

Volt's Energy Transition and Climate Change Policy

*A Comprehensive Green Transformation of
Europe*

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I. Energy Transition and Climate Change

Introduction

The 2015 Paris Agreement¹ was a diplomatic breakthrough in the fight against climate change. Almost all countries committed to limiting global warming to 2°C and aiming for 1.5°C through strict and continuously reported nationally determined contributions (NDCs). Yet, despite good intentions, mankind remains far away 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 The 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 behavioral revolutions to live in a well-balanced world, where corporations, governments, and citizens take a larger responsibility for the future of our generations and our planet.

Volt envisions a transition with the primary objective of stopping anthropogenic global warming, plus 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.

A. Increase the Targets on Emission Reduction to Drive Behavioral Change

Given the difficulties and the urgency required, Volt will not only take steps to declare a climate and biodiversity emergency in the European Union but will also push for ambitious comprehensive climate policies. Volt sees the supply of cleaner energy as an ongoing process and supports building a strategy for achieving the decarbonization of energy supply in the EU by 2035.

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 <https://climateactiontracker.org/global/temperatures/>

- **Reduce net greenhouse gas emissions³ in the European Union by a minimum of 80% by 2030⁴ compared to 2019 and by 100%⁵ by 2040 so that the EU becomes carbon-neutral and contributes its fair share to reach 1.5°C warming by 2100 with a 66% chances^{6,7}**
- **Implement measures that ensure and support a transformation on a technological level as well as on the behavioural and structural side.**

Volt wants to drive a technological revolution, while building upon the contribution of every citizen consuming in a more sustainable way.

- **Develop and start implementing a long-term carbon carbon negativity strategy** to succeed the 2040 carbon neutrality milestone in order to create a buffer in case other economies do not contribute their fair share and to reverse damaging global warming in the long run. Carbon sinks / carbon sequestering should be its main focus, both technical solutions like Carbon Capture & Sequestration (CCS) and especially natural carbon sinks like rewilding and sustainable agriculture.

B. 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 that, 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

³ "Net" emissions are actual (gross) emissions minus negative emissions (carbon absorption/sequestration). According to the latest available data, the EU has net emissions of roughly 4.0Gt annually, consisting of 4.3Gt gross emissions and -0.3Gt negative emissions.

⁴ The current EU target is 40% compared to 1990; 55% are actively being discussed by leading EU politicians

⁵ <https://felix-benning.shinyapps.io/emissionmodel/>

⁶ Reflecting the remaining global CO2 budget for the 1.5°C/66% goal (according to IPCC) distributed evenly across all global citizens and spread realistically over time. Calculations:

<https://felix-benning.shinyapps.io/emissionmodel/>

⁷ A Smart Energy System approach for Europe could increase renewable energy penetration to over 80%. Conolly et al, 2016, " Smart Energy Europe: The technical and economic impact of one potential 100% renewable energy scenario for the European Union "

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.

1. Pricing Greenhouse Emissions

- **Extend the ETS to further sectors to cover at least 90% (2019 ca. 45%) of all EU carbon emissions by 2022 at the latest** under a single cap in order to reduce emissions efficiently and predictably. All forms of fossil fuels shall be included, independent from the usage, covering the sectors energy supply, industry⁸, transport, residential and commercial⁹. 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 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 2020¹⁰ and aiming for 100% reduction by 2040.
- **Introduce an EU-wide price corridor for EU ETS auctions and trade** in order to create predictability for investments (price floor) and prevent excessive prices above the social cost of carbon (price ceiling). Volt suggests to use the newly introduced CO₂e tax¹¹ (see below) as a reference point and allow 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’.¹²
- **Introduce a carbon tax for any sectors where an expanded ETS would cause disproportionate administrative efforts** (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.**¹³ That is 65.40€ per ton in 2021, gradually

⁸ B. J. Ruijven et al, 2016, “ Long-term model-based projections of energy use and CO₂ emissions from the global steel and cement industries ”, Resources, Conservation and Recycling

⁹ https://www.eea.europa.eu/data-and-maps/daviz/ghg-emissions-by-sector-in#tab-chart_1

¹⁰ European Commission, EU Emissions Trading Scheme (EU ETS), available at https://ec.europa.eu/clima/policies/ets_en

¹¹ CO₂e = CO₂ equivalents

¹² German Council of Economic Experts, Special Report 2019, “ Setting Out for a New Climate Policy ”

¹³ 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>

rising up to 205€ in 2030.^{14 15 16} CO2e pricing shall be reviewed on a regular basis, potentially increasing further if necessary but not exceeding the range of scientific consensus of the global social cost of carbon.

- **Volt supports national CO2e pricing until there is a European solution.** Although Volt clearly favors an ETS over a carbon tax, Volt would support a strong carbon tax on 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 declarations on products or the implementation of a carbon added tax (CAT).¹⁷ Similarly, measurement and monitoring of emissions by geography, sector and (large) company should be strengthened where needed in order to ensure a transparent, reliable and trustworthy basis for carbon pricing.
- **Removed, captured or avoided Greenhousegas equivalents shall be included in the ETS System where feasible, or lead to a refund equivalent to the CO2e tax** in order 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.¹⁸

2. Sector-Specific Regulation

- **Land Use, Land-Use Change and Forestry (LULUCF)** shall be included in the ETS treating each member state as a single emitter. While accounting shall take place on EU level, this leaves the freedom for each Member State to respect their circumstances and follow their own strategy.¹⁹
- **The aviation industry shall be included in the ETS without any exemptions, incorporating all climate effects as CO2e to the best scientific knowledge.**^{20 21}

¹⁴ Carbon price variations in 2°C scenarios explored

¹⁵ Carbon Pricing Leadership Coalition, Report of the High-Level Commission on Carbon Prices

¹⁶ Methodological Convention 3.0 for the Assessment of Environmental Costs

¹⁷ Today, 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

¹⁸ Note: This solar geoengineering does not qualify as greenhouse gas removal.

¹⁹ E.g. Sweden demands three new trees planted for each tree cut; this proved successful since 1903

²⁰ CEDelft, 2008, "Lower NOx at Higher altitudes: Policies to Reduce the Climate Impact of Aviation NOx emissions"

²¹ U.S. National Oceanic and Atmospheric Administration, The use of non- CO 2 multipliers for the climate impact of aviation: The scientific basis found at www.icao.int

²² ²³ Direct off-setting by the industry will not lead to a reduced amount of ETS certificates needed. The amount of free allowances shall be reduced from currently 83% to 0% in 2022. In the long term, the EU shall push for the alignment of CORSIA to the ETS. ²⁴ ²⁵

- **Ships within or entering European waters shall be subject to a carbon price (ETS or tax).** ²⁶ ²⁷ ²⁸ The price shall apply to all vessels above 5,000 gross tonnage on a per-voyage berthing fee paid to the port authorities.
- **Agricultural emissions from livestock and soil shall be taxed at the source** because these are local and fragmented. Other non-sector-specific emissions in the agricultural sector (like electricity, tractor fuels) shall be covered mid- or upstream by the ETS.

3. 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.

- **Implement comprehensive Border Carbon Adjustments (BCAs) at the EU's external borders, in order to prevent carbon leakage and create a level competitive playing field between European and non-European companies.**²⁹ 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

²² ESU-Services, Aviation and Climate Change: Best Practice for Calculation of the Global Warming Potential, available at www.esu.services

²³ H. A. Edwards, D. D. Hardy, Wadud, Z., 2006, " Aircraft cost index and the future of carbon emissions from air travel" <http://www.esu-services.ch/fileadmin/download/jungbluth-2018-RFI-best-practice.pdf>

²⁴ J. D. Scheelhaase, 2019, " How to regulate aviation's full climate impact as intended by the EU council from 2020 onwards "

²⁵ Roadmap to decarbonising European Aviation

²⁶ In 2018, the International Maritime Organization agreed on a 50% reduction of emissions for 2050. Nevertheless, these reductions are not enough (available at Anderson(2012) and Kachi(2018)), and stronger action is required to limit the temperature increase below 1.5 degrees with high probability.

²⁷ A. Kachi, et al, 2019, " Carbon pricing options for international and Maritime emissions ", Newclimate.

²⁸ I. Parry, D. Heine, K. Kizzier, T. Smith, 2018 " Carbon Taxation for International Maritime Fuels: Assessing the Options ", ISBN: 9781484374559/1018-5941

²⁹ Carbon border adjustments are (today) among the most universally proposed policies as a complement to any domestic carbon price to prevent carbon leakage <https://www.clcouncil.org/economists-statement/> ; see also <https://www.sachverstaendigenrat-wirtschaft.de/en/special-report-2019.html> , point 17 and <https://www.economist.com/the-economist-explains/2017/02/17/are-carbon-tariffs-a-good-idea>

such countries. End the practice of free allowance allotment ('grandfathering') to entire companies or industries.

- **Border tax adjustments shall also be implemented not just on selected domestic, CO₂-intensive industries in global competition but also on a broad range of imported goods**, to shift consumption to more sustainable products using the price mechanism.^{30 31}
- **Use possible net gains of import and export adjustments** to finance the global climate change Adaptation Fund and the Green Climate Fund³², both of which were established under the Paris Accord but lack funding.

C. Energy Transition in the European Electrical System

The current society and economy is built on the assumption that "energy demand dictates the supply". To reduce the negative effects on our ecosystem, Volt suggests shifting to green energy sources and changing behavioural patterns towards a more conscious use of energy.

1. Electricity Market

- **Promote liberalisation of electricity markets, especially at the retail level**, and encourage consumers to switch to green power suppliers through transparent pricing and reduced switching barriers to guarantee true market competition and fair prices. Separate the ownership of power generation, transmission, distribution and retailing, and allow direct bilateral agreements between suppliers and consumers.^{33 34}
- **Create a coordinator network of cross-border regional Independent System Operators (ISO) in Europe** through evolving RSCs and ENTSO-E as consultants.
- **Adopt nodal dynamic electricity pricing³⁵ throughout the EU** to account for network constraints rather than political borders, and ensure economic

³⁰ https://climatestrategies.org/wp-content/uploads/2017/12/CS_report-Dec-2017-4.pdf

³¹ Böhringer, C., Carbone, J.C., and Rutherford, T.F. (2012), 'Unilateral Climate Policy Design: Efficiency and Equity Implications of Alternative Instruments to Reduce Carbon Leakage', *Energy Economics* 34: 208-217

³² https://ec.europa.eu/clima/policies/international/finance_en

³³ Sven Teske et al, 2019, 13.2.1.6 Political Framework for Power Markets in "Achieving the Paris Climate Agreement Goals", Springer.

³⁴ International Renewable Energy Agency, 2017, "Adapting Market Design to High Shares of Variable Renewable Energy"

³⁵ Nodal dynamic pricing, or locational marginal pricing, means that (opposite to zonal static pricing) the wholesale electricity price differs at every node of the electricity grid in order to reflect supply, demand and transmission losses in each spot at all times; see Hogan, William W. "On an 'Energy Only' Electricity Market Design for Resource Adequacy."

https://sites.hks.harvard.edu/fs/whogan/Hogan_Energy_Only_092305.pdf

dispatching, subject to transmission and operational constraints³⁶, well-aligned generation, demand and network management, and adequate investment incentives.^{37 38}

- **Harmonise the 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 minimizing the need for fossil fuel power plants as back-up for intermittent renewable generation capacity.
- **An EU-wide adoption of smart meters and variable pricing 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.**

2. Renewable Energy System

- **Promote a diversified portfolio of renewable energy sources (RES) to enhance flexibility and reflect its value in the market price³⁹.** Volt will promote further research on geothermal energy⁴⁰, ocean thermal energy conversion⁴¹, tidal and wave energy, residual heat from industry⁴², biomass as well as new designs for solar and wind energy, to enable a mix of intermittent and mutually complementing sustainable energy sources. Furthermore, we will **promote low-carbon and disruptive technologies, such as sustainable chemistry concepts⁴³, bio-based solutions, and organic⁴⁴** and plastic waste-to-fuel concepts with particular emphasis on the shift from theory and prototypes to large-scale

³⁶ R. A. Verzijlbergh, et al, 2017, "Institutional challenges caused by the integration of renewable energy sources in the European electricity sector"

³⁷ Neuhoff K, Hobbs BF, Newbery D., 2011, "Congestion management in European power networks: criteria to assess the available options", Tech. rep., Discussion Papers, German Institute for Economic Research. DIW Berlin.

³⁸ Borggrefe F, Neuhoff K. 2011, "Balancing and intraday market design: options for wind integration", Tech. rep., Discussion Papers, German Institute for Economic Research, DIW Berlin

³⁹ R. A. Verzijlbergh, et al, 2017, "Institutional challenges caused by the integration of renewable energy sources in the European electricity sector"

⁴⁰ VITO, Deep Geothermal Energy ; Geowatt, and <https://vito.be/en/geowatt>

⁴¹ Ocean Energy Europe, Ocean Thermal Energy Conversion, and U.S. Energy Information and Administration, Hydropower Explained: Ocean Thermal Energy Conversion

⁴² Research on thermal networks for use in business parks and large urban districts, like in the Port of Antwerp: Antwerp South can use the heat generated by the petrochemicals industry by laying an extensive thermal network that connects different energy sources in an intelligent way. Energy Ville, EPOC 2030-2050

⁴³ Sustainable Chemistry and Pharmacy, The concept of sustainable chemistry: Key drivers for the transition towards sustainable development

⁴⁴ Waste-to-Energy biofuel production potential for selected feedstocks in the conterminous United States, 2017, <https://www.sciencedirect.com/science/article/pii/S1364032117313631>

applications.

- **Promote the total phase-out of coal by 2030 (lignite by 2025)**, prohibit new permits to drill for fossil fuels, and eliminate flaring immediately⁴⁵. Leave 80% of all known fossil fuel reserves in the ground⁴⁶. Prohibit advertising fossil fuel products similar to cigarette ad bans.
- **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.⁴⁷
- **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.⁴⁸
- **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.^{49 50 51}
- **Simplify regulation for approvals and embrace participatory financing schemes for RES infrastructure** in order to accelerate RES deployment and make citizens and municipalities benefit financially.
- **Enable and advocate for a decentralized and autonomous energy generation** as well as supply and regional distribution structures. Volt will promote installation of energy storage at home and on grid level through incentives/tax deductions.
- **Foster the deployment of demand response** by putting its providers on par with generation and storage capacity to expand the availability of zero-carbon balancing capacity to complement intermittent renewables at virtually zero capital expenditure.
- **Support studies on the economic, technological and behavioural aspects of energy systems within the proposed EU Agency for Climate Action**, that will

⁴⁵ Flaring operations result in around 270 MtCO₂ of emissions, while the gas could be utilised or stored. International Energy Agency, 2019, “Flaring Emissions”, available at <https://www.iea.org/tcep/fuelsupply/flaring/>

⁴⁶ IPCC, Climate Change 2014, Mitigation of Climate Change, Contribution of Working Group III to the Fifth Assessment Report, Chapter on Energy Systems

⁴⁷ “The importance of the gas infrastructure for Germany’s Energy Transition”

⁴⁸ Medjroubi et al, 2017, “ Open Data in Power Grid Modelling: New Approaches Towards Transparent Grid Models ”, Energy Reports

⁴⁹ W. Zappa et al, 2019, “ Applied Energy, Is a 100% renewable European power system feasible by2050? ”

⁵⁰ Fraunhofer IWES, 2015 “The European Power System in 2030: Flexibility Challenges and Integration Benefits. An Analysis with a Focus on the Pentalateral Energy Forum Region”. Analysis on behalf of Agora Energiewende., Tech. rep..

⁵¹ G. CzischJ. Schmid, 2014, “ Low Cost but Totally Renewable Electricity Supply for a Huge Supply Area - a European/Transeuropean Example ”

help monitor and assess the supply and demand of energy for businesses and decision-makers.⁵²

- **Continue the harmonization of technology and engineering standards across Member States** to increase energy efficiency and reduce waste. Specifically update EN 50160 to align voltage levels (“precision supply”) after the UK left the EU.
- **Promote enhanced and harmonised financing of relevant infrastructure** for centralised and decentralised energy solutions.

3. Nuclear Energy

Nuclear energy is a low-carbon baseload electricity source⁵³. Yet, unresolved risks like nuclear waste, nuclear material proliferation, and potentially catastrophic nuclear accidents remain. While nuclear energy in its current form is incompatible with a vision of a truly sustainable world, and its economic competitiveness with renewable sources is questionable^{54 55 56 57}, Volt deems fast, large-scale CO₂ reductions as more urgent given the current planetary climate crisis, and hence propose the following:

- **Start the decommissioning of current types of nuclear reactors at the latest when safety concerns require so, or the full cost of nuclear energy (including for waste disposal) exceeds the full cost of renewable energy and other forms of clean energy, or a majority of the population wants an accelerated**

⁵² Such models for long-term optimization of the energy system are based on the TIMES modeling framework, to calculate cost-efficient trajectories to a new energy system, based on renewable energy sources and taking into account the climate goals and energy policy. VITO, Energy Markets & Strategies

⁵³ Nuclear energy has one of the lowest life cycle CO₂ emissions, together with wind energy and other renewable energy sources." IPCC Working Group III – Mitigation of Climate Change, Annex II Metrics and Methodology - Table A.III.2 (Emissions of selected electricity supply technologies (gCO₂eq/kWh)) ". Page 1335 contains a life cycle emission table.

⁵⁴ Ram, M. et al, Greenpeace Deutschland, 2017, " Comparing electricity production costs of renewables to fossil and nuclear power plants in G20 countries "

⁵⁵ Verbruggen, A. and Yurchenko, Y, 2017, „ Positioning Nuclear Power in the Low-Carbon Electricity Transition "

⁵⁶ A. B. Lovins, 2018, " Relative deployment rates of renewable and nuclear power: A cautionary tale of two metrics "

⁵⁷ M. Z. Jacobson, 2011, " Providing all global energy with wind, water, and solar power, Part I: Technologies, energy resources, quantities and areas of infrastructure, and materials "

decommissioning.^{58 59} During the renewable energy transition, existing nuclear power plants will be allowed to operate through their currently planned lifetimes, although life prolongations of existing reactors will not be allowed.

- **Make uncapped liability and indemnification insurances mandatory for all nuclear power plant operators so that the financial costs of risks are not externalized to taxpayers and society.**⁶⁰ Unlike today where the Member States would cover the majority of the costs of large nuclear incidents regardless of the fault or the cause⁶¹, any nuclear utility should internalize the full risk costs of nuclear accidents.⁶² If no private insurances are available, Member States can offer it at market (actuarial) rates.
- **New types of nuclear fission reactors** (e.g. molten salt, fast breeder, small modular reactors) **would be allowed only if deemed significantly safer than today's types and if required for the energy transition.** Furthermore, citizens would be consulted about new sites, and given absolute veto rights.
- **Volt supports the research on advanced nuclear fission and fusion concepts** such as molten salt, and Gen4, fast breeder and potentially small modular reactors, as well as the use of research reactors and nuclear radioisotopes for other low-risk applications such as medicine, food sterilization and space exploration.
- **Sharpen EU regulation** for operating nuclear power plants with the aim to protect the safety of EU citizens. In particular, limit operation to 40 years, which is the typical lifetime of a nuclear power plant. Also strengthen the legal rights of EU neighbouring countries near nuclear power plants in border areas to have full access to information about safety risks and accidents, plus the right to object to any extension of the operation of the power plant in case of serious safety risks: those risks do not stop at national borders.⁶³
- **Create a long-term spent fuel and waste management policy for the European Union by reforming the Radioactive Waste and Spent Fuel Management Directive.**⁶⁴ Nuclear waste producers will be made fully financially and legally

⁵⁸ OECD, NEA, 2016, " Costs of decommissioning Nuclear Power Plants "

⁵⁹ Suh, Y. A. et al, " Decisions on Nuclear Energy Decommissioning: A Historical Review , Progress in Nuclear Energy

⁶⁰ EU Commissioner Oettinger in 2012:

<https://www.ft.com/content/eb74d6ec-0e3a-11e2-b87e-00144feabdc0>

⁶¹ if only this one indirect subsidy for nuclear power was diverted to photovoltaic manufacturing, it would result in more installed power and more energy produced by mid-century compared to the nuclear case. "Diverting indirect subsidies from the nuclear industry to the photovoltaic industry: Energy and economic returns", Pearce, 2011.

⁶² "Limitations of Nuclear Power as a Sustainable Energy Source" , Pearce, 2012.

⁶³ <https://energypost.eu/putting-nuclear-energy-on-the-critical-path/>

⁶⁴ <https://ec.europa.eu/energy/en/topics/nuclear-energy/radioactive-waste-and-spent-fuel>

- responsible for decommissioning, spent fuel and waste management.
- **Phase out** the current nuclear fleet at the latest when carbon neutrality has been reached.
 - **Build new nuclear power plants only if** land use for wind and solar make them necessary.
 - **Require mandatory liability insurance.**
 - **Require harmonized nuclear regulation.**
 - **Have R&D support for new forms of nuclear energy as part of the R&D mix.**

4. 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.⁶⁵ 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, and the use of waste biomass, and by 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.⁶⁶ Bioenergy for energy production should thus remain within adequate sustainable limits.

D. Transportation Revolution

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

⁶⁵ J. Fargione, J. Hill, D. Tilman, S. Polasky, P. Hawthorne, 2008, "Land clearing and the biofuel carbon debt". Science

⁶⁶ The European parliament recently included wood harvesting for bioenergy production as a source of renewable low-carbon energy (Searchinger et al, 2018) . 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.

1. Road and Mobility

- **Establish sustainable infrastructure in cities**, exploring possibilities and harmonising regulations for green zones in towns larger than 50,000 people,⁶⁷ 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 refueling infrastructure deployment for zero-emission vehicles** and net-zero carbon fuels like sustainably produced synfuels.
- **The transportation systems in Europe shall be modernised, both for short and long distances.** This includes the promotion of innovative road charge solutions⁶⁸ 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 congestion⁶⁹, and enforce reduced speed limits.⁷⁰
- **Extend energy efficiency obligations to the transport sector** to discourage the use of fossil fuels⁷¹. Efficiency in the transportation sector includes RES integration (biofuels and electric motors), and may ultimately promote the use of public transportation.

2. European Rail Transportation

- **Volt proposes 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) network⁷², as well as regional and local public transport.
- **Europe-wide harmonisation should be sought**, in particular with regard to the European Train Control System (ETCS), platform height, track gauge and the

⁶⁷ EC, "Urban Access Regulations in Europe "

⁶⁸ Best practice example of Sweden. See Electrive, eRoadArlanda – Swedish road charges EVs while driving

⁶⁹ As with carbon-activated concrete and other alternatives

⁷⁰ By reducing speed limits from 120 km/h to 110, a 2-18% of emission reductions could be attained. "Do lower speed limits on motorways reduce fuel consumption and pollutant emissions?" European Environmental Agency, 2011. "Towards Low-Carbon Interurban Road Strategies: Identifying Hot Spots Road Corridors in Spain", Sobrino and Monzon, 2018

⁷¹ IEA, Energy Efficiency 2017, available at <https://www.iea.org/reports/energy-efficiency-2017>

⁷² Energy use can be 90% lower than for aviation, Energy Technology Perspectives 2017, Catalysing Energy Technology Transformations, available at <https://www.iea.org/etp2017/>

approval of railway vehicles.

- **Volt calls for the expansion and improvement of national and international night train services as a convenient alternative to air travel.**

3. Revolutionizing Aviation

- **Abolish taxation exemptions on aircraft fuel**^{73 74}. The tax will apply to all European flights but include discounts for main residents of European remote 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**⁷⁵. Push for R&D programs on sustainable aircrafts^{76 77 78} and infrastructure emission reduction.^{79 80}
- **Promote more efficient air traffic operations** such as continuous climb & descent operations, European cross-border Free-Route Airspace, airport collaborative decision making⁸¹ and sustainable fleet routing for contrail formation avoidance⁸² 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 programs⁸³, limiting aircraft operational age⁸⁴, speed

⁷³ 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. CEDelft, 2019, "Taxes in the field of Aviation and their Impact".

⁷⁴ European Citizens' Initiative, Fairose, available at <https://fairose.eu/>

⁷⁵ ICAO, 2016, "Environmental Report".

⁷⁶ E.g. biofuels and synthetic "electro" fuels, hybrid, hydrogen and electrical aircrafts

⁷⁷ R., Schmidt, 2017, "Power-to-Liquids: A new pathway to renewable jet fuel".

⁷⁸ 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. T&E, 2018, "Roadmap to decarbonising European aviation"

⁷⁹ Such as with electrification of airport operations: AIN Online, Electric Taxiing could be a green and economic option, available at <https://www.ainonline.com/>

⁸⁰ EASA, EEA, Eurocontrol, 2019, "European Aviation Environmental Report"

⁸¹ EEA, EASA, Eurocontrol, 2019, "European Aviation Environmental Report 2019"

⁸² V, C. Frewe et al, 2014, "Aircraft routing with minimal climate impact: The REACT4C climate costfunction modelling approach (V1.0)" Fröming et al, 2012, "Aviation-induced radiative forcing and surface temperature change in dependency of the emission altitude"

⁸³ As incentives for more touristic and business flights are increasing the carbon footprint. Cohen et al, 2011, "Binge flying: Behavioural addiction and climate change", Annals of Tourism Research.

⁸⁴ Early commercial aircraft replacement by new more efficient models could significantly reduce emissions. Schafer, 2019, "Costs of mitigating CO2 emissions from passenger aircraft". Nature Journal

limitations⁸⁵, and halting the expansion of airports should be considered unless there is an ETS price with at least 50 € / ton.

4. Maritime Industry and Shipping

- **Aim at net zero emissions in European waters by 2035**^{86 87}, create a dedicated EU agency and initiate public-private partnerships for technological development and implementation.
- **Volt supports the inclusion of all EU seas as an Emission Control Area**⁸⁸. Further measures may follow like a 30% speed reduction for high-emission ocean ships.^{89 90}
- **Invest in transparent, publicly accessible monitoring and reporting of CO2 emissions for all vessels above 5000 GT** in European waters⁹¹, while pushing for cost-effective techniques to include smaller ships.
- **Promote shore-to-ship power (SSP) supply for ships on berth** with harmonised legislation based on best practices and focussing on all European ports, both seashore and inland, especially concerning the cruise industry.⁹²

E. Sustainable Buildings

With **36% of the EU's GHG emissions**⁹³, thereof 13% caused on-site⁹⁴, the building sector (residential and commercial) is one of the largest causers of emission. Moreover, construction and buildings account for 1/2 of all extracted materials, 1/2 of all energy

⁸⁵ Energy Technology Perspectives 2017, Catalysing Energy Technology Transformations, available at <https://www.iea.org/etp2017/>

⁸⁶ In 2018, the International Maritime Organization agreed on a 50% reduction of emissions for 2050 . Nevertheless, these reductions are not enough (available at Anderson(2012) and Kachi(2018)) , and stronger action is required to limit the temperature increase below 1.5 degrees with high probability .

⁸⁷ OECD/ITF, 2018, " Decarbonising Maritime Transport: Pathways to zero-carbon shipping by 2035 "

⁸⁸ For greenhouse gasses and other pollutants.

⁸⁹ A speed reduction of 30% would reduce 33% of emissions by 2030. This would be nonexistent for ships using E-fuels, electric or other non fossil fuel based propulsion. CE Delft, 2017 " Regulating Speed: A short-term measure to reduce maritime GHG emissions",

⁹⁰ IPCC, WG3 AR5 " Chapter 8: Transport "

⁹¹ 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,

⁹² 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

⁹³ <https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-performance-of-buildings/overview>

⁹⁴

<https://www.eea.europa.eu/data-and-maps/daviz/ghg-emissions-by-aggregated-sector-2#tab-dashboard-01>

consumption, 1/3 of all water consumption and 1/3 of all waste in the EU.⁹⁵ While **technical solutions** for a near-zero emission building stock do exist, legal, financial and behavioral **hurdles** need to be addressed.

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

- **Replacement of individual fossil-fueled heating/cooling installations** with alternatives such as renewably powered electric heating, heat pumps, 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** policy.⁹⁶

- **Set near zero energy building (nZEB) standards for all new buildings** in the EU by 2030 and **net zero emissions for all buildings** (incl. existing building sock) by 2035.
- **Develop standards for resource-efficient design and integrated construction processes.** Measure the efficiency of building design with both the annual “in-use” energy and the carbon footprint of the overall construction process (Differentiate between “Operational Carbon” and “Embodied Carbon”). Mapping⁹⁷ 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.⁹⁸
- **Enable owners of homes and offices to make the necessary investments** by

⁹⁵ https://www.architecture.com/-/media/GatherContent/Test-resources-page/Additional-Documents/RIBA_SustainableOutcomesGuide2019pdf.pdf

⁹⁶ <https://sustainabledevelopment.un.org>

⁹⁷ Live and interactive map of energy use on buildings.

<https://www.chalmers.se/en/areas-of-advance/buildingfutures/profileareas/Pages/Virtual-City-at-Chalmers.aspx>

⁹⁸ <https://www.thinkwood.com/clt100book>, <https://www.sidewalklabs.com>

harmonizing and increasing public financing, and by offering direct low-interest funding by the European Investment Bank (EIB). Raise awareness and engage citizens about the possibilities of green buildings.⁹⁹

- **Promote cost-effective energy efficiency measures**¹⁰⁰, and develop standards to support the integration of renewable energy generation into the design of new buildings¹⁰¹ 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”¹⁰² by restoring and modernising older buildings and designing new buildings to save energy and water.
- **Overcome legal hurdles to making existing buildings more energy-efficient** by modernizing legislation. 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.¹⁰³
- **Encourage the development of a properly sized and well qualified retrofit industry** through training, labor mobility, and best practice sharing.
- **Create incentives for innovative buildings to have a positive environmental impact** that beat net-zero targets¹⁰⁴. 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 collaborate to address the impacts of climate change on a large scale with community engagement.¹⁰⁵
- Sustainable water use and biodiversity to be incorporated in the planning approval process for land developments. (to be developed further).

⁹⁹ JRC, 2019, “ From nearly-zero energy buildings to net-zero energy districts: Lessons learned from existing EU projects ”,

¹⁰⁰ For example: better insulation, temperature regulating systems, thermal solar energy for warm water, and higher efficiency equipment, including green heat pumps

¹⁰¹ Best practice example from UNOPS in Denmark. See State of Green, UN opens Green Headquarters in Copenhagen, available at <https://stateofgreen.com/en/news/un-opens-green-headquarters-in-copenhagen>

¹⁰² European Commission, 2016, Communication on Clean Energy For All Europeans, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52016DC0860>

¹⁰³ <https://www.bcg.com/publications/2014/sustainability-energy-efficiency-opportunity-winning-strategies-high-growth-market.aspx>

¹⁰⁴ Best practice example from UNOPS in Denmark. See State of Green, UN opens Green Headquarters in Copenhagen, available at <https://stateofgreen.com/en/news/un-opens-green-headquarters-in-copenhagen>

¹⁰⁵ JRC, 2019, “From nearly-zero energy buildings to net-zero energy districts: Lessons learned from existing EU projects”,

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

Reducing carbon emissions is only one half of the story. The other half is **carbon capture**. While there have been some efforts to capture emissions directly, they cannot make a significant impact¹⁰⁶. **Healthy ecosystems** are essential to long-term carbon capture (“negative emissions”)¹⁰⁷. **Ecosystem restoration**, also known as **rewilding**, is therefore vital to rebuild Nature’s capacity to capture carbon¹⁰⁸. One of the greatest cause of ecosystem destruction is agriculture¹⁰⁹, which used 41% of land in Europe in 2015.¹¹⁰

In addition to protecting wildlife from unscrupulous land use, **industrial agriculture** must be reformed. Many current agricultural practices destroy ecosystems (the IPCC estimates land use accounts for 23% of GHGs¹¹¹) and should be replaced with sustainable practices to make agriculture a GHG sink, not only carbon zero¹¹². This is also known as regenerative agriculture.¹¹³ Volt wants to phase out subsidies on all agricultural practices that degrade soil, cause erosion or load water bodies with harmful chemicals. Subsidies shall be aimed at any agricultural practices that build up topsoil, capture GHGs, protect water bodies, foster biodiversity, and halt and reverse erosion.

➤ Utilize natural carbon capturing by increasing efforts in sustainable forest

¹⁰⁶

<https://theconversation.com/its-time-to-accept-carbon-capture-has-failed-heres-what-we-should-do-instead-82929>

¹⁰⁷ See (and the IPCC report linked therein):

<https://www.dw.com/en/ipcc-report-the-world-gets-hungrier-but-the-land-is-exhausted-from-us-and-from-climate-change/a-49783271> ; <https://www.naturalclimate.solutions/>

¹⁰⁸ E.g. see

<https://www.dw.com/en/scotland-restores-its-peatlands-to-keep-carbon-in-the-ground/a-50915166>

¹⁰⁹ <https://www.dw.com/en/opinion-science-guides-un-actions-to-curb-land-degradation/a-50268049>

¹¹⁰ https://ec.europa.eu/eurostat/statistics-explained/index.php/Land_use_statistics

¹¹¹ https://www.ipcc.ch/site/assets/uploads/2019/08/4.-SPM_Approved_Microsite_FINAL.pdf

¹¹² J. Russel Smith wrote an important book on this topic, in

1929:<https://soilandhealth.org/wp-content/uploads/01aglibrary/010175.tree%20crops.pdf>; see also

[http://amazingcarbon.com/JONES-LightFarmingFINAL\(2018\).pdf](http://amazingcarbon.com/JONES-LightFarmingFINAL(2018).pdf), <http://carbonfarming-solution.com/>,

<https://www.amazon.com/dp/B00557Z0OE>, <https://savory.global/climate-change-cause-remedy/>,

<http://waterparadigm.org/>,

<https://www.dw.com/en/ipcc-report-the-world-gets-hungrier-but-the-land-is-exhausted-from-us-and-from-climate-change/a-49783271>

¹¹³ <https://regenerationinternational.org/>

management, restoration and afforestation^{114 115}. Agricultural and forestry practices shall be focused on emission reduction and landscape preservation¹¹⁶ and aim at pre-industrial levels of terrestrial carbon stocks in Europe^{117 118} and combating desertification.

- **Push for conservation and restoration of wetlands**¹¹⁹. **Focus on peatlands** (which can store twice as much carbon as forests¹²⁰) **by imposing an immediate moratorium on peat exploitation** until legislation is strengthened to ensure its protection and sustainable management¹²¹, in addition to **actively restoring** already exploited peatlands to their natural state.¹²²
- **Stop subsidising unsustainable agricultural practices** and use existing subsidies to promote eco-friendly practices, that build up **topsoil**¹²³ and reduce the necessity for fertiliser, pest- and insecticides and diesel use. Volt sees a lot of potential in current research and development of practices like perennial and **polycultural** agricultural production systems, but there are also other promising possible solutions.
- Increase the amount of protected wildlife areas, as per the **UN biodiversity plan**¹²⁴. **Ensure the protection of European natural parks, with increased funding and firmness against illegal practices**¹²⁵ and create an exploitation map to enable all citizens to recognize 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 extension.^{126 127}

¹¹⁴ "Tree planting 'has mind blowing potential' to tackle climate crisis", The Guardian, 2019.

¹¹⁵ Commercial logging requires a drastic reduction to almost zero in some European forests. Recently, the Polish government was fined for logging an ancient forest. Volt supports this firmness against unsustainable practices.

¹¹⁶ IPCC, Fifth Assessment Report, 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

¹¹⁷ J. F. Bastin et al 2019, "The global tree restoration potential "

¹¹⁸ Volt acknowledges the challenges of these efforts, but the benefits would be enormous, ranging from no dependency on advanced geoengineering technologies, biodiversity protection, reduced erosion, improved local climates, and reduced air pollution (Sven et al 2019) .

¹¹⁹ <https://www.intechopen.com/books/wetlands-management-assessing-risk-and-sustainable-solutions>

¹²⁰ <https://www.unenvironment.org/news-and-stories/story/peatlands-store-twice-much-carbon-all-worlds-forests>

¹²¹ <https://www.iucn.org/resources/issues-briefs/peatlands-and-climate-change>

¹²²

<https://www.theguardian.com/world/2019/dec/28/danish-farmers-plan-to-flood-land-peat-bog-carbon-emissions>

¹²³ See point 5 of <http://www.fao.org/3/I9900EN/i9900en.pdf>

¹²⁴ <https://www.cbd.int/doc/c/efb0/1f84/a892b98d2982a829962b6371/wg2020-02-03-en.pdf>

¹²⁵ European natural areas, such as Doñana natural space , are under constant threat as a consequence of illegal groundwater extraction and political inaction.

¹²⁶ International Energy Agency, 2019, " Material efficiency in clean energy transitions "

¹²⁷ P. v. Exter, et al, 2018, " Could a rare metals shortage disrupt the global

- Improve 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)**¹²⁸ to have a major focus on sustainable/environmental practices. The **EAGF** and **EAFRD** budgets (e.g. minimum 50%) should be directed towards climate and environmental action and **sustainable agriculture standards** should be **harmonised** across Europe.
- EU legislation should define goals and reliable evaluation methods, but not dictate the methods. EU farmers are best placed to reform their farming practices with the help of **expert knowledge and financial support**. Creativity and freedom to run their farming operations sustainably will be encouraged this way.
- Further support **research & development**¹²⁹ 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 together with involved professionals to deliver low carbon local species & 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.¹³⁰ 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 earlier point on European waterways).
- Promote 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 affects 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 floods and droughts.

renewable energy transition? "

¹²⁸ See also

https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap_en

¹²⁹ See also

https://ec.europa.eu/info/news/european-commission-announces-eu1-billion-funding-more-sustainable-agriculture-food-and-rural-development_en

¹³⁰ See point 2 of <http://www.fao.org/3/I9900EN/i9900en.pdf>

G. Carbon sinks / Carbon sequestering

1. 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 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.

2. Afforestation/Reforestation

Afforestation or reforestation are currently the cheapest and easiest way 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.¹³¹ We plan to examine where further forest areas can be created, although it is difficult due to the competition with other land use and as such limited space. Therefore, we plan to make the current forests healthier and 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 the integration into agricultural funding. Deforestation, especially for infrastructure projects, must be considered in terms of climate impact and combined with reforestation.

Another approach is the concept of urban forestry or smart forest cities, where nature becomes a part of the city by large parks, garden rooftops and green facades.¹³² In this

¹³¹ https://foresteurope.org/wp-content/uploads/2017/08/Summary_web.pdf

¹³² <https://www.stefanoerarchitetti.net/en/project/smart-forest-city-cancun/>

context, we also support the development of other sources of biomass like microalgae¹³³ and kelp which supports the generation of negative emissions.

3. 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 the biochar involves citizens directly in 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 are waste regulations: Legally, Biochar is treated as a by-product (waste) of bioenergy-production, which in turn outlaw many of its possible applications especially in agriculture. We want to change that and build a legal environment that supports the widespread use and research in further applications for biochar¹³⁴, and simultaneously sets clear requirements for quality.

Estimates of 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 proposed¹³⁵ ¹³⁶– mitigation potential goes way up.) The IPCC attests, *“Biochar could make a significant contribution to mitigating both land degradation and climate change, simultaneously.”*¹³⁷

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.¹³⁸ Best practice and international

¹³³ Farrelly et al. Carbon sequestration and the role of biological carbon mitigation: A review
<http://dx.doi.org/10.1016/j.rser.2012.12.038>

¹³⁴

<https://cdrlaw.org/resources/biochar-status-under-international-law-and-regulatory-issues-for-the-practical-application/>;

¹³⁵ <https://www.nature.com/articles/srep09665>

¹³⁶ Albert Bates, Kathleen Draper: Burn. Igniting a New Carbon Drawdown Economy to End the Climate Crisis. London 2019

¹³⁷

<https://www.ipcc.ch/site/assets/uploads/sites/4/2021/02/210202-IPCC.J7230-SRCCI-Complete-BOOK-HRES.pdf>; P.398

¹³⁸ http://www.biochar-industry.com/wp-content/uploads/2020/10/Whitepaper_Biochar2020.pdf

pioneer is the award-winning "Stockholm Biochar Project".¹³⁹ It has found so many imitators in Europe and the USA that a guide for cities and municipalities has been published.¹⁴⁰

4. 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 support of farmers livelihoods are possible.¹⁴¹ However, due to the huge demand on land, relying on BECCS alone and maximizing this technology would threaten food security and biodiversity.

Volt aims to open pathways for the needed implementation of BECCS, while at the same time limit 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 future large-scale biomass is only eligible for policy support and public funding if equipped with CCS.¹⁴² We reject overreliance on this approach and see it as an important part within a broader strategy including 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. Best practice so far is Stockholm's Combined Heat & Power BECCS-Plant, operational since 2019, which burns only wood residues from Swedish forestry and wood industry.

It is noteworthy, Bioenergy with Carbon Capture and Storage (BECCS) is also a source of energy that, if used to replace fossil fuels, has additional mitigation potential above the potential CO₂-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 ensure 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 wider economy.

¹³⁹ <https://goexplorer.org/stockholm-worlds-first-urban-carbon-sink-with-biochar/>

¹⁴⁰ <https://nordregio.org/wp-content/uploads/2018/05/Replicating-in-Stockholm-booklet-manual.pdf>

¹⁴¹ https://www.ipcc.ch/site/assets/uploads/sites/4/2020/02/SPM_Updated-Jan20.pdf; P. 27

¹⁴²

<https://www.theccc.org.uk/wp-content/uploads/2018/11/Biomass-in-a-low-carbon-economy-CCC-2018.pdf>

5. Direct Air 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 significant land footprint has no comparable limitations and is therefore more environmentally friendly. Above that, models show that and in the long run DACCS is also cheaper due to better “economies of scale”. Not restrained by land-use requirements, technical potential of DACCS is nearly unlimited. For example, a study from 2019 reports a potential 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.¹⁴³ Other studies considering questions of scalability reach far smaller numbers especially for 2050, but even these studies assess potential by 2100 of up to 40GT/y – still twice the amount needed in the upper-end of estimates.¹⁴⁴ Most recent research highlights the importance of technological learning curves and the constraints on the speed with which novel industries can scale.¹⁴⁵ One important result is, 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 this demand can go down considerably – cut in half or even more – due to technological progress^{146 147}. Still, all estimates of future energy demand and production are highly dependent on assumptions about how much Negative Emissions are needed, which technologies will be employed and how they will be integrated in our energy-systems. Identifying best practices is one of the major tasks of the coming decade, and Volt is committed to support further development and deployment of DACCS. This includes the building of a supportive legal framework: Laws hindering or outright prohibiting geological storage of carbon, like they exist in some European Countries like Germany, have to end.

¹⁴³ <https://link.springer.com/article/10.1007/s11027-019-9847-y>

¹⁴⁴ <https://iopscience.iop.org/article/10.1088/1748-9326/aabf9f/meta>

¹⁴⁵ <https://www.nature.com/articles/s41467-020-20437-0>

¹⁴⁶ <https://www.energiate-messenger.de/news/194903/mcc-beziffert-energiebedarf-fuer-klimanutralitaet>
(german)

¹⁴⁷ <https://news.mit.edu/2020/new-approach-to-carbon-capture-0709>

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 successful test operation of a small pilot since 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 CO₂ 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.

In order 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 future, as soon as technological maturity is achieved and costs start to sink.

H. 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 a rising sea level¹⁴⁸ , weather migration or disaster management, amongst others. Volt will:¹⁴⁹

- **Reinforce flood defences of vulnerable European coastal areas and implement long-term coordinated adaptation plans within vulnerable European regions.**¹⁵⁰
- **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 underwriters¹⁵¹ and risk management to have assessments over a minimum of 50 years protection. Subsidies and compulsory fraction of capital reserves to be ring fenced for spending on infrastructure that mitigates climate catastrophe.

¹⁴⁸ <https://unfccc.int/resource/docs/2009/smsn/igo/054.pdf>

¹⁴⁹ https://www.vn.nl/cookie-wall?url_redirect=https://www.vn.nl/rising-sea-levels-netherlands/

¹⁵⁰ CarbonBrief, 2018, " Coastal flooding in Europe 'could cost up to €1 trillion per year' by 2100 "

¹⁵¹ C. Morana, G. Sbrana, 2019, " Climate change implications for the catastrophe bonds market: An empirical analysis ", Economic Modelling

- **Support legally binding treaties¹⁵² that fund planned migration as an adaptation strategy:** This can prevent conflicts, preserve lifestyles¹⁵³, and give a clear definition of 'climate migration' in order 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.

I. 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 that vision fast and effectively will require the EU to change its self-organization - its governance. Similarly, funding new green infrastructure, power generation, buildings and R&D capital investments will require investments of unprecedented scale.

The citizens are key as actors in this transformation, so Volt wants their strong empowerment and participation. At the same time, even the best carbon regulation can cause substantial redistribution of income and wealth among and between 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: that will cut only 10% of global emissions. Strong diplomatic influence over extraterritorial emitters, foreign countries, companies and citizens are hence the EU's instrument to solve this truly global challenge.

¹⁵² Foresight (2011), Migration and Global Environmental Change: Future Challenges and Opportunities: Final Project Report, London, The Government Office for Science.

¹⁵³ To grasp the extent of the phenomenon, at: Femia, F. and Werrell, C. (eds.) (2013), The Arab Spring and Climate Change: A Climate and Security Correlations Series, USA, Center for American Progress.

1. Green Governance

There is an enormous potential within European institutions to exercise the necessary action while managing and monitoring the transition. It is important to help in developing 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 will therefore:

- **Create a multi-disciplinary European Climate Action and Energy Transition Agency (CAETA), or expand the competences of a suitable existing organization accordingly**, which will also coordinate a climate action partnership network, in close collaboration with **all relevant Directorate Generals and Agencies. CAETA can manage the proposed funding¹⁵⁴ for the energy transition and climate action**, and will be in charge of identifying, developing and supporting regional and local sustainable projects.¹⁵⁵ Furthermore, the agency will be in charge of assessing knowledge and technological transfer programs to developing nations, in close collaboration with the proposed Climate Diplomacy Group.
- **Check all new EU legislation for its climate impact** and make compliance with the EU's reduction targets a requirement just like standard budget approval¹⁵⁶. Review and revise existing legislation as well.
- **Increase transparency and awareness on exported/imported CO₂e emissions by yearly reporting and implement "CO₂e in trade reduction targets"** to reduce emissions globally.
- **Direct participatory budgets to citizens's green initiatives aimed at reducing our environmental impact at all governance levels.**
- **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 behavioral change¹⁵⁷, and crowdfunding and participatory budgets for a sustainable accelerator platform.
- **Empower citizens: improving information for a more conscious energy consumption.** Volt will increase climate change knowledge and awareness by including climate change information in public communication channels and at all

¹⁵⁴ Funds and Additional Financing Instruments

¹⁵⁵ We would promote a collaboration with the EU Covenant of mayors and encourage all EU towns to join them and similar initiatives as it can engage local authorities in climate action .

¹⁵⁶ Some legislation will inevitably cause higher emissions; this rule must hence apply at an aggregate level, e.g. DG

¹⁵⁷ Feedback and consumption advice could produce 20% of electricity savings. R. Baud, 2013, "Policy and Decision Making" in "Handbook of Sustainable Engineering" by R. Baud et al, Springer Netherlands

education levels¹⁵⁸, by mandating and improving cradle-to-grave carbon footprint declarations on products and services, starting with unambiguous carbon footprints coming from travel and fuels, and by promoting education and awareness-raising initiatives on environmentally friendly travelling.

2. 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 regulation 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 like a negative cost on carbon and currently amount to €40-200 billion per year¹⁵⁹. Redirect those subsidies to compensate citizens for higher costs and fund the EU's green transition.
- **Raise 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 package shall contain at least 50% of green spending.¹⁶⁰
- **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 model¹⁶¹ and successful best practice in Switzerland and Canada.¹⁶²
 - **Subsidies for green products and investments¹⁶³ to change individual behavior 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 like future energy technologies or pan-european power grids (on top of regular**

¹⁵⁸ R. Baud, 2013, "Education and Outreach" in "Handbook of Sustainable Engineering" by R. Baudetal, Springer Netherlands

¹⁵⁹ 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](http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/595372/IPOL_IDA(2017)595372_EN.pdf)

¹⁶⁰ Bowen, Alex, Nick Stern, Sam Fankhauser and Dimitri Zenghelis, 2019, "An Outline of the Case for a Green Stimulus". London, Grantham Institute

¹⁶¹ <https://clcouncil.org/economists-statement/>

¹⁶² <https://www.oxfordmartin.ox.ac.uk/news/201807-carbon-pricing/>

¹⁶³ Like cheaper public transport, buying incentives for electric cars, lower VAT for non-meat food, subsidies for building insulation (Swiss best practice)

budget).

All proceeds should be spent in the country that they originate from in order 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 shall decide which green products to subsidize and which R&D to support.

The proceeds should be divided evenly in a balanced mix with 33% for carbon dividen, 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, incl. 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 action¹⁶⁴ 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, and with the support of the EU budget and European financial institutions.
- **Create programmes for 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 subsidized professional training courses.
- **Enable easier balancing of the interests of individual citizens and society overall when it comes to infrastructure built near residences in order to overcome resistance and accelerate the transition.** E.g., enable and support citizens' participation in infrastructure investments, either individually or as the municipality.
- **Incentivise institutional investors and the financial sector to shift resources away from fossil fuels towards climate-friendly solutions**¹⁶⁵. 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**

¹⁶⁴ Currently, the EU has a target of 25% of the Multiannual Financial Framework for 2021-2027 .

¹⁶⁵ Such as shifting towards a low-carbon economy, climate risk resilience, and environmental expertise on corporate boards.

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.

3. 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 framework¹⁶⁶. 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 abroad¹⁶⁷ by making them **contingent on compliance with the Paris Agreement and other environmental and emission standards.**¹⁶⁸ 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 of 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.¹⁶⁹
- **Center development cooperation around climate protection** through transfer of technology, know-how, and best practices to enable leapfrogging of developing countries to decarbonized economies. Aid to developing nations should adhere to

¹⁶⁶ www.geoengineering.ox.ac.uk/what-is-geoengineering/what-is-geoengineering/

¹⁶⁷ Kateryna Holzera and Thomas Cottier, "Addressing climate change under preferential trade agreements: Towards alignment of carbon standards under the Transatlantic Trade and Investment Partnership" , 2015

¹⁶⁸ Such as with the USA with Trump's recent announcement to withdraw from the Paris Agreement, as this would harm climate action worldwide .

¹⁶⁹

https://opencommons.uconn.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1322&context=law_papers

the UN sustainable development goals¹⁷⁰. This would mean, for example, supporting **low carbon development**¹⁷¹. For some examples see ¹⁷² and the **UN sustainable development partnership** with Ghana.¹⁷³

- **Work towards expanded adoption as well as the harmonization 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 governments¹⁷⁴, and the Oxford Principles on Geoengineering should be followed¹⁷⁵. These technologies shall not be part of a transition strategy but only a last resort, and must be agreed on an international level. Focus of this panel should be potentially dangerous forms of geoengineering like solar radiation management; in contrast, greenhouse gas removal through CCS¹⁷⁶ and reforestation is actually encouraged and hence not in focus.
- **Recognise 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 universal¹⁷⁷, and extend it to regions of armed conflicts for biodiversity protection through a 5th Geneva Convention.^{178 179}

¹⁷⁰ <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

¹⁷¹ http://www.climatenetwork.org/sites/default/files/151127_can_cop21_report_rz-screen_es.pdf

¹⁷²

http://www.climatenetwork.org/sites/default/files/exploring_sustainable_low_carbon_development_path_ways_overall_concept_1.pdf

¹⁷³ <https://ghana.un.org/en/10146-united-nations-sustainable-development-framework>

¹⁷⁴ Volt document on Geoengineering

https://docs.google.com/document/d/1lhGfwx4HNcDEkyqoHpMOuqw_TnuyfHQbMD8jgCzPIBA/edit#heading=h.rpbcq6fy1o34

¹⁷⁵ The Oxford Principles

¹⁷⁶ Carbon Capture and Storage

¹⁷⁷ 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. "On an international recognition of the crime of ecocide: For a binding international environmental law architecture", 5th EGP Congress, Liverpool, 30 March - 2 April 2017

¹⁷⁸ Durant, S. M., Brito, J. C., 2019, " Stop military conflicts from trashing the environment ", Nature

¹⁷⁹ Brito, J. C. et al. 2019, " Armed conflicts and wildlife decline: Challenges and recommendations for effective conservation policy in the Sahara-Sahel ", Society for Conservation Biology.