Volt's Energy Transition and Climate Change Policy

A Comprehensive Green Transformation of Europe

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I. Introduction

The 2015 Paris Agreement was a diplomatic breakthrough in the fight against climate change[1]. Almost all countries committed to limiting global warming to 2°C, aiming for 1.5°C, through strict and continuously reported nationally determined contributions (NDCs). Yet, despite good intentions, humankind remains far from solving the climate crisis: all pledges, targets and NDCs combined would only limit global warming to 3.2°C with only a 66% probability[2]. With current policies, the European Union (EU) is not on a 2°C or 1.5°C pathway either. All the while, science presents more and more evidence that the window of opportunity to solve this existential challenge is narrowing.

Europe needs a massive green transformation involving technological, structural, and behavioural revolutions to live in a well-balanced world, where corporations, governments, and citizens take a larger responsibility for future generations and the future of our planet.

Volt envisions a transition with the primary objective of stopping anthropogenic global warming as well as achieving a long-term sustainable and prosperous eco-civilization, hand in hand with technological development. We aim to boost progressive policies and to take the ecological revolution to the next level, from the local to the European and ultimately to the global political stage. In addition, we will push for a transition that is as social and fair as possible, encouraging citizen empowerment and targeting the biggest polluters.

Volt is committed to working towards climate neutrality in energy production and use by 2035. The required changes will fundamentally alter society, our economies, and the relationship of humanity to the environment. The current delay of action, however, does not delay the impact of consequences. Volt recognises that a broad range of impactful policies is required to ensure livable societies and a humane future worldwide. These include policies to transform our behaviour and our economy, as well as policies intended to speed up the energy transition and reduce the damage done to the environment. Volt aims to fairly distribute the burden of these policies, based on the principle that the responsibility to act should be proportional to the damage done and profit gained by all parties alike, companies, institutions, and people across the world.

Climate change is the ultimate cross-border issue that requires collective and forceful action. Volt is uniquely positioned to provide a European response to the unprecedented

[1] United Nations (2015). The Paris Agreement. Available at: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.
[2] Carbon Action Tracker per 19 September 2019. Available at: https://climateactiontracker.org/global/temperatures/.

challenge of halting climate change through climate mitigation and adaptation measures.

This policy begins by introducing the targets and pathways to decarbonise Europe in Chapter II. This is followed by the carbon pricing policy, one of the main instruments to achieve decarbonisation, in Chapter III. The policy introduces specific regulations aimed at the European energy sector in Chapter IV. As the transition also requires a paradigm shift in the mobility and shipping sectors, Chapter V details our proposals to revolutionise transportation. Chapter VI specifies the proposed policies to decarbonize the housing and building sector. These are followed in Chapter VII by specific policies aimed at decarbonising the agriculture sector while achieving negative emissions through ecosystem restoration efforts. Additional strategies for negative emissions are described in Chapter VIII. As noted before, adaptation is key to facing the damages already done to the ecosystem and biosphere, and these are detailed in Chapter IX. The policy concludes in Chapter X with specific governance aspects, including provisions to ensure a fair transition.

II. Increase Targets on Emission Reduction

The European Union is already experiencing a climate and biodiversity emergency. Meeting this challenge requires an unprecedented sense of urgency and ambitious, comprehensive climate policies. To this end, Volt aims to ensure a sufficient supply of cleaner energy and supports the creation of a strategy to achieve the decarbonization of the energy supply in the EU. This strategy should

- **Reduce net greenhouse gas emissions[3] by 80% by 2030** compared to 2019 and 100%[4] by 2040, so that the EU becomes carbon-neutral and contributes its fair share to limiting global warming to 1.5 degrees Celsius by 2100, with a 66% chance of success[5].
- **Support technological innovation** as well as structural and behavioural transformation towards sustainable ways of living.
- **Develop and start implementing a long-term carbon negativity strategy** to achieve the 2040 carbon neutrality milestone, thus creating a buffer in case other economies do not contribute their fair share in reversing damaging global warming in the long run. Carbon sinks/carbon-sequestering should be its main focus, including technical solutions (e.g., carbon capture & sequestration) and natural carbon sinks (e.g., ecosystem restoration and sustainable agriculture).

[3] "Net" emissions are actual (gross) emissions minus negative emissions (carbon absorption/sequestration).
[4] A model to estimate these targets based on the remaining carbon budget was developed by Felix Benning and available at : https://felix-benning.shinyapps.io/emissionmodel.
[5] Connolly, D., Lund, H., & Mathiesen, B. V. (2016). Smart Energy Europe: The technical and economic impact of one potential 100% renewable energy scenario for the European Union. *Renewable and Sustainable Energy Reviews*, *60*, 1634-1653.

III. Volt's Carbon Pricing Concept

Climate change is the result of a massive market failure: Social and ecological costs to third parties are not sufficiently reflected in market prices. To correct this discrepancy, the cornerstone of Volt's climate policy is a comprehensive, ambitious, predictable and credible carbon pricing scheme enforced by a strong EU. We aim to cover 100% of emissions with two efficient, effective, market-based and technology-neutral instruments: **an expanded EU Emissions Trading System (ETS)** which shall cover the vast majority of sectors under one universal cap and **one uniform price**, complemented by **a carbon tax** for such emissions where that is the more effective or efficient instrument. To prevent carbon leakage to other countries and ensure a level playing field for all companies, border carbon adjustments shall be implemented to level carbon prices for imports and exports to and from the EU. Further, Volt understands the social hardship that a high carbon price can cause and hence proposes the transparent redistribution of revenues combined with economically sound investments in green research and development (R&D) and infrastructure to fund the economic transition as fast as possible. The EU is working on the revision of its climate, energy and transport-related legislation under the so-called 'Fit for 55' package[6]. Volt believes that some of these new measures, e.g., the Emission Trading System (ETS) and the new Carbon Border Adjustment Mechanism (CBAM), are a step in the right direction. However, significant improvements are still necessary. **Our carbon pricing policy** is outlined below.

A.Pricing Greenhouse Emissions

- **Extend the ETS to further sectors to cover at least 90% (2019 ca. 45%) of all EU carbon emissions** under a single cap **by the end of 2022 at the latest,** to reduce emissions efficiently and predictably. All forms of fossil fuels shall be included, independent of their usage, covering the sectors of energy supply, industry[7], transport, residential and commercial[8]. As a principle, apply regulation as much "upstream" as possible, i.e., where fossil fuels (gas, oil, coal, etc) enter the system (ports, pipelines, mines, etc) to simplify the administrative effort for both

[6] For more information on the EU's plan for a green transition and the new initiatives adopted, consult: https://www.consilium.europa.eu/en/policies/green-deal/eu-plan-for-a-green-transition/.
[7] Van Ruijven, B. J., Van Vuuren, D. P., Boskaljon, W., Neelis, M. L., Saygin, D., & Patel, M. K. (2016). Long-term model-based projections of energy use and CO2 emissions from the global steel and cement industries. *Resources, Conservation and Recycling*, *112*, 15-36.
[8] European Environmental Agency (2018) "GHG emissions by sector in the EU-28, 1990-2016". Available at: https://www.eea.europa.eu/data-and-maps/daviz/ghg-emissions-by-sector-in#tab-chart_1.

companies and authorities.

- ➢ **Reduce the number of allowances (scope-adjusted) by 8 ppts each year** (current EU plan: 2.2 ppts each year) from 2020–2030 to net cut carbon emissions by 80% until 2030 compared to 2020[9] and aim for a 100% reduction by 2040.
- ➢ **Introduce an EU-wide price corridor for EU ETS auctions and trade** to create predictability for investments (price floor) and prevent excessive prices above the social cost of carbon (price ceiling). Volt suggests using the newly introduced CO_2e tax[10] (see below) as a reference point and allowing the ETS price to vary within a +/-50% corridor of the CO2e tax.
- ➢ **Require the retirement (deletion) of certificates when national policies directly reduce emissions in ETS sectors** (e.g. feed-in-tariffs) to ensure the additionality of such policies and to prevent the "waterbed effect"[11].
- ➢ **Introduce a carbon tax for any sectors where an expanded ETS would cause disproportionate administrative effort** (e.g., highly fragmented industries that can hardly be captured upstream).
- ➢ **Volt suggests a tax level in line with France's originally planned CO2 price, which is also in line with suggestions by the High-Level Commission on Carbon Prices and the German Umweltbundesamt**[12]. That is 65.40 euros per tonne in 2021, gradually rising to 205 euros in 2030[13] [14] [15]. CO2e pricing will be reviewed regularly, with the potential for further increases if necessary, but not exceeding the range of scientific consensus on the global social cost of carbon.
- ➢ **Volt supports national CO2e pricing until there is a European solution.** Although Volt favours an ETS over a carbon tax, Volt would support a strong carbon tax at the European level as an intermediate solution/Plan B.
- ➢ **Prevent double taxation of emissions and respect the tax sovereignty of the Member States** by crediting national or regional CO2 taxes and levies against the applicable EU CO2 price where they overlap.
- ➢ **End-to-end CO2e accounting standards shall be implemented until 2025 as a basis for** more precise border carbon adjustments (BCA), carbon footprint

[9] European Commission (2021). "EU Emissions Trading Scheme (EU ETS)". Available at: https://ec.europa.eu/clima/policies/ets_en.
[10] CO 2e = CO 2 equivalents.
[11] German Council of Economic Experts (2019). "Setting Out for a New Climate Policy". Available at: https://www.sachverstaendigenrat-wirtschaft.de/en/special-report-2019.html.
[12] Best practice: British Columbia, Canada, has put a price on burning fuels and introduced successfully a Carbon Tax. Available at: https://www2.gov.bc.ca/gov.
[13] Carbon price variations in 2°C scenarios explored.
[14] Edenhofer, O. (2017). Carbon Pricing Leadership Coalition: Report of the High-Level Commission on Carbon Prices, Potsdam Institute for Climate Impact Research.
[15] Matthey, A. & Bünger, B. (2019). "Methodological Convention 3.0 for the Assessment of Environmental Costs", German Environment Agency. Available at: https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2019-02-11_methodenkonvention-3-0_en_kostensaetze_korr.pdf.

declarations on products or the implementation of a carbon added tax (CAT)[16]. Similarly, measurement and monitoring of emissions by geography, sector and (large) company should be strengthened where needed to ensure a transparent, reliable and trustworthy basis for carbon pricing.

- **Removed, captured or avoided greenhouse gas equivalents shall be included in the ETS System where feasible, or lead to a refund equivalent to the CO2e tax** to create an incentive for greenhouse gas removal. This should include both technological as well as natural forms of carbon sequestration as long as the permanence of the removal can be ensured[17].

B. Sector-Specific Regulation

- **The ETS must include land use, land-use change, and forestry (LULUCF)**, with each member state treated as a single emitter. While accounting will take place at the EU level, each Member State will be free to respect their circumstances and pursue their strategy.
- **The aviation industry should be included in the ETS without any exemptions, incorporating all climate effects as CO2e to the best of our scientific knowledge**[18] [19] [20] [21]. Direct off-setting by the industry will not lead to a reduced number of ETS certificates needed. In 2022, the number of free allowances will be reduced from 83% to 0%. In the long term, the EU should push for the alignment of CORSIA to the ETS[22].
- **Ships operating in or entering European waters must pay a carbon price (ETS**

[16] At the time of writing, there are no mandatory carbon accounting standards so that said use cases rely on approximations, averages and estimates; that is not sufficient for nuanced carbon footprint calculations as needed to compare competing products of the same category, and can lead to legal disputes, especially in case of high CO2 prices

[17] Note: solar geoengineering does not qualify as greenhouse gas removal.

[18] Faber, J., Greenwood, D., Lee, D., Mann, M., De Leon, P. M., Nelissen, D., ... & van de Vreede, G. (2008). Lower NOx at higher altitudes policies to reduce the climate impact of aviation NOx emission. *CE-Delft*, *8*, 32.

[19] Fahey W. D. (2008). "The use of non- CO 2 multipliers for the climate impact of aviation: The scientific basis", U.S. National Oceanic and Atmospheric Administration. Available at: https://www.icao.int/Meetings/EnvironmentalWorkshops/Documents/WACM-2008/2_Fahey.pdf.

[20] Jungbluth, N. (2013). Aviation and Climate Change: Best practice for calculation of the global warming potential. *Retrieved from: www. esu-services. ch/our-services/pcf*.

[21] Edwards, H. A., Dixon-Hardy, D., & Wadud, Z. (2016). Aircraft cost index and the future of carbon emissions from air travel. *Applied energy*, *164*, 553-562.

[22] Scheelhaase, J. D. (2019). How to regulate aviation's full climate impact as intended by the EU council from 2020 onwards. *Journal of Air Transport Management*, *75*, 68-74.

or tax)[23] [24]. The price shall apply to all vessels with a gross tonnage of more than 5,000 on a per-voyage berthing fee paid to the port authorities.

- ➢ **Agricultural emissions from livestock and soil should be taxed at the source** because they are local and fragmented. Other non-sector-specific emissions in the agricultural sector (such as electricity and tractor fuels) will be covered by the ETS mid- or upstream.

C. Carbon tariffs to create a level competitive playing field and prevent carbon leakage

A strong carbon pricing system is the best mechanism to curb emissions. Yet, in our interconnected world, the transition to a global sustainable economic system will succeed only if industries with high emissions do not move to less regulated countries, thereby both causing higher emissions elsewhere and weakening the European economy. We, therefore, propose to

- ➢ **Implement comprehensive Border Carbon Adjustments (BCAs) at the EU's external borders to prevent carbon leakage and create a level competitive playing field between European and non-European companies**[25] [26] [27]. That means applying import adjustment taxes to products subject to lower carbon prices in their countries of origin. Reimburse carbon price differences for exports to such countries. End the practice of free allowance allotment ('grandfathering') to entire companies or industries.
- ➢ **Border tax adjustments must be implemented not only on selected domestic, CO2-intensive industries in global competition but also on a wide range of imported goods,** to shift consumption to more sustainable products through the

[23] Kachi, A., Mooldijk, S., Warnecke, C., & BMU, N. S. (2019). Carbon pricing options for international maritime emissions. *New Climate-Institute for Climate Policy and Global Sustainability gGmbH: Berlin, Germany.*
[24] Parry, I., Heine, M. D., Kizzier, K., & Smith, T. (2018). *Carbon taxation for international maritime fuels: Assessing the options*. International Monetary Fund.
[25] At the of writing, carbon border adjustments are among the most universally proposed policies as a complement to any domestic carbon price to prevent carbon leakage.
[26] German Council of Economic Experts (2019). Setting out for a new climate policy", point 17. Available at: https://www.sachverstaendigenrat-wirtschaft.de/en/special-report-2019.html.
[27] R. C. (2017). "Are carbon tariffs a good idea?". The Economist. Available at: https://www.economist.com/the-economist-explains/2017/02/17/are-carbon-tariffs-a-good-idea

price mechanism[28] [29].

- ➢ **Use any net gains from import and export adjustments to fund the global climate change adaptation fund and the green climate fund**[30], both of which were established under the Paris Agreement but are currently underfunded.

[28] Mehling, M., van Asselt, H., Das, K., Droege, S. and Verkuijl, C. (2017). "Designing Border Carbon Adjustments for Enhanced Climate Action". Climate Strategies. Available at: ttps://climatestrategies.org/wp-content/uploads/2017/12/CS_report-Dec-2017-4.pdf.
[29] Böhringer, C., Carbone, J. C., & Rutherford, T. F. (2012). Unilateral climate policy design: Efficiency and equity implications of alternative instruments to reduce carbon leakage. *Energy Economics*, *34*, S208-S217.
[30] European Commission's International climate finance strategy available at: https://ec.europa.eu/clima/policies/international/finance_en.

IV. Energy Transition in the European Energy System

Our current society and economy are built on the assumption that energy demand dictates supply. To reduce the negative effects on our ecosystem, Volt suggests:

- ➢ Shifting to green energy sources and engaging directly with citizens to ensure a transition towards more sustainable ways of living and use of energy. The transition to a sustainable European system calls for changes in the electricity markets with the use of alternative and carbon-free sources of energy to achieve the full decarbonization of the energy system by 2035.

Recent developments in the security landscape of Europe, for instance, the Russian war of aggression in Ukraine, highlight the need for strengthening European energy sovereignty. In particular, it has made reducing the EU's energy dependency on Russian imports, especially of oil and gas, imperative and urgent. To this end, Volt suggests

- ➢ Imposing additional EU-wide targets for reductions in fossil energy use to compensate for the loss of energy imports from Russia as early as possible.

A.Electricity Market

As for the electricity market, we propose to:

- ➢ **Promote the liberalisation of electricity markets, especially at the retail level;** encourage consumers to switch to green power suppliers through transparent pricing and reduced switching barriers to guarantee effective market competition; separate the ownership of power generation, transmission, distribution, and retailing; and allow direct bilateral agreements between suppliers and consumers[31].
- ➢ Optimise the coordinated network of cross-border Transmission Systems Operators (TSOs) for efficient energy management and international market functioning beyond country-based limits.
- ➢ **Adopt nodal dynamic electricity pricing[32] throughout the EU** to account for

[31] International Renewable Energy Agency IRENA (2017), Adapting market design to high shares of variable renewable energy. International Renewable Energy Agency, Abu Dhabi. Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/May/IRENA_Adapting_Market_Design_VRE_2017.pdf.

[32] Hogan, W. W. (2005). On an "energy only" electricity market design for resource adequacy. Available at: https://sites.hks.harvard.edu/fs/whogan/Hogan_Energy_Only_092305.pdf.

network constraints across political borders; ensure economic dispatching, subject to transmission and operational constraints[33]; well-aligned generation, demand, and network management; and adequate investment incentives[34] [35].

- ➢ **Harmonise market regulation throughout Europe** to guarantee a free flow of energy in response to thoroughly dynamic electricity prices, thereby improving market efficiency, fostering new forms of generation and storage, and minimising the need for fossil fuel power plants as a backup for intermittent renewable generation capacity.
- ➢ **Adopt smart metres and variable pricing EU-wide, making both available to all consumers**, improving grid stability and incentivising efficient usage of energy.
- ➢ **Empower citizens to contribute easily to the green transition** by providing free access to energy grids and removing private feed-in caps.

B. Renewable Energy System

Regarding the renewable energy system, we propose to:

- ➢ **Promote a diversified portfolio of renewable energy sources (RES) to enhance flexibility and reflect its value in the market price**[36]. To enable a mix of intermittent and mutually complementing sustainable energy sources, further research on geothermal energy should be promoted, alongside research on ocean thermal energy conversion, tidal and wave energy, residual heat from industry, biomass, and new designs for solar and wind energy. Furthermore, research in alternative technologies should be promoted, including **low-carbon and disruptive technologies** such as sustainable chemistry concepts[37], bio-based solutions, and organic[38] and plastic waste-to-fuel concepts, with particular emphasis on

[33] Verzijlbergh, R. A., De Vries, L. J., Dijkema, G. P. J., & Herder, P. M. (2017). Institutional challenges caused by the integration of renewable energy sources in the European electricity sector. *Renewable and Sustainable Energy Reviews*, *75*, 660-667.
[34] Neuhoff, K., Hobbs, B. F., & Newbery, D. M. (2011). Congestion management in European power networks: criteria to assess the available options. German Institute for Economic Research, DIW Berlin.
[35] Borggrefe, F., & Neuhoff, K. (2011). Balancing and intraday market design: Options for wind integration, German Institute for Economic Research, DIW Berlin.
[36] Verzijlbergh, R. A., De Vries, L. J., Dijkema, G. P. J., & Herder, P. M. (2017). Institutional challenges caused by the integration of renewable energy sources in the European electricity sector. *Renewable and Sustainable Energy Reviews*, *75*, 660-667.
[37] Blum, C., Bunke, D., Hungsberg, M., Roelofs, E., Joas, A., Joas, R., ... & Stolzenberg, H. C. (2017). The concept of sustainable chemistry: Key drivers for the transition towards sustainable development. *Sustainable Chemistry and Pharmacy*, *5*, 94-104.
[38] Skaggs, R. L., Coleman, A. M., Seiple, T. E., & Milbrandt, A. R. (2018). Waste-to-Energy biofuel production potential for selected feedstocks in the conterminous United States. *Renewable and Sustainable Energy Reviews*, *82*, 2640-2651.

large-scale applications.

- ➢ **Promote the total phase-out of coal by 2030 (lignite by 2025)**, prohibit new permits to drill for fossil fuels, and eliminate flaring immediately[39]. In addition, 80% of all known fossil fuel reserves should be left in the ground[40]. The advertising of fossil fuel products should be prohibited, similar to bans on cigarette advertisements.
- ➢ **Make use of existing infrastructure for Power-to-Gas, Gas-to-Power, and hydrogen.** Adapt the current fossil fuel storage and generation infrastructure to use renewable fuels[41].
- ➢ **Support intensified deployment of smart electricity grids at the European level to provide** a stable and clean energy system based on volatile electricity generation. Relevant grid data should be available from system operations to encourage innovation in clean-tech.[42]
- ➢ **Introduce an EU-wide infrastructure of high voltage "electricity motorways"** and storage systems, funded by the EU budget, to facilitate an integrated renewable energy system via both load balancing and energy transport across countries and large distances[43] [44] [45].
- ➢ **Simplify regulation for approvals and embrace participatory financing schemes for RES infrastructure** to accelerate RES deployment and make citizens and municipalities benefit financially.
- ➢ **Enable and advocate for decentralised and autonomous energy generation** as well as supply and regional distribution structures. Installation of energy storage at home and on the grid level should be promoted through incentives or tax deductions.
- ➢ **Foster the deployment of demand response systems** by putting their providers at the same level of policy and regulation as generation and storage capacity, to

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[39] Flaring operations result in around 270 MtCO2 of emissions, while the gas could be utilised or stored. For more information, consult the special report published by the International Energy Agency in 2019 titled "Flaring Emissions", available at: https://www.iea.org/articles/global-co2-emissions-in-2019.

[40] Change, I. C. (2014). Mitigation of climate change. *Contribution of working group III to the fifth assessment report of the intergovernmental panel on climate change*, *1454*, 147.

[41] Bothe, D. & Janssen, M. (2018). The importance of the gas infrastructure for Germany's Energy Transition. *Frontier Economics*. Available at: https://fsr.eui.eu/wp-content/uploads/2the-importance-of-gas.pdf

[42] Medjroubi, W., Müller, U. P., Scharf, M., Matke, C., & Kleinhans, D. (2017). Open data in power grid modelling: new approaches towards transparent grid models. *Energy Reports*, *3*, 14-21.

[43] Zappa, W., Junginger, M., & Van Den Broek, M. (2019). Is a 100% renewable European power system feasible by 2050?. *Applied energy*, *233*, 1027-1050.

[44] Redl, C., & Pescia, D. (2015). The European Power System in 2030: Flexibility Challenges and Integration Benefits. Study performed by Fraunhofer IWES on behalf of Agora Energiewende. Available at: https://www.agora-energiewende.de/en/publications/?tx_agorathemen_themenliste%5Bprodukt%5D=968&cHash=20c2e80ea407d6e7488e24d21997761f.

[45] Czisch, G. & Schmid, J. (2014), Low Cost but Totally Renewable Electricity Supply for a Huge Supply Area - a European/Transeuropean Example. Citeseerx. Available at: https://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.165.3156.

expand the availability of zero-carbon balancing capacity, thereby complementing intermittent renewables at virtually zero capital expenditure.

- ➢ **Support research on the economic, technological and behavioural aspects of energy systems within the proposed EU Agency for Climate Action** to help monitor and assess the supply and demand of energy for businesses and decision-makers.
- ➢ **Strengthen the harmonisation of technology and engineering standards across the Member States** to increase energy efficiency and reduce waste. Specifically, update the EN 50160 to align voltage levels ("precision supply") after the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union.
- ➢ **Promote enhanced and harmonised financing of relevant infrastructure** for centralised and decentralised energy solutions.

C. Nuclear Energy

Nuclear energy is a low-carbon and low-land use dispatchable source of energy and method for electricity generation[46]. Concerns over the risks surrounding nuclear waste, nuclear material proliferation, and nuclear accidents remain and loom over public discourse. However, given the unprecedented challenge of the transition towards a low-carbon European electricity system, nuclear energy is an important technology to achieve the desired timeline for climate neutrality.

Volt's primary goal is a world free of human-generated greenhouse gas emissions, ultimately achieving the goal of limiting global climate change to 1.5° Celsius. Therefore, it is necessary to balance options for fast and large-scale CO2 reduction, where the advantages of nuclear energy generation can play an important role, against the potential risks of nuclear energy.

From a financial perspective, nuclear energy has both benefits and drawbacks. On one hand, a significant part of the scientific community agrees that the inclusion of dispatchable sources, such as nuclear, hydropower or geothermal, is expected to reduce the total system cost of a fully decarbonised energy portfolio[47]. Nuclear energy also has a low operation, maintenance, and fuel costs. On the other hand, nuclear energy requires

[46] Nuclear energy has one of the lowest life cycle CO2 emissions, together with wind energy and other renewable energy sources (page, 1335). Change, C. (2007). Working Group III: Mitigation of Climate Change. Available at: http://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch11s11-es.html.
[47] Sepulveda, N. A., Jenkins, J. D., de Sisternes, F. J., & Lester, R. K. (2018). The role of firm low-carbon electricity resources in deep decarbonization of power generation. *Joule*, *2*(11), 2403-2420.

high upfront capital expenditure, which is sensitive to increases in the cost of capital and project delays[48]. Decommissioning and waste disposal also require substantial investments[49]. Finally, the liability regimes for nuclear accidents are limited.

In consideration of these complexities, we are advancing a specific proposal to harness nuclear energy's full potential. To achieve this goal, Volt proposes clear EU-wide guidelines for the development, construction, and operation of all types of nuclear reactors. These guidelines will require the Member States to ensure safe provision for the continued operation of current nuclear reactors. In line with these requirements, investments in research and development into new kinds of nuclear fission and fusion technologies should be incentivised to reduce levels of waste produced in operations and to promote the transition to new generations of nuclear reactors. The goal is to ensure the safest possible usage of nuclear energy, to i) support and stabilise power grids, ii) enable alternative uses of nuclear energy for industrial and research purposes where appropriate and necessary, and iii) still pursue our ultimate goal of achieving a truly sustainable energy supply.

Ongoing **development and usage** of new nuclear technologies

- ➢ Promote research and support the adoption of **advanced nuclear fission and fusion concepts,** such as thorium cycles, molten salt, liquid-metal, Gen4, fast breeder, or small modular reactors, as well as the use of research reactors and nuclear radioisotopes for other low-risk applications such as medicine, food sterilisation, and space exploration.

Conditions for the **construction** of new nuclear reactors, including safety, waste, and financial transparency

- ➢ **Allow new reactors only if they are inherently safe**[50]; that is, no active safety systems are required to bring the operation into a safe state of shut-down (so-called walk-away safe). In addition, robustness against outside influences must

[48] Gamboa Palacios, S. S., & Jansen, J. J. (2018). *Nuclear energy economics: An update to fact finding nuclear energy* (No. TNO 2018 P11577). TNO.
[49] European Commission. (2016). Nuclear Illustrative Programme Presented under Article 40 of the Euratom Treaty for the Opinion of the European Economic and Social Committee. Available at: https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_autre_document_travail_service_part1_v10.pdf.
[50] "Safety related terms for advanced nuclear plants". *Directory of National Competent Authorities' Approval Certificates for Package Design, Special Form Material and Shipment of Radioactive Material*. Vienna, Austria: International Atomic Energy Agency: 1–20. September 1991. ISSN 1011-4289. IAEA-TECDOC-626.

be included, such as the consequences of climate change[51] and human threats (i.e., terrorist attacks or war).

- ➢ **Require operators to consult publicly with local authorities and citizens** in the discussion around new nuclear reactor projects. Operators must provide full information on the environmental and economic benefits as well as risks, and organise open public forums for exchange between operators, citizens, and local councillors[52], strengthening the legal rights of the European population near power plants. Financial participation and indemnification shall apply to all citizens equally based on the area of impact, no matter which country they live in.
- ➢ Ensure that byproducts of energy production are retaken and recycled whenever possible, or otherwise placed in safe long-term storage.
- ➢ Ensure the proven availability of a **suitable long-term nuclear waste storage** facility, taking into account the rate of waste generation and storage conditions, as well as the risk landscape (including, but not limited to, geological and geopolitical factors). All possible mitigations should be employed to minimise risks of accidental contamination to acceptable or marginal levels that would be equivalent to average background radiation levels. Risk assessments should be provided by independent third parties.
- ➢ **Mandatory liability insurance to cover the true costs of accidents within the whole chain of nuclear power (cradle to grave), including radioactive waste and waste management.** We believe that all individual insurance policies have to cover the risk of nuclear power accidents while ensuring that the financial burden of accidents is not externalised to taxpayers and society. Any energy supply utility should internalise the full risk costs of accidents[53].

The scale of the energy transition challenge means that existing nuclear reactors can also be a major contributor to achieving the desired timeline for reaching carbon neutrality. As a result, the following derogations apply to existing nuclear reactors that are unable to meet the aforementioned requirements:

- ➢ **Allow the build and operation of already approved reactors** under the respective agreed-upon contractual obligations.
- ➢ **Allow existing reactors to continue operating** in their current form until the **agreed-upon end of their lifecycle**. At this time, the reactors must either be **decommissioned, refurbished, or integrated into a new cycle environment to**

[51] Kromp-Kolb, H., Muellner, N., Kim, D., Holy, J., Syri, S., Caneill, J. Y., ... & Obreja, C. (2021). Climate Change: Assessment of the Vulnerability of Nuclear Power Plants and Approaches for their Adaptation (No. NEA--7207). *Organisation for Economic Co-Operation and Development*. Available at: https://www.oecd-nea.org/jcms/pl_61802/climate-change-assessment-of-the-vulnerability-of-nuclear-power-plants-and-approaches-for-their-adaptation?details=true.

[52] European Commission's Aarhus Convention. Available at: https://ec.europa.eu/environment/aarhus/.

[53] Pearce, J. M. (2012). Limitations of nuclear power as a sustainable energy source. *Sustainability*, *4*(6), 1173-1187.

achieve the technological development as mentioned above, to produce lower and shorter-lived levels of radioactive waste, and to have inherent safety. Runtime extensions for current-generation nuclear reactors (which produce comparatively high levels of waste with long half-lives) will be prohibited once either i) next-generation nuclear technologies with significantly lower levels of waste are available and economically viable to operators, or ii) sustainable energy sources (such as solar or wind power) have spread widely enough to meet energy demands.

- ➢ **Create a long-term spent fuel and waste management policy** for the EU, including by reforming the Radioactive Waste and Spent Fuel Management Directive[54]. This must include making waste producers financially and legally responsible for decommissioning, spent fuel and waste management (under the strict supervision of independent controllers and regulators), and finding, accepting, and building an adequate location for final storage of waste materials. Coordination between Member States and waste producers is essential as a final storage facility has minimal marginal costs for increased material.
- ➢ **Promote the adoption of closed-fuel cycle options** to reduce the volume and duration of radioactive waste and promote the production of fully sustainable waste management systems.
- ➢ **Ensure that runtime extensions are permitted only if**: (1) all safety regulations valid at the time of the decision are met; (2) long-term operations are performed at the full cost of the operator[55]; and (3) the latest level of technological advancements at the time of the evaluation are achieved; (4) needed to ensure climate neutrality;
- ➢ **Allow for earlier decommission** of nuclear reactors based on the principle of subsidiarity, for instance when the population closer to the nuclear reactors is in favour of a complete nuclear exit, under all considerations of political, environmental, climate, and economic consequences as Europe moves to achieve climate neutrality.
- ➢ **Decommission or require repairs/refurbishments to nuclear reactors** whenever the established safety protocols are not met or the planned end of their lifecycle is reached[56] [57].

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[54] The European Commission's policy on radioactive waste and spent fuel is available at: https://ec.europa.eu/energy/en/topics/nuclear-energy/radioactive-waste-and-spent-fuel

[55] Duchac, A., Bruynooghe, C., & Martin, O. (2011). Operation of Ageing Reactors: Approaches and associated Research in the European Union. Available at: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC68051/reqno_jrc68051_pdf%20version%5B1%5D.pdf.

[56] OECD-NEA, 2016. Costs of decommissioning Nuclear Power Plants. https://www.oecd-nea.org/jcms/pl_14910/costs-of-decommissioning-nuclear-power-plants?details=true .

[57] Suh, Y. A., Hornibrook, C., & Yim, M. S. (2018). Decisions on nuclear decommissioning strategies: Historical review. *Progress in Nuclear Energy*, *106*, 34-43.

D. Bioenergy

Volt does not see biofuels as a solution for widespread use as long as large plantation schemes cause serious second-order environmental risks such as deforestation and food crop competition[58]. Nevertheless, without alternatives of the same energy density, biofuels may be necessary for certain applications. Volt thus supports its sustainable use and corresponding research and development.

- **Ensure sustainable practices for biomass production** by encouraging local sourcing, the use of waste biomass, and avoiding damage to the local environment or inefficient energy crops competing with food. The EU's RED directive has to be reformed to avoid uncompensated wood harvesting for bioenergy production[59]. Bioenergy for energy production should thus remain within adequate sustainable limits.

[58] Fargione, J., Hill, J., Tilman, D., Polasky, S., & Hawthorne, P. (2008). Land clearing and the biofuel carbon debt. *Science*, *319*(5867), 1235-1238.

[59] The European parliament recently included wood harvesting for bioenergy production as a source of renewable low-carbon energy. This would increase emissions by 10% due to slow incomplete forest recovery and would encourage other nations, such as Brazil with the Amazons, to do so. For more information, consult: Searchinger, T. D., Wirsenius, S., Beringer, T., & Dumas, P. (2018). Assessing the efficiency of changes in land use for mitigating climate change. *Nature*, *564*(7735), 249-253.

V. Transportation Revolution

We need to make large investments in infrastructure, introduce new regulations, taxes, and subsidies, and induce behavioural changes to obtain a decarbonized transportation system. We therefore need to shift public spending from airports and roads towards sustainable transport infrastructure. Volt will support all forms of environmentally-friendly travel, including bicycles, emission-free and shared mobility, as well as an integrated European rail network.

A.Road and Mobility

- **Establish sustainable infrastructure in cities** by exploring possibilities and harmonising regulations for green zones in towns larger than 50,000 people[60]; expanding city public transport capabilities; creating bicycle-friendly zones and bike lanes; promoting sharing solutions; and introducing free public parking slots for electric cars.
- **Ban the use of fossil fuels in road vehicles by 2035.** This does not ban the sale or use of internal combustion engines as long as they **burn biofuels or synfuels.**
- **Redirect subsidies to R&D, purchase, and refuelling infrastructure deployment for zero-emission vehicles** and net-zero carbon fuels like sustainably produced synfuels.
- **Modernise the transportation systems in Europe for short and long distances.** This includes the promotion of innovative road charge solutions[61] as well as the development of coherent re-charging station networks throughout Europe and within the cities.
- **Promote smart dynamic road traffic management infrastructure** to reduce congestion[62] and enforce reduced speed limits[63].
- **Extend energy efficiency obligations to the transport sector** to discourage the

[60] The European Commission's policy on urban access regulations in Europe. Available at: https://urbanaccessregulations.eu.
[61] An example of best practice can be found in Sweden. For more information, consult: eElective (2018). "eRoadArlanda: Swedish road charges EVs while driving" . Available at: https://www.electrive.com/2018/04/18/eroadarlanda-swedish-road-charges-evs-while-driving/.
[62] As with carbon-activated concrete and other alternatives.
[63] By reducing speed limits from 120 km/h to 110 km/h, a 2-18% of emission reductions could be attained. See also Sobrino, N., & Monzon, A. (2018). Towards Low-Carbon Interurban Road Strategies: Identifying Hot Spots Road Corridors in Spain. *Sustainability*, *10*(11), 3963.

use of fossil fuels[64]. Efficiency in the transportation sector includes RES integration (biofuels and electric motors), and may ultimately promote the use of public transportation.

B. European Rail Transportation

- **Propose considerable EU-wide investments and subsidies on all levels of rail transportation,** such as integrated long- and medium distance railway networks for goods and passengers, a European High-Speed Rail (HSR) network[65], as well as regional and local public transport.
- **Harmonise infrastructure across Europe**, in particular about the European Train Control System (ETCS), platform height, track gauge and the approval of railway vehicles.
- Expand and improve **national and international night train services** as a convenient alternative to air travel.

C. Revolutionising Aviation

- **Abolish taxation exemptions on aircraft fuel**[66] [67]. The tax will apply to all European flights, but there will be exemptions for primary residents of remote European regions.
- Increase efforts to achieve **net-zero emissions in European international and domestic aviation by 2040** through the aviation advisory council (ACARE).
- **Increase funding for green aviation to go beyond current concepts with limited potential based on evolutionary designs** and aim at revolutionary concepts[68].

[64] IRENA (2017), Adapting market design to high shares of variable renewable energy. International Renewable Energy Agency, Abu Dhabi. Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/May/IRENA_Adapting_Market_Design_VRE_2017.pdf.

[65] IEA (2017). Energy use can be 90% lower than for aviation, Energy Technology Perspectives, Catalysing Energy Technology Transformations. *International Energy Agency*. Available at: https://www.iea.org/etp2017/.

[66] According to CEDelft, although it would have a negative impact on aviation employment within the EU (11% reduction), it would decrease CO2 emissions by 11% and noise pollution by 8% while having negligible impact on the total employment and GDP. For more information, consult: Delft, C. E. (2019). Taxes in the Field of Aviation and their impact. *Final Report*. Available at:ç https://cedelft.eu/wp-content/uploads/sites/2/2021/03/CE_Delft_7M16_taxes_in_the_field_of_aviation_and_their_impact.pdf

[67] European Citizens' Initiative, Fairosene. Available at: https://fairosene.eu/

[68] ICAO (2016). "Environmental Report". Available at: https://www.icao.int/environmental-protection/Pages/ENV2016.aspx.

Encourage R&D programmes for environmentally friendly aircraft and infrastructure[69] [70] [71] [72] [73].

- ➢ **Promote more efficient air traffic operations** such as continuous climb & descent operations, European cross-border free-route airspace, airport collaborative decision-making[74] and sustainable fleet routing for contrail formation avoidance[75] [76] through the Single European Sky programme.
- ➢ Improve **legislation to facilitate sustainable aviation** by improving the flexibility of the flight ticket market with name-swap and re-selling regulations. Furthermore, removing frequent flying programs[77], limiting aircraft operational age[78], speed limitations[79], and halting the expansion of airports should be considered unless there is an ETS price of at least 50 €/ton.

[69] For example, synthetic "electro" fuels, hybrid, hydrogen and electrical aircrafts.
[70] Roth, A., & Schmidt, P. (2017). Power-to-liquids: A new pathway to renewable jet fuel. Icao. int. Available at: https://www.icao.int/Meetings/altfuels17/Documents/20170208_ROTH_V1-0_submitted.pdf.
[71] Electro fuels, which require a massive investment in new renewable power generation, are a more sustainable alternative to biofuels and can serve as a bridging function until hydrogen or electrical aircraft are fully developed. For more information, consult: Murphy, A., Earl, T., Hemmings, B., Calvo Ambel, C., Buffet, L., Gilliam, L., & Sihvonen, J. (2018). Roadmap to decarbonising European aviation. *Transport & Environment: Brussels, Belgium*.
[72] Such as with electrification of airport operations.
[73] EEEA, EASA (2016). European Aviation Environmental Report 2016. *Publication of the European Environmental Agency, the European Aviation Safety Agency and the European Organisation for safety of air navigation.* Available at: https://www.easa.europa.eu/eaer/system/files/usr_uploaded/European%20Aviation%20Environmental%20Report%202016%20-72dpi.pdf.
[74] EEA, EASA, Eurocontrol (2019). European Aviation Environmental Report 2016. *Publication of the European Environmental Agency, the European Aviation Safety Agency and the European Organisation for safety of air navigation.* Available at: https://www.easa.europa.eu/eaer/system/files/usr_uploaded/219473_EASA_EAER_2019_WEB_LOW-RES.pdf.
[75] Grewe, V., Frömming, C., Matthes, S., Brinkop, S., Ponater, M., Dietmüller, S., ... & Hullah, P. (2014). Aircraft routing with minimal climate impact: The REACT4C climate cost function modelling approach (V1. 0). *Geoscientific Model Development*, *7*(1), 175-201.
[76] Frömming, C., Ponater, M., Dahlmann, K., Grewe, V., Lee, D. S., & Sausen, R. (2012). Aviation-induced radiative forcing and surface temperature change in dependency of the emission altitude. *Journal of Geophysical Research: Atmospheres*, *117*(D19).
[77] As incentives for more touristic and business flights are increasing the carbon footprint. For more information, consult: Cohen, S. A., Higham, J. E., & Cavaliere, C. T. (2011). Binge flying: Behavioural addiction and climate change. *Annals of Tourism Research*, *38*(3), 1070-1089.
[78] Early commercial aircraft replacement by new more efficient models could significantly reduce emissions. For more information, consult: Schäfer, A. W., Evans, A. D., Reynolds, T. G., & Dray, L. (2016). Costs of mitigating CO2 emissions from passenger aircraft. *Nature Climate Change*, *6*(4), 412-417.
[79] Abergel, T., Brown, A., Cazzola, P., Dockweiler, S., Dulac, J., Pales, A. F., ... & West, K. (2017). *Energy technology perspectives 2017: Catalysing energy technology transformations*. OECD. Available at: https://www.iea.org/etp2017/.

D. Maritime Industry and Shipping

- **Aim for net zero emissions in European waters by 2035**[80] [81], create a dedicated EU agency and initiate public-private partnerships for technological development and implementation.
- **Support the inclusion of all EU seas as an emission control area**[82]**.** Further measures may follow, like a 30% speed reduction for high-emission ocean ships[83] [84].
- **Invest in transparent, publicly-accessible monitoring and reporting of CO2 emissions for all vessels above 5000 GT** in European waters[85], while pushing for cost-effective techniques to include smaller ships.
- **Promote shore-to-ship power (SSP) supply for ships at berth** through harmonised legislation based on best practices and focusing on all European ports, both seashore and inland, with a particular emphasis on the cruise industry[86].

[80] In 2018, the International Maritime Organisation agreed on a 50% reduction of emissions for 2050 . Nevertheless, these reductions are not enough, and more efforts are required to achieve a high probability of limiting the temperature increase below 1.5 degrees. Available at: Anderson(2012) and Kachi (2018).
[81] OECD/ITF (2018). Decarbonising Maritime Transport: Pathways to zero-carbon shipping by 2035. *International Transport Forum*. Available at: https://www.itf-oecd.org/sites/default/files/docs/decarbonising-maritime-transport.pdf.
[82] For greenhouse gases and other pollutants.
[83] A speed reduction of 30% would reduce 33% of emissions by 2030. This would be nonexistent forships using E-fuels, electric or other non fossil fuel based propulsion. For more information, consult: Faber, J. F., Huigen, T., & Nelissen, D. (2017). *Regulating speed: a short-term measure to reduce maritime GHG emissions*. CE Delft.
[84] IPCC. I (2014), Fifth Assessment Synthesis Report, Chapter 8: Transport. Available at: https://www.ipcc.ch/assessment-report/ar5/.
[85] EU (2015) Regulation (EU) 2015/757 of the European Parliament and of the Council of 29 April 2015 on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport, and amending Directive 2009/16/EC.
[86] In accordance with Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure.

VI. Sustainable Buildings

With **36% of the EU's GHG emissions**[87], of which 13% are caused on-site[88], the building sector (residential and commercial) is one of the largest contributors to emissions. Moreover, construction and buildings account for half of all extracted materials, half of all energy consumption, 1/3 of all water consumption, and 1/3 of all waste in the EU. While **technical solutions** for a near-zero-emission building stock do exist**,** legal, financial, and behavioural **hurdles** need to be addressed.

To make the building sector carbon-neutral, changes are needed (lifecycle perspective):

- ➢ **Replacement of individual fossil-fueled heating and cooling installations** with alternatives such as renewably powered electric heating, heat pumps, and solar water heating.
- ➢ **Better energy efficiency** (insulation, energy-saving appliances, behavioural change, etc.) - Use of sustainable building materials when constructing new or renovating existing buildings.

Volt supports the EU's current direction (the EPBD – the Energy Performance of Buildings Directive) which addresses these components. However, the sector must **change more radically** from finite fossil-based resources toward renewable, zero-waste materials. Volt supports measures that accelerate this transition through modernised legislation and advocates for stronger, **pan-European** and more **innovative** policies.

- ➢ **Set near-zero energy building (nZEB) standards for all *new* buildings** in the EU by 2030 and **net-zero emissions for *all* buildings** (including existing building stock) by 2035.
- ➢ **Develop standards for resource-efficient design and integrated construction processes.** Measure the efficiency of building design with both the annual "in-use"

[87] European Commission's energy performance of buildings directive. Available at: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en.
[88] European Environment Agency's GHG emissions by aggregated sector. Available at: https://www.eea.europa.eu/data-and-maps/daviz/ghg-emissions-by-aggregated-sector-2#tab-dashboard-01.

energy and the carbon footprint of the overall construction process (Differentiate between "Operational Carbon" and "Embodied Carbon"). Mapping[89] buildings by continual **energy performance** data will allow **consensus** on the meaning of sustainable design and also allow access to accurate measurement of "**Whole Life Carbon**" within the building lifecycle[90].

- ➢ **Enable owners of homes and offices to make the necessary investments** by harmonising and increasing public financing and by offering direct low-interest financing from the European Investment Bank (EIB). Raise awareness and engage citizens about the possibilities of green buildings[91].
- ➢ **Promote cost-effective energy efficiency measures**[92] and develop standards to support the integration of renewable energy generation into the design of new buildings[93] to shift towards carbon-neutrality in the construction sector. Volt wants to support sustainable and resource-efficient building and living research and enforce the European legislation on "Clean Energy for All Europeans"[94] by restoring and modernising older buildings and designing new buildings to save energy and water.
- ➢ **By modernising legislation, we can overcome legal hurdles to making existing buildings more energy-efficient.** E.g., lower restrictions for landlords to recoup investment costs for energy efficiency renovations through rent adjustments as long as the tenant overall also benefits through energy bill savings. Do not soften architectural preservation rules so that Europe's cultural heritage remains intact.
- ➢ **Embrace the opportunities that new business models** like performance contracting and energy service companies offer.
- ➢ **Encourage the development of a properly sized and well-qualified retrofit industry** through training, labour mobility, and best practice sharing.
- ➢ **Create incentives for innovative buildings to have a positive environmental impact** that beats net-zero targets. Innovate through knowledge transfer by bringing design, engineering, and construction sectors together.
- ➢ **Engage citizens and architects** to raise awareness about the possibilities of combining contemporary design with architectural conservation.
- ➢ **Develop a digital construction platform** where architects and policymakers

[89] Consult Chalmers' live and interactive map of energy use on buildings, available at: https://www.chalmers.se/en/areas-of-advance/buildingfutures/profileareas/Pages/Virtual-City-at-Chalmers.aspx.
[90] For instance, see the example of SideWalk Labs and how they plan to improve the quality of urban life. Available at: https://www.thinkwood.com/clt100book, https://www.sidewalklabs.com.
[91] Saheb, Y., Shnapp, S., & Paci, D. (2019). From nearly-zero energy buildings to net-zero energy districts. *Luxembourg: Publications Office of the European Union. doi: https://doi. org/10.2760/693662*.
[92] For example, better insulation, temperature regulating systems, thermal solar energy for warm water, and higher efficiency equipment, including green heat pumps.
[93] A best practice comes from the United Nations Office for Project Services (UNOPS) in Denmark.
[94] European Commission (2016). Communication on Clean Energy For All Europeans. EUR-LEX. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52016DC0860.

collaborate to address the impacts of climate change on a large scale with community engagement.

- ➢ Sustainable water use and biodiversity are to be incorporated into the planning approval process for land developments. (to be developed further).

VII. Sustainable Agriculture & Land Use, and Natural Carbon Capture

Reducing carbon emissions is only one side of the story. The other side is **carbon capture**. While there have been some efforts to capture emissions directly, they have not had a significant impact[95]. **Healthy ecosystems** are essential to long-term carbon capture ("negative emissions")[96]. **Ecosystem restoration** is therefore vital to rebuilding nature's capacity to capture carbon[97]. One of the greatest causes of ecosystem destruction is agriculture[98], which used 41% of the land in Europe in 2015[99].

In addition to protecting ecosystems from unscrupulous land use, **industrial agriculture** must be reformed. Many current agricultural practices destroy ecosystems (the IPCC estimates land use accounts for 23% of GHGs[100]) and should be replaced with sustainable practices to make agriculture a GHG sink, not only carbon zero[101] [102] [103]. This is also known as regenerative agriculture[104]. Volt wants to phase out subsidies for all agricultural practices that degrade soil, cause erosion or load water bodies with

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[95] Baxter, T. (2017). "It's time to accept carbon capture has failed – here's what we should do instead". The Conversation. Available at: https://theconversation.com/its-time-to-accept-carbon-capture-has-failed-heres-what-we-should-do-instead-82929.

[96] Ruiz, B. I. (2019). "IPCC report: The world gets hungrier, but the land is exhausted – from us and from climate change". DW. Available at: https://www.dw.com/en/ipcc-report-the-world-gets-hungrier-but-the-land-is-exhausted-from-us-and-from-climate-change/a-49783271.

[97] For instance, see: Lo, J. (2019). "Scotland restores its peatlands to keep carbon in the ground", DW. Available at: https://www.dw.com/en/scotland-restores-its-peatlands-to-keep-carbon-in-the-ground/a-50915166

[98] Thiaw, I. (2019). "Opinion: Science guides UN actions to curb land degradation". DW. Available at: https://www.dw.com/en/opinion-science-guides-un-actions-to-curb-land-degradation/a-50268049

[99] Eurostat's land use statistics, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Land_use_statistics.

[100] Shukla, P. R., Skeg, J., Buendia, E. C., Masson-Delmotte, V., Pörtner, H. O., Roberts, D. C., ... & Malley, J. (2019). Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. Available at: https://www.ipcc.ch/site/assets/uploads/2019/08/4.-SPM_Approved_Microsite_FINAL.pdf.

[101] Smith, J. R. (2013). *Tree crops: A permanent agriculture*. Island Press.

[102] Jones, C. E. (2018, February). Light farming: restoring carbon, organic nitrogen and biodiversity to agricultural soils. In *Agriculture, s Innovative Minds Symposium,. Wichita, Kansas, USA* (pp. 1-12).

[103] Ruiz, B. I. (2019). "IPCC report: The world gets hungrier, but the land is exhausted – from us and from climate change". DW. Available at: ttps://www.dw.com/en/ipcc-report-the-world-gets-hungrier-but-the-land-is-exhausted-from-us-and-from-climate-change/a-49783271

[104] On this issue, the work of the nonprofit Regeneration Internation is exemplary. For mor information, see: https://regenerationinternational.org/.

harmful chemicals. Subsidies must be directed toward any agricultural practices that improve topsoil, capture GHGs, protect water bodies, promote biodiversity, and stop or reverse erosion.

- **Utilise natural carbon-capturing by increasing efforts in sustainable forest management, restoration and afforestation**. Agricultural and forestry practices shall be focused on emission reduction and landscape preservation[105] and aim at pre-industrial levels of terrestrial carbon stocks in Europe and combating desertification.
- **Push for conservation and restoration of wetlands**[106]. **Focus on peatlands** (which can store twice as much carbon as forests[107]) **by imposing an immediate moratorium on peat exploitation** until legislation is strengthened to ensure its protection and sustainable management[108], in addition to **actively restoring** already exploited peatlands to their natural state.
- **Stop subsidising unsustainable agricultural practices** and use existing subsidies to promote eco-friendly practices, that build up **topsoil**[109] and reduce the need for fertiliser, pesticides and insecticides and diesel use. Volt sees a lot of potential in current research and development of practices like perennial and **poly-cultural** agricultural production systems, but there are also other promising possible solutions.
- Increase the number of protected wildlife areas, as per the **UN biodiversity plan**[110]. **Ensure the protection of European natural parks with increased funding and firmness against illegal practices**[111] and create an exploitation map to enable all citizens to recognise and report illegal actions performed.
- **Create a European strategy to assess the material needs for the transition,** coordinate key resource processing and extraction, and push for its global

[105] Smith, P., Clark, H., Dong, H., Elsiddig, E. A., Haberl, H., Harper, R., ... & Tubiello, F. (2014). Agriculture, forestry and other land use (AFOLU), Chapter 11. Available at https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter11.pdf.
[106] Gokce, D. (Ed.). (2019). *Wetlands Management: Assessing Risk and Sustainable Solutions*. BoD–Books on Demand. Open access version available at: https://www.intechopen.com/books/wetlands-management-assessing-risk-and-sustainable-solutions
[107] UN Environment Programme (2019). "Peatlands store twice as much carbon as all the world's forests". Available at: https://www.unenvironment.org/news-and-stories/story/peatlands-store-twice-much-carbon-all-worlds-forest.
[108] International Union for Conservation of Nature (2021). "Peatlands and climate change". Available at: https://www.iucn.org/resources/issues-briefs/peatlands-and-climate-change.
[109] Food and Agriculture Organisation of the United Nations (2018). "Transforming food and agriculture and to achieve the SDGs". Point 5. Available at: http://www.fao.org/3/I9900EN/i9900en.pdf.
[110] Convention on Biological Diversity (2020). "Zero draft of the post-2020 global biodiversity framework". Available at: https://www.cbd.int/doc/c/efb0/1f84/a892b98d2982a829962b6371/wg2020-02-03-en.pdf
[111] European natural areas, such as Doñana natural space, are under constant threat as a consequence of illegal groundwater extraction and political inaction.

extension[112].

- ➢ Improvement in protection and health of European **waterways** (only 40% of surface water bodies surveyed by the European Environmental Agency (EEA) in 2018 were found to be in a good ecological state).
- ➢ Reform the **Common Agricultural Policy (CAP)**[113] to increase the focus on sustainable and environmental practices. The **EAGF** and **EAFRD** budgets (e.g., a minimum of 50%) should be directed towards climate and environmental action, and **sustainable agriculture standards** should be **harmonised** across Europe.
- ➢ Adapt EU legislation to define goals and reliable evaluation methods, but not dictate methods. EU farmers are best placed to reform their farming practices with the help of **expert knowledge and financial support**. This way, creativity and freedom to run their farming operations sustainably will be encouraged.
- ➢ Further support **research & development** into ways to build **high-yield eco-friendly agricultural systems** that extract GHGs from the atmosphere and deposit them into our soils, some of which have already been implemented on other continents. The EU should offer support (financial or otherwise) and education to all European farmers to implement these practices.
- ➢ Encourage primary manufacturing industries to connect the supply chain with involved professionals to deliver low-carbon local species and products directly to the market rather than relying on imports. There should be more infrastructure and support given to farmers to access markets and consumers directly, instead of relying on international commodity markets[114]. By giving farmers more market power, we can help them improve their livelihoods.
- ➢ Improve water use in agriculture, with less reliance on **irrigation** and better regulations taking ecosystem health into account (see the earlier point on European waterways).
- ➢ Encourage more sustainable **consumer habits**, e.g., encouraging a plant-based diet, promoting the circular economy (see next section), educating the public on how their diet and other consumption affect the climate, encouraging shoppers to buy seasonal produce and diversifying the ingredients they use, and having a balanced diet.
- ➢ Support farmers who need to change their agricultural practices because of climate change (**climate adaptation**); ensure that the **climate transition** is not overwhelmingly detrimental; as weather patterns change, so too must the types of crops used. Better prepare the agriculture sector for **extreme weather events** like

[112] IEA (2019). Material efficiency in clean energy transitions. *Material and Efficiency in Clean Energy Transitions*.
[113] European Commission's the new common agricultural policy 2023-27, available at: https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap_en
[114] Food and Agriculture Organisation of the United Nations (2018). "Transforming food and agriculture and to achieve the SDGs". Point 2. Available at: http://www.fao.org/3/I9900EN/i9900en.pdf.

floods and droughts.

VIII. Carbon sinks / Carbon sequestering

A.Negative Emissions

To achieve our ambitious goal of limiting warming to 1.5 °C according to the Paris Agreement, Volt supports the development and deployment of negative emission technologies through an appropriate framework of legislation. We aim to develop a portfolio of solutions, both natural and technological, that can be deployed according to best practices and local conditions: Biomass-dependent approaches are best in areas that have large amounts of biomass. In Europe Sweden is a prime example. Energy-intensive approaches like DACCS profit from the availability of suitable storage and infrastructure. Using decommissioned gas platforms is one proposal among many. Biochar is most effective, where its application to the soil, its capacity to store water and reduce nitrate leaching brings the best results. The following list is not conclusive but focuses on those techniques most discussed at the moment. Volt also supports research and development in other promising approaches like ocean-based CO2-removal or enhanced weathering.

B.Afforestation/Reforestation

Afforestation or reforestation are currently the cheapest and easiest ways to generate negative emissions. Forests already capture 10% (155 million tons) of the European greenhouse gas emissions and cover 35% of the European land surface[115]**. We plan to examine where further forest areas can be created, although it is difficult due to the competition with other land uses and, as such, limited space. Therefore, we plan to make the current forests healthier and more resilient with more biodiversity.**

Volt aims for a higher percentage of natural forests and a transition to biodiverse mixed forests in forestry. We promote the symbiosis of agriculture and forests in so-called agroforests and support the development of a controllable definition and its integration into agricultural funding. Deforestation, especially for infrastructure projects, must be considered in terms of climate impact and combined with reforestation.

[115] ForestEurope (2020). “States of Europe’s forests 2020: Summary for Policy Makers”. Available at: https://foresteurope.org/wp-content/uploads/2017/08/Summary_web.pdf.

Another approach is the concept of urban forestry, or smart forest cities, where nature becomes a part of the city through large parks, garden rooftops, and green facades. In this context, we also support the development of other sources of biomass like microalgae[116] and kelp, which support the generation of negative emissions.

C. Biochar

The use of biochar as a carbon sink – PyCCS (Pyrogenic carbon capture and storage) – enables smaller cities and communities without large industries to contribute to negative emissions. The use of shrub cuttings from gardens and the application of biochar involves citizens directly in the climate protection measures of their municipality. When used as a soil conditioner, it results in additional carbon storage effects and additional yields for agriculture, as well as producing renewable energy: a win-win-win situation. But quite often, existing European (and national) laws and regulations stand in the way of its widespread use. One important example is waste regulations: Legally, biochar is treated as a by-product (waste) of bioenergy production, which in turn outlaws many of its possible applications, especially in agriculture. We want to change this and build a legal environment that supports the widespread use and research of biochar in further applications[117], and simultaneously sets clear requirements for quality.

Estimates of the global potential of biochar as a mitigation policy differ widely from moderate to large and are highly dependent on the biomass sources considered. (For example, if you integrate commercially cultivated seaweed like kelp – as already proposed[118] [119] – mitigation potential goes way up.) The IPCC attests, *"Biochar could make a significant contribution to mitigating both land degradation and climate change, simultaneously."*[120]

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[116] Farrelly, D. J., Everard, C. D., Fagan, C. C., & McDonnell, K. P. (2013). Carbon sequestration and the role of biological carbon mitigation: a review. *Renewable and sustainable energy reviews*, *21*, 712-727.
[117] Vereš, J., Koloničnýa, J., & Ochodeka, T. (2014). Biochar status under international law and regulatory issues for the practical application. *Chem Eng*, *37*, 799-804.
[118] Roberts, D. A., Paul, N. A., Dworjanyn, S. A., Bird, M. I., & de Nys, R. (2015). Biochar from commercially cultivated seaweed for soil amelioration. *Scientific reports*, *5*(1), 1-6.
[119] Bates, A., & Draper, K. (2019). *Burn: Igniting a New Carbon Drawdown Economy to End the Climate Crisis*. Chelsea Green Publishing.
[120] Shukla, P. R., Skeg, J., Buendia, E. C., Masson-Delmotte, V., Pörtner, H. O., Roberts, D. C., ... & Malley, J. (2019). Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. Page 398. Available at: https://www.ipcc.ch/site/assets/uploads/sites/4/2021/02/210202-IPCCJ7230-SRCCL-Complete-BOOK-HRES.pdf

The most promising and economical use of biochar is cascade use, for example as animal feed to be spread on the fields later as slurry. We want to build and promote carbon-based agriculture as part of a comprehensive carbon economy[121]. The award-winning "Stockholm Biochar Project" is an international best practice and international pioneer[122]. It has found so many imitators in Europe and the USA that a guide for cities and municipalities has been published[123].

D. Bioenergy with carbon capture and storage (BECCS)

In models depicting pathways in compliance with the 1.5°-Goal, one of the most important negative emission technologies is the combination of bioenergy with carbon capture and storage (BECCS). The IPCC report on Land Use (2019) shows that if applied and restricted to best practices, above climate mitigation additional benefits like the support of farmers' livelihoods are possible[124]. However, due to the huge demand for land, relying on BECCS alone and maximising this technology would threaten food security and biodiversity.

Volt aims to create pathways for the needed implementation of BECCS while at the same time limiting the technology to best practices in light of regional conditions and the Sustainable Development Goals of the UN. Following the recommendations of the British Committee on Climate Change (CCC), we are committed to ensuring that in the future large-scale biomass is only eligible for policy support and public funding if equipped with CCS[125]. We reject overreliance on this approach and see it as an important part of a broader strategy that includes a suite of technologies. Best practices preferably rely on biomass residues and organic waste (like biomethane from manure), but this doesn't completely rule out the use of dedicated biomass if combined with careful land use and sustainable agriculture. The best practice so far is Stockholm's Combined Heat & Power BECCS-Plant, operational since 2019, which burns only wood residues from the Swedish forestry and wood industry.

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[121] Bier, H., Gerber, H., Huber, M., Junginger, H., Kray, D., Lange, J., ... & Nilsen, P. J. (2020). Biochar-Based Carbon Sinks to Mitigate Climate Change. *European Biochar Industry Consortium eV (EBI): Freiburg, Germany*.
[122] Explorer, G. O. (2018). Stockholm: World's First Urban Carbon Sink with Biochar. *Haettu*, *24*, 2020.
[123] Bloomberg Philanthropies (2018) "Bringing biochar to your city: Lessons from the Stockholm biochat project". Available at: https://nordregio.org/wp-content/uploads/2018/05/Replicating-in-Stockholm-booklet-manual.pdf
[124] Shukla, P. R., Skeg, J., Buendia, E. C., Masson-Delmotte, V., Pörtner, H. O., Roberts, D. C., ... & Malley, J. (2019). Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. Page 27. Available at: https://www.ipcc.ch/site/assets/uploads/sites/4/2021/02/210202-IPCCJ7230-SRCCL-Complete-BOOK-HRES.pdf
[125] Committee on Climate Change (2018) "Biomass in a low-carbon economy". Available at: https://www.theccc.org.uk/wp-content/uploads/2018/11/Biomass-in-a-low-carbon-economy-CCC-2018.pdf

It is noteworthy that Bioenergy with Carbon Capture and Storage (BECCS) is also a source of energy which, if used to replace fossil fuels, has additional mitigation potential above and beyond the potential CO_2 removal considered here. For this reason, biomass plays an important role in energy-transition scenarios, whether combined with CCS or not. Volt is committed to ensuring only sustainable agricultural and forestry practices are employed and food security is not at risk, no matter how *exactly* biomass will be integrated into future energy systems and the wider economy.

E. Direct Air Carbon Capture & Storage (DACCS)

Volt sees Direct Air Carbon Capture and Storage (DACCS) as a key technology to ambitious climate policy that limits warming to 1.5 degrees. While land-based approaches such as afforestation, biochar or bioenergy+CCS (BECCS) can make an important contribution, their feasibility is limited due to high land requirements. DACCS, on the other hand, as a purely technical process without a significant land footprint, has no comparable limitations and is therefore more environmentally friendly. Above that, models show that, in the long run, DACCS is also cheaper due to better economies of scale. Not restrained by land-use requirements, the technical potential of DACCS is nearly unlimited. For example, a study from 2019 reports a potential of up to 155 GT/y by 2050 in the Maghreb region alone (based on solar), outstripping any reasonable demand assumptions by an order of magnitude[126]. Other studies considering questions of scalability reach far smaller numbers, especially for 2050, but even these studies assess potential by 2100 of up to 40 GT/y – still twice the amount needed in the upper-end of estimates[127]. Most recent research highlights the importance of technological learning curves and the constraints on the speed with which novel industries can scale[128]. One important result is that, in the long-term, carbon removal from DACCS profits greatly from early deployment (even before the energy system is completely carbon free) to achieve technological maturity.

The one important drawback of DACCS is the high energy demand. However, it seems possible that this demand can be reduced considerably – cut in half or even more – with further technological progress. Still, all estimates of future energy demand and production are highly dependent on assumptions about how many negative emissions are

[126] Breyer, C., Fasihi, M., & Aghahosseini, A. (2020). Carbon dioxide direct air capture for effective climate change mitigation based on renewable electricity: a new type of energy system sector coupling. *Mitigation and Adaptation Strategies for Global Change*, *25*(1), 43-65.
[127] Fuss, S., Lamb, W. F., Callaghan, M. W., Hilaire, J., Creutzig, F., Amann, T., ... & Minx, J. C. (2018). Negative emissions—Part 2: Costs, potentials and side effects. *Environmental Research Letters*, *13*(6), 063002.
[128] Hanna, R., Abdulla, A., Xu, Y., & Victor, D. G. (2021). Emergency deployment of direct air capture as a response to the climate crisis. *Nature communications*, *12*(1), 1-13.

needed, which technologies will be employed, and how they will be integrated into our energy systems. Identifying best practices is one of the major tasks of the coming decade, and Volt is committed to supporting further development and deployment of DACCS. This includes the building of a supportive legal framework. Laws hindering or outright prohibiting geological storage of carbon, as they currently exist in some European countries like Germany, have to end.

Direct Air Capture pilot plants have been successfully operated in Europe and the USA. In Europe, there are plants in Iceland, Switzerland, and Italy. Best Practice is Iceland. The carbon extracted from the air is geologically stored, where it mineralizes—petrifies—quickly. After a successful test operation of a small pilot in 2017, the first large plant, "Orca", is currently being built with funding from the EU (Carbfix Project). Starting in spring 2021, it will remove 4000 tonnes of CO_2 permanently from the atmosphere annually. Replication of the successful Carbfix project is currently being prepared – again with funding from the EU – at three other locations in Turkey, Italy, and Germany.

To cope with the high costs of entering the technology, we want to make it mandatory for the fossil industry to remove an initially small fraction of the emissions caused by their products (1-2%) from the air. This percentage may increase in the future, as soon as technological maturity is achieved and costs start to sink.

IX. Adaptation Strategies

Even in the best scenario, limiting global warming to below 1.5 degrees, climatic changes will be significant and will require communities to increase their adaptive capacity. Strategies need to be developed in many areas to adapt to consequences such as a rising sea levels[129], weather migration or disaster management, amongst others. Volt will:

- **Reinforce flood defences of vulnerable European coastal areas and implement long-term coordinated adaptation plans within vulnerable European regions.**
- **Create a European agency to control and coordinate the response to natural disasters and mitigate their consequences through an EU-wide collaborative approach**.
- Create a strategy for insurance underwriters[130] and risk management to have assessments over a minimum of 50 years of protection. Subsidies and a compulsory fraction of capital reserves are to be ring-fenced for spending on infrastructure that mitigates climate catastrophes.
- **Support legally binding treaties[131] that fund planned migration as an adaptation strategy**. This can prevent conflicts, preserve lifestyles[132], **and give a clear definition of "climate migration" to manage relocation.**
- **Explore the possibility of applying circular economy principles as a strategy for policy reform**. The theory of circular economy can be distilled into three core focus areas which can be applied to adaptation plans: design-out waste and pollution, retain materials in-use continually, and regenerate natural ecosystems.

[129] United Nations Framework Convention on Climate Change (2009). "Climate Change Adaptation Strategies for Local Impact". Available at: https://unfccc.int/resource/docs/2009/smsn/igo/054.pdf.
[130] Morana, C., & Sbrana, G. (2019). Climate change implications for the catastrophe bonds market: An empirical analysis. *Economic Modelling*, *81*, 274-294.
[131] Foresight (2011), Migration and Global Environmental Change: Future Challenges and Opportunities: Final Project Report, London, The Government Office for Science. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/287717/11-1116-migration-and-global-environmental-change.pdf.
[132] Femia, F. and Werrell, C. (eds.) (2013), The Arab Springand Climate Change: A Climate and Security Correlations Series , USA, Center for American Progress.

X. Politics, Budget, and Governance of the Fair Transition

The transition to a carbon-neutral economic system is a colossal undertaking and will redefine the EU's industry, society, landscape, and even culture. Achieving this vision quickly and effectively will require the EU to change its self-organisation and its governance. Similarly, funding new green infrastructure, power generation, buildings, and R&D capital investments will require investments of unprecedented scale.

Citizens are key actors in this transformation, and Volt encourages their strong empowerment and participation. At the same time, even the best carbon regulation can cause substantial redistribution of income and wealth amongst citizens, companies, industries, and even states. While structural and sectoral changes are natural corollaries of transformative progress, it is the responsibility of politicians to protect the weakest and least adaptable members of society and create new opportunities.

But even if the EU succeeds with its most ambitious carbon reduction plans, these will cut only 10% of global emissions. Strong diplomatic influence over extraterritorial emitters, foreign countries, companies, and citizens is hence the EU's instrument to solve this truly global challenge.

A.'United in diversity': the role of the EU and the Member States

In the context of the energy transition, the role of the EU is to set (a) overall goals and (b) conditions for deployments to ensure safety and equality for all Member States. In more detail, the EU should:

- Institute **stimulus packages** to achieve those goals.
- Act as a **high-level system integrator** to ensure that the goals are achieved (e.g., European wide transmission systems for energy, quality requirements for supply, European management and control systems).
- Serve as the final arbiter on deployment conditions.

Under the "European Green Deal", a package of measures has been provided to support the energy transition until its completion. Further stimulus after such a milestone should be provided by other means.

In this context, Member States still have a significant role in determining key decisions for their energy transition pathways, together with the related financial costs. These decisions should include:

- ➢ Deciding on their actual energy supply, including the involvement of industry;
- ➢ Setting local conditions for deployment, in alignment with the European conditions and system integration requirements;
- ➢ Determining local decisions for energy distribution, management, and control systems;
- ➢ Ensuring full integration within the European framework.

B. Green Governance

There is enormous potential within European institutions to take the necessary actions to prevent catastrophic damage while managing and monitoring the transition to a more sustainable energy ecosystem. It is important to support the development of key technologies while easing regulation and promoting new green initiatives. Furthermore, we need intelligent policies and investments through a coordinated European Union, supported by multidisciplinary and highly qualified professionals. Volt's suggestions are, therefore,

- ➢ **Create a multi-disciplinary European Climate Action and Energy Transition Agency (CAETA), or expand the competencies of a suitable existing organisation accordingly**, which will coordinate a climate action partnership network in close collaboration with **all relevant Directorate Generals and agencies. CAETA can manage the proposed funding**[133] **for the energy transition and climate action** and will be in charge of identifying, developing, and supporting regional and local sustainable projects[134]. Furthermore, the agency will be in charge of assessing knowledge and technology transfer programmes to developing nations in close collaboration with the proposed Climate Diplomacy Group.
- ➢ **Check all new EU legislation for their climate impact** and make compliance with the EU's reduction targets a requirement, similar to budget approval[135]. Existing legislation will be reviewed and revised according to the same principles.
- ➢ **Increase transparency and awareness of exported and imported CO2e**

[133] Funds and Additional Financing Instruments.
[134] We would promote a collaboration with the EU Covenant of majors and encourage all EU towns to join them and similar initiatives as it can engage local authorities in climate action.
[135] Some legislation will inevitably cause higher emissions; this rule must hence apply at an aggregate level, e.g. DG.

emissions by yearly reporting and implementing "CO2e in trade reduction targets" to reduce emissions globally.

- ➢ **Direct participatory budgets to citizens' green initiatives aimed at reducing our environmental impact at all levels of governance**.
- ➢ **Create citizens' assemblies at all governance levels to ensure that citizens' demands for a fair energy transition are met.**
- ➢ **Create a smart platform to link the energy transition planning from CAETA with citizens**, providing feedback regarding carbon footprint, sustainable options to encourage behavioural change[136], and crowdfunding and participatory budgets for a sustainable accelerator platform.
- ➢ **Empower citizens by improving publicly available information for more conscious energy consumption.** Volt will increase climate change knowledge and awareness by including climate change information in public communication channels and at all education levels[137]; by mandating and improving cradle-to-grave carbon footprint declarations on products and services, starting with unambiguous carbon footprints coming from travel and fuel; and by promoting education and awareness-raising initiatives on environmentally friendly travel.

C. Funding and social transition

With the right regulatory framework, private banks will likely cover the lion's share of the multi-trillion-euro green investments. Yet, public funding will, in some cases, likely be needed as a complement. Low-income demographics are likely to get hit hardest by green regulations like the introduction of a carbon price, the redirection of subsidies, and new restrictions for carbon emitters. Volt wants to alleviate undue social distortions, and prevent the rise of populist parties by proposing the following:

- ➢ **Stop all subsidies for all fossil fuels** as they function as a negative cost on carbon and currently amount to €40-200 billion per year[138]. Redirect those subsidies to compensate citizens for higher costs and fund the EU's green transition.
- ➢ **Raising funds to support the energy transition through the European Investment Bank and other public investment banks within the EU, with the support of the European Central Bank**. Furthermore, any new European stimulus

[136] Feedback and consumption advice could produce 20% of electricity savings. For more information, consult: Baud, R. (2013). "Policy and Decision Making". In *Handbook of Sustainable Engineering*, Springer Netherlands.
[137] Baud, R. (2013). "Education and Outreach". In *Handbook of Sustainable Engineering*, Springer Netherlands.
[138] European Parliament, Directorate General for Internal Policies, Policy Department, Economic and Scientific Policy, Analysis on Fossil Fuel Subsidies. Available at http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/595372/IPOL_IDA(2017)595372_EN.pdf.

package must contain at least 50% of green spending[139].

- ➢ **Use the proceeds from CO2 pricing for three purposes:**
  - **Direct cash payments to citizens ('carbon dividends') to compensate for higher consumer price levels resulting from the expanded carbon pricing.** This is a widely recommended model[140] and successful best practice in Switzerland and Canada[141].
  - **Subsidies for green products and investments[142] to change individual behaviour and steer the green transformation at the individual level** while also benefiting citizens monetarily to offset price increases, and
  - **Direct state investments in green R&D and infrastructure such as future energy technologies or pan-european power grids (on top of regular budget).**

  All proceeds should be spent in the country they originate from to avoid unintended financial re-distributions across EU countries.

  The total annual budget is expected to be around €200 billion (order of magnitude) - a significant amount (1 - 1.5% of GDP). The Member States will decide which green products to subsidise, and which R&D projects to fund.

  The proceeds should be divided evenly in a balanced mix with 33% for carbon divvied, 33% for green product subsidies and 33% for state investments for green R&D + infrastructure.

- ➢ **Use tax revenue and cost savings collected from the former fossil fuel subsidies to directly fund relevant climate mitigation and adaptation projects**, including social adaptation like retraining (see below).
- ➢ **Ensure that at least 50% of the EU expenditure contributes to the climate objectives** to strengthen action in key areas and through direct climate action[143] and for climate mainstreaming across all EU programmes.
- ➢ **Increase spending on climate-action related research and development** and on the EU-wide energy and transport cross-border infrastructure through the innovation fund and the NEW 300 programme, the fossil-fuels subsidy phase-out,

[139] Bowen, A., Fankhauser, S., Stern, N., & Zenghelis, D. (2009). An outline of the case for a 'green'stimulus. London School of Economics. Available at: http://eprints.lse.ac.uk/24345/1/An_outline_of_the_case_for_a_green_stimulus.pdf.
[140] Climate Leadership Council (2019). "Economists' Statement on Carbon Dividends". Available at: https://clcouncil.org/economists-statement/.
[141] Klenert, D., Mattauch, L., Combet, E., Edenhofer, O., Hepburn, C., Rafaty, R., & Stern, N. (2018). Making carbon pricing work for citizens. *Nature Climate Change*, *8*(8), 669-677.
[142] Like cheaper public transport, buying incentives for electric cars, lower VAT for non-meat food, subsidies for building insulation, as Switzerland shows.
[143] At the time of writing, the EU has a target of 25% of the Multiannual Financial Framework for 2021-2017.

and with the support of the EU budget and European financial institutions.

- ➢ **Create programmes for the re-training and re-employment of workers from the fossil fuel industries;** create re-employment programmes oriented towards other professions; and promote the creation of subsidised professional training courses**.**
- ➢ **Enable easier balancing of the interests of individual citizens and society overall when it comes to infrastructure built near residences to overcome resistance and accelerate the transition**. E.g., enabling and supporting citizens' participation in infrastructure investments, either individually or as a municipality.
- ➢ **Incentivise institutional investors and the financial sector to shift resources away from fossil fuels toward climate-friendly solutions**[144]**.** All public administrations, banks, pension funds, etc., need to take their funds out of fossil fuels.
- ➢ **Support research, training, and capacity-building programmes for investors and business professionals** to encourage corporate social responsibility together with effective and efficient financing for the climate revolution. Support the creation of such training schemes for responsible public and private financing.

D. Climate Diplomacy

About 90% of the world's emissions happen outside the EU; 15% come from tropical deforestation alone. It is therefore not enough to only cut emissions in Europe—the EU should leverage its soft power as a trade powerhouse to foster global carbon neutrality through excellent diplomacy, green trade agreements, tropical reforestation, green development cooperation, global adoption of carbon pricing, a geoengineering treaty, and a geoengineering framework. This requires making climate protection a top foreign policy goal. A relatively small investment in diplomatic excellence can have a decisive impact in solving this climate crisis.

- ➢ **Create a joint dedicated Climate Diplomacy Group by the EU's Common Foreign and Security Policy (CFSP) and the Directorate-General for Climate Action (DG CLIMA) to amp up the EU's climate diplomatic efforts and support other DGs.**
- ➢ **Use trade agreements** as a tool to advance environmental protection and climate action abroad[145] by making them **contingent on compliance with the Paris**

[144] Such as, shifting towards a low-carbon economy, climate risk resilience, and environmental expertise on corporate boards.

[145] Holzer, K., & Cottier, T. (2015). Addressing climate change under preferential trade agreements: Towards alignment of carbon standards under the Transatlantic Trade and Investment Partnership. *Global Environmental Change*, *35*, 514-522.

Agreement and other environmental and emission standards[146]. Volt specifically opposes trade agreements with countries contributing to serious environmental damage and sees trade agreements as a way to induce stricter climate action worldwide.

- ➢ **Drive the protection and restoration of tropical rainforests** and other carbon sinks through **monitoring, regulation, and investment**. This can include bans on damaging products like non-sustainable tropical wood or palm oil from former rainforest areas and using the full arsenal of international diplomacy, such as imposing sanctions for environmental abuses[147].
- ➢ **Centre development cooperation around climate protection** through transfer of technology, know-how, and best practices to enable the leapfrogging of developing countries to decarbonized economies. Aid to developing nations should adhere to the UN's sustainable development goals. This would mean, for example, supporting **low-carbon development**. The **UN sustainable development partnership** with Ghana is exemplary[148].
- ➢ **Working towards expanded adoption as well as the harmonisation of carbon pricing schemes globally**, with the objective of a single global carbon pricing framework
- ➢ **Encourage the creation of an international panel on geoengineering under the auspices of the United Nations to prevent its potentially dangerous and unethical deployment.** This should happen in close and transparent cooperation with the IPCC, leading geoengineering experts, and national governments, and the Oxford Principles on Geoengineering should be followed. These technologies shall not be part of a transition strategy but only a last resort, and must be agreed on an international level. The focus of this panel should be on potentially dangerous forms of geoengineering like solar radiation management; in contrast, greenhouse gas removal through Carbon Capture and Storage (CCS) and reforestation is actually encouraged and hence not in focus.
- ➢ **Recognize ecocide through an amendment to the Rome treaty and push the international community to follow**. Push for the creation of an international environmental court, within the EU and UN, to make ecocide completely universal[149] and extend it to regions of armed conflicts for biodiversity protection through a 5th Geneva Convention.

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[146] Such as, with the USA with Trump's recent announcement to withdraw from the Paris Agreement, as this would harm climate action worldwide.
[147] Parker, R. W. (2001). The Case for Environmental Trade Sanctions. In *Widener L. Symp. J.* (Vol. 7, p. 21).
[148] For more information, consult the Sustainable Development Framework 2018-2022 between Ghana and the United Nations, available at: https://ghana.un.org/en/10146-united-nations-sustainable-development-framework.
[149] Ecocide can be present when a company decides to invest in fossil fuel energies for a long term strategy, or when a politician acts to oppose environmental regulations without alternatives which would decrease pollution and GHG emissions.