

BULGARIA'S CLIMATE CHALLENGE

Aligning Science, Policy & Business



Acknowledgments

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Foreword

Climate change is not just one problem among many others – it is the greatest modern challenge facing humanity, as it threatens the natural foundations of our life, and, if we cannot limit global temperature increase to 1.5° C by 2100 r. above pre-industrial levels, there will be dramatic consequences: environmental, economic and social.

We know the reasons the climate is changing: first and foremost, the use of fossil fuels to generate energy, which leads to increased emissions of carbon dioxide and leads to a greenhouse effect. Methane and nitrous oxide, emitted from fertilizers, rice cultivation and livestock also contribute. Deforestation, especially of tropical regions, reinforces the effect.

We know the goals we must achieve: by 2030 greenhouse gas emissions must be reduced drastically; a prerequisite is that a very high share of our energy needs must be met by renewable energy. Our agriculture and forestry must become more sustainable and tropical deforestation must be stopped.

However, even if we achieve all these goals, climate change cannot be fully stopped, so society's defensive strength must be raised and adaptation plans must be elaborated and updated.

Economically strong countries must set an example for the process and the European Union is doing all it can to justify the confidence it is entrusted with as a climate leader. For example, the EU has presented a plan to cut its emissions by 55% by 2030, and by 2050 Europe must be a climate-neutral continent. The European Union has put in motion a comprehensive package for limiting climate change: the Green Deal, the European Climate Law, the "Fit for 55" Package, the EU Climate Adaptation Strategy, the EU Emissions Trading Scheme and the Social Climate Fund are the most important ones.

Internationally, the EU will demand systematic implementation of the Paris Climate Agreement, as without this, the climate goal cannot be reached.

If we limit climate change intelligently, there will not be losses of jobs and prosperity, but we will rekindle growth through innovative investments, which do not threaten the environment, enhance quality of life and generate economic growth and new jobs.

Christian Democrats are aware of our responsibility for life on Earth, which is why the Konrad-Adenauer Foundation advocates globally and in Bulgaria for concerted climate action.

Thorsten Geissler,
Director, Sofia Office, Konrad Adenauer-Stiftung

Nature is our support system. Our life, health, way of life, economic development and technological progress depend on our understanding and relationship with the natural processes. Ecosystems provide the air we breathe, the water we drink, the food we eat, the clothes we wear and the resources, which power the economy.

At present we face two enormous challenges – the climate crisis and the biodiversity loss crisis. The climate crisis has focused the attention of politicians and the public, but the connected biodiversity crisis, albeit less visible, is no less urgent and acute. According to WWF's 2020 Living Planet report, we have lost more than 2/3 of the wild vertebrate species populations since 1970, and in the same period we lose around 4% of the populations of fish, reptiles and amphibians annually. At the same time, the warming caused by our greenhouse gas emissions have warmed the planet by 1.2 degrees Celsius, contributing to these losses and their economic impact. Deforestation and forest loss globally is a main factor for both crises and is responsible for one tenth of the emitted CO₂.

Vesselina Kavrakova
CEO
WWF Bulgaria

The need to stabilize the climate and the need to conserve ecosystems and biodiversity are the two sides of the same problem. Actions to address this need must be common and connected. Functioning forests, oceans and wetlands absorb carbon and help adapt ecosystems and communities. As we reorganize our economies, production, consumption and lifestyles to eliminate emissions, we must not forget that natural systems are our best ally against climate change. If we protect the remaining key ecosystems, restore them where possible and manage them properly, we will mitigate warming and cope better with its local impacts.

At WWF we are actively working to achieve this. We help countries and local authorities to develop ecosystem-based climate solutions and we support companies in setting and implementing science-based targets for reducing emissions.

In this report, together with Konrad Adenauer-Stiftung, we demonstrate how solving the climate crisis can be a uniting challenge for science, policy and business. We face three critical objective - protecting ecosystems, stabilizing the climate and creating a climate-neutral, circular and thriving economy in Bulgaria. We can only do this uniting forces with nature, of which we are a part.

Introduction:

Bulgaria is at a climate crossroads

Bulgaria is at a climate crossroads. In 2021, the Covid-19 pandemic continues to demonstrate the imperfections and vulnerabilities of the social and economic systems, whose functioning, until recently, we took for granted. This crisis is a prelude to the greater current and future crisis of a warming planet.

The science is unambiguous: the world is warming. More than 1.2 degrees of global warming since the pre-industrial period, already seriously strain food and water resources, productivity and trade, national security and jobs, the educational, career and health prospects for young people in Bulgaria, the EU and the world. Acting on the climate emergency and protecting our planet's fragile ecosystems is not "left" or "right", "liberal" or "conservative" policy – it is simply good common sense.

Alas, in 2021, the climate crisis is no longer unseen – we see record heat waves, unprecedented floods and other meteorological extremes, made overwhelmingly more probable by human greenhouse gas emissions.

This is a dangerous crossroads – we have entered an age of climate emergency and if we do not act fast, we face great loss of life, human suffering, destruction of biodiversity and incalculable economic costs. Bulgaria will be affected, and in order to avoid the worst impacts, we need:

- › **Science and Education** – climate science must be understood, taught to students and adults, and used by policymakers to set science-based climate goals for the EU and Bulgaria.
- › **Policy and Regulation** – the new "Fit for 55" EU legislative package, proposed on 14 July 2021, will mean wide-ranging transformations in our economy. As industries race to zero carbon, national policies must follow.
- › **Business and Innovation** – we need the energy, skills and resolve of Bulgarian entrepreneurs, working on technology and social innovations.

"The danger of global warming is as yet unseen, but real enough for us to make changes and sacrifices, so that we do not live at the expense of future generations."

Margaret Thatcher, 1990

"We do not have a moment to waste on fighting climate change. The faster Europe moves, the greater the advantage for our citizens, our competitiveness and our prosperity."

Ursula von der Leyen, 2021



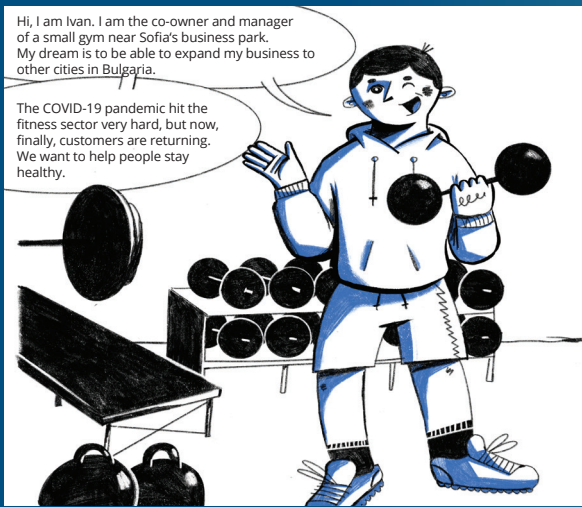
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Science

Climate Conversation Meet Ivan and Nelly

To start our conversation, we have invited **two protagonists – Ivan and Nelly**. Ivan and Nelly are not real, but you might know people who are just like them – **asking questions, expressing concerns**

and, most importantly, sharing ideas. Their questions, concerns and ideas are what we need to move our climate conversation forward! Please share this report with others like Ivan and Nelly!



The science of Climate Change

Scientists have known that CO₂ and other greenhouse gases heat the planet since **1826**, when the famous French mathematician Joseph Fourier discovered the greenhouse effect. In **1895** Swedish chemist Svante Arrhenius calculated that combustion of coal from human industry is increasing global CO₂ concentrations and contributing to global warming. US physicist Charles David Keeling started instrumental measurements of CO₂ increases in 1958. CO₂ concentrations in atmosphere (measured as **parts per million – ppm**) have been rising steadily. Every year humankind emits approximately **40 billion tons of CO₂**, which raises concentrations by about 2ppm. In May 2021, the global concentration of CO₂ peaked near **420 parts per million (ppm)**, higher than it has been **during the last 4 million years**. The global surface temperature of the Earth has risen by **1.2°C since the 1800s**, with most of the warming since 1950.

Scientists are certain that the extra CO₂ is **from fossil fuel and deforestation**, as well as two other greenhouse gases – **methane CH₄ and nitrous oxide N₂O**, also emitted by human activities, such as **oil and gas drilling and agriculture**, are heating the planet. We can now observe the emissions from power plants, oil fields, factories and roads in real time from space, thanks to the **European Space Agency’s Copernicus satellites**. We know there are no natural sources of CO₂ or other greenhouse gases, on a comparable scale to human emissions. While the Earth is subject to cycles of global warming and cooling, caused by natural processes, such as solar activity and orbital cycles, the scientists are confident the current warming is not caused by natural factors – **see next page**.



Learn the important climate change facts scientists agree on:



Source: UNEP.org

Find out more about greenhouse gases and their concentrations:



Source: Copernicus

Climate Conversation

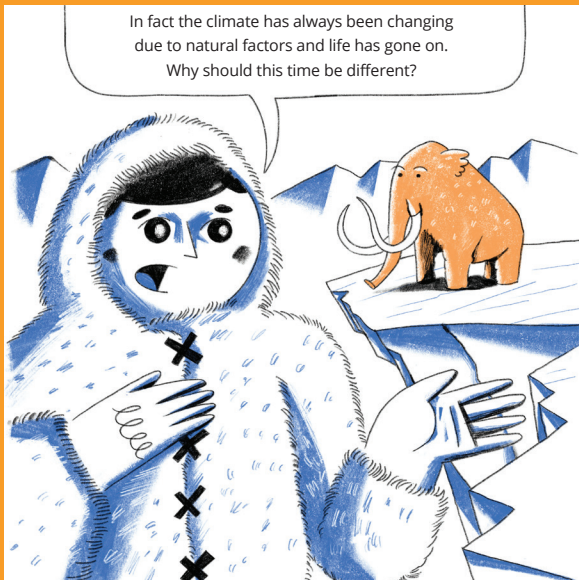
Climate Change Myths



It is true that long-term variability in the Earth's climate depends on solar activity variations and on periodic changes in our planet's orbit, which cause Ice Ages and are known as Milankovitch cycles. Solar activity had been increasing from 1750 to 1980, but this effect is 50 times weaker than that of CO₂ emissions. Since 1980 solar activity has decreased, while the Earth has kept warming, due to human CO₂ emissions. Our current position in the Earth's orbital cycles is not responsible for any recent warming.



Source: NASA.gov



Previous natural rapid changes in climate have often led to mass extinctions of life, as in the PETM event 55 million years ago when a 5 degree rise in temperature over thousands of years led to a big extinction of oceanic species. The current anthropogenic rise in CO₂ and global temperatures happens tens of times faster than natural climate change and threatens a new extinction event and our civilization, whose agriculture depends on a stable climate.



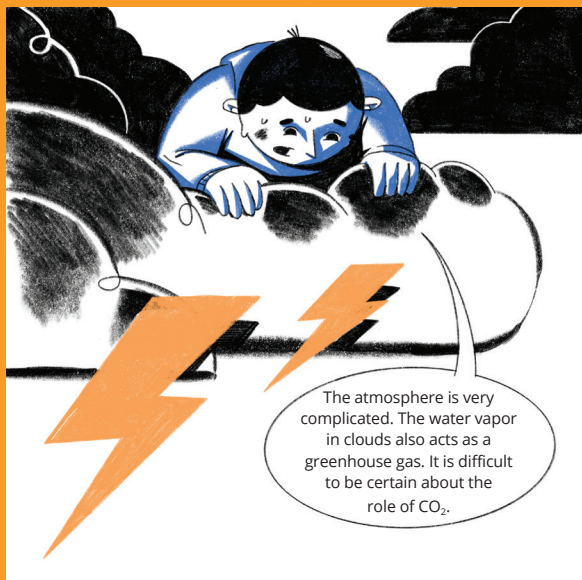
Source: Carbon Brief



Volcanic eruptions emit CO₂ and other gases into the atmosphere, which can alter the climate. However, humans are now emitting 40-100 times more CO₂ than all volcanoes on the planet. The biggest volcanic eruptions in the last decades only emitted as much CO₂ as humankind emits in a few hours. In fact, humans emit as much CO₂ in 10 years, as the most catastrophic eruptions and meteor impacts in the Earth's history.



Source: Phys.org



Clouds are formed out of water vapor and have a dual climate effect – they both absorb heat and block sunlight. Water vapor is a short-lived gas and does not accumulate in the atmosphere. Humans continue to add CO₂ and other long-lived greenhouse gases, which remain in the atmosphere for decades or centuries, causing excess warming.



Source: ACS.org

There are many climate myths. Explore 10 of them with WWF:



Source: WWF UK

Limiting the Warming to 1.5°C

According to current scientific estimates, if greenhouse gas emissions continue at present levels, the planet will warm by approximately 2.7°C by 2100. This level of warming would be catastrophic for the human society, economy and natural ecosystems – in fact, scientists think that any warming above 1.5°C will likely cause irreversible damage, such as the **dying back of the Amazon rainforest and coral reefs, and complete melting of all Arctic ice in summer.**

Warming of only **1.5 to 2°C** would mean between **700 million and 2 billion people** could be exposed to extreme heat, similar to the June 2021 extreme heat wave in Canada and the USA. It would also significantly elevate the risks of **catastrophic floods, such as those in Germany in July 2021**, as warmer air can hold more moisture, so longer dry spells may be followed by destructive rains.

Beyond 1.5 degrees of warming many species will become extinct. Some are especially vulnerable – such as **amphibians** whose wetland habitats are shrinking due to drought and **marine crustaceans** living in warmer seas with higher CO₂ concentrations. In Europe, many **tree species**, not adapted to heat and pollinating insects, dependent on regular arrival of spring, are threatened.

Bulgaria is one of the countries in Europe, which would be severely affected by the impacts of global warming above 1.5°C. Under current emission projections, **Bulgaria will warm by 4.4°C by 2100. Rainfall will drop by more than 20%**, threatening the water supply of cities and agriculture. **Yields of wheat and maize, would decline by 20%**. By 2090, severe summer droughts will happen each year, while **once-in-50-year flooding events could quadruple** in number.



Find out how Earth's ecosystems and species are affected:



Source: WWF Intl.

Climate models predict an increase in air temperature in Bulgaria will rise by more than 2°C by 2050 with a as much as 4°C possible by 2100, if CO₂ emissions are not stopped. Heat waves, floods, wildfires and droughts may become the new normal.

Flooding already affects approximately 80 000 Bulgarians and causes damages around 350 million EUR every year, on average. By 2080, the risk of once-in-50-year floods events will double and could quadruple if greenhouse gas emissions are not stopped.

Week-long heatwaves are now common in the summer. By 2050 Bulgaria may experience months of temperatures over 30°C and more than 40 nights when the temperature stays above 20°C, greatly increasing heat strokes and heat stress.

Forest fires in Bulgaria have increased dramatically since 1990 to more than 1000 during a hot summer. High mountain forests are already under wildfire threat.

While extreme rains and floods will be more frequent, the total rainfall in the summer months will decrease between 10-20%, leading to prolonged droughts and a decrease in crop yields by more than 10%.

Explore climate change impacts in Europe:



Source: World Bank



Setting Science-Based Targets

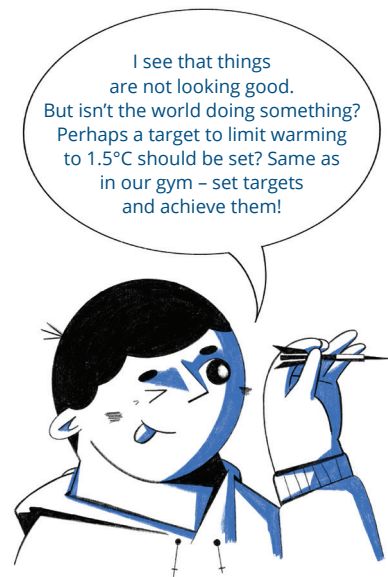
In response to the findings of scientists, and after more than 20 years of diplomatic negotiations, the **Paris Agreement was adopted in 2015**, setting a binding target of limiting global warming to “**well below 2°C, preferably 1.5 °C**”.

The Paris Agreement encourages nations like Bulgaria and economic blocks like the EU to submit their own **science-based and scientifically-verifiable** plans on how they can achieve **decarbonization** (reduction of CO₂ emissions).

The Paris Agreement is far from perfect and many nations are not setting and planning for sufficiently ambitious goals. According to UN scientists, compiling the data from all countries, the world needs to **halve its emissions by 2030, or emit no more than 25 billion tons of CO₂ equivalent** (accounting for the full combined greenhouse effect from CO₂ and other emitted greenhouse gases). **By 2050, the world must achieve net zero** – no net greenhouse gas emissions!

The world is far from meeting this goal. Current and planned national policies will still leave a “**gap**” of **extra 30 billion tons of emissions per year by 2030**.

To reduce this gap more countries should commit to halving their emissions by 2030 and eliminating them completely by 2050. **In 2021, the US pledged to net zero emissions by 2050 and China pledged net zero emissions by 2060**. Presently, the European Union has pledged to reduce its emissions by **55% by 2030 and become climate neutral by 2050**, although experts think it possible the EU could reduce emissions by 65% by 2030 and achieve neutrality by 2040!



Find out how the 2015 Paris Climate Agreement works:



Source: UNFCCC

Learn about the emissions gap we must close by 2030:



Source: UNEP



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Policy

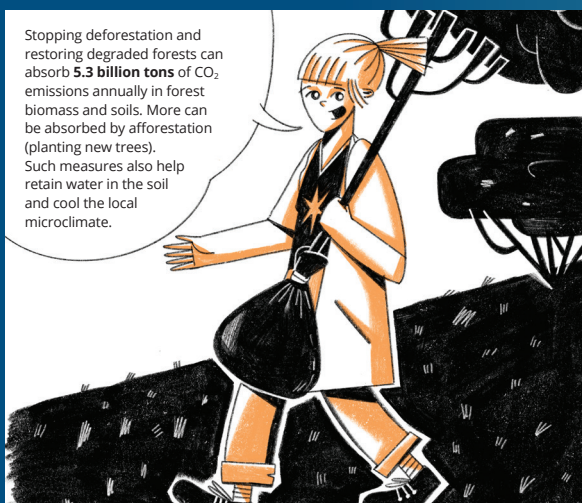
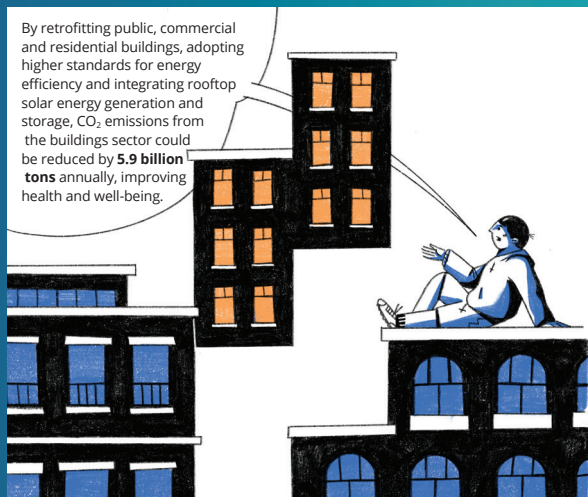
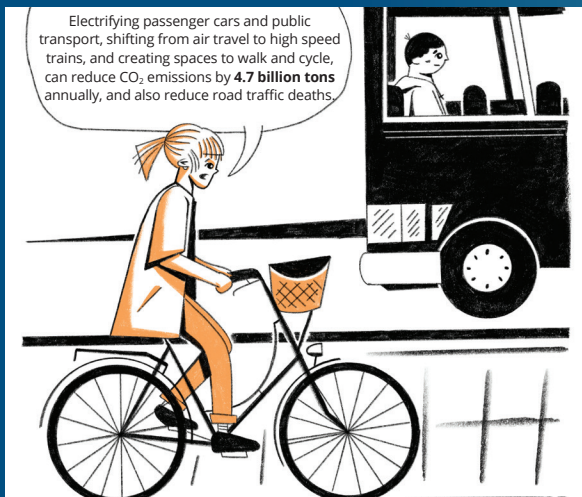
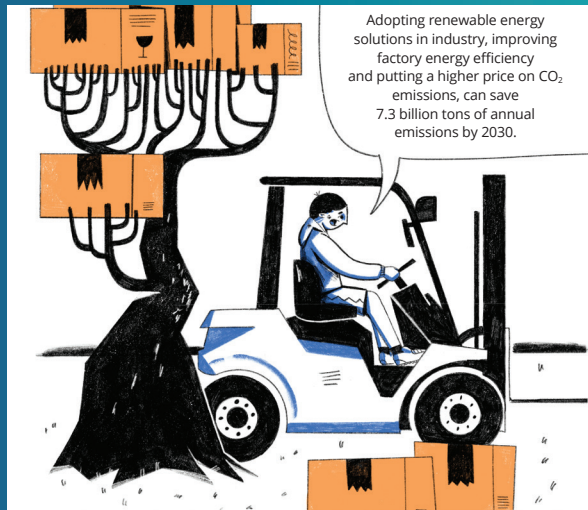
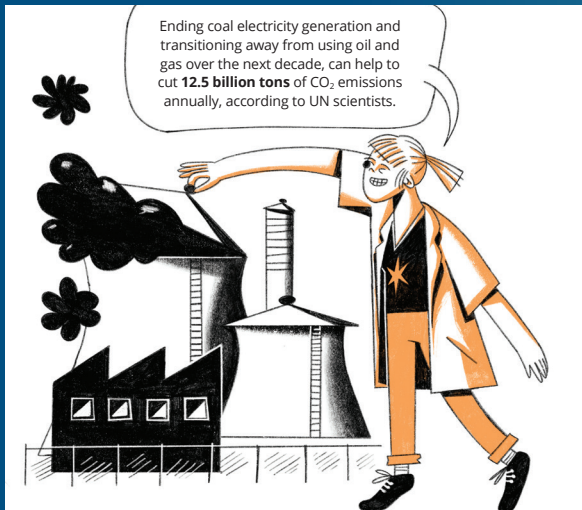
From Science to Policy

Learn More:



Source: UNEP

Explore 6 sectors where eliminating emissions is urgent:



EU Climate Change Policy

In **2019** the EU embarked on the new **European Green Deal (EGD)**, a policy initiative aimed to fulfill the EU's commitments under the 2015 Paris Agreement, by creating a **"climate neutral continent"** by 2050, **decoupling economic growth from resource use**, and ensuring a **just transition to a zero carbon economy, leaving no one behind**.

"The EU Green Deal is Europe's new growth strategy. A strategy where the environmental, economic and social sustainability go hand-in-hand."

Frans Timmermans,
EC Climate Commissioner

In **2021**, the European Green Deal entered its implementation stage. On June 28, a new **EU Climate Law** was adopted, setting a **55% CO₂ emissions target by 2030 and a net-zero emissions target by 2050**. On July 14, the European Commission proposed a "Fit for 55" policy package, including legislation update and new initiatives proposals on **climate and energy, transport, buildings, land use and forestry**.

The major policy reforms and investments, needed for implementing the European Green Deal are supported by two funding mechanisms – the **Recovery and Resilience Facility and the Just Transition Fund**. A new **EU Taxonomy** defines types of investments, which member states like Bulgaria can plan using the funds to meet the EGD goals.

EU Green Deal Building Block	Mechanism of Implementation	How this will support Bulgaria on climate
EU Climate Law & "Fit For 55 Package"	EU legislation setting 2030 and 2050 targets	Setting climate goals and rules for industry
Recovery & Resilience Facility	Funding for Climate Mitigation & Adaptation	€6.3 billion for Bulgaria, 37% for climate action
Just Transition Mechanisms	Economic Restructuring of Coal Regions	€1.3 billion to develop Bulgaria's coal regions

Climate Conversation

EU Green Deal Myths

The European Union is not acting alone – USA and China have also proclaimed ambitions for climate neutrality by 2050 and 2060. This competition is not a bad thing – provided it leads to international cooperation and real action. So far over 700 cities, 3000 companies and 600 higher education institutions have joined the “race to zero” that was announced by the UN in 2020.



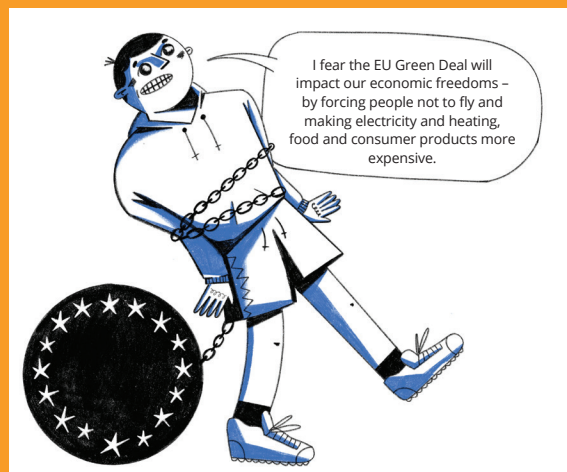
Source: UNFCCC



The EU Green Deal will not in any way jeopardize the basic freedoms, on which the European Union is built, including freedom of movement of citizens and goods. The Green Deal will reinforce EU's principles, including the Polluter Pays Principle, so aviation and shipping will have to bear some of the costs for their carbon emissions impacts. See a summary of the “Fit for 55” minimum tax rates for air, road and shipping fuels.



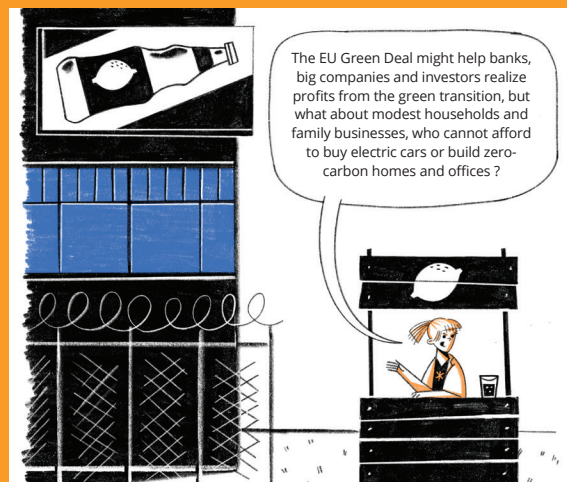
Source: EC



No one should be left behind, as the EU embarks on a green economy transition. The EU Green Deal “Fit for 55” package proposes a Social Climate Fund, which will compensate vulnerable households and small businesses that might be affected by the higher costs of energy. It will allow them to invest in green building retrofits, renewable energy systems and zero-emission vehicles.



Source: EC



The European Climate Law

On **28 June, 2021**, the European Council, under the Portuguese Presidency, adopted the **European Climate Law**, which legally binds the EU to become **climate-neutral** by 2050 and to **reduce greenhouse gas emissions by at least 55%** by 2030, compared to a baseline 1990 levels.

The ambition of the Climate Law is for the EU to actually absorb more greenhouse gas emissions than it emits after 2050, which can be achieved by **planting and restoring forests and wetlands, better land use management and agricultural practices**, which lock CO₂ in the land.

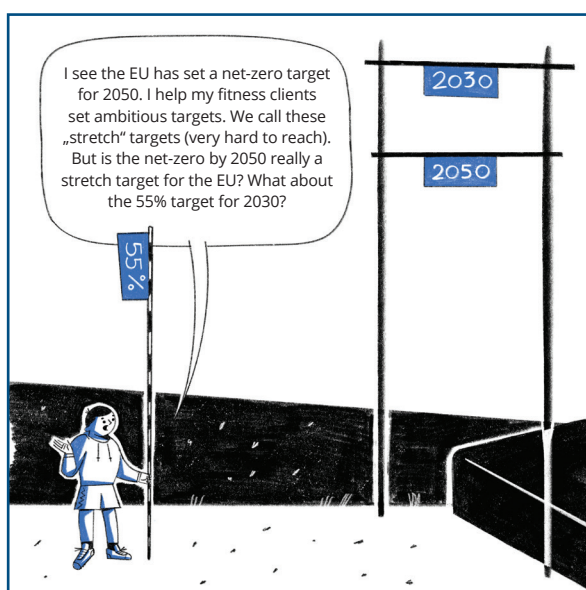
By 2030, the EU must cut fossil fuel use and remove **up to 310 million tons of CO₂**, in order to get to **55%**.

While the EU Climate Law does not mandate individual targets for EU member states, such targets have already been set by 2030 for some sectors by EU's **Emissions Trading Regulation** (see next page), and it is expected that **Bulgaria's low current ambition** (no net reductions by 2030) will

have to be revised upward, in accordance with new emissions projections. Sectoral decarbonization scenarios for 2050 will be elaborated and an intermediate 2040 target must be adopted, based on up-to-date science, as required by the new Law.

The EU Climate Law also sets up a **European Scientific Advisory Board on Climate Change** – a major step in integrating scientific knowledge and recommendations into policy. The Board will produce **data and reports on the effectiveness of EU climate action, the 2040 target and updates to the remaining EU carbon budget**, to fulfill the EU's 2050 obligations under the 2015 Paris Agreement.

In its initial response to the 2015 Paris Agreement, the EU had not set a 2050 climate neutrality target, and had a lower intermediate target for 2030: **40% greenhouse gas emission reductions**, against a 1990 baseline. However, the youth **climate strikes of 2019** spurred the EU to up its game. The EU Parliament voted for a **2030 goal of 60%**, and scientists think the EU **can achieve even 65%**!



Learn more:



Source: EC

“Fit for 55”: Renewable Energy

The “Fit for 55” package, proposed by the European Commission on July 14, 2021, contains a significant revision of the EU **Renewable Energy Directive**, the main policy instrument for energy transition. Currently, the EU has set a **2030 target for achieving 32% share of renewable energy sources (RES)** in the EU's final energy consumption mix (which includes electricity, as well as energy for transport, heating, cooling and industry). A new target of **40% RES by 2030** is now proposed, in line with the EU Climate Law's 55% target for reducing CO₂ emissions – **75% of which come from energy use**.

The EU's definition of RES sources includes **solar and wind energy, bioenergy, hydropower, geothermal energy and hydrogen gas**, produced by electrolysis, using RES electricity. Bulgaria is still a long way from being fully powered by renewable energy. As of **2021**, Bulgaria has a RES power generation capacity of **5.1 gigawatts (GW)**, including **1.1 GW** photovoltaic plants, **0.7 GW** wind turbines and **3.2 GW** hydropower plants. In 2019, Bulgaria generated **21.9%** of its final energy use from renewable sources, including

23.5% of its power, **35.5%** of its heat (due to households burning wood biomass), but only **7.9%** of the energy used in transport. Much more RES development is needed by 2030!

In its current **National Energy and Climate Plan**, Bulgaria plans to add **2.6 GW** renewable energy capacity by 2030, including **1.7 GW** financed by the **European Green Deal RRF Facility**. Bulgaria will need to revise its **Long-term Energy Strategy (LTS)** and **National Energy and Climate Plan (NECP)**, and its current low **2030 RES target of 27%**. New distributed RES generation and battery storage will allow residents and communities to become energy independent, save costs and inspire RES entrepreneurs.

Bulgaria plans to increase biomass heating by **44% by 2030** – **1.1 million** poor rural households already rely on inefficient wood burning to heat their homes, using **5.7 million m³** of wood (**87% of Bulgaria's wood harvest**) at the expense of forests. Bulgaria must use EU funding to **support its citizens to switch to energy-efficient and ecological heating options**.



Learn more:



Source: WWF CEE

“Fit for 55”: CO₂ Emission Trading

The **“Fit for 55”** package proposes a significant revision of **EU’s Emissions Trading System (ETS)**, set up in 2005 to allow **10,000 energy and industry facilities** to trade CO₂ emissions. The logic of the so called **“cap and trade” market model of the ETS**, is that the EU will achieve its decarbonization targets much cheaper if the power plants and factories, which can install upgrades and innovations to reduce their CO₂ emissions at a lower price can sell their unused CO₂ emissions to other plants and factories, which cannot lower their emissions cheaply.

In order for the system to work, the total number of CO₂ emissions allowances is limited (a **“cap”**), and the EU takes some out of the market (**approx. 2.2% each year**), raising the CO₂ price – now over **50 EUR per ton**. Over more than 15 years of operation, the EU ETS has shown that a market mechanism to allocate and reduce CO₂ emissions is possible – leading others, like the state of California in the USA, to introduce similar systems.

However, there have been significant criticisms of the EU ETS – namely that the progress of emissions

reduction is too slow, and that some sectors, which produce CO₂ emissions, like shipping and road transport (**aviation was included in 2012**), are excluded. One specific criticism by industry is that if factories are moved out of the EU (and jobs in the EU are lost!), they can import goods to the EU, without having to pay for their CO₂ emissions. This is known as **“carbon leakage”**.

The July 2021 “Fit for 55” proposal for **EU ETS Directive** revision, seeks to address these problems. **From 2025, shipping and road transport, as well as emissions from buildings**, will be included in the ETS. A **Carbon Border Adjustment Mechanism (CBAM)** will ensure **importers pay for their CO₂**.

Bulgaria will gain from the protection of the **CBAM Mechanism**, which will initially apply for **electricity, cement, steel, aluminum and fertilizers**. This will ensure fairness for Bulgarian producers of metals, fertilizers and cement. It will also **prevent importing electricity from coal from Turkey or the Western Balkans**, as domestic RES will be cheaper.



Learn more:



Source: EC

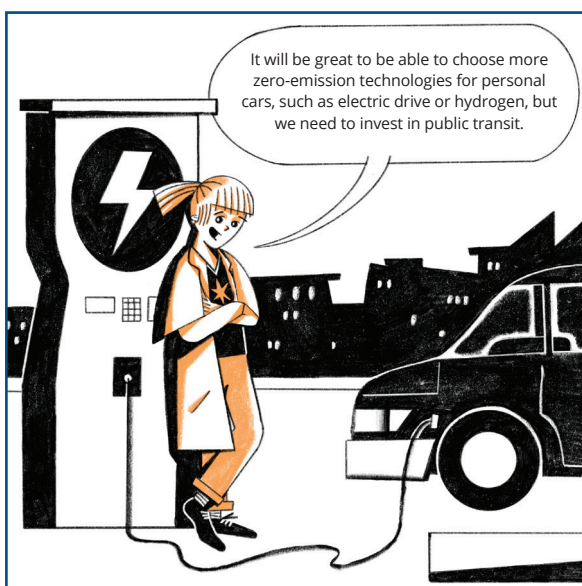
“Fit for 55”: Zero-emission mobility

Transport is currently the only sector in the EU where emissions are rising. The “Fit for 55” package proposes a major tightening of the CO₂ emission standards for new vehicles, to come into force in the 2030s. From 2030, all new cars and vans in the EU have to emit **55% less CO₂ than the current standards, and from 2035 they have to emit zero CO₂**. This essentially will mean that all new cars and vans after 2035 will be either **electric or will run on green hydrogen fuel from RES**.

Changing the EU automobile industry and ensuring that households will be able to afford the new zero-emission vehicles is no easy task. Similar to the coal power exit, it means that entire supply chains will have to disappear. There must be a **just transition** for auto workers who may lose their jobs. It also means that Bulgaria and other EU countries will have to invest in the infrastructure to charge and maintain the new zero-emission vehicles. The “Fit for 55” proposed revisions to the **EU Alternative Fuels Infrastructure Regulation** will mandate that all EU countries provide **electric charging points for every 60 km of road, and hydrogen stations for every 150 km**.

Zero-carbon mobility will also apply for inter-city public transit and cargo alternatives, notably for fuels used by **trucks, energy, aviation and shipping**. Trucks can use the new charging networks (with fast charging for electric ones), but aviation and ships will have to use green fuel blends including **biofuels, hydrogen and ammonia fuels**.

Bulgaria has one of the oldest car and van fleet in the European Union – with most vehicles failing to meet the existing Euro standards for carbon emissions and other pollutants. In 2019, **only 0.87% of newly registered cars were battery electric vehicles**. By 2035, this figure must reach 100%! The most efficient way to reduce CO₂ emissions from transportation is to encourage a “**modal shift**” – switching from high carbon modes of transport like aviation and personal cars to lowcarbon options like electric vehicles, trains and bicycles. **2021 is the EU year of rail**, encouraging Europeans to travel by train.



Learn more about EU rail travel:



Source: EC

“Fit for 55”: Agriculture and Forestry

The **Agriculture, Forestry and Other Land Use (AFOLU)** sector is one of the major sources of greenhouse gas (**CO₂**, **CH₄** and **N₂O**) emissions in the EU, but also an opportunity to absorb carbon in soils and biomass, as part of a **310 million ton CO₂ sink**, which is required by the **EU Climate Law**.

To this end, the “**Fit for 55**” package proposes that **climate-neutrality for this sector is achieved by 2035**, and negative emissions (or net removals) of CO₂ must be generated from 2036, using a certification system for sinks.

Furthermore, for the first time, non- CO₂ greenhouse gas emissions from agriculture – **mostly methane and nitrous oxide from fertilizers and livestock**, will be regulated using a system similar to the ETS, after 2031.

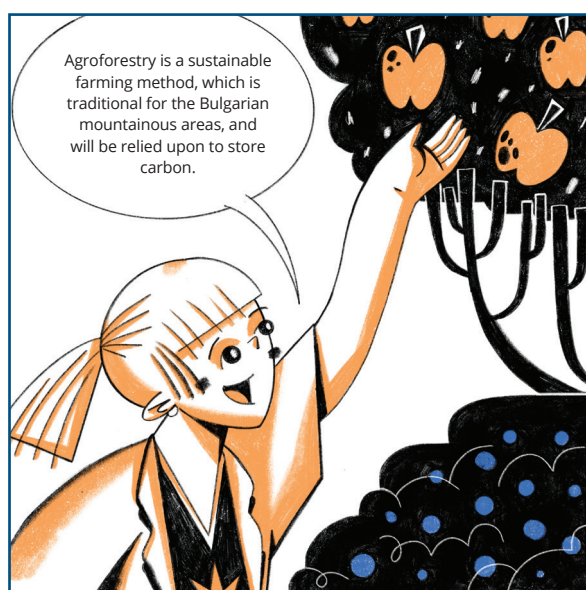
In the Forestry sector, the European Commission has developed a new **EU Forestry Strategy**, published on July 16, 2021. It affirming a broad “**cascading use of wood**” principle – meaning that wood in the European Union must be used for new durable products, which can store carbon from the

CO₂ emissions absorbed by trees and keep them locked in furniture or wood buildings, rather than using wood biomass as a fuel.

The Strategy also sets an ambitious vision for **afforestation**: planting new forests on barren or unused farmland in order to be used as CO₂ sinks. A total of **3 billion** new trees must be planted across the EU, raising the land area of forests, currently at **43%**.

Bulgaria is very well positioned to take advantage of new afforestation efforts, as it has diverse forest types and many abandoned lands, which can be used for planting trees. Care must be taken to protect Bulgarian **old growth forests**, which can store carbon in trees and soil for centuries.

Perhaps the biggest opportunity in the AFOLU sector are the sustainable practices of **agroforestry**. Using the same land to grow crops and trees, and manage livestock, allows land to serve as a CO₂ sink, while the farmers can produce food and forest products, and receive payments for the carbon storage.



Learn how innovative agroforestry is being developed in the EU:



Source: European Parliament



3

Business

The 3 Challenges of Climate Entrepreneurship

We have seen that climate science is unambiguous and the climate policy in the European Union is catching up. However, neither science nor policy can solve the climate crisis alone. To create a truly-climate neutral European continent, we need **unprecedented innovation** – not only in technology, but also in the way our society works for the well-being and prosperity and its citizens. Such technological and social innovation can only be delivered by a new generation of **daring and motivated climate entrepreneurs**, working together with researchers, policymakers and local communities.

In 2021 Bulgaria seems a long way off from realizing this dream. Bulgarian companies invest much less in research and development than their EU counterparts. SMEs cannot secure enough financing for transformational green projects. The educational system does not prioritize an entrepreneurial mindset, combined with STEM knowledge and business development skills.

Yet, there is much hope. As we have seen from examples in other countries, as well as by our own leading Bulgarian startup companies, every challenge can be overcome through sustained business and social entrepreneurship.

To make Bulgaria a climate-neutral economy by 2050, 3 such challenges need to be solved:

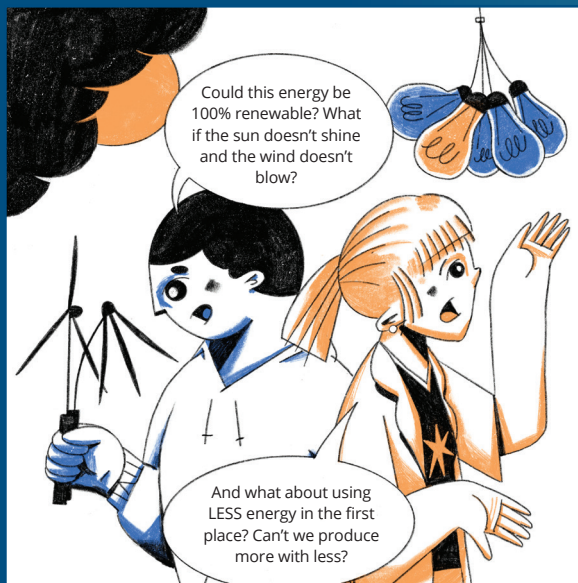
- 1. Producing and using renewable energy** – powering businesses, transport and buildings, using only **renewable sources of energy**.
- 2. Reusing and recycling everything** – all raw materials and products, saving greenhouse gas emissions and creating **circular value chains**.
- 3. Regenerating natural ecosystems** – bringing back nature on our farms and in cities, to absorb CO₂ and help us adapt to climate risks.



We will look at each of these challenges on the next pages to show what is possible, what goals should we set, where work needs to be done, and where Bulgarian business can lead.

Making Business Renewable

Any business – from a town bakery to a steelmaking plant, requires energy. When the energy is not available, machines – boilers, furnaces, motors, and conveyor belts, can't operate. When the electricity and fuels get expensive (like we see in the fall of 2021), costs for the business increase and it must raise the prices of its products or services. Thus, the Bulgarian economy needs both qualified and motivated workers, and reliable, affordable energy.



The Scale of the Challenge

Right now, the Bulgarian economy mostly depends on fossil fuels – coal for electricity, oil products for transport and gas for heating and industry.

In 2019, 39% of Bulgaria's electricity generation came from coal – some 28 million tons were mined in the country, mostly inefficient and polluting lignite.

The transport sector is the next biggest fossil fuel user, consuming 3,4 million tons of oil equivalent in 2019 – **gasoline, diesel, autogas and other fuels. Just 7.9% are biofuels, which are often unsustainably derived from food crops.**

Finally, heating residential buildings and providing heat for industry consumes fossil gas, which in Bulgaria is mostly imported from Russia – imports from Russia amounted to 2.7 million cubic meters of gas in 2019. Whole more than 1 million Bulgarian households use firewood for heating, expanding fossil gas use further would risk Bulgaria's energy independence.

Overall, Bulgaria has the biggest energy intensity of any EU member state, using almost 400 kilograms of oil equivalent for every 1000 EUR its economy generates. **We could do better – use less energy and create more value!**

Explore energy statistics in Bulgaria



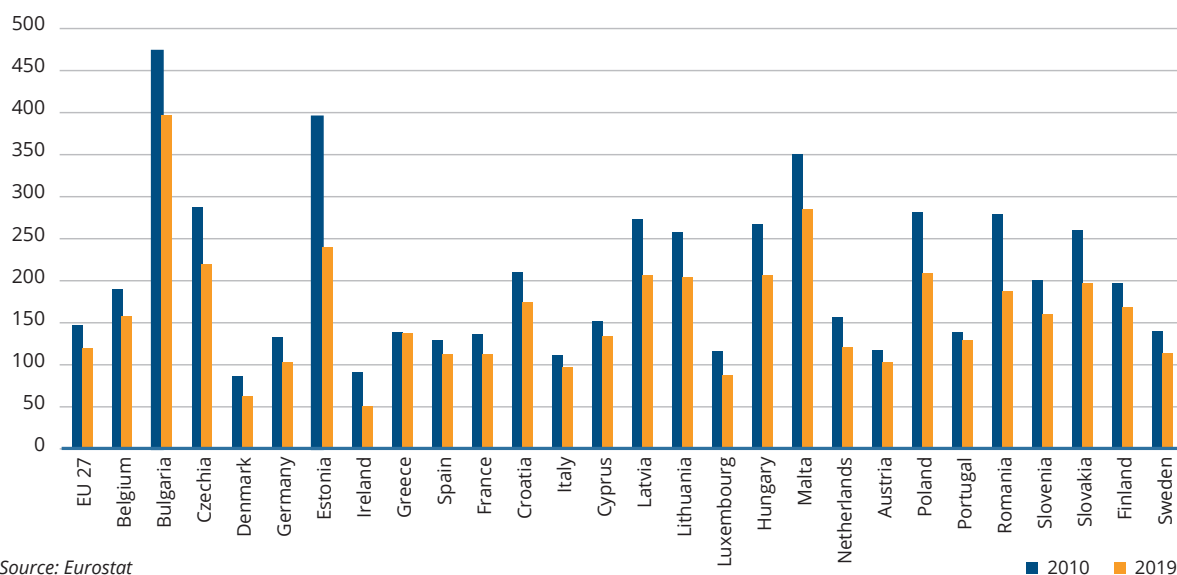
Source: NSI



Source: Eurostat

Energy intensity of the economy, in selected years (2010 and 2019)

Kilograms of oil equivalent (KGOE) per thousand euro



Source: Eurostat

What Solutions Are Needed?

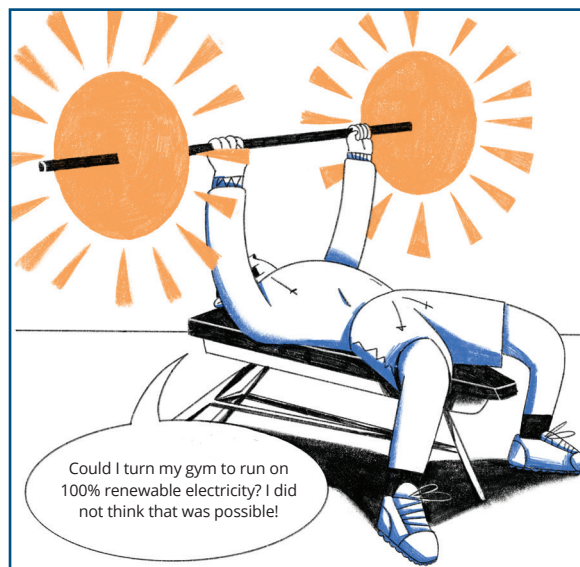
Bulgarian businesses should significantly increase their investments in solar power and other renewable electricity sources, zero-emission vehicle fleets and zero or even positive-energy production and office buildings. Every one of these investments will help businesses save costs and generate revenue.

Businesses can also help local communities, by supporting and participating in renewable energy cooperatives, providing EV charging points, and aiding energy retrofitting of public buildings, such as local schools and hospitals.

Being part of a community is at the heart of future energy and good business.

Electricity

Since July 2020, every Bulgarian business can purchase 100% renewable electricity from renewable energy suppliers on the Independent Bulgarian Energy Exchange (IBEX). This is smart, because with rising electricity costs, renewable energy sources – wind and solar – are becoming the cheapest power sources even in Bulgaria, although supply is limited. If fossil gas prices keep rising, more businesses will prefer green electricity for heat and power.



Source: Harmonica

The small organic milk and yoghurt production facility of Harmonica in Malo Buchino village near Sofia, switched to 100% renewable electricity supply in the summer of 2021. In the first 3 months, it saved 12 tons of CO₂ emissions from the electricity it uses, while saving money by switching away from the default electricity supplier.



Learn more:

The next logical step is building an own installation for producing renewable electricity from the sun. To achieve bigger gains and efficiencies companies and citizens may team together.

For example, several firms and multiple citizens could buy or lease a 1 ha (100 x 100 m) plot of unused land – such as old factory buildings or parking lots and install up to 1 MWp of PV panels for approx. 500 000 EUR at 2021 prices. This is enough electric power to power dozens of electricity-

intensive small businesses, or more than 300 Bulgarian households, without any emissions or any additional fuel costs.

Excess energy produced during the day can be sold to the electric grid or stored in electric battery packs, already available in the market, adding up to 150 000 EUR investment for 500 kWh electric battery storage. The price of industrial batteries is expected to fall further significantly in the next years.

Accessible and affordable credit lines for renewable energy investments by firms and households will be offered by the EU and commercial banks. In September 2021, the Bulgarian Development Bank started giving out loans to micro and small companies, covering up to 95% of the investment in photovoltaic plants of up to 1MWp, with a payback period of 15 years.

Learn more:



Source: BDB

In Germany, energy cooperative of citizens and small firms are well developed. More than 200 000 citizens have joined in 835 energy cooperatives as of October 2021, saving 3 million tons of CO₂. Citizens can participate for as little as 50 EUR per person, with a median upfront investment of 5 200 EUR.

Learn more:



Source: DGRV

Bulgaria is catching up. The next government is expected to approve significant streamlining of the rules for small-scale solar power and energy cooperatives and provide incentives for renewable projects by business.

Learn more about the regulatory changes to make energy cooperatives in Bulgaria possible:



Source: E3Analytics



Transport



Not all EVs employees of a company can use are cars! Electric bicycles are becoming more popular with companies, who want to help their employees cut carbon emissions and improve their health. In 2018, German company Stiebel Eltron started leasing bicycles on behalf of its workers – more than 200 employees joined the scheme, each one saving up to 40% from the cost of their bikes. Providing charging racks for the electric bikes allows workers living more than 10 km away to bike to work.

Learn more:



Source: IHK

Transportation accounts for more than 14% of CO₂ emissions in Bulgaria, and 85% of that is due to road transport – cars, buses, vans and trucks. The already available path to reduce these emissions is electrification of transport and business has a big role to play – Bulgarian companies buy many of the approximately 30 thousand new cars sold in Bulgaria each year, less than 10% of which currently are battery electric vehicles (EVs). Buying new passenger and light cargo EVs and funding charging points for company and employee cars is one of the big ways businesses can help the EV transition.

Light cargo vehicles, which Bulgarians affectionately call “banitsa trucks”, are especially suitable to run on electricity. They carry bigger batteries and are typically used to transport goods for short distances on congested city routes, where the CO₂ and air pollution emissions from diesel engines are highest.

And, perhaps, the best thing business can do to help reduce emissions from transport is to allow its staff to not travel at all. Flexible workplaces and online meetings since the start of the Covid pandemic don't always work perfectly, but they have saved thousands and thousands of tons of CO₂. According to data from Germany, collected during the pandemic, when 25% of people worked from home, adding 1 day per week of home office could save 18% annual emissions from commuting or 4% of all transport emissions annually.

Learn more:



Source: Greenpeace Germany

Buildings

Buildings and construction are responsible for 36% of CO₂ emissions worldwide – 17% of emissions are due just to residential buildings, while non-residential buildings and construction of buildings are responsible for 10% each. Many of the materials, which modern buildings are made of – steel, cement and aluminum, have major carbon footprints, when produced using fossil fuel sources of energy. Heating is responsible for about 45% of emissions from building, but as the planet warms emissions for the cooling of buildings are rising 3% every year. Great savings can be made – in the EU, more strict building codes have saved 30% in building's energy demand.

Bulgaria has adopted a national standard for “Near Zero Energy Building”, (Class A), which requires at least 55% of the energy for heating, cooling, ventilation, hot water for washing and lighting to be produced from renewable energy sources, located in/on the building or near the building.

A “positive energy” building is one that produces more energy than it uses.

EU programmes, like the Recovery and Resilience Plan, offer support to upgrade public, commercial and residential buildings, improving heating and cooling efficiency and adding solar heating and photovoltaic energy.

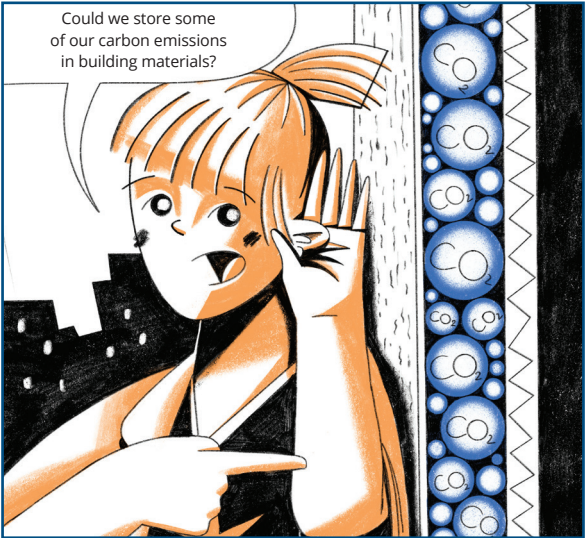
Even skyscrapers can be constructed from wood. In Berlin, Germany, the tallest “wooden skyscraper” is being constructed – a 98-meter, 29-story high mixed commercial and residential building, which will offer offices for small local enterprises, as well as affordable apartments for young people.

Learn more:



Source: *Investor.bg*

Buildings can even go one step further in the fight against the climate crisis – by storing carbon, absorbed from the atmosphere, in the building materials. To do this, we can construct new buildings from sustainably sourced wood (for example wood, which has Forest Stewardship Council – FSC certificate). Wooden buildings store the carbon inside the wood, which trees absorb from the atmosphere, which is much better than using wood to burn as biomass.



Making Business Circular

As mentioned, energy is not the only aspect of our economy, which produces greenhouse gases. Getting all the stuff that we use – mining raw materials, transforming them into finished products, as well as providing the services we use every day, from food to banking, generates a big carbon footprint. Companies have a key role to play in creating and implementing innovative business models for the “circular economy” – one that does not generate any waste, and which saves greenhouse gas emissions, by recycling materials.

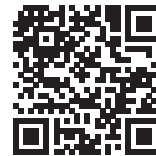


The Scale of the Challenge

The world uses an unbelievable quantity of raw materials – 100 000 000 000 tons (100 billion tons) every year. This includes everything from gravel for roads to grain to feed cattle. It is mined, transported, milled, refined, baked, assembled, packaged, sold, used and discarded. Only 9% of all is reused or recycled, while almost 10% is illegally discarded or simply lost – like all the microplastic, which goes into the rivers and oceans, harming aquatic life!

Bulgaria lags behind the EU in terms of resource efficiency in all economic materials, and rates of recycling. While domestic resource consumption per capita is about 20 tons of materials annually – less than Finland (30 tons) or Sweden (25 tons), but higher than Germany and the EU average (about 13 tons). These consumed resources, including metals, food, wood, cloth and other biomass and fossil fuel-based resources, of which plastics are made, are currently not producing enough value for the Bulgarian economy – our “resource productivity” or how much euros we get for each kilogram of materials input in production is still less than 0.5 EUR per kilogram, while it is more than 2 EUR per kilogram on average for the EU. Bulgarian firms and entrepreneurs need to find high value economic uses of materials, as well as cycle materials and products through circular chains of production, use, reuse and recycling. Three directions of innovation include utilizing electronic waste and rare metals, finding new uses of rubber and textiles in Bulgaria's automotive parts and light manufacturing industries. Bulgarians on average discard 8 kilograms of electronic waste every year. A single automobile tire releases 20 kg of CO₂ and many toxic air pollutants when burned illegally.

Learn more:



Source: CGRI

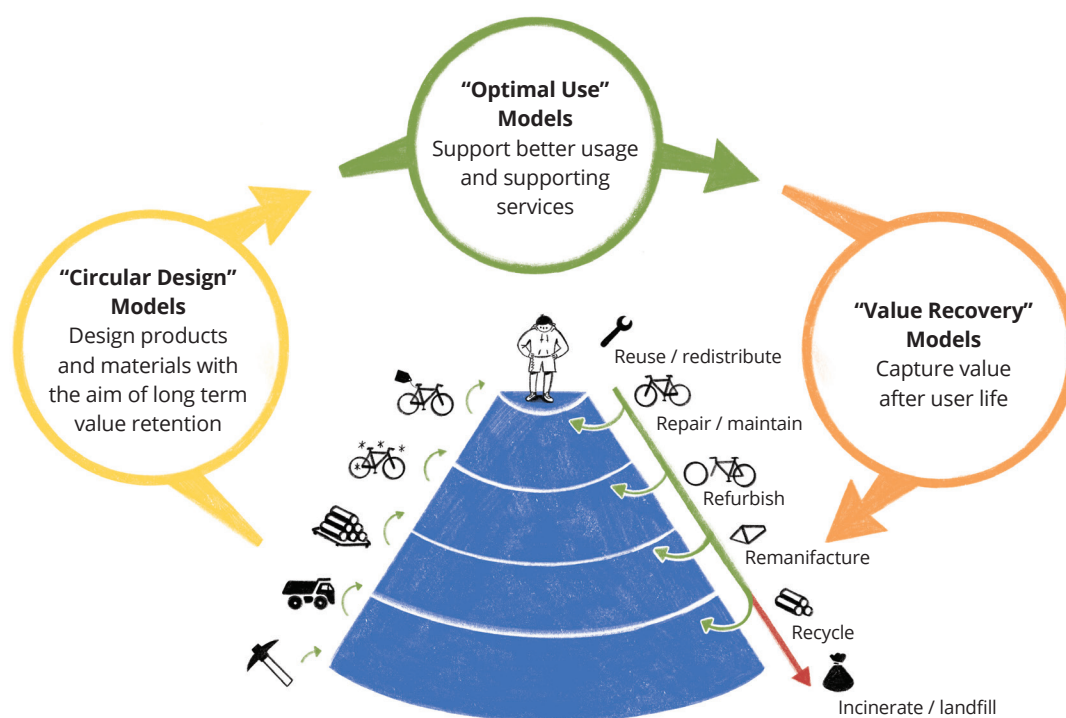
Circular Solutions

The solutions to make the Bulgarian economy circular and carbon-neutral are focused on changing the way we source the raw materials, and changing the ways we design, produce and use products and services. Both material resources, energy and CO₂ emissions can be saved during each step. The goal is to minimize resource, energy and carbon inputs, and maximize the value for product and services users, and the economy during each step. If we do this, we could reduce greenhouse gas emissions from the production of cars by up to 66%, electronics by up to 50%. Increasing the amount of municipal waste that is recycled, instead of sent to landfills, could save up to 4% of the European Union's total greenhouse gas emissions every year.

Learn more:



Source: EIB



Raw Materials



To produce all the mobile phones, electric cars and rooftop solar panels EU citizens will need, the EU needs “critical raw materials” – such as copper, lithium, cobalt and graphite. While Bulgaria is the biggest producer of mined copper in Europe, demand for copper to produce cars and electronic equipment is expected to grow by 40%, and that for lithium and cobalt – by more than 2000% in 2030, compared to the 2010s. We need completely new industrial models, where critical raw materials are continually recycled and reused in the economy, and the need to mine raw materials, which creates greenhouse gas emissions and other environmental impacts, is minimized.



Source: ecologica.bg

Since 2015, Bulgarian company Ecologica has processed post-consumer electronic equipment from citizens and business. The company collects equipment like used printers and coffee machines from offices, mobile devices, batteries, storage disks and electronic scrap, transports and sorts them. Some of the collected electronics are refurbished and resold, while others are recycled using a closed-loop approach. Extracted critical metals are recycled and refined in Austria by partners in Austria Metrade GmbH. In total, over 5 years Ecologica has recycled 6 000 tons of electronic waste. The company also educates consumers how to repair and reuse products.

Learn more:



Source: Ecologica

Packaging and Design



What else can reduce costs materials use and greenhouse gas emissions? It is the design of products and services, which use less materials, especially in terms of packaging, or use bio-based sources, instead of fossil carbon-based plastic. An average Bulgarian is responsible for close to 20 kilograms of single-use plastic packaging waste every year. Here, a competitive advantage can be realized by small and medium Bulgarian companies, which use single-use packaging in the food and catering industry, printed materials and shipped goods. Many plastic items will be banned or unwanted by customers in the future, so Bulgarian companies must innovate and find sustainable climate-friendly alternatives.



will save 33,000 tons of CO₂ eq. emissions from entering the atmosphere. Mass production and efficient recycling of PLA and other bio-based plastics can maximize their climate benefits even further.

LAM'ON is an innovative startup, which solves a big problem – most print and paper packaging materials are laminated using fossil plastic. LAM'ON has developed a bio-based and biodegradable laminating film, which does not produce toxic emissions. The film is based on polylactic acid (PLA), derived from corn.

Only the production of PLA emits over 4 times less CO₂ than the production of petroleum based plastic. On top of that, as it is biodegradable, at the end of its life cycle LAM'ON's foil can become compost instead of waste that lasts for hundreds of years. By 2028 the company

Learn more:



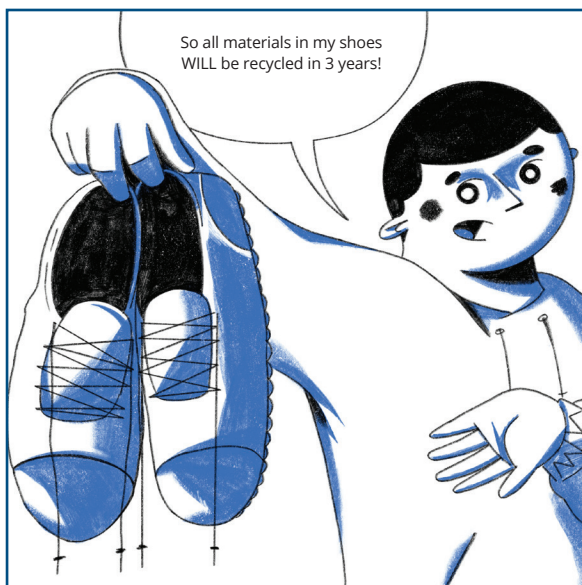
Source: LAM'ON

Plastic packaging can be upcycled. This is when lower-grade plastic materials are used and incorporated into products of higher value, while retaining the embodied carbon. German company Adidas, which produces over 400 000 pairs of shoes every year is incorporating waste packaging plastics into its new models. At present, more than 40% of Adidas shoes and clothes use recycled polyester. It released its first 100% recycled sneaker model in 2021 and is aiming to use only recycled plastic by 2024. The company even uses plastic bottles collected from ocean beaches by local communities, which helps to solve the critical problem of marine plastic pollution, although waste transport generates some CO₂ emissions.

Learn more:



Source: Adidas



Making Business Regenerative

The third challenge to climate entrepreneurship is how to regenerate natural ecosystems. This will be necessary for the sake of protecting the world's species and the quality of life of future generations, but it is also vital for the climate – forests, soils and good land and water management practices hold the best chance to absorb our CO₂ emissions from the atmosphere. What is needed are enough green entrepreneurs to make this into a business case.

The Scale of the Challenge

The world has lost a third of its forests, and deforestation destroys about 10 million ha of forests every year – an area slightly smaller than Bulgaria. About 68% of the populations of vertebrate species have disappeared in just the last 50 years, with aquatic species particularly hit by draining wetlands and deforestation. Agriculture is destroying topsoil at a rate 100 times faster than natural erosion, losing more than 100 million tons of carbon annually.

Bulgaria is one of the EU member states with vast areas of old growth forests and abundant agricultural land. However, we are losing approximately 2 tons of topsoil from each hectare of cropland every year, due to unsustainable farming. WWF estimates that between a quarter and a third of all tree-logging in Bulgaria is illegal, and most of the Danubian natural wetlands are drained.

Regenerative Solutions

Reforestation, soil and wetland restoration are among the so-called “nature-based solutions”, which are a key element to combating the climate crisis. Most often, the same solutions can absorb carbon from the atmosphere, while also helping to adapt ecosystems and communities to climate change. Planting forests in river floodplains turns CO₂ into biomass, prevents erosion and retains water during droughts. Protecting ecosystems like peatlands and natural grasslands is critical because they are key to the formation of topsoil.

The EU has vowed to plant 3 billion trees. Bulgaria is slowly increasing the size of tree cover and grasslands, due to land abandonment. This chaotic process can be replaced with planned reforestation using climate-adapted tree species, restoring floodplain forests and conducting nature-based carbon management practices by farmers. CO₂ sequestration rates from land use and management could be increased more than double by 2050.

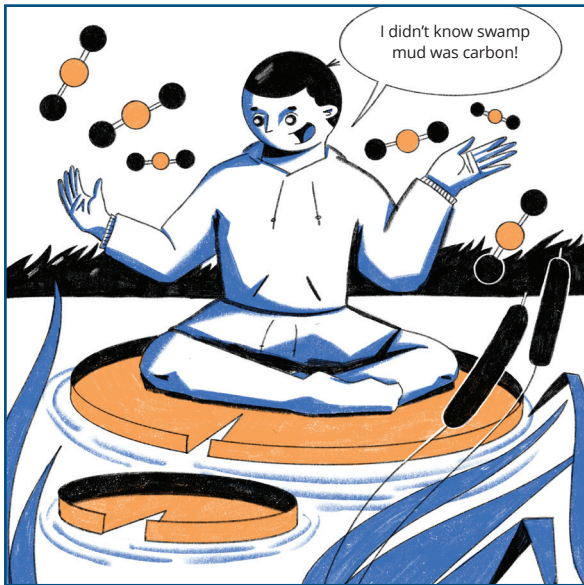


Non-timber forest products (NTFP), such as fruits, mushrooms and herbs can supplant our diet with local food and medicinal products, while creating very little carbon footprint, or even helping to fix carbon in the forest. Edible mushrooms can be cultivated in the forests without cutting trees, by simply leaving dead wood, instead of removing it and burning it for fuel. In this way the carbon in the dead wood, as well as all the valuable nutrients are being converted into living soil and biomass, while local people can pick and sell mushrooms and berries, which have a high market value. Biodiversity, especially insects and birds like the woodpecker, also benefit. Pilot projects to store more carbon in forests by using dead wood and producing non-timber wood products by the local communities are being pioneered by WWF in the forests of Romania and Bulgaria.

Learn more:



Source: WWF

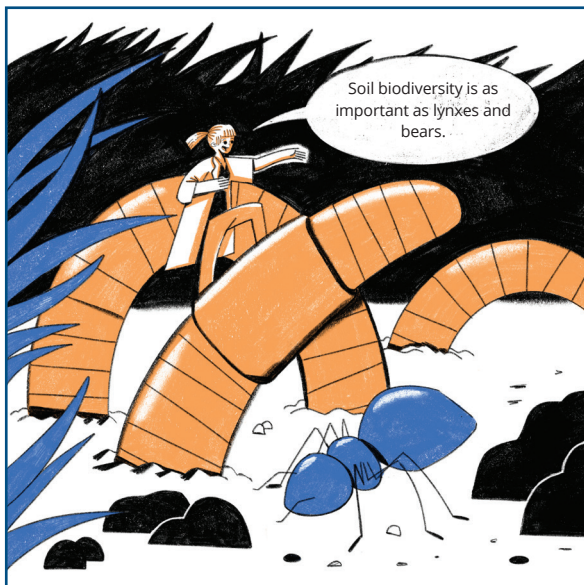


Soils are extremely important for carbon management and biodiversity. Soil microorganisms (fungi, bacteria, earthworms and a multitude of organisms) are the primary driver, which recycles carbon in biomass. Now farmers are learning to actively manage their soils to enhance the work of microbes and increase carbon sequestration. New regenerative farming techniques, including no till farming, keeping cover plants to not lose the soil, not using pesticides, which destroy microbes, composting farming waste and, otherwise, actively supporting microbial life are integral parts of the emerging “carbon farming” practice. Farmers in Germany and the North Sea region have been actively piloting and applying these techniques, and are able to return to the soils up to 1 ton of carbon per hectare per year, which means that up to 3.6 tons of CO₂ emissions are avoided.

Learn more:



Source: Interreg Europe



Wetland and peatland restoration has been a long-established method to sequester carbon from the atmosphere. Along the length of the Danube coast, near the Black Sea and elsewhere in Bulgaria, wetlands have been drained in the 19th and 20th century. However, restoring wetlands and using excess biomass (such as the reed grasses, which need to be mowed to maintain the wetland in optimal condition) as construction and furniture materials, animal fodder and for biomass, can be integral to a biobased economy. Over the last 12 years WWF has helped to restore approximately 30 km² of Bulgarian wetland habitats near Persina Nature Park, working with local livestock farmers and biomass producers in order to restore carbon and put it to profitable economic use.

Learn more:



Source: WWF

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