The concept of

CLIMATE PLATFORM

for adapting Ukrainian economy to the latest environmental trends

FEDERATION OF EMPLOYERS OF UKRAINE

CMD UKRAINE Center for Market Economy Development

NEW DEMOCRACY FUND

DI Dansk Industri

CONTENTS

GLOSSARY

AFID	Alternative Fuels Infrastructure Directive
BAT	Best available techniques
CAP	Common Agricultural Policy
CBAM	Carbon Border Adjustment Mechanism
DCFTA	Deep and comprehensive free trade agreement
EC	European Commission
EED	Energy efficiency d ective
ESR	Effo t Sharing Regulation
EU ETS	European Union Emission Trading System
FEU	Federation of employers of Ukraine
GDP	Gross domestic product
GHG	Greenhouse gases
IMO	International maritime organization
ISO	International Organization for Standardization
LULUCF	Land use, land-use change and forestry
NDC-2	Updated nationally determined contribution of Ukraine
OECD	Organization for Economic Co-operation and Development
PEF	Product ecological footprint
PPP	Public-private partnership
RED	Renewable energy directive
RES	Renewable energy sources
UNFCCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organization

EXECUTIVE SUMMARY

Recently, the fight against climate change has gained a particular topicality in international agenda, as long discussions have finally led to the development of specific mechanisms and plans for the decarbonization of economies in most countries of the world. Ukraine also did not bypass this global trend, taking on obligations under the Paris Agreement to reduce greenhouse gas emissions by 65% by 2030 compared to 1990.

Today, Ukraine is suffering from a large-scale Russian invasion, which, naturally, calls into question, if Ukraine fulfills its international climate obligations on time, as hostilities are in progress, and many industrial and infrastructure objects had been destroyed. At the same time, prospects of the structural transformation of economy during post-war reconstruction provides additional chances for Ukraine to fulfill its climate obligations and a green transition, perhaps, even ahead of schedule. However, considering ambition of climate goals, deep integration into the world economy, and strategic importance of further cooperation with Western countries, the climate agenda sets a number of new challenges for Ukrainian businesses that must be urgently dealt with.

In response to these challenges, the Federation of Employers of Ukraine (FEU) developed the concept of a Climate Platform to adapt the Ukrainian economy to key environmental trends. The Climate Platform is a venue for businesses, authorities, civil society and experts to discuss a roadmap for country's climate policy implementation. The purpose of the Platform is to effectively integrate Ukrainian business into global climate trends, using green transition as a means for modernization, creating new jobs, and increasing the level of international competitiveness of domestic economy.

To achieve this goal, the FEU Climate Platform will manifest itself as:

— an *office* that monitors, analyzes and spreads information on current international and domestic events in the field of climate policy

— a *forum* that contributes to formation of a broad public consensus on combating climate change, creation of coalitions in support of green initiatives, building communications of Ukrainian businesses with foreign partners in this area;

— a *secretariat* of climate partnerships that will organize operation of sectoral working groups involving businesses and authorities to draw up road maps for reaching climate goals in Ukraine.

The presented concept of the Climate Platform is based on the Danish experience of achieving the Government's climate goals, by organizing public-private partnerships (hereinafter referred to as PPPs) in the form of 14 sectoral Climate Partnerships. Within these Climate Partnerships, representatives of each industry were tasked with formu-

lating specific proposals for their contribution to reducing GHG emissions, and creating a roadmap for achieving climate targets in a way that would help maintain the competitiveness of the Danish economy, boost exports, create new jobs and increase welfare. Climate Partnerships aimed to develop two types of proposals: a) measures that industries can implement themselves to reduce greenhouse gas emissions; b) recommendations for the Government to remove barriers and improve the regulatory and institutional framework to facilitate climate investment. As a results, businesses developed their own realistic climate roadmaps, and the Government received topical recommendations to improve policies aimed at supporting green transition. By the end of 2021, the Danish Climate Partnerships contributed to the development of more than 400 proposals and recommendations, most of which were approved by the Government and began to be urgently implemented in the national climate policy.

The benefits of Denmark's Climate Partnerships go far beyond improving the effe - tiveness of public policy and protecting business interests in green transition. The Partnerships also encouraged private business to make strict climate commitments and set long-term climate goals. During the discussions, new technological solutions and business models were crystallized to contribute to implementation of green transition road map by industries. An important role was also played by the requirement of the Government to provide specific recommendations with clear calculations of the impact of certain decisions on GHG emissions reduction. Publication of the results of Climate Partnerships provided an opportunity to raise the awareness of all economic agents regarding modern technologies and tools for climate modernization of the economy. Besides, it enhanced not only public-private partnership, but intra- and inter-industry cooperation of enterprises as well that contributed to pursuing a common goal.

This format of public-private partnership, which has been practiced in Denmark since the 1970s, has proven to be an effective way of developing and implementing mechanisms for solving sustainable development issues, as it has provided political stability that is vital to ensuring continued investment and setting ambitious long-term environmental goals. The Danish model of PPP is aimed at using the strengths of all participants involved in the process, and at the same time enables coordination of divergent interests that inevitably occur in this kind of cooperation. While the state provides ambitious long-term goals and stable support, the private sector provides the innovative solutions and investment needed to achieve the Government's vision. An effective PPP model provides the Danish Government with broad and active support for climate initiatives from business, and thus promotes their effective implementation by private secto .

As a result, Denmark has one of the lowest ratios of GHG emissions per unit of GDP in the world. At the same time, Denmark manages to maintain dynamic economic growth and sustainable socio-economic development. Denmark has become one of the few developed countries that decoupled economic growth from carbon emissions. Moreover, such decoupling has also occurred in employment: jobs lost in the fossil fuel extraction are offset by new jobs in the renewable energy sector, green technologies manufacturing and export, etc.

Unfortunately, Ukraine cannot boast of an adequate interaction between the state and business in solving such important issues. In particular, the primary tables devel-

oped by the Ministry of Environmental Protection and Natural Resources of Ukraine to collect information on measures for implementation of the Paris Agreement Second Nationally Determined Contribution (which was adopted despite numerous reservations from business) clearly indicate that in achieving climate goals the government relies on inter-departmental cooperation of bureaucracy and interaction with experts, while businesses are mainly assigned the role of consumers of ready-made state support programs.

Such an approach hinders productive cooperation between state and businesses, leads to a skeptical attitude of business community and civil society to Government's climate initiatives, and therefore may inhibit taking real steps for green transition, result in missing the established deadlines of the Second Nationally Determined Contribution (NDC-2), and deteriorate Ukraine's international reputation. It should be noted that as of July 2022, the time frame set by the Government for the development of a plan of measures to achieve Ukraine's climate goal has obviously not been met. This provides an opportunity to reorganize preparation of this plan correcting its key shortcomings in the field of PPP and inte action between the state, business and civil society.

It's necessary to urgently use the key principles of Denmark's experience in the stakeholders' cooperation to effectively implement green transition, namely, to create a system of sectoral climate partnerships that will unite businesses, authorities and experts to elaborate concrete road maps, grassroots initiatives and recommendations on decarbonization of the economy.

The Federation of Employers of Ukraine, as one of the most influential business associations, representing the largest industries of economy, has sufficien potential to become the basis for establishment of PPP on implementation of climate goals in the form of Climate Platform.

INTRODUCTION

The problem of anthropogenic impact on the climate through GHG emissions takes a prominent place among the global challenges of today. There is no doubt that climate change as a result of greenhouse effect will lead to devastating consequences not only in the ecological, but in the socio-economic sphere as well. There is an urgent need for humanity to ensure a rapid reduction of carbon dioxide and other greenhouse gases emissions into the atmosphere, and it requires large-scale steps from the Governments, scientific and business communities of all countrie .

The determination of the world community to solve the problem of climate change was embodied in a number of international agreements, the prominent place among which belongs to the Paris Agreement of 2015 that sets out a global framework to avoid climate change replacing the Kyoto Protocol of 1992. According to Paris Agreement, each participant individually establishes its own Nationally Determined Contribution into GHG emissions reduction to limit the global temperature increase in this century. Thus, specific obligations to combat climate change and a reporting and monitoring mechanism for the fulfillment of these obligations a e established.

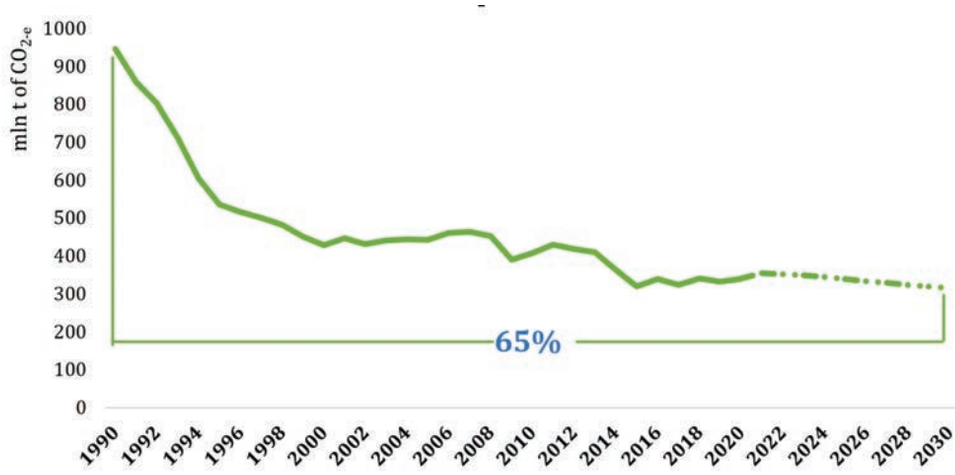
On July 30, 2021, the Government of Ukraine approved its a new climate goal under the Paris Agreement (Updated/Second Nationally Determined Contribution) that obliges to reduce GHG emissions in Ukraine by 65% by 2030 compared to 1990, and achieve carbon neutrality by 2060.

Along with this, the European Union, as one of the undisputed leaders of the world economy, is on the verge of launching an ambitious program of the European Green Deal, designed to ensure transition of the EU countries to a climate-neutral economy by 2050. Under the Green Deal, it's being currently discussed to introduce CBAM – carbon border adjustment mechanism (essentially an additional tax on imports) for goods and services from third countries, that don't not keep up with decarbonization policy in the EU.

Since Russia's large-scale invasion of Ukraine on February 24, 2022, a political component was rapidly added to the environmental and climate reasons for abandoning fossil fuels consumption on the European continent. Natural gas, oil, fuels, and coal, export of which remains Russia's key source of military budget, is now regarded as foundation of Kremlin authoritarian regime and driver of further military aggression.

Step by step, Western countries began to introduce sanctions that prohibit or significantly limit the import of Russian mineral fuels. In response, Russia resorted to blackmail, blocking the supply of hydrocarbons to the EU even before the introduction of a number of sanctions. This, in our opinion, should accelerate the green transition of European economies for the reasons of strengthening energy independence, and ability to resist aggressive Kremlin policy.

Climate goal of Ukraine: to reduce GHG emissions by 65% by 2030 compared 1990



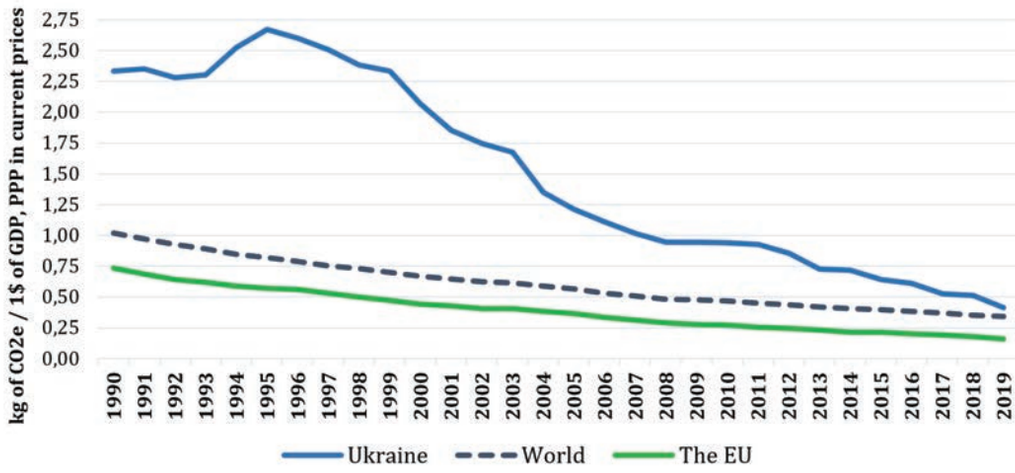
Taking into account that the EU is Ukraine's largest trading partner (the share of EU in Ukraine's foreign trade turnover reached 39.0% in 2021), the very EU policies of combating climate change and abandoning Russian energy sources pose even more challenges to our country in the ecological, economic and energy spheres than the possible consequences of climate change in the distant future. Ukraine's falling out of decarbonization trends may hinder export market access for domestic manufacturers that will have catastrophic consequences for the economy long before the difficultie caused by natural disasters from climate change.

It should be noted that over the last three decades, the national economy of Ukraine has already undergone significant decarbonization. During 1990–2018, total greenhouse gas emissions in Ukraine decreased by 64.0%, from 945 to 340 million tons of CO_2-equivalent. In 1990, when producing 1 USD of GDP at purchasing power parity, Ukraine emitted 2.3 kg of CO_2-eq. In 1995, this indicator increased to 2.67 kg, but then rapidly decreased to 0.42 kg in 2019. Despite the global trend of reducing the intensity of GHG emissions into the atmosphere, the dynamics of decarbonization in Ukraine was above average. If in 1995 carbon intensity of Ukraine's GDP exceeded the world average level by more than 3.3 times, and the level of the EU by 4.7 times, then in 2019 this gap decreased to 1.2 and 2.6 times, respectively.

Ukraine's share in global emissions of CO_2-eq into the atmosphere decreased from 2.95 to 0.70% during 1990–2018.

In 2019, about two-thirds of GHG emissions in Ukraine were produced by energy and transport sectors. These two sectors hold the largest reserves for reducing GHG emissions in Ukraine, as electricity is still predominantly generated by consumption of foil fuels. The share of renewables in domestic electricity production was only 11.3% in 2020. For comparison, in the EU, the share of renewables in electricity generation, heating and transportation sectors in the same year was 22.1% (in particular, 19.3% in Germany, 36.1% in Denmark, 60% in Sweden).

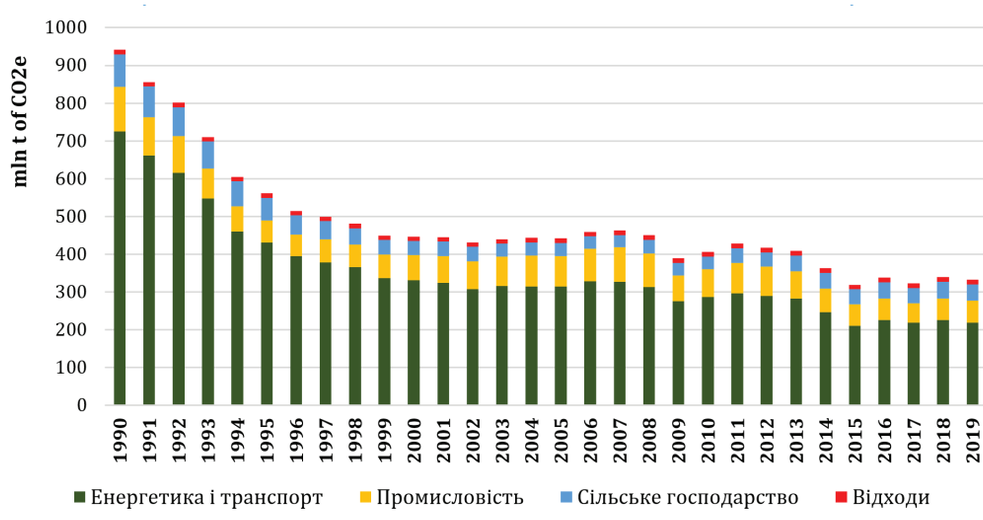
The ratio of greenhouse gas emissions to GDP by PPP in Ukraine, the EU and the world on average (1990–2019)



Source: The World Bank data "Total greenhouse gas emissions (kt of CO2 equivalent)" https://data.worldbank.org/indicator/EN.ATM.GHGT.KT.CE?end=2018&start=1990

The industry and agriculture sectors in Ukraine account for 16.6% and 13.0% of GHG emissions, respectively. During 1990–2018, these emissions decreased by more than half (by 52.0%) in industry, and by almost half (by 49.1%) in agriculture. Another 4% of GHG emissions in Ukraine are generated by waste and other sources. GHG absorption by forests is estimated to be insignificant compa ed to emissions.

GHG emissions in Ukraine by sectors (1990–2019 pp.)

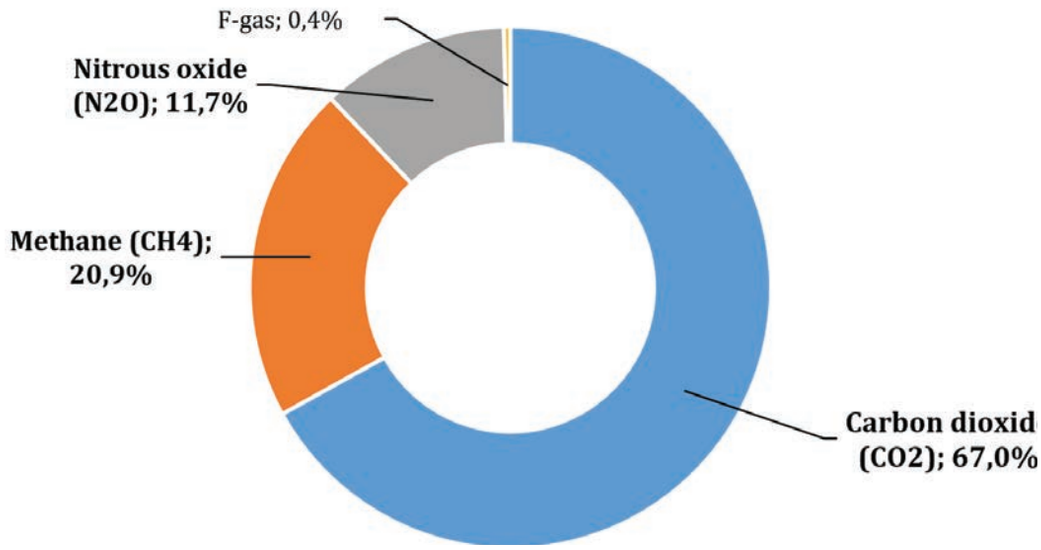


Source: Global Historical Green-House Gases Emissions: Ukraine / Climate Watch. https://www.climatewatchdata.org/ghg-emissions?end_year=2018&start_year=1990

The main greenhouse gas emitted in Ukraine is carbon dioxide. Its share in total CO_2-equivalent emissions was 67.0% in 2019. Methane (CH_4) comes next after carbon dioxide, its share is estimated at 20.9%. The main sources of methane emissions in Ukraine are the energy (production and transportation of fossil fuels), waste and agriculture (livestock) sectors. Methane emissions are also noticeable in industry, in particular in the production of iron, silicon, ethanol, etc. Although methane has a much shorter atmospheric lifetime than CO_2, it has 83 times the warming power of carbon dioxide.

Nitrous oxide (N_2O) accounts for 11.7% of greenhouse gas emissions in Ukraine. The main sources of nitrous oxide emissions are vehicles and machinery that use internal combustion engines (including ships, railway locomotives, construction and special equipment), as well as industrial facilities, including chemical, oil refining, cement, foundries, waste incineration, and power plants. Significant N_2O emissions are also caused by use of nitrogen fertilizers. Like CO_2, nitrous oxide is a long-lasting GHG that accumulates in the atmosphere for decades. Fluorinated greenhouse gases (F-gas) in Ukraine account for only 0.4% of CO_2-eq. emissions.

GHG emissions in Ukraine by types of gases, 2019



Source: Global Historical Green-House Gases Emissions: Ukraine / Climate Watch. https://www.climatewatchdata.org/ghg-emissions?end_year=2018&start_year=1990

Positive developments in Ukraine's decarbonization took place mainly as a result of several stages of significant reduction in industrial production and, accordingly, a reduction in fossil fuels consumption. These stages were:

— a sharp drop in industrial production and agriculture in the 1990s due to the collapse of the USSR. At the same time, there was a growth in the service sector with a lower intensity of fossil fuel consumption and, accordingly, GHG emissions;

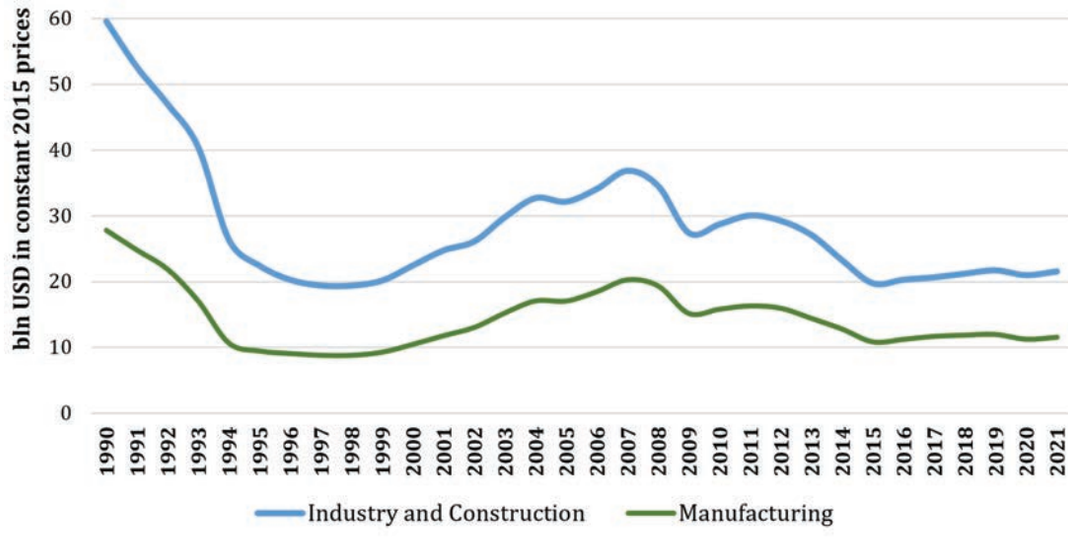
— the impact of the Global recession of 2009, when production of cement, chemicals, iron and steel significantly decreased. As a result of this crisis, Ukraine's GDP decreased by 13%, and GHG emissions decreased by 15%;

— the partial destruction of the economy as a result of Russia's occupation of Crimea and hostilities in Donetsk and Luhansk regions, where significant energy-intensive production capacities and coal extraction facilities are concentrated[1].

Only since 2016, reduction of GHG emissions in Ukraine began to couple with economic growth thanks to implementation of the energy efficienc policy in housing and utilities (in particular, the "Warm credits" program to stimulate energy-efficien measures in residential buildings, replacing gas boilers with biomass boilers, etc.) and the gradual increase of tariffs for natural gas, hot water and heating up to the market level, which made energy efficiency meas es economically attractive.

As a result, GHG emissions by manufacturers in Ukraine decreased by 66% in 1990–2018, and industrial output (value added) decreased by 55%. For comparison, during this period, Danish manufacturing reduced GHG emissions to approximately the same level as the Ukrainian one (about 65%), but its industrial output increased by 35%[2].

Manufacturing (value added) in Ukraine, 1990–2021



Source: The World Bank data " Manufacturing, value added (constant 2015 US$) - Ukraine" https://data.worldbank.org/indicator/NV.IND.MANF.KD?locations=UA

It should be noted that for the industry, Ukraine's current obligations under the Paris Agreement (in particular, the Second Nationally Determined Contribution) do not so much lead to the reduction of total GHG emissions as complicate restoring previous output volumes without large-scale investments in energy efficien , specifically

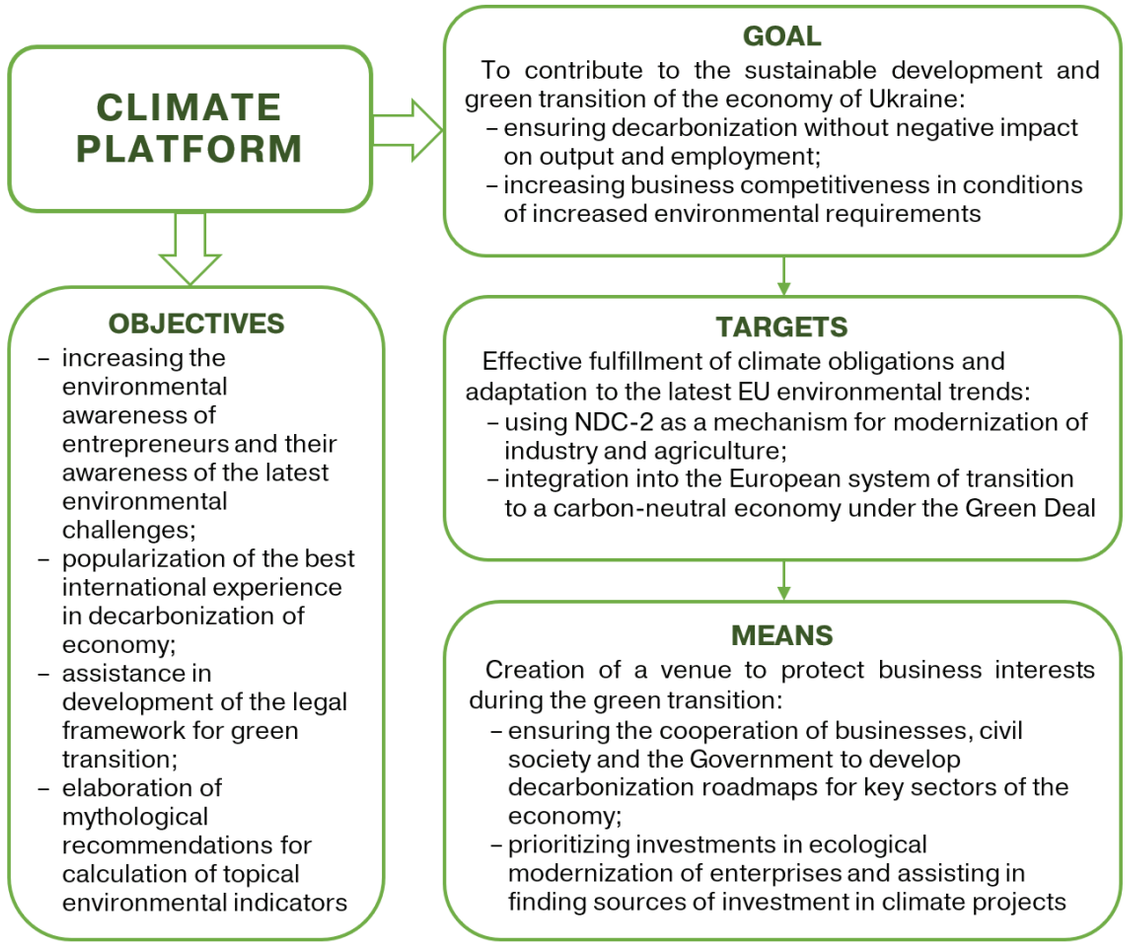
— the sector of industry and product use in 2018 emitted 75 million tons of CO_2-eq, while NDC-2 sets a 2030 limit for this sector at the level of 89.5 million tons of CO_2-eq. Thus, total GHG emissions in sector may increase by 16% by 2030, which means that under "business as usual" scenario, annual growth of industrial output shouldn't exceed on average 1.5% in the 2020s. According to available estimates, the prevention of exceeding the NDC-2 limit requires 37 bln euros of investments in the sector by 2030;

— the agricultural sector emitted GHG at the level of 44.2 mln t of CO_2-eq in 2018, while NDC-2 sets a target to emit no more than 44.5 mln t of CO_2-eq by 2030. Therefore, in this sector, the limit for increasing GHG emissions has already been practically exhausted and it should stop its development if it does not take measures to reduce the carbon intensity. Investments in relevant measures are estimated at 2.3 bln euros by 2030;

While NDC-2 challenges the industry and agriculture of Ukraine to modernize production processes, the Green Deal also puts the prospect of the survival of domestic agricultural and industrial enterprises in direct dependence on the reduction of GHG emissions in the energy and transport sectors. The point is that possible restrictions to access the EU markets under CBAM are linked to carbon footprint, which occurs not only in result of direct GHG emissions by companies' production facilities, but also in result of using "dirty" electricity (produced by consumption of fossil fuels) and carrier vehicles powered by petroleum products.

Thus, keeping international competitiveness of Ukrainian manufacturers and prospects for rapid economic growth are closely connected with following modern environmental trend thorough green modernization of all key sectors of the national economy. This requires coordination of efforts among these sectors and mandatory involvement of the state, representatives of civil society and scientific circles. It is also obvious that the costs of ecological modernization in order to achieve decarbonization goals within the established time frame are too high, therefore the it cannot take place without state support. This requires a decisive role of the Government in providing fiscal incentives, financial resources, organizational, regulatory and other support to reduce GHG emissions.

There is an urgent need to create and launch the Climate Platform to combine and effectively coordinate the efforts of all stakeholders of green transition. The Climate Platform is to become a center for joint development of methodological, organizational and legal foundations of climate modernization of the domestic economy, based on the best international experience and current challenges of Ukraine's adaptation to global environmental trends. The strategic goal of the climate platform is to ensure the sustainable development of the Ukrainian economy, to promote competitiveness in new environmental and economic realities, to prioritize green investments for business and Government, and to intensify the search for available resources to carry out climate projects.



The purpose of this work is to prepare the concept of such a Climate Platform that will work to adapt the Ukrainian economy to the key environmental trends. In order to reach that purpose, the *first chapter* analyzes the EU legislative framework in the field of climate change and carbon neutrality, primarily those related to possible import restrictions for products with carbon footprint. International standards for calculating and evaluating the carbon footprint are analyzed.

The *second chapter* provides a detailed analysis of Ukrainian legislation in the field of decarbonization of the economy, as well as FEU members' point of view on how to improve it in order to ensure effective ecological modernization of domestic industrial and agricultural enterprises.

The *third chapter* analyzes European experience of organizing fruitful interaction between businesses and the state in the field of decarbonization. Special emphasis is placed on the experience of organizing sectoral climate partnerships in Denmark as one of the leaders of green transition among EU countries, both in terms of environmental ambitions and innovative approaches in realizing them.

The *fourth chapter* presents a concept of the Climate Platform in Ukraine based on international experience and results of domestic and European legislation analysis.

CHAPTER 1. EU LEGISLATION IN THE FIELD OF CLIMATE POLICY

1.1. Key provisions of European Green Deal

Among six European Commission priorities for 2019–2024, the fi st priority is the European Green Deal designed to make Europe the fi st climate-neutral continent with a modern, resource-efficien economy[3]. Green Deal was officiall presented by the President of the EC Ursula von der Leyen in the European Parliament on December 11, 2019 and is a road map for transforming Europe into the fi st climate-neutral continent by 2050.

Green Deal is the main strategy of the EU aimed at the decarbonization of the entire economy, that is, the transition of the industrial, transport, energy, and agricultural sectors to technologies that make it impossible to emit GHGs into the atmosphere in amounts that exceed their natural absorption by plants and oceans[4].

Green Deal sets two main objectives: a) to develop a set of deeply transformative policies; b) to bring sustainability into the mainstream in all EU policies.

THE FIRST OBJECTIVE CONSISTS OF THE FOLLOWING ELEMENTS:

1. INCREASING THE EU'S CLIMATE AMBITION FOR 2030 AND 2050:

— reduction of GHG emissions from 40% to 50–55% by 2030 (compared to 1990) and achieving climate neutrality of Europe by 2050;

— revision of the EU Emissions Trading System (EU ETS);

— adoption of the fi st European ‘Climate Law’;

— revision of the Energy Taxation Directive;

— introduction of carbon border adjustment mechanism.

2. SUPPLYING CLEAN, AFFORDABLE AND SECURE ENERGY:

— development by each member state of a national plan for its contribution to the achievement of Pan-European climate and energy goals in line with the Regulation on the Governance of the Energy Union and Climate Action;

— increasing the role of renewable energy sources (rapid phasing out coal, decarbonizing gas, unlocking the potential of offsho e wind energy);

— financing schemes for households to enovate their houses;

— deployment of innovative technologies and infrastructure, such as smart grids, hydrogen networks or carbon capture, storage and utilization, energy storage, also enabling sector integration.

3. MOBILIZING INDUSTRY FOR A CLEAN AND CIRCULAR ECONOMY:

— adoption of a new EU industrial strategy;

— elaboration of a new circular economy action plan aimed at creating a coherent policy for sustainable goods and services, mainly to reduce waste generation;

— decarbonization and modernization of energy-intensive industries, such as steel, chemicals and cement;

— improvement of legislation on waste management;

— development of digital sector as an enabler for attaining the sustainability goals.

4. BUILDING AND RENOVATING IN AN ENERGY AND RESOURCE EFFICIENT WAY:

— development by each member state of the national long-term renovation strategy to reconstruct and modernize public and private buildings;

— revision of the Construction Products Regulation (design of new and renovated buildings at all stages must be in line with the needs of the circular economy, and lead to increased digitalization and climate-proofing of the building stock);

— lifting national regulatory barriers that inhibit energy efficienc investments in renovation of social housing, schools and hospitals (money saved through building efficiency will supp t education and public health).

5. ACCELERATING THE SHIFT TO SUSTAINABLE AND SMART MOBILITY[5]:

— adoption of a strategy for sustainable and smart mobility that addresses the following issues: a) accelerating the deployment of zero- and low-emission vehicles and vessels; b) creation of airports and ports with zero emissions; c) making long-distance and urban mobility more permanent and healthy; d) greening freight transport; e) taxing carbon emissions and providing better incentives for consumers; f) creation of an automated and connected multimodal mobility, together with smart traffi management systems enabled by digitalization (in particular, simple and understandable purchase of e-tickets with a transfer, a paperless system of payment for travel for all types of transport, the introduction of transport systems management and transport control centers); g) introduction of new technologies and artificial intelligence in transport; h) strengthening the single market (attracting investments into all spheres of the transport system and modernization of all types of transport, as well as business investments in digital mobility, launching Trans-European Transport Network); i) ensuring fair mobility for all; j) improving transport security;

— revision of the Alternative Fuels Infrastructure Directive 20 and the TENT Regulation;

— revision of the Directive on the establishment of common rules for certain types of combined transport of goods between member states;

— revision of the legislation on CO_2 emission performance standards for cars and vans, vessels, airplanes;

6. DESIGNING A FAIR, HEALTHY AND ENVIRONMENTALLY-FRIENDLY FOOD SYSTEM:

The implementation of this task consists, fi st of all, in the adoption of “Farm to fork” strategy, aiming to make food systems fair, healthy and environmentally friendly, mitigate the consequences of climate change, and stop biodiversity loss[6]. The strategy establishes the following targets in agricultural sector by 2030: a 50% reduction in the use of pesticides that pollute soil, water and air, a 20% reduction in the use of fertilizers, a 50% reduc-

tion in the sale of antimicrobials for pets and fisheries, as well as allocating 25% of farm land to organic farming household. These indicators are planned to be achieved by:

— creating a food environment encouraging to choose environmentally friendly and healthy diet. Increasing the share of vegetable products in the nutrition will reduce the negative impact of food industry on environment;

— introduction of special labeling requirements. The EC proposes not only to place information on the nutritional value of item on the front of package, but also to develop a labeling system that demonstrates its environmental and social features;

— conducting R&D on food, bio-economy, natural resources, agriculture, fishe - ies and implementing innovations developed on the results of these researches. Advisory services by EU's common agricultural policy will play an important role in providing informational support to farmers;

— intensifying the fight against food waste: educing the amount of food waste;

— facilitating the global transition. In case of successful implementation of this strategy, the EU plans to spread gained experience to third countries, to cooperate with them to create conditions for the transition to sustainable food systems;

7. PRESERVING AND RESTORING ECOSYSTEMS AND BIODIVERSITY:

— adoption of Biodiversity Strategy and Plan of its implementation. The goal of the Strategy is to put Europe on a path to restoring biodiversity by 2030, benefiting people, the climate and the planet. Among the main tasks of the strategy, the following can be highlighted: increasing the coverage of protected biodiversity-rich land and sea areas building on the 'Natura 2000' network; restoration of damaged ecosystems by 2030; funds mobilization for biodiversity and enhancing ecosystem management, etc.;

— adoption of the New Forest Strategy, developed on the basis of Biodiversity Strategy, aiming, among other things, to strengthen control over imports into the EU that involve deforestation and forest degradation;

— strengthening protection of seas and oceans, namely by applying a "zero tolerance" approach to illegal, unregistered and unregulated fishin .

8. A ZERO POLLUTION AMBITION FOR A TOXIC-FREE ENVIRONMENT:

— strengthening provisions on monitoring and preventing pollution of water, soil, air, etc.;

— revision of EU ambient air quality standards to align them more closely with the World Health Organization recommendations;

— adoption of the EU Chemicals Strategy for Sustainability[7]. The new strategy will cover the following areas: strengthening control over compliance with EU legislation when importing products and on the EU single market; adoption of an EU research and innovation program to study effects of chemicals, promote modernization and reject animal testing; simplification, cost savings and improved regulatory predictability by introducing "one substance – one assessment", "no data – no market" principles, amending REACH and industry legislation; revision of EU measures to address pollution from large industrial installations[8].

THE SECOND OBJECTIVE – TO BRING SUSTAINABILITY INTO THE MAINSTREAM IN ALL EU POLICIES – CONSISTS OF THE FOLLOWING ELEMENTS:

9. PURSUING GREEN FINANCE AND INVESTMENT AND ENSURING A JUST TRANSITION.

The Commission has estimated that achieving the current 2030 climate and energy targets will require €260 billion of additional annual investment, about 1.5% of 2018 GDP. The magnitude of the investment challenge requires mobilizing both the public and private sector. That's why the Commission will present a Sustainable Europe Investment Plan[9] to mobilize at least 1 trillion euros of sustainable investments over the next decade, create incentives to unlock and redirect public and private investments, provide support to public authorities and project initiators in planning, development and implementation of sustainable projects. Also, this involves the adoption of the Strategy for financing the transition to a sustainable economy[10], revision of the Non-Financial Reporting Directive, development of green bond standards, etc.

10. GREENING NATIONAL BUDGETS AND SENDING THE RIGHT PRICE SIGNALS.

This element involves a review of the European economic governance framework that will include a reference to green public investment in the context of the quality of public financ . This will inform a debate on how to improve EU fiscal governance. The outcome of the debate will form the basis for any possible future steps including how to treat green investments within EU fiscal rules, while preserving safeguards against risks to debt sustainability.

The European Green Deal will create the context for broad-based tax reforms, removing subsidies for fossil fuels, shifting the tax burden from labor to pollution, and taking into account social considerations. There is a need to ensure rapid adoption of the Commission's proposal on value added tax (VAT) rates currently on the table of the Council, so that Member States can make a more targeted use of VAT rates to reflect increased environmental ambitions, for example to support organic fruit and vegetables.

11. MOBILIZING RESEARCH AND FOSTERING INNOVATION.

The full range of instruments available under the Horizon Europe program will support the research and innovation effo ts needed for Green Deal. The European Innovation Council will dedicate funding, equity investment and business acceleration services to high potential start-ups and SMEs for them to achieve breakthrough Green Deal innovation that can be scaled up rapidly on global markets.

12. ACTIVATING EDUCATION AND TRAINING.

The European Commission will prepare a European competence framework to help develop and assess knowledge, skills and attitudes on climate change and sustainable development, as well as to enhance youth employability in the green economy.

13. FOLLOWING THE 'DO NO HARM' PRINCIPLE.

The objective is to ensure that all Green Deal initiatives achieve their objectives in the most effective and least burdensome way and all other EU initiatives live up to a green oath to 'do no harm'. To this end, the explanatory memorandum accompanying all legislative proposals and delegated acts will include a specific section explaining how each initiative upholds this principle.

Besides mentioned above, Green Deal defines the EU as the global leader that will continue to promote and implement ambitious environment, climate and energy policies across the world. The EU will develop a stronger 'green deal diplomacy', develop economic incentives for climate action, facilitate international trade in environmental goods and services, and remain at the forefront of effo ts to set up a financial system that supports global sustainable growth.

1.2. Analysis of ‘Fit for 55’ package

On July 14, 2021, the European Commission published a package of legislative initiatives “Fit for 55” – a set of proposals aimed at reducing CO_2 emissions by 55% by 2030, ensuring that EU policies are in line with the climate goals agreed by the Council and the European Parliament. The package makes significant changes to eight existing pieces of legislation and provides for five new initiatives in the following economic sectors and areas: climate, energy, transport and buildings, land use and forestry. The new initiatives include:

— carbon border adjustment mechanism;

— increasing the uptake of greener fuel in the aviation (ReFuelEU Aviation);

— reducing GHG intensity of the energy used in maritime transport (FuelEU Maritime);

— establishing the Social Climate Fund;

— elaborating new EU forest strategy.

Proposals for updating the current legislation include:

— reforming the EU Emissions trading system (ETS);

— revision of the Renewable Energy Directive (RED);

— revision of the Energy Efficiency D ective (EED);

— revision of The Effo t Sharing Regulation (ESR) that sets a target for each EU member state to cut greenhouse gas emissions in a number of economic sectors;

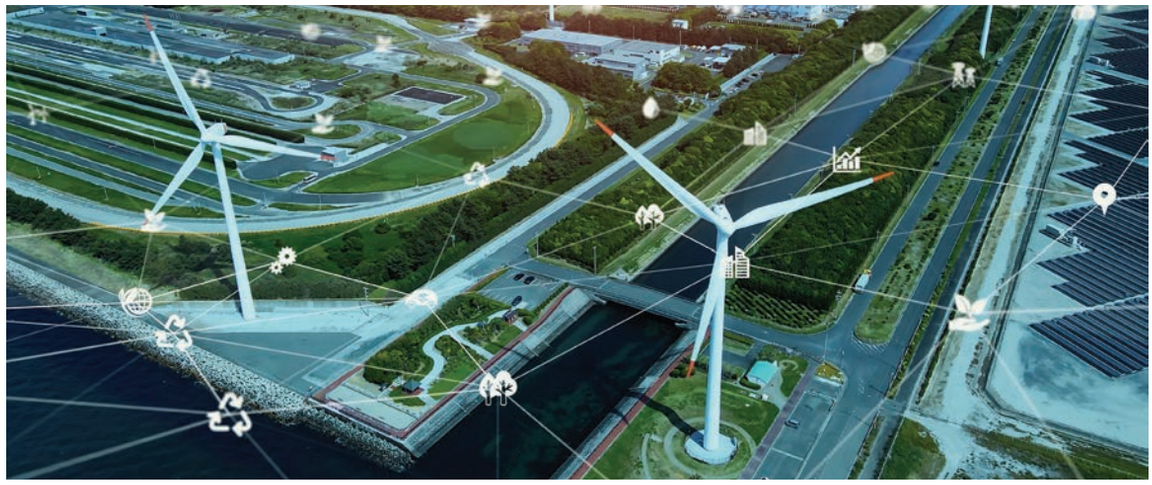
— revision of Alternative Fuels Infrastructure Directive (AFID);

— revision of Land Use, Land-Use Change and Forestry Regulation (LULUCF);

— toughening CO_2 emission standards for cars and vans;

— broadening taxable base in Energy Taxation Directive (ETD).

CARBON BORDER ADJUSTMENT MECHANISM.



CBAM is expected to be a tool to counter carbon leakage – a situation when industries either shift production with high greenhouse gases emissions out of the EU to jurisdictions with lower climate policy standards than those of the EU or import products with high carbon footprint from out of EU. The main purpose of introducing such a mechanism is to ensure the same level climate burden for producers in the EU and producers from other countries where strict EU climate policies and EU Emissions Trading System do not apply.

Proposal for a regulation of the European parliament and of the council establishing a carbon border adjustment mechanism defines four key objectives of this mechanism: a) addressing the risk of carbon leakage under increased EU ambition; b) contributing to the provision of a stable and secure policy framework for investments in low or zero carbon technologies; c) ensuring that domestic production and imports are subject to similar level of carbon pricing; d) encouraging producers in third countries who export to the EU to adopt low carbon technologies[11].

According to clause 14 of the proposal[12], CBAM should apply to goods imported into the customs territory of the Union from third countries, except where their production has already been subject to the EU ETS, whereby it applies to third countries or territories, or to a carbon pricing system fully linked with the EU ETS. These jurisdictions include Iceland, Liechtenstein, Norway, Switzerland, Büsingen, Heligoland, Livigno, Ceuta, Melilla.

This mechanism will be implemented gradually and will initially be applied only to certain product groups associated with high carbon emissions and a significant risk of carbon leakage: iron and steel, cement, fertilizers, aluminum, electricity.

According to Ukrainian Classification of Goods for Foreign Economic Activity (UCG-FEA), CBAM will be applied to the following categories of goods:

2523 – Portland cement, aluminous cement, slag cement, supersulphate cement and similar hydraulic cements, whether or not colored or in the form of clinkers;

2716 – Electrical energy;

2808 – Nitric acid, sulphonitric acids;

2814 – Ammonia, anhydrous or in aqueous solution;

2834 21 – Nitrates of potassium;
3102 – Mineral or chemical fertilizers, nitrogenous;
3105 – Mineral or chemical fertilizers containing two or three of the fertilizing elements nitrogen, phosphorus and potassium;
72 – Ferrous metals (except 7202 “Ferro-alloys” and 7204 “Ferrous waste and scrap”);
7301-11 – Articles of iron and steel;
7601-09 – Aluminum and articles thereof (except 7602 “Aluminum waste and scrap”).

Proposal establishes an initial transitional period from 1 January 2023 to 31 December 2025 when CBAM will apply with no financial adjustment aiming at collecting data and raising awareness of declarants. Starting in 2026, importers will pay a tax on carbon emissions. This tax will be calculated on the basis of direct CO_2 emissions resulting from the production of goods (“carbon footprint”) and the price of emissions equal to the price on the EU-ETS carbon certificate marke .

The mechanism will work as follows: EU importers will buy carbon certificates corresponding to the CO_2 price that would have been paid if those goods had been manufactured under EU carbon pricing system. And once a third-country producer demonstrate that it has already paid for the CO_2 emissions occurred in result of imported goods production in a third country, importer in the EU will not have to do extra CBAM payments.

CBAM will complement the EU Emissions Trading System (ETS), but instead establishing quantitative limits to import, it introduces special certificates for importers of carbon-intensive goods in the EU states. The price of CBAM certificates should reasonably reflect the price (in euros per ton of CO2-eqv) of such auctions through averages calculated on a weekly basis.

Importers will have to register themselves or through a representative with the climate authorities responsible for CBAM. Such institutions will issue permissions to declarants in the CBAM system, verify declarations, and be responsible for the sale of CBAM certificates to importers. By 31 May of each year, the authorized declarant shall surrender a number of CBAM certificates to the competent authority that corresponds to emissions embedded in goods imported during the previous year[13]. The importer has the right to sell previously purchased certificates to the competent authority, if he discovers their surplus at the end of the year. The number of certificates subject to re-purchase will be limited to one third of the total CBAM certificates purchased by the authorized declarant during the previous calendar year. The re-purchase price will be the price paid by the authorized declarant for that certificate at the time of pu chase.

In turn, the Regulation develop methods of calculating embedded emissions based on environmental footprint methods. There are three options for determining the carbon footprint for goods:

— based on actual embedded emissions produced in a given installation, certified by an accredited verifier

— based on default value, if monitoring data referring to direct emissions cannot be adequately provided. A default value to be set at the average emission intensity

of each exporting country and for each of the goods increased by a mark-up (the latter to be determined in implementing acts);

— when reliable data for the exporting country cannot be applied for a type of goods, the default values to be based on the average emission intensity of the 10% worst performing EU installations for that type of goods.

There are three options for determining the carbon footprint for electricity as well:

— based on default value, calculated on the best data available to EC determining the average CO_2 emission factor in tones of CO_2 per megawatt-hour of price-setting sources in the third country, group of third countries or region within a third country;

— if default value cannot be calculated (for example, in the absence of reliable data in the exporting country/group of countries/geographic zone), then the default values for similar electricity production in the EU to be used. This indicator is defined as the ratio of the total CO_2 emissions of all EU power plants to the amount of electricity produced (without deducting electricity consumption for the power stations' own needs);

— based on actual embedded emissions (certified by an accredited verifier) instead of default values for individual importers who meet if the following cumulative criteria:

a . the authorized declarant has concluded a power purchase agreement with a producer of electricity located in a third country for an amount of electricity that is equivalent to the amount for which the use of a specific value is claimed;

b . he installation producing electricity is either directly connected to the EU transmission system or it can be demonstrated that at the time of export, there was no physical network congestion at any point in the network between the installation and the EU transmission system;

c . an equivalent amount of electricity to the electricity for which the use of actual embedded emissions is claimed has been firmly nominated to allocated interconnection capacity by all responsible transmission system operators in the country of origin, the country of destination and, if relevant, each third country of transit;

d . meeting the above criteria is certified by an accredited verifie . The verifier shall receive at least monthly interim reports demonstrating how the above criteria are fulfille .

INCREASING THE UPTAKE OF GREENER FUEL IN THE AVIATION (REFUELEU AVIATION).

ReFuelEU Aviation initiative aims to promote environmentally safe aviation fuel and obliges suppliers to increase its share in existing fossil fuel consumed at the EU airports, and will also encourage the consumption of synthetic fuel (e-fuel).

According to Article 4 of the Proposal for a regulation of the European parliament and of the council on ensuring a level playing field for sustainable air transport[14], aviation fuel suppliers shall ensure that all aviation fuel made available to aircraft operators at each Union airport contains a minimum share of sustainable aviation fuel, including a minimum share of synthetic aviation fuel. This proposal stipulates that sustainable aviation fuels should account for at least 5% of aviation fuels by 2030 and 63% by 2050.

Along with this, airports shall take necessary measures to facilitate the access of aircraft operators to aviation fuels containing shares of sustainable aviation fuels, and provide the infrastructure necessary for delivery, storage and uplifting of such fuels.

REDUCING GHG INTENSITY OF THE ENERGY USED IN MARITIME TRANSPORT (FUELEU MARITIME).

Proposal for regulation of the European parliament and of the council on the use of renewable and low-carbon fuels in maritime transport[15] identifies two main objectives to be achieved in the shipping sector:

— to use on-shore power supply or zero-emission technology in ports;

— to limit the greenhouse gas intensity of energy used on-board by ships.

From 1 January 2030, a containerships and passenger ships at berth in a port of call under the jurisdiction of EU member state shall connect to on-shore power supply and use it for all

energy needs while at berth. This regulation applies to all ships above a gross tonnage of 5000, regardless of their fla . However, this regulation will not apply to: warships, naval auxiliaries, fish-catching, fish- ocessing ships, government ships used for non-commercial purposes.

Greenhouse gas intensity limit will reduce gradually during the period from 2025 to 2050. The limit referred will be calculated by reducing the reference value, which corresponds to the fleet average greenhouse gas intensity of the energy used on-board by ships in 2020. GHG intensity is to reduce by 2% in 2025, and by 75% by 2050.

This Regulation applies to the entirety of the energy used on voyages from a port of call under the jurisdiction of a Member State to a port of call under the jurisdiction of a EU member state. A half of the energy used on voyages departing from or arriving to a port of call under the jurisdiction of a EU member state will be covered with this regulation, if the last or the next port of call is under the jurisdiction of a third country.

The person or organization responsible for the compliance with this Regulation should be the shipping company, defined as the ship-owner or any other organization or person, such as the manager or the bareboat charterer, that has assumed the responsibility for the operation of the ship from the ship-owner.

SOCIAL CLIMATE FUND.

Along with other initiatives of 'Fit for 55' package, the EC proposed to create a Social Climate Fund, which, together with the Innovation Fund and the Modernization Fund, will contribute to the effective transition of Europe into a carbon-neutral region. The goals of Social Climate Fund to solve the social and distributional problems that will arise in the process of combating climate change, as well as to stimulate measures necessary to alleviate the social consequences of the EU Emissions Trading System impact on households. Single pricing for emissions in construction and road transport will have an uneven impact on diffe ent EU member states and regions. The fund will provide support to member states to finance an agreed list of measures and investments necessary to achieve climate goals. These measures and investments, including temporary direct income support, will help households, micro-enterprises and transport users who are vulnerable and suffer the most from emissions trading in construction and road transport. Most of the revenue from the new emissions trading will go to the national budgets of the member states and should be used for climate-related purposes, including to address the social consequences of combating climate change.

According to Proposal for a regulation of the European parliament and of the council establishing a Social Climate Fund[16], each EU state should submit to the EC a Social Climate Plan, which should contain a detailed list of financial and investment measu es aimed at:

— increasing energy efficienc of buildings, decarbonization of heating and cooling of buildings, including the integration of energy from renewable sources;

— granting improved access to zero- and low-emission mobility and transport.

Payments from the Fund will be made depending on the fulfillment of the established milestones and targets indicated by the member state in the social climate plan. The Fund shall not support, and the estimated total costs of plans shall not include measures in the form of direct income support for households already benefiting f om:

— public intervention in the price level of the fuels covered by Chapter IVa of Directive 2003/87/EC;

— public interventions in the price setting for the supply of gas in accordance with Article 3(3) of Directive 2009/73/EC.

Fund will be financed by the own resources of the EU budget, including as of 2026 the 25% of revenues from the emission trading for buildings and road transport.

The Fund will also cover expenses pertaining to preparatory, monitoring, control, audit and evaluation activities which are required for its management.

THE NEW EU FOREST STRATEGY.

The new EU forest strategy for 2030[17] is one of the flagship initiatives of the European Green Deal and builds on the EU biodiversity strategy for 2030. The strategy defines a specific action plan aimed at increasing the area and quality of EU forests, strengthening their protection, restoration and sustainability, and also promotes the most climate and biodiversity-friendly forest management practices, emphasizes the need for sustainable biomass use and specify principles of circular bioeconomy.

This action plan consists of five main blocks containing a number of measures: regulatory, financial and voluntary. The fi st block includes support for social and economic functions of forests for the prosperity of rural areas and stimulation of the forest bioeconomy[18]. It provides for:

— development of a standard, robust and transparent methodology to quantify the climate benefits of wood construction p oducts and other building materials;

— new means to share information on good practices on best design and implementation of forest-relevant interventions, as part of the Common Agricultural Policy;

— promoting the use of the 'Natura 2000' logo for non-wood forest-based products and services;

— creating a new alliance between the professionals of tourism and foresters, involving the World Tourism Organization and the network for Europe's natural and cultural heritage;

— establishing life-long programs and advice to foresters and adapt education and training to challenges and needs of today's forest needs and realities.

The second block involves measures aimed at protecting, restoring and expanding the area of EU forests to overcome negative consequences of climate change, preserve biodiversity and ensure sustainable and multifunctional forest ecosystems. This block includes:

— roadmap for planting at least 3 billion additional trees by 2030;

— development of guidelines on definition of primary and old-growth forests, including their definition, mapping, monitoring and strict p otection;

— identifying additional indicators and thresholds or ranges for sustainable forest management;

— development of guidelines on biodiversity friendly affo estation and reforestation.

Strategic forest monitoring, reporting and data collection is the third block of the Strategy, which provides for development of legislation to establish and implement the system of forest monitoring, reporting and data collection.

The fourth block launches strong research and innovation agenda to improve knowledge on forests, as well as to avoid escalating socio-economic costs from natural disasters, in particular forest fi es.

The fifth block is about establishing inclusive and coherent EU forest governance framework and 'Forest Advisory Service', equivalent to the Farm Advisory services existing under the CAP.

REFORMING THE EU EMISSIONS TRADING SYSTEM.

The EU ETS was established in 2005 and became the world's first international emissions trading system, as well as the central tool of the European Union for reducing GHG emissions. Due to the establishment of limits on GHG emissions and

their annual reduction, demand for reduction units is created and the market price is formed. Over the past 16 years, ETS has successfully reduced emissions from electricity production and energy-intensive industries by 42.8%. Its implementation has shown that emissions trading is an effective and economically optimal mechanism for reducing emissions, and the revenues it collects through auction of emission permits can be used to support the transition to more environmentally-friendly production and stimulate innovation.

The refinement of this system plays an important role in the 'Fit for 55' package. The main proposals of the EC regarding changes to the ETS include:

— reduction of emissions by 61% (compared to the level of 2005) by 2030, by increasing the pace of annual cap reduction to 4.2% from the currently used 2.2% for sectors already included in the EU ETS (electricity and heat production, steel plants and production of metal, aluminum, cement, lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals, commercial aviation within the EU)[19];

— increase in emissions reductions from 29% to 40% for sectors not included in the trading system;

— introduction of CBAM – a mechanism for certain product groups (iron, steel, cement, fertilizers, aluminum and electricity) imported into the EU. For all other industries, free allocation of emission allowances will continue to be based on benchmarks determined according to emissions performance of the best (greenest in terms of emissions) industrial installations;

— phasing out free allowances for the aviation sector and moving to full auctioning of allowances by 2027. The total number of aviation quotas will be approved at the current level and will decrease by 4.2% annually;

— introducing Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) for international flight . The EU ETS Directive will apply CORSIA to EU-based airline emissions for flights to and f om countries outside the EEA;

— extending the scope of the ETS to maritime transport, which will cover CO_2 emissions from large ships (over 5,000 tons), regardless of the flag under which they enter an EU port (for intra-EU voyages), as well as 50% of emissions from voyages that start or end outside the EU and emissions that occur when ships are docked in EU ports. The expansion will be carried out in stages, from 2023 to 2025;

— creation of a parallel emissions trading system for road transport and buildings in 2025, and for fuel suppliers (who sell fuel for buildings and road transport) in 2026;

— immediate cancellation of free quotas for 120 mln tons of CO_2 emissions and further reduction of excessive quotas at an accelerated pace.

Overall, the ultimate goal of the proposed changes should be complete abolition of free allocation of emission allowances in all industries, probably by the end of 2028.

REVISION OF THE RENEWABLE ENERGY DIRECTIVE.

The Renewable Energy Directive has two main functions: it defines which energy sources are considered "renewable" and it sets binding targets for renewable energy sources in Europe's energy balance. The EU's goal of zero emissions by mid-century will require a huge increase in renewable energy capacity in Europe. In 2018, the EU set a 32% target for renewables in Europe's energy consumption by 2030, up from around 20% currently[20]. However, according to the EC, this figu e needs to roughly double up to 40% to meet the EU's renewed climate ambitions, as outlined in the Proposal amending RED[21].

In addition, the above-mentioned document includes the following proposals aimed at renewables expansion:

— *in the industrial sector* (mining, industrial production, construction, information technologies): to increase the share of renewables in the amount of energy sources used for final energy and non-energy purposes by an average minimum annual of 1.1 percentage points by 2030. By 2030, 50% of hydrogen used in sector must be generated by renewable energy;

— *in the heating and cooling sector*: to increase the share of renewables by 1.1 p.p. annually in the EU on average; individual increase in this share varies from 0.6 to 2.9 p.p. depending on the member state's renewables share in the centralized EU heating and cooling system;

— *in the buildings sector*: member states set an indicative target for the share of renewables in final energy consumption in their buildings of at least a 49% in the Union's final consumption of ene gy by 2030;

— *in the transport sector*: the amount of renewable fuels and renewable electricity supplied to transport sector leads to a GHG intensity reduction of at least 13% by 2030.

An additional increase in share of renewables in the EU energy balance (compared to previous version of the Directive) is planned to be obtained primarily through the use of bioenergy. At the same time, control over heaters and generators using biomass is being strengthened. Revised RED also applies the GHG emissions criteria not only to new installations but to existing ones.

REVISION OF THE ENERGY EFFICIENCY DIRECTIVE.

The proposals for the revision of the Energy Efficienc Directive[22] are aimed at further stimulating the EU's effo ts in promoting energy efficienc and achieving energy saving targets to combat climate change. By revising the EED, it is proposed to enshrine the principle of 'energy efficienc fi st' at the Union level and strengthen energy efficienc measures. Following this principle, a number of goals and objectives was set before the member states[23]:

— to reduce energy consumption by 2030: by 39% for primary and by 36% for final energy consumption compared to current target of 32.5% (both for primary and final ene gy consumption);

— to double member states' annual end-use energy savings commitments. Revised EED introduces a comparative analysis system allowing the member states to establish an approximate national contribution to the achievement of the EU's overall goal set in Green Deal. The proposal addresses sectors with high potential for energy savings – notably heating and cooling of buildings, industry and energy – and pays particular attention to the public sector;

— to renovate each year at least 3% of the total floor area of buildings owned by all levels of public administration, in order to eventually transform these buildings into structures with almost zero energy consumption;

— to reduce energy consumption in the public sector by 1.7% annually. According to the Commission's estimates, the public sector (education, health care, social services, public transport, water supply, street lighting) in the EU annually consumes about 50 million tons of oil equivalent, which is 5% of the final energy consumption in the Union.

The revised Directive set new requirements for heating and cooling in buildings, which account for 80% of buildings' total energy consumption. In district heating and cooling, the definition of 'efficien systems' will be gradually strengthened to avoid systems where fossil fuels are consumed.

Requirements for energy efficienc at enterprises will be strengthened as well. The largest energy consumers that use more than 100 TJ annually for the last three years but have no energy management system, will need to implement such systems. Businesses that use more than 10 TJ annually will be required to undergo an energy audit every four years.

REVISION OF THE EFFORT SHARING REGULATION.

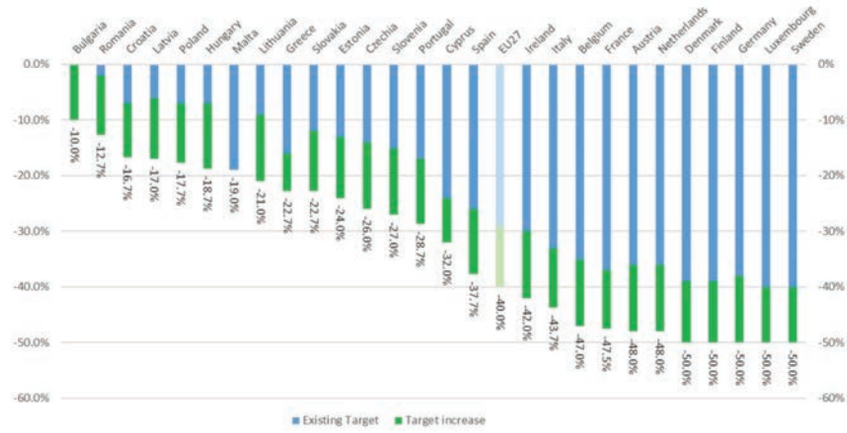
The Effo t Sharing Regulation covers agriculture, road transportation, building heating, small industrial installations and waste disposal that collectively generate about

60% of GHG emissions in the EU. This regulation works in in conjunction with the ETS, covering sectors not covered by ETS and setting mandatory GHG emission reduction targets for each EU country depending on GDP.

As part of the revision of this Regulation, the European Commission proposes to reduce GHG emissions by at least 40% compared to the level of 2005, which exceeds the previous target by 11 percentage points[24]. The distribution of contributions to the reduction of GHG emissions among EU members by 2030 is shown in the figure 1.1.

According to the new EC proposals, Sweden, Luxembourg, Germany, Finland and Denmark commit to reduce GHG emissions by 50%, while Bulgaria's contribution reaches only 10% of GHG emissions reduction, Romania's – 12%, Croatia's – 16%.

Figure 1.1. EU member states' contribution to reduction of GHG emissions under ESR by 2030: existing and new targets



Source: Questions and Answers - The Effo t Sharing Regulation and Land, Forestry and Agriculture Regulation https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3543

REVISION OF ALTERNATIVE FUELS INFRASTRUCTURE DIRECTIVE.

Taking into account the overall greening of the European transport, revision of Alternative Fuels Infrastructure Directive was initiated to ensure an effective infrastructure for recharging and refueling of eco-friendly transport (cars, planes, barges, ships, trucks) on EU territory. It is proposed to set the following goals for the development of alternative fuels infrastructure for various types of transport[25]:

— infrastructure of electric charging stations for light-duty vehicles: by December 31, 2035, member states must launch refueling pools with a capacity of at least 600 kW, which have at least two charging stations with an individual capacity of at

least 150 kW. Such stations must be located at a distance of at least 60 km from each other on the territory of the EU;

— *infrastructure of electric charging stations for heavy-duty vehicles*: by December 1, 2035, each refueling pool must have a capacity of at least 3,500 kW and include at least two recharging stations with an individual capacity of at least 350 kW. Stations must be located at a distance of at least 100 km from each other;

— *hydrogen refueling infrastructure for road transport*: by 31 December, 2030, member states must provide a minimum quantity of hydrogen refueling stations available on the territory of each EU country. Hydrogen stations must be located at a distance of 150 km from each other, have a minimum capacity of 2 t/day and be equipped with a dispenser of at least 700 bars;

— *infrastructure of liquefied natural gas refueling points for heavy-duty vehicles and maritime transport*: by January 1, 2025, member states must ensure the necessary number of LNG refueling points for trucks and sea vessels;

— *infrastructure of electric charging stations in seaports and inland ports*: by 1 January 2030, member states must ensure a minimum amount of shore-side electricity supply for charging stations for seagoing container and passenger ships, and for inland waterway vessels;

— *infrastructure of electrical charging stations for aircraft*: by January 1, 2030, member states must provide electricity for stationary aircraft used for commercial air transport.

In addition to ensuring an adequate infrastructure of charging stations, the revision of the AFID provides for the creation of a fair and transparent pricing and payments in alternative fuel market.

According to Article 13 of the revised Directive, each member state must submit to EC a draft of national policy for the development of alternative fuels infrastructure by January 1, 2024.

REVISION OF LAND USE, LAND-USE CHANGE AND FORESTRY REGULATION.

Healthy natural carbon sinks are needed to meet the Green Deal goals, support biodiversity recovery and ensure Europe's climate neutrality by 2050.

According to the EC, the amount of CO2 that European forests and soils absorb from the atmosphere decreased by about 20% between 2013 and 2018[26]. As a result, the EC expressed concern about such a negative trend and suggested to revise Land Use,

Land-Use Change and Forestry Regulation to provide stronger incentives for member states to grow and improve natural carbon sinks under the European Climate Law. In particular, the Commission proposed to set mandatory targets for member states to increase net carbon absorption in the land use and forestry sector for the period from 2026 to 2030. Proposals for the regulation establish:

— commitments in the fields of land use, land-use change, forestry and agriculture, implementation of which will contribute to achieve the goals of the Paris Agreement and the EU goals for reducing GHG emissions in the period from 2021 to 2025;

— accounting for GHG emissions and absorption in land use, forestry and agriculture (allowing better identification and more accurate monitoring of sensitive areas with high biodiversity or high carbon stocks, such as wetlands or forested areas, which shouldn't be used to produce biomass);

— EU target for net GHG absorption in the land use, forestry and agriculture for the period from 2026 to 2030;

— commitment by member states to collectively achieve climate neutrality in the EU land use, forestry and agriculture sectors by 2035, including CO_2-free agricultural emissions[27] (e.g. from fertilizer and livestock).

LULUCF revision enables monitoring the negative impact of natural disasters (forest fi es, damage from bark beetles, etc.) on fulfillment of member states targets, as well as introduces a system of stimulating carbon storage in wood products of long-term and circular use[28].

For gradual transition to new requirements and goals fulfillment, Commission proposes a three-phase approach, namely: Phase 1 – by 2025, Phase 2 – from 2026 to 2030, and Phase 3 – from 2031 to 2035. At the Phase 1, current system remains largely in place, with the obligation for each member state to balance emission and removals. At the Phase 2, net carbon absorption on the EU territory should amount to 310 million tons of CO_2-eq, increasing by 15% compared to current level. Phase 3 envisages climate neutrality in the sector of land use, forestry and agriculture by 2035. Member states are required to contribute to the collective goal and by mid-2024 present in their national energy and climate plans how to achieve this goal. Based on the results of the analysis of the specified plans, the Commission will propose targets for each member state until the end of 2025 and general measures for the entire EU.

TOUGHENING CO_2 EMISSION STANDARDS FOR CARS AND VANS.

By the end of 2050, almost all cars and vans on the road should be zero-emission vehicles. Carbon emission standards for passenger cars and minibuses are key factors in

reducing CO_2 emissions in road transport[29]. In the new edition of the Regulations establishing CO_2 emission standards for cars and vans, the Commission proposes to strengthen the current emission standards for these types of transport. In particular, the fleet of newly registered cars must reduce emissions by 55% by 2030 and by 100% by 2035 compared to 2021. For new vans, reduction rates are 50% and 100%, respectively[30].

According to EC, new stricter CO_2 emission standards will stimulate production of more zero-emission cars in the EU market. In addition, these standards are beneficial not only in terms of decarbonization, but also in terms of saving energy costs and better air quality.

The annex of working document to the Regulation defines practical consequences of its implementation for various stakeholders:

— *for vehicle manufacturers*: the need to introduce new technologies aimed at reducing CO_2 emissions, including new types of power units in cars. In the short term, this is likely to lead to higher production costs and, as a result, higher investments in production facilities and new technologies. However, given the global trend of increasing demand for zero- and low-emission vehicles, European car manufacturers will have the potential to lead sales of advanced vehicles in other markets;

— *for suppliers of spare parts and intermediates*: the need to adapt to new power units and technologies and to invest in increasing production capacity for zero- and low-emission components. However, requirements leading to the introduction of new powertrains and batteries may create additional business activity for suppliers in these sectors;

— *for vehicle users*: a higher price for zero- and low-emission vehicles. However, users of environmentally friendly vehicles will save thanks to reduced fuel costs;

— *for suppliers and consumers of fossil fuel*: a decrease in demand, which will lead to a drop in sales and underuse of existing infrastructure;

— *for car repair and maintenance enterprises*: a decrease in demand for maintenance of cars running on conventional fuel, which will negatively affect repair enterprises, require retraining of personnel and retooling of production.

REVISION OF ENERGY TAXATION DIRECTIVE.

ETD is the basic document on the taxation of the energy sector in the EU. It was adopted in 2003 establishing minimum excise rates and rules for taxation of energy carriers (motor fuel, heating, electricity). The current Directive defines the minimum tax rates for energy carriers, while member states may exceed this level. However, instead of increasing tax rates, some European countries adopted internal directives establish-

ing a number of exceptions and benefits, encouraging the use of fossil fuels such as coal. Thus, as part of Green Deal discussion, it was argued that rates presented in current ETD are outdated and their level does not depend on volume of emissions and scale of negative impact on environment caused by the consumption of various energy products. In addition, excessive exceptions and diffe ence in energy taxation approaches among member states led to large-scale distortions in the EU single market.

Taking into account the above, it was decided to amend ETD in the context of establishing a clear link between the minimum fuel tax rates, fuels composition and impact on the environment. It was also proposed to expand the tax base by including new energy products and areas of their application that were not previously covered with this legislation. The document presents a new structure of tax rates[31], according to which all energy products, including electricity, are divided into groups depending on energy density and indicators of environmental impact. Energy carriers that produce most harmful emissions will have the highest tax rate. For example, starting from January 1, 2023, the highest tax rate of 10.75 EUR/GJ will apply to gasoline, gas and kerosene, the lowest rate of 0.15 EUR/GJ will apply to low-carbon fuels, renewable fuels of non-biological origin, biofuel, biogas and electricity[32]. Taxes on other types of energy carriers will vary between these maximum and minimum rates depending on the amount of harmful emissions.

As for tax base expansion, the scope of energy taxes will be extended to aviation and maritime transport in 2023. The minimum tax rate in aviation will gradually increase over a ten-year transition period, while maritime fuel will be taxed at the same (lower) tax rate as in agriculture. Alternative types of fuel used in these sectors will have a preferential zero rate during the fi st ten years, in order to stimulate consumption of environmentally friendly fuel.

1.3. Key provisions of the new EU Trade Strategy. The concept of EU Open Strategic Autonomy

On February 18, 2021, a new EU trade strategy was published on the EC website aimed at solving urgent and relevant European problems, namely: economic recovery after COVID-19 crisis, climate change and environmental degradation, growing international tensions, the use of one-sided approaches to solving problems and the negative consequences of such approaches for various institutions[33].

New trade strategy is designed to integrate trade policy into the Union's economic priorities, define the role of trade policy in post COVID-19 economic recovery and support EU's geopolitical ambitions. It also aims to establish a new consensus on trade policy based on openness, sustainability and persistence.

The new EU trade policy focuses on three main medium term goals:

— *recovery and fundamental transformation of the EU economy in line with green and digital goals*. In this context, EU trade policy continues to fulfill its core function of facilitating the flow of goods and services in a way that creates opportunities and economic well-being. At the same time, EU trade policy should contribute to the transformation of the EU economy in accordance with the green and digital transition, namely with the European Green Deal in all its spheres, primarily achieving climate neutrality by 2050. EU's long-term competitiveness and global position will depend on its ability to embrace and exploit digital transformation;

— *shaping the rules for a more sustainable and fair globalization*. EU trade policy should use all available tools to support social justice and environmental sustainability. In turn, the key priority for achieving this goal should be reforming the World Trade Organization and improving the effectiveness of the multilate al trading system;

— *strengthening the EU's ability to realize its interests and ensure its rights, including autonomously, if necessary*. This goal envisages that the EU direct its primary effo ts to effectively implement and enforce its trade agreements in order to raise social, labor and environmental standards throughout the world. By strengthening implementation of such agreements, EU trade policy will create conditions for development, growth and innovation in business, provide high-quality jobs in Europe and beyond. However, openness to cooperation should not contradict the EU's own interests. The EU will work to create its own tools to protect member states from unfair trade practices or other hostile actions, acting according to its international obligations;

TO ACHIEVE THESE GOALS, THE EC WILL FOCUS ON SIX AREAS:

1. **Reforming World Trade Organization.**

   — The Commission intends to reform all WTO functions and will insist to adopt the fi st set of reforms focused on strengthening WTO contribution to sustainable development, and start negotiating new international trade rules to avoid competition distortions through state intervention. It also plans to restore WTO dispute settlement system by reforming the Appellate Body;

2. **Supporting green transition and promoting responsible and sustainable value chains through:**

   — promoting ideas and implementing measures to combat climate change and environmental degradation under WTO;

   — requiring G20 partners to commit to climate neutrality and strengthen cooperation on other Green Deal aspects (biodiversity, sustainable food policy, etc.), and offering to take into account the Paris Agreement when concluding all future trade agreements;

   — promoting sustainable and responsible supply chains by implementing mandatory due diligence, including effective actions and mechanisms to ensure that there is no forced labor in European companies' value chains.

3. **Support for digital transition and trade in services.**

   EU trade policy will create an environment in which European service providers can innovate and grow. The EC plans to conclude as soon as possible a WTO agreement on digital trade to settle data sharing rules that will meet the requirements of the EU data protection system and provisions on strengthening consumer confidenc . It also will intensify bilateral interaction and elaborate digital cooperation framework in the field of t ade with like-minded partners;

4. **Strengthening the EU regulatory influence.**

   The ability to influence the development of rules and standards of global significance is an important competitive advantage. Over the past decades, the EU became a leader in this field, participating in ISO international standardization bodies and sectoral international forums. These effo ts helped European companies gain access to global markets and eliminate trade barriers. However, the EU

influence has weakened recently due to emergence of new regulatory bodies and rapid technological development outside of Europe. In order to restore Union's global leadership in this field, it's p oposed:

— to strengthen regulatory dialogue in strategic sectors with like-minded partners and initiate close dialogue with international standardization organizations;

— develop a close transatlantic partnership in the field of green and digital transformation, in particular through the EU-US Trade and Technology Council.

5. Deepening partnership with neighboring countries, from Western Balkans and Africa in particular, as well as countries that concluded with the EU agreements on a deep and comprehensive free trade areas.

Stability and prosperity in EU's neighboring countries, as well as in Africa, is one of the prior political and economic interests of the Union. The EU intends to do everything possible to support its partners and their effo ts in overcoming negative consequences of COVID-19 pandemic and achieving sustainable development. Dense network of EU trade agreements with these countries opens up prospects for closer economic integration and the development of integrated networks of production and services.

Supporting closer economic integration with the Western Balkans and countries of Eastern Partnership will be of particular importance. For the Western Balkans, the improved enlargement methodology and the Economic and Investment Plan represent the basis for accelerated integration into the EU market on equal terms. In order to deepen relations with the above-mentioned countries, the following measures are included in the new trade strategy:

— expanding trade and economic relations with other European countries, including the Western Balkans and countries that concluded DCFTA agreements with the EU, focusing on closer regulatory cooperation in support of the green and digital transition;

— expanding political dialogue and cooperation with the African Union and its members, including engagement with private sector and promotion of common standards in Africa to strengthen regional and continental integration;

— deepening and expanding existing trade agreements with African regional economic communities;

— continuing to explore the possibility of strengthening links and synergies between various trade agreements with African countries, for example through harmonized rules of origin in trade with the EU;

— conclusion of agreements on sustainable investments with African and the Southern Neighborhood countries.

6. Strengthening the EU's focus on implementation and enforcement of trade agreements and ensuring a level playing field for EU business.

The European Union will continue to strengthen partnerships with key growing regions in the Asia-Pacific region and Latin America by creating conditions for negotiation and ratification of bilate al agreements that haven't been adopted yet.

The EU will fully utilize the institution of Chief Trade Enforcement Office (CTEO[34]) to maximize the benefits of negotiations for companies (especially farmers and SMEs) and remove obstacles that reduce the prospect of concluding agreements.

The EU will continue to strengthen and expand tools to face new challenges and protect European companies and citizens from unfair trade practices. In addition, the Commission will study options for an EU strategy on export credits.

In order to support and ensure equal conditions for business in the EU, it is proposed to improve or develop new online tools:

— new efficien digital systems to facilitate trade procedures and regulatory compliance under the EU Single Window Environment for Customs[35] and the Information and Communication System for Liaison and Market Surveillance (ICSMS[36]), and to digitize product conformity information (including product conformity certificates) and its implementation in EU legislation

— a new tool for access to procurement (A2P[37]), enabling the EU economic operators to determine whether and under what conditions they have legally guaranteed access to procurement in third countries;

— an improved online tool for 'Access2Markets' (A2M) portal to expand and include information for service exporters and investors from the EU;

— enhanced self-assessment tool "ROSA" (provides specific assistance on the rules that determine the "economic nationality" of a good, known as rules of origin) to help companies, in particular SMEs, correctly apply the rules of origin when exporting to third countries[38].

For each area, the EC outlined specific actions that must be implemented. The peculiarities of WTO reform had been defined in a sepa ate document.

New EU trade policy is also based on the concept of 'Open Strategic Autonomy' (OSA). The term "strategic autonomy" comes from defense/military planning and refers to the ability of the EU to determine its own course according to its interests and values. This doesn't mean acting alone, but rather accepting and managing interdependence in

the best possible way. “Openness” shows that the EU will be open to trade and will promote stable rules to be an economically strong union and have geopolitical influenc [39]. OSA will be based on the following principles:

— stability and competitiveness to strengthen the economy;

— sustainability and fairness, reflecting the need for responsible and fair EU action;

— rules-based persistence and cooperation, through which EU demonstrates its commitment to international cooperation and dialogue, at the same time readiness to fight injustice, apply autonomous tools to p otect its interests where necessary.

Open strategic autonomy is the compass of EU trade policy in the period of economic transformations and geopolitical instability.

1.4. The Foundations of New industrial strategy for Europe

On March 10, 2020, the New Industrial Strategy for Europe was published on the European Commission website[40]. It reflects the vision of EU industry development – a cleaner, circular, digital and competitive industry[41]. The new EU industrial strategy is based on three priorities (global goals):

— EU industry should become a competitive and leading sector of economy worldwide. The EU Government must create necessary conditions for entrepreneurs to transform their ideas into goods and services, as well as for prosperity and growth of all companies, regardless of their size and activity. The EU should use its influence, and single market to make its voice heard in the world and set global standards;

— EU industry is an economic sector paving the way to climate neutrality. The Green Deal requires all industries to reduce carbon footprint and accelerate transition to climate neutrality by offering affo dable, environmentally friendly technological solutions and developing new business models. Increasing investments in research, innovation and modern infrastructure will help to develop new production processes and create jobs on the way to climate neutrality;

— EU industry is the industry that defines Europe’s digital future. The New industrial strategy together with ‘Shaping Europe’s digital future’ will enable Europe

to maintain its technological and digital sovereignty and become a global digital leader. Europe aims to accelerate investment in research and technology implementation in artificial intelligence, 5G, data analytics and metadat .

THE NEW INDUSTRIAL STRATEGY CONSISTS OF SEVEN ELEMENTS OR "FUNDAMENTALS" DRIVING EUROPE'S INDUSTRIAL TRANSFORMATION:

1. **Creating a single powerful digital market in industrial sector.**

For this purpose, the Action Plan for better implementation and enforcement of Single Market and SME Strategy for a Sustainable and Digital Europe were adopted, providing for new forms of cooperation between diffe ent types of enterprises (industries). In addition, it is planned to adopt: Action Plan in the field of intellectual property (provides for assessment of legal framework in the field of intellectual property, fair and reasonable use of intellectual property, effective fight against intellectual property rights infringement) and the Law on Digital Services (provides for updating and strengthening legal framework of single market in digital services);

2. **creating equal market conditions on a global scale.**

Although European industry is highly integrated into global value chains (GVCs) and operates worldwide, the EU should not ignore the threats posed by unfair competition and trade. The EU will make full use of trade protection tools and insist on strengthening the WTO rules on industrial subsidies. In addition, International public procurement instrument will be introduced, to solve problems in the field of public procurement and provide the EU with additional leverage in negotiations;

3. **supporting industry on the way to climate neutrality.**

Introduction of the Just Transition Mechanism will mobilize 100 billion euros to ensure a just transition of low-carbon regions to climate-neutral regions. This element also introduces CBAM to ensure reduction of carbon leakage risk in compliance with WTO commitments.

The new industrial strategy envisages creation of the European Clean Hydrogen Alliance, introduces the institution of Chief Trade Inspector.

4. **creating a more circular economy.**

European industry must play a leading role in ecological transition. This means reducing the carbon and resource footprint in industry and creating a

closed-loop economy. It is necessary to cease to apply 'materials extracted from the earth' model;

Closed-looped economy will lead to cleaner and more competitive industry by reducing the environmental impact, competition for limited resources, and production costs. According to EU estimates, applying circular economy principles in all sectors could create 700,000 new jobs in the EU by 2030, especially by SMEs.

Under the New Industrial Strategy, a New Action Plan for closed-looped economy was developed. It includes: the basis of the policy for sustainable production; measures allowing consumers to play a more active role in circular economy (consumers should receive reliable and up-to-date information to choose reusable, durable and repairable products); proposals for legislation in the field of environmental public procurement.

In addition, with the aim of creating a more circular economy, the EU regulatory framework for batteries, the EU Textile Strategy, and the Circular Electronics Initiative have been introduced.

5. supporting industrial innovations.

It's necessary to invite and stimulate industries to develop their own road maps to achieve climate neutrality or digital leadership. This should be supported by high-quality research, skills and PPP helping industry to develop technologies and achieve its goal, as successfully practiced in industrial alliances.

The European Innovation Council, launched in 2021, will make the most of Europe's research base to identify next-generation technologies, accelerate their commercial application and help to support the rapid scale-up of start-ups[42]. The creation and scaling of digital innovation hubs, which act as one-stop centers for companies to access technology testing, should become a major platform for the further development of the innovation industry.

6. learning new skills and professional reorientation.

The competitiveness of industry depends on the recruitment and retention of a qualified workforce. Learning new skills throughout life is a new reality for everyone: in next five years alone, 120 million Europeans will have to upgrade or retrain. The transition to a low-carbon economy is expected to generate more than 1 million jobs by 2030. And there are 1 million digital jobs in Europe today. At the same time, 70% of companies report that they are holding back on investment because they cannot find people with the right skill .

Addressing these issues requires collective action by industry, member states, social partners and other stakeholders. For this purpose, a Pact for skills[43] has been introduced to promote upskilling and reskilling, unlock public and private investment in the workforce.

The Strategy emphasizes gender balance in industry, encourages women to study science, technology, engineering and mathematics, consider careers in

technology fields and invest in digital skills, thereby improving the gender balance in launching and running business.

7. financing t ansition.

Mobilization of private investment and public finance is critical where market failures occur, especially during large-scale adoption of innovative technologies. An appropriate tool for this purpose is 'Important Projects of Pan-European Interest' (IPCEI[44]). Member states can use IPCEI to pool financial resources, operational activities and connect the right actors to key value chains. IPCEI act as a catalyst for investment and allow member states to finance large-scale innovation projects abroad if market failures occur.

As part of the New industrial strategy, Commission is implementing the updated IPCEI State Aid Rules, setting out clearer conditions under which member state-led projects in key sectors can move forward in a timely and pro-competitive manner. It should also help SMEs to fully participate in IPCEI.

The strategy envisages stimulation of investments in order to ensure competitive stability in the entire financial system. The recent EU Taxonomy Agreement and the Climate Act are big steps in this direction.

As part of the continued work on deepening the Economic and Monetary Union, the Commission's new Action Plan for the capital markets union includes an initiative to strengthen protection of investments within the EU and effo ts to open up diffe ent sources of financin for European businesses, especially SMEs. Digital finance strategy will help drive innovation in financial se vices to help expand new services and address new risks[45].

New Industrial Strategy for Europe laid the foundations for an industrial policy that supports transition to a green and digital economy to make EU industry more competitive globally and expand Europe's Open Strategic Autonomy. However, a day after the adoption of this strategy, the World Health Organization announced the COVID-19 pandemic, which posed new challenges for industries and economies not only of Europe, but for the entire world. That's why, New Industrial Strategy was updated on 5 May, 2021, with subheading 'building a stronger single market to restore Europe'. This document does not replace 2020 New Industrial Strategy for Europe, but focuses on pandemic negative consequences, outlines lessons to be learned, and suggests ways to overcome post crisis challenges.

The updated Strategy defines three main areas of activity, outlined in annexed working documents:

— strengthening the stability of the single market;

— elimination of Europe's strategic dependence;

— acceleration of the double (green and digital) transition.

The impact of COVID-19 crisis on EU single market has shown how restrictions have led to serious disruptions in free movement of people, goods, services and capital, as well as in production and supply chains and economic activity in general. To assess the single market conditions, Commission published the fi st Annual Single Market Report[46], which examines in detail the impact of the crisis on 14 industrial ecosystems, and also establishes a list of key performance indicators (KPIs) for economic changes and processes analysis. Analysis of these indicators will be carried out regularly by the EC and will help to adopt a strategic position on the EU economy, predict problems and inform on political and investment decisions. In particular, the EC will monitor:

— integration of the single market, based on indicators of intra-EU trade (for example, the price gaps among member states);

— labor productivity;

— international competitiveness, based on EU's share in world market or in world trade and public and private investments to GDP ratios;

— investments in research and development, based on public and private expenditures on research and development to GDP ratios.

The EC will introduce the Single Market Emergency Instrument to guarantee the free movement of goods and services, and maximize availability of essential products. The Instrument includes: strengthened government mechanisms, targeted transparency measures and tailored digital solutions in areas such as standard setting, accelerated compliance assessment, public procurement cooperation. New measures identified in updated industrial strategy will greatly benefit SMEs and start-ups through increasing resilience, tackling late payments and maintaining solvency.

The European Commission's Report on Strategic Dependencies and Capacities identifies 137 products on imports of which the EU is highly dependent and which account for 6% of EU merchandise imports. Report highlights six strategic commodity groups (raw materials, batteries, active pharmaceutical ingredients, semiconductors, hydrogen, cloud and edge technologies), for which it is proposed to develop measures to support and overcome strategic dependence.

Commission adopted the EU Foreign Subsidies Regulation[47]. It is a key element in implementation of industrial strategy by ensuring a level playing field and promoting a fair and competitive single market.

In updated industrial strategy, Commission proposes new measures to support the double transition to green and digital technologies, ensuring that all investments are targeted towards this goal. The following tools are suggested:

— to create transition pathways for ecosystems, from tourism to energy-intensive industries in collaboration with industry, public authorities, social partners and other stakeholders;

— to support the implementation of corporate renewable energy purchase agreements under the revised Renewable Energy Directive;

— together with stakeholders from the industrial sector, to create Energy and Industry Geography Lab to provide geospatial information for companies and experts in energy infrastructure planning.

1.5. Analysis of international standards for calculating carbon footprint

1.5.1. GENERAL OVERVIEW OF CALCULATING APPROACHES AND METHODOLOGY

Attitudes of authorities, investors and consumers to environmental issues are changing rapidly around the world. All stakeholders want to see real effo ts by companies, organizations, enterprises and institutions to reduce the negative impact of climate change. Environmental and social business strategies, corporate responsibility become an important indicator and requirement for successful relations with clients and investors. Business models of most companies in developed countries pay significant attention to environmental issues, including carbon emissions minimization and transition to climate neutral production processes.

In order to plan GHG emissions minimization, organization or enterprise need to estimate carbon footprint occurring in result of its business activities. Identifying the sources and size of carbon footprint helps limit the negative impact on the environment, as well as form a clear action plan to implement company's environmental strategy.

There are many international and national standards elaborating methodologies for calculation of carbon footprint for both an organization and a product. However, there is no single unified international standard that would establish generally accepted rules and methodologies to measure carbon footprint at the moment. Each country develops its own internal standards for determining GHG emissions, which differ in methodology and approaches to measuring the carbon footprint. At the same time, when developing national standards, diffe ent countries rely on principles and methods of calculating the carbon footprint developed by various international organizations on climate change, standardization, measurement of emissions.

In general, there are two types of carbon footprint to measure: company's carbon footprint and carbon footprint of a product. The carbon footprint of a company/ organ-

ization is the amount of GHG emissions generated as a result of its activities. Carbon footprint of company is usually measured on an annual basis and covers all its key activities during the year. Determining the company's carbon footprint is the fi st step towards identifying the extent of its impact on climate change and taking necessary measures to reduce it. The formula for calculating company's carbon footprint is simple: the result is formed by multiplying the data on activities by the corresponding emission factor[48]:

Carbon footprint of company = CPI x EF, *where* (1.5.1)

CPI is company's performance indicator: a parameter that determines the level (volume) of activity that generates GHG emissions (for example, kilowatts of energy, tons of coal or gas, etc.).

EF is an emission factor that represents how many GHG are on average emitted per unit of fossil fuel or electrical energy consumption.

The company's performance indicator can be determined at three levels of GHG generation:

— Level 1 covers direct GHG emissions related to company's production processes only;

— Level 2 includes indirect emissions related to consumption of energy purchased and consumed by company;

— Level 3 includes all other indirect GHG emissions (not related to Level 2), which company can influence but doesn't cont ol directly.

Therefore, before starting calculation of carbon footprint, it is necessary to decide, which level to choose in assessment of company's performance indicator.

Emission factor is a default indicator that company does not need to calculate on its own. Such indicators can be found in publicly available international databases developed by competent authorities and organizations[49]. The most common databases include: EFDB emission factor database[50], EXIOBASE[51], Clim'Foot[52] and others. Thus, in most cases, companies only need data such as distance traveled, fuel burned, electricity consumed, etc., to calculate their carbon footprint. The formula (1.5.1) is used in almost all methodologies for estimating company's carbon footprint as a part of various international standards (UNE-ISO 14064, Greenhouse Gas Protocol, etc.). The most widely used is the Greenhouse Gas Protocol standard (see section 1.5.2 for details).

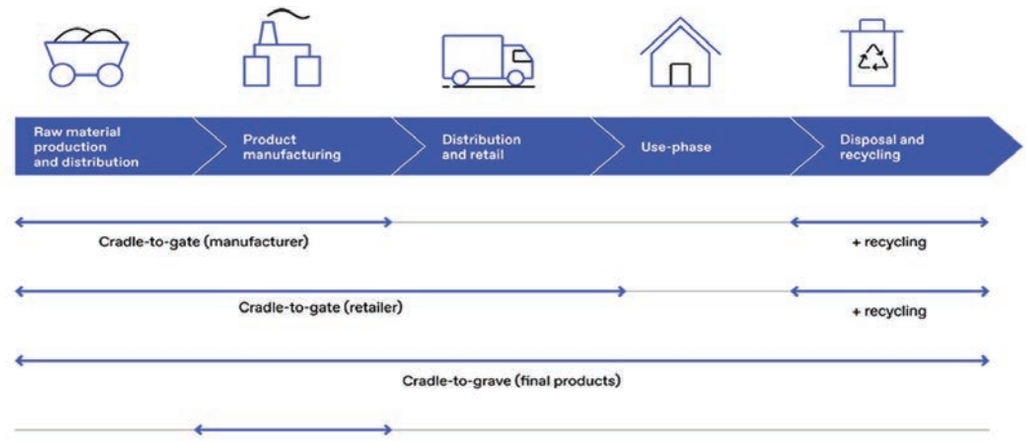
As for manufacturing companies, they increasingly report their carbon footprint on a product-by-product basis. At the same time, in addition to direct emissions, all indirect emissions are also taken into account. For manufacturing companies, this means that entire value chain is part of the company's carbon footprint. This includes all emissions from the supply chain, logistics and utilization ("cradle-to-grave product life cycle").

A product's carbon footprint includes GHG emissions that occur during the product's life cycle[53]. There are two types of product's life cycle:

1. "cradle-to-gate": mainly used for B2B products. In this case, the total GHG emissions are measured, starting with the extraction of raw materials and the production process and ending with finished p oducts getting "outside the gates" of the plant;

2 . "cradle-to-grave": used mainly for B2C products. In this case, total GHG emissions are measured, starting with raw materials extraction, production, distribution, use and utilization of the product (Fig. 1.5.1).

Figure. 1.5.1. Product's life cycle in the context of carbon footprint measurement



Source: https://www.carbontrust.com/

Assessment of product's carbon footprint is more complicated than calculating company's one, as it requires to evaluate emissions separately for each type of product manufactured by company at each stage of its life cycle. The main diffe ence in determining the carbon footprint of a company and a product is that one company can produce many products, so the corporate carbon footprint includes a general estimate of emissions for all products manufactured (services provided), while the product's carbon footprint is calculated for one product only.

In order to ensure transparency and relevance of data when estimating GHG emissions, several standards have been developed at diffe ent times and by diffe ent organizations that contain methodologies and approaches for calculating carbon footprint of a company and a product. These standards can be divided into two groups:

— Group 1 includes standards containing methodologies that cover emissions and impacts related to climate change only.

— Group 2 includes standards containing multi-criteria methodologies, based on a list of mandatory indicators on emissions that affect not only climate change but the environment as a whole.

Group 1 includes the following standards:

1) ISO 14067:2018 “Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification . This standard is largely based on other existing ISO standards dealing with product life cycle assessment. It can be considered an international reference standard for determining product carbon footprint based on globally agreed principles, requirements and guidelines for the procedure for quantifying the carbon footprint of a product and preparing corresponding reports. The standard allows organizations to more accurately determine which supply chains sections generate the most carbon footprint, and thus take measures to reduce it.

2) PAS 2050 standard developed by the British Standards Institute (BSI). This standard is very common and is considered the fi st standard regulating the carbon footprint, which is used in international practice. It establishes approaches to assess the impact of organization’s activities, products and services on environment, and measure product’s life cycle GHG emissions.

3) The GHG Protocol was elaborated by the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI) in October 2011. The protocol was developed according to PAS 2050 but including requirements for public reporting. It introduced the Corporate Accounting and Reporting Standard[54], which provides an accounting platform for virtually any corporate GHG reporting program in the world.

Group 2 includes the following standards:

1) The Product Environmental Footprint[55] is a life cycle assessment-based method of measuring the potential environmental impact of products (goods or services) and organizations. This standard was developed with the aim of harmonizing all existing standards for product life cycle assessment. This approach is based on the following principles:

— in impact assessment, all stages of life cycle of products and services are considered, from extraction of raw materials to processing and production, distribution, use and recycling;

— 16 categories of environmental impact are included in analysis: 1) climate change; 2) ozone depletion; 3) human toxicity potential (threat of cancer); 4) negative impact on human health (threat of diseases other than cancer); 5) impact on human health caused by emissions of solid particles and their precursors (e.g. sulfur, nitrogen); 6) risk of ionizing radiation; 7) potentially harmful ground-level ozone pollution (summer smog); 8) oxidation of air, water and soil as a result of combustion, electricity production, heating and transporting; 9–11): eutrophication (pollution with biogenic elements) and its potential impact on ecosystems (soil, fresh and sea water), caused by nitrogen and phosphorus emissions from fertilizers, sewage; 12) impact of toxic substances on freshwater ecosystems; 13) impact on soil fertility and properties; 14) shortage of available water for human needs and ecosystem integrity; 15–16): depletion of non-renewable resources (minerals, metals and fossil fuels) and deprivation for future generations[56].

(In this context, it is worth noting that some current legislative initiatives in the field of carbon footprint assessment recommend climate change as the only indicator that should be used to report a product's carbon footprint.)

— indicators used in this approach are quantitative and based on mathematical models that describe causations arising as result of various factors influence (for example, emissions, natural resources use, etc.);

— comparative analysis: life cycle assessment is primarily intended to have a choice of the best option from two or more scenarios;

— analysis can be used both at the global and local levels.

2) National Standard BP X30-323-0 developed by the French Association for Standardization (AFNOR), tested in 2011 and finalized in 2015. Similar to PEF, this standard covers several impact categories[57]. However, if necessary, the "climate change" indicator can be presented separately.

3) EN 15804 "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products" is European standard that covers a set of mandatory indicators of environmental impact, including climate change, and is applied to products used in construction industry[58]. This standard establishes requirements and rules for calculation, analysis of input and output data for the Environmental Product Declaration (EDP) that quantifies product's environmental impact. In 2019, the standard was revised and aligned with the European PEF standard.

All the above-mentioned standards are built on the principles of ISO 14040[59] and ISO 14044[60] that regulate the assessment of products life cycle, and also correspond to the latest reports of the Intergovernmental Panel on Climate Change of the United Nations[61]. Although the methodologies presented in these standards are not identical, their developers (BSI, WRI/WBCSD, ISO, AFNOR and EC) seek for unification and accessibilit .

Some methodologies are more general, while others are more prescriptive and require increased calculations reproducibility and compatibility of results. ISO 14067 is an example of a more general standard, while PAS 2050 and the GHG Protocol contain more specific and detailed requirements with less room for interpretation. EN 15804, BPX30-323-0 and PEF set even more detailed requirements for products life cycle assessment and cover many other categories of GHG impacts in addition to climate change. However, PEF has the strictest requirements for data that can be used[62].

It can be concluded that there are many international standards that establish rules and define methodologies for measuring carbon footprints. Unfortunately, there is no simple and unequivocal answer to the question of which methodology to choose, since the choice may depend on many factors and criteria. For instance:

— final purpose: is carbon footprint research (measurement) designed to be used for internal communication exclusively or public reporting, external environmental claims or to meet the requirements of national legislation;

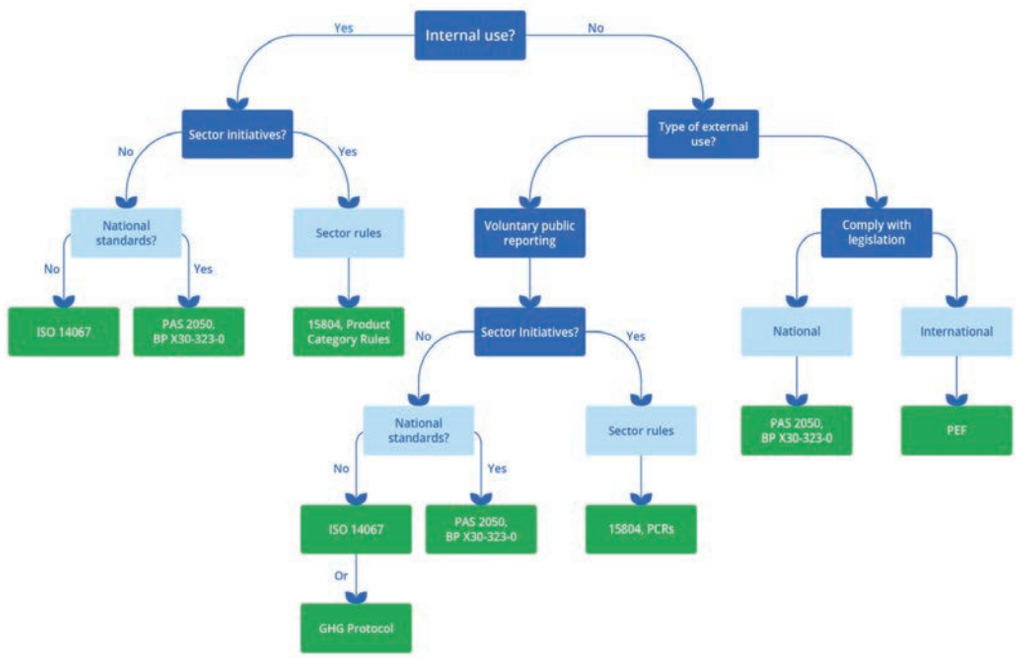
— geographical and sectoral map of the organization/enterprise/company: on territory of which country/countries is organization and its subdivisions / branches / production capacities located? Map should include such criteria as: existing regulations and rules for specific products/industries in the relevant country, union, actions of national and international Governments, company's internal policies and strategies.

In order to make the right decision about choosing a standard for carbon footprint assessment, the international consulting company "PRé Sustainability" (Netherlands)[63], which helps companies to form environmental strategy (including estimation of product carbon footprint), developed a "decision tree" for choosing a carbon footprint assessment standard or methodology (Fig. 1.5.2).

This scheme is one of the didactic manual alternatives helping to structure company's selection criteria and choose the appropriate methodology for measuring the carbon footprint. The most appropriate methodology may be very case-specifi . At the same time, the methodology presented in ISO 14067 can be considered universal: if no specific rules need to be followed. This standard can be considered as the last internationally recognized standard available today.

If the ISO 14067 standard methodology is not sufficientl detailed, additional guidance can always be found in the more detailed methodological materials presented in the GHG Protocol, PEF or BPX30-323-0.

Figure 1.5.2. Decision tree for choosing a carbon footprint assessment standard or methodology



Source: «PRé Sustainability» company.

1.5.2. Basic approaches to carbon footprint assessment according to the GHG Protocol

The GHG Protocol is one of the most widely used (by companies, governments, environmental organizations, etc.) standards for assessing carbon footprint, as well as for creating reliable and effective programs to combat climate change[64]. This standard introduces an internationally recognized methodology that helps quantify and report on GHG emissions associated with the activities of an enterprise or organization. Businesses often pursue multiple goals for carbon footprint assessment, but the primary goal is often to identify ways and opportunities to reduce GHG emissions at various stages of a product's life cycle. Basic approaches and methods for evaluating the carbon footprint established in this standard became the basis for other international and national standards for estimating the volume of GHG emissions, both for company and for product.

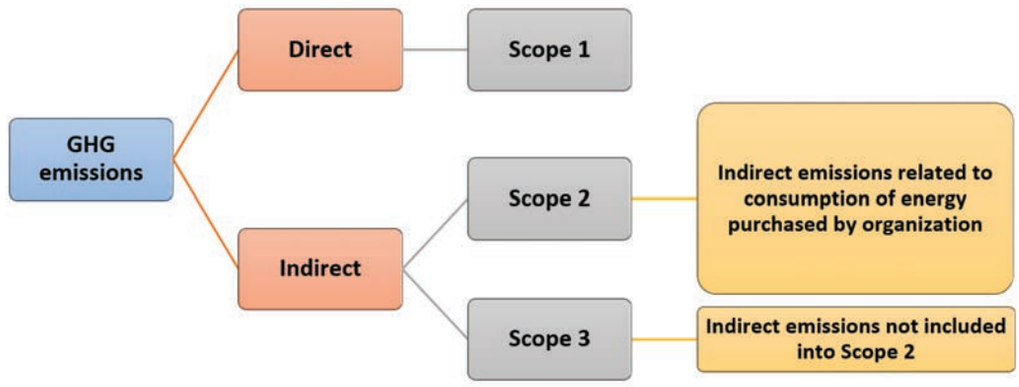
In estimation of carbon footprint, the GHG Protocol takes into account direct and indirect GHG emissions. According to the Protocol, direct emissions include emissions from sources owned or controlled by reporting organization:

— emissions from boilers, furnaces or generators operating on fossil fuel at enterprises;
— emissions from mobile sources (for example, cars) owned by the company;
— emissions from industrial processes;
— emissions from waste treatment with installations owned by company, etc.

Indirect emissions are emissions that result from the reporting entity's activities but originate from sources owned or controlled by another entity.

In the GHG Protocol, all GHG emissions (direct and indirect) are divided into 3 scopes (Fig. 1.5.3).

Figure 1.5.3. Classification of emissions acco ding to the GHG Protocol



Source: elaborated by the author.

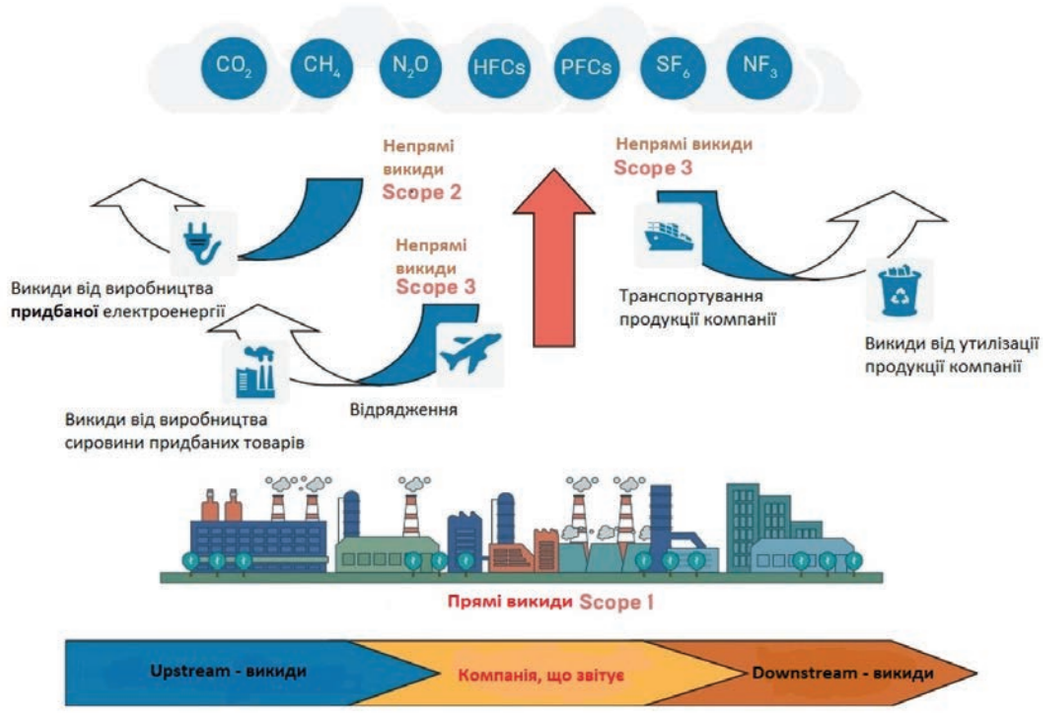
Scope 1 includes all direct emissions of the reporting entity, which were mentioned above.

Scope 2 includes indirect emissions related to consumption of energy purchased by organization (electricity, heat energy, energy for cooling).

Scope 3 includes indirect emissions resulting from an organization's activities that are outside its control or ownership. This category includes all other indirect emissions that are not included in Scope 2. For example, GHG from vehicles not owned or controlled by the reporting company, but used for employees travel. These emissions relate to: product storage in third-party logistics centers; energy consumed when customers use company's products; procurement and transportation of materials by a third party; disposal of waste products; etc.

All indirect emissions (Scope 2 and Scope 3), in turn, are divided into upstream ("ascending", up the chain) and downstream ("descending", down the chain) emissions (Fig. 1.5.4).

Figure 1.5.4. Origin of direct and indirect emissions



Source: author's elaboration based on GHG Protocol

According to the standard, reporting emissions of Scopes 1 and 2 is mandatory, while estimating emissions of Scope 3 is voluntary and the most difficul to track. However, companies that manage to evaluate and report on all three Scopes receive a sustainable competitive advantage in world market, more favorable credit terms and other preferences.

To estimate carbon footprint GHG Protocol offe s the free software “The GHG Emissions Calculation Tool”[65]. It helps the company to calculate its carbon footprint in accordance with the norms and rules of this standard. This tool offe s users a step-by-step assessment of the company’s emissions from specific sources, and also contains detailed instructions and calculation examples.

GHG Protocol also contains many other free tools to help companies understand the GHG emissions assessment process, namely: general information about sectors and sources of emissions covered by the GHG Protocol; approaches to evaluating CO_2 and other GHG emissions; instructions on collecting company’s activity data and choosing appropriate emission factors; information on likely emissions sources; information on quality control methods and information on specific p ograms[66].

The proposed tools are adapted for specific developing countries and can be applied to enterprises of many industries.

1.5.3. The principles of calculating GHG emission factor

As already mentioned, one of the indicators necessary for calculating the carbon footprint is the emission factor – the average amount of GHG emissions (kg CO_2eq) per unit of company’s activity or process[67] (combustion of 1 m^3 of gas, use of 1 kWh of energy, etc.). For example, natural gas emits 0.244 kg CO_2eq/kWh (European average value) with 5% deviation, which means: the emission factor for natural gas is the sum of emissions from its combustion (0.205 kg CO_2eq/kWh) and up-flow activities, i.e. extraction and transportation (0.0389 kg CO_2eq/kWh).

The carbon dioxide equivalent is used to determine the emission factor. Carbon dioxide (CO_2) is the most common GHG emitted into the atmosphere as a result of human activity, but there are also other GHGs that have a negative impact on the environment. That is why CO_2eq also takes into account other types of GHGs that affect climate change, expressing them in terms of CO_2. Such GHGs according to the Kyoto Protocol, include: methane (CH_4), nitrous oxide (N_2O), hydrofluo ocarbons (HFCs), perfluo ocarbons (PFCs), sulfur hexafluoride (S_6), nitrogen trifluoride (N_3).

According to Eurostat’s officia definition, CO_2eq is used to compare emissions of diffe ent GHGs based on their global warming potential (GWP) by converting the amount of other gases into an equivalent amount of CO_2[68]. For example, the GWP for methane is 25 metric tons and for nitrous oxide is 298 metric tons (Figure 1.5.5). This means that emissions of 1 million metric tons of methane (CH_4) and nitrous oxide (N_2O) are equivalent to emissions of 25 and 298 million metric tons of carbon dioxide (CO_2), respectively.

Thus, if the calculation of the carbon footprint is based only on CO_2 emissions, we ignore the influence of other gases and, as a esult, get incorrect data.

Figure 1.5.5. GWP for GHG according to the Kyoto Protocol

Kyoto Gases
(IPCC 2007)

Greenhouse Gas	Global Warming Potential (GWP)
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous oxide (N_2O)	298
Hydrofluorcarbons (HFCs)	124 – 14,800
Perfluorocarbons (PFCs)	7,390 – 12,200
Sulfur hexafluoride (SF_6)	22,800
Nitrogen trifluoride (NF_3)	17,200

Source: https://www.coolerfuture.com/blog/co2e

That is why all international protocols and standards establishing rules for carbon footprint measuring are based on an assessment of impact of 7 types of GHGs reduced to CO_2 equivalent.

CHAPTER 2. UKRAINE'S LEGISLATION ON CLIMATE ISSUES

2.1. Ukrainian legislation concerning Paris Agreement and European Green Deal

The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016[69]. The Paris Agreement set out to improve upon and replace the Kyoto Protocol. It introduced some changes and additions regarding global emission reduction targets, the list of countries and the approach to contributing to global effo ts to mitigate climate change. Key novelties that differ the aris Agreement from the Kyoto Protocol are:

— changing the nature of the emission reduction goal from "obligation" to "contribution". If the Kyoto Protocol provided for countries a legally fixed upper limit of GHG emissions, the Paris Agreement gives each country the right to determine its contribution to reducing GHG emissions, taking into account national circumstances;

— covering all countries with approved plans to reduce GHG emissions in the form of nationally determined contributions. The Kyoto Protocol included quantitative commitments to reduce GHG emissions only by developed countries (Annex B to the Kyoto Protocol). Instead, the Paris Agreement brings together contributions from countries that are Parties to the Paris Agreement;

— introducing a bottom-up approach instead of a top-down approach, enabling all participants, not only at national, but also at local/local or even corporate levels, to contribute to reducing GHG emissions[70].

Among the main goals and aspects of the Paris Agreement, the following should be noted:

— holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing effo ts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change (Article 2 of the PA);

— reach global peaking of GHG emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of GHG in the second half of this century, on the basis of equity, and in the context of sustainable development and effo ts to eradicate poverty (Clause 1 of Article 4 of the PA);

— mitigate climate change: each Party shall prepare, communicate and maintain successive nationally determined contributions; enhancing mitigation effo ts, and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of diffe ent national circumstances. Every five years Parties hold a Conference serving as the meeting to inform about outcomes of the global stock-take. Developed country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets. Developing country Parties should continue enhancing their mitigation effo ts, and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of diffe ent national circumstances (Clause 2 of Article 4 of the PA);

— take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases, such as forests, biomass, oceans and other terrestrial, coastal and marine ecosystems (Article 5 of the PA);

— pursue voluntary cooperation in the implementation of nationally determined contributions to allow for higher ambition in mitigation and adaptation actions and to promote sustainable development and environmental integrity (Article 6 of the PA);

— establish global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal (Article 7 of the PA);

— averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and he role of sustainable development in reducing the risk of loss and damage (Article 8 of the PA);

— financial and technological support, capacity building: developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations. The provision of scaled-up financial resources should aim to achieve a balance between adaptation and mitigation, taking into account country-driven strategies, and the priorities and needs of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change and have significant capacity constraints, such as the least developed countries and small island developing States, considering the need for public and grant-based resources for adaptation. Parties also share a long-term vision on the importance of fully realizing technology development and transfer in order to improve resilience to climate change and to reduce greenhouse gas emissions (Articles 9–11 of the PA);

— cooperation of Parties in taking measures, as appropriate, to enhance climate change education, training, public awareness, public participation and public access to information (Article 12 of the PA);

— introduction of enhanced transparency framework in order to build mutual trust and confidence and to promote effective implementation of Agreement (Article 13), as well as establishing a controlling mechanism to facilitate implementation of and promote compliance with the provisions of this Agreement (Article 15);

— holding a Conference of the Parties serving as the meeting of the Parties that shall periodically take stock of the implementation of this Agreement to assess the collective progress towards achieving the purpose of this Agreement and its long-term goals[71].

Ukraine was one of the fi st European countries to ratify the Paris Agreement. This happened on July 14, 2016, with the adoption of Law of Ukraine No. 1469-VIII "On Ratification of the Paris Agreement".

Ukraine, as a Party to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, in accordance with decision 1/CP.19, presented the nationally determined contribution (NDC), approved by the Order of the Cabinet of Ministers of Ukraine No. 980 on September 16, 2015. After the entry into force of the Paris Agreement, in accordance with paragraph 22 of decision 1/CP.21, it automatically became the fi st NDC of Ukraine to the Paris Agreement and was sent to the UNFCCC Secretariat on September 19, 2016. According to this NDC, Ukraine obliged to reduce its GHG emissions by 40% by 2030 compared to 1990 level.

According to decisions 1/CR.21, 1/CP.20 of the Conference of the Parties, which is the meeting of the Parties to the Paris Agreement, the Parties whose NDC contain a time frame until 2030 had to submit or update them by 2020 and do this, thereafter, every time five years, according to paragraph 9 of Article 4 of the Paris Agreement. So, in 2018,

Ukraine began to prepare the Second Nationally Determined Contribution (NDC-2). On this way, the following legislative and regulatory acts in the field of combating climate change were adopted:

The concept of implementing state policy in the field of climate change by 2030, approved by Government's Order No. 932 on December 7, 2016, and the action plan on the concept of implementing state policy in the field of climate change by 2030, approved by Government's Order No. 878 on December 6, 2017.

This is the fi st national strategic document in the field of combating climate change. The Concept aims at: strengthening institutional capacity to form and implement state policy in the field of climate change; preventing climate change by reducing anthropogenic emissions and increasing GHG absorption and ensuring a gradual transition to low-carbon development of the state; climate change adaptation, building resilience and reducing climate change risks[72].

The action plan provides for implementation of a number of specific measures regarding gradual transition to low-carbon economic development; proper regulation of climate change mitigation activities; adaptation to climate change. These measures cover almost all sectors of economy, including energy, industry, agriculture, transport, water, forestry, construction and utilities, as well as healthcare, preservation and reproduction of natural ecosystems.

Strategy of low-carbon development of Ukraine by 2050, approved by protocol decision of the Government of July 18, 2018, No. 28.

This is strategy for transition of Ukraine's economy to a low-carbon development model, which involves reducing the volume of GHG emissions, phasing out fossil fuels and starting to invest in renewable energy sources. The strategy was developed to fulfill Ukraine's international obligations in accordance with paragraph 19 of Article 4 of the Paris Agreement and paragraph 35 of Decision 1/SR.21 of the Conference of the Parties to the UN Framework Convention on Climate Change.

This document contains 3 main goals:

1) to transit to an energy system running on low-carbon energy sources, develop sources of green electricity and heating, improve energy efficienc and energy saving in all sectors of the economy, as well as in buildings and utilities, stimulate the use of non-fossil motor fuels, including for cargo and passenger transportation, as well as more environmentally friendly modes of transport;

2) increase the amount of carbon absorption and retention through the use of better agricultural and forestry practices adapted to climate change;

3) reduce GHG emissions, such as methane and nitrous oxide (N_2O), mainly associated with fossil fuel production, agriculture and waste.

The Strategy also defines a list of measures necessary to reach these goals. For example, a group of energy efficienc measures includes: increasing the energy efficienc of buildings; promotion of private and public financing of projects designed to increase energy efficiency specific measures to increase energy efficienc in the use of electricity and heat-

ing; stimulating introduction of energy-efficien technologies in agriculture and industry. In the field of renewables, the following are foreseen: an increase in production and consumption of electricity from RES; environmentally sustainable production and increasing use of biomass (biofuel); production of biogas and increasing the share of heating and electricity produced with biogas; international integration of Ukraine in the field of renewable energy. In the sphere of modernization and innovation, the following have been established: increasing the efficienc of power plants; development of nuclear energy; modernization and intellectualization of electrical networks; modernization of transportation; development of highly efficien cogeneration at the local and regional levels; supporting introduction of energy storage technologies; development of hydrogen technologies, etc[73].

Law of Ukraine "On Principles of Monitoring, Reporting and Verification of Greenhouse Gas Emissions" of December 12, 2019, No. 377-IX. The law defines the principles for functioning of the system of monitoring, reporting and verification of greenhouse gas emissions in Ukraine and the fulfills Ukraine's obligations on gradual approximation of its legislation to EU's legislation, in particular, to Directive 2003/87/EU.

The law defines: government authorities in the field of monitoring, reporting and verification, legal basis for registering installations in State Register of Installations, as well as the organization and implementation of monitoring, reporting and verificatio . It also establishes the institute of the verifier of the operator's report on GHG emissions and defines his main rights and obligations, and establishes responsibility for violations of legislation in the field of monitoring, eporting and verification of GHG emission [74].

Law of Ukraine "On Regulation of Economic Activities with Ozone Depleting Substances and Fluorinated Greenhouse Gases" of December 12, 2019, No. 376-IX.

This Law was developed in accordance with Appendix XXX to Chapter 6 "Environment" of EU–UA Association Agreement and requirements of the Montreal protocol on substances that deplete the ozone layer.

The Law determines the powers of central government and basic requirements for economic entities in the sphere of regulation of mentioned substances; establishes the procedure for withdrawal from these substances and goods containing them, as well as requirements for personnel and equipment certification; determines procedures for import, export of these substances and goods containing them, and procedure for handling waste containing these substances[75].

The energy strategy of Ukraine by 2035 "Security, energy efficienc , competitiveness", approved by the Order of the Government No. 605 on August 18, 2017[76].

The energy strategy of Ukraine outlines the strategic guidelines for development of the fuel and energy sectors of Ukraine by 2035. This document provides that by 2025, the reform of the energy sector will be mostly completed, priority targets for safety and energy efficienc will be achieved, and its modernization and integration with the EU energy sector will be completed. The strategy aims at inter-industry cooperation for effective and reliable satisfaction of aggregate demand on diffe ent types of energy. The energy sector of Ukraine must go through transformation caused not only by economic factors, but also by socio-economic transformations, taking into account the factor of national security under wartime conditions.

The strategy defines the goals, tasks and mechanisms of bringing the energy sector to a fundamentally new, high level of development. First of all, it aims at solving the problems of energy security under urgent need to ensure sovereignty while repelling external aggression using both the latest types of weapons (including information and hybrid methods of warfare) and non-military influence .

This strategy establishes three stages – reforming the energy sector (by 2020), optimization and innovative development of infrastructure (by 2025) and ensuring sustainable development in the long run. For each stage, goals and objectives for energy sub-sectors are define . For example, one of the key goals is modernization of the electricity production. The strategy provides for ensuring energy efficienc in transportation and distribution systems, introduction of "smart" energy networks (smart grids) and automated accounting systems, as well as an increase in the share of RES gross energy consumption, up to 12% by 2025 and 25% by 2035.

National economic strategy by 2030, approved by resolution of the Government No. 179 on March 3, 2021. It defines the long-term economic vision, principles and values, "red lines", directions of economic development, and strategic goals and ways to achieve them for each direction, taking into account existing and potential challenges and barriers, main objectives and target indicators of economic policy by 2030.

This strategy envisages the step-by-step welfare increasing. The primary stage is establishing competitive conditions for business and investments, restoration of trust to institutions. This will make it possible to win competition for capital on the world market and, as a result, attract investments for economic modernization.

The mission of strategy is to create an opportunity to realize existing geographical, resource and human potential to ensure appropriate level of well-being, self-realization, security, rights and freedoms of every citizen of Ukraine through innovative, proactive economic growth taking into account Sustainable Development Goals and achieving climate neutrality by 2060. The purpose of the strategy is to create opportunities for Ukrainians as citizens, entrepreneurs and investors[77].

The strategy doesn't mention climate change directly, although balanced development implies equal development not only of economy, but of social sphere and environmental component. One of the guidelines in economic policy, in particular, is decarbonization (increasing energy efficien , RES development, circular economy and synchronization with the European green deal). The strategy also defines a number of unacceptable steps that are critical obstacles to economic development ("red lines"), including non-fulfillmen of the Association Agreement, deterioration of environment, etc.

To achieve strategic goal of "Ensuring safe environment for people", the following is proposed: improving state management, monitoring, control, preservation of natural resources, implementing principles of sustainable development and gradual transition to a green economy. Clear tasks are prescribed for each goal. For example, it is proposed to promote the eco-modernization of Ukrainian enterprises at the expense of environmental tax and through access to international financing, as well as to create an environmental fund as a separate legal entity with the attraction of additional funds for financing environmental protection measures and implementation of environmental investment projects[78].

To ensure preservation of natural resources, the following changes are foreseen in the field of fo estry:

— approving Forest Management Strategy of Ukraine by 2035 on December 29, 2021 by the Order of the Government No. 1777-r. It includes Action Plan for 2022– 2024 aimed at effective forest management, ensuring environmental sustainability, contribution of forests to economic development, recreation and open society, research and education in the field of fo estry[79];

— improving the legislation on the wood market (a fully transparent market will be one of the safeguards against illegal logging), and creating a forest fi e prevention mechanism taking into account the goals of preserving biodiversity and increasing forest cover.

In the field of land resources, the National economic strategy includes measures for preservation, restoration and sustainable use of peatlands, wetlands, meadows, steppes and other valuable ecosystems, improvement of measures to combat land degradation and desertification, identification of zones vulnerable to accumulation of nitrates and ensuring transition to the principles of ecologically balanced land use.

In order to preserve and ensure biodiversity, the following are foreseen: adoption of the Biodiversity strategy by 2030 (its development began in 2021); improvement of legislation on state biosafety system during regarding creation, testing, transportation and use of genetically modified organisms; creation of a biodiversity monitoring center; improvement of state cadasters of flo a and fauna, etc.

To implement the principles of sustainable development and the gradual transition to green economy, the National economic strategy provides:

• regarding climate change:

— monitoring, reporting and verification of GHG emissions at the installation level

— introduction of the national GHG emission trading system;

— development of a framework strategy for adaptation to climate change by 2030 (to fulfill this point, on October 20, 2021, the Strategy for environmental safety and adaptation to climate change by 2030[80] was approved by the Order of the Government No. 1363);

— development of sectoral climate policies and establishment of specific goals for each of them;

— creation of a national climate fund;

— introduction of "green bonds" to attract investments in eco-modernization and environmental projects (to fulfill this point, on February 23, 2022, the Concept of the introduction and development of the green bond market[81] was approved by the Order of the Government No. 175-r);

- regarding waste:

— adoption of the Laws "On waste management", "On packaging waste", "On waste management of extractive industries", "On waste electrical and electronic equipment", "On batteries and accumulators", "On restrictions on plastic bags circulation" (on June 1, 2021, only one Law – "On Limiting the Circulation of Plastic Bags in the Territory of Ukraine"[82] – was adopted so far);

— adoption of regional waste management plans;
— implementation of best practices in waste management;
— establishment of waste management hierarchy;
— investments attraction in the field of waste management
— creation of modern waste management infrastructure;
— reducing the number of landfills
— increasing use of secondary raw materials and industrial waste, etc.;

- regarding industrial pollution:

— legal and institutional prerequisites for effective prevention, reduction and control of industrial pollution;

— increasing the effectiveness of state egulation in the field of industrial pollution

— adoption of the Law "On Prevention, Reduction and Control of Industrial Pollution";

— implementation of integrated permits, best available technologies and business models;

— introduction of unified state electronic information system of integrated permits;

— ensuring public access to information on issuing integrated permits.

In addition, the National economic strategy by 2030 includes measures regarding Chernobyl nuclear power plant and the exclusion zone.

The National Transport Strategy of Ukraine by 2030, approved by the Decree of the Government No. 430 on May 30, 2018. The strategy determines the priorities for transport policy, effective state management and main directions of development of the transport sector by 2030. The purpose of the Strategy is to create a safely functioning

and efficien transport sector integrated into international transport network, to meet the needs of population in transportation and to improve doing business conditions in sector to ensure the competitiveness and efficiency of national econo .

The Strategy envisages implementation of tasks in the following areas: efficien and competitive transport system; innovative development and global investment projects in transport sector; safe for society, environmentally friendly and energy-efficien transport; unimpeded mobility and interregional integration[83].

Pursuant to Article 3 of the Order of the Government of May 30, 2018 No. 430 "On the Approval of the National Transport Strategy of Ukraine by 2030", on April 7, 2021, the Government approved the Action Plan for the Implementation of the National Transport Strategy of Ukraine by 2030[84], which defines specific stages and terms of implementation of measures necessary to ensure effective activity and comprehensive development of the sector as a whole.

Among other things, this Action plan envisages development of the transport sector according to European green deal, replacement of public transport running on fossil fuels with an environmentally friendly one, improvement of passenger transportation, and development of bicycle infrastructure. In addition, the Action plan envisages: development and adoption of a number of laws aimed at stimulating the use of alternative energy sources, green transport modes and equipment; development of charging stations infrastructure for electric vehicles; stimulating production of electric vehicles in Ukraine, and other regulatory and fiscal measures regarding introduction of international environmental standards for vehicles, improvement of the mechanism of using alternative motor fuels, introduction of economic incentives for green vehicles.

In this context, it should be noted that in August 2021, the President of Ukraine signed the Laws "On Amendments to Chapter XX "Transitional Provisions" of the Tax Code of Ukraine on Stimulating the Development of the Ecological Transport Industry in Ukraine" and No. 1661-IX "On Amendments to Chapter XXI "Final and transitional provisions" of the Customs Code of Ukraine on stimulating the development of the ecological transport industry in Ukraine"[85].

These Laws provide for tax preferences for importing ecological transport. Until January 1, 2026, transactions involving the import into Ukraine and the supply on the territory of Ukraine of vehicles equipped with electric motors, as well as new cars with internal combustion engines running exclusively on methane or biogas, are exempt from VAT. Besides, until January 1, 2031, import of a number of goods into Ukraine by enterprises that manufacture or modernize facilities to produce such vehicles is exempt from VAT and import duties. Until December 31, 2035, enterprises producing the green vehicles, electric motors, lithium-ion batteries and chargers are exempt from corporate tax.

The released funds will be directed to R&D in the field of electric transport, updating capital goods, increasing the volume of production and innovation.

National waste management strategy in Ukraine by 2030, approved by the Order of the Government No. 820 on November 8, 2017. The purpose of this strategy is to create conditions for raising the living standards of the population by implementing a systemic approach to waste management at the state and regional levels, reducing the volume of waste generation and increasing the volume of its processing and reuse.

The objectives of the strategy are:

— to determine directions and priorities for secondary resource use development, taking into account both real current opportunities and long-term economic, social and environmental interests of society;

— to promote PPPs, interaction and cooperation of central and local authorities;

— to provide scientific and technological suppo t for waste management;

— to increase the role of regions and civil society in reforming the sphere of waste management;

— to fund further improvement of waste management[86].

In general, this strategy establishes a hierarchy of waste management: prevention – preparation for reuse – recycling – utilization – removal of waste (placing it in specially equipped facilities and destroying it in facilities that meet environmental standards).

The main planned indicators of the strategy are:

— ensuring the processing of 15% of household waste with the help of incentive tools, increasing the share of population involved in waste sorting up to 23%, and putting waste sorting lines and waste processing plants into operation by 2023;

— processing of 50% of household waste generated by 2030;

— closing landfills that do not meet the established equirements.

According to this strategy the National waste management plan by 2030 was approved on February 20, 2019 by Order of the Government No. 117.

This plan establishes an effective system of collection and removal of household waste by 2030, in particular: capital goods renewal (fleet of special vehicles, container fleet, waste transfer stations), creation of reception/collection centers for household waste, creation within the framework of regional waste management plans in regional centers of a network of collection points for furniture, household appliances, clothes and other goods reuse. The Plan also provides for establishing infrastructure for the household waste recycling, hazardous waste management, spent oil products, industrial waste, construction and repair waste, and other types of waste.

In order to implement the Strategy, the Parliament of Ukraine adopted the Law of "On Waste Management" (No. 2320-IX)[87], which will enter into force in July 2023. This law is aimed at improving waste management system, ensuring legislative and regulatory regulation in the field of waste management, taking into account requirements of EU directives,

improving environment and achieving sustainable development goals. This law also establishes the concept of extended responsibility for manufacturers who collect and process packaging, batteries, accumulators, electrical and electronic equipment, etc.

The Law of Ukraine "On Waste Management" provides for a comprehensive reform in the field of waste management, circulation, procedures for obtaining permits. However, according to private sector, it's necessary to exclude metal scrap from the list of waste because economic relations on scrap market are regulated by the Law of Ukraine "On Scrap Metal".

For years, the Law of Ukraine "On Scrap Metal" contained norms that made collecting scrap metal complicated and engulfed in corruption. However, recently amendments were made to simplify the process of collecting scrap metal, make it more transparent, and provide metallurgists with valuable raw materials. But the Law "On Waste Management" provides for even more complicated regulation for scrap metal classifying it as waste. This can ruin all the positive changes to scrap metal regulation that have just begun to work.

But in general, in the process of preparing the Second Nationally Determined Contribution to the Paris Agreement, Ukraine took many positive regulatory steps in the way of combating the negative consequences of climate change.

On July 30, 2021, the Order of the Government No. 868 approved the Updated Nationally Determined Contribution of Ukraine to the Paris Agreement. In accordance with NDC-2, in order to implement Articles 2 and 7 of the Paris Agreement by 2030, Ukraine plans to create a reliable basis in order to increase adaptive capacity, strengthen resilience and reduce vulnerability to climate change. Ukraine undertook to achieve the ambitious goals of reducing GHG emissions by 65% by 2030 compared to 1990 level and achieving climate neutrality by 2060.

According to NDC-2, GHG reduction applies to all emissions not covered by the Montreal Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluo ocarbons (HFC), perfluo ocarbons (PFC), sulfur hexafluoride (SF_6), nitrogen trifl - oride (NF_3), and extends to the following sectors of economy: energy; industry and use of products; agriculture; land use, land use change and forestry; waste management[88].

The following measures are planned to be implemented in Ukraine in order to achieve the indicators of NDC-2:

— modernization of energy and industrial enterprises;

— development of renewable energy sources;

— energy efficienc measures in all sectors of economy from industry, transportation to consumption;

— thermal modernization of buildings;

— increasing the share of organic agriculture and resource-saving agricultural practices;

— electrification and enewal of transport;

— introduction of waste management hierarchy;

— increase in forest cover and reform of forest management[89].

Ukraine's approval of NDC-2 under the Paris Agreement became one of the main steps on the way to integration into the European Economic Community, the goal of which is to achieve climate neutrality on the European continent by 2050.

In July 2020, Ukraine supported the Green Deal at a high political level and declared that it is an integral part of its goals and that the concept of the Green Deal is a logical continuation of international effo ts to green the economy.

In 2021, with the aim of discussing issues and developing measures aimed at Ukraine's integration into the Green Deal, a working group of the High-level Dialogue on the European Green Deal and Green Transition of Ukraine was established under co-chairmanship of Olga Stefanishyna, the Deputy Prime Minister for European and Euro-Atlantic Integration of Ukraine, and Katarina Maternova, Deputy Director General of the Directorate General of the European Commission for Neighborhood and Enlargement, Head of the Ukraine Support Group.

Two meetings of the Working Group have already been held.

According to results of the second meeting, the Government of Ukraine determined the priorities of the dialogue with the EU regarding Green Deal: attracting resources for the green transformation under large European investment plan that was announced as part of the Eastern Partnership, as well as establishing a platform for communication with international financial institutions regarding green financin . Other priority directions in 2022 were: fair transformation of coal regions, energy efficienc and NDC-2 implementation[90]. Ukraine, as a Party to the Paris Agreement and an active participant in the Green Deal integration, continues to take measures aimed at decarbonization and contributing to overall decarbonization of European continent.

On November 30, 2021, the Parliament of Ukraine adopted the Law "On Amendments to the Tax Code of Ukraine and other legislative acts of Ukraine on ensuring the balance of budget revenues"[91], according to which the carbon tax rate in Ukraine was increased to 30 UAH, three times compared to the previous rate.

One of the few practical and affo dable solutions that will contribute to reduction of GHG emissions, as well as achievement of carbon neutrality of Ukraine, is reusing raw materials. The World Steel Association notes an important global trend in iron and steel – scrap metal is replacing iron ore as the basic raw material in steel production, since the processing of scrap into steel requires only 1/3 of the energy compared to production of steel from primary raw materials. Using ferrous scrap (cast iron, mild steel, and stainless steel) instead of primary raw materials in steel and iron production reduces CO_2 emissions by 60%, according to research by Institute of Scrap Recycling Industries (ISRI). These properties of scrap metal make it irreplaceable for green metallurgy and circular economy in general. On the other hand, demand on metal scrap rises sharply on the

global market. Scrap collected in Ukraine is no exception.

Data from the Independent Monitoring of Policies that Affect World Commerce, "Global Trade Alert", indicate that during 2015-2021, countries implemented 21 measures to limit the export of scrap metals, including 9 export bans, 6 export taxes, 4 export quotas, 2 export licensing requirements worldwide. Taking this into account and aiming to reduce energy consumption and CO_2 emissions in the metallurgical industry of Ukraine, as well as reducing scrap metal shortage as a basic raw material for iron and steel, the Law "On Amendments to Section II "Final and Transitional Provisions" of the Law of Ukraine "On Amendments to Certain Laws of Ukraine on Reducing the Deficit of Scrap Ferrous Metals on the Domestic Market"[92] was adopted, which increases the export duty rate on scrap metals from 10 to 180 euros per ton for 5 years (by September 2026).

This Law is aimed at achieving a number of UN sustainable development goals, namely:

— Goal No. 8 "Decent work and economic growth" – promotes sustainable economic development and increasing the level of productivity through the use of technological innovations;

— Goal No. 12 "Responsible consumption and production" – aims to encourage enterprises to reduce the volume of waste and increase the use of secondary raw materials;

— Goal No. 13 "Climate action" – involves reducing GHG emissions into the atmosphere.

Adoption of this Law enables reduction of CO_2 emissions by 4.17 million tons (or by 3.8% of all emissions from stationary sources compared to 2020).

In the global perspective, scrap metal remains the most important resource for reducing CO_2 emissions in metallurgy, so prices for this product will remain high in the long term.

Despite the war due to the Russian invasion and the COVID pandemic, as well as the fact that the issue of the green transition in Europe had to be temporarily put on the back burner due to the lack of energy carriers and the increase in their prices, the course for decarbonization of developed countries in the long term remains unchanged. For metallurgy, this means a transition to electric facilities and more use of scrap metal. About 630 million tons of scrap are processed annually worldwide reducing CO_2 emissions by 950 million tons.

The consulting company "Wood Mackenzie" expects carbon dioxide emissions in the steel industry to be reduced by 30% by 2050 compared to 2021. Such results will be achieved thanks to switching to more environmentally friendly electric steelmaking. Wood Mackenzie expects around 48% of global steel to be produced in electric arc furnaces in 30 years, up from 30% in 2021[93].

Another solution to achieving the goals of Ukraine's climate policy by 2030 is to create favorable conditions for balancing GHG emissions and absorption, in particular through limiting export of wood-in-the-rough. After all, the volumes of GHG emission absorption by

the forests have decreased by 8% compared to 1990[94]. That is why the increase in forest cover and forest management reforms are identified as key measures to reduce GHG emissions in the next 10 years in the NDC-2.

According to estimates of the State Forestry Agency, forests in Ukraine annually absorb about 200 million tons of CO_2. With a forest cover of 15.9%, forests absorb about 7% of the of GHG emissions per year. For comparison, in the European Union, GHG absorption by forests is 10% with an average forest cover of 42%. That is, the productivity of Ukrainian forests is relatively high and has the potential to increase. To reach in Ukraine the environmental effect of CO_2 and other GHGs absorption that the EU has, it is necessary to achieve an average forest coverage of 22.7%. For this, it is necessary to increase the area of Ukrainian forests by 4.4 million hectares, from 10.4 to 14.8 million ha.

That is why the Law of Ukraine "On Amendments to the Law of Ukraine "On Peculiarities of State Regulation of the Activities of Business Entities Related to the Sale and Export of Timber"[95] adopted in 2015, which introduced a temporary the ban on export of wood-in-the-rough, allows to reduce deforestation and ensure the rational use of forest resources, and, as a result, contributes to the sustainable growth of forest cover in Ukraine and emissions reduction.

Among other measures in the field of decarbonization, the implementation of which is actively underway, it is worth noting: development of the Hydrogen Strategy of Ukraine, plans to create Ukrainian climate fund, and USA–UA Platform for Strategic Dialogue (SECD) aimed at decarbonization and transformation of the energy sector of Ukraine[96]. As is well known, hydrogen is an innovative solution for achieving carbon neutrality and other climate goals. At the moment, three important decisions have been developed on the way to elaborate the Hydrogen Strategy of Ukraine: Roadmap project for hydrogen production and use in Ukraine; the Roadmap project for hydrogen use in road transport of Ukraine; the draft report on the large-scale action according to the procedure of the Strategic Environmental Assessment of the Road Map[97]. Establishing the Ukrainian climate fund will take place with the support of the World Bank. This fund will be a financial institution to co-finance decarbonization and modernization programs in a transparent way[98].

2.2. Proposals for improving legislative initiatives on climate change (vision of Ukrainian manufacturers)

In 2021, three draft laws on prevention and control of industrial pollution were registered in the Parliament of Ukraine aimed to implement provisions of Directive 2010/75/EU on industrial pollution. Draft Laws No. 6004, 6004-1, 6004-2 oblige Ukraine to introduce a system of integrated environmental permits that will establish maximum allowable emissions in accordance with the best available techniques (BAT) and business

models. Two significant innovations are proposed in comparison with current legislation:

— obtaining a single permit for all types of emissions for one installation;

— emission standards are established in accordance EU standards.

Ukrainian industry supports Directive 2010/75/EU and transition to the new BAT requirements, but period of transition is debatable. The Directive supports approving national transition plans and the granting derogations for plant operators without any time limits. For example, in the EU, many installations still operate on the basis of a derogation (less strict norms of maximum allowable emissions than BAT establishes).

The EU countries carried out a gradual transition to new environmental standards for several decades and with active government support. In particular, Poland carried out transition for 20 years, Slovakia – for 17 years. Thus, Ukrainian need a long period for transition to such standards (at least15 years).

But draft laws No. 6004, 6004-2 propose an absolutely unrealistic deadline for the transition to new maximum allowable emissions of pollutants, in particular:

— maximum derogation period is 7 years;

— automated monitoring of emissions in real time (which very often means a complete conversion and installation of only the latest equipment) is introduced with coming into force of the law and obtaining permits;

— continuation of current technological standards of emissions is not foreseen – that is, manufacturers are to reequip facilities to achieve technological standards of maximum allowable emissions, and then reinvest once again to comply with the BAT few years later.

In any case, legislative changes can be supported by business, if the maximum derogation periods depend on type of modernization and last (starting from the date of BAT's entry into force):

— up to seven years, if repair, reconstruction, modernization, replacement or construction of auxiliary equipment is required, which does not relate to technology, other technical solutions, conditions for the technological process;

— up to fifteen years, if changes are required in core installations, which relate to technology, other technical solutions, and conditions of technological process.

Along with this, automated monitoring of emissions must be introduced only if it is provided for by BAT conclusions for specific types of activities and plant operators and 2 years after the enactment of the BAT conclusions (taking into account derogation

period); the term of validity of the current technological standards of emissions must be extended until BAT is implemented.

It should be emphasized that draft laws in this sphere should establish national BAT and business models, which will take into account both the relevant technological potential and investment opportunities of the Ukrainian industry, as well as modern approaches, experience in the development and implementation of BAT in the European Union.

Introduction of carbon border adjustment mechanism (CBAM) is one of the most discussed initiative among Ukrainian manufacturers. In this context, they emphasize that Ukraine should enjoy a special legal regime considering that:

— warfare is taking place throughout the country. Since signing of the Association Agreement and beginning of military aggression by Russia, the EU became Ukraine's largest trading partner. Ukrainian economy is dependent on the EU market, since the share of EU in Ukraine's exports of goods exceeds 40%;

— application of CBAM on Ukrainian goods will not affect combating climate change significantly The goal of CBAM is to reduce carbon leakage (i.e. the transfer of energy-intensive production outside the EU, where climate policy is less strict than in the EU market). However, Ukraine's share is only about 1% of all imports to the EU. Thus, there is no risk of transferring production from the EU to Ukraine in order to cover only 1% of the needs for imported products. On the other hand, the introduction of CBAM will have a significant impact on the Ukrainian economy and exporters;

— introduction of CBAM for Ukrainian exporters will deprive them of significant income and sufficient investments in modernization and decarbonizati .

Taking into account the above, it is necessary:

— to add Annex II to CBAM regulation (countries and territories that are not subject to regulation). Section C "Countries and territories with close trade ties that are making significant effo ts to introduce national GHG emissions trading systems" should be introduced;

— to establish clear criteria for the inclusion of countries in Section C of Annex II, namely: signing the Association Agreement; to be a member of the deep and comprehensive free trade area (DCFTA); have significant progress in decarbonizing (adoption of legislation, approaches to implementation of an emissions trading system similar to EU ETS).

The draft law "On State Environmental Control" (No. 3091) introduces a new system of state control in the field of environmental protection, which does not comply with the Law

of Ukraine "On the Basic Principles of State Supervision (Control) in the Field of Economic Activity" and increases pressure on business due to introduction of extremely strict control in the field of environmental protection. In particular, it is proposed to introduce a completely new system of business entities classification depending on risk degree, and extremely large powers are given to inspectors of the state environmental inspection, e.g.:

— increasing the frequency of inspections (for the highest inspection category, once a year (in existing legislation – once every 2 years));

— obliging business to notify the supervisory body of a change in name, location and CEO within 12 hours; during inspection no such change is possible;

— right to conduct unscheduled inspections, including on weekends, non-working days, holidays and/or at night (if business violates working schedule);

— expand rationale for launching unscheduled inspections;

— new type of liability not typical for this sphere – administrative and economic fine . Inspectors will be able to impose fines of up to 1.8 million UAH on enterprises by their own decision (without court order). The largest fine is imposed if inspector was refused to enter the site;

— exempt eco-inspections from paying court fees when filing lawsuits (gives privileges to authorities compared to business entities).

Introduction of such draconian restrictions, taking into account domestic realities of state controlling, will increase pressure on business entities but will in no way affect compliance with environmental protection legislation. Malicious offende s, as a rule, carry out "shady" activities and are used to taking advantage of corruption and other weaknesses of regulatory system, while large and transparent business will suffer from environmental inspection pressure. Besides, draft law No. 3091, significantly increases the pressure on business, establish no clear responsibility for environmental inspectors. Partial administrative responsibility for them is established in draft law No. 5414 (for groundless imposition of sanctions and some other violations). This draft law must be considered together with No. 3091, and responsibility must be commensurate with the damage that can be caused by the illegal actions of the regulatory bodies.

However, this draft law can be supported by all stakeholders, including the private sector, if the following amendment are made:

inspections on weekends, non-working days, holidays and/or at night can be carried out only if CEO is on site; inspection does not start without CEO or another responsible supervisor before four hours have passed since inspector arrived;

— the maximum period of scheduled inspections is ten days;

— in case of suspension of inspection, inspectors must leave territory of enterprise; inspectors can request documents no more than twice per inspection;

— fin payment may be deferred for 30 days or resolution on fine comes into force after the court decision enters if enterprise apply to the court;

— exclude extension of the environmental inspection powers to subsoil use;

— exclude involvement of municipals in implementation of environmental control measures;

— unimpeded admission of inspectors takes place only if there are legal grounds (a complete documentation on issue);

— exclude exemption for eco-inspections from paying court fees when applying to the court.

The draft laws on Emerald Network (4461, 4461-1) establish so-called Emerald Network in Ukraine, that is, the territory that should ensure a favorable status for the preservation of natural habitats and species of fauna and flo a. To ensure protection of these territories, it is proposed to carry out an assessment of prospect activities impact

on the Emerald Network territory, prepare reports and make conclusions whether such activity is permitted.

Quite ambiguous in these draft laws are provisions establishing prohibitions and restrictions on economic activities and other interventions in environment and landscapes within the Emerald Network territory. Undoubtedly, Ukraine must take all necessary measures to preserve and protect environment. However, in case of establishing prohibitions and restrictions, there is key issue to resolve to ensure support from business. It's necessary to introduce clear norms to make impossible establishing any prohibitions or restrictions economic activities that are already being carried out in the relevant territory at the time the law enters into force.

This is a key requirement of the private sector, as businesses that already exist on these territories may be at risk of bankruptcy. The consequences of establishing such prohibitions and restrictions are quite unclear, as new conditions may be unbearable and perceived as pressure on business. Draft law No. 4461 partially takes into account this apprehension. However, it establishes a transition period for existing business activities by 2028. But terms are critically small in view of the return on investment and planning of economic activity. Provisions of the alternative draft law No. 4461-1 appear more acceptable.

The Law "On Amendments to Certain Laws of Ukraine Regarding Improvement of Regulation Mechanism of Air Pollutant Emissions" No. 2393-IX of July 9, 2022 provides:

— system of mandatory automated pollutant emission control;

— basic requirements for obtaining a permit for emissions of pollutants into the atmosphere by stationary sources;

— procedures for issuing a permit, grounds and procedures for refusal, suspension and cancellation of a permit for emissions;

— time limits and impossibility of postponing implementation of environmental protection measures approved by emission permit, etc.

Despite the draft law mostly provides for minor amendments to the Law "On Atmospheric Air Protection", its provisions contain a number of threats:

— necessity to obtain a new permit every time the change in production installation takes place ("if a change in parameters of emission sources, their quantity, quantitative and qualitative composition of pollutants occurs the economic entity must obtain a new emissions permit");

— terms to implement measures on emissions reduction cannot exceed seven years from the date of approval, and cannot be extended;

— the Ministry of Environmental Protection is granted a right to suspend permits without a court decision.

In order to provide comprehensive support and make a balanced decision that could be supported by all stakeholders, it is necessary to:

— make it possible to amend existing emission permits, instead of obtaining a new one;

— abandon the maximum term for implementation of measures to reduce emissions of pollutants (or set a term of at least 15 years), as this issue should be regulated by other legislative acts designed to implement Directive 2010/75/EU and introduce integrated environmental permits in Ukraine. An alternative could be to limit the scope of the Law to those economic entities not covered by the law on industrial pollution (sectors covered by the law on industrial pollution and BAT defined in Di ective 2010/75/EU);

— make it possible to annul or suspend permits only in court proceedings;

— give a 5-years transition period for introduction of mandatory automated emission control systems and sampling equipment at stationary organized sources;

— oblige to equip sampling sites for measuring gas and dust flow parameters only

to those installations that have such a technical possibility.

Draft law "On waste management" (No. 2207-1-D) launches a comprehensive reform in the field of waste management and usage, introduces procedures to obtain permits on waste removal and recycling. Still, some amendments are necessary:

— to exclude scrap metal from this draft law as its handling is regulated by the Law of Ukraine "On Scrap Metal".

— to exclude by-products of ferrous metals production (slags, sludge, scum, scrap, etc.) from the draft law.

By-products of metallurgy meet all criteria and are recognized as goods, as they are included in the State Classification of Goods and Services No. 021:2015 (item 14630000-6). In addition, dozens of standards have been approved for various types of slag as products for various spheres of economic activity.

Legislation of industrially developed countries (EU, USA, Canada, Japan) does not classify metallurgy slag as waste, but on the contrary, as industrial products (in Japan, it is an eco-product and subject to public procurement). In Ukraine, value and necessity of industrial by-products, e.g. in road construction, is also recognized at the state level.

The Order of the Government of 04.12.2019 No. 1420, recommends to the state highway agency, and municipals to use non-price criterion "Environmental protection measures" in public procurement of construction works and services for highways repair at a specific weight of at least 0%, characterized by indicator "the level of use of waste and building materials containing waste as aggregates"; and in tenders for the construction or repairing roads in Zaporizhzhia, Donetsk, Luhansk, Dnipropetrovsk, Mykolaiv, and Kirovohrad regions, it recommends to include provisions regarding the expediency of using production waste (metallurgical slag, fly ash, etc.) in accordance with existing regulations, including environmental labels.

Unlike the European practice (in particular, Directive 2004/35/EC), where businesses are encouraged to take out voluntary environmental insurance, draft laws on environmental insurance No. 6018, No. 6018-2 in Ukraine introduce mandatory environmental insurance for all enterprises assigned to a high degree of risk (more than 13 thousand legal entities), i.e. for the entire industry. At the same time, it is proposed to establish the Bureau of Environmental Insurance as a separate legal entity, formed by insurers with an existing license for a certain type of insurance, oblige businesses to pay an entry fee. Draft laws No. 6018, No. 6018-2 also provide for the creation of various funds in the Bureau, introducing of non-transparent tariff setting at the request of the Bureau, etc.

That is, the obligation to participate in environmental insurance is imposed on both business entities and insurers. Such approaches create a lack of competition in insurance market, contain high corruption risks regarding funds disposal and may lead to an unjustified increase in the cost of environmental insurance. In turn, Draft Law No. 6018-1

provides for implementation of mandatory civil liability insurance of business entities for damage that may be caused by fi es and accidents at high-risk facilities, including tariffs, franchise. Most importantly it doesn't establish additional structures to be maintained at the expense of insurers.

In view of the above, there are two options that can be supported by private sector:

1. rejection of all three draft laws (No. 6018, No. 6018-1, No. 6018-2) and keeping with state regulation imposed by Government Decree of November 16, 2002 No. 1788;

2 . adoption of draft law No. 6018-1 as ensuring the already existing procedure of mandatory civil liability insurance of business entities for damage that may be caused by fi es and accidents at high-risk facilities at the legislative level.

Analyzing draft laws on increasing administrative and criminal liability for offenses in the field of environmental protection (Nos. 6148, 6175), it is worth noting that a completely false approach is once again being promoted – to increase sanctions for certain types of offenses, instead of ensuring the effective work of law enforcement and monitoring bodies and principle of inevitability of punishment for the offense committed. In this way, ineffectiveness of controlling system is disguised and attention is diverted to constant increase of responsibility. In addition, this mechanism will only increase the pressure on transparent business, which is open to inspections, but will not affect the "shadow" economy, which is used to work in a corruptive way.

2.3. Challenges, risks and benefits for the Ukrainian economy under the Paris Agreement and European Green Deal

Remaining an active participant in global fight against climate change, recognizing responsibility for achieving goals of the Paris Agreement and joining the Green Deal, as well as being guided by national interests and priorities, Ukraine forms a vision for transformations, policies and measures that contribute to transition to a climate-neutral economy in the second half of this century in the most economically and socially optimal way, based on justice, sustainable development and effo ts to eradicate poverty, as required by Article 4 of the Paris Agreement.

Alas, taking into consideration full-scale invasion by Russian Federation, existing and future negative economic, social and environmental outcomes of this war, NDC-2 looks extremely ambitious, and integration of our state into European Green Deal may

be significantly slowed down or temporarily suspended. Full-scale military invasion by RF has a significant negative impact on economic and social conditions in Ukraine and has already led to destruction of industrial, energy and strategic infrastructure.

Along with this, military operations cause major problems with environment, which may later turn into threats of a social nature. For example, severe contamination of drinking water or ruining a powerful industrial facility can lead to mass illness and death. War already causes relief disturbance, soil destruction, pollution and poisoning of air and water, destruction of flo a and fauna[99].

Obviously, at the moment all the effo ts of the Government of Ukraine are focused on survival: financing the army, housing refugees, providing assistance to wounded, as well as taking measures aimed at supporting economy. For now, the Government has chosen a policy of deregulation and liberalization with massive tax cuts, including abolition of environmental tax for businesses located near battlefields or on temporarily occupied territories.

According to World Bank, economy of Ukraine will shrink by approximately 45.1% in 2022, although the scale of reduction will depend on duration and intensity of war[100]. According to Center for Economic Policy Research, domestic economy lost 30-50% of its production capacity, mainly in the East of Ukraine, and during the fi st month of the war, economic activity decreased by 30-50%[101]. Surveys of business leaders indicate that the main obstacles to business are logistical difficultie and a lack of resources, including labor. Only 1% of companies reported that they did not incur losses. As for foreign trade, sea transportation – Ukraine's main export route – is blocked by Russian ships and constant ports shelling. A deficit in trade balance is accumulating (imports are 80-90% of the pre-war level, while exports decreased by 40%).

The UN's Food and Agriculture Organization has warned that the world is facing a potential food crisis caused by soaring prices and the threat of severe hunger for millions as the war in Ukraine threatens supplies of key crops. Before the war started, Ukraine supplied 12% of world's wheat and was the largest producer of sunflower oil. About two-thirds of country's wheat exports had already been delivered before invasion, but the rest is now blocked and farmers may not be able to continue spring planting or harvest summer grain.

Also, Ukraine was a large producer of fertilizers, the prices of which have already jumped due to high energy prices, and war leads to an even greater increase in energy prices, further increasing the cost of agricultural products[102].

Along with negative and devastating consequences for industry and economy, this war provided Ukraine with an opportunity to accelerate its integration into the EU. The process of our country's accession to the EU should definitely have a positive impact on the post-war reconstruction and creation of a new business environment according to European standards. Such a recovery will provide the domestic industry with a unique opportunity to radically modernize industryб move to a new technological level, lay foundation for long-term growth, and further integrate Ukraine into global economy.

Reconstruction of industrial facilities according to new environmental standards should play an important role in Ukraine's integration into the EU. Aid for economic recovery should focus on increasing productive potential of industry and stimulating

investments in machines, equipment and technologies. Modernization and creation of new modern industrial sites will give Ukraine an opportunity to make a "technological leap" and create a carbon-neutral economy.

This also applies to infrastructure restoration in partially ruined cities (Mariupol, Kharkiv, Chernihiv and others), in particular, in the housing and transport sectors. Reconstruction should base on the latest technologies (especially in the field of energy efficiency) design and urban planning (for example, public transport should consist of electric buses, modernized tram lines, etc.).

The prospect of EU membership brings Ukraine closer to the possibility of using Pan-European instruments of green financin . After Ukraine received the status of a candidate for EU membership, it obtained opportunities and access to various financing programs designed to achieve climate goals and protect environment.

The LIFE Program is a good example. It is an EU funding tool for environmental protection and climate change. It has been operating since 1992 and co-finances more than 5,500 projects in the EU and beyond. The European Commission has announced an investment of more than €110 million in integrated LIFE projects on environment and climate issues, selected following a call for applications in 2020. The funding will support new major projects in 11 EU countries – Cyprus, Czechia, Denmark, Estonia, Finland, France, Latvia, Lithuania, the Netherlands, Poland and Slovenia – that will contribute to a green recovery after the COVID-19 pandemic and support the European Green Deal objectives of achieving climate neutrality and zero emissions by 2050.

Solas Sustainable Energy Fund ICAV (SSEF), founded by Solas Capital AG, is one of the largest providers of climate finance in the EU. The target size of the fund is EUR 200 million, its purpose is debt financing of energy service companies for implementation of small projects on energy efficienc and renewable energy sources, mainly in EU countries. The fund's activities are aimed at financing energy-saving business models focused on upgrading existing infrastructure, particularly buildings, using reliable energy-efficien technologies, such as modern heating and cooling systems, high-efficienc cogeneration, solar roofs, building fabrics, LED lighting, etc.

These programs and instruments of cooperation of the EU don't cover Ukraine currently. However, after receiving the status of a candidate for EU membership, Ukraine's opportunities and access to financing was expanded. Therefore, currently the advocacy of Ukraine's access to LIFE, SSEF and other funds is relevant, especially in the context of investment needs for the post-war reconstruction[103].

CHAPTER 3. DENMARK'S EXPERIENCE OF DECARBONIZING THE ECONOMY

3.1. Denmark as a European and global leader of environmental trends

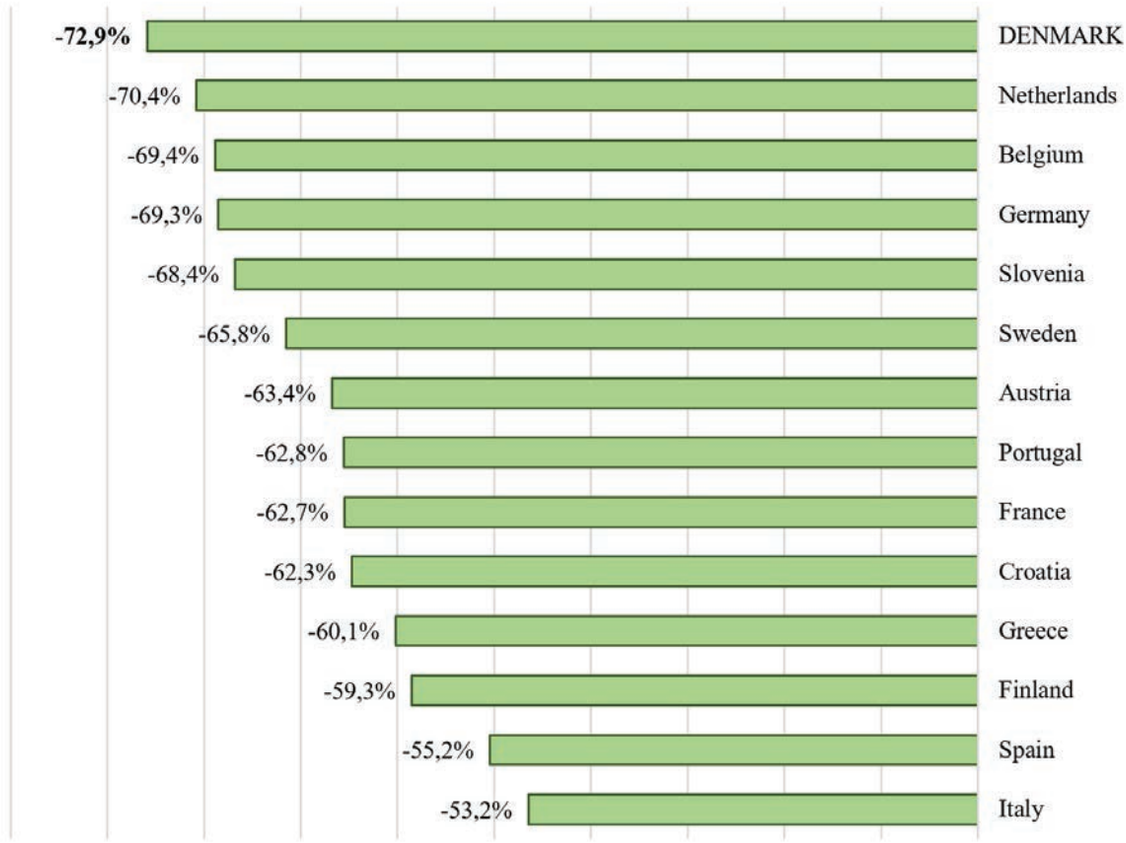
Denmark reduced GHG emissions by 36% during 1990–2019. Decarbonization has gained particularly significant pace since 2005, thanks to the purposeful transition of the energy sector from coal to natural gas and renewables. The rapid and systematic spread of renewables led to a significant cost reduction, and large-scale investments in the development of low-carbon energy ensured the use of the latest technologies in this area, such as clean hydrogen and carbon storage. In district heating, CO_2 emissions have been reduced by switching from coal to biomass. Since 2005, the energy intensity of Danish GDP decreased by 20%, and the share of fossil fuels in primary energy consumption decreased from 82 to 60% (the share of renewables increased from 15 to 35%).

Electricity production in Denmark has changed dramatically over the past two decades with wind and biomass replacing coal to a large extent. With flexible domestic energy system and high-level network connectivity, Denmark is widely recognized as a world leader in integrating renewables into electrical grid, while maintaining highly reliable and secure electricity generation and supply. Back in 2017, 40% of electricity in Denmark was generated with wind energy, and by the end of 2020, it reached its target of 50% of electricity production from wind energy, entering the top-5 countries in the world in terms of the share of wind energy use for electricity generation. If all types of renewables are taken into account, the share of RES in Denmark's electricity generation reaches 80% (at the same time, unlike most other countries, it does not have any hydroelectric power plant and does not use water energy for electricity generation).

Denmark also actively exports green technologies. In 2019, the Danish exports of green goods and services reached 16.4 billion euros. Turbines for wind power plants consist 55% of these exports. Since 2010, Danish green technologies exports increased by 61%, their share in total exports reached 13.5%.

Thus, Denmark is one of the least carbon-intensive economies in the world and undisputed leader in the pace of decarbonization among EU and OECD countries. At the same time, Denmark manages to maintain brisk economic growth and sustainable socio-economic development. Country's real GDP increased by more than 1.6 times during 1990–2018; and the GHG emissions to GDP ratio decreased by 72.9% (Figure 3.1), which is the highest level among developed European countries[104].

Figure 3.1. Dynamics of GHG-emissions-to-GDP ratio in Western and North European countries, 1990–2018



Source: Global Historical GHG Emissions. URL: https://www.climatewatchdata.org/ghg-emissions?calculation=PER_GDP&chartType=line&end_year=2018&regions=EUU&source=PIK&start_year=1990

Denmark is one of the few OECD countries that achieved decoupling – generating economic growth while reducing the absolute amount of GHG emissions. Moreover, decoupling has also occurred in employment: jobs lost in fossil fuel extraction are offset by new jobs in renewable energy sector. Denmark's well-functioning flexicurity (Government programs for ensuring high mobility of the workforce) helped to employ those who lost their jobs because of green transition keeping full employment (75% of Denmark's working-age population has a job, which is one of the highest indicators in the OECD).

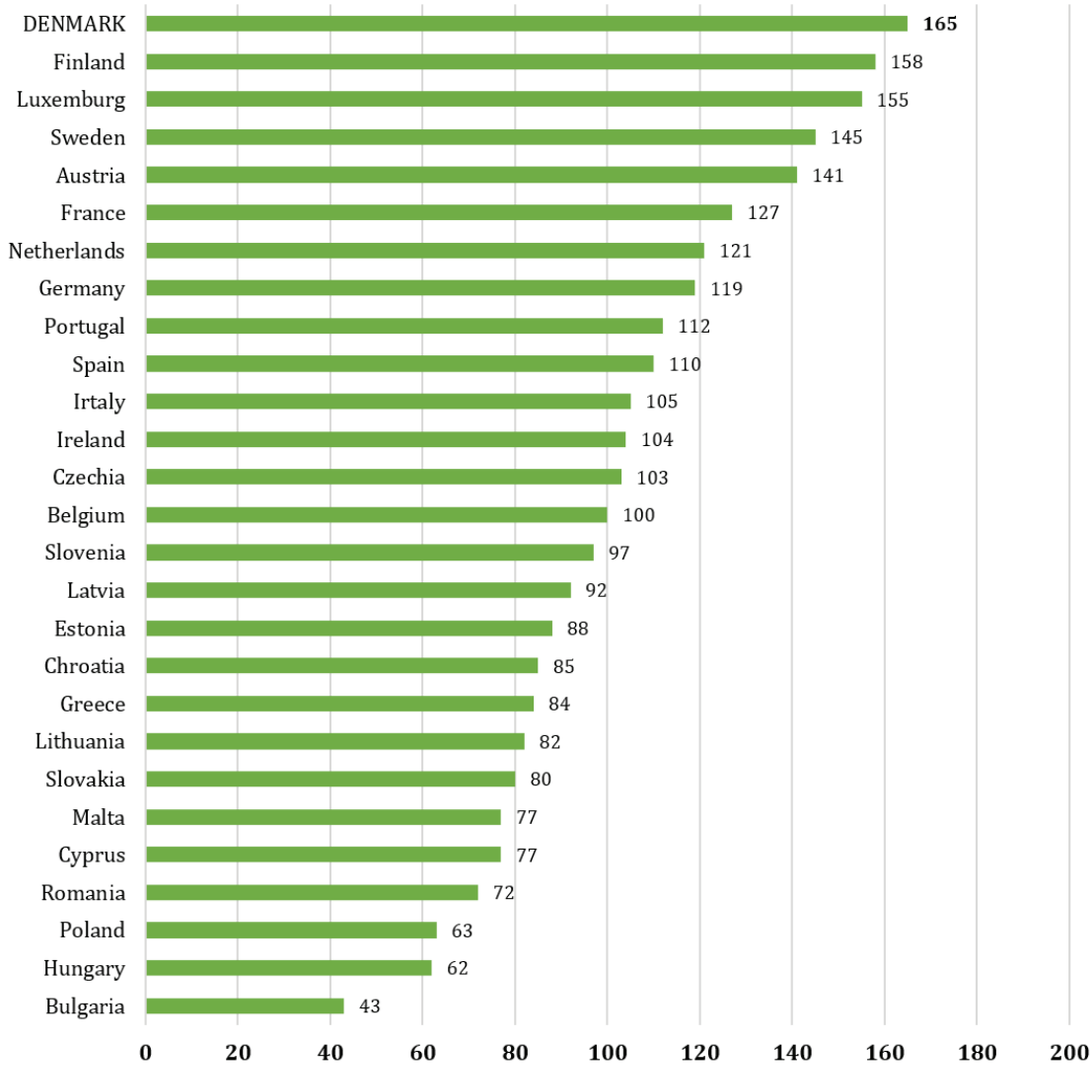
Denmark's leadership in combating climate change is based on two pillars: the proactiveness Danish society that cultivated a high level of environmental awareness for years (Denmark, as a rule, undertakes one of the most ambitious commitments to increase share of renewables and reduce GHG emissions among other EU members), as well as complex system of stakeholders' interaction in green transition that enables effective and quick implementation of elevant initiatives.

Denmark's success in the environmental policy implementation is reflected, in particular, in the eco-innovation index – an indicator that reflects the activities of EU member states in sustainable development, use of natural resources and reduction of the negative impact on environment. The generalizing eco-innovation index consists of 16 indicators, the annual assessment of which ensures monitoring of EU participants progress on the way to sustainable development. These indicators are:

— governments environmental and energy R&D appropriations and outlays (% of GDP);
— total R&D personnel and researchers (% of total employment);
— total value of green early-stage investments (USD/capita);
— implementation of resource efficiency actions among SMEs (Sc e);
— implementation of sustainable products among SMEs (% of surveyed firms)
— number of ISO 14001 certificates (per mln population)
— eco-innovation related patents (per mln population);
— eco-innovation related academic publications (per mln population);
— eco-innovation related media coverage (per mln population);
— exports of products from eco-industries (% of total exports);
— employment in environmental protection and resource management activities (% of workforce);
— value added in environmental protection and resource management activities (% of GDP);
— material productivity (GDP/Domestic Material Consumption);
— water productivity (GDP/total fresh water abstraction);
— energy productivity (GDP/gross inland energy consumption);
— GHG emissions intensity (CO2e/GDP).

In 2019, Denmark took fi st place among all EU countries in terms of the eco-innovation index (Figure 3.2).

Figure 3.2. EU member states by eco-innovation index, 2019



Source: European Commission – The Eco-Innovation Scoreboard and the Eco-Innovation Index. URL: https://ec.europa.eu/environment/ecoap/indicators/index_en

Since establishing eco-innovation index in 2010, Denmark held leading positions (from 1st to 5th) in ranking. Even before the fi st eco-innovation report was published, Denmark was already known as a country with a strong environmental policy backed by effective funding mechanisms. There was also widespread recognition among its citizens that environmental protection should play an important role on the political agenda. Danish companies were and remain the leading distributors of environmental solutions and technologies in the world, making an important contribution to national economic growth and exports.

For years, Denmark has been integrating the environmental agenda into economic policy and encouraging green growth. The central government sets increasingly ambitious targets for reducing greenhouse gas emissions, while local governments develop and implement

circular economy strategies. Danish enterprises increasingly look for opportunities in the circular economy as a means to increase efficiency and international competitivene .

This "national culture" of giving ecology such a high importance and value for all layers of society is the most important driver of decarbonization and eco-innovations in Denmark. This driving force is based on such components as: environmental awareness of citizens; systematic approach to the preparation and implementation of environmental initiatives; broad political support for the green transition; significant funding for decarbonization and new green production standards; development of the institutional and regulatory framework to support the green transition.

Let's look into current legislation, state programs, initiatives, agreements and strategies aimed at implementing the green transition of the Danish economy, as well as the newest institutions in this area. For this purpose, following should be noted:

— Energy Agreement (2018);

— Strategy for Circular Economy (2018);

— Strategy for Denmark's digital growth (2018);

— "Together for A Greener Future" (2018);

— Programs to support green technologies development (MUDP, GUDP, EUDP) (2019);

— The Environmental Economic Council (2019);

— Danish Board of Business Development (2019);

— Climate Act (2019);

— New political agreement to ensure a green Danish waste sector by 2030 (2020).

ENERGY AGREEMENT

In 2018, the Danish government signed an energy agreement with the unanimous support of all parliament parties. It allocated funding to support the course to achieve the 55% share of renewables in Denmark's energy balance by 2030. The Agreement also obliges Denmark phase out coal in electricity production within a decade. At the same time, 90% share of district heating to be based on sources other than coal, oil or gas. The long-term goal of the Agreement is to build a carbon-neutral economy by 2050. It should be noted that the 2018 Energy Agreement replaced the 2012 Energy Agreement that set a number of interim goals by 2020, including: achieving a share of renewables in the transport sector at the level of 10%, reaching a 50% share of wind energy in domes-

tic electricity supply and reduction in gross energy consumption by 7,6% compared to 2010. Thus, both energy agreements set key goals and time-frames for Danish climate policy in the medium and long term (Table 3.1).

Table 3.1.Medium- and long-term goals stated in the 2012 and 2018 Energy Agreements

Goal	2020	2030	2050
Overall goal			Carbon-neutral society
Share of renewables in gross final ene gy consumption, %	30	55	
Renewables in electricity consumption, %		>100	
Share of district heating based on sources other than coal, oil or gas, %		90	
Renewables share in the transport sector, %	10		
Wind energy share in domestic electricity supply, %	50		
Reduction in gross energy consumption compared to 2010, %	-7,6		
Coal in electricity production, %		0	

Source: OECD Environmental Performance Reviews: Denmark 2019.
URL: https://www.oecd-ilibrary.org//sites/83ee0a64-en/index.html?itemId=/content/component/83ee0a64-en#section-d1e5479

The key initiatives presented in the 2018 Energy Agreement are:

— *greener energy* – elimination of regulatory constraints on heat production of district heating plants, promotion of new ecological solutions and technologies, providing consumers a greater freedom of heating choice. The Energy Agreement allocates DKK 540 million to this effo t for the period 2018–2023;

— *cheaper green electricity* – reductions in the electrical heating tax and electricity tax to increase the share of electricity in overall energy balance to 21% in 2030 and to 35% in 2040; revision of regulation on converting excess green electricity can be into heat;

— *efficient use of energy* – new obligations to increase energy efficienc both in business and buildings. Implementation of energy-efficien initiatives for specific industries, consumers and targeted groups. To implement this initiative, Agreement allocates DKK 500 million during 2021–2024;

— *energy and climate research* – starting in 2024, the Danish Government will annually allocate more than 1 billion DKK for energy and climate change research;

— *more offshore wind* – building three new offsho e wind farms that generate at least 2,400 MWh (more than the Danish households' overall electricity consumption). The Agreement will contribute to creation of a better market conditions and regulatory framework so that offsho e wind exploitation doesn't require government subsidies;

— *CO_2 impact* – a number of steps to reduce CO_2 emissions in energy sector outside of the EU Emissions Trading System by approximately 1.1–1.5 million tons by 2030.

However, the Energy Agreement does not clarify how Denmark plans to deal with increasing energy demand from new data centers, and their environmental impact while coal is to be phased out. The Agreement also provides for further extensive oil and gas extraction in the North Sea with no exploration for oil, gas and shale gas deposits on land.

STRATEGY FOR CIRCULAR ECONOMY.

In September 2018, the Danish Government approved the Strategy for Circular Economy based on 27 recommendations developed by the Advisory Board for Circular Economy a year earlier in four areas: value chains, production and design, consumption, recycling. To promote the transition to a more circular economy, the Danish Government allocated 116 million DKK, which will be directed to the implementation of 15 initiatives in six thematic areas:

— strengthening enterprises as a driving force for circular transition. Danish Government defined three promising industries for this purpose: food and beverages, manufacturing and construction;

— supporting circular economy through data and digitalization. Government will analyze available public and private data that have the potential to support circular businesses development, determine whether there is adequate demand on this data, and promote its availability and use. The analysis will also assess the potential of using this data to promote circular business models. Thus, Government not only recognizes benefits of digitization in transition to a circular economy, but also the challenges for business in terms of being able to use relevant data, understand its potential and ways of application;

— promoting circular economy through design;
— changing consumption patterns through circular economy;
— creating a proper functioning market for waste and recycled raw materials;
— getting more value out of buildings and biomass.

It should be noted that, in general, Denmark has already made significant progress in transition to a circular economy. Landfills have almost disappeared in the state (landfills accounted for only 1% of household waste in 2016). Waste from industry, construction and dismantling, packaging, electrical equipment and end-of-life vehicles is recycled at the level of 70–90%. About half of household waste is not processed but is used in incinerators for energy production.

STRATEGY FOR DENMARK'S DIGITAL GROWTH.

The Strategy was adopted in January 2018 and consists of 38 initiatives worth 134 million euros by 2025.The key initiatives are: Digital Hub Denmark; SME: digital; the technology pact; Test program to improve technological understanding in primary and lower secondary education; data as a driver of growth – free access to DMI data; regulation that facilitates new business models; strengthened cyber security in companies. Although the Strategy has no direct mention of circular economy or climate change combating, it contains the initiative 'Supporting digital circular options through the commercial use of data' directly referring to the Strategy for Circular Economy.

THE NEW DANISH CLIMATE PLAN 'TOGETHER FOR A GREENER FUTURE'.

This plan on climate change and air quality calls on citizens to take shared responsibility for the future of the planet. The initiative is built around 38 specific steps grouped into the following categories: a) clean transportation; b) modern and effective agriculture; c) cleaner shipping; d) clean air and low emissions from industry and housing. The key steps of this plan are:

— gradually phase out new gasoline and diesel cars by 2030;
— achieve zero carbon emissions and zero air pollution from buses in Danish cities by 2030;
— build a climate and environmentally efficien agricultural sector with a strong emphasis on research;
— achieve cleaner air in big cities through stricter environmental laws;
— reduce greenhouse gas emissions from industry and buildings;
— use methods of behavioral economics with a climate purpose;
— conduct research to develop carbon capture and storage technologies for use in fields and fo ests.

PROGRAMS TO SUPPORT GREEN TECHNOLOGIES DEVELOPMENT.

There are three programs with the common goal of supporting green technologies development: Environmental Technology Development and Demonstration Program (MUDP), Green Development and Demonstration Program (GUDP), Energy Technology Development and Demonstration Program (EUDP). The main

goals of MUDP are to prevent biodiversity loss, curb climate change, protect environment and health of people. The Program provides environmental activities based on knowledge and innovation. According to research funding agreement, additional funds have been allocated to the MUDP, bringing the annual costs of its implementation to DKK 134 million.

GUDP was established back in 2010 as a business support mechanism to create better environmental sustainability in the Danish food industry by addressing climate and environmental issues. The current 2019 edition focuses on contribution to both environmental and economic sustainability of companies, which should lead to a green transition. Each year, there are two rounds of submitting applications for state financial assistance to realize investment projects. The fi st round is held to consider applications on environmentally issues, the second round is specifically dedicated to reduction of GHG emissions. If the Program attracts additional funding from the Danish Research Reserve, unscheduled application rounds are held in both spheres.

The EUDP is a mechanism for state grant support for energy innovations that can help achieving energy and climate change goals, especially Denmark's independence from fossil fuels by 2050. The Program emphasizes the inclusion of private business entities in project consortia in order to commercialize the results. EUDP's strategic approach is to invest in industries where Danish production and export potential meets global demand on new energy technologies. EUDP also invests in sustainability and growth by stimulating collaboration of scientific research and companies. Funding is aimed at developing and disseminating know-how, and most consortium applicants involve private and public partners. The current volume of annual funding for Program expenditures reaches DKK 514 million.

THE ENVIRONMENTAL ECONOMIC COUNCIL.

It was established in 2007 and is one of two Danish economic councils providing independent analysis and giving advice on environmental and economic policy to Danish officia . Every year, the Council for the prepares a report on the economy and the environment. The 2019 report focuses on the distribution of environmental impacts and leakage due to Danish climate policies.

DANISH BOARD OF BUSINESS DEVELOPMENT.

It was established in January 2019 at the initiative of the Government. The task of the Council is to ensure the coherence of business initiatives in various sectors of the economy, as well as the coherence of public policies at the central and regional levels. The Council is also designed to simplify government services for businesses in four main areas:

— high quality and availability in the business service provided. Business Development Centers have been established across municipalities along with a digital platform for the promotion of trade;

— one coherent decentralized business promotion. The Board takes over the responsibility from the Regional Growth fora, and the effo ts regarding clusters are strengthened;

— simplification of the business promotion on state level. The initiatives in the area of knowledge-based entrepreneurship are strengthened;

— stronger tourist destinations and better coherence within the effo ts of tourism.

The Board developed a strategy that sets the framework for its effo ts for 2020–2023. It represents six driving forces for growth and development in Denmark: qualified workforce and social integration; entrepreneurship; innovations; green transition and circular economy; internationalization; digitization and automation. The strategy also identifies 13 of Denmark's strongest and most promising business areas, including environmental technology, energy technology and digital technology.

THE CLIMATE ACT

Was passed in 2020 by 167 of the 179 members of the Danish parliament. It obligates the sitting government to work to reduce Denmark's GHG emissions by 70 per cent by 2030 compared to 1990 levels and towards net zero by 2050 at the latest. The Climate Act revised Denmark's previous environmental policy in a fundamental way. First, it obliges the Government to establish and regularly revise ten-year intermediate goals on the way to achieving the ultimate goal of carbon neutrality. Second, the Act obliges the Danish Government to develop annual climate action plans that should outline specific measures to reduce GHG emissions for all sectors of the economy: energy, energy efficiency of buildings and utilities, indus y, transport, agriculture and forestry.

Third, the act expands institutional capacity of the Danish Council on Climate Change. The Council was empowered to: provide a professional assessment of whether the initiatives presented in the annual climate action plan are sufficien to reduce GHG emissions; develop recommendations for improving environmental initiatives. Along with this, the Council's funding was more than doubled, and its board was expanded by new experts. The political independence of the Council has been strengthened, as it can now elect its leaders and members. Fourth, the Act obliges the Government to report particularly on the impact of Denmark's environmental policy on international greenhouse gas emissions.

The Climate Act is fully integrated into EU policy. Thus, Denmark also registered the ten-year Climate Plan for 2021–2030 developed under this Act as its national contribution to the EU energy and climate policy. Structurally, Denmark's Climate Plan meets the criteria of the EU Energy Union, covering five areas: energy security; the internal energy market; energy efficiency decarbonization of the economy; research, innovation and competitiveness. Denmark reports to the EU on progress in these areas every two years. This is European Commission's mechanism of monitoring progress in achieving climate goals of EU member states.

To ensure effective implementation of the Climate Act, the Danish Government together with private businesses established **14 Climate Partnerships** representing all sectors of the economy. The idea of these partnerships is that business community plays a central role in green transition, and the Government should work closely with it on practical solutions to climate problems, maintaining a balance between the pace of the green transition and maintaining a high level of competitiveness of Danish economy. Climate Partnerships are discussed in detail in the next subsection of this research.

NEW POLITICAL AGREEMENT TO ENSURE A GREEN DANISH WASTE SECTOR BY 2030

On June 16, 2020, the Danish government approved an agreement to ensure an environmentally neutral waste sector by 2030. The Agreement is designed to increase the processing and to reduce the incineration of waste and secondary raw materials. It aims to reduce GHG emissions in Denmark by 0.7 million tons by 2030, which is equivalent to removing 280,000 diesel and gasoline cars from the roads. To implement Agreement, Danes have to sort and process more waste, and Denmark's incinerators must operate on imported waste and burn much smaller amounts of it.

In conclusion, Denmark has accumulated considerable experience of progressive green and climate policy supported by proper financing mechanisms and effective implementation. The Danish government systematically adheres to the principle that solving any problem of green transition requires systematic application of a number of solutions in all relevant spheres. At the same time, there is a strong consensus that Denmark is to keep the leadership in environmental and climate policy and influence the development of environmental solutions in Europe and around the world.

3.2. Climate partnerships as a mechanism of public-private collaboration in achieving ambitious environmental goals

Public-private partnership (PPP) is an extremely important element of Denmark's success in climate policy. Since the 1970s, Denmark has maintained a tradition of making agreements on energy and environmental policy with a broad consensus. It helped to achieve political stability vital to ensure continued investment and ambitious long-term environmental goals. In this regard, the PPP proved to be an effective way of developing and implementing mechanisms for solving the problems of sustainable development.

The Danish model of PPP is aimed at using strengths of all participants in the process and, at the same time, coordinating divergent interests inherent to this kind of cooperation. An effective PPP model provides the Danish Government with broad and active support for climate initiatives from business community, and thus their effective implementation in industry.

This model is embodied in 14 climate partnerships to reach the goals of the Danish Climate Act – a reduction of greenhouse gas emissions by 70% by 2030 compared to 1990. Within these Climate Partnerships, leading representatives of each industry were tasked with formulating proposals for their contribution to reducing CO_2 emissions and a roadmap for achieving the respective targets in a way contributing to maintaining the competitiveness of the Danish economy, boosting exports, creating new jobs and increasing prosperity.

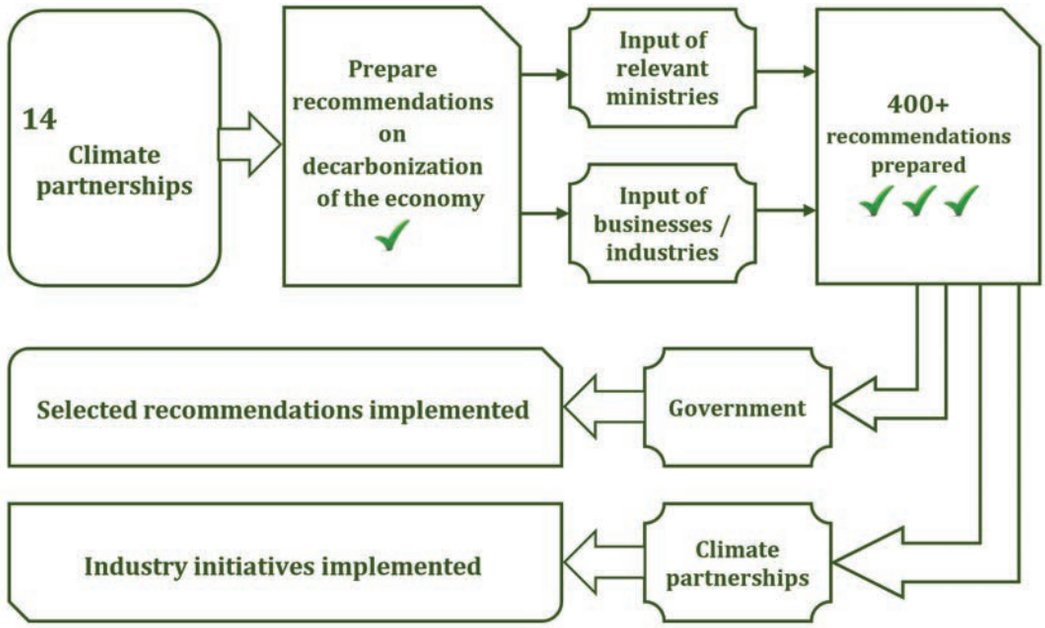
The Climate Partnerships aimed to develop two types of proposals: action plans that industries could implement themselves to reduce GHG emissions (in particular, optimizing supply chains, developing new goods and services, using energy-efficien technologies, introducing business models supporting the green transition); the second type are recommendations for the Government to remove barriers and improve the regulatory and institutional framework to facilitate climate investment.

Climate Partnerships were carried out by a representative from a leading private company with deputies who represented other influential companies and private partners in industry. The chairmen of all partnerships were appointed by the Danish Government. Business organizations served as secretariats providing organizational, information and analytical support for holding meetings and developing proposals. Public sector participants of partnerships were representatives of ministries related to green transition challenges of the industries (mainly the Ministry of Industry, Business and Financial Affai s, and the Ministry of Climate, Energy and Utilities). The number of stakeholders involved varied from partnership to partnership due to diffe ent structures. The development of recommendations and proposals took place in an open discussion with participation of enterprises and associations of relevant industries.

As of the end of 2021, Climate Partnerships developed more than 400 proposals and recommendations (Figure 3.3), most of which were approved by the Government and began to be implemented in the national climate policy (for instance on energy islands, Power-to-X, carbon capture technologies, electrification effo ts and new financial models). It should be noted that in the process of preparation, the proposals of diffe ent Climate Partnerships were not coordinated, therefore a number of proposals are repetitive, cross-sectorial and cross-industrial. Therefore, the Government faced the task of combining received proposals into a single plan for modernization of legal and institutional environment.

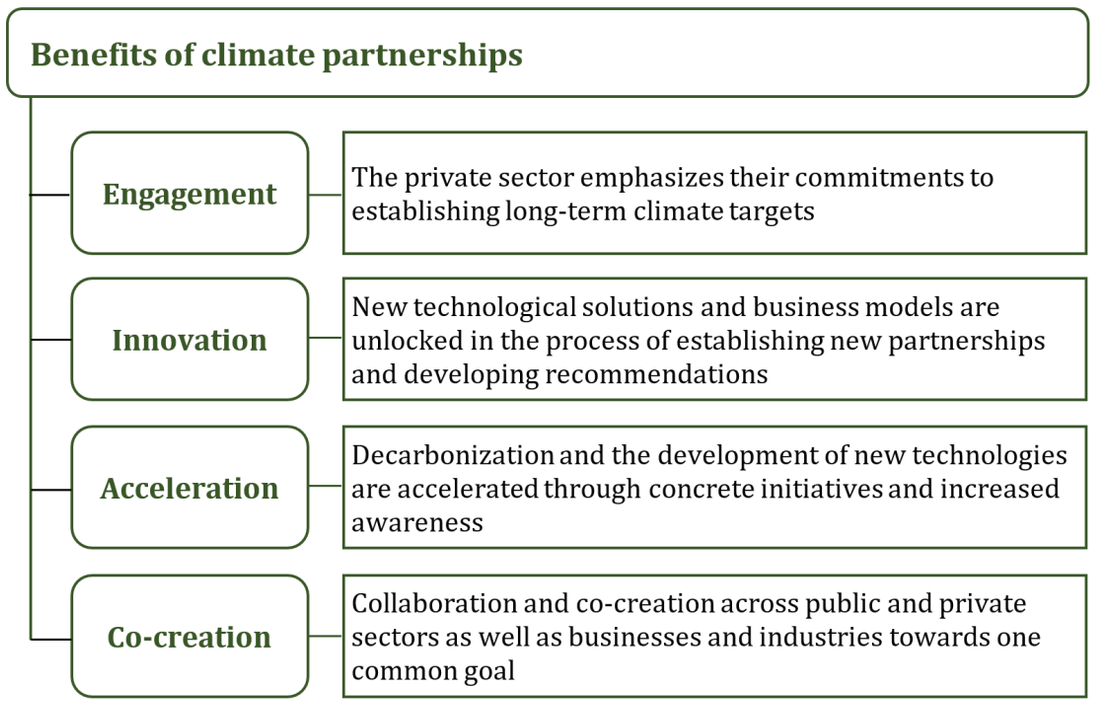
However, benefits of climate partnerships go far beyond improving effectiveness of public policy and lobbying business interests in the sphere of green transition. The partnerships encouraged private business to make climate commitments and set long-term climate goals. New technological solutions and business models contributing to green transition were crystallized in discussions. Government also played an important role with a requirement to provide specific recommendations with clear calculations of climate

Figure 3.3. The framework of sectoral climate partnerships of Denmark



decisions impact on GHG emissions reduction. Publication of results of climate partnerships raised awareness of all economic agents about modern technologies and policies for green modernization. In addition, fruitful cooperation was strengthened both on public-private, intra- and inter-industry levels in achieving of a common goal (Figure 3.4).

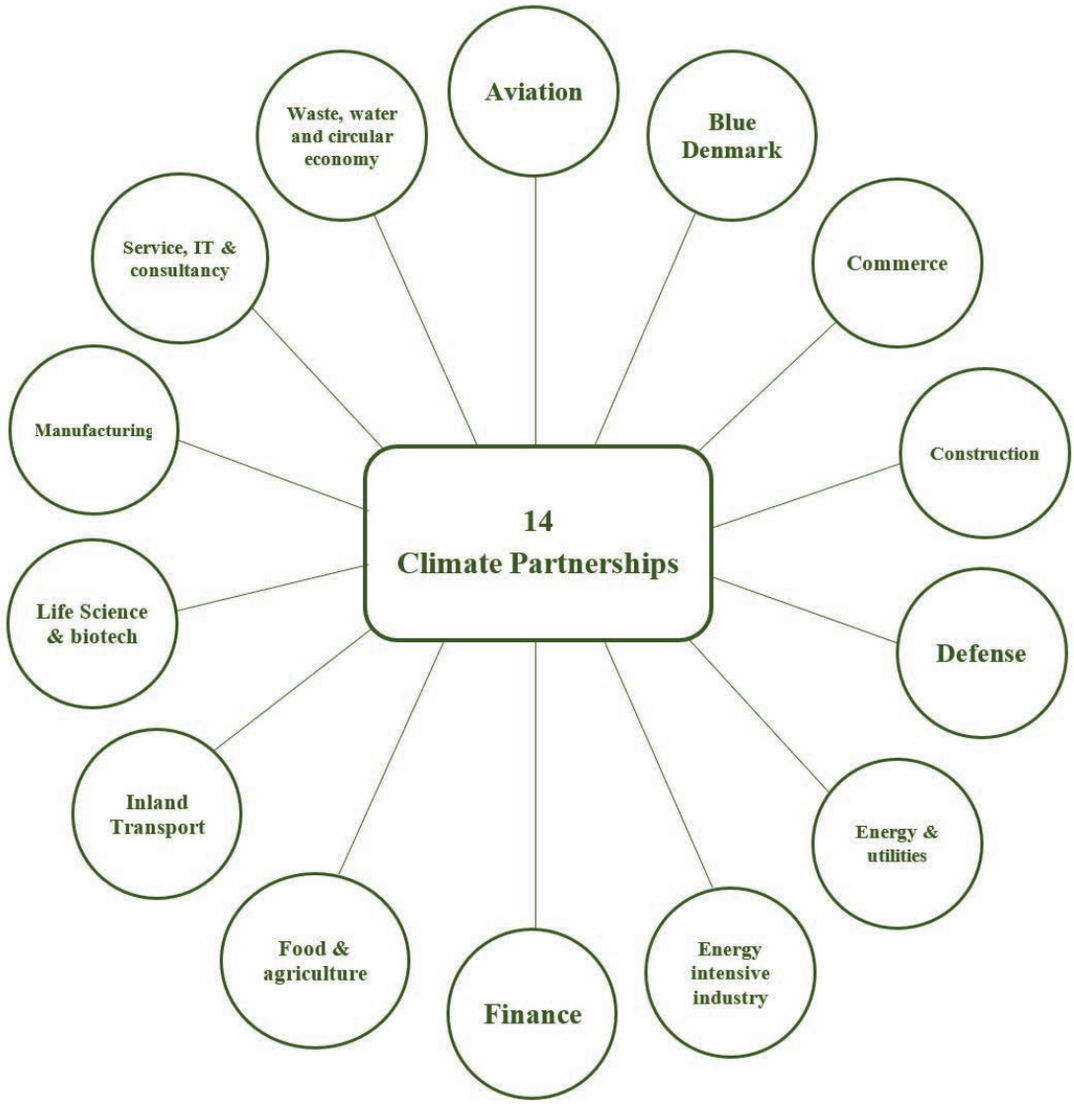
Figure 3.4. Benefits of climate pa tnerships



Cooperation of usually separate players from the energy and environmental sectors, in particular, a joint decision for the energy and water supply sectors to use sludge from water treatment facilities for electricity production of and district heating is an example of such cross-sectoral business interaction. Climate partnerships participants: Ramboll, an environmental consultancy, Biofos, a wastewater treatment company, and public utilities in the cities of Taarnby, Odense and Aarhus have shown great results in this area. Similar links have also produced solutions that prevent flooding in cities, while simultaneously creating greener, more resilient cities with strong livability. Trustful collaboration across sectors and industries has long been a key ingredient in the Danish way of environmental innovating and doing business in general.

14 climate partnerships have been established by the Danish Government in the following sectors of economy (Figure 3.5):

Figure 3.5. Danish climate partnerships



— Aviation;

— Blue Denmark (maritime transport);

— Construction;

— Commerce;

— Defense;

— Energy and utilities;

— Energy intensive industry (cement, metallurgy, etc.);

— Finance;

— Food and agriculture;

— Inland transport;

— Life Science and biotech;

— Manufacturing;

— Service, IT and consultancy;

— Waste, water and circular economy.

The Danish government required from the partnerships to present proposals and recommendations in standardized reports with analytical materials developed on the basis of officia statistical data. Thanks to this, the array of received proposals and recommendations, as well as climate information on industries, are easily provided for generalization and processing by authorities. Structure of standardized report includes: a) description of the industry, current volumes and retrospective of its GHG emissions, sources of these emissions and previous achievements in reducing them; b) description of technological, organizational and other mechanisms for further reduction of GHG emissions in the industry, quantitative assessment of GHG reduction in case of using these mechanisms, estimation of costs needed to apply these mechanisms; c) arguments for government support and reforms necessary to unlock and promote environmental innovations in the industry.

Considering that Danish emissions of GHG are insignificant on a global scale, partnerships participants were also required to propose solutions that would contribute to reduction of emissions at the international level, in particular in foreign trade of Danish

enterprises. Along with this, Denmark's proactive climate policy, according to the intention of its initiators, will serve as a guide and a model for other countries, encouraging them to activate climate policy, and thus accelerate transition to a carbon-neutral society on a global scale.

Other mandatory chapters of climate partnership reports defined by authorities are: a) introduction where partners declare their commitment to green transition idea and promise to make necessary effo ts to reduce GHG emissions; b) summary with key directions and areas of climate action in the industry from businesses' point of view; c) annexes with statistical data and methodological approaches used for calculations of potential GHG reductions.

STRUCTURE OF CLIMATE PARTNERS REPORTS

1. INTRODUCTION

2. SUMMARY

3. DESCRIPTION OF THE INDUSTRY, CURRENT VOLUMES AND RETROSPECTIVE OF ITS GHG EMISSIONS

Industry overview; analysis of GHG emitted by enterprises of the industry, starting from 1990; analysis of main factors of GHG emissions; presentation of industry's key achievements in the field of decarbonizatio .

4. GENERAL VISION OF DECARBONIZATION IN THE INDUSTRY BY 2030 AND KEY OBSTACLES ON THIS WAY

Industry forecast for reduction of fossil fuel consumption and greenhouse gas emissions by 2030; consistency of this forecast with Government climate goals and international obligations in the field of green transition; description of key areas of technological innovation to achieve climate goals; arguments on legislative, resource, and organizational barriers on the way of achieving these goals within the set time.

5. DETAILED ANALYSIS OF TOOLS AND DIRECTIONS OF GREENHOUSE GAS EMISSIONS REDUCTION BASED ON RESULTS OF THE CLIMATE PARTNERSHIP WORKING GROUPS MEETINGS

Presentation of specific business initiatives to reduce greenhouse gas emissions within specific industrial sites; detailed assessment of the prospects for implementation of these initiatives from the point of view of GHG emissions reduction, and the impact on enterprises' domestic and international competitiveness. Calculation of described initiatives' implementation "price" (cost and approximate period of return on investment).

6. ARGUMENTS FOR GOVERNMENT SUPPORT OF DECARBONIZATION IN THE INDUSTRY

The list of government support measures, changes in legislative and institutional environment, mechanisms for strengthening public-private partnership to promote implementation of green investment projects in the industry, both in general and according to specific initiatives determined by the results of working groups meetings.

7. ANNEXES

Let's glance through the key results of climate partnerships' activities recorded in their reports, according to the basic structure: current state and challenges, potential for reducing GHG emissions, recommendations.

AVIATION

Challenge.

To reduce GHG emissions, the industry urgently needs to switch to sustainable aviation fuel (SAF) in the medium term. SAF is produced from biomass, solid household waste, used lubricants and reduces CO_2 emissions by 80% compared to conventional jet fuel. The key barrier to switching to SAF is significant price gap between conventional fuel and SAF (prices sustainable aviation fuel are 2–5 times higher), as fuel costs represent approximately 20% of an airline's cost base.

Potential.

The industry has the potential to reduce GHG emissions by 70% by 2030 compared to 1990 and by 30% compared to 2017, and to achieve climate neutrality by 2050.

Recommendations:

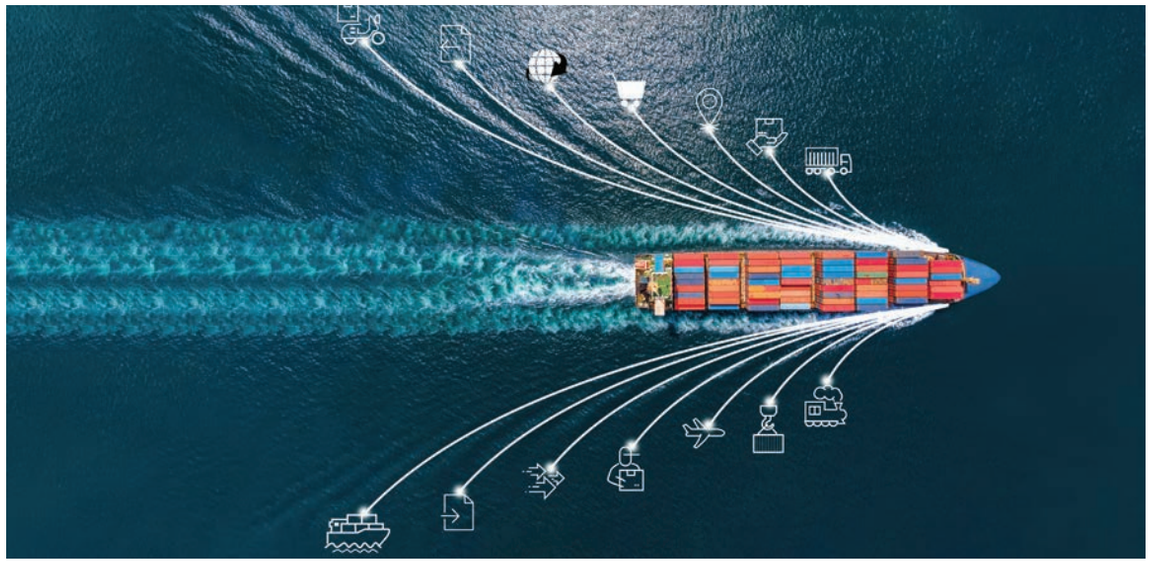
to create a national aviation climate fund financed by extra charges from passengers (4 euros per ticket) to allocate resources for transition to SAF. In the long term, it will be necessary to introduce a global tax on conventional fuel for the same purpose.

BLUE DENMARK

Challenge.

Danish domestic shipping (ferries, fishing vessels and ships sailing between Danish ports) emits 0.8 million tons CO_2 annually. Emissions from Danish international shipping amount to 38 million tons of CO_2e. Several barriers must be overcome to achieve CO_2e emission reduction targets:

— Shipping is an extremely competitive sector, operating in a global market and is consequently sensitive to national regulation. The International Maritime Organization, IMO, is the only global regulator of the entire world flee – hence IMO is the means to ensure significant global emission reductions while preserving a level playing fiel .



— Shipping must take a quantum leap in technology by replacing traditional fuels with new climate-neutral fuels in order to further reduce emissions in absolute terms.

— A substantial upgrade of the current energy systems on a national and global scale will need to take place to secure a reliable supply of green fuels in the maritime sector.

— The land-based energy infrastructure in ports must be upgraded to be able to handle the new green fuels or batteries

Potential.

Industry set two ambitious goals supported by all enterprises involved in the Partnership. The fi st is to achieve climate neutrality by 2050 without state financial support. The second is to put into commercial operation the fi st ocean-going zero emission vessel by 2030. These goals go far beyond those set by the International Maritime Organization.

Recommendations:

— *in energy efficiency*: share shipping big data; develop maritime climate solutions, including demonstration programs; government-provided export financing to accelerate investment in climate-friendly vessels;

— *in ports and shortsea shipping*: eliminate waiting time in ports; introduce green ferry tenders; provide green municipal ferry services; establish green highways at sea, which give priority to green vessels; introduce a climate-diffe entiated toll at all ports; construct new energy infrastructure at ports;

— *in green fuels*: establish a partnership to test ships using green fuels; establish a research, test, and development facility (a Maritime Centre of Excellence); construct a demonstration ship to showcase the 2030 ship of the future; develop a national strategy for the development of Power-to-X in the maritime sector; develop pilot schemes for the transition to new fuels; remove regulatory barriers that prevent using a blend of green and fossil fuels;

— *in climate diplomacy*: establish a global innovation fund funded by the shipping industry; coordinated effo t to attract research funds from the EU; strengthened climate diplomacy in the IMO; efficien implementation of new IMO regulations; Denmark to take the lead in establishing a fast-track approval scheme in the IMO for new climate technologies; expansion of fishing capacity regulations for fis - ing vessels in the EU.

COMMERCE

Challenge.

The sector does not have a big, direct carbon footprint, but is indirectly responsible for the emissions caused by Danish consumers' consumption of food, clothes, electronics etc. the sector has vast potential to secure climate-friendly products and solutions by means of its companies' purchases, agreements and knowledge sharing with other enterprises. In addition, the commercial sector can directly influence consumer behavior to select sustainable alternatives.

Potential.

The sector is deeply enmeshed in complex value chains, which means that the climate crisis cannot be overcome without thinking globally and taking initiatives that transect value chains, sectors and national borders. The commercial sector has unique, direct access to consumers, which must be utilized to enable companies to make it easier for their customers to choose climate-friendly products. The commercial sector has committed itself to working together with authorities and NGOs in terms of shared, action-oriented messaging enabling the sector to achieve genuine behavioral change for the benefit of the climat .

Recommendations:

— *a taxation reform to kick-start the sustainable transition*: a CO_2e-tax will ensure that it is the emitter who pays for the emissions. This will incentivize innovation and reward sustainable front-runners with lower costs. It will affect both the market forces and the green transition;

— *significantly improved recycling of resources*: discarded packaging, textiles, electronics, food, and other waste generated by the commercial sector largely end up being incinerated, because we are unable to efficientl collect, separate and recycle it. This area can be improved by initiatives such as clear common packaging principles, partnership for sustainable clothing and textiles, streamlined recycling of resources, implementation of manufacturer liability for packaging;

— *climate information for Danish consumers*: significantly improve the level of climate-related information provided to consumers together with the authorities to make climate-friendly purchases more enticing. This entails initiatives such as reliably communicating about food and non-food product's climate footprints;

— *less resource waste to secure CO2e reductions*: a reduction in resource waste will help us avoid unnecessary costs and reduce the waste stream. The sector has already come far in achieving this goal, especially when it comes to reducing food waste. Nonetheless, there is still unexploited potential, and an incentive could for instance be to simplify the rules relating to product donations;

— *incentives for climate-friendly behavior to help the sector*: a number of incentives must be brought into play and barriers broken down to support the sector's contributions to achieve a more sustainable consumption and production of goods in Denmark. This entails initiatives such as public-sector procurement as a driver of climate-friendly behavior and an implementation of a repair arrangement.

CONSTRUCTION

Challenge.

The energy consumption of buildings is responsible for 40% of Denmark's overall energy consumption and 23% of CO_2e emissions. 10 % of the country's CO_2e emissions stem from the production of building materials and building processes. To significantly reduce these figu es, the construction industry's climate partnership has investigated how CO2e emissions can be reduced across all parts of the value chain and analyzed the carbon footprint of buildings and infrastructure over their entire lifespan.

Potential.

The Partnership assures that the construction industry can significantly lower buildings' CO_2e emissions by 2030. It can be achieved due to replacement of oil boilers with electric heat pumps and district heating, as well as due to phasing out natural gas for heating. Most of the buildings will be renovated to increase their energy efficien , new

buildings will be built in compliance with the latest environmental and climate standards, buildings will be demolished in rare cases only. All construction processes will be fossil-free. Implementation of partnership's proposals will result in a net reduction in CO_2e emissions of 5.8 million tons annually.

Recommendations:

— *optimize energy use* – intelligent energy management in existing buildings can reduce its consumption by 20–25% (up to 1.2 million tons of CO_2e annually) by 2030;

— *replace natural gas with renewable energy* in district heating of more than 400,000 buildings and replace oil boilers with electric heat pumps in 100,000 buildings (reducing emissions by 1.8 million tons of CO_2e per year);

— *introduce mandatory CO2e accounts* in building regulations and similar requirements for infrastructure projects (potential for reducing emissions by 1.1 million tons of CO_2e per year);

— *ban gas and diesel fuel* at construction sites, switch to electrically powered forklifts and cranes, biofuel for excavators, and electricity instead of diesel powered generators (reduction of emissions by 550,000 tons of CO_2e per year);

— *introduce energy labeling* for all buildings within five years in order to monitor the current state and possibilities for reducing energy and water consumption, as well as improving the indoor climate.

DEFENSE

Challenges.

Today, the overall emissions of the Danish defense sector are approximately 254,000 tons CO_2e. The defense sector covers a wide range of elements across most sectors. It is both an operator of aircrafts, ships, and vehicles, as well as a transportation and logistics organization and an education facility. In the context of climate policy, the sector faces a challenge to reduce emissions and at the same time increase operational efficiency, security of supply and enhance the safety of soldiers.

Potential.

The potential of the Danish defense sector to reduce GHG emissions is not yet define . Currently, it has been estimated that the key sources of sector's GHG emissions are: fossil fuels consumption (75.5%), military institutions (17.9%), business trips (4.2%), refrigerants and fi e extinguishers (2.4%). Key criteria are to keep defense capability, as well as safety and security of military personnel while implementing measures aimed at reducing the climate burden.

Recommendations.

The defense climate partnership was established after all other partnerships began their operation, so report preparation in defense is planned by the end of 2022. Currently, the main directions on which recommendations will be formed have been determined:

— analyze achievements of other partnerships and adapt them to the needs of the defense sector;

— analyze mechanisms and tools of climate policy already in use and assess whether it is relevant for defense sector;

— identify where new technologies and procedures can help reduce GHG emissions, enhance operational efficienc and provide more safety and security for personnel in the defense sector.

ENERGY AND UTILITIES

Challenge.

The energy sector plays a key role in Denmark's green transition. During 1990–2019, it accounted for 60% of all GHG emissions reduction: CO_2e emissions in energy and utilities decreased by 19 million tons (from 32 million to 13 million tons). This has been achieved through the deployment of renewable energy, including wind, bioenergy and

solar, as well as energy efficien supply of heat and electricity. The challenge towards 2030 is to secure enough renewable energy, phase out the remaining coal used for power stations and natural gas for district heating production, phasing out natural gas and oil in individual heating systems, carbon capture at large point sources, reduction of the use of plastics in waste-to-energy systems and reduction of the amount of natural gas used for energy production in the North Sea. Furthermore, the large amounts of renewable energy from wind and solar must be directed to the sectors, which have not yet been decarbonized such as transport, agriculture, buildings and industry.

Potential.

Denmark's energy sector has an opportunity to reduce CO_2e emissions by 95% by 2030 compared to 1990. But it is necessary to fulfil the growing demand for RES, which will increase by 64% by 2030 and reach 125 billion kW. This requires the implementation of a strategic approach to decision-making in the industry with close public-private cooperation.

Recommendations:

— phase natural gas out of the heating system by 2030 and cease the use of coal in heat/power generation;

— introduce new regulations to support a transition to 100 per cent green energy in district heating;

— include Carbon Capture Utilization & Storage (CCUS) in Denmark's national climate strategy;

— expand offsho e wind in the North Sea;

— introduce new vehicle taxation scheme to prioritize electric vehicles and phase out fossil fuel operated vehicles before 2030;

— all new public transport contracts must be fossil-free solutions;

— design a roadmap for the expansion of renewable energy and transmission infrastructure including energy islands connected to other countries;

— increase biogas in the energy supply;

— implement time-diffe entiated tariffs to balance demand

— develop a strategy and roadmap for Power-to-X.

ENERGY INTENSIVE INDUSTRY

Challenge.

Energy-intensive industries generate 1.6% of GDP and 14% of Denmark's GHG emissions. The sector has reduced emissions by 7% as compared to 1990 levels. Decarbonization in these industries is extremely difficult because they require extremely high temperatures (up to 1000°C) in production processes (and therefore consume significant amounts of energy), as well as fossil fuels in particular, since such high temperatures cannot be achieved using electricity.

Potential.

Climate Partnership in energy-intensive industries concluded that it is able to reduce GHG emissions by 70%by 2030, in particular through:

— investments in further energy efficienc measures, increased use of alternative fuels (such as biogas and waste), and changes in products (e.g., cement with a lower content of chalk);

— replacing coal and natural gas with biogas, and the electrification of processes at low and medium temperatures;

— carbon capture at the largest emitters.

Recommendations:

— expand investments in biogas production, infrastructure and price support;

— introduce sustainability as a criterion in public procurement to stimulate demand;

— develop a national strategy for carbon capture;

— remove taxes on the use of surplus heat from energy intensive companies to encourage its use for heating, e.g. in district heating networks.

FINANCE

Challenge.

The financial sector has very low direct emissions but has a large effect through investments and lending. While the other climate partnerships have the role of identifying areas requiring investment, the climate partnership for the financial sector has a pivotal role in providing the finance and investments necessary to establish wind farms, solar power, energy islands, Power-to-X, and energy systems etc. to ensure the transition to a green economy and that the goal of reducing emissions by 70% by 2030 and climate neutrality by 2050 is reached.

Potential.

The partnership has made a commitment to enlarge total lending to, and investment in, green financ . The financial partnership has developed a CO_2 model that provides a framework on how the individual members can collect and compile the most optimal information on their CO_2e footprint. In addition, the partnership has been at the forefront of developing a common method for calculating the CO_2e emissions of the private sector and the public sector.

Recommendations:

— establish independent state loan funds that co-finance projects promoting sustainable development to lower investment risk;

— develop finance innovation and the development of new technologies and new solutions for global climate challenges;

— elaborate easy and inexpensive access to standardized and digital data regarding companies, households, etc. that need financin . Align this data with the future EU regulation on reporting for the financial sector to finance een transition;

— utilize the role of the public sector as a buyer and construction project owner and indirectly as a trendsetter to promote the green transition in Denmark;

— increase the use of public funding and venture capital to finance development projects with the potential to reduce global emissions, such as the development of e-fuels and the capture and storage of CO_2;

— continue the work to ensure that EU regulation in the financial field is ambitious, evidence-based and useful, while limiting administrative burdens on financial and non-financial institutions. Long-term, clear and attractive framework conditions in Denmark and in the EU play a major role in enabling sufficien investments from the private sector to further accelerate the green transition.

FOOD AND AGRICULTURE

Challenge.

Decarbonizing food production is difficult as food is produced under biological and natural conditions. Climate change, increasing pressure on natural resources and the need to feed a global population of 10 billion people by 2050 are some of the most pressing global challenges of our time. New, innovative solutions are needed so that we can produce and consume food in a sustainable way.

Potential.

GHG emissions from the agricultural and forestry sectors in Denmark decreased by 25% to 15.4 million tons during 1990–2017. The sector could reduce its climate impact by 62% by 2030 (approximately 12.6 million tons CO_2e). Through further research in the food field, industry is likely to reduce its climate impact by a further 10 percentage points, corresponding to an overall gain of 72%.

Recommendations:

— abandon the use of alluvial land[105] for agricultural crops cultivation and provide compensation to landowners;

— use nitrification inhibitors in manure and chemical fertilizers can significantly reduce emissions;

— remove slurry from the pigsties once a week rather than every five or six weeks, which is common practice today, to reduce methane emissions;

— change fodder composition for ruminants to emit less methane;

— utilize the large quantities of biomass the sector produces (such as straw, manure, residuals and by-products) for climate-friendly energy production. Erect wind turbines and solar panels on agricultural land;

— increase the forest area, so that forest landscapes cover 20–25% of the country by the end of the 21st century;

— design and implement a strategy to increase the use of climate-friendly timber construction, including a revision of fi e regulations and the building code;

— establish a number of large, multiannual and challenge-driven research partnerships (basic and strategic research, development and demonstration) which ensure interdisciplinarity and regulatory involvement.

INLAND TRANSPORT

Challenge.

The transport sector emits around 20% of Denmark's total CO_2e emissions, whereas inland transport, including lorries, delivery vans and buses, is responsible for about 32% of the transport sector's carbon emissions in Denmark. For example, more than 99% of Denmark's lorries still run on 93 per cent petrodiesel fuel.

Potential.

Partnership participants identified three main directions for reducing GHG emissions in the industry: a) reduce fuel consumption; b) widen selection and greater use of green vehicles can be encouraged via subsidies; c) promote green fuels.

Recommendations:

— establish a model with a gradually increasing decarbonization requirement for fuel suppliers;

— conduct experiment of launching double-trailer combined vehicles, in which the combined vehicle is made up of two standard semi-trailers (up to 32 meters);

— promote the market for heavy vehicles running on alternative fuels in Denmark. A Danish subsidy scheme is proposed for the fi st 10,000 heavy vehicles that run on alternative fuels (such as biogas, electricity or hydrogen) up to 2030.

LIFE SCIENCE AND BIOTECH

Challenge.

The sector has reduced CO_2e emissions from 118,000 tons in 1990 to 53,000 tons in 2017, which equates to a reduction of 55%. This means that CO_2e emissions from the life sciences and biotechnology sector accounted for 0.1 per cent of all CO_2e emissions in Denmark in 2017. Optimization of production and conversion to green energy can take a significant sha e of the credit for the low CO_2e emissions.

Potential.

Key potential to reduce sector's GHG emission lies in ensuring resource efficienc through energy efficienc and circular resource consumption. Biotech companies are also developing solutions, offering great potential to reduce global CO_2 emissions if implemented on a large scale in sectors with significant emissions challenges. These include biofuels for transportation, bio-based alternatives in food production, agriculture, textile manufacturing, cleaning etc. and circular bio-recycling solutions for residual and side streams from production, household, processing, agriculture, etc., resource optimization of energy, water and crops in the production and processing of textiles, food, feed, biological farming solutions (alternatives to pesticides and fertilizers).

Recommendations:

— remove taxes, change the regulatory environment for excess heat utilization;

— improve the regulatory environment in the sphere of the circular economy and implement Good Manufacturing Practice – a European program establishing requirements for pharmaceutical manufacturers;

— introduce biotech solutions in agriculture and food production, energy and transport sectors;

— improve conditions for R&D in biotech;

— increase demand on green goods and services through public procurement, purchasing green transport and energy.

MANUFACTURING

Challenge.

Denmark's manufacturing sector has reduced direct emissions by 65% since 1990 through increased efficien , relocation of production and fuel switching. Meanwhile, output has increased by 35%. Today, only 10% of manufacturing companies have calculated their emissions and carbon footprint. Most projects and initiatives to reduce CO_2e emissions require an up-front investment with a long payback period, while planning horizon of most manufacturing enterprises is short.

Potential.

The climate partnership has charted a path for an 80-85% reduction in CO_2e by 2030 using measures that are chiefly economically viable. Through economic incentives and further use of biogas, reductions can reach 90-95%.

Recommendations:

— strengthen information and advisory services to provide knowledge to industry, including the many SMEs, granting access to tools for measuring emissions, possible climate measures and consulting services;

— give better financing possibilities: government is to apply co-financing mechanisms and other incentives to promote companies' investments in energy effi-

ciency;

— carry out tax reform: it is necessary to lower taxes on electricity and surplus heat to enable greater consumption of green energy resources;

— support biogas: effo ts should be made to ensure more biogas in the national biogas grid and that companies use green gas in their processes.

SERVICE, IT AND CONSULTANCY

Challenge.

Services, IT and consultancy sectors employs up to half a million people and represents a third of the gross value added across the 14 partnerships. However, their direct GHG emissions remain insignificant, and the main opportunity to contribute to emissions reduction is to stimulate demand for green goods and services and encourage manufacturers from other industries to produce such goods. Therefore, partnership's main contribution to the achievement of climate goals is to help other economic agents (households, enterprises, both public and private, domestic and foreign) to reduce GHG emissions.

Potential.

The key potential of the services, IT and consulting sector to achieve climate goals lies in: a) paving the way for a green transition in all sectors via the use of data, AI and digitalization; b) creating new markets that drive a demand for green products among companies and consumers; c) driving new behavior via customer contacts, employees, and supplier relationships; d) continuing to reduce the sector's own climate footprint via sustainable business models.

Recommendations:

— take advantage of the potential for digitalization, data, IT and AI across sectors;

— create data-driven green cities – both the private and public sectors must make better use of data in the utility sector and elsewhere;

— standardize key figu es in climate and environmental reporting;

— use procurement systems as an engine of change;

— avoid unnecessary trips and embrace new, cost-effective technologies in transport;

— reduce tax burden for reusable heat to be used for district heating;

— use building regulations and financing to c eate a greener housing mass;

— facilitate access to green venture capital;

— introduce strong labelling schemes and spread new knowledge on climate footprints;

— draw more attention to and market sustainable Danish solutions for the tourism sector;

— promote circular economy – less waste, more efficien waste sorting and increased reuse/recycling of materials;

— assist SMEs in transition process for both business models and physical premises.

WASTE, WATER AND CIRCULAR ECONOMY

Challenge.

Half of the total global greenhouse gas emissions and more than 90 % of the loss of biodiversity is caused by the extraction and processing of natural resources. Consequently, products and resources should be kept in circulation for as long as possible through reuse or recycling. Some of the challenges when transforming to a circular economy are a lack of competitive, high-quality recycled materials, lack of standards and knowledge about the content and quality of used products and recycled materials. It is essential to alter consumption patterns and stimulate demand for circular solutions.

Globally, the water sector accounts for 2-4% of the world's total electricity consumption and this amount will increase as more water is treated throughout the world. Energy-efficie technologies and a focus on CO_2e reductions can reduce this number significantl . Direct emissions of methane and nitrous oxides from the water sector, especially related to wastewater treatment, are significant but can be educed with new technology.

Potential.

The overall vision of the climate partnership is for Denmark to be a world leader in circular economy by 2030. In the waste sector, the goal is to recycle 90% of all waste by 2030. For Denmark, converting to a circular economy is estimated to result in a reduction of approximately 7-9 million tons of CO_2e in 2030 globally.

Recommendations:

In circular economy:

— extend product life and increase reuse – introduce circular design criteria into EU product policy, demand green and circular solutions through public procurement and increase access and incentive for repair and use of recycled models;

— increase use of recycled materials – create an efficien market for recycled materials using globally recognized standards for secondary materials. Standards create a level playing field and create confidence amongst users and consumers;

— introduce circular business models – Green Public Procurement should be a driving force for the transition to circular business models and solutions. The focus of public procurement should not only be on the acquisition price, but also total costs and entire value chains;

— switch to new materials – a shift to bio-based materials and substitution of unwanted chemicals where relevant requires research into and development of methods in the field of circular bioeconomy and strategies for sustainable use of chemicals;

— reduce wastage – European and national strategies for waste reduction should present targets, tools and incentives to reduce waste from both households and companies.

In waste management:

— increase and improve recycling of waste;

— carry out degassing of landfill

— reduce CO_{2-}e from biogas plants;

— phase out composting;

In water sector:

— reduce direct greenhouse gas emissions in the wastewater sector;

— increase energy efficiency in the water and wastewater secto

— avoid rainwater and unauthorized water in the wastewater system;

— increase energy production via biogas and heat pumps;

— export efficient water technology to achieve global impa .

Summarizing recommendations provided by climate partnerships indicates that one of the key mechanisms for facilitating green transition, according to Danish private businesses, is public procurement. Demand and consumption of public sector is considered as effective support for environmentally conscious and climate-friendly industries. Thus, the partnerships emphasize the necessity to take into consideration product cycle, value chain carbon footprint and other non-price factors in public tenders. The Government should also prioritize procurement of public transport and cars that run on green fuel. Stable demand from the public sector remains critical for private companies to implement ambitious climate initiatives that increase the cost of their products compared to less environmentally conscious competitors at domestic and foreign markets.

Climate partnerships are also eager to change taxes on heating and electricity, as well as improve tax collection for greenhouse gas emissions. Taxation should stimulate business to abandon fossil fuels in favor of renewables, collected funds should be used for financial support of companies to implement energy efficienc projects and apply green technologies. Along with this, preferential tariffs or subsidies are expected from the state for green electricity, biogas and other climate-neutral energy resources, the cost of which still remains too high to compete with fossil fuels.

Also, Danish business considers the state as a (co)investor in large-scale projects for the development of renewable energy capacities, such as energy islands, Power-to-X technologies, integration into existing biogas and biofuel networks, etc. Large-scale funding from the state is also expected in R&D related to finding new and improving

existing climate solutions. Sectors where green transition is associated with significant technological risks are counting on significant financial support from the government. This is especially true for truck manufacturers and inland transport, as in this field the technical possibility and economic feasibility of using electric vehicles or biofuels has not been investigated yet.

Industries highly integrated into the global economy, such as maritime transport, fi st of all expect the government to closely cooperate with international organizations to develop international incentives for green transition. These industries need support in the form of radical reconstruction of infrastructure (in particular ports), introduction of environmentally diffe entiated fees, government incentives to consumers of their goods and services.

The government is also expected to take steps to intensify SMEs involvement in green transition, spread climate awareness through introduction of product labeling requirements on carbon footprint and recycled materials, application of international standards for the use of secondary raw materials.

Private companies, on the other side, outlined quantitative and time frames for reducing their GHG emissions, defined specific technological and organizational steps along the way. To illustrate the approach used, the following subsection analyzes report of "Construction" climate partnership in detail.

3.3. A closer look on "Construction" climate partnership report

Report of "Construction" Climate Partnership begins with a summary presented in the previous section. It emphasizes readiness of the industry to contribute to green transition in cooperation with the Government, the Danish Parliament and the people, and also summarizes five blocks of recommendations, aiming at reducing industry's GHG emissions by 5.8 million tons of CO_2e per year.

The fi st chapter illustrates the point of departure containing statistics on current state of the industry, buildings in Denmark and their contribution to GHG emissions. Building energy consumption, building process in connection with new construction or renovation of buildings, roads and bridges, as well as production of building materials account for 30% of Denmark's CO_2e emissions. 2/3 of these emissions are generated by energy consumption in buildings and 1/3 – by construction processes and production of building materials. The construction industry accounts for 35% of waste production, 85% of which is recycled.

The second chapter presents the vision of construction industry development by 2030, if proposals outlined by partnership are implemented. The report emphasizes that energy consumption in buildings will be reduced by 25% in a ten-year perspective. New

rules for construction and renovation of buildings will be in place ensuring that the industry's carbon footprint is minimized. In 2030, all buildings will have an energy label, which gives a precise and continually updated picture of the status of the building and suggestions for improvements. As part of the green transition, Denmark will adhere to the EU "Energy efficienc fi st" principle. This will make Denmark's cost of green transition cheaper by DKK 14 billion by 2030 and by DKK 120-160 billion by 2050.

Fossil fuels for the construction sites to be phased out: construction equipment will run on electricity or biofuel, and dehumidification of constructions will take place through the use of electricity or district heating only. When buildings are demolished, building parts and materials will be recycled in direct reuse or are re-utilized for new materials in a circular building economy.

The third chapter describes the obstacles to decarbonization of the industry and ways to overcome them. Among the main obstacles, fie ce competition in the industry is highlighted. It forces to look for opportunities to reduce the cost of construction as much as possible and bypass most energy-efficien solutions. Legislation significantly complicates implementation of climate initiatives for public building owners and non-profit sector. Private households mostly show lack of interest in energy saving in buildings. This hinders renovation and smart management of housing stock, so implementation of energy efficiency initiatives in Denmark is too sl .

Problems with access to financial resources are also highlighted. Lessors cannot add costs for energy improvements to the rent, municipalities hit the construction spending cap, and the politically approved budget of the National Building Fund impedes the implementation of energy efficiency meas es in non-profit housin .

It's stressed that there are still about half a million buildings in Denmark heated with natural gas or oil burners. Transition from fossil fuels to renewables in district heating is very slow. There are no specific requirements from the Government about phasing out natural gas in this sphere.

The focus in construction is still to deliver at a low price, because that is the most important thing for most customers today. The problem is that this does not create climate-friendly solutions except for individual show-case projects. For most people, it is a new and unfamiliar way of thinking regarding the carbon footprint and life cycle calculations in the entire life of the building because the demand is so small.

Almost all construction machinery runs on diesel or petrol. The electrically powerd machines are found costly to purchase. That also applies to delievery vans and cars in the industry. At the same time large quantity of diesel oil is used for electric generators ans hot air generators for dehumidification of moistu e in the construction process.

Finally, the report highlights shortcomings of energy labels describing them as defective, imprecise and rarely usable in practice. As regards private homes, there is only a requirement of an energy label inspection in case of change of ownership. That means that implementation of energy efficienc measures having taken place since the change of ownership, e.g. replacement of windows, are not reflected in energy label. Therefore, the energy label and related recommendations for energy improvements quickly become obsolete.

Partnership suggestions on how to overcome the above-mentioned obstacles and unlock green transition in the industry are summarized in the table 3.2.

Table 3.2. Measures to unlock the green transition in the construction industry according to climate partnership

From the side of business	From the side of Government
1. advise the building owners and recommend green solutions; 2. cooperate with the financial sector to develop new business models in which the homeowners can pay for implementing energy efficiency meas es via the ongoing operations; 3. ensure better compliance with the building regulations; 4. create new solutions that make it easy for the individual homeowner to switch to green alternatives; 5. develop its "mindset" from an economic to a life-cycle cost /climate bottom line; 6. work to promote that all constructions have CO2 accounts, that material optimization is made and that product-specific envi onmental declarations of content is in demand; 7. develop more and smarter solutions for calculating life cycle analyses; 8. reduce the footprint of CO2 through increased innovation with producers of materials by using more renewable energy in the production; 9. protect construction works better against moisture during construction and make energy requirements in connection with dehumidification 10. demand green machines and energy and implement the practical transition; 11. participate in the development of the future energy label for buildings in collaboration with the authorities – a reliable, digital and dynamic tool which is updated when projects are carried out; 12. contribute to developing the energy label so that the financing institutions may use it in their advice to homeowners and as a basis for loans for green investments.	1. improve the financial incentive to implement energy efficiency meas es, e.g. through an improved deduction for builders, prop-erty taxes and energy taxes; 2. make demands on the use of life-cycle costs which prevents a narrow focus on the here and now cost and not on the long-term economy; 3. adjust the rules so that municipalities etc. invest in energy improvements and renewable energy – e.g. through ESCO models; 4. increase the budget of the National Building Fund so that social housing accommodations can be energy-efficient and moder 5. ensure better compliance with the building regulations; 6. lay down requirements for the efficiency of he - ing installations; 7. implement a national plan for phasing out natural gas for heating; 8. phase out oil burners towards 2030; 9. make demands for the CO2 accounts of buildings in the building regulations from 2021 and set out a requirement level of 12 kg CO2/m2/per year; 10. set up a working group to assess and further develop methods, tools, requirement levels; 11. establish a "support office" for SMEs, so that w involve all in relation to developing EPDs (environ-mental product declarations), use the tool "LCA Byg" etc.; 12. incorporate LCA methods for bridges and civil engineering works; 13. obligate utility companies to deliver green energy for building sites when construction commences; 14. promote CO2 free production equipment by means of requirements and duties; 15. ensure that requirements are made for a mandatory energy label for all buildings erected before 2000; 16. further develop the future energy label for buildings into a reliable, digital and dynamic tool.

The fourth chpter contains an exhaustive list of recommendations and proposals with detailed description, rationale and assessment of CO_2e emissions reduction. To develop recommendations, all participants were divided into five working groups, each of which specializes in separate areas of the construction industry:

1. energy renovation of existing buildings;

2 . reduce CO_2 emissions from operation of buildings;

3 . design and the CO_2 content of materials in buildings;

4 . reduce CO_2 emissions at the building site;

5 . reduce CO_2 emissions in the civil engineering sector;

Calculations of proposals GHG emissions reduction effects are based on officia statistics from the Danish Energy Agency and Statistics Denmark. In cases where it was impossible to rely on officia statistical sources, the experience of implementing climate initiatives by individual enterprises was taken as the basis for estimation, then scaled to the size of the industry.

Working group "Energy renovation of existing buildings" presented 14 initiatives that the industry undertakes to implement together with society and the Government in order to reduce GHG emissions. They include: lower heat consumption by 10%; reconstruct 120,000 energy-efficien social housing units; public investment in heat savings to reduce energy consumption for heating in municipal buildings; develop package solutions for energy renovation for homeowners; make energy label an active tool for energy savings; introduce clear requirements for energy efficienc in building regulations; improve methodology to assess CO_2 emissions reduction; increase energy label requirements in case of lease buildings; exempt all energy related construction work from the construction spending cap for municipal energy saving; introduce green tax credits and/or other fiscal incentives for building renovations; introduce a climate component into the real estate tax; maintaining the role of the Building Damage Fund in relation to implementing energy effective measu es of privately owned multi storey homes.

The working group "Reduce CO_2 emissions from operation of buildings" also presented 14 initiatives to reduce GHG emissions in the industry by 2.5 million tons. These initiatives include:

— replace natural gas with non-fossil fuel for heating;

— introduce intelligent management of energy consumption in buildings, in particular through automatic control of lighting, ventilation and heating or more integrated systems such as "smart home";

— replace oil boilers with green alternatives, directly obliging owners to do so and prohibiting installation of new fossil fuel boilers;

— optimize heat pumps by improving the requirements for their installation and maintenance;

— ease bureaucratic burden and improve financing models for building renovation;

— strengthen possibilities for internal use of excess heat;

— create easier access to energy data, in particular data on energy consumption to make it possible to develop more effective solutions on its optimization

— strengthen ongoing service of buildings because energy consumption of buildings increases over time if the technical installations are not maintained;

— use buildings to storage energy from renewables and balance its consumption;

— remove regulatory barriers that complicate the development of alternative energy sources;

— adjust tariff structure and payment of electricity, gas and district heating to support flexible consumption and implementation of ene gy-efficient meas es;

— adapt building regulations to green transition requirements and strengthen compliance. The rules of the construction industry must ensure low carbon footprint and low energy consumption;

— focus on overall economy because construction and renovation are completed with the focus on the lowest possible construction price and not on long-term operating efficiency and climate impac

— introduce pilot projects to improve energy efficienc in public and social housing sector, making them to lead the way for the private sector.

Working group "Design and the CO_2 content of materials in buildings" developed 20 initiatives that will reduce CO_2 emissions by 1.13 million tons by 2030. 4/5 of this reduction is expected to be achieved through industry-wide adoption of best sustainable development practices, namely life cycle analysis at all stages of construction. For this, must set CO_2 targets for the total construction during its useful life in connection with tenders and make demands for the use of LCA calculations in order to document compliance with the demands. This is made visible in climate accounts which are also an element of the requirements of the tender material.

The working group also emphasized the need to include new climate requirements at the stage of designing buildings and planning construction process. This should help builders avoid equipment overloads and excess waste, plan optimal logistics on construction sites, choose materials with a minimal carbon footprint. In turn, it requires reliable and transparent data on carbon footprint of building materials. Builders must be able to trace all stages of production of these materials using environmental declarations and material passports.

The working group "Reduce CO_2 emissions at the building site" developed six initiatives aimed at reducing GHG emissions by 850,000 tons. These initiatives are:

— equip construction sites with electricity and district heating to make it possible to convert machines and dehumidification into CO2 neut al propellants;

— obtain CO_2 neutral dehumidification and heating by

- demanding heating and dehumidification by means of electricity or district heating;
- placing isolated site accommodation in clusters to be heated with heat pumps;
- using concrete elements which have been dehu-midified and concrete types with a smaller water content;
- covering constructions so that they are not ex-posed to precipitation thus needing subsequent dehumidification
- demanding permanent or isolated windows and doors before dehumidification
- planning dehydration outside the winter season and close shells in the winter;
- create incentives for savings, such as payment of energy consumption at the building site.
- use small fossil-free production equipment at the building site. That will require a strategy for an implementation of CO_2 neutral propellants, including taxes;
- facilitate recycling and reusing on building sites (about 7-15% of the total material consumption in building sites ends up as waste) so that it becomes easy to sort for recycling and promote a circular economy;

— optimize planning and layout of the building site.

The working group "Reduce CO_2 emissions in the civil engineering sector" presented

17 recommendations, the potential of which is estimated at 683 thousand tons of GHG emission reduction by 2030. Key initiatives are:

— use fossil fuel and emission-free plant machinery. The development must be driven by requirements in tender material from the government and municipalities for fossil-free and emission-free construction work;

— transit to electric vehicles on the roads. The gradual replacement of the car fleet can be made on an ongoing basis from 2021 and be concluded in 2030 when the technological development is expected to render it possible to also convert the largest vehicles to the effect that all diesel and petrol-powered vehicles will be phased out;

— use climate-friendly asphalt. It reduces the rolling friction of the road and hence reduces the CO_2 emission from the road traffic due to savings of the quantity of fuel;

— resort to digital solutions, robots, additive manufacturing, digital twins, etc.

Finally, the annex of the Climate Partnership report contains a summarized list of all recommendations and proposals elaborated by the partnership, as well as effects on reducing GHG emissions. This list is reflected in Annex .

CHAPTER 4. CONCEPT OF CLIMATE PLATFORM

On July 30, 2021, the Government of Ukraine approved a new climate goal (updated / second nationally determined contribution) to reduce GHG emissions in Ukraine by 65% by 2030 compared to 1990. At the same time, the Ministry of Environmental Protection and Natural Resources of Ukraine was instructed to develop and approve in a six-month period an action plan for implementation of NDC-2. This action plan must include:

— a road map defining key technological, organizational and regulatory transformations necessary to achieve new climate goal;

— a concept of attracting finances from state budget, private investors and creditors to reach NDC-2 goals;

— the concept of assessing the compliance of projects and programs financed from the state and local budgets with the climate goals defined in NDC- .

The primary tables developed by the Ministry of Environmental Protection and Natural Resources for collecting information on measures for NDC-2 implementation clearly indicate that the Government decided to rely primarily on interdepartmental cooperation among the bodies of executive power and interaction with experts, while business community is expected to be an observer and executor of state programs developed by authorities to promote green technologies in electricity and heating. A ready-made list of transformations and measures in seven sectors is scheduled to be submitted for public discussion. These sectors are:

— electricity and heat;
— energy supply;
— industry;
— transport;
— buildings;
— agriculture;
— waste;
— land use and forestry.

Such an approach alienates private sector from climate policy, makes business community and civil society skeptical to Government's climate initiatives and there-

fore will rather slow down real decisions and steps towards green transition, and lead to Ukraine's non-compliance with NDC-2 deadlines.

It should be noted that as of July 2022, the time frame set by the Government to develop action plan for implementation of NDC-2 has obviously not been met. This provides an opportunity to reorganize the process of preparing this plan, correcting its key shortcomings in the field of public-private partnership and interaction between the state, business and civil society. It is considered expedient to urgently apply the key principles of Danish experience of all stakeholders' cooperation to implement green transition, namely, to create a system of sectoral climate partnerships that will unite business, authorities and experts in order to discuss and elaborate road maps, grassroots initiatives and recommendations on decarbonization of economy.

The Federation of Employers of Ukraine as the most influential business association representing the largest sectors of national economy (iron and steel, machinery, chemical industry, defense, food and agriculture, textile and apparel, IT, media, energy, pharmaceutical production and microbiology, construction, transport, logistics, infrastructure, retail, tourism, utilities, services, etc.), has sufficien potential to become the basis for establishing a public-private partnership on green transition issues. For this reasons, it's advisable to establish a climate platform.

The climate platform of FEU is a floor for discussion, planning and preparation of the most effective strategic mechanisms for green transition of Ukraine's economy, while ensuring the interests of business, the state and society as a whole. At the stage of developing an action plan for implementation of NDC-2, the climate platform should function as a secretariat for sectoral climate partnerships (similar to Confederation of Danish Industry (DI) in Denmark's climate partnerships). Unlike Danish experience, where the Government itself acted as initiator of establishing climate partnerships and appointed their heads, in Ukraine grassroots initiatives of business associations are considered necessary. With this in mind, the functions of the FEU Climate Platform as an organizer and *secretariat* of sectoral climate partnerships should be:

— carrying out an information and consulting campaign among FEU members regarding challenges related to Ukraine's climate commitments and global (primarily European) trends in climate policy with the aim of the largest possible, consolidated inclusion of domestic business community in preparation of decarbonization agenda;

— advocacy of businesses in climate dialogue with the government: entrepreneurs are primarily interested in maintaining competitiveness in the process of green transition, they are most familiar with the latest technological solutions and know-how for decarbonization in their industries, and, like no one else, are able to give a clear assessment of resource and time costs for their implementation. Therefore, businesses should have the right to develop road maps for achieving sectoral climate goals, which the Government should listen to;

— involvement of experts, including foreign experts, whose experience is based on effective measures actually implemented in the field of consulting, accounting and auditing, economic analysis and modeling to assist entrepreneurs in calculating their current carbon footprint, developing new business models and preparing investment projects, designed to reduce GHG emissions. Among other things, this will give the private sector an opportunity to determine which share of costs and at what stage can be carried out by business at its own expense, and where support from the state and/or international donors will be needed. It will also help justify specific decarbonization measures through the assessment of their economic, social and environmental effects at all levels

— drawing up reports and recommendations sectoral climate partnerships – bringing together the results of public-private discussions into coherent and meaningful action plans and standardized reports on achieving Ukraine's climate goals:

— analysis of GHG emissions by enterprises in the industry, summarization of key factors driving dynamics of GHG emissions in the industry, description and evaluation of industry's main achievements in the field of decarbonization

— presentation by enterprises of the industry of their own vision of green transition process by 2030 with an explanation of what technological, financial and regulatory means are needed to achieve climate goals;

— detailed presentation of business initiatives to reduce GHG emissions in specific production processes of the industry mentioning costs for implementation and including assessment of climate effects

— argumentation of regulatory, resource, organizational and other barriers on the way to achieving of industry's climate goals;

— proposals and recommendations for government on elimination of identified obstacles and on ensuring financial and other incentives for the industry on the way to a green transition.

Climate platform as a secretariat that organizes public-private partnership in green transition will provide business an opportunity to form an agenda for decarbonization of the Ukrainian economy, systematically influence the legislative and regulatory environment in this area; as well as provide authorities with clear guidelines regarding key obstacles to implementation of climate goals. This will help to agree on directions for overcoming relevant challenges, get an idea of the scope and prospects of the state's participation in financia and other business support in the implementation of green initiatives.

Since approaches to green transition are continuously developing, changing and modifying, the climate platform of FEU will also function as an *office* that monitors, ana-

lyzes and spreads information on current international and domestic events related to decarbonization of economy. Among main functions of the climate platform office the following should be highlighted:

— monitoring and analyzing international legislation (primarily, EU's one in the context of Ukraine's candidacy for membership) in the field of decarbonization, assessment of the potential impact of legislative changes on competitiveness, market access, etc.;

— study of approaches to taxation of GHG emissions in diffe ent countries and mechanisms of targeted using collected budget funds to stimulate green transition;

— monitoring of national legislation and regulatory initiatives in the field of decarbonization with prompt assessment of potential impact on the private sector and analysis of effectiveness in the context of achieving climate goals

— investigation of advanced business practices in the field of decarbonization: green business models; big data, artificial intelligence, digitalization; interactions with the public sector and international donors; the latest technological solutions and know-how on renewables, energy efficien , circular economy, etc.;

— development and publication of methodological materials on technical aspects of GHG emissions that assess economic effects of climate policies, in particular: norms for converting emissions of various greenhouse gases into the equivalent of carbon dioxide emissions; norms of GHG emissions from fossil fuels consumption (coal, gas, oil and petroleum products); assessment of the carbon footprint in goods and services; assessment and simulation of CBAM effects

— provision of consulting services on decarbonization and green transition;

— gathering and publication of other relevant information on climate policy and decarbonization.

Broad social consensus regarding the fight against climate change, coalitions to support green initiatives implementation, and communication with Western partners remain extremely important for Ukraine to ensure green transition. In this regard, the climate platform will also act as a *forum* for exchanging ideas and proposals, promoting climate ideas and building connections between all stakeholders. The main functions of the climate platform as a forum are considered to be:

— holding meetings, conferences, discussion clubs on green transition issues in order to increase environmental awareness of businesses and citizens, and

strengthen public demand for the implementation of systemic climate policy;

— presentation of successful practices on decarbonization in domestic and foreign companies, conducting factory tours to relevant enterprises, organization of experience exchange between FEU participants and foreign partners;

— organizing meetings between representatives of business, government and civil society to summarize interim results of keeping up with action plan for implementation of NDC-2, and to discuss changes and modifications into sectoral road maps that will inevitably be needed for further decarbonization.

For the greatest transparency possible and maximum spread of information about climate challenges and decarbonization of economy, it is also envisaged to create and support the officia website of the climate platform, where (in addition to general information about the essence, purpose and goals of the platform's operation) basic information about issues of green transition in Ukraine and the world, online events will be held, and their key results will be presented. The conceptual structure of the FEU Climate Platform is summarized in Annex C.

Lastly, it's necessary to determine the principles of public-private partnership under climate platform to make this project effectiv . Adherence to these principles will contribute to adoption of best practices in planning and implementing climate policy according to the Danish model. So, these principles include:

— purposefulness – climate partnerships and the climate platform must constantly keep in sight final goal of implementing the NDC-2 and intermediate goals of reducing GHG emissions. Achieving these goals will serve as a basic criterion for effectiveness of public-private partnership, as well as a roadmap for reforms;

— scientificit – international decarbonization experience serves as confirmation of various scientific hypotheses regarding the most effective and appropriate technologies of green transition, effective state support mechanisms, as well as business models at the level of individual enterprises. For FEU climate platform, it is necessary to rely on practice-tested tools and strategies to run decent climate policy;

— motivation – business must be involved in climate policy under such conditions that will motivate its active participation in projects to decarbonize the economy. To do this, it is necessary to develop a mechanism for supporting and stimulating green transition on the part of the government, to provide tools allowing private companies to maintain and strengthen competitiveness in domestic and foreign markets, contribute to creation of new jobs, etc.;

— reliability – any specific climate measure elaborated under PPP should be carried out on the basis of reliable facts (calculations, indicators, modeling, forecasts, etc.);

— systematicity – all steps of green transition must be consistent, non-contradictory and complement each other. Means, tools, mechanisms and algorithms for reduction of GHG emissions in all sectors should work as a whole and lead to achievement of the strategic goal of building a climate-neutral economy.

It is worth highlighting two components of the principle of systematicity: external and internal. The external systematicity means that a number of mechanisms to reach climate goals developed by climate platform will also become elements of achieving goals in a number of other spheres (economic, social, environmental, etc.). Therefore, they must take into account the broad context. In turn, the internal systematicity of the climate platform will be manifested in a clearly constructed structure of all its elements with mutual influences, levels, connections, subo dination, etc.

Obviously, compliance with the principle of systematicity will inevitably require establishment of official of the climate platform, as well as regulation of their duties, rights and responsibilities.

1. responsibility – participants of climate partnerships must be clearly aware of the consequences of adopting (or not adopting) certain decisions on decarbonization, while it is primarily about informal responsibility. Ignoring this principle will result in stakeholders' disinterest to actively and effectively move towards realizing the goals of the platform;

2. completeness – the climate partnerships activity should result in concrete initiatives from business and recommendations for authorities. All initiatives and recommendations should be aimed at solving specific tasks. Taking into account this principle will make it possible to avoid the common problem in domestic administration, when certain processes are implemented for the sake of processes, and not for the sake of results;

3. adaptability – PPP measures under climate platform should be adaptive in terms of their content and direction, i.e. able to change parameters depending on changes in operating environment, adjusted or clarified goals, new stakeholders involved, etc.;

4. information sufficien – effectiveness of decision-making is directly determined by sufficienc of necessary information, therefore the array of data on certain issues of green transition must be complete and free from biased, contradictory or redundant information;

5. feedback – authorities must respond to the initiatives and recommendations of entrepreneurs regarding implementation of climate goals, take them into account in legislative activities, provide reasonable explanations about impossibility or impracticality of implementing certain proposals, work on improving

road maps and recommendations together with private sector and civil society;

6 . continuity – the scale of the tasks on the way to achieving the NDC-2 goals is so big that the FEU climate platform will have to work on a continuous basis to achieve them in 2030;

7 . comprehensibility – the activity of the platform must be highlighted in a clear and understandable way, for which it is necessary to inform stakeholders and public about current achievements, hold press-conferences and/or round tables with presentation of intermediate results, etc.;

8 . competence – climate platform functioning should be carried out exclusively by specialists and official competent in the relevant issues, regardless of their level in the government or corporate hierarchy. It is considered appropriate to specify the limits of such competence in platform's statute and when establishing each climate partnership in particular;

9 . controllability – the platform's management must maintain controlling functions at all stages of its activity in case of deviations, problem areas, weaknesses to eliminate such deficiencies in a timely manner. For this, controllability must be permanent;

10 . cost-effectivenes – it is necessary to achieve a balance between environmental and economic benefits from climate partnerships and costs of maintaining the platform to make it possible to continue its operation when resources of international donors are exhausted;

11. uniformity – emphasizes the need to use a single methodology when creating a climate platform and defining the sphe es of its functioning;

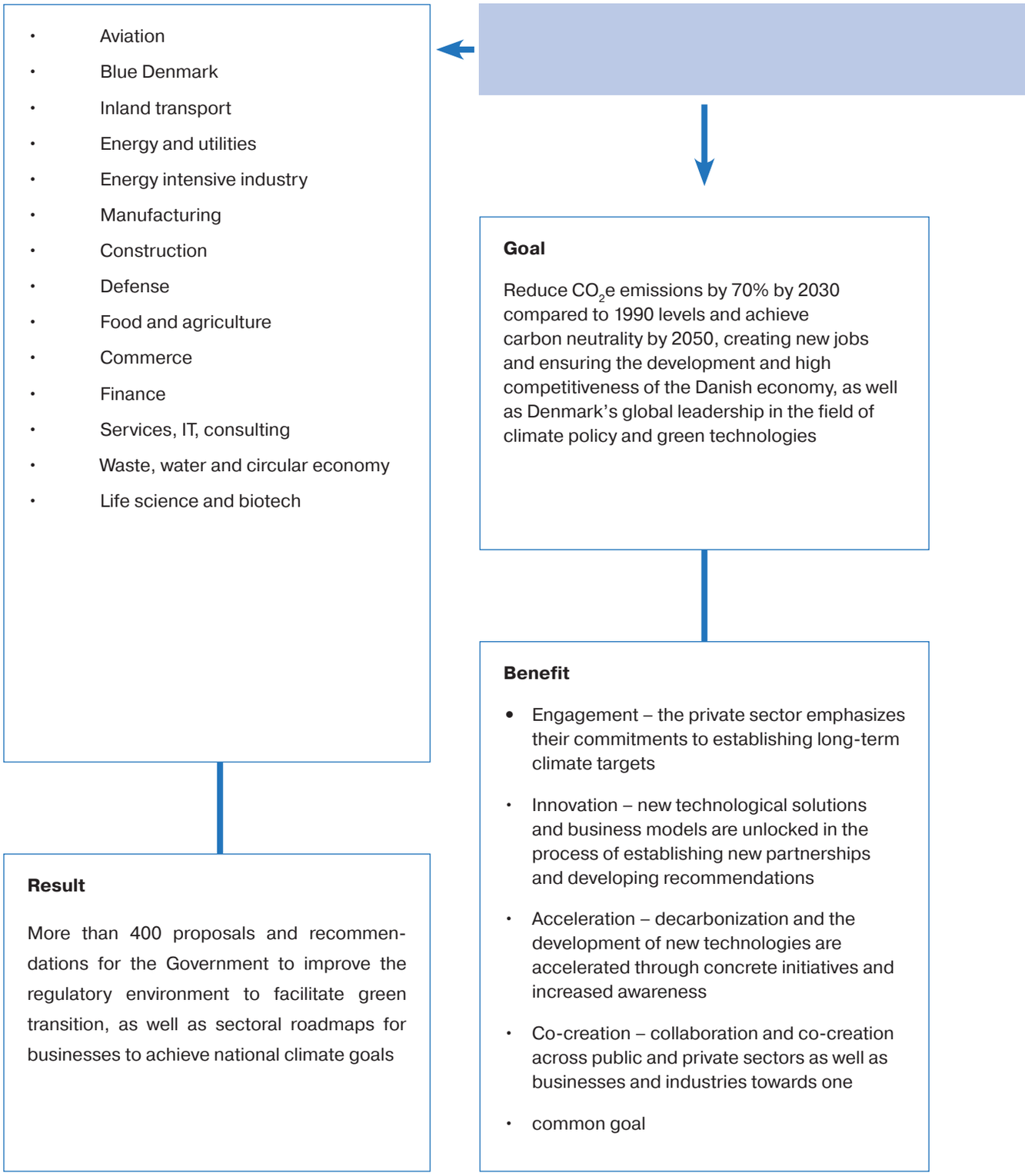
12 . consistency in time – all processes and measures implemented under FEU climate platform must take into account time limits, because ignoring time factor in a dynamic environment often leads to ineffectiveness, obsolescence and irrelevance of developed proposals;

13 . objectivity –decision-making in climate platform and partnerships should be built in such a way as to minimize the influence of one-sided, subjective views on prospects of decarbonization of the Ukrainian economy. When developing recommendations, it is necessary to objectively assess the existing situation, strengths and weaknesses of domestic economy, its resource limitations, etc.

ANNEXES

ANNEX A

Mechanism of public-private partnership in Danish climate policy



14 CLIMATE PARTNERSHIPS

Government incentives

- public procurement – almost all partnerships emphasized that public consumption should become one of the key drivers of Denmark's green transition
- venture investment and co-financing of climate projects – the state as a source of capital investments to reach climate goals
- tax reform –carbon tax optimization, reduction of taxes and tariffs on RES, tax inc ease on fossil fuels and cars running on fossil fuels
- financial suppo t for exports carried out by green transport – subsidies for maritime vessels running on RES
- direct subsidization– for producers of lorries running on renewables, in particular
- label requirements – mandatory indication of carbon footprint information on packages
- long-term funding for R&D
- promoting big data and AI for decarbonization purposes

Green transition technologies

- increasing energy efficien – reduction of energy consumption in industry and utilities
- electrificatio – replacing coal and natural gas with electricity
- generating electricity from RES – energy of solar, offsho e wind, energy islands in North and Baltic seas
- alternative fuels – biogas, biofuels, green hydrogen
- using biomass – to produce biofuels, fertilizers, and generate thermal energy at waste incineration plants
- power-to-X – technology of electricity conversion, energy storage, and reconversion pathways that use surplus electric power from RES
- Carbon capture, utilization and storage (CCUS)– capture of CO2 from large point sources, such as power generation or industrial facilities that use either fossil fuels or biomass as fuel.
- nitrification inhibito s – reduce nitrous oxide (NOx) emissions from manure and chemical fertilizers in agriculture

ANNEX B

Key initiatives of “Construction” climate partnership to reduce CO_2e emissions

№	Recommendations	CO2e reduction in tons
1	Phasing out natural gas for heating	1540000
2	Conversion of builders’ vehicles to being electrically powered	1055000
3	Dissemination of LCA and targets for CO2	608000
4	10% lower heat consumption	560000
5	Intelligent management of energy consumption	510000
6	Project-specific climate accounts in tende s	304000
7	Replacement of oil burners	280000
8	Fossil-free production equipment at the building site	275000
9	Reduce the material consumption and CO2 emission in the design	220000
10	Fewer materials and less waste	200000
11	Fossil fuel and emission-free plant machinery	177000
12	Transition to electric vehicles on the roads	162000
13	Use of new types of cement	146000
14	Optimized planning and layout at the building site	100000
15	CO2 free dehumidification and heatin	75000

№	Recommendations	CO2e reduction in tons
16	Optimization of heat pumps	70000
17	Renovation of technical installations	70000
18	Package solutions for energy renovations for homeowners	66000
19	120,000 energy-efficient social housing uni	61000
20	Climate-friendly asphalt	57000
21	Digital solutions: Robots, Additive Manufacturing and digital twins	50000
22	Public investments in heating savings	42000
23	The energy label must be an active tool for energy savings	Enabler
24	Electricity and district heating at the building site	Enabler
25	CO2 accounts for the building site	Enabler
26	Development of underlying data and systems	Enabler
27	Requirements of the building regulations and sustainability class from 2021 with a step-by-step tightening towards 2030, and development of technical common ownership	Enabler
Total		**5800000***

*Overall effect of educing GHG emissions is lower than the sum of individual effects, as the effects of individual initiatives overla .

ANNEX C

The Concept of Climate Platform of Federation of Employers of Ukraine

Goal

Effectively integ ate Ukrainian business into modern climate trends, using the green transition as a means of modernization, creating new jobs and increasing the international competitiveness of the domestic economy

SECRETARIAT
of sectoral climate partnerships

Priorities

- development of public-private partnership in the elaboration and implementation of climate policy;
- development and implementation of a comprehensive state support mechanism for business to stimulate decarbonization;
- establishment of cooperation with international donors and partners on ecology and climate issues;
- ensuring Ukraine's fulfillment of international climate obligations (Nationally Determined Contribution) and adaptation to the latest environmental trends of the European Green Deal

Organizes the work of sectoral climate partnerships with the involvement of business and state representatives to draw up road maps for the implementation of Ukraine's climate goals:

- conducts an active information campaign among FEU members for the consolidated involvement of Ukrainian business in the formation of the green transition agenda;
- advocates the position and interests of business in the climate dialogue with the government;
- engages experts in the field of consulting, accounting and auditing, economic analysis and modeling to assist business in calculating the carbon footprint, developing business models and preparing investment projects designed to reduce GHG emissions;
- processes report and recommendations of climate partnerships, summarizing them into meaningful action plans for the implementation of Ukraine's climate goals according to a unified p esentation structure (analysis of greenhouse gas emissions, proposals and recommendations for decarbonization, etc.)

CLIMATE PLATFORM
FEDERATION OF EMPLOYERS OF UKRAINE

OFFICE
of climate platform

Monitors, analyzes and spreads information about current international and domestic events in the field of climate policy

- monitors and analyzes international and national legislation in the field of decarbonization of the economy;
- investigates approaches to taxation of GHG emissions and mechanisms for the targeted use of tax revenues to stimulate the green transition;
- researches the latest management practices, technologies and know-how, and mechanisms of cooperation with donors in the field of decarbonization;
- prepares methodological materials disclosing the technical aspects of GHG emissions (GHG emission standards, carbon footprint assessment, CBAM calculation, etc.);
- provides other consulting services on climate issues

FORUM
of climate platform

Contributes to the formation of a broad public consensus on climate change, builds coalitions in support of green initiatives, establishes communications with foreign partners:

- conducts meetings, conferences, public discussions on green transition issues;
- presents successful decarbonization practices in Ukrainian and international companies;
- organizes meetings between businesses, government and civil society to summarize the interim results of the implementation of the Nationally Determined Contribution under the Paris Agreement;
- maintains the official web page of the climat platform, where it publishes the main results of its activities

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