



**VEF**   
**VIRTUAL  
SERIES**



# VEF VIRTUAL SERIES INDUSTRY TRACK POLICY BRIEF



The VEF Virtual Series is an initiative launched by the United Nations Industrial Development Organization (UNIDO) in partnership with the Food and Agriculture Organization (FAO), United Nations Environment Programme (UNEP) and Sustainable Energy for All (SEforALL).

Assembled in anticipation of the Vienna Energy Forum 2021, the VEF Virtual Series was designed as a platform for discussion with the aim of providing recommendations and action-oriented solutions to assist countries in aligning their COVID-19 recovery efforts with

inclusive and sustainable industrial development. It produced eight virtual sessions per track, gathering selected representatives from the private sector, academia, think tanks, non-governmental organisations (NGOs), civil society organisations (CSOs), governments and international organisations.

Guided by the theme “Accelerating Energy Transition,” the 2020/2021 edition of the series explored the pathways that stimulate demand and promote economic recovery in three end-use sectors: Food Systems, Industry and Products.

**The VEF Virtual Series culminates with the launch of three Policy Briefs that address the needs of developing countries and emerging economies, and unlock opportunities to pursue the energy nexus with each end-use sector. This Industry Track Policy Brief provides the findings and recommendations of over 120 leading experts that contributed to the VEF Virtual Series, representing different sectors, institutions and geographies.**

## EXECUTIVE SUMMARY

Economic growth resulting from industrialisation is often fast and sustained<sup>1,2</sup>. However, developing countries aspiring to industrialise face challenges in pursuing inclusive low-carbon industrial development. These include severe energy supply deficits, continued heavy reliance on fossil fuel, poor infrastructure and outdated technologies, and high investment costs coupled with a lack of financing.

Unfortunately, developing and developed countries alike still power many of their industrial sectors with fossil fuels, and industrial productivity is only slowly improving<sup>3</sup>. In 2018, industry, counting mining, manufacturing and construction, was directly responsible for more than 37% of global primary energy consumption (157 exajoules [EJ]) and 24% of global carbon dioxide (CO<sub>2</sub>) emissions (8.5 gigatonnes of equivalent carbon dioxide [GtCO<sub>2</sub>]). Heavy industries such as aluminium, cement, chemicals and steel rely particularly heavily on fossil fuels because alternative fuels and electrification options to produce the necessary high-temperature heat are not yet economically viable.

Insufficient supply of technologies and innovations to support industrial decarbonisation, lack of CO<sub>2</sub> reduction policies and regulations, and weak market demand for low-carbon products and services remain barriers to low-carbon industrialisation. These are exacerbated by a lack of clear and internationally accepted carbon reporting standards and methodologies and associated data. Furthermore, despite the substantial leapfrogging potential that exists in developing countries to adopt sustainable energy, technology transfer to these countries is slow. Small and Medium Enterprises (SMEs) face an additional knowledge gap in understanding energy saving opportunities and have difficulties in accessing finance for energy improvement projects.

1 Felipe, J., Aashish, M. and Changyong, R. (2014). Manufacturing Matters... but It's the Jobs That Count. Asian Development Bank Working Paper, No. 420.

2 Commission on Growth and Development (2008). [The Growth Report: Strategies for Sustained Growth and Inclusive Development](#). Washington: The World Bank.

3 IEA (2020). [Tracking Industry 2020](#).

Achieving energy and climate goals in industries will require: i) improved energy efficiency; ii) electrification of end-uses based on renewable sources; iii) direct use of renewable heat and sustainable biomass; iv) indirect use of renewable electricity through green hydrogen, e-fuels and feedstocks; and v) carbon capture technologies<sup>4,5</sup>.

In the midst of the climate crisis, compounded by the current economic crisis resulting from COVID-19, how can we ensure the industrial sector has sufficient energy to power production without compromising our commitment towards meeting the UNFCCC Paris Agreement and the Sustainable Development Goal (SDG) 7 on *affordable and clean energy for all* and SDG 13 on *climate action*?

This Policy Brief provides findings and recommendations derived from the discussions and consultations with over 120 leading experts representing different sectors, institutions and geographies during the 2020/2021 VEF Virtual Series.

## KEY FINDINGS AND RECOMMENDATIONS



Stronger policy coherence and coordination are needed to ensure the alignment and convergence of industrial policy and energy policy and to generate positive societal impacts for all, leaving no one behind.



Augmented investments and cooperation in research, design, demonstration & development (RD-D&D) are necessary to deliver the technologies needed to help industry achieve the goal of net zero by 2050.



Pathways to a transition to low-carbon industrialisation should foster the uptake of sustainable energy technologies and innovations, especially by SMEs and harder-to-abate sectors.



Digitalisation is a key enabler to generate better data and support transparent reporting, which are critical to inform both industry and government.



Industry adoption of the technologies depends on demand for low-carbon products and services. Both governments and the private sector can play a critical role signalling markets to stimulate that demand and spread benefits across the supply chain.



Key bottlenecks such as limited skills and knowledge of market players need to be addressed to ensure a successful transition.



Countries need to leverage the opportunity offered through COVID-19 recovery plans to reap the benefits of sustainable energy solutions to ensure that we build back better.

4 IRENA (2020). Reaching Zero with Renewables: Eliminating CO2 Emissions from Industry and Transport in Line with the 1.5°C Climate Goal.

5 IRENA (2021). World Energy Transitions Outlook 1.5°C Pathway.

# INTRODUCTION

## Slow deployment of low-carbon technologies and innovations

Through the application of renewable energy for electricity and heat, 2018 saw a drop of 4% in fossil fuel consumption in the industrial energy mix and a 10% increase in renewable energy for industrial heat<sup>6</sup>. While solar thermal and geothermal final energy use expanded the quickest – more than doubling from 2010 to 2018 – they accounted for less than 0.05% of total final industrial energy use in 2018. Despite all the progress in deployment of renewable energy and energy efficiency, the overall industrial energy mix has remained relatively unchanged since 2010<sup>7</sup>. Industry continues to rely heavily on fossil fuel consumption (69%), with coal making up as much as 75% of iron and steel's energy demand.

While industrial energy efficiency opportunities are still important and need to be ramped up significantly, especially for long-lived industrial assets, half of the potential for decarbonisation now lies in the deployment of renewable energy<sup>8</sup>. Renewable energy applications in industrial heat represent a relative gap, with some existing solutions for low-grade heat. Significant progress is needed in high-grade heat applications required in many industrial processes, specifically those employed in the hard-to-abate sectors. Despite this, both public and private investments in heavy industry innovation remain low compared to other sectors.

The risk of production interruptions is a significant barrier for manufacturers looking to adopt new, energy-efficient technology into production facilities. The creation of a databank of enterprises' experience in technology transitions – and information sharing facilitated through knowledge networks, business conferences and market studies – can help enterprises reduce risks<sup>9</sup>.

Different approaches are necessary to address the challenges facing the adoption of technologies for industrial decarbonisation. For industrial applications for which low-carbon technologies are not yet developed but a potential exists – such as hydrogen use for steel production – research and development (R&D) investments are required. Other existing technologies, such as green hydrogen use in transport and heating, have been demonstrated and need to be scaled up. For mature technologies – such as electricity generation decarbonisation through renewable power plants and industrial energy efficiency projects – enforcement policies and regulations need to be considered when there is a clear business case. Relevant interventions for the deployment of low-carbon technologies and innovations should be pursued through a suite of carefully designed policies, regulations and incentive schemes.

6 IEA (2020). [Tracking Industry](#) 2020.

7 IEA (2020). [Tracking Industry](#) 2020.

8 IRENA (2021). World Energy Transitions Outlook 1.5°C Pathway.

9 The green technology selector tool in China is an example of such risk-mitigating tools for investors and producers.

## Improving post-harvest handling of food in agricultural businesses:

Hard-to-abate sectors, which include heavy industry (cement, aluminium, chemicals and steel) and heavy-duty transport (aviation, trucking and shipping) are together responsible for nearly one third of global CO<sub>2</sub> emissions<sup>10</sup>. Growing demand coupled with price pressure for these commodities make for highly competitive markets, creating a barrier to the energy transition and decarbonisation. There are uncertainties about these sectors' decarbonisation options, and none of them will be easy to scale up. Nevertheless, renewable energy can play an important role in their decarbonisation. It can supply clean power to electrical end uses and provide a clean energy source for industrial feedstocks, including hydrogen, ammonia and other industrial products.

Sustainable energy integration into the hard-to-abate sectors is a main challenge of low-carbon industrialisation. This is because of the large and long-term investment needs for new technologies; the industry sector's well-established practices and highly integrated operations; gaps in carbon accounting that leave no incentive for action; and competitiveness and carbon leakage risks for first-movers<sup>11</sup>.

In heavy industries, emissions are also disproportionately distributed along the value chain, weighing heavily on the upstream industries (e.g., cement and steel production) and decreasing downstream (e.g., automotive or construction industries), where profit margins are also much higher. A supply chain approach is therefore needed in these sectors for a more equal distribution of profit margin to abatement costs ratio. In addition, as 29% of steel and half of cement go into civil engineering infrastructure projects, implementing public procurement policies or imposing procurement standards for low-carbon materials can also play a big role. This would require the development of a standard evaluation process and tools for public procurement bids.

The industry sector may not be able to achieve the energy transition alone. A level playing field needs to be created for industries to recover the cost of their decarbonisation efforts. Today, there is reluctance to pay a premium for low-carbon steel and cement, and there are significant gaps in consumer awareness of environmental concerns along with biases in purchasing behaviour. The United Nations Industrial Development Organization (UNIDO) (2018) concluded that large-scale production of environmental goods (massification) can lead to substantial price reductions that can stimulate further demand and production. Procurement of low-carbon products and services by governments and the private sector can pave the way to commercial maturity<sup>12</sup>. Hence, aggressive market reforms for low-carbon commodities are needed as well as changes to the existing socio-technical systems around the use of carbon-intensive products.

## Insufficient policies & regulations for industrial end-users

The unexploited potential of an energy management system such as ISO 50001 is still present in energy-intensive industries and in developing countries. UNIDO experience shows that organisation-wide energy savings in the first one to two years of implementing ISO 50001 range from 4% to 15%, with little or no capital investments. However, according to the 2019 ISO survey, only a total of 6,415 industrial firms were ISO 50001 certified globally, 22% of which fall within the basic metal and fabricated metal sector. A more worrying fact is that the uptake of ISO 50001 by industrial firms is not equally distributed geographically. Germany alone accounts for 62% of these, while developing countries account for a mere 20%.

<sup>10</sup> WEF (2019). [Heavy industries have a vital role to play in fighting climate change.](#)

<sup>11</sup> IRENA (2020). Reaching Zero with Renewables: Eliminating CO<sub>2</sub> Emissions from Industry and Transport in Line with the 1.5 °C Climate Goal.

<sup>12</sup> UNIDO (2018). Industrial Development Report 2018. Demand for Manufacturing: Driving Inclusive and Sustainable Industrial Development.



## Limited capacity and access to finance for SMEs

The business value of instituting an ISO 50001 energy management system needs to be clearly communicated. Providing evidence of ISO 50001 drivers and benefits falls within the remit of national agencies for energy efficiency, and these should be promoted widely through national policies and regulations. Further adoption requires leveraging companies' purchasing power through commitments to purchase from ISO 50001-certified suppliers.

Many countries have recourse to minimum energy performance standards (MEPS) to specify the minimum level of energy performance that energy-using devices must meet or exceed before they can be offered for sale or used for commercial purposes. This is often implemented in tandem with financial support to meet these requirements<sup>13</sup>. Today, however, only 25% of industrial energy use is covered by mandatory energy efficiency standards.

In parallel, the recently published Net Zero by 2050 report by the IEA finds that without a new level of international cooperation, defined as tackling global challenges through coordinated actions, net-zero emissions by 2050 will not be achieved. Cross-border coordination is critical to evolve regulation, codes and international standards related to renewable-based technologies that are not widely deployed today but are essential for the energy transition. Global trade of green energy carriers like hydrogen from renewable power will necessitate that standardisation institutions and international bodies plan carefully to ensure directives are in place at the same pace as technological changes. Obtaining consensus on the modification of existing codes is a long process, and therefore urgent action is needed<sup>14</sup>.

At all levels of development, SMEs play a significant role in a country's economic and industrial development<sup>15</sup>. SMEs form the backbone of the private sector, accounting for a staggering 70% of employment worldwide<sup>16</sup>. Manufacturing SMEs provide productive employment with reasonable remuneration, contribute to building up systemic productive capacities, are dynamic and resourceful, and have a risk-taking attitude. These attributes trigger and sustain equitable distribution of income, resilience and economic growth. SMEs are often the foundation of the supply chain for larger companies; their adoption of sustainable energy measures is key to building carbon-neutral supply chains and achieving climate goals.

COVID-19 has dealt a disproportionately severe blow to SMEs. Despite the support packages provided by many countries, SMEs are expecting a larger decrease in profits and more job cuts than large firms<sup>17</sup> due to halted production, low/no sales and dried-up credit. Moreover, manufacturing SMEs have higher energy intensity than larger manu-

---

13 For example, the Green Climate Fund works with countries to promote energy efficient cooling and to structure MEPS to access new financial mechanisms. In India, regulations require old motors to be upgraded to improve their energy efficiency. Egypt saw a rapid increase in the uptake of sustainable energy in industry following the introduction of MEPS coupled with a financing facility in 2016, and in South Africa, the introduction of MEPS saw increased reporting on and transparency about energy usage.

14 IEA (2021). Net Zero by 2050: A Roadmap for the Global Energy Sector.

15 Snodgrass, D.R. and Biggs, T. (1996). Industrialization and the Small Firm: Patterns and Policies, International Centre for Economic Growth.

16 ILO (2019). [The Power of Small: Unlocking the Potential of SMEs](#).

17 UNIDO (2020). [Coronavirus: The Economic Impact: A Health Pandemic or a Pandemic for the Economy?](#)

## Digitisation for industry decarbonisation

facturing firms<sup>18</sup> as they often rely on outdated technology, which translates into higher energy costs. A transition to efficient and clean energy can represent a real opportunity for SMEs on the road to recovery. As relatively low emitters, SMEs' decarbonisation efforts should focus on the clean energy transition, while larger companies in high-emission value chains should lead the drive to net zero.

For hard-to-abate sectors, hydrogen and biomass are discussed as decarbonisation options. For SMEs, interventions in renewable energy, energy efficiency and alternative thermal energy solutions (e.g., heat pumps) are far more relevant. However, SMEs suffer from limited awareness of and access to the technologies and the finance for upfront investments. The financing of such projects remains challenging, as the transaction costs and risks associated with a fragmented market of many small actors is high.

Investment in innovation and digitisation is a key driver of economic growth. Hepburn et al.<sup>19</sup> showed that policies that encouraged clean R&D spending and connectivity infrastructure spending implemented after the 2008 global financial crisis had long-run economic multipliers and made high contributions to reducing greenhouse gas (GHG) emissions.

The COVID-19 pandemic has sped up digitalisation and spurred innovation, as these have been shown to help build operational resilience to disruptions. Embracing innovations such as the Internet of Things, data science, machine learning and cloud computing can lead to a digital revolution in the energy, utilities and industry sectors (Industry 4.0). Digitalisation is a key enabler to generate better data, support transparent reporting and aid more efficient consumption of energy. The adoption of advanced analytics in industry results in efficient overall industrial processes, while also allowing for cost control, energy performance and environmental reporting efficiencies. Operational control has the potential to achieve a 25%–40% reduction in energy use without a large investment. It also allows for improved capital utilisation through the use of predictive and automatic maintenance, down-time reduction and a lower inventory rate.

Digitalisation can bring innovations in business models for the industry, energy and utilities sectors. In industry, digitalisation takes advantage of collecting and analysing real-time customer data, enabling the direct involvement of customer demands, and facilitating cost-effective mass customisation of products and new pricing models<sup>20</sup>. The uptake of blockchain technology can help unlock climate change mitigation and circularity potential in industrial value chains by facilitating flexible and decentralised production, supply chain connectivity, delivery, performance and logistics. In the energy and utilities sectors, blockchain technologies, particularly smart contracts, can integrate renewable energy sources and simplify end-to-end energy delivery. This includes accounting for emissions and guaranteeing that energy supplies come from the sources attached to the contracts.

The road to adoption of these technologies is fraught with challenges, aggravated by a widening technological divide between developed and developing countries. Many

18 Kostka, G., Moslener, U. and Andreas, J. (2013). Barriers to Increasing Energy Efficiency: Evidence from Small-and Medium-Sized Enterprises in China. *Journal of Cleaner Production*, vol. 57, pp. 59–68.

19 Hepburn, C., O'Callaghan, B., Stern, N., Stiglitz, J. and Zenghelis, D. (2020). Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change? *Oxford Review of Economic Policy*, vol. 36, S1.

20 UNIDO (2020). [Industrial Development Report 2020: Industrializing in the Digital Age](#).



## Sustainable energy in post-COVID-19 recovery packages

developing countries are currently using Industry 1.0 technologies and are constrained from making progress by poor energy infrastructure, electricity access, a lack of technical skill sets and high investment costs coupled with a lack of financing and poor business models. Because the jump to Industry 4.0 may seem unattainable to many, just interventions that address this digital inequality are needed.

The COVID-19 pandemic hit the manufacturing sector hard, with sharp drops in demand, disruptions in supply chains and a contraction in investments. Nevertheless, data for the last quarter of 2020 showed that manufacturing is gradually recovering worldwide. However, the pace of recovery has been unequal across countries, and the impacts of new coronavirus variants and slow vaccination campaigns are causes for uncertainty.

To mitigate the pandemic's effects, governments have been putting in place economic support policies in the form of recovery stimulus packages. The pandemic has also forced a recognition of the role of renewable energy and energy efficiency in industry at large. Governments now have an opportunity to channel recovery efforts towards more inclusive, resilient and environmentally friendly industrial development plans that deploy sustainable energy to ensure that we build back better. Renewable energy and energy efficiency goals need to be aligned with employment creation and poverty reduction goals. Although renewable energy's local job creation and energy efficiency potential is clear, a lack of coordination among ministries to devise and implement recovery roadmaps that achieve these goals simultaneously remains a challenge.

## RECOMMENDATIONS



### Continue to enhance skills & knowledge transfer

Industrial resilience post-COVID-19 will happen at the intersection of smart industrialisation, based on knowledge and innovation; sustainable industrialisation, promoting a more resource-efficient, greener and more competitive economy; and inclusive industrialisation, fostering high levels of productive employment in decent, green jobs. The emphasis will be on valorising, protecting and investing in employees and practitioners throughout the value chain to harness the opportunities offered by green technologies and to innovate.

In many SMEs, capacity building may be needed to convey that increasing competitiveness is a main driver for integrating sustainable energy in industry. Capacity building may take the shape of reskilling, upskilling, demonstration programmes and information dissemination on key technologies and best practices. Grants or tax incentives can be given for capacity building, training and hiring of personnel. Dedicated institutions, such as technical, industrial and vocational education training institutions (TIVETs) with green expertise, can be established for spearheading specific green skills gaps identified in industry.

Information tools – such as marketing, labels with product sustainability information and certifications, and quality and sustainability guarantee marks from an independent external verification party – can help create a market for green products<sup>21</sup> and incentivise investments required for their production.

Building informational infrastructure, such as platforms for information sharing and learning among practitioners in industry, has also proved to be useful.



### **Stimulate demand for low-carbon products & services**

Governments can steer demand for low-carbon products and services through market policies aimed at reducing the price of environmental goods and increasing the prices of conventional goods. These include regulation, knowledge brokerage, innovation promotion and public procurement. Blending mandates similar to those implemented for biofuels in countries such as Brazil and the United States can also be instrumental in ensuring long-term demand and lowering investment risks.

Policies aimed at increasing consumer awareness of environmental issues and correcting information-related market failures for green products, such as labelling, are key. It is important to develop and apply these policies across the whole value chain. For example, iron and steel producers need to understand the carbon intensity of iron ore, car manufacturers need to understand the carbon intensity of steel, and end consumers need to understand the carbon intensity of the vehicles they buy. A whole ecosystem that supports the effective use of labelling is required. This includes the development of harmonised minimum standards, guidelines for target setting and low-cost certification services. At the same time, it is essential to complement these consumer awareness policies with price incentives or public procurement<sup>22</sup> that accepts the green premium until the markets for low-carbon products and services have developed.

The private sector can also play a significant role in driving demand for low-carbon products and services. The creation of a voluntary demand-aggregation space, such as the Renewable Energy Buyers Alliance<sup>23</sup> in the United States, is an example of a private initiative that has had a huge impact on scaling the renewable energy markets, both by scaling up the provision and by reducing the cost of renewable energy and clean energy. This initiative – which has been replicated in other countries, such as India, Colombia and China – brings together large-scale energy buyers from the commercial and industrial sectors looking to procure renewable energy from energy service providers. SMEs may also benefit from the pooling of demand into such aggregated procurement schemes.



### **Support sustainable energy technology adoption & innovation**

As more decarbonisation technology options become available, their deployment can be supported through credit support, tax credits and other financial incentives. Support and cooperation among energy producers, transporters, distributors, suppliers and consumers can also be sought to ensure a correlation of interests while striving to achieve the realisation of national sustainable energy goals.

21 UNIDO (2016). [Industrial Development in the CIS: Re-Industrialization Trends and Potential](#).

22 UNIDO (2017). Industrial Development Report 2018. Demand for Manufacturing: Driving Inclusive and Sustainable Industrial Development. Table 6.1, p. 137.

23 <https://rebuyers.org/>

When it comes to sustainable energy innovation, a dedicated technical institution to promote research and implementation of scientific innovation in the field of sustainable energy is key for most countries that are not at the forefront of technology development. Such institutions would also manage R&D subsidies and grants to increase local sustainable energy-related patents and adapt foreign sustainable energy technology to local needs. Moreover, innovative SMEs should be recognised through initiatives such as the SME Climate Hub<sup>24</sup> Race to Zero Campaign.

If public funds are used to support R&D for renewable energy solutions for high-grade heat, it will be important to balance how innovators are rewarded with getting the intellectual property (IP) into a global setting. For example, public funding could be conditional: technologies brought to market as a result of public funds<sup>25</sup> should be open to licensing to avoid monopolies and enable higher adoption rates.



### **Provide targeted finance to adopt & innovate**

Access to finance to adopt sustainable energy technologies remains a considerable barrier in developing countries. Credit lines, revolving funds, publicly backed guarantees and project loan facilities are funding mechanisms available to firms, but soft loans remain the most common form of finance accessed by firms for adopting sustainable energy technologies<sup>26</sup>.

The financial sector also has a key role to play in supporting investments in sustainable energy, whether in the form of technology adoption by firms or R&D for sustainable energy innovation. The sector should provide uncomplicated and inexpensive access to relevant financing, offer a blend of finance options to accommodate local idiosyncrasies, and provide clear terms for third-party finance, particularly for on-site renewable energy generation. Green banks should be encouraged to provide low-cost loans for the replacement of outdated technology.

The uptake of best-performing technologies in the United Kingdom is facilitated through an established list of energy efficient and clean energy projects that acts as a route to finance. The list provides information on performance and paybacks of technologies that are technically certified. Technologies on the list are eligible for tax credits. To get on the list, technologies must be among the top 10% performing products. There is interest in developing these technology lists internationally as a key enabler of access to targeted finance.

Governmental grants and subsidies for sustainable energy technologies need to be stable and clear. To encourage investment, they also need to be in place long enough for installation and payback. Recovery grants and subsidies should be tailored for and targeted to SMEs. Because low-carbon transition investments are often substantial, escrow agents can be instrumental in breaking these down into smaller investment sums that are more affordable for SMEs. Revenue from carbon pricing could potentially be used for SMEs that are supporting a low-carbon transition.

Financing gaps tend to be concentrated between the demonstration and the deployment stages. One of the recommendations that emerged from the VEF Virtual Series discussions is that the bulk of public finance and technical cooperation should address the lack of capital and capacity before the technology reaches the diffusion stage<sup>27</sup>.

<sup>24</sup> <https://smeclimatehub.org/>.

<sup>25</sup> Mazzucato, M. (2018). Mission-Oriented Innovation Policies: Challenges and Opportunities, *Industrial and Corporate Change*, vol. 27, No. 5, pp. 803–815.

<sup>26</sup> UNIDO (2011). *Industrial Development Report 2011. Industrial Energy Efficiency for Sustainable Wealth Creation*.

<sup>27</sup> UNIDO (2011). *Industrial Development Report 2011. Industrial Energy Efficiency for Sustainable Wealth Creation*.



## Stronger policy coherence & coordination (national, international and across value chains)

Policy coordination is one of the oldest challenges for policy makers, but it remains crucial to the success of any governmental programme. It is important to consider how to coordinate policies and get them to work together. When it comes to sustainable energy policies, for example, it is important to set long-term goals that drive action and commitment and look at the whole energy system rather than just focusing on industry or specific applications. Significant inter-ministerial collaboration and coordination is needed to align all energy policies to the same vision and targets, especially now, when governments are drafting roadmaps for their countries' economic recovery plans. The European deal on the COVID-19 recovery package and Egypt's Vision 2030, which includes targets and sustainability goals, as well as 'Get Ready for Green' plans, are examples of such coordination and systems approaches to sustainable energy policy. These can then be translated into sector-specific measures<sup>28</sup>.

Policy coordination should not be limited to public entities. It also requires an open dialogue with stakeholders regarding incentives for industry and commercial sectors to implement sustainable energy systems. Public and private partnerships are especially important in sending signals to industry and consumers

Coordinated, sustainable energy policy making also tends to be more inclusive of sections of communities, such as women and youth, who are under-represented in manufacturing, industrial value chains and the energy sector. Sustainable energy initiatives represent big employment opportunities that can be leveraged when industrial energy policy is linked to employment goals. By bridging the gender divide gap and the education gap with career advancement avenues, policy makers have a chance to develop inclusive policies for a more inclusive and sustainable economy.

In addition to national policy initiatives, there is a need for international collective action for sustainable energy policies. A key area where international cooperation is required is international technology innovation, transfer and knowledge sharing. There is a need to fast-track the development and commercialisation of sustainable energy technologies because the world cannot wait another 25 years – the time it took for solar, wind and other renewable electricity generation technologies to become competitive.

International collective action is also needed in promoting financial mechanisms to support sustainable energy technology innovation and transfers. Global markets and mechanisms need to be leveraged and further developed to help bring down the generation, transport and storage costs of hydrogen and other sustainable energy technologies for high-temperature heat applications. For heavy industries, where the technology exists but the economics do not always make sense, the introduction of industrial energy transformation funds such as Mission Innovation can turbocharge their transformation into low-carbon industries<sup>29</sup>. Pooling investments at the regional level to invest in renewable energy generation is another area ripe for regional and international cooperation.

The most well-known international coordination for sustainable energy and its monitoring is probably linked to the Paris Agreement and its Nationally Determined Contributions (NDCs). The Paris Agreement, adopted in 2015 and ratified by 153 parties, entered into force in 2016. Unlike the Kyoto Protocol, the Paris Agreement gives responsibility to all parties, irrespective of income level, to combat climate change through NDCs and to regularly

<sup>28</sup> Such as India's government-supported scheme for decentralised energy provision that promotes the use of solar rooftop by industrial productive users.

<sup>29</sup> Mission Innovation is a global initiative of 24 countries and the European Union working to reinvigorate and accelerate global clean energy innovation with the objective of making clean energy widely affordable.

report on their emission rates and implementation efforts. International technical cooperation is needed in the form of capacity building to assist countries at operational and institutional levels to make the NDCs more action oriented and specific to different industries. Updating and strengthening NDCs to include industry-specific emissions abatement measures is also important and highly recommended because this remains a gap in many countries' NDCs. More work remains to be done on improving data reporting systems and data consistency for transparency. This work needs to be carried out across different industry sectors to feed into national sustainable energy policy design cycles.

## CONCLUSIONS

### CALL TO ACTION

While industry remains the engine of growth for the majority of countries, its high reliance on energy services, especially from fossil fuels, makes it unsustainable. We urgently need pathways to transition to low-carbon, inclusive industrialisation. The political climate is changing in favour of an economic transformation and a green transition. The recent German court ruling, for example, is a clear indication that environmental impacts are central to the planning and financing of these businesses. As economic recovery and stimulus packages are being rolled out, it will be critical to consider:

- Coordinating policies both at the national and international level, which should help ensure coherence and alignment between industrial policies and energy policies;
- finding appropriate ways to price carbon emissions;
- improving data reporting systems and data consistency to support transparency and better decision making;
- building capacities to assist countries at operational and institutional levels, such as reskilling, upskilling, demonstration programmes, information dissemination on key technologies and best practices;
- developing inclusive policies by bridging the gender, race and educational divide gaps;
- deploying decarbonisation technology options through a suite of carefully designed policies, regulations and incentive schemes;
- creating a dedicated technical institution to promote research and implementation of scientific innovation in the field of sustainable energy for industry;
- targeting funds to fill in financing gaps that occur between the demonstration and deployment stages;
- providing tailored support for SMEs;
- investing in the ecosystem required to support effective use of labelling, harmonised minimum standards, guidelines for target setting and low-cost certification services;
- promoting green public procurement as a signal to manufacturers;
- creating global markets and mechanisms to help bring down the generation, transport and storage costs of hydrogen and other sustainable energy technologies for high-temperature heat applications.

These actions are to be complemented by the financial and private sectors through:

- Knowledge exchange by experienced enterprises through knowledge networks, business conferences and market studies for improved information sharing;
- communication of the business value of integrating sustainable energy options into industrial processes and business operations with evidence of the drivers, benefits and challenges of implementation;
- leveraging their purchasing power and committing to purchasing from suppliers that follow sustainable practices;
- offering a blend of finance options to accommodate local idiosyncrasies as well as deploying de-risking instruments and standardising and bundling interventions to reduce transaction costs;
- providing clear terms for third-party finance, particularly for on-site renewable energy generation.

Countries need to make the best use of the opportunity offered through COVID-19 recovery plans to reap the benefits of sustainable energy solutions for industry to ensure that we build back better.

Building a net zero-emission economy will require public and private collaboration on both national and international levels. These collaborations between leading countries and industry groups are critical for establishing workable policy frameworks and incentives and enabling joint investment in low-carbon infrastructure. Policy makers, investors and businesses must take immediate and bold action if these industries are to successfully decarbonise. The Global Industry Programme will support this collaboration on different levels.



# CONTACT

Smeeta Fokeer, S.FOKEER@unido.org

Rana Ghoneim, R.Ghoneim@unido.org

Evita Moawad, E.Moawad@unido.org

Nurzat Myrsalieva, N. Myrsalieva@unido.org

## ABBREVIATIONS

CO <sub>2</sub>	Carbon dioxide
EJ	Exajoule
GHG	Greenhouse gas
GtCO <sub>2</sub>	Gigatonnes of equivalent carbon dioxide
IP	Intellectual property
MEPS	Minimum energy performance standards
NDC	Nationally Determined Contribution
R&D	Research and development
RDD&D	Research, design, demonstration & development
SME	Small and Medium Enterprise
TIVETs	Technical, industrial and vocational education training institutions
UNIDO	United Nations Industrial Development Organization

*Valuable input and comments on this Policy Brief were provided by:*

*Morgan Bazilian, Colorado School of Mines*

*Michael Boulle, Change Pathways*

*Anthony Dane, Change Pathways*

*Anya Boyd, Change Pathways*

*Ivan Jaques, ESMAP, World Bank*

*Raul Miranda, International Renewable Energy Agency*