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Contribution by Türkiye

to the CSTD 2022-2023 priority theme on "Technology and innovation for cleaner and more productive and competitive production"

PRIORITY THEME 1: Technology and innovation for cleaner and more productive and competitive production

United Nations Commission on Science and Technology for Development (CSTD)

Dear CSTD member,

As you are aware, the CSTD 25th annual session selected "Technology and innovation for cleaner and more productive and competitive production" as one of the priority themes for its 26th session (2022-23 period). This priority theme is directly relevant to SDG 9 on industry, innovation and infrastructure.

As highlighted by the Technology and Innovation Report 2021, We live in a time of rapid technological change, at the height of the digital transformation and the early stages of the Industry 4.0 revolution. These technological waves have great potential to bring about the transformations needed to achieve the SDGs, reduce poverty, tackle climate change and put the world on a sustainable path. They also offer a window of opportunity for developing countries to catch up technologically and narrow global divides. Critical areas for innovation in this new technological revolution are renewable energy technologies and frontier technologies for sustainable production and consumption. Innovation in these areas could help diversify economies and create higher-wage jobs while protecting the planet.

This priority theme will examine national strategies and policies related to green technology and green innovation, and the role of international cooperation, including triangular and South-South cooperation, in supporting developing countries to benefit from windows of opportunity for developing, using, adopting and adapting these frontier technologies in production processes for catching up economically and technologically.

Questions to be addressed include: What countries should do to take advantage of this window of opportunity? How could the international community support developing countries in this regard?

The CSTD secretariat is in the process of drafting an issues paper on the theme to be presented at the CSTD inter-sessional panel meeting from 25 to 27 October 2022. In this context, we would like to solicit input from the CSTD members on this theme. We would be grateful if you could kindly answer the following questions based on your experience in your country or region.

1. What are some specific examples (from the public and private sectors) of green technology and innovation for cleaner and more productive and competitive production in your country? Please include contact, website, link to reports and any other relevant information concerning these projects and initiatives.

   Participation to international R&D projects on green technologies is viewed as an important tool to increase R&D capacity by the green ecosystem of Türkiye. Several actors from academia, private sector and government take part in important R&D projects on green technologies. Here three projects co-funded by Türkiye and the European Union as examples:

   a) GEOSMART Project: GEOSMART Project is geothermal energy project which combines thermal energy storages with flexible ORC (Organic Rankine Cyscle) solutions to provide a highly flexible operational capability of a geothermal installation. During periods with low demand, energy will be stored in the storage to be released at a later stage when the demand is higher. As this approach does not influence the flow condition at the wellhead, critical infrastructures will be unaffected under variable energy generation. Efficiency will be further improved by larger power plant heat extraction enabled due to a scaling reduction system consisting of specially design retention tank, heat exchanger, and recombining with extracted gases. The scaling reduction system has the potential to almost double power production of many medium enthalpy geothermal plants. Overall, GeoSmart technologies will drastically reduce geothermal energy costs, making it cost competitive with its fossil fuel-based counterparts.The project has a total budget of nearly 20 Million € and it is planned to be finished by May 2023. It includes partners from 8 countries and Türkiye joins the

project with Zorlu Enerji, Kadir Has University and Middle East Technical University. (For more information project website: https://www.geosmartproject.eu/)

b) VPP4ISLANDS: VPP4Islands aims to facilitate the integration of renewable systems, accelerate the transition towards smart and green energy and help Islands to exploit energy efficiency potential and innovative storage approaches, foster the active participation of citizens and become self-sufficient in energy, while reducing costs, GHG emissions and reliance on heavy fuel oil to generate power, and creating new intelligent business, growth and local skilled jobs. To reach these goals, VPP4Islands project proposes disruptive solutions based on digital twin concept, Virtual energy storage systems (VESS) and Distributed Ledger technology (DLT) to revolutionize the existing VPP and build smart energy communities. Based on aggregation and smart management of distributed energy resources (DERs), VPP4Islands increases the flexibility and profitability of energy systems while providing novel services. VPP4Island will also enhance the Demand Response Capability of consumers by understating their behaviors and promoting selfconsumption. The project has a total budget of over 7 Million € and it is planned to be finished by March 2024. It includes partners from several countries and Türkiye joins the project with UEDAŞ, Troya, Inavitas and Bozcaada Municipality. (For more information project website: https://vpp4islands.eu/)

c) REVOLUTION: Coordinator of the project is Farplas Otomotiv from Türkiye. The project focusses on overcoming the challenges hindering the use of recycled materials, but more broadly, restricting the widespread adoption of circular economy principles in the automotive industry. Forthcoming ELV directives are expected to recognise the potential for plastics to enable a circular flow of materials in the automotive sector. Implementing minimum post-consumer recyclate (PCR) targets in any new plastic components in vehicles are currently being discussed. These targets will disrupt the automotive industry. The project has a total budget of over 7 Million € and it is planned to be finished by December 2023. It includes partners from 10 countries and Türkiye joins the project with Farplas Otomotiv and TOFAŞ. (For more information project website: https://revolution-project.eu/)

Moreover, it has brought the "Border Carbon Regulation Mechanism" application, which is one of the important policy tools of the European Green Deal announced by the European Union, which has set the goal of being a carbon-neutral continent by 2050. In order to comply with these regulations, Small and Medium Enterprises Development Organization (KOSGEB) has initiated studies to inform, develop and support SMEs.

As it is known, 1 kWh of electrical energy; It releases approximately ½ kg of CO_2 emissions into the atmosphere during the production process. For this reason, it is important to monitor and reduce the carbon dioxide rate that energy-consuming processes impose on the environment.

KOSGEB, by starting its support for Green Transformation;

- Reducing CO_2 emissions and reducing energy costs thanks to the energy to be saved in the operation,

- To raise awareness about reducing energy losses with survey supports,

- Reducing emissions through the conversion of inefficient engines and systems in businesses and efficiency-enhancing practices

contribution will be made.

2. What are the national strategies, policies, and laws concerning green technology and innovation for cleaner and more productive and competitive production in your country?

Türkiye has announced its 2053 Net Zero Emission Target on September 27, 2021. By becoming a party to the Paris Agreement and announcing the net zero emission target, which is defined as the flagship target of the green development revolution of Türkiye, our country has taken an important step towards green and sustainable growth. The Scientific And Technological Research Council Of Türkiye (TÜBİTAK) has been one of the earliest institutions which announced the roadmap for the zero emission target for the year 2053, which was determined in order to fulfill our country's obligations arising from the Paris Climate Agreement. "Prioritized R&D and Innovation Topics within the Scope of Green Deal Agreement Compliance" is published at the beginning of the year 2021. This guidance document for prioritized topics focused on five main themes namely “Climate Change, Environment and Biodiversity”, “Clean and Circular Economy”, “Clean, Accessible and Secure Energy Supply”, “Green and Sustainable Agriculture”, “Sustainable Smart Transportation”. Projects focusing on these topics are being prioritized in the TÜBİTAK’s R&D and Innovation Supports and co-creation models for both knowledge creation and development of human resources are being mobilized by TÜBİTAK.

Tackling climate change and realizing the “2053 zero emission target” requires university, government and industry actors to collaborate and to join efforts and capabilities. Accordingly, TÜBİTAK directed its platform based support tools to the areas of compliance with the European Green Deal for achieving impact and for mobilizing the R&D and innovation accumulation within the scope of co-creation models. In TÜBİTAK’s new call for proposals of the “High Technology Platforms Support” and “Industry Innovation Networks Mechanism (SAYEM)”, areas focusing on sustainable solutions to mitigate and adapt to climate change attracted significant attention.

Furthermore, TÜBİTAK took the responsibility for leading “Science and Technology Commission” within the context of the first Climate Council of Türkiye organized in the begining of this year. Science and Technology Commission was established to foresee the technologies of the future that are required and will contribute to our country's 2053 net zero emission target and green development policy. Ground-breaking R&D and innovation-based solutions are discussed in specific themes chosen in accordance with the EU Green Deal topics. We aimed to foresee the technologies of the future for adaptation and mitigation to climate change, to enable our country to develop its R&D and innovation capacity in these technologies, and thus to turn the climate change crisis into an opportunity in the medium/long term. With a multidisciplinary holistic approach, we held more than 40 online meetings with the participation of 97 experts from universities, private sector, NGOs and public institutions. We have prioritized 34 technology main topics and 262 sub-topics consisting of targets.

We believe that focusing on and being prepared for the technological advancements that will transform the future while fostering a sustainable development will bring our country to the forefront in the area of R&D and Innovation. Therefore, the outcomes of the Science and Technology Commission are translated into priotized RDI topics in TÜBİTAK’s R&D and innovation support programs and "Prioritized R&D and Innovation Topics within the Scope of Green Deal Agreement Compliance" has been renewed accordingly for academia and industry.

Besides, the Green Deal Action Plan of Türkiye was released by the Ministry of Trade and provides a strategy for achieving a green transition in all sectors of the economy. Within the scope of the Action Plan, "Green Growth Technology Roadmap" studies are being carried out by the Ministry of Industry and Technology and TUBITAK. The Technology Roadmap study is being conducted for the Iron-Steel, Aluminum, Cement, Chemicals, Plastics and Fertilizer sectors; which are critically important for the Turkish economy and have high carbon emissions. As a result of the Technology Roadmap studies, priority R&D and innovation themes for each sector will be detailed. Benefiting from the outputs of this study, proper STI and investment support programs will be designed in cooperation with Ministry of Industry and Techology especially for projects that will provide domestic solutions to the technological needs of private sector organizations in our country that will enable them to adapt to green transition. TÜBİTAK will contribute to the green transformation of the Turkish economy and industry and our country's vision of green and sustainable development, with a focus on science and technology.

Moreover, the relationship of the Green Transformation Support Program commissioned by KOSGEB with the national policy documents within the scope of our Institution's Activities is as follows.

- In the Eleventh Development Plan (2019-2023), the "Competitive Production and Efficiency" target is among the Industrial Policies of the Logistics and Energy Infrastructure title as "341. Energy efficiency will be increased in the manufacturing industry." with "341.1. A support mechanism will be established to replace inefficient electric motors used in industry with efficient ones.

- National Climate Change Action Plan (2011-2023), "Determining and piloting economic instruments to increase energy efficiency and reduce greenhouse gas emissions"

- Subparagraph b of the first paragraph of Article 9 of the Energy Efficiency Law

3. What are the key industries that are pioneering green innovation in the country? List the key actors in the national ecosystem of innovation related to green innovation in your country (firms, universities, financial institutions, regulators)? What are the key networks of the ecosystem in your country (including online networks, innovation hubs, forums, etc.)?

   The Green Deal Action Plan of Türkiye which was released by the Ministry of Trade and provides a strategy for achieving a green transition in all sectors of the economy. Within the scope of the Action Plan, "Green Growth Technology Roadmap" studies are being carried out by the Ministry of Industry and Technology and TÜBITAK. The Technology Roadmap study is being conducted for the Iron-Steel, Aluminum, Cement, Chemicals, Plastics and Fertilizer sectors; which are critically important for the Turkish economy and have high carbon emissions. As a result of the Technology Roadmap studies, priority R&D and innovation themes for each sector will be detailed. Benefiting from the outputs of this study, proper STI and investment support programs will be designed in cooperation with Ministry of Industry and Techology especially for projects that will provide domestic solutions to the technological needs of private sector organizations in our country that will enable them to adapt to green transition. As TÜBİTAK, we will contribute to the green transformation of the Turkish economy and industry and our country's vision of green and sustainable development, with a focus on science and technology

   Beside, The Ministry of Energy and Natural Resources is the institution that regulates Energy Efficiency, which is examined within the scope of the Green Transformation Support Program.

4. What are the challenges that your government have faced or may face in promoting green technology and innovation in your country to contribute to national development priorities and accelerate the progress towards the SDGs?

5. What should governments, the private sector, organized civil society, and other stakeholders do so that developing countries can benefit from these technologies?

   Tackling climate change and realizing the "2053 zero emission target" requires university, government and industry actors to collaborate and to join efforts and capabilities. In this view, TÜBİTAK (The Scientific and Technological Research Council of Türkiye) designs its R&D support tools to the areas of compliance with the European Green Deal for achieving impact and for mobilizing the R&D and innovation accumulation within the scope of co-creation models. In TÜBİTAK's new call for proposals of the "High Technology Platforms Support" and "Industry Innovation Networks Mechanism (SAYEM)", areas focusing on sustainable solutions to mitigate and adapt to climate change attracted significant attention.

   In addition, TÜBİTAK gives priority to R&D projects covering areas in line with the European Green Deal in its several R&D support programmes. 1501 Industrial R&D Projects Grant Programme and 1507 SME R&D Start-up Support Programme are two of these programmes. Also TÜBİTAK 1512 Entrepreneurship Support Programme's 2021 call was targeting R&D and

innovation topics within the scope of European Green Deal Agreement. 1512 Entrepreneurship Support Programme's 2022 call also targets "green growth".

These two policy tools, namely the co-creation based RDI platforms and giving priority to green themes in a range of RDI support programmes, from R&D to commercialisation, have been effective in promoting green technologies.

6. What are some examples of international cooperation mechanisms, projects, programmes or strategies, including triangular and South-South cooperation, in green technology and innovation that your country is part of?

   Horizon Europe projects which are co-funded by Türkiye and European Union can be shown as examples of successful international cooperation. These joint projects show how stakeholders from different countries and sectors can come together to tackle problems on climate change.

   Below are some of the joint projects:

   WHITECYCLE: Upscaling of Innovative Processes for the Recycling of Pet From Complex WASTES: A Case Study Involving Mechanical and Enzymatic Sorting Applied to Tyres, Textiles and Hoses
   CALIMERO: Industry Case Studies Analysis to Improve Environmental Performance and Sustainability of Bio-Based Industrial Processes
   RHINOCEROS: Batteries reuse and direct production of high performances cathodic and anodic materials and other raw materials from batteries recycling using low cost and environmentally friendly technologies
   FREE4LIB: Feasible Recovery Of Critical Raw Materials Through A New Circular Ecosystem For A Li-Ion Battery Cross-Value Chain In Europe
   HIGHSCAPE: High efficiency, high power density, cost effective, scalable and modular power electronics and control solutions for electric vehicles

7. What actions can the international community, including the CSTD, take to help your country take advantage of green technology and innovation for cleaner and more productive and competitive production?

   The CSTD studies and discussions are useful platforms which let countries share their best practices and challenges. CSTD meetings and documentation has utmost importance to pave the way to effective knowledge and experience sharing among countries; as well as building collaborations and carrying out joint projects. International RDI Support Programmes, such as Horizon Europe, has vital role for the advancement of green technologies by supporting, promoting and financing international R&D projects on green technologies and clean production.

8. Could you suggest some contact persons of the nodal agency responsible for projects/policies and international collaboration in this context as well as any experts (from academia, private sector, civil society or government) dealing with projects in this area? We might contact them directly for further input or invite some of them as speakers for the CSTD inter-sessional panel and annual session.

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Do you have any documentation, references, technological assessments, future studies or reports on the priority theme in your country or region?

The Green Deal Action Plan of Türkiye which was released by the Ministry of Trade can be found at Ministry fo Trade web site. (available in Turkish)

https://ticaret.gov.tr/data/60f1200013b876eb28421b23/MUTABAKAT%20YE%C5%9E%C4%B0L.pdf

Beside, With the Green Transformation Support Program, it is aimed to determine the current status of SMEs in green transformation, to identify their problems and needs, to create the necessary strategies in this regard, to develop their capacities in line with these strategies and to meet their priority needs.

Information on the new support program design to be prepared within this framework is as follows:

For businesses with annual energy consumption in the range of 10-99 TOE;

Tons of Oil Equivalent (TOE) Value	Support Upper Limit (TL)	
	Engine Study Expenses	Engine Replacement Expenses
10-49 TOE	1.500	60.000
50-99 TOE	2.500	100.000
Support Ratio	100 %	75 %

For businesses with annual energy consumption in the range of 100-500 TOE;

Tons of Oil Equivalent (TOE) Value	Support Upper Limit (TL)	
	Engine Study Expenses	Engine Study Expenses
100-500 TEP	30.000	400.000
Destek Oranı	75 %	40 %

Sincere Regards,
CSTD secretariat