

**Working paper**

# Climate Activism, Social Media and Behavioural Change: A Literature Review

Franziska Gaupp, [gaupp@iiasa.ac.at](mailto:gaupp@iiasa.ac.at)

Sibel Eker, [eker@iiasa.ac.at](mailto:eker@iiasa.ac.at)

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**Approved by:**

**Name:** Keywan Riahi

**Program:** Energy, Climate and Environment

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## Abstract

Social change significantly influences climate action through various mechanisms, such as the adoption of low-carbon behaviors and lifestyle, as well as activism that puts pressure on decisionmakers for stricter climate action. Public opinion and attitudes towards climate change and solutions are driven by a complex interplay of several individual, social, economic and environmental factors. Youth climate activism, exemplified by the Fridays for Future (FFF) movement, and social media engagement are two of such interconnected factors. This review paper addresses the impact of youth-led climate protests on online discussions about climate change and solutions, particularly focusing on the influence of social media on shaping societal norms and consumption preferences, notably dietary patterns. Further, it explores the potential of Reddit as a space for deliberative dialogue and a useful data source to analyse public discourse on climate change. By synthesizing existing literature, this paper provides insights for further research on using social media data as a resource to understand the drivers of changing public attitudes towards climate change and climate-friendly behaviors.

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## About the authors

**Franziska Gaupp** is a Guest Research Scholar in IIASA's Equity and Justice Research Group (EQU) and a Senior Guest Scientist at the Potsdam Institute for Climate Impact Research (PIK). (Contact: [gaupp@iiasa.ac.at](mailto:gaupp@iiasa.ac.at))

**Sibel Eker** is a Senior Research Scholar at IIASA's Energy, Climate, and Environment (ECE) program and an Assistant Professor at Radboud University in the Netherlands. (Contact: [eker@iiasa.ac.at](mailto:eker@iiasa.ac.at))

## Introduction

The Paris Agreement as well as the Sustainable Development Goals (SDGs) provide the global community with a clear set of goals and pathways towards a sustainable future. However, despite those agreements, global GHG emissions are still on the rise<sup>1</sup> and a recent Agenda 2030 midterm review concluded that all of the SDGs are 'seriously off track'<sup>2</sup>. In order to return to a safe operating space within planetary boundaries, consolidated action from politics, business and civil society is required. Luckily, there are numerous interventions that different actors can engage in to bring our societies back on a sustainable path. Those interventions range from setting the right policies and policy bundles, financial innovations that facilitate access to credit and loans, to climate activism and other engagements of the civil society.

Social change plays a prominent role in climate action through different mechanisms. Norm and value changes are characterized as one of the key social tipping dynamics that can facilitate rapid decarbonization<sup>3</sup>. Widespread behavior and lifestyle changes, that is, consumption choices, technology adoption and other demand-side actions motivated by specific personal and contextual factors towards low-carbon consumption, have a high potential to reduce GHG emissions while improving human wellbeing<sup>4</sup>, as well as alleviating the tradeoffs between several Sustainable Development Goals (SDG) related to public health, food security and biodiversity. Furthermore, social change has cascading effects on many sociotechnical, -economic and political systems<sup>5</sup>. While behavior change can push the food, energy and transport systems towards decarbonization, it also signals readiness for stricter climate policies to the policymakers. Social movements, as well as climate litigation cases, put pressure on policymakers, and increase the financial risk of carbon-intensive assets. Therefore, understanding the drivers of such social changes is instrumental to harnessing the power of them for climate change mitigation and sustainability.

This Working Paper reviews existing literature towards one of the key leverage points in terms of GHG emission reduction as well as the achievement of a range of SDGs: change in public opinion and attitudes towards climate change, as well as pro-climate behavior changes such as a consumption shift towards plant-based diets. Instead of analysing potential policy interventions<sup>6,7</sup>, this Working Paper will focus on the role of climate activism and social media in changing public opinion and attitudes towards climate change and consumption patterns, as well as the use of social media data to analyze such trends. It will review critically the widespread assumption that social media leads to polarization and echo chambers and will examine to what extent social media data can provide information about behavioural change of their users and the wider society.

## Youth activism on climate change

While we see the first impacts of climate change already today, future generations will have to bear the brunt of it regarding impacts, adaptation potential and loss and damages<sup>8</sup>. Policies and decisions made today will influence the course of the remainder of this century and beyond, which means that the youth today have a huge stake in them. It is thus not surprising that many youth express concern, anger and dissent toward current economic, social and environmental policies and decisions. There are many forms of expressing dissent that can be summarized under the name of activism. It ranges from small-scale community-based actions such as educational programmes or awareness-raising campaigns to individual actions such as signing

petitions on social media or consuming more sustainable products. It can extend to joining protests and civil disobedience.<sup>9</sup> The underlying goals of most youth climate action is shifting economic and political power away from fossil fuel investments, encouraging a shift to renewable energy and an emphasize on climate and environmental justice<sup>10</sup>. Social movements are considered a key driver of social tipping dynamics towards rapid decarbonization, as they trigger wider awareness about climate change, and facilitate the spread of pro-environmental norms and values<sup>3,11</sup>.

The rise of global youth movements in recent years has been attributed to several factors. Children and young people have lower levels of skepticism towards climate change and usually believe that human behaviour is a main driver of it<sup>12</sup>. Further, many youth feel they have a responsibility for addressing climate change as current and future citizens<sup>13</sup>. Future generations will be most impacted by climate change which is why young people report higher rates of anxiety and concern about the future of the planet<sup>12,14</sup>. Most children and young people think that the world does not act quickly enough to address climate change. Current plans and actions of governments around the globe is seen as inadequate by many. A study on Australian adolescents found that 91% of the respondents believe their government is not doing enough to address climate change<sup>15</sup>. Furthermore, youth is often excluded from voting and other formal political processes such as formal discussion and decision-making<sup>16</sup>. Engaging in activism is therefore a result of young people's oppressed political power and gives them a voice in the climate change debate. Another factor for the rise in global youth engagement is increased climate education in schools<sup>17</sup>. Education about climate issues plays a key role in helping young people to make informed decision and choices<sup>18</sup>. Teacher and schools play thus an important role in supporting youth climate action. Support for activism might include nurturing leaning environments where different views can be expressed, promoting participatory, dialogic and deliberative education approaches and creating situations where knowledge and skills regarding climate action are developed. Current didactic approaches to climate change education have been criticized for being ineffective<sup>12</sup>, and creative, interdisciplinary and affect-driven approaches that directly involve young people were suggested instead.

Another lens on climate activism are emotions and the premise that emotions orient and energize action. Regarding social movements and youth climate activism, fear, anger, hope and guilt have been identified as key emotions that might spur but also inhibit collective action. A study on emotions in climate activism found that, while fear is often associated with inhibiting collective actions, it might also be a reason to take action in the climate change context. Fear of social change, guilt for causing climate change and hopelessness can lead to apathy and denial<sup>19</sup>. On the other hand, fear and threat can serve as trigger for mobilization and action<sup>20</sup>. Especially non-acute fear about potential consequences in the future can alert activists against a threat. A more effective emotion regarding climate action is hope. Hope mitigates the potentially paralyzing effect of fear and can be a coping mechanism regarding climate threats. Hope has a positive influence on pro-environmental behaviour among young people<sup>21</sup>. It can facilitate problem-focused coping, provide momentary respite from harsh realities and give people strength to search for solutions. Hope can take different forms. It can help re-appraise a given situation to make it appear brighter, it can provide trust in solutions outside oneself such as technological innovations and create trust in one's own ability to have an impact<sup>21</sup>. However, it can also mean denying that climate change is a serious problem. Further emotions with regards to climate change activism and social movements are anger and guilt. Guilt, e.g., can transform potentially paralyzing fear into mobilizing anger. Especially youth activists from the Global South have expressed anger and ascribed

guilt and responsibility to countries in the Global North<sup>20</sup>. Northern interviewees instead emphasized hope, rejected guilt and treated anger with caution.

The importance that youth play in the climate change debate is increasingly recognized by policy makers. More than ever, they are involved in politics and decision-making of climate change. Since, 2009, for example, youth non-governmental organizations have an official constituency status at the UNFCCC annual conferences<sup>13</sup>. Over the past years, young people are increasingly perceived as important agents of change in the global climate change arena. They have succeeded in raising the profile of climate change as important global topic of high priority, they created broad societal endorsement for climate action and promoted policy changes in several countries<sup>22</sup>. While there has been youth climate activism for many years, the past few years have seen an exponential growth of youth social movements fighting for climate action<sup>22,23</sup>. This has now become a global youth movement with a shared identify around combating climate change and climate justice, triggered by Greta Thunberg and the Fridays for Future movement.

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## **Fridays for Future**

With her refusal to attend school and instead setting up a 'Skolstrejk för Klimatet' on August 20, 2018, the Swedish teenager Greta Thunberg initiated the Friday for Futures (FFF) movement which soon became a global climate campaign that brought millions of people, especially the youth, onto the streets. By their own account, FFF organized more than 20 000 events between November 2018 and March 2023 across the globe in more than 200 countries<sup>24</sup>. FFF supports inter-generational climate justice and societal and political change in order to create a world in line with the Paris Agreement<sup>25</sup>. While Greta Thunberg and the FFF movement receive large public and media attention that made her an inspirational youth figure for millions of teenagers, she has received fierce criticism and verbal attacks from right-wing policy makers and media personalities<sup>26</sup>.

The FFF climate movement has become highly visible around the world over the past years through protest and strikes and have influenced people's perception of our environmental and climate crises. Nearly a third of respondents in a survey in Switzerland indicated that Greta Thunberg's activism has motivated them to act more environmentally friendly<sup>27</sup>. Behavioural change that was reported by study participants includes shifts to public transport and cycling, an increase in recycling practices, a reduction in electricity consumption and a change in food consumption behaviour. Further, they reported to have changed their diet by becoming vegetarian or vegan and reducing meat consumption. Global and local climate strikes have also had impact on policy makers. A study in Germany found that MPs are responsive to protests in their area. MPs that were confronted with protest events in their districts spent more attention to the Climate Strike Movement on Facebook as well as in parliamentary debates during and after strikes<sup>28</sup>.

One of the biggest levers for change that is, at the same time, controversially and emotionally discussed, is the change to more plant-based diets. The next section will provide an overview of the environmental and health impacts our current diets have as well as the opportunities that a shift in diets yield.

## Dietary behavior change

Low-carbon behavior change is an important demand-side measure for climate change mitigation.

Consumption choices in the mobility, food, and residential energy domains, such as reduced travel distance, shifts to low-carbon diets and the use of low-carbon energy in residential buildings can reduce the individuals' carbon footprint by 0.3-0.8 tonCO<sub>2</sub>eq per capita per year. Dietary shifts, among those, is one of the most widely debated choices, as it relates to health and culture.

While animal-sourced food constitutes an important part of improved nutrition in many regions in Sub-Saharan Africa and South Asia, the Global North as well as many industrializing countries face overconsumption of red and processed meat<sup>7,29</sup>. High levels of red and processed meat yield health risks such as cardiovascular disease, diabetes and colorectal cancer<sup>30</sup>. The livestock sector is a major contributor to agricultural greenhouse gas emissions, accounting for 14.5% of global GHG emissions annually<sup>31</sup>. Especially emissions from enteric fermentation and emissions from livestock manure are key contributors to agri-food system emissions<sup>32</sup>.

Reducing meat consumption in the Global North can provide significant benefits to reduce agri-food GHG emissions and improve people's health. A healthy and environmentally friendly diet largely consists of fruits, vegetables, whole grains, nuts and unsaturated oils<sup>33</sup>. It includes low quantities of red meat, poultry and seafood, added sugar and starchy vegetables. This so-called 'planetary health diet' can significantly help mitigate climate change. A study estimated that a progressive shift to a 100% plant-based diet by 2030 could reduce GHG emissions resulting from agriculture, livestock production and land-use change by 84% on a global scale<sup>34</sup>.

A shift to a plant-based diet on a larger scale in society includes behavioural change as well as a change in norms and values. Food preferences are linked to culture, norms and habits<sup>35</sup> and are influenced by eating habits of our peers, parents and role models<sup>36</sup>. Hence, a change of social norms towards a less meat-intense diet could widely change society's eating habits, e.g. due to social pressure<sup>37</sup>, as demonstrated in a climate-society modelling case<sup>38</sup>. In addition to peer pressure, advertisement and media can influence dietary preferences. While currently, food marketing mostly focuses on nutrient-poor, energy-dense foods, healthy alternatives could be advertised or promoted by influencers on social media<sup>39</sup>.

Social and climate movements are able to influence people's behaviour such as a change in diets. A study about young adults in Germany, aged between 15 and 29 years, revealed that 56.7% of respondents have adjusted their diets due to their climate change awareness<sup>40</sup>. The high number, compared to other studies, was attributed to the emergence of the FFF movement which has considerably increased the public's awareness of climate change. Social movements also include groups that directly address vegetarianism or veganism where people form a common identity around health, animal rights advocacy or environmental concern<sup>41</sup>. Behavioural change as well as a change in norms and beliefs can be motivated by peers, advertisements or influential individuals who serve as role models. In addition to that, media plays an important role in forming opinions and beliefs.

## Media impacts on public opinion and beliefs

Conventional media such as the press and television, but also social media, inform the public about what happens in the world. However, media plays also a role in the construction of public belief and attitudes and shapes the behaviour of individuals. Media exposure to climate change topics can increase the level of awareness of the topic and influence social learning<sup>42</sup>. Through repetition and reinforcement of certain messages as well as the absence of proposed alternatives, media can facilitate or inhibit policy action<sup>43</sup>. It can either place trust and credibility in certain social policies or insert doubt and confusion into a topics such as climate change to reduce commitments to action.

With the rise of social media platforms, classic mass media communication (e.g. newspapers or television) has been blended with interpersonal communication (e.g. influencing peer groups through online debates) and thus, have created a new way of public opinion formation in society<sup>44</sup>. Proprietor content such as original newspaper articles or websites is combined with user-generated content such as the comments posted below an article. Comment sections of blogs and news articles can influence a perceived reader consensus which in turn can alter readers' attitudes<sup>45</sup>.

Social media has opened up new channels for public debates and fundamentally changed the communication about important societal topics such as climate change<sup>46</sup>. Individuals are able to communicate with each other and to exchange views in an unprecedented way. In addition, the rise of new communication channels such as social media has changed the way of community building<sup>47</sup>. Social media provides individuals an accessible platform to raise their voices and to quickly reach a broad audience. Further, social sharing in the virtual world helps people to signal their identity, share their emotions and manage their self-concept<sup>48</sup>. People are able to increase their feeling of individual and collective agency when they share ideas, educate themselves, build relationships and feel inspired. Social media enables mobilisation and organisation of consumer activism<sup>49</sup>. Online conversations between concerned consumers, e.g., provide individuals access to information, shape their perceptions and offers opportunities for collective action<sup>50</sup>.

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### Polarization

In addition to the unprecedented increase in exposure to media content through social media, people tend to consume information adhering to their own beliefs and worldviews<sup>51-53</sup>. Such homophilic cluster building or echo chamber can further reinforce existing opinions within a group and move the entire group towards more extreme positions<sup>54</sup>. Despite broad scientific consensus on the causes of climate change<sup>55</sup>, for example, public opinion about climate change is polarized by believers and deniers<sup>56</sup>. A study about social media related to climate change found a high degree of polarisation in attitudes, segregated in 'sceptic' and 'activist' groups that mostly interact with like-minded others<sup>57</sup>. Only a minority of users interacted in mixed-attitudes communities where views were less polarized. An analysis of tweets about sea level rise in Catalunya, following the publication of a report, showed three types of reactions: realist, joking and denier, who predominantly interact with their own group<sup>56</sup>. All three narratives are shaped by societal beliefs and perspectives which in turn are determined by knowledge (or lack of it) about an issue. The study confirmed previous research that showed how identical information can be interpreted in different ways, depending on prior knowledge, mental models and values systems<sup>58</sup>.

Clustering of individual characteristics and attitudes has been studied from several disciplines. Social psychology suggests that social identity, an individual's self-image, has been accentuated through online communication. New norms can be established in an iterative process of observation and negotiation in defining emergent social groups<sup>59</sup>. A study about twitter found that membership of a perceived ingroup influences how members interact with each other, e.g., they adjust linguistic features of within-group tweets to adhere to group norms<sup>60</sup>. According to cultural cognition theory, individuals' opinions about societal issues such as climate change are formed according to their 'cultural way of life' which is how they think society should be organized. A study about the choices of news outlets and media showed that individuals choose news products that are culturally congruent with their own cultural worldviews on climate change<sup>61</sup>. Beliefs such as a person's self-concept, political ideology or religious affiliation guide news media selectivity. In addition, they selectively process the arguments in a way that reinforces and strengthens their existing worldviews.

However, there are also voices questioning the narrative that social media increases political polarization. A study in the US showed that social media users perceive more politically diverse news than non-users and that they face more political disagreement on social media than in other communication settings<sup>62</sup>. A comparative study across six countries found no support for the claim that online audiences are more fragmented than offline audiences<sup>63</sup>. On the contrary, people who use social media are exposed to more diverse news than those who do not. An explanation for those findings is that social media sites increase the exposure to diverse views because they connect so-called weak ties. Weak ties refer to people we interact with in our lives such as coworkers, school friends or distant relatives whom we do not perceive as close to us such as partners, close friends or direct family<sup>64</sup>. As we use social media to stay in touch with people we would otherwise not see regularly, it exposes us to more weak ties than our offline life<sup>65</sup>. Cluster building, or homophily, tends to be lower among weak ties as people who are not very close to us are more different from us than close ties who we feel more similar to. As social media is built around weak ties, novel and diverse information can easily be propagated through the networks<sup>66</sup>.

Media, especially social media, has the power to change social norms and beliefs but it might also lead to opinion clustering and societal divide. For researchers, social media data are thus an interesting and rich resource for studies about behavioural changes on a broad, societal level.

## **Social media as a data source**

Social media data provides a unique opportunity to analyse users' knowledge and views about topics such as climate change. The participatory and decentralized nature of social media offers new possibilities to study people's perception of issues like climate change.<sup>67</sup> Especially contradictory and marginal views can be studied and offer a snapshot of public sentiment<sup>68</sup>. In climate change and sustainability research, social media data has been used increasingly, too, for understanding the human-nature interactions and analyzing temporal socioecological change<sup>69</sup>, such as disaster response and risk perception<sup>70</sup> and urban sustainability<sup>71</sup>. The use of social media data to analyze the extent and drivers of consumption in the climate and sustainability context, however, has been limited to a few studies which analyzed the geotags of tweets to estimate daily travel demand in specific locations<sup>72,73</sup>, or the Facebook (and Instagram) audience size data to analyze the global interest in plant-based diets<sup>74</sup> and air-conditioning adoption<sup>75</sup>.

Despite the fact that social media platforms such as Facebook, YouTube or Instagram have higher monthly active users, research about climate change debates on social media is dominated by studies using Twitter analyses.<sup>46</sup> This is likely to be related with the free accessibility of Twitter's Application Programming Interface (API) to researchers until February 2023 which made data easily available to perform e.g. trend or sentiment analyses. In addition to Twitter, Youtube, Facebook and Instagram, the social media platform 'Reddit' provides vast amounts of data and is a popular resource for scientific analyses about climate change opinions among users.

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## Reddit

Reddit is a popular social media platform with over 70 million daily users in over 100 000 active communities, so called subreddits<sup>76</sup>. To join Reddit, users choose a unique username, email verification is not required. In general, Reddit offers a large degree of anonymity and a rather permissive content policy which is why users might speak more freely than in other contexts<sup>77</sup>. Most content and discussions on Reddit are public which means they can be read even without user account. Users can vote on comments and shared content which determines their visibility. Subreddits are topical communities and discussion forums that are created and moderated by its users. They create their own rules about content and thus, vary greatly in their culture and norms<sup>78</sup>. Reddit's API is free and publicly available which makes it easy to access and analyse its content. There are several climate change related subreddits on Reddit which provide an easily accessible data repository on climate change views, ideologies and opinions. Subreddits range from *r/climatescience*, focused on 'rational discussion of the science of climate change', to *r/climatesceptics* that portrays climate change debates as alarmism and environmentalism driven politics. The largest and most relevant subreddits related to climate change are *r/climate*, *r/climatechange*, *r/climateskeptics*, *r/climateOffensive*, *r/climate\_science* and *r/collapse*.<sup>79,80</sup> An analysis of climate change discussion on Reddit using exploratory data analysis revealed that climate change is an important topic in the community with discussions spanning from politics, news to television programs and celebrities<sup>81</sup>. Peaks of climate change debates include events such as Trump leaving the Paris Agreement. Topics include global warming, US and UK politics world economics and the scientific consensus. Interestingly, the climate change community goes beyond the subreddit structure with activities going across a number of subreddits. Such a degree of connectedness between communities on Reddit contrasts the echo chambers and polarization found on other platforms such as Twitter<sup>57</sup>.

The pseudonymous and self-organized nature of discourse on Reddit offers a useful case study for examining how people with no institutional power discuss climate change. New perspectives such as capitalism and wealth inequality as root cause of climate change can emerge questioning the dominant social and economic system that is usually taken for granted<sup>79</sup>. Regarding polarization, previous studies show mixed results as to whether the Reddit's platform design fosters or prevents echo chambers, misinformation and polarization. A study about political discourse on Reddit following the Trump election found that incivility, the prevalence of offensive speech in political discussions, strongly increased after the start of the 2016 US presidential elections which indicates increased polarization between left leaning and right leaning users<sup>82</sup>. In addition, Republican subreddits experienced a sharp increase in controversial posts linking to controversial media outlets which indicate an increase in misinformation and fake news. The number of Republican extremist subreddits and connected activities of their members across the platform indicate a asymmetric polarization with Republicans exhibiting more extremity than Democrats.

On the other hand, a study about political interaction on Reddit around the 2016 US election found a users' preference for cross-cutting political interaction between Trump and Clinton supporters rather than within-group interactions which contradicts the echo chamber narrative<sup>83</sup>. Similarly, a study about potential Pro-Trump and Anti-Trump echo chambers after the 2016 election found polarization regarding the people's ideology but did not find closed echo chambers<sup>84</sup>. And a study about the subreddit *r/WallStreetBets* even identified Reddit as a potential arena for deliberative dialogue where users from different political leaning actively engage with each other<sup>85</sup>. The authors argue that a forum such as Reddit can play an important role for depolarization and with that, for democracy. An explanation for the lack of echo chambers on Reddit, compared to other platforms such as Twitter, could be the subject-themes structures of user interaction, the level of moderation and the possibility to share longer texts allowing for a deeper level of discussion<sup>81</sup>.

In general, there are differences in cluster formation across social media platforms. A comparative study has identified variations in the creation of echo chambers and polarization among different social platforms<sup>53</sup>. Comparing news consumption pattern, the study found higher segregation between homophilic clusters on Facebook than on Reddit which is explained by the fact that on Reddit the feed algorithm is tweakable by the users while platforms such as Facebook or Twitter don't have such an option.

## Conclusion

This working paper reviewed existing literature on the role of youth climate activism, especially the Fridays for Future global movement, in changing public opinion about and the attitudes towards climate change, as well as the role of social media debates in influencing societal norms and beliefs. It found that both climate activism as well as social media debates influence people's norms and preferences such as dietary patterns. In addition, there are direct links between climate protest and social media debates and vice versa. Studies about climate change debates on social media found cluster building and polarization but there are differences across social media platforms. While Facebook and Twitter tend to foster homophilic clusters, Reddit can act as a space for deliberative dialogue due its algorithm that allows for better moderated user interaction and the option to engage in longer discussions.

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