A citizen's footprint

An analysis of the carbon footprint of our consumption, investment, and political choices for the UK and Germany

2° Investing Initiative

ABOUT 2° INVESTING INITIATIVE

The 2° Investing Initiative (2DII) is an international, non-profit think tank working to align financial markets and regulations with the Paris Agreement goals.

Working globally with offices in **Paris, New York, Berlin, Brussels, and London,** we coordinate some of the world's largest research projects on climate metrics in financial markets. In order to ensure our independence and the intellectual integrity of our work, we have a multi-stakeholder governance and funding structure, with representatives from a diverse array of financial institutions, regulators, policymakers, universities, and NGOs.

DISCLAIMER

This report seeks to identify potential differences in the carbon footprint of individuals based on accounting rules that translate and allocate carbon budgets to individual choices. The analysis and carbon budgeting of political party manifestos was taken from third party organizations. 2° Investing Initiative is not liable for any errors or omissions related to data sourced from third parties. The report does not represent an endorsement, advice, or in any other way an expression of support for one or more political parties. Nothing in this report should be construed to reflect the opinion of 2° Investing Initiative, its staff, Board, or members, as to political preferences.

With thanks to our funder: This report has received support from the Life NGO program under Grant No LIFE20 NGO/SGA/DE/200040. This content reflects the views of the author only, and the funders are not responsible for any use that may be made of the information it contains.

Authors: Dr. Jakob Thomä, with the contribution of Anne Schönauer, Constanze Bayer, and Dr. Andreas Büchler

Table of Contents

Executive Summary

Footprinting the choices of individuals has a long track record in environmental accounting.

To date, such footprinting has however largely been limited to citizen consumption choices, despite the fact that citizens serve many roles – as voters, as investors, and also as employees. While there are meaningful debates around the relative importance of each of these areas of a person's life, there is limited to no analysis that ties these different strands together in one exercise.

This report is the first attempt known to the authors to compare the carbon footprint of an individual across their voting, investment and consumption choices.

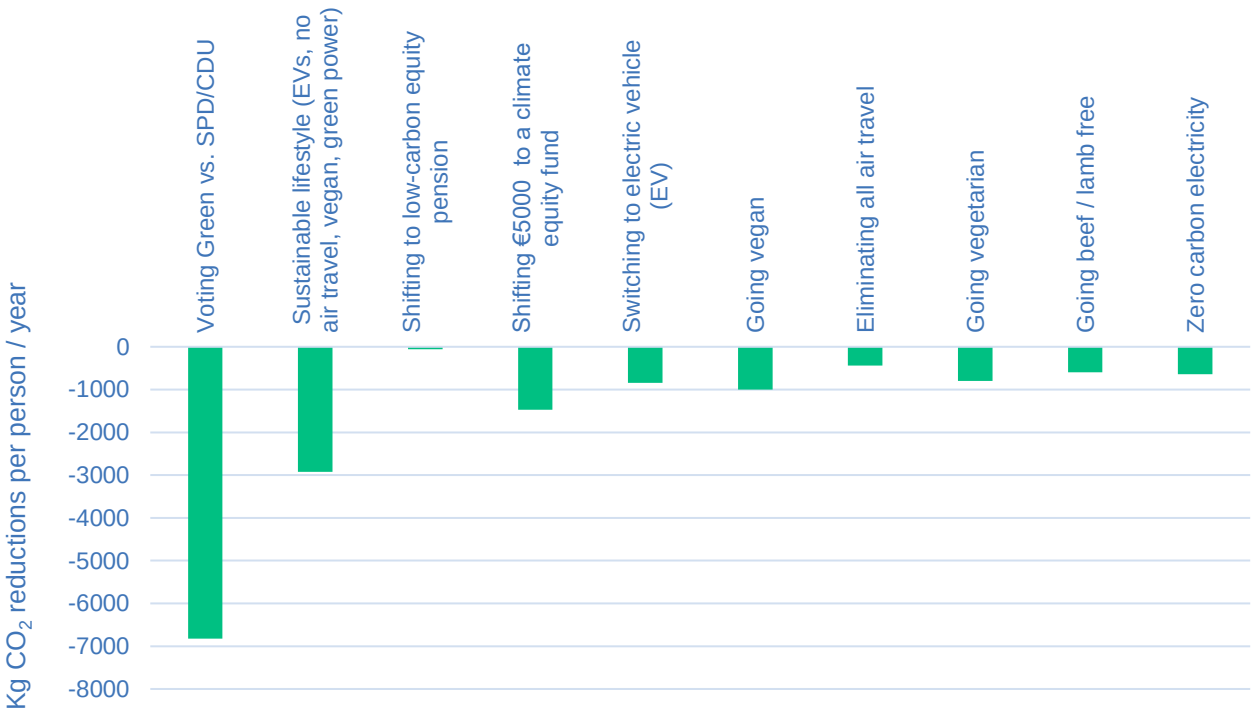
The analysis focuses on the average person in the United Kingdom and Germany as two case studies for the analysis. The key findings can be summarized as follows:

- Individuals will have the biggest impact on their carbon footprint through voting for climate-friendly political parties both in the United Kingdom and Germany (~7,000 kgs of CO2 / year). This is largely a result of the fact that the political impact for the whole country is allocated to the voters who delivered the political outcome.

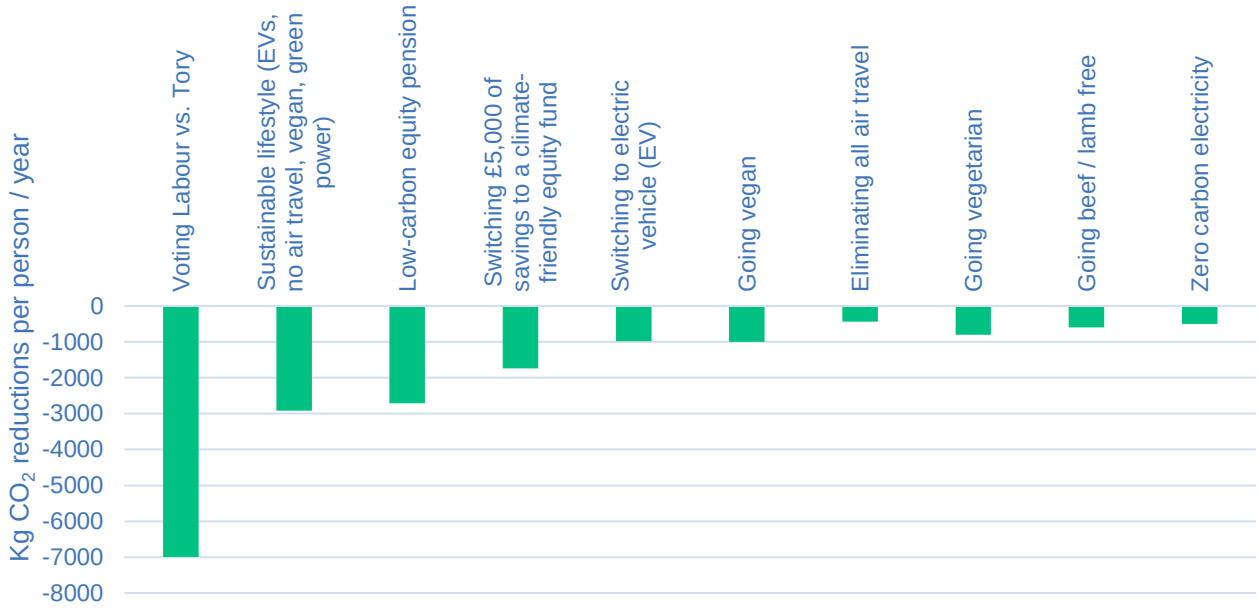
- The average person will have the second biggest impact on their carbon footprint through changes in consumption, specifically in terms of travel (Electric vehicles, rail), electricity, and diet. However, the relationship between an individual's consumption and investment footprint is highly dependent on a person's savings and investment profile. Moreover, depending on how you allocate 'responsibility' for a country's emissions reductions, individual choice can actually be the primary driver of footprint reduction.

- The footprint analysis does not consider 'effort levels'. In the case of voting, the primary effort is with the government implementing its manifesto and the individual usually only votes every 4-5 years. In the case of lifestyle changes, these can be associated with high degrees of effort (e.g. changing diets).

ES 1: Differences in the emissions footprint of an individual in Germany related to voting, consumption, and investment choices (Source: Authors based on various sources, see Annex)



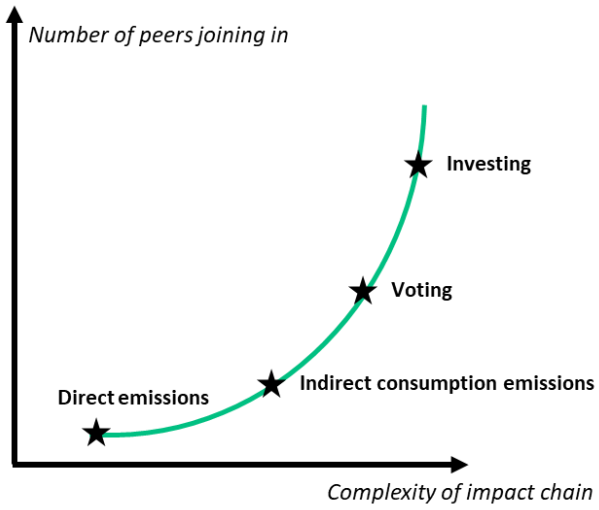
ES 2: Differences in the emissions footprint of an individual in United Kingdom related to voting, consumption, and investment choices (Source: Authors based on various sources, see Annex)



While footprinting is a key mechanism to better understand the relationship between an individual and climate change, it does not automatically measure the real world 'impact' of a person on outcomes.

This may seem counter-intuitive. Footprinting exercise are designed to 'footprint' a person's choice in terms of climate or other sustainability outcomes. However, this is not the same as impact. For example, choosing not to fly reduces your carbon footprint, but it doesn't by default reduce the number of planes in the sky. Voting for a party with a more ambitious political manifesto related to climate change reduces your political footprint, but if that party doesn't win, the manifesto doesn't get implemented. The extent to which an individual's personal choice translates into real world impact is primarily driven by the extent to which impact requires collective action and whether the targeted emissions reduction is 'direct' (i.e. where a person themselves reduces real world emissions), 'indirect' (i.e. where a person's choices signal to others e.g. the airline to reduce emissions) or 'mandated' (i.e. where a person votes to reduce emissions, either at elections or through their shareholder rights). Depending on the nature of the activity and its complexity, a smaller or larger degree of collective action is needed for individual choices to translate into real world emissions reductions (Fig. ES3).

ES. 3: Requirement of collective action in relation to 'impact' of climate actions by individuals (Source: Authors)



I. Introduction

There are a number of different avenues for citizens to influence the climate crisis. Three stand out in particular:

- **Voting**: Through their voting behavior, citizens will influence the outcome of political elections that determine climate and energy policies. Differences in these policies will drive both domestic emissions trajectories and – given the UK's and Germany's geopolitical heft – may also influence global emissions.

- **Consumption**: Citizens will also influence overall emissions through their consumption choices. This can be direct (e.g. walking instead of using a car), indirect with immediate emissions effects (e.g. picking up food yourself rather than getting it delivered with a car or motorbike), or indirect without immediate emissions reduction (e.g. taking the train instead of an airplane).

- **Investing**: Through their savings and pensions, citizens will both 'own' emissions through their equity investments and finance emissions through their bond portfolios.

Understanding these avenues requires an ability to 'footprint' different choices.

To date, footprinting exercises for individuals primarily focus either on consumption and investments, without meaningfully linking them both to each other and political choices. The paper will seek to fill this gap by responding to the following questions:

- *What is the estimated emissions footprint of different citizen activities (voting, consuming, investing)?*

- *What is the expected 'impact' of changing your voting, consuming, or investing behaviour in terms of driving real world emissions reductions?*

While footprinting is a key tool for understanding climate 'impacts', such exercises also come with a number of caveats:

- First, these types of accounting exercises are associated with wide uncertainties both regarding the overall carbon footprint of different activities, both today and tomorrow, and the specific nature of individual choices. Different citizens will have different impact levers in different countries. Not to put too fine a point on it, a celebrity voting in favour of the most climate-friendly political programme and advertising the vote may in turn influence other voters, etc. This paper is not designed to give an individual assessment, but provide broad estimates as to the differences between these choices.

- Second, these estimates don't consider non-climate considerations of individuals. There are issues related to personal preferences around these choices, as well as other social outcomes (notably in terms of political party allegiances and their policy manifestos).

- Third, the paper largely ignores 'network' or 'spillover' effects that individual choices have on peers. This also extends to potential spillover effects that political choices have on other countries, which may be material, as well as spillover effects that certain voting choices for one party may have on the policies of other parties.

- Finally, the paper makes certain methodological choices around allocating 'responsibility' for emissions reductions that can be challenged. These aspects are discussed further in the paper.

II. Concept & brief summary of methodology

The report tries to carbon footprint the choices and actions of individuals insofar as they pertain to three types of actions – voting, consuming, investing – whose impact on emissions operates across three axes:

- **Direct actions on emissions:** The first category relates to actions that directly reduce carbon emissions. These are typically day-to-day choices (e.g. walking instead of taking the car) and the impact does not rely on any other actor.

- **Indirect actions on emissions:** The second category relates to actions that do not directly reduce carbon, but signal to other market actors to reduce carbon. Examples for this are the choice to take a train rather than fly. This choice does not prevent the plane from flying and thus the emissions from happening but send a signal to the market (the airline in this guy) that there is less demand for flights. This signal may or may not – depending on its power and the extent to which it represents a broader group – be translated into less flights over time. In financial markets, the phenomenon is similar. Selling high-carbon shares to decarbonize your portfolio or switching to a low-carbon equity pension plan sends a signal to companies, but does not directly reduce emissions (even if it reduces the carbon footprint of your investments). Here too the extent to which this signal translates into real world emissions reductions is a function of its strength and the extent to which there is a countervailing action (e.g. somebody else buying more shares when you sell them, other people taking more flights).

- **Mandating emissions reduction:** The third category of actions relates to situations where you as the consumer 'mandate' emissions reductions, typically through voting. This is the dynamic in the political arena where you vote for policy manifestos linked to emissions reductions plans or when you vote on climate-related shareholder resolutions for your investments. Voting practice does not always translate into real world emissions reductions. You may lose the vote or you may win the vote, but the mandate isn't followed (e.g. the party does not fulfil its policy manifesto promises, companies find workarounds to implementing your resolutions).

Given these differences, there are some uncertainties as to the right way to carbon footprint these different activities.

While footprinting direct emissions reductions is arguably relatively straightforward, the matter becomes more complicated with indirect and mandated emissions. How do you value a lower carbon footprint of a consumption choice when it doesn't directly translate into real world emissions reductions? Most people would arguably agree with the framing that if you don't consume beef or lamb, you lower your carbon footprint. But we rarely consider whether the fact that you have a lower carbon footprint actually reduces real world emissions. Often, indirect emissions reductions may just lead to somebody else having a higher carbon footprint (e.g. shifting portfolio assets to another investor).

The GHG Protocol, the global standard for corporate emissions accounting, on p. 107 of its Scope 3 guidance concludes that "as long as the accounting of scope 3 emissions over time recognizes activities that in aggregate change global emissions, any such concerns should not inhibit companies from reporting and tracking their scope 3 emissions over time." At the same time, if we want to better understand the real world impact of choices, there are clear limits to carbon footprinting exercises.

Mandated emissions may face a similar challenge if the voter mandating the emissions reductions is in the minority. Moreover, it is unclear how such emissions should be allocated. Mandated emissions reductions have the counterintuitive result that the more people vote for the emissions reduction, the lower the relative share of each voter in terms of responsibility. In other words, if only one person votes for the most climate-friendly party and it wins, they get 100% of the credit for the emissions reductions. If 20 million people vote for this party, the credit is split between 20 million people.

In financial markets, there is a case that investors that vote in favour of climate resolutions should no longer be allocated the carbon footprint of the company they invest in, given that they voted against those carbon emissions, and that instead all emissions should be allocated to those investors that voted in favour of the resolution. Finally, mandated emissions also come with different effort levels as the burden of reducing emissions is “mandated” to a third party.

The problem with these technical challenges is that the debate around the role of citizens around driving the climate transition lacks meaningful data.

While there is a broad and expansive literature on the carbon footprint of goods and services and life-cycle analysis underpinning these footprints, the debate on the relative importance and contribution of individual actions’ on climate change and mitigation across different types of activities (voting, consumption, investment) lacks such indicators. Part of the reason relates to conceptual differences between these activities as direct emissions reductions, indirect emissions, and mandated emissions. The other reason relates to historically a lack of analysis as to the actual ‘footprint’ of political manifestos.

As a result, while there is a lot of debate around the role of citizens as voters, consumers, and investors, there is little quantitative insight into how these roles compare to each other. As outlined above, this paper is not designed however to endorse a specific political party, consumption, or investment choice. There are multiple factors that drive these choices and as Section IV outlines, a carbon footprint is not the same as an ‘impact footprint’.

This paper seeks to contribute to a better understanding of the relative contributions different actions make on the reduction of an individual carbon footprint.

It compares the relative footprint reductions of voting, consuming, and investing for the average UK and German citizen. While the annex provides a more detailed methodology, a brief summary of the analytical approach is provided below:

- The paper sources emission estimates of consumption and investment choices, as well as the political manifestos, in all but one case from third party providers. An external reputable public source that footprints the 2019 UK General Election manifestos was not identified by the authors and thus the carbon footprint of these manifestos was estimated using a simple interpolation based on the net zero targets of these manifestos. The interpolation model was applied and compared to the German election third party estimates for a robustness test.

- The different actions / choices were compared to each other to quantify the different carbon outcomes of these choices. For the political estimates, these different outcomes were allocated to individual voters based on the estimated number of votes necessary to become the largest political party. The text provides some insight into the sensitivity of the results to different assumptions around the necessary vote total and the sensitivity to different footprint estimates for the underlying manifestos. Given that policies have multi-year impact beyond the duration of a typical government (4-5 years), the emissions difference in aggregate until net zero was allocated to voters, and then divided by the number of years to achieve the net zero goal.

- The investment footprints were estimated using public disclosures from MSCI around the mainstream and low-carbon / climate change index footprints and then multiplied by a Scope 3 factor, given that these disclosures only cover Scope 1 + 2.

A more detailed methodology and accounting rules is provided in the annex. The next section will summarize the key quantitative results of this exercise.

III. Comparing the emissions footprint of individual 'actions'

a. *Overview*

The first section will outline the annualized carbon footprint savings of individual 'actions'.

It is conceptually complicated to define an individual action. How do you compare the 'action' of going to the voting booth (something that the typical person does once every four to five years) to the sustained efforts of changing your lifestyle every day or the action of switching your savings or pension plan to a 'green' fund that for most citizens involves an email or letter, but requires continuous management by a third party. There are different energy levels required and so thinking about emissions reductions in a way that compares the sustained reduction efforts of a political process over 20-30 years with the efforts of buying an electric car once and then simply charging based on the nature of the car you bought is complicated.

For the purpose of this paper, we have classified 'actions' as binary choices that one makes independent of the underlying effort level associated with that choice.

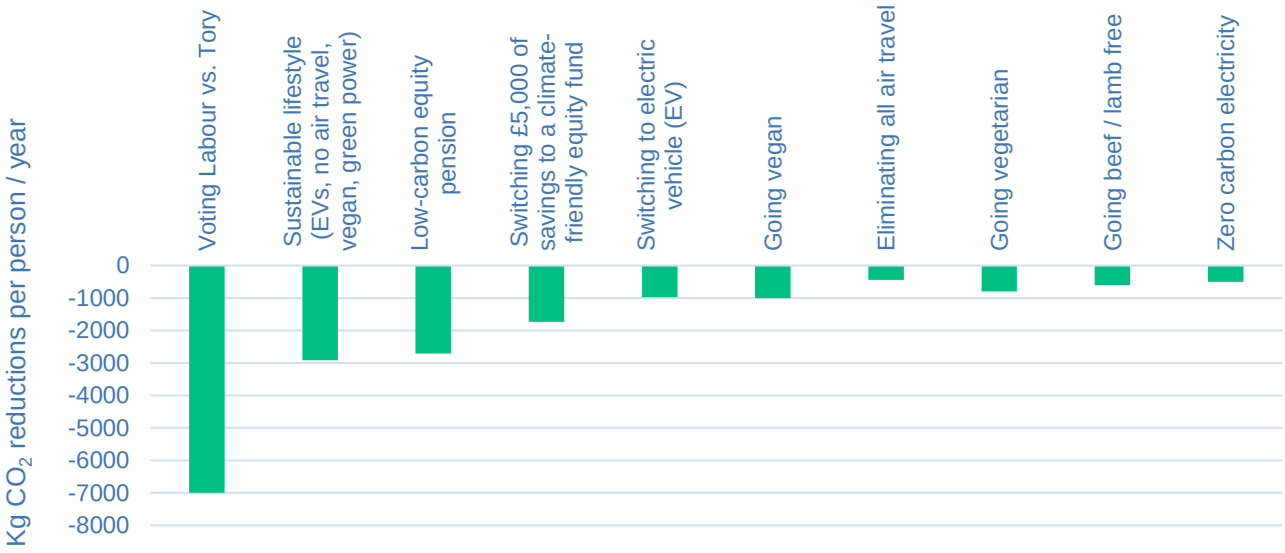
While we recognize the shortcomings of such an approach, it is in the nature of comparing different activities of citizens that they do not represent the same effort level. In order to address this issue, Section IV will seek to – at least for the purpose of comparing investing and consumption – put these figures in relation to money spent or invested. A detailed methodology for the analysis below is provided in the annex.

b. *United Kingdom*

The figure below outlines the estimated emissions savings associated with different actions by an individual.

Note that this does not seek to measure the real world impact of the individual actions, but simply the emissions savings of different choices independent of the marginal contributions of the choice. To illustrate that point, we estimate that voting Labour instead of the Conservatives in the 2019 General Election would have saved about 7,000 kgs of CO_2 per year. Of course, since Labour did not win the 2019 General Election, no emissions were saved at all. Moreover, it is unclear to what extent Labour would actually have fulfilled its election manifesto pledge and it appears open if the UK government is considering revisiting its pledge.

FIG 1: The estimated emissions footprint of different political, lifestyle, and investment choices of UK citizens (Source: Authors based on various sources, see Annex)



The analysis confirms the hypothesis that voting has the biggest impact on carbon footprint reductions.

That being said, citizens as consumers can dramatically reduce their emissions profile by around 2,916 Kgs per year, depending on different estimates around 25-40% of the entire consumption footprint of an individual. Finally, emissions savings from switching your equity allocation in your pension plan, based on typical pensions investment levels, is about 2,700 Kgs per year.

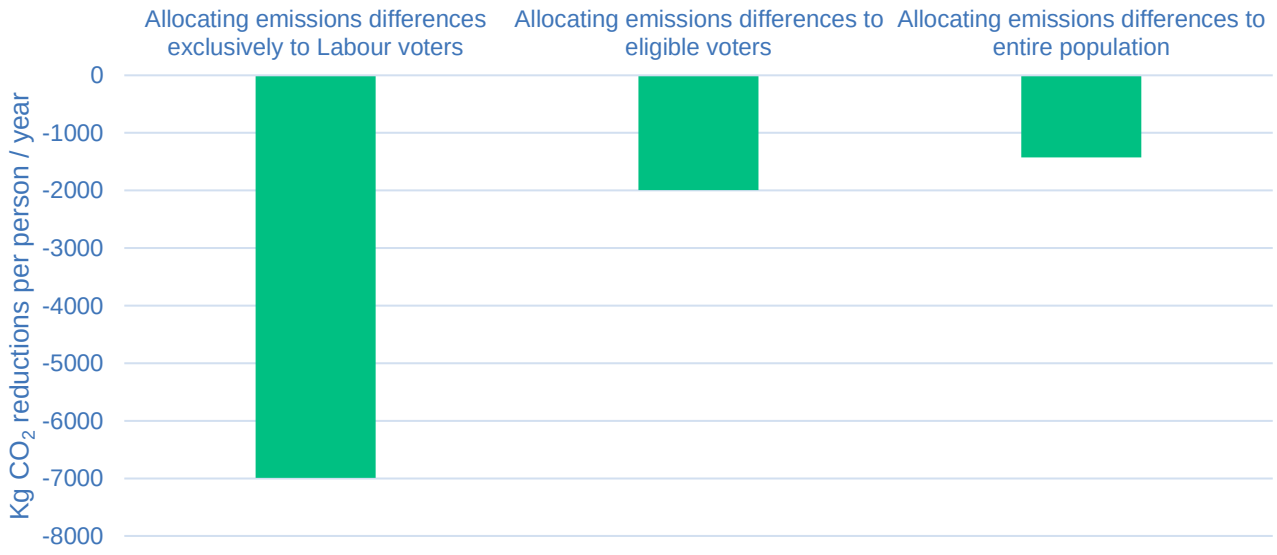
It is worthwhile highlighting a number of additional components:

- The Figure clearly highlights that voting generates the biggest difference in the footprint of a person. The primary reason for that is that the emissions difference between the Conservative and Labour party based on their manifestos is allocated only to the voters that voted for the party. In other words, unlike with lifestyle choices where your emissions are just allocated to you, the entire decarbonization difference of the country between the Conservative and Labour manifestos is allocated exclusively to Labour voters. If that difference was allocated to all citizens, the voting footprint would "only" be around 1,500 kgs, and around 2,500 kgs if allocated to eligible voters. This makes sense, it basically suggests that all other things being equal, voting and consumption changes impact your footprint roughly the same, except for the fact that in the case of voting you get the 'credit' of the emissions that non-Labour voters will reduce as a result of Labour policies. As outlined above, these Figures do not represent estimates of emissions reductions achieved in the real economy. They are simply illustrations of differences to an individual carbon's footprint of different activities. If the political party doesn't win, companies don't reduce air travel offering because 1 person doesn't fly, or investments are transferred, no real world emissions are reduced.

- In addition, it is worth highlighting that the figures for any individual may be radically different. Some citizens have 100% of their pension in equity, others 100% in gilts. Some are meat lovers who would save a lot more if they switched to a vegan diet, others don't drive a car to begin with so would increase their footprint if they bought an electric vehicle versus not having one at all. While we recognize all these nuances, the analysis here seeks to provide a high-level overview for the 'average' UK citizen.

-

FIG 2: Estimated differences in the individual allocation of emissions footprints' for electing a Labour manifesto vs. Conservative manifesto (Source: Authors based on various sources, see Annex)



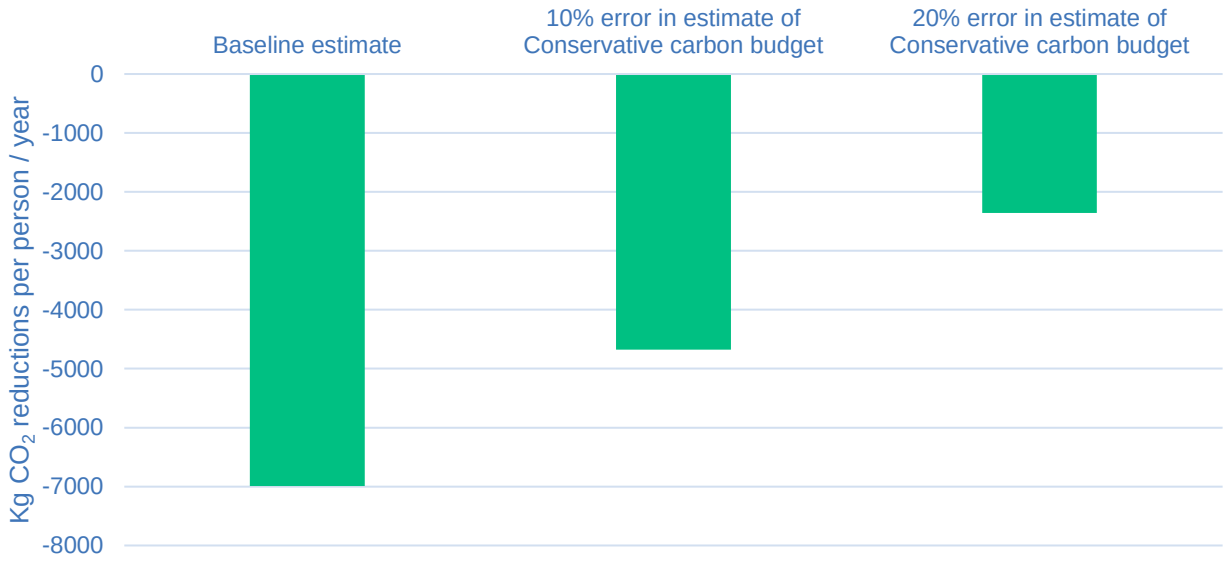
General election manifestos are difficult to footprint over long time horizons, given the uncertainty of policy outcomes, the extent to which policy objectives are actually translated into policy, and the relative 'responsibility' of different governments over long time periods for future emissions reductions.

This makes it complex to 'footprint' a voters' choice. How do you distribute the footprint of policy outcomes across voters and governments over time? This complexity is amplified by the extent to which 'policy outcomes' are driven by a range of factors and feedback loops from the private sector that amplify or potentially hinder effective policy implementation.

For this paper, unlike for Germany, the authors were unable to identify a specific policy model published for the General Election that footprinted the different political manifestos in terms of emissions profiles until the UK economy achieves net zero. As a result, the paper applies a simple interpolation of emissions trends between the net zero target date defined by the policy manifesto and UK emissions from 2019. The paper assumes a 3 year lag before emissions would have diverted between the two policies to construct the interpolation. To test the approach, the model was applied to the German context, where the approach has a 'fit' to the data estimated by Konzeptwerk Neue Ökonomie of 95% (88%-102% difference by political party).

The Fig. below illustrates the reduction in the carbon footprint of an individual voting choice when applying the baseline estimate shown above, an illustration of the results if the carbon budget of the Tory manifesto is 10% lower, and an illustration where the carbon budget is 20% lower. A 20% difference would be dramatic, likely only achievable if either market forces bridged the gap between the Tory manifesto and that of Labour or if the Tory policy agenda evolved.

FIG 2: Changes to the carbon footprint of voting under different assumptions about the Conservative party manifesto carbon budget (Source: Authors based on various sources, see Annex)



c. Germany

Looking at the German market, the results are similar, but differ across a number of notable aspects. The Labour (SPD) and Conservative (CDU/CSU) net zero targets included in their political manifestos are largely identical, with the German economy reaching net zero by 2045 under both manifestos. The analysis thus compares the voting impact of voting for the Green party versus the Conservative / Labour party on your personal carbon footprint. The Green Party targets net zero no later than 2040.

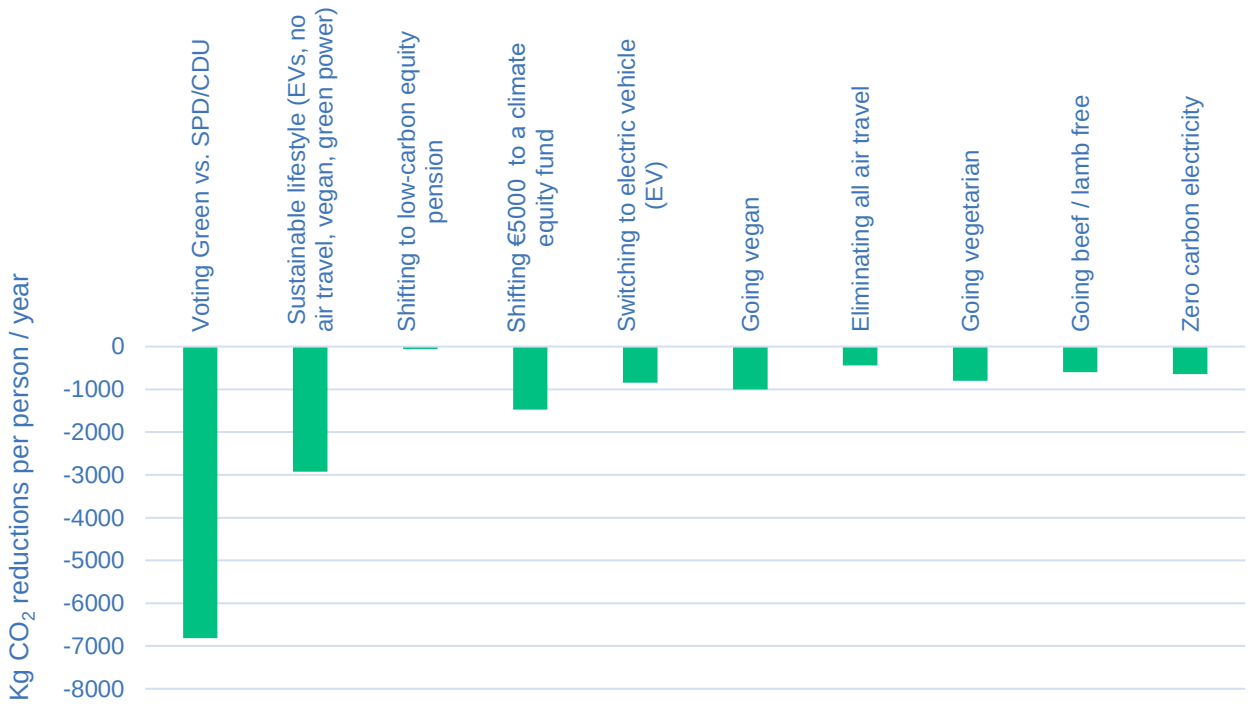
For Germany, the higher emissions intensity of the German energy sector also means that personal lifestyle choices have a different effect than in the UK. The relative impact of switching to an electric vehicle in Germany is lower given higher emissions intensity of the electric grid whereas switching to renewable energy is higher as a result. The overall impact on your carbon footprint of a 'Sustainable Lifestyle' switch is roughly the same in aggregate.

As the chart shows, both in Germany and the United Kingdom the footprint difference – independent of overall impact on real world emissions – of the political choice is higher than both the consumption or investment choice. The specific findings are summarized in the Figure below.

Note that when comparing these actions to the pure 'time' or effort factor, the political choice is dramatically different. While there is significant work by the government to realize climate policies, from the perspective of a citizen, it takes about 1 hour every four to five years to reduce the overall carbon footprint of your political actions by 4,000 – 5,000 kgs per year (again, without considering the actual real world impact).

Similarly, the action of shifting your pensions plan outsources the day-to-day management and execution of the action and is thus 'easy' from a pure time and effort perspective. On the other hand, given broader political preferences it may be very difficult to vote for a different party than your preferred choice. Finally, as discussed above, there is a component of uncertainty associated with that choice in terms of political parties realizing election manifesto pledges versus the immediate gratification and 'impact' of walking rather than taking a taxi. The caveats outlined above for the UK case thus also hold for the German case.

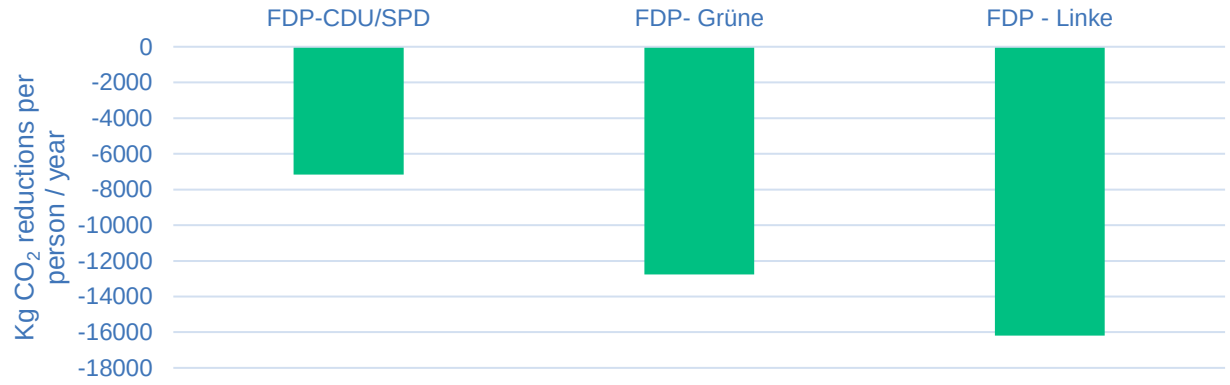
FIG 4: Differences in the emissions footprint of an individual in Germany related to voting, consumption, and investment choices (Source: Authors based on various sources, see Annex)



The figure below summarizes carbon footprint savings of voting for either the Conservative / Labour party manifesto, the Green Party manifesto, or Die Linke party manifesto relative to voting or the FDP (Liberal-Democrats), who have the highest carbon footprint of any major political party (excluding the AFD).

The analysis excludes the AFD since their political platform does not include any clear manifesto or emissions reductions plan. The table highlights the dramatic impact that different voting choices are set to have on emissions per vote per year. The authors chose to compare the Green party to the CDU / SPD in the table above given that it is more comparable politically to the Labour party in terms of emissions net zero target (2040).

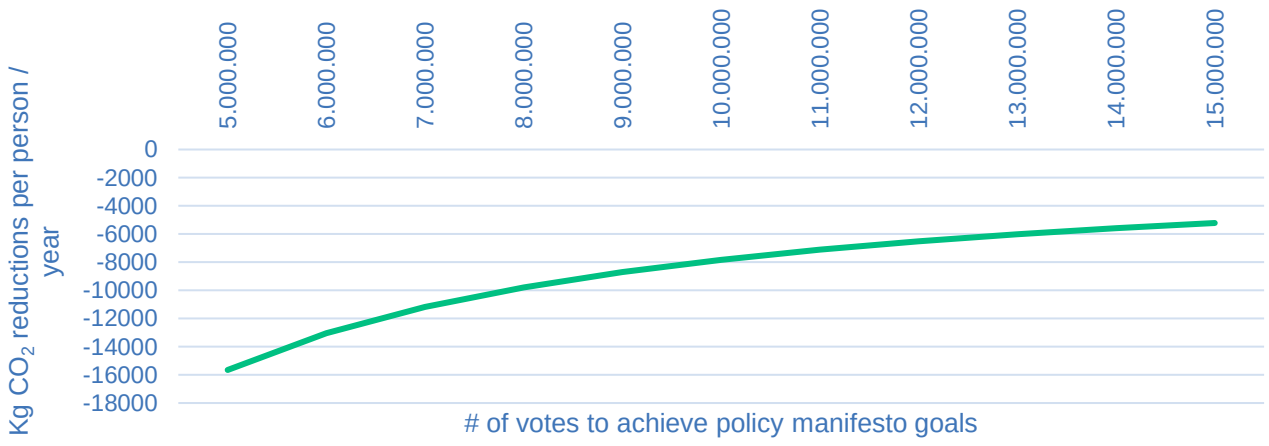
FIG 5: Differences in the emissions footprint of an individual in the Germany related to voting choices across different political parties (Source: Authors based on various sources, see Annex)



A key determinant of the carbon footprint of an individual in the area of voting relates to the number of votes needed to achieve the programme.

In the United Kingdom, this is typically less complicated given that generally only one party governs. In Germany, the nature of coalition governments means it is both unclear how many votes are needed to represent the biggest party and how many votes are needed to form part of a coalition government that allows you to realize your political objective. The Fig. below demonstrates the sensitivity of the results above to different election outcomes. The analysis shows that even if you assume significantly more votes, the relative footprint reduction is still higher than for consumption choices.

FIG 6: The carbon footprint reductions of voting under different voting-majority scenarios (Source: Authors based on various sources, see Annex)



IV. Comparing the emissions footprint of money spent

The previous section sought to compare the impact of an individual 'action' or choice made by a citizen – to vote for the climate, to consume for the climate, or to invest for the climate.

As outlined above, the challenge with comparing choices or actions is the relative effort level associated with executing these choices. The problem here is the lack of common metric to compare these choices more meaningfully (e.g. time spent per action, level of effort). However, at least when comparing investment and consumption choices, emissions footprints can be compared in monetary units.

When comparing investment and consumption actions, emissions footprints can be compared in monetary units. These comparisons are not necessarily always appropriate since in one case we refer to the emissions of a consumption choice that involves annual expenditures and the other case emissions associated with a stock of assets (your investment portfolio) that doesn't necessarily involve a reinvestment. However, such analysis can help to illustrate the relative footprint in a more meaningful way.

The figure below illustrates the emissions intensity reduction per Euro reallocated from a baseline choice to a sustainable choice across different items per Euro spent for the average individual.

The results clearly highlight the huge footprint of air travel per Euro spent. The results show that while in overall terms, the sustainable equity choice is the third most impactful 'action', in terms of expenditure allocation eliminating air travel gives you the most 'bang for your buck', followed by switching to a renewable electricity provider. Interestingly, eliminating beef and lamb from your diet is higher than going vegan, since it affects a lower part of your food spend with a higher impact (beef and lamb have significantly higher footprints than other meats and fish).

FIG 5: Differences in the emissions footprint of an individual in the UK and Germany per € reallocated (Source: Authors based on various sources, see Annex)

V. Comparing the relative impact of different choices

The previous two sections looked at the raw 'emissions footprint' of different voting, consumption, and investment choices. As flagged throughout the discussion, it only considered the actual changes in the emissions footprint of a citizen as an 'accounting exercise', not the actual emissions reductions achieved as a result of the actions. The actual emissions reductions achieved is primarily driven by the extent to which this action represents a 'collective action' shared with others. Each action has a different dependency on collective actions, in line with their characteristic as being direct, indirect, or mandated:

- **Immediate emissions reduction without the need for collective action (Direct).** The first scenario is the emissions are reduced independent of other actors. This happens when the emissions happen directly at point of purchase, the production is directly linked to the service, and its personal to you. An example is walking to work instead of driving. Here, emissions savings are both direct and ensured. Very few consumption choices in practice fall into that category. In investment choices, this will typically only happen if you have majority control of a company (e.g. private equity).

- **Emissions reduction contingent on a material, but limited number of peers (Indirect).** The second scenario relates to where emissions are 'produced' that don't get bought. Not buying the beef in the supermarket all other things being equal will in the first instance increase the food waste of non-purchased beef. In the case of air travel, the plane will still fly and while it will be your luggage and weight lighter and thus consume slightly less fuel, the emissions still take place. These choices likely only show up in real world emissions reduction if some peers similarly adjust their choices. For companies to respond to such demand signals, such changes likely do not have to affect a large number of people but can even materialize if only a small single digit percentage of the population changes their decisions

- **Emissions reduction are contingent on being in the majority (Mandated).** You may vote for a political party that is "green", but does not win the election. In that case, the actual emissions reductions may be zero. Conceptually, that is the same as buying a Korean BBQ with your friends in a restaurant and losing the vote to go for the vegetarian or beef-free option. You voted for the lower carbon outcome, but you lost the vote so the carbon footprint of the dinner was the same. Incidentally, the majority principle holds for equity investments voting power.

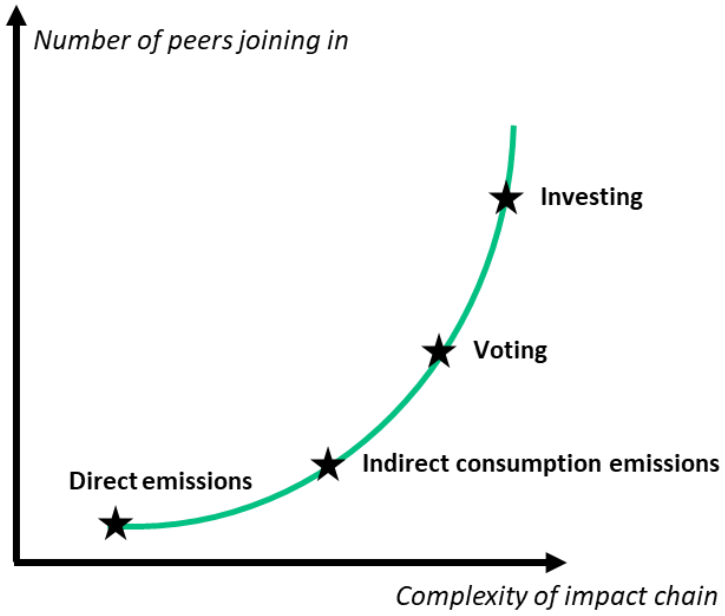
- **Emissions reduction contingent on a meaningful mass significantly larger than the majority ("Supermajority") (Indirect).** You may switch your equity pension plan but simply sell your investments to another investor whose carbon footprint 'goes up'. In that case your decision had an 'impact' in the sense that you no longer invest in the same high-carbon activities and thus reduced your personal carbon footprint, but you transferred these emissions to another actor in the system whose footprint went up. Such actions can in theory have an impact if the overall demand is lower and translates into different corporate decisions, but in the first instance, the emissions don't get reduced. For equity investment shifts to have impact thus requires a meaningful mass likely significantly larger than a simple majority given that it requires for there to no longer be an outlet for an "emissions transfer" or at the very least for that outlet to be much more limited. There are also examples where less than a "super-majority" will suffice. For example, companies may be sensitive to signals from certain domestic investors or key stakeholders and in less liquid markets price signals may be reached through a more limited number of investor actions. Indeed, one of the key challenges with the sustainable finance agenda is the lack of robust evidence as to the thresholds necessary for investor action to translate into price signals. The distinction between portfolio emissions and real world impact is an important feature of the academic literature on the topic (Kölbel et al. 2019).

Given the relative uncertainty and confluence of factors that determine the real world impact of different choices, the consideration of the most 'effective' decision a consumer can take is not as straight-forward as comparing the emissions differences between different actions or choices, or even the emissions differences per Euro or Pound allocated.

Clearly, the more 'direct' the impact channel, the more likely the emissions reductions will take place. From that perspective, walking is arguably the most direct way to save emissions. On the other hand, sustained changes to consumption choices will influence companies as well. Similarly, even if voting is contingent on being in the majority (or forming part of the ruling party), if that event materializes, than impact is likely larger in absolute terms, assuming the political parties keep their promises and future governments do not backtrack on advances made. As this sentence demonstrates, there are a lot of contingencies here, as there are with any choice that isn't direct. In the case of investments, a 'majority' may not be enough if the minority of investors have enough resources to allow a company to maintain their high-carbon activities.

The figure below illustrates the relative requirements in terms of "collective actions" to ensure the emissions differences of different choices translate into emissions differences in the real world.

FIG. 5: Requirement of collective action in relation to 'impact' of climate actions by individuals (Source: Authors)



V. Conclusion

This note sought to illustrate and compare the footprint of different political, consumption, and investing choices. By providing a simple mathematical relationship between these choices, it highlighted that voting in favour of ambitious climate policies has the biggest impact in terms of different emissions outcomes from a pure accounting perspective, followed by consumption / lifestyle choices, and then investing preferences. In terms of 'efficacy', while estimates are more complex, at least a qualitative assessment suggests that investment changes are likely least effective, given the need for collective action at scale to translate these actions into real world outcomes.

It is worth reminding though that the estimates provided here are associated with material uncertainties. Those uncertainties are unlikely to change the order of footprints between the different types of activities, but suggest that the numbers may be highly dependent on a personal situation. Somebody who eats a hamburger every day or flies every month will see a bigger difference in their emissions profile if they switch to a sustainable lifestyle versus somebody who already is conscious in their consumption choices.

Over time, it will be interesting to explore how professional career choices factor into this conversation. For now, that remains a black box. One could imagine future analyses exploring the footprint of working in certain sectors or within certain jobs with sectors.

In terms of the analysis in this report, while it is important and useful to understand the different 'footprints' of citizens, these numbers are not absolute truths. As outlined in the introduction, there are significant uncertainties in the area of carbon footprinting. Decisions do not take place in a vacuum, but can inspire others and be inspired. There is more to political engagement than simply voting, just as there is more to consumption than the simple act of consuming. Civil engagement and public signaling are all parts of how we interact with society.

The paper does not represent an 'effective altruism' case for focusing on voting over consumption choices. As we look forward, while the paper highlights the importance of political choices, it also demonstrates the extent to which different levers can contribute to solving the overall climate problem. Even if investments in relative terms are in third place, all of these factors can play a meaningful role to ensure citizens do their bit to drive decarbonization and achieve climate goals.

VI. Bibliography

Allianz Direct. (n.d.). *Unterhaltskosten Auto: Was kostet ein Auto im Monat?* Retrieved September 14, 2021, from https://www.allianzdirect.de/kfz-versicherung/unterhaltskosten-auto-ratgeber/

AssCompact. (2018, February 19). *So viele Kilometer legen die deutschen Autofahrer pro Jahr zurück*. AssCompact – News für Assekuranz und Finanzwirtschaft. https://www.asscompact.de/nachrichten/so-viele-kilometer-legen-die-deutschen-autofahrer-pro-jahr-zur%C3%BCck

Bieker, G. (2021, July). *A Global Comparison of the Life-Cycle Greenhouse Gas Emissions of Combustion Engine and Electric Passenger Cars*. The International Council of Clean Transportation. https://theicct.org/sites/default/files/publications/Global-LCA-passenger-cars-jul2021_0.pdf

Bocksch, R. (2021, September 10). *Ist das Klimaziel mit dieser Politik erreichbar?* Statista Infografiken. https://de.statista.com/infografik/25693/in-den-wahlprogrammen-vorgesehenes-co2-budget/

Bressler, R. D. (2021). The mortality cost of carbon. *Nature Communications*, *12*(1). https://doi.org/10.1038/s41467-021-24487-w

Crouch, K. J. (2019). *Financing a Low-Carbon Economy: Towards a Standardized Method for 'Two-Degree' Portfolio Alignment for Banks*. [Master's thesis, Harvard Extension School]. https://dash.harvard.edu/handle/1/42006721

DE Statis Statisches Bundesamt. (2021, July 7). *Konsumausgaben und Lebenshaltungskosten*. https://www.destatis.de/error_path/400.html?al_req_id=YUCYKNxZeL6KUSp-ooDHPgAABUg

Der Bundeswahlleiter. (2021, February 17). *Bundestagswahl 2021: 60,4 Millionen Wahlberechtigte - Der Bundeswahlleiter*. https://www.bundeswahlleiter.de/info/presse/mitteilungen/bundestagswahl-2021/01_21_wahlberechtigte-geschaetzt.html

Der Spiegel. (n.d.). *Homepage*. Retrieved September 14, 2021, from https://www.spiegel.de/

Ellmore, J. (2020, August 5). *What Is The Cost Of Owning A Car In The UK?* NerdWallet. https://www.nerdwallet.com/uk/personal-finance/cost-of-car-ownership/

Family Food 2017/18. (2020, February 11). GOV.UK. https://www.gov.uk/government/statistics/family-food-201718/family-food-201718#household-spending-on-food

Good Energy Limited. (2020, June 9). *How much do you save in carbon emissions by being a Good Energy customer?* https://www.goodenergy.co.uk/blog/2020/06/09/how-much-do-you-save-in-carbon-emissions-by-being-a-good-energy-customer/

Hamburger Abendblatt. (2019, March 14). *Deutsche geben 80 Milliarden Euro für Essen außer Haus aus*. https://www.abendblatt.de/wirtschaft/article216656457/Deutsche-geben-80-Milliarden-Euro-fuer-Essen-ausser-Haus-aus.html

Harrabin, B. R. (2020, March 23). *Electric car emissions myth "busted."* BBC News. https://www.bbc.com/news/science-environment-51977625

Harrop, A. (2019, September). *Another mountain to climb: Labour's electoral challenge in the 2020s*. Fabian Society. https://fabians.org.uk/wp-content/uploads/2019/12/Another-Mountain-to-Climb.pdf

Institute for Government. (n.d.). *General Election 2019: manifesto tracker*. Retrieved September 14, 2021, from https://www.instituteforgovernment.org.uk/manifesto-tracker

Knobloch, F., Hanssen, S. V., Lam, A., Pollitt, H., Salas, P., Chewpreecha, U., Huijbregts, M. A. J., & Mercure, J. F. (2020). Net emission reductions from electric cars and heat pumps in 59 world regions over time. *Nature Sustainability*, *3*(6), 437–447. https://doi.org/10.1038/s41893-020-0488-7

Kölbel, J, F. Heeb, F. Paetzold, T. Busch (2019). Can Sustainable Investing Save the World? Reviewing the Mechanisms of Investor Impact. Organization & Environment Vol. 33(4). P. 554-574. https://journals.sagepub.com/doi/pdf/10.1177/1086026620919202

Kuhnhenn, K., Thiele, L., & Schmelzer, M. (2021, September). *Ist Klimagerechtigkeit wählbar?* Konzeptwerk Neue Ökonomie e.V. https://konzeptwerk-neue-oekonomie.org/wp-content/uploads/2021/09/Konzeptwerk_Wahlprogrammanalyse_2021_korrigiert.pdf

Make My Money Matter. (n.d.). Make My Money Matter. Retrieved September 14, 2021, from https://makemymoneymatter.co.uk/

The Measure of Things - 100 kilograms. (n.d.). The Measure of Things. Retrieved September 14, 2021, from https://www.themeasureofthings.com/results.php?amt=100&comp=weight&unit=kgms&searchTerm=100+kg

MSCI. (2021, January). *Consultation on Potential Enhancement of the MSCI Climate Change Indexes methodology to align with the minimum requirements for EU Climate Transition Benchmarks* [Slides]. MSCI. https://www.msci.com/documents/1296102/22675532/Consultation+on+Potential+Enhancement+of+t

he+MSCI+Climate+Change+Indexes+methodology+to+align+with+the+minimum+requirements+for+EU+Climate+Transition+Benchmarks.pdf/a7eaeeaa-7edb-20ac-4d1b-96ee7fb8fc17?t=1611262812504

MSCI (2020). Scope 3 Carbon Emissions: Seeing the Full Picture [Blog]. MSCI. https://www.msci.com/www/blog-posts/scope-3-carbon-emissions-seeing/02092372761

National Statistics. (2021, March). *2020 UK greenhouse gas emissions, provisional figures*. Department for Business, Energy and Industrial Strategy. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/972583/2020_Provisional_emissions_statistics_report.pdf

Richards, J. (2020, October 15). *Carbon Footprint of Food*. Green Eatz. https://www.greeneatz.com/foods-carbon-footprint.html

Rowe, C. (2021, May 21). *How much is the average gas and electricity bill per month?* Money Helper. https://www.moneyadviceservice.org.uk/blog/how-much-is-the-average-gas-and-electricity-bill-per-month

Statista. (2020, August 19). *Durchschnittspreise von Zug- und Flugtickets in Europa 2015 bis 2017*. https://de.statista.com/statistik/daten/studie/1036738/umfrage/durchschnittspreise-von-zug-und-flugtickets-in-europa/

taggeschau. (2021, September 9). *Wahlprogramme im Vergleich: Diese Klimapläne haben die Parteien*. tagesschau.de. https://www.tagesschau.de/inland/btw21/programmvergleich-klimaschutz-109.html

Wagener, L., & Weißbach, A. (n.d.). *Stromverbrauch im Haushalt: Vergleich & Übersicht*. co2online. Retrieved September 14, 2021, from https://www.co2online.de/energie-sparen/strom-sparen/strom-sparen-stromspartipps/stromverbrauch-im-haushalt/

Wikipedia contributors. (2021, September 11). *2019 United Kingdom general election*. Wikipedia. https://en.wikipedia.org/wiki/2019_United_Kingdom_general_election

Wikipedia-Autoren. (2017, September 26). *Bundestagswahl 2017*. Wikipedia. https://de.wikipedia.org/wiki/Bundestagswahl_2017

Yurday, E. (2021a, March 30). *Average UK Household Cost of Food*. NimbleFins. https://www.nimblefins.co.uk/average-uk-household-cost-food

Yurday, E. (2021b, May 30). *Average Car Mileage UK 2021*. NimbleFins. https://www.nimblefins.co.uk/cheap-car-insurance/average-car-mileage-uk

VII. Methodology annex

a. Estimating the emissions footprint of political choices

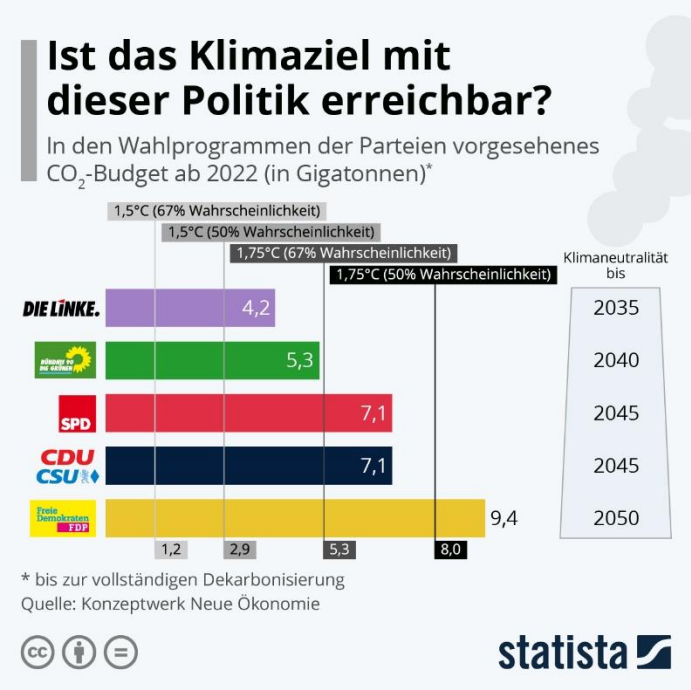
i. *Emissions footprint of election choices – United Kingdom*

Unlike for Germany we could not identify credible public sources that had footprinted the different election manifestos. As a result, we applied the net zero target end dates to the CO2 emissions starting point of 2019 and simply extrapolated in a linear fashion the emissions pathways. While this is a highly simplistic model, it closely replicated the third-party estimates in Germany when applied to the German case. We thus feel relatively confident that it approximates the emissions pathways of the manifestos. The results suggest 5.8 Gt of CO2 in the Conservative manifesto until net zero and 3.8 Gt of CO2 in the Labour manifesto. The differences to Germany can be explained as a result of the lower overall carbon footprint of the UK economy in 2019.

We assume for Labour to govern it would have had to increase its vote share by 10.3%[1] relative to what it actually achieved, suggesting a total necessary vote total of 13.564 million.[2]

ii. *Emissions footprint of election choices – Germany*

The differences in the emissions footprints of the political manifestos of different political parties in Germany is derived from Konzeptwerk neue Ökonomie (2021).[3] These estimates are distributed over the respective time horizons until Germany achieves net zero under the more ambitious of the two scenarios being compared.



The second step of the analysis is allocating the annual emissions reductions to voters. We assume that the political manifesto will be achieved if the party with the manifesto pledge becomes the largest political party in a coalition. Of course, this may also materialize if the party simply joins a coalition government. However, in order to not artificially weight the different political parties, we set a consistent threshold of the expected vote

[1] https://fabians.org.uk/wp-content/uploads/2019/12/Another-Mountain-to-Climb.pdf
[2] https://en.wikipedia.org/wiki/2019_United_Kingdom_general_election
[3] https://konzeptwerk-neue-oekonomie.org/wp-content/uploads/2021/09/Konzeptwerk_Wahlprogrammanalyse_2021_korrigiert.pdf

total assuming 60.4 million eligible voters,[4] the same participation as in 2017 (76%),[5] and a vote share of 25%, the current vote share of the leading political party in the weighted polling average of Der Spiegel.[6]

b. Emissions footprint of investment choices

For the UK pensions savings, we assume the total pension wealth of GBP 30,000, as provided by Make My Money Matter (2021) and apply the equity share as estimated by WillisTowersWatson (2018). For Germany, we use the EC market study to compare UK and German pension wealth and apply the population multiplier to arrive at the relative German pension wealth and the equity allocation.

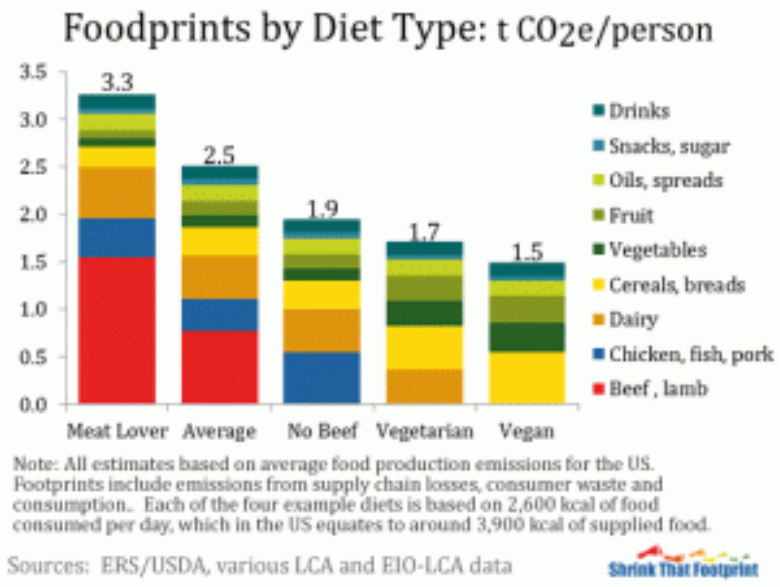
We then apply the MSCI World carbon footprint per $1 invested provided by MSCI and use the currency multipliers to derive relative values in GBP and Euros (0.72 for GBP and then GBP-EUR 1.17). These values only represent Scope 1 and Scope 2 emissions. Assuming 80% of emissions are Scope 3 (based on CDP averages), we multiply the MSCI provided emissions by 4. We compare this value to the MSCI Climate Change Index (also multiplied by 4) and assume the emissions reductions for Scope 3 mirror those of Scope 1+2. We can then multiply these emissions by the pension wealth to derive the overall emissions delta of a consumer that switches their pension plan. We should note that this multiplier of "4" and the relative emissions reductions of low-carbon indexes relative to that multiplier are uncertain. MSCI estimates that Scope 3 actually represents 3x the emissions of Scope 1+2 (MSCI 2020).

The same calculations were applied to estimate the movement of €5,000 / GBP 5,000 respectively in order to generate a comparable estimate for the UK and German market.

c. Emissions footprint of consumption choices

i. Food

The differences in the carbon footprint of different food choices were applied based on the estimates of Shrink that Footprint. While those estimates were made for the US market, the overall carbon footprint of foodstuffs should be roughly the same in both the United Kingdom and Germany. We took the average footprint as a reference point to the emissions reduction of no beef, vegetarian, and vegan diets.



[4] https://www.bundeswahlleiter.de/info/presse/mitteilungen/bundestagswahl-2021/01_21_wahlberechtigte-geschaetzt.html
[5] https://de.wikipedia.org/wiki/Bundestagswahl_2017
[6] www.spiegel.de

ii. *Electricity*

The emissions savings of 640 kg for Germany of switching to a renewable provider were derived from the UBA Footprint calculator, based on the assumption of an average household size of 2 people.

The emissions savings of 525 kg for the UK of switching to a renewable provider were derived from Good Energy.[7]

iii. *Air travel*

The emissions savings of 440 kg for Germany were derived from the UBA footprint calculator which suggests the average air emissions of a German are 490 kg. Assuming not flying requires additional train travel of 1,000 km, which equates to around 50kg, the net emissions savings are 440.

We assume a similar emissions profile for the UK, although further detailed and credible analysis could not be identified.

iv. Electric vehicles

The electric vehicles savings were estimated by first establishing km driven per year on average in the UK (11,909)[8] and Germany (11,888).[9] The relative emissions intensity per vehicle-km were between an average petrol car and an electric car were derived from Knobloch et al. (2018).[10] These were multiplied with average car use to derive the emissions estimates.

d. Estimates of expenditures by consumption item

The estimated expenditures by consumption items were derived from a range of different sources outlined in the bibliography. For the purpose of estimating consumption on different meat products, high-level multipliers of 15% (for beef & lamb products), 30% (for all non-vegetarian products) and 40% (for all non-vegan products) were selected. These estimates are highly uncertain given the lack of data on specific expenditures by exact food item and different costs of different meats relative to other staples.

[7] https://www.goodenergy.co.uk/blog/2020/06/09/how-much-do-you-save-in-carbon-emissions-by-being-a-good-energy-customer/
[8] https://www.nimblefins.co.uk/cheap-car-insurance/average-car-mileage-uk
[9] https://www.asscompact.de/nachrichten/so-viele-kilometer-legen-die-deutschen-autofahrer-pro-jahr-zur%C3%BCck
[10] https://www.sim4nexus.eu/userfiles/s41893_020_0488_7.pdf