contexts of LDCs, LLDCs and SIDS. This means taking into account their unique challenges, such as geographical remoteness, limited infrastructure, energy import dependence and vulnerability to climate change.

Bangladesh and Nepal, for example, have received ESCAP support in aligning their national energy planning with SDG7 targets, emphasizing the integration of renewable energy and off-grid solutions. Elsewhere, the Lao People's Democratic Republic, Mongolia and Kazakhstan now benefit from roadmaps that address energy connectivity challenges and promote regional cooperation in the energy trade.

In addition, through online knowledge hubs – such as the Asia-Pacific Energy Portal[7] – ESCAP monitors and reports on the progress the LDCs, LLDCs and SIDS have made towards achieving SDG7.

Focused support for the LDCs

To accelerate cross-sectoral sustainable energy transition in the LDCs W in the region of the United Nations Economic and Social Commission for Western Asia (ESCWA), it has been providing targeted support to Comoros, Djibouti, Mauritania, Somalia, Sudan and Yemen through a holistic approach focused on capacity building, policy development and innovative financing. Through initiatives such as the Arab Climate Change Capacity Building Project and the Regional Initiative to Promote Small-Scale Renewable Energy Applications in Rural Areas of the Arab Region (REGEND), ESCWA has been addressing critical challenges. These include low levels of access to modern energy, a heavy reliance on traditional biomass, limited clean cooking solutions and acute climate vulnerabilities.

Best practices from the SIDS in advancing wind and green hydrogen pathways

The small Caribbean Island nation of Trinidad and Tobago has recently taken some significant forward strides in its energy transition, by focusing on wind energy and green hydrogen development.

The country's wind energy potential is substantial, with estimates indicating approximately 2.75 gigawatts (GW) of onshore and 32 GW of offshore capacity. After recognizing this potential as a key driver of large-scale renewable energy development, Trinidad and Tobago has developed a national wind energy strategy.[8]

At the same time, the country has been scaling up its green hydrogen development. Building on its legacy as a petrochemical and liquefied natural gas (LNG) hub, Trinidad and Tobago has been positioning itself as a regional leader for green hydrogen and its derivative products.

4. Policy Recommendations for Fast-Tracking Progress and Addressing Key Challenges

The progress described in this policy brief highlights the need for dedicated efforts to ensure that the LLDCs, LDCs and SIDS are not left behind in the energy transition. Urgent international attention is needed to address inequalities in access to sustainable energy, if the ambitions set forward in SDG7, the Doha Programme of Action for LDCs, the Antigua and Barbuda Agenda for SIDS, and the Awaza Programme of Action for LLDCs are to be realized.

Moreover, there is a need to pay more attention to a just and fair energy transition. This is one in which domestic green jobs and revenues are created by promoting productive uses, and/or by localizing parts of the renewable energy value chain. It is also a transition that takes into account the poorest and most marginalised groups, ensuring no one is left behind.

The urgency of doing this is further underscored by the decline in ODA registered in 2024. This decline is particularly alarming, given that levels of ODA were already significantly short of those needed by developing countries.[9] As a result, many vulnerable countries have resorted to discussing how to maximize their use of insufficient funding. Unless financing efforts are scaled up significantly and rapidly in these countries, the world will fall short of its target of universal access to affordable, reliable and modern energy services by 2030. Furthermore, the impacts of climate change will only increase the need for investment in energy generation, transmission and distribution infrastructure.

To bring SDG7 within reach of the LDCs, LLDCs and SIDS, a transformative change is therefore required in the energy sectors of these countries. To accelerate the energy transition, LDCs, LLDCs and SIDS and their development partners need to focus on the following areas:

- **The creation of an enabling environment, together with the building of predictable demand and supply**

  Well-functioning institutions and transparent regulatory frameworks are required to help build the necessary credibility with investors and scale up long-term private investment. A clearer understanding of the most critical areas of development is needed for more efficient and targeted private investment. Fostering policy coherence can play a significant role in accelerating reforms and mobilizing partners and financing.

- **The undertaking of long-term energy sector planning at the national level, focusing on least-cost pathways and socioeconomic benefits**

Today's decisions will shape the energy landscape of vulnerable countries for decades to come. While making long-term energy sector plans, consideration should be given to the new realities. These include the fact that renewables are not only environmentally sound, but also currently the most cost-effective power source.[10,11] National level planning should also be closely aligned with the development of ambitious Nationally Determined Contributions (NDCs).

Access to an affordable, reliable and sustainable energy infrastructure is a key enabler for inclusive and sustainable urban and rural industrial development in the LDCs, LLDCs and SIDS. It is a prerequisite for their economic diversification and the shift towards higher value-added manufacturing and servicing. A just energy transition needs to create local green jobs and revenues by promoting productive uses and localizing parts of the renewable energy manufacturing and servicing value chain. Through economic and renewable energy corridors and access to critical minerals, some industrial agglomerates in the LDCs and LLDCs have the opportunity to become future hubs for sustainable energy manufacturing. This could be in areas such as components, batteries, electric vehicles and in the export of green hydrogen. In this regard, various capacity-building and training opportunities should be provided to prepare people for these new opportunities.

- **The development of financing solutions that match the needs of both large scale and smaller projects**

International public financing plays a critical role in accelerating the energy transition. Yet, as detailed above, the current level of international public financial flows to the LDCs, LLDCs and SIDS for clean energy is insufficient to spur larger volumes of investments from the private sector.

Also, the consequences of high interest rates and increased capital costs can be alarming for the energy transition in vulnerable countries. Such developments discourage investment in green transitions, as they make financing capital-heavy renewable energy projects costlier.

As international public finance remains an important driver for the energy transition in LDCs, LLDCs and SIDS, there is a need to incentivize additional financing and investment. This should include grants, bonds, guarantees and blended finance. At the same time, rather than concentrating public resources in a few countries and large-scale projects, it is crucial to support local enterprises and community-based initiatives. This is particularly so in regard to decentralized energy solutions, such as off-grid developers and micro, small and medium-sized energy enterprises.

Since most energy transition investments need to come from the private sector, there is a need to look into new, innovative financing and risk mitigation instruments. These could include green bonds, debt-for-climate swaps, carbon finance and forms

of guarantees. Due to typically small project sizes in the LDCs, LLDCs and SIDS and the increasing impact of climate change upon them, there is also a greater need for financial instruments and insurance regimes that are tailored specifically to these countries.

- **The enhancement of technology transfer**

In addition to increasing the flow of finance to them, the LDCs, LLDCs and SIDS should also be supported in technological leapfrogging by the promotion and encouragement of technology transfer. Green hydrogen, for example, could transform the energy sector. It has the potential to help many African LDCs leapfrog outdated technologies and leverage their solar and wind power potential. Clean energy solutions should be designed, however, with specific country needs taken into account. These include, for example, the geographical remoteness of many SIDS and LLDCs.

- **A strengthening of the linkage between climate action and energy transition**

Mitigating the impacts of climate change will also contribute to the energy transition agenda. The challenges posed by climate change far surpass the capacity of any single country to address them. This is particularly so in regard to the most vulnerable countries, which have comparatively limited means and much greater exposure to climate impacts. Mitigating rising sea levels and averting the catastrophic impacts of climate-induced weather events requires global cooperation and a concerted effort.

Energy insecurity caused by the immediate and long-term impacts of climate change on energy generation, transmission and distribution is also a challenge for vulnerable countries. It also endangers previous successes. Heatwaves and water scarcity impact the efficiency, output and cooling systems of power plants and increase cooling demand and the number of peak hours. Energy systems in LDCs, LLDCs and SIDS therefore need to improve their ability to anticipate, accommodate, manage and recover from climate change-based disasters. Moreover, they need to increase their robustness when responding to the long-term impact of climate change on energy generation, transmission, distribution and consumption.

By embracing solutions such as solar, wind and ocean energy – in combination with battery energy storage systems – the LDCs, LLDCs and SIDS can diversify their energy mix, reduce their reliance on fossil fuels and cut costs, while also enhancing their energy security. The implementation of NDCs and National Adaptation Plans (NAPs) will be critical in this regard.

Energy transition in vulnerable countries can be assisted by supporting these countries' access to climate financing facilities. The capacity constraints of LDCs, LLDCs and SIDS in accessing and navigating multiple financing facilities must also be addressed. Similarly, their capacity to prepare bankable projects must be enhanced.

- **The enhancement of regional cooperation and strengthening of partnerships with the private sector and other development partners.**

Going forward, enhanced regional collaboration and partnerships will play a critical role in unlocking the potential that the energy transition in the LDCs, LLDCs and SIDS holds.

Promising examples of increased regional collaboration have already started to emerge. These include, for example, the GN-SEC programme mentioned above, or the Eastern Africa Power Pool (EAPP), which seeks to optimize the usage of energy resources available in the region.

Similarly, the private sector and other development partners need to stay engaged and further strengthen their support. The private sector could further develop and drive innovation. It could deploy business models that reduce costs and increase affordability in order to provide “last mile energy access” in the LDCs, LLDCs and SIDS, for example.

In addition, for the SIDS, platforms like the Centre of Excellence and the SIDS Global Business Network play a key role in mobilizing investment and new public-private partnerships (PPPs). They also help promote technology transfers and the sharing of knowledge on sustainable practices in energy.

Such regional collaborations should also include strong partnerships with organizations that focus on gender and youth. In this context, the GN-SEC programme, coordinated by UNIDO in partnership with regional economic communities, has established a network of gender and youth focal points that works on south-south and triangular programmes and projects.

5. Priority Actions Going Forward

To bring SDG7 within reach of the LDCs, LLDCs and SIDS, a transformative change is needed in the energy sectors of these countries. To do this, the pace and scale of deployment of renewables and energy efficiency must increase significantly between now and 2030. In the light of this conclusion, this brief now lists below a series of observations and recommendations for priority action:

1. There is no one-size-fits-all solution to ending energy poverty in the LDCs, LLDCs and SIDS. In these countries there are instead many ways to bridge the gaps in access to affordable, reliable, sustainable and modern energy. One critical element, however, is for these vulnerable countries to seize the opportunities offered by renewables. By doing this, they can leapfrog to renewable technologies and energy systems that not only contribute to global climate goals, but also meet these countries' growing demand for energy.

2. A critical starting point for accelerated access is the creation of an enabling environment and the introduction of comprehensive energy-sector planning at the national and regional level. This can identify the least-cost pathways and enable the financing that is appropriate in the ensuring of universal access to sustainable energy in the shortest time possible. A successful energy transition hinges on strong political support, long-term energy planning and inclusive financing mechanisms. Such planning frameworks also need to address the immediate and long-term impacts of climate change on energy generation, transmission and distribution.

3. Those with the least access should be put first. This can be done by focusing on blended financing and fostering a positive enabling environment. Reaching rural areas in the LDCs, LLDCs and SIDS with the lowest access rates and where progress has often stagnated, needs to be put at the centre of focus.

4. There should be an enhanced focus on access that not only provides energy at the household level, but also ignites economic growth and human potential. National-level energy plans and policy coherence are needed to ensure that enhanced access to energy enables value-chain development in key sectors, such as agriculture and manufacturing. Increased access should also contribute to job creation and economic diversification. A just energy transition needs to create local green jobs and revenues by promoting productive uses and localizing parts of the renewable energy manufacturing and servicing value chain.

5. Integrating renewable energy solutions across agrifood systems is critical to advancing food and nutrition security and sustainable development in the LDCs, LLDCs and SIDS. The use of clean energy throughout agrifood value chains can help these countries

strengthen food and energy security simultaneously, while also enhancing rural livelihoods. Targeted investments in solar photovoltaic-powered irrigation, cold storage, agroprocessing, or sustainable bioenergy generation can reduce post-harvest losses, increase agricultural productivity and support local value addition.

6. Public finance remains a significant source of global renewables investments and is key to leveraging private finance. There is also an urgent need to turbocharge business deals and investment to accelerate energy access in the LDCs, LLDCs and SIDS.

   To respond to the energy challenges of the LDCs, LLDCs and SIDS, urgent international attention, increased focus on regional sustainable energy cooperation and enhanced partnerships with public and private actors are needed to realize the ambitions set out in the Doha Programme of Action for LDCs, the Antigua and Barbuda Agenda for SIDS, and the Awaza Programme of Action. Such efforts should include strong focus on the promotion of gender and youth engagement and the inclusion of marginalised peoples.

7. The strengthening of data collection – including disaggregated energy access data – can aid in more targeted interventions and the monitoring of progress.

Responding to the urgency to achieve SDG7 in the LDCs, LLDCs and SIDS, it is imperative to significantly intensify current efforts to meet the 2030 targets. As we look ahead to the post 2030 Agenda, discussions must be firmly anchored in a comprehensive and evidence-based analysis of the persistent barriers that have impeded these countries' progress in the global energy transition. In the post-2030 era, this approach will be essential in ensuring that more effective and targeted strategies, policies and programmes are identified and implemented. Such initiatives can then accelerate access to affordable, reliable, sustainable and modern energy for all in the LDCs, LLDCs and SIDS.

Endnotes

[1] See Figure 1.

[2] See World Bank Group data, Access to clean fuels and technologies for cooking (% of population) | Data, 2025, WHO, 2024, or Global Health Observatory, Household Energy Database, Geneva, WHO, www.who.int/data/gho/data/themes/air-pollution/who-household-energy-db.

[3] World Health Organization, 2025, Global Health Observatory (Household Energy Database). Geneva: WHO. www.who.int/data/gho/data/themes/air-pollution/who-household-energy-db

[4] International Energy Agency, Energy Balances and Statistics, 2025. IEA – International Energy Agency – IEA/ International Energy Agency SDG 7 webpage: SDG7: Data and Projections – Analysis - IEA

[5] SDG Global Database UNSDG

[6] See www.gn-sec.net.

[7] See www.asiapacificenergy.org.

[8] See www.eeas.europa.eu/sites/default/files/documents/2023/Setting%20the%20path%20for%20Wind%20Energy%20Generation%20in%20Trinidad%20%26%20Tobago%20FINAL%2004MAY23.pdf.

[9] See, for example, Preliminary official development assistance levels, 2024, published by the Organisation of Economic Co operation and Development (OECD): https://one.oecd.org/document/DCD(2025)6/en/pdf, or OECD website www.oecd.org/en/topics/policy-issues/official-development-assistance-oda.html#key-messages.

[10] IRENA, 2024, Renewable Power Generation Costs in 2023, Renewable power generation costs in 2023

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