POLICY BRIEFS IN SUPPORT OF THE UN HIGH-LEVEL POLITICAL FORUM 2026

Affordable and Clean Energy and Responsible Consumption and Production: The SDG7-SDG12 Interlinkages

SDG7 POLICY BRIEFS IN SUPPORT OF THE UN HLPF 2026

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KEY MESSAGES

- **To enable the decoupling of economic growth from resource use and emissions, progress on Sustainable Development Goal (SDG) 7 and SDG12 must be advanced together.**

  Unsustainable production and consumption increase energy demand, material extraction and greenhouse gas (GHG) emissions, reinforcing a negative link between economic growth and resource use. At the same time, access to affordable, reliable, sustainable and modern energy enables more resource-efficient production, cleaner value chains and more sustainable economies. The decoupling of economic growth from resource use and emissions is therefore key; it is also in urgent need of acceleration, as the required growth of global energy intensity and material efficiency are well above the current rate of progress.[1]

- **Circular economy approaches can reduce energy, material and GHG pressures, but trade-offs must be managed carefully.**

  Measures such as eco-design, durability, reuse, repair, remanufacturing, industrial symbiosis and high-quality recycling can reduce reliance on energy-intensive virgin materials and lower emissions across product lifecycles. Rising demand for biomass, land, water and critical minerals, however, can create tensions that require integrated planning. Indeed, the energy transition is generating new waste streams and material dependencies of its own. There is an urgent need to ensure that circularity contributes to absolute reductions in resource use, rather than just shifts the burden across sectors.

- **Industry decarbonization is the key convergence point.**

  Decarbonizing energy-intensive sectors requires a combination of cleaner energy access (both renewables and electrification), higher energy efficiency and material efficiency, reduced waste, more circular value chains, and responsible sourcing. Integrated approaches can deliver deeper emissions reductions while strengthening sustainable industrial development. Demand-side actions and circular supply chains can support more efficient and resilient energy systems.[2]

- **SDG7 and SDG12 are closely linked, but policy frameworks often treat energy systems and consumption and production systems separately.**

  The core policy challenges are: 1) how to decouple rising material use and waste from growing energy demand, while also scaling affordable, reliable, sustainable and modern energy systems; 2) tackling the possibility that clean energy transitions that proceed without stronger action on material efficiency, circularity and sustainable consumption shift environmental and social pressures, rather than reducing them; 3) tackling the converse possibility that circular economy strategies that do not expand access to clean and affordable energy may remain limited in scale and unequal in their benefits.

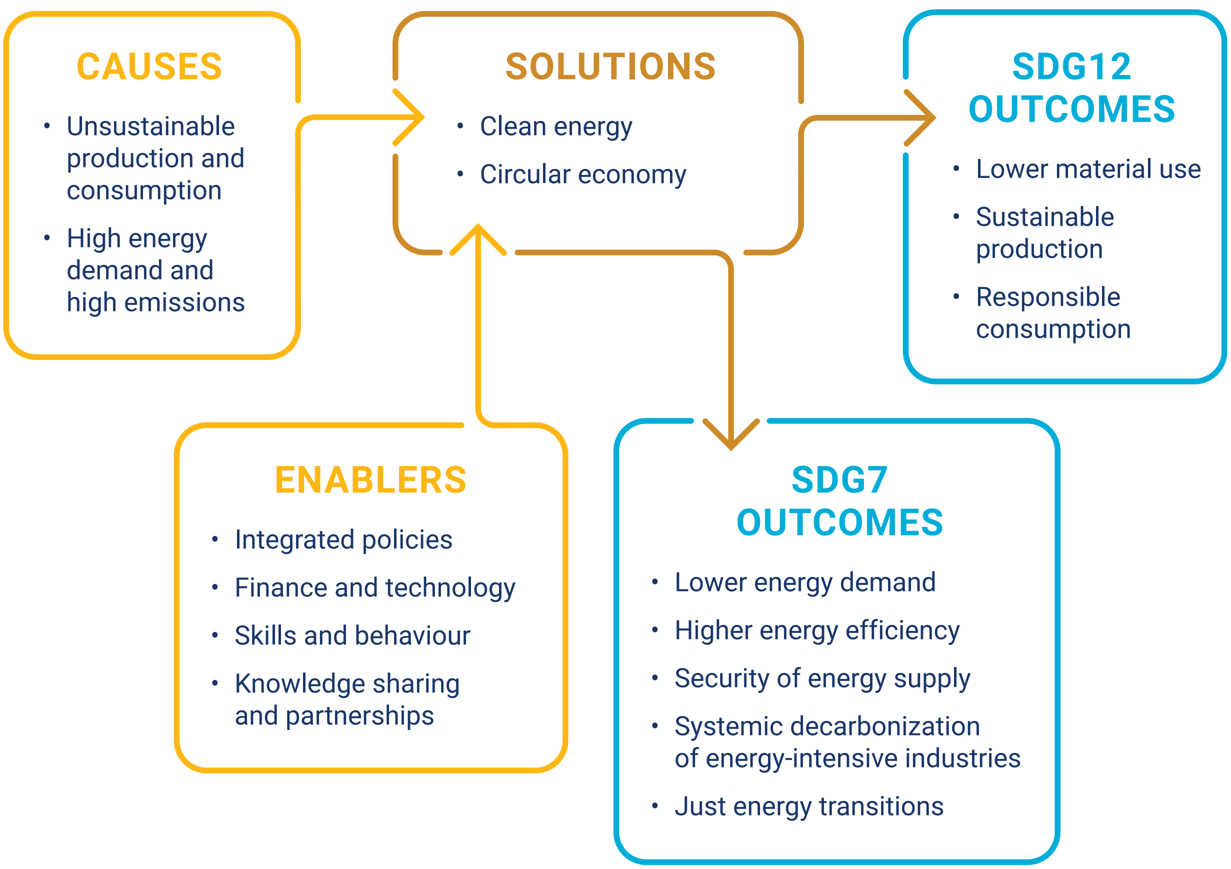
- **Decoupling will not happen through energy or circularity alone.**

  It requires fully integrated policies that simultaneously address energy systems, material flows and consumption patterns. Only then can economic growth become genuinely sustainable, rather than resource intensive.

1. SDG7 and SDG12 Interlinkages

SDG7 and SDG12 are fundamentally intertwined. Production and consumption patterns determine material and energy demand, while the availability and carbon-intensity of energy shape the sustainability of production and consumption systems. Addressing one SDG without explicit action on the other therefore risks burden-shifting, while integrated approaches can generate stronger mitigation, economic and social outcomes. This process is illustrated in Figure 1.

Figure 1: How clean energy and circular economy approaches link SDG7 and SDG12



Unsustainable production and consumption patterns increase material extraction, manufacturing, transport and waste generation, all of which raise energy demand and GHG emissions. Global circularity fell to 6.9 per cent in 2021, down from 7.2 per cent in 2018, while annual material extraction exceeded 100 billion tonnes. This illustrates how current economic systems intensify pressure on energy systems and hinder progress towards both SDGs.[3] Progress on SDG12 can therefore directly support SDG7 by reducing overall energy demand, improving energy productivity and easing pressure on infrastructure. At the same time, progress on SDG7 enables cleaner, lower-carbon and more resource-efficient production and consumption by reducing the environmental footprint of extraction, manufacturing, logistics and waste management.

In addition, **access to affordable, reliable, sustainable and modern energy is essential for more sustainable production systems.** Renewable energy, electrification and energy efficiency are critical for lower-carbon industrial processes, cleaner value chains and more sustainable materials use. This is especially clear in agrifood systems, where energy is used throughout irrigation, mechanization, cold chains, processing, transport and cooking. About 30 per cent of global end-use energy is consumed by the agrifood sector, meaning that improvements in irrigation, cold chains, mechanization, processing and food-loss reduction can deliver simultaneous gains in energy efficiency, resource productivity and food-system sustainability.

At the same time, in 2023, around 2.1 billion people still relied on polluting cooking fuels and technologies.[4] While clean cooking is primarily an SDG7 issue, it also relates to SDG12 through more sustainable household energy use and lower dependence on polluting and resource-intensive fuels. Clean cooking also has important benefits for health, gender equality and social inclusion.

The SDG7-SDG12 interlinkages are also visible on the demand side. Consumption patterns affect not only how much energy is used, but also when and how it is used. Through consumer behaviour, public procurement and lifestyle choices, SDG12 influences load variability, peak demand and the flexibility needs of power systems. The uptake of energy-efficient appliances, smart devices and resource-efficient processes supports demand-side management, load shifting and peak shaving, which are increasingly important for integrating variable renewable energy and reducing system costs. More responsible consumption can therefore support more resilient, affordable and sustainable energy systems.

Importantly, too, **circular economy approaches sit at the centre of the SDG7–SDG12 nexus.** Eco-design, durability, reuse, repair, remanufacturing, industrial symbiosis and high-quality recycling can reduce demand for energy-intensive virgin materials and lower lifecycle energy use. For example, producing steel from scrap in electric arc furnaces typically requires much less energy than primary steel production from iron ore.[5]

Circularity, however, is not automatically beneficial in every case. Outcomes depend on the material, process, energy mix and system context – underlying the importance of prioritizing material reduction, reuse and high-quality recovery pathways.

Meanwhile, examples of circularity in practice are already emerging. Active in seven countries with extension work in five more, the UNIDO Global Eco-Industrial Parks Programme[6] supports energy efficiency, renewable energy integration, industrial symbiosis and capacity-building.

The raw material basis of the energy transition is a further dimension of this nexus. Renewable energy technologies and related systems, including solar photovoltaics (PVs), wind turbines, batteries, electric vehicles and electrolyzers, rely on copper, lithium, cobalt, nickel, rare earth elements, aluminium and other critical minerals. Without stronger circularity, the expansion of these systems could create new forms of resource pressure. As the World Economic Forum notes, circular approaches can create a "second major supply source"[7] for the clean energy era by recovering materials from end-of-life solar panels, batteries and industrial by-products, reducing exposure to mining supply concentration and geopolitical risks. This is increasingly important because the energy transition is also generating new waste streams. The International Renewable Energy Agency (IRENA) forecasts that cumulative solar PV waste will rise from 0.2 million tonnes in 2021 to more than 200 million tonnes by 2050, while effective circular systems could recover more than 17.7 million tonnes of raw materials – a quantity worth, in United States dollar (US$) terms, about US$ 8.8 billion.[8]

Yet, **the interlinkages between SDG7 and SDG12 are not always mutually reinforcing.** If not carefully managed, some pathways to cleaner energy or more circular production can create trade-offs related to materials, land, water, ecosystems and technology choices.

Biomass illustrates these tensions clearly. It is increasingly used both as an energy source and as a feedstock for materials, chemicals and bio-based products. Without sustainable production, cascading use and waste-to-resource approaches, growing biomass demand can intensify competition for land and water, exacerbate food insecurity and shift environmental pressures, rather than reduce them. Priority should therefore be given to sustainably-sourced agricultural residues, by-products and organic waste, supported by sustainability frameworks and impact assessment tools. In agrifood systems, circular bioenergy pathways, such as biogas, can recover energy from waste while returning nutrients to soils through digestate. This thereby reduces reliance on fossil fuels, lowers emissions, improves rural energy access and enhances farm productivity and resilience. The work done by UNIDO on bioeconomy further highlights the need to optimize land and water use and strengthen ecosystem resilience through nature-positive approaches.[9]

Overall, industry decarbonization is one of the most outstanding areas of convergence between SDG7 and SDG12. Industry accounts for nearly 40 per cent of global final energy consumption,[10] while energy-intensive sectors such as steel, cement, chemicals and aluminium make up roughly three-quarters of industrial energy demand.

The transformation of these industries depends not only on access to sustainable energy, however, but also on lower material intensity, reduced waste, cleaner processing, resource recovery and circular value chains. Renewable energy and energy efficiency can reduce emissions from operations and purchased energy, while circularity, material efficiency and responsible sourcing can reduce emissions across supply chains and product life cycles. This convergence is increasingly reflected in industrial and trade frameworks. These include carbon border measures, product transparency requirements and programmes such as the Industrial Deep Decarbonization Initiative[11] and the Net-Zero Partnership for Industry Decarbonization.[12] These support lower-emission industrial production in emerging and developing economies.

Progress, however, currently remains insufficient. Across 71 countries, the United Nations *Sustainable Development Goals Report 2025*[13] identified only 530 sustainable consumption and production policy instruments in place that year. Meanwhile, material footprint and waste generation had continued to rise, while recycling rates remained stagnant – at around 27 per cent – with nearly 29 per cent of global waste still being sent to landfill.

More broadly, **progress on both SDG7 and SDG12 remains off-track.** What is needed is system-level change. This has to integrate the thinking behind sustainable consumption and production, lifecycles and the circular economy into energy, industrial and climate strategies. At the same time, access to finance, technology, skills and governance capacity also all have to be improved.

2. Policy Implications and Recommendations

The policy implications of the SDG7-SDG12 nexus can be organized into five complementary pathways: 1) circular economy-driven demand reduction; 2) clean energy-enabled circular production; 3) responsible resource and supply-chain governance; 4) sustainable consumption and demand-side transformation; and 5) integrated energy-resource planning.

These pathways are mutually reinforcing, but countries will place different emphasis on them depending on their level of industrialization, energy-access conditions, natural-resource endowments and institutional capacities. In low-income and energy-access-deficit settings, priorities may include expanding sustainable energy access for households, essential services and productive uses. In more industrialized and material-intensive economies, greater emphasis may be placed on demand reduction, industrial decarbonization, product standards and high-quality recycling.

1. Circular economy-driven demand reduction

The first priority is to reduce lifecycle energy demand by lowering material throughput across production and consumption systems. Key measures include eco-design, product durability and repairability, reuse, remanufacturing, waste prevention, extended producer responsibility, high-quality recycling and industrial symbiosis. These measures can reduce demand for energy-intensive virgin materials, lower emissions across product life cycles and ease pressure on energy systems. In the near term, these are among the most practical "no-regret" options because they support the energy-efficiency objectives of both SDG7 and SDG12.

2. Clean energy enabled circular production

The second pathway is to decarbonize manufacturing and circular production systems through clean energy, electrification and efficiency. This includes renewable electricity and renewable heat for industry, electrification of industrial processes, energy-efficient recycling and remanufacturing, low-carbon logistics, and the development of eco-industrial parks and circular industrial clusters. Such measures are particularly important in energy-intensive sectors such as steel, cement, chemicals, aluminium and buildings. They are also relevant in agrifood systems, where renewable energy, efficient irrigation, cold chains, clean cooking and agroprocessing can simultaneously reduce food loss, lower energy intensity and strengthen rural livelihoods.

Given that the agrifood sector accounts for about 30 per cent of global end-use energy consumption, it represents an important opportunity space for integrated SDG7-SDG12 activity.[14] Related experience is also emerging at the enterprise and supply-chain level.

The UNIDO Switch2CE initiative supports micro, small and medium-sized enterprises (MSMEs) and supply-chain actors in adopting circular economy practices through pilot projects, capacity-building, circular skills development and stronger value-chain collaboration. This shows how circular value-chain support can improve competitiveness, strengthen supplier capabilities and help create the enabling conditions needed to scale circular economy approaches.[15]

3. Responsible resource and supply-chain governance

The third pathway is to ensure that the material requirements of the energy transition are aligned with sustainable production principles. Policy instruments may include responsible sourcing standards, due diligence requirements, traceability systems, recycling targets and take-back systems for solar panels, batteries and electronics, support for urban mining, and the development of markets for secondary material. These measures are increasingly important as the energy transition creates new material dependencies and waste streams of its own. Expanding secondary-material markets and substituting recycled materials for primary mined inputs, where feasible, can also help reduce supply-chain emissions, improve resource security and strengthen the sustainability of clean energy technologies. Relevant instruments include extended producer responsibility, digital product passports, global standards and targets for secondary minerals. They also include trackable material and energy-efficiency standards across the supply chains for energy transition minerals.[16]

4. Sustainable consumption and demand-side transformation

The fourth pathway is to reduce both energy and material demand through more sustainable consumption patterns. Relevant measures include green public procurement, sustainable product labelling, consumer information systems, behavioural interventions, shared consumption models, service-based business models and greater attention to food loss and waste. These measures matter because consumption patterns shape not only how much energy and material is used, but also when and how energy is used across value chains and power systems. More responsible consumption can therefore improve the integration of variable renewable energy, support load shifting, lower system costs and reduce waste and material pressures. To be effective, demand-side measures should be designed in ways that are practical, affordable and inclusive – especially for low-income households and vulnerable groups.

5. Integrated energy-resource planning

The fifth pathway is to manage trade-offs across land, water and ecosystems, energy deployment and material use through more integrated planning. This includes cross-ministerial coordination, lifecycle assessment in infrastructure planning, stronger links between energy, the circular economy, industrial and land-use strategies, and sustainability frameworks for biomass and critical minerals.

Such approaches are essential in avoiding burden shifting across sectors and geographies. They are also important in ensuring that clean energy deployment, bioenergy expansion and circular economy strategies do not create new pressures on food systems, biodiversity or vulnerable communities. Over the longer term, better integrated planning will also depend on improved data systems, scenario analysis and monitoring frameworks that capture interactions across energy, materials and value-chain emissions.

To operationalize integrated planning, countries should adopt the following:

- cross-ministerial planning units
- explicit lifecycle assessment requirements in infrastructure approvals
- monitoring frameworks that link energy, material and social indicators.

Financing instruments should include:

- blended finance facilities for circular infrastructure
- green public procurement to create market pull for recycled content
- concessional finance
- results-based grants and risk-sharing mechanisms for large industrial decarbonization projects
- complementary technical assistance support for MSMEs to aid them in adopting circular practices.

Taken together, the above five pathways suggest that progress on SDG7 and SDG12 will be most effective when pursued in an integrated, rather than parallel manner. Clean energy transitions may create new pressures and inequities if material use, circularity and consumption patterns are not addressed. Circular economy strategies may also remain limited if access to clean and affordable energy is not expanded. Advancing both SDGs together can support more low-carbon, resource-efficient, resilient and inclusive development, and provide a stronger foundation for sustainable industrial transformation.

Endnotes

[1] See *Tracking SDG7: The Energy Progress Report 2025,* The World Bank, Washington DC, 2025, https://trackingsdg7.esmap.org/sites/default/files/download-documents/SDG7-Report2025-0804-V11.pdf

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[3] See *Circularity Gap Report 2025,* Circle Economy, Amsterdam, 2025, www.circularity-gap.world/2025

[4] See endnote 1.

[5] See "Steel", International Energy Agency (IEA), Paris, www.iea.org/energy-system/industry/steel (accessed 30 March 2026).

[6] See "What is Eco-Industrial Park?", Global Eco-Industrial Parks Programme, UNIDO, Vienna, https://geipp.org/ (accessed 30 March 2026).

[7] See "Clean energy supply chains of the future need a circular economy" , World Economic Forum, Geneva, 2026: www.weforum.org/stories/2026/01/circular-economy-clean-energy-supply-chain-critical-minerals/

[8] See "Circular economy", International Renewable Energy Agency (IRENA), Abu Dhabi, www.irena.org/Energy-Transition/Policy/Circular-economy (accessed 30 March 2026).

[9] See "UNIDO activities related to circular economy (IDB.53/18)", Industrial Development Board, 53rd Session, UNIDO, Vienna, 30 June-3 July 2025, https://downloads.unido.org/ot/38/09/38098465/2507691E.pdf?_ga=2.214510039.150975416.1773652616-1889259389.1771504814

[10] See *Energy Efficiency 2025,* IEA, Paris, 2025, https://iea.blob.core.windows.net/assets/23a80bb2-6985-4507-ab99-c1d700f6548b/EnergyEfficiency2025.pdf

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[12] See "Net-Zero Partnership for Industry Decarbonization", UNIDO, Vienna, https://decarbonization.unido.org/projects/net-zero-partnership/ (accessed 30 March 2026).

[13] See *The Sustainable Development Goals Report 2025,* United Nations, New York, 2025, https://unstats.un.org/sdgs/report/2025/

[14] See endnote 1.

[15] See "Switch to Circular Economy Value Chains: About the Programme", Switch2CE, European Union, European Investment Bank, Chatham House, Circle Economy, UNIDO, Vienna, www.switchtocircular.eu/ (accessed 30 March 2026).

[16] See *Critical Transitions: Circularity, equity, and responsibility in the quest for energy transition materials,* United Nations Environment Programme (UNEP), Nairobi, 2024, https://wedocs.unep.org/rest/api/core/bitstreams/131167fb-be44-4bb5-9a87-f5122ba759c2/content

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