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Transformative Approaches to an Ecologically Sustainable Welfare State

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Summary

This paper examines how the necessary socio-ecological transformation can be shaped through welfare state institutions and measures in such a way that it does not cause social tensions and avoids any new environmentally harmful maladjustments, but rather is as socially just and ecologically sustainable as possible. The focus is on those policy areas that are addressed within the traditional welfare state and belong to the realm of social policy. Overall, the transition from the traditional to an ecologically sustainable welfare state requires structural changes in various fields of action. These include employment, health and long-term care which are core policy fields within the welfare state, housing and mobility as important elements of social infrastructure, and family policy.

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Zusammenfassung

In diesem Beitrag wird untersucht, wie die notwendige sozial-ökologische Transformation durch wohlfahrtsstaatliche Institutionen und Maßnahmen so gestaltet werden kann, dass sie keine sozialen Spannungen hervorruft und keine neuen umweltschädlichen Fehlentwicklungen verursacht, sondern möglichst sozial gerecht und ökologisch nachhaltig ist. Der Fokus liegt dabei auf den Politikfeldern, die im traditionellen Wohlfahrtsstaat adressiert werden und zur Sozialpolitik gehören. Insgesamt erfordert der Übergang vom traditionellen zu einem ökologisch nachhaltigen Sozialstaat strukturelle Veränderungen in verschiedenen Handlungsfeldern. Dazu gehören Beschäftigung, Gesundheit und Pflege als zentrale Politikfelder des Wohlfahrtsstaates, Wohnen und Mobilität als wichtige Elemente der sozialen Infrastruktur sowie die Familienpolitik.

JEL classification: H2, H23, H53, H55, I18

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1. Introduction

Environmentally harmful production and lifestyles endanger our planet as a functioning ecosystem and thus our livelihood. Environmental degradation, heat and extreme weather events, but also social inequality are exacerbated by climate change and lead to fundamental changes in our society. This article examines how these fundamental changes can be shaped through welfare state institutions and measures in such a way that the necessary socio-ecological transformation contains social tensions and avoids further maladjustments that are environmentally harmful, but is as socially just and ecologically sustainable as possible. The focus is on those policy areas that are addressed within the traditional welfare state and belong to the realm of social policy – even if a number of measures and instruments employed to support the socio-ecological transformation go beyond traditional social policy as we know it.

The specific objectives and the desired shape of the socio-ecological transformation as well as future production and consumption conditions must be determined through a social and political discourse and negotiation process. It is ultimately a political decision how the socio-ecological transformation will shape the economic and social order of the future and, specifically, how the welfare state can contribute to this socio-ecological transformation. Hence, we can only identify the scope and need for action and starting points within the existing welfare state in what follows.

Scope and need for action exists with regard to

i) the protection of society against new risks and impacts caused by climate change (e. g., strengthening and regulating private insurance coverage and disaster protection);

ii) the internalization of costs related to environmental and health damage;
iii) the socially balanced design of measures to combat climate change;
iv) the promotion of the resilience of communities;
v) the enabling and promotion of environmentally friendly work and lifestyles.

Like all human activity, welfare state interventions contribute to greenhouse gas (GHG) emissions. The impact is more pronounced, the more welfare states succeed in supporting economic growth. Specific policy areas within the welfare state exert a direct impact on climate change, particularly through GHG emissions from mobility, housing and healthcare. The socio-ecological transformation therefore requires measures to reduce GHG emissions and the development of innovative solutions that enable behavioral changes of all citizens. Financial support, particularly for the poorer segments of society, is needed as well, for example, for the thermal insulation of buildings or the installation of low-emission heating systems. Improved access to high-quality and ecologically sustainable public infrastructure, including care, healthcare, nursing and transport, and its expansion towards universal basic services also alleviates both economic and regional inequalities.

Climate change adaptation and mitigation measures require a fundamental structural reorganization in several (social policy) areas. Social and labor market policy instruments are required, in order to mitigate the negative effects of the transformation process on employment, such as the loss of jobs in sectors characterized by high GHG emissions, high resource and water extraction and land use. At the same time, the transformation process will also generate new employment opportunities and fields of employment, which will require new qualifications, retraining and reskilling. Their socially inclusive design is an important prerequisite for ensuring that all social groups can participate in the new employment opportunities. The field of education and training is therefore not only a crucial resource for imparting green skills in addition to sufficient basic skills, but also for supporting a sustainable economic system that promotes ecologically sustainable production and services.

Overall, the transition from the traditional to an ecologically sustainable welfare state requires structural changes in various fields of action. These include employment, health and long-term care which are core policy fields within the welfare state, housing, and mobility as important elements of social infrastructure, and family policy as horizontal policy area that has many overlaps with the other policy fields (see Bock-Schappelwein et al., 2024).[1] A central lever to shape the socio-ecological transformation is public finances.

[1] For a detailed presentation of the transition from the traditional to the environmentally sustainable welfare state see Bock-Schappelwein et al.

2. Employment

2.1 Implications of Climate Change and Environmental Policy for Labour

Climate change and its consequences introduce new risks to the labour market. Extreme weather events can impede the access of employees to their workplace and thereby disrupt production and international supply chains or destroy business premises. In some cases, entire sectors, such as winter tourism or agriculture, need to be reorganized. Social inequalities could be exacerbated because workers in precarious employment are particularly affected, as they often work in environments where they are unable to protect themselves from heat. Companies are urged to plan for climate risks and make their products and processes more environmentally friendly, which in some instances may involve reorganizing their business models.

Climate and environmental protection measures also have an impact on employment, helping to secure it in the long term: although employment in emission- and resource-intensive sectors (as well as along the value chain) may become less important or disappear, new fields of employment in renewable energies, energy efficiency, recycling and the circular economy, sustainable agriculture, environmental technologies and many more may emerge (IRENA and ILO, 2022). Overall, scenarios for employment development in the socio-ecological transformation suggest a neutral to positive employment effect for the EU in the aggregate. This involves sectoral shifts (Cedefop, 2023) and investments in the expansion of renewables and refurbishment could lead to sector-specific employment growth. As this transformation unfolds, changes in qualification requirements and needed skills portfolios are likely; some qualifications or professions are in increasing demand, and a shortage could hinder the transformation. For instance, the use of renewable energy has increased the demand for specific occupations in the craft and technical sector as well as for electrical and installation occupations, and environmental policy has raised the demand for occupations in public transport (Cedefop, 2023).

2.2 Approaches to a Socio-Ecological Transformation within Employment

In an ecologically sustainable welfare state, priority must be given to employment that fulfills existential needs with comparatively low negative environmental impact (e. g., public transport, childcare, education, organic farming, or the care sector). Promoting good working conditions, equality, and recognition of the value of work in these areas is therefore in the interest of an ecologically sustainable welfare state.

The conceptual ideas for reshaping work and their potential impacts on the welfare state are manifold, ranging from promoting technological innovation and the transformation of production processes to breaking economic path dependencies in emission-intensive sectors to changing the structure of gainful employment.

Even in the socio-ecological transformation process, the traditional role of labor market policy is to secure employment, prevent unemployment, and actively advance the ecological transformation[2]. Existing instruments and tools can be expanded and adjusted, for example, through qualification initiatives like partial qualifications for high-demand green occupations (Bock-Schappelwein et al., 2023). These should enable immediate (supervised) employment and provide for subsequent qualification in skilled occupations. Skill upgrading should be accessible to both employees and job seekers, with social and financial security being ensured during training. Other examples include foundation models or wage subsidies. Adjustment foundation models in Austria have proven effective, having a positive, employment-integrating impact in the long term, especially for disadvantaged labour market groups (Egger-Subotitsch et al., 2017). When transitioning to a lower-paid job, wage subsidies (for example via the Austrian "Kombilohnmodell", where the Public Employment Service continues to pay 50 % of the previous unemployment benefit in addition to the salary) can reduce individual transaction costs (Bock-Schappelwein et al., 2021; IRENA and ILO, 2022; Cedefop, 2023; Bock-Schappelwein et al., 2023; Egger-Subotitsch et al., 2017). Additionally, the EU has made EUR 17.5 billion available for its member states through the Just Transition Fund (e. g., to promote the circular economy), part of which is reserved for measures for employees and job seekers.

Extreme weather events and heat are also challenging health and safety at the workplace as well as volunteering. Health and safety measures have been designed only for a relatively small share of outdoor workers, e. g., construction workers. These instruments, for example, should be extended to other outdoor workers, accompanied by developing appropriate income security models. Currently, construction firms in Austria have the option of giving workers time off when the temperature reaches 32.5 °C (in the shade), with 60 % of lost wages reimbursed if work is interrupted by extreme heat. Also, health protection in the workplace needs to be adapted and extended, as heat affects mental and physical health, in the long run the ability to work generally. Many services, such as clearing work after extreme weather events, are provided by voluntary workers. Rising future demand will jeopardise such a system mainly based on voluntary work.

[2] For example, the Just Transition process aims to strengthen gainful employment. In contrast, there is the post-growth discourse, which criticises full employment (e. g., Seidl and Zahrnt, 2019; Fitzgerald, 2022; Meinhart et al., 2022).

3. Health and Long-Term Care

3.1 Challenges Related to Climate Change

Climate-related challenges for the health and long-term care sector arise from both acute climate change effects, like heat and natural disasters, and gradual changes, such as shifts in precipitation patterns. For instance, climate change has increased the incidence of disease across the spectrum. The most significant health impacts are expected from heat, increasing the morbidity and mortality of existing conditions, especially respiratory and cardiovascular diseases (Schlegel et al., 2021).

Health risks from climate change are not limited to heat waves but include the rise of vector-borne diseases, previously known as tropical diseases, due to an expansion of the habitat of hosts (Bakran-Lebl and Reichl, 2023; Baylis, 2017; Brugueras et al., 2020). In addition, research has found an increased prevalence and severity of allergic respiratory diseases due to altered blooming periods (Eguiluz-Gracia et al., 2020; Winklmayr et al., 2022), accelerated development rates of toxigenic fungi (Vilcins et al., 2018), and a rise in antibiotic resistance due to the expansion of bacterial infections (Burnham, 2021).[3]

The health consequences of climate change are predicted to lead to more hospitalizations, emergency responses, and resource requirements in public health systems (Rocque et al., 2021). Heatwaves necessitate more personnel and worsen working conditions and thus disproportionately affect women who make up a larger share of the health workforce (Huang et al., 2013). Infrastructure may also be ill-prepared for climate impacts, with extreme weather events potentially damaging buildings and power supplies (Klinger et al., 2014). Hospitals and long-term care homes often lack air conditioning due to hygiene concerns (Stafoggia et al., 2008).

It is crucial to identify groups disproportionately affected by climate-related health impacts, such as the elderly, children, pregnant women, people with disabilities or pre-existing conditions, and the economically disadvantaged. These

[3] Empirical evidence points to increases in mental disorders (Carleton, 2017; Cianconi et al., 2020; Miles-Novelo and Anderson, 2019), cardiovascular diseases (Sun et al., 2018), skin and soft tissue infections (Huang et al., 2016), obesity (An et al., 2018), cancers (Nichols et al., 2009; Stanke et al., 2013), neurological disorders (Lawton et al., 2019; Lian et al., 2015), kidney failure (Zuo et al., 2015), eye diseases (Swynghedauw, 2009), diabetes (Bunker et al., 2016), sleep disorders (Rifkin et al., 2018), gout arthritis (Park et al., 2017), urogenital diseases (Bunker et al., 2016), electrolyte imbalance in children (Xu et al., 2014), birth complications (Kuehn and McCormick, 2017; Zhang et al., 2017), and accident injuries (Binazzi et al., 2019; Otte im Kampe et al., 2016) due to climate change and extreme weather events. These events also increase the risk of injuries, permanent disabilities, and death (Butsch et al., 2023).

groups often lack access to green spaces or air-conditioned environments, work in physically demanding jobs, and have a higher prevalence of chronic diseases (Kovats and Hajat, 2008). Social isolation is another risk factor, delaying support and medical care for heat-related illnesses (Kovats and Hajat, 2008).

3.2 Approaches to a Socio-Ecological Transformation within Health and Long-Term Care

A climate-resilient welfare state must integrate health, climate, and inequality considerations to achieve co-benefits (Haas et al., 2018; Corlet Walker et al., 2024). Key co-benefits arise from promoting active mobility, healthy nutrition, and sustainable urban planning. These measures not only reduce emissions and air pollution but also support physical activity, prevent obesity and related diseases, and ensure social inclusion. Below, specific measures for climate adaptation and (urban) heat protection () as well as emission reduction () are proposed. The health system is to be restructured to reduce GHG emissions while maintaining or improving care quality.

Health-Related Climate Adaptation Measures

Health and long-term care facilities need to adapt to new climatic conditions by setting temperature limits and installing cooling systems (Huang et al., 2013). Energy-efficient cooling methods include insulation, shading, and anti-microbial filters for cooling systems. Health and long-term care facilities should prioritize climate-friendly cooling systems and implement heat action plans and emergency plans for events like wildfires. Furthermore, training healthcare and long-term care personnel in climate health impacts is crucial. One element of adapting public health policies to climate change is effective urban heat protection which includes maintaining cool air corridors, increasing urban greenery, using reflective asphalt, and creating shaded areas (Kluge et al., 2022; Smith et al., 2023; WHO, 2019).

Climate Protection Measures in Health and Care

The health sector in the EU accounts for 5 % of CO_2 emissions (Karliner et al., 2019), arising from various sources, including hospital care, outpatient services, and long-term care. Ambulatory care and prevention, where possible, are more climate-friendly than hospital care (Brugger et al., 2023). Health policy decisions should consider climate criteria, and the health system should focus on prevention, reducing inefficiencies (e. g., multiple testing due to a lack of exchange between the various contact points, such as general practitioner, special-

ist and hospital), and avoiding unnecessary hospital stays. Climate-efficient infrastructure includes energy-efficient buildings and sustainable transportation options. The Austrian "Climate-Neutral Healthcare Strategy", for example, identifies several key areas for action, including green procurement, waste management, and telemedicine to reduce emissions.

Home care services should use climate-efficient vehicles and optimize routes. Initiatives to financially support health and long-term care facilities in reducing GHG emissions and improving climate resilience are required across the entire EU.

4. Housing

4.1 Housing and Vulnerable Groups

The consumption of fossil fuels for the supply of space heating and hot water related to housing causes considerable GHG emissions (EEA, 2023). The longevity and quality of the built infrastructure as well as the spatial structures determine the climate impact over long time periods. With rising climate risks and climate change impacts, the vulnerability of households and potential damage to buildings increase. Vulnerabilities vary locally, regionally, over time and depending on household characteristics. Vulnerable groups, such as low-income households, elderly people and people with pre-existing conditions, are significantly more exposed to climate change impacts (e. g., heat stress) than high-income groups (APCC, 2024; Arnberger et al., 2017). At the same time, the socially disadvantaged have a lower adaptive capacity, i. e., have fewer options to take action against climate change impacts (Kussel, 2018). For instance, they are more often tenants and live in urban and densely populated areas. Moreover, low-income households frequently lack financial resources to invest in climate-fit buildings, e. g., insulation or air conditioning (Khomenko et al., 2020; König et al., 2014; Lampl et al., 2023). Lower-income households suffer from "fuel poverty", caused by price increases for energy, that is sustained by rising energy demand for cooling (König et al., 2014) due to the increase in the number of heat days and urban heat islands (IPCC, 2018; Oke, 1982). In addition, increasing extreme weather events lead to severe damages of assets (Ranasinghe et al., 2023).

4.2 Structures for Climate-Friendly and Social Housing

The supply of affordable housing has long been the main objective of social housing. The challenge of climate change, however, requires a broader understanding of social housing policy. As with increasing climate change impacts, additional objectives are becoming more relevant, such as a reduction in re-

source consumption and net-zero GHG emissions (Günther et al., 2019). Due to the longevity of buildings, the investment and operating phases should be considered together. Decisions concerning the construction and energy system technology determine the operating costs over the entire service life of buildings. An integrated perspective which already takes into account the energy efficiency of the building stock translates directly into lower energy demand. Therefore, synergies between providing affordable housing and avoiding energy poverty could be achieved (Jany et al., 2023).

A transformative perspective should go beyond individual buildings and pursue social as well as emission reduction goals (i. e., low energy costs, high building quality, access to sufficient green space and recreational opportunities). Examples include superblocks (e. g., Barcelona; Ajuntament de Barcelona, n.d.; Nieuwenhuijsen et al., 2024; Frey et al., 2020) and future-proof concepts of quarters and areas, which provide multiple functions in short distances (e. g., daily needs, education, leisure, recreation). These structures also open opportunities for innovative energy systems and the provision of green infrastructure (e. g., Suurstoffi in Switzerland; Zug Estate AG, 2019; Taranu, 2024). From a climate change and biodiversity perspective, high levels of land consumption and soil sealing are problematic (JRC Joint Research Centre et al., 2012). Therefore, sustainable spatial development should place a stronger focus on the revitalization of existing vacant buildings and town centers.

4.3 Elements of a Transformative Housing Policy

From a social policy perspective, sustainable spatial planning and housing structures should reduce the impact on vulnerable groups. Spatial planning and zoning are the basis of a climate-friendly housing infrastructure. In densely populated areas, it is crucial to ensure cold air flows and sufficient green space based on urban and regional climate analyses. Examples of urban climate analyses exist for the Austrian cities of Linz (Tschannett et al., 2021), Graz (Lazar and Sulzer, 2011), and Vienna (Ratheiser et al., 2021), as well as the German cities Mannheim (GEO-NET Umweltconsulting GmbH and ÖKOPLANA, 2021) and Augsburg (GEO-NET Umweltconsulting GmbH, 2023).

Building regulations and building codes define the technical requirements and quality characteristics of buildings, e. g., in terms of energy efficiency, thermal quality of the building envelope, greening and shading. In case legal requirements lead to higher costs for low-income households, additional regulatory measures may be necessary to mitigate these burdens, for example regulations in rent law.

Housing subsidies for residential construction and the underlying funding criteria are a lever to influence the climate impact of buildings, both for new

buildings and renovation of the building stock. Taking Austria as an example, recent analyses show that housing subsidies are not well targeted from a socio-ecological perspective (Rocha-Akis et al., 2023), as they also tend to drive land consumption and soil sealing (Kletzan-Slamanig and Köppl, 2016).

From a social policy perspective, specific funding programmes for low-income households can be important to achieve an emission-free building infrastructure. The "Clean Heating for All" program in Austria is an example of such a targeted funding campaign to replace fossil fuels through climate-friendly heating systems (BMK, 2023; KPC, 2023). At the European level (European Commission, 2021), the new emissions trading scheme (ETS2; European Commission, 2023b) for buildings and mobility adopted as part of the EU's Fit for 55 package and entering into force in 2027 includes the implementation of a Social Climate Fund (European Commission, 2023c). Its resources are partly earmarked for improving the building infrastructure of low-income households.

There is a broad consensus among economists that CO_2 taxes are an important instrument to mitigate climate change as they directly target the use of fossil fuels for heating and warm water supply. However, CO_2 taxes can have undesirable distributional effects, which in turn can be mitigated through adequate revenue recycling measures specifically supporting lower income groups and green investment. Finally, specific taxes, e. g., vacancy taxes, can serve as an incentive to utilize vacant buildings (Segú, 2020, for France). Synergies with a reduction of emissions in the mobility sector can arise, e. g., if progressing urban sprawl is reduced.

5. Mobility

5.1 Mobility, Climate Change, and Vulnerable Groups

Mobility is fundamental for social participation and covering basic needs (e. g., nutrition, health, recreation, education; Brenner, 2023; Grunwald and Kopfmüller, 2022). The current mobility system is geared towards motorized individual transport and is associated with considerable GHG emissions (and other negative externalities). At the same time, mobility expenditure is a significant category in consumer spending. From a social perspective, "mobility poverty", which is described in the literature as limited access to participation in society, is problematic (Bock-Schappelwein and Kettner, 2023; Mattioli, 2021). Peiseler et al. (2022) differentiate between various forms of inadequate access to mobility. Particularly disadvantaged are (i) children and young people as well as elderly and health-impaired people who cannot (or can no longer) drive themselves, (ii) low-income households, who often do not own a car, and (iii) residents of rural areas with insufficient access to public transport.

Motorized mobility contributes to climate change but is also affected by climate change, for example due to extreme weather events that lead to road closures and rail interruptions. This can subsequently cause disruptions in supply chains and restricted access to services and essential goods (Benzie et al., 2016; EPA, 2022; Steininger et al., 2020).

5.2 Structures for a Socio-Ecological Mobility System

A sustainable, climate-friendly mobility system is socially inclusive and barrier-free, and it takes ecological limits into account. It focuses on mobility services, understood as access to people, goods, and places. Such a perspective requires a range of different forms of mobility. Transport infrastructure for active mobility, such as attractive and sufficient foot and cycle paths, is an important lever from a climate and social policy perspective (Peiseler et al., 2022). From an ecological perspective, three strategic lines for a transformation of the mobility system are discussed in the literature (BMK, 2021; Bongardt et al., 2019; Creutzig et al., 2018; Grunwald and Kopfmüller, 2022):

(i) Avoid: Avoidance strategies require the joint consideration of mobility needs, urban development, and spatial planning. These strategies aim at a reduction of distances and the number of necessary trips, i. e., supplying different functions (work, school, shopping, medical care) within short distances. Work-related changes such as working from home and video conferences as a substitute for business trips (Peneder et al., 2023) are one element of this strategy, and so are compact spatial structures, the avoidance of urban sprawl, and zoning in rural areas.

(ii) Shift: These strategies relate to changes in the modal split and an improved integration of different modes of transport, demand-oriented public transport services, and the expansion of cycle and walking routes. They also include solutions for the so-called "last mile problem" through public micro-transport and cooperation across municipal boundaries (Shaheen and Chan, 2016). A shift in mobility needs is associated with a high potential for reducing GHG emissions as well as consumer spending on mobility.

(iii) Improve: Improvement strategies refer to the use of the most efficient technology available, such as electromobility and the availability of the necessary charging infrastructure. They also relate to the use of existing infrastructure (e. g., supermarket parking lots, noise barriers) for PV systems, which, in addition to generating electricity, also serve as shading (Fechner, 2020).

5.3 *Elements of Transformative Mobility Policies*

Spatial planning and zoning are equally important for housing and mobility, as mobility needs already arise during the planning of building and settlement infrastructure. A concrete example are guidelines and standards for the supply of a minimum number of parking spaces (Lehe, 2018; Shoup, 2014). From a socio-ecological perspective, a reform could aim to introduce an upper limit for the number of parking spaces while at the same time increasing the number of well-equipped bicycle parking spaces (Sprei et al., 2020). Another approach could be nationwide regulations for the provision of cycle and footpaths as well as different modes of transport. Focusing solely on e-mobility in the public debate is not an adequate way to meet the needs of vulnerable groups due to the high vehicle costs or their limited ability to drive a car themselves.

Subsidies for mobility services can promote the participation of vulnerable groups in society. For example, reduced fares for certain groups (e. g., young people, people with disabilities, senior citizens, low-income households) can improve access to public transport and contribute to its attractiveness. In contrast, the tax deductibility of commuting costs (Kletzan-Slamanig et al., 2022) provided for in a number of tax systems is subject to criticism. From an environmental perspective, the incentives for the use of motorized private transport and urban sprawl inherent in the tax deductibility of commuting expenditures is problematic. From a social perspective it is criticized that the current system is not well targeted, as it tends to favor higher incomes (see Kletzan-Slamanig et al., 2022 and the literature cited therein).

Taxes and levies, which include CO_2 pricing and tolls, are important instruments because of their steering effect. They should determine the true costs of different forms of mobility and internalize external costs. Taxes on car use tend to have a progressive effect (Köppl and Schratzenstaller, 2023). However, in a mobility system with a strong focus on the use of private vehicles with combustion engines, they can lead to undesirable distributional effects that affect particularly vulnerable groups. Taxes on air travel have shown to be progressive more unambiguously as air travel is still more of a "luxury good" (Büchs and Mattioli, 2024); however, their increase requires internationally coordinated action.

In addition to taxes, road tolls are another pricing instrument in the mobility sector. In several European countries, road tolls are limited to the high-ranking road network. They are intended to reflect the costs associated with the use of the infrastructure. The design ranges from fixed (e. g., vignette system for the high-ranking road network in Austria) to kilometer-based charges (e. g., Italy). Tolling systems can also be used in urban areas, as well as parking fees in order to reduce the demand of (sealed) spaces for parking infrastructure.

6. Family policy

6.1 Family Policy and Vulnerable Groups

Children suffer particularly from increasing heat stress (Aigner et al., 2023; Thiery et al., 2021), due to different physical conditions compared to adults (Böse-O'Reilly et al., 2023; Kenny et al., 2018; Xu et al., 2014) and because of their limited ability to assess heat effects. Children and (especially female) adolescents are increasingly affected by climate anxiety and are particularly vulnerable psychologically (Cissé et al., 2023; Fulda and Hövermann, 2020; Hickman et al., 2021). Moreover, children generally suffer more from climate-unfriendly structures, for example, from dangers in road traffic or the lack of recreational space in cities.

Households at risk of poverty are also among the vulnerable groups (Helldén et al., 2021), as are pregnant women, single parents (among whom women are significantly overrepresented), and the predominantly female employees in childcare facilities affected by climate change impacts. Moreover, poor households are particularly affected by energy poverty.

Women in particular, who bear a large share of care work and – accounting for unpaid care work and paid employment into account – work more overall than men, are put under even more time pressure when implementing climate-friendly practices such as switching to public transport, buying sustainably produced food or avoiding ready meals (Striessnig et al., 2022). Due to the unequal distribution of unpaid work, women tend to be more affected by heat days due to a feedback effect: they need to care more for children and elderly people, who are particularly affected by heat, in physically demanding circumstances.

6.2 Objectives of a Transformative Family Policy

A transformation-oriented family policy should focus more on enabling a more equal distribution of paid work and care work between women and men. Therefore, its focus should be sharpened with regard to increasing the participation of men in childcare and long-term care for the elderly. A second objective of a transformation-oriented family policy would be to improve the quantity and quality of childcare facilities in order to facilitate the reconciliation of work and family life, but also with regard to climate-relevant aspects. The third objective of a family policy that is committed to a just transition, exemplified by the principle of "leaving no one behind", is to avoid excessive climate change-related burdens for families. It should therefore expand the objective of poverty prevention to include the dimension of energy poverty among families with children and avoid excessive burdens through climate protection measures.

6.3 Elements of a Transformative Family Policy

In the context of a transformative family policy, regulations that can influence the gender-differentiated distribution of paid work and care work are particularly relevant. In order to increase the participation of fathers in childcare, the right to parental part-time work could be supplemented by the requirement that a certain proportion of parental part-time work must be claimed by the second parent. Also increasing the number of non-transferable partner months for the second parent during parental leave could be considered.

It should also be reviewed whether cash payments can – in combination with other monetary benefits – adequately compensate for the particular burden placed on families by climate change and climate protection measures or sufficiently strengthen their resilience. The main focus here should be on preventing or reducing poverty in general and energy poverty in particular.

Although a universal basic child cash benefit could alleviate (energy) poverty in the short run, it would not actively contribute to the socio-ecological transformation. The Council of the EU's recommendation regarding an adequate minimum income (not just for children, but for all people)[4], adopted at the beginning of 2023 to ensure active inclusion, appears to be more effective because it emphasizes the importance of public services (childcare facilities, health services, affordable housing, and mobility) for a socially balanced transformation in addition to cash benefits. In the longer run, the aim should therefore be to provide socio-ecological universal basic services that are affordable for all families (Jonas et al., 2023). In the field of family policy, this includes childcare facilities and public transport. This focus implies a shift away from cash transfers towards low- or zero-emission infrastructure.

Finally, from a family or children's perspective, compensation measures for regressive climate measures such as carbon pricing that do not take into account the household size or the possible presence of children – for example household-based flat cash transfers – are insufficient (Eisner et al., 2021). Compensation measures that include child allowances are more adequate.

Regarding infrastructure, very generally, a sufficient supply of childcare facilities is required both to enable parents to improve their work-life balance and to make a more equal distribution of unpaid work within the family possible, which can also potentially enhance sustainability. There is little empirical research whether and to what extent work-family policies can improve pro-environmental behavior of parents. In a recent study, Parth (2024) finds that work-family policies, including childcare provisions, may increase single mothers' pro-environmental behavior.

[4] See https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023H0203(01).

When building childcare facilities, attention should be paid to the careful use of resources and climate-friendly construction processes that minimize GHG emissions as well as accessibility by public transport and the use of renewable energies (e. g., energy self-sufficient operation through the installation of PV systems). Climate protection aspects can also be integrated into the operation of childcare facilities at various points (climate-friendly meals as well as play and learning materials, use of public transport for excursions, reduction of waste). Furthermore, the increasing number of heat days is associated with challenges regarding daily and annual opening hours if parents need to adapt their daily or annual working hours to changing climatic conditions. Climate change adaptation measures, on the other hand, are important both in the construction of new childcare facilities or the renovation of existing ones in order to improve the play and learning environment for children and to reduce the heat-related stress of the predominantly female workforce, as well as with regard to the daily and annual working hours of working parents.

Not least, awareness raising is important, for which early childhood interventions can be particularly effective. For example, climate-friendly operation of childcare facilities (e. g., climate-friendly meals) can serve as a model to illustrate sustainable consumption patterns and lifestyles.

7. Financing of the Welfare State in the Socio-Ecological Transformation

7.1 Challenges for Public Finances due to the Socio-Ecological Transformation

The existing tax systems of European welfare states support the necessary socio-ecological transformation only to a limited extent. EU tax systems are heavily based on the taxation of labour income (European Commission, 2023a; 2024), which reduces labour supply and demand (OECD, 2011; Goudswaard and Caminada, 2016) in general and for mothers in particular (Bargain and Peichl, 2013; Meghir and Phillips, 2010). Moreover, second earners carry a higher labour tax burden than single workers in the majority of OECD countries, which supports the existing unequal distribution of paid work and thus implicitly also of care work between men and women (OECD, 2024).

In contrast, the steering and revenue potential of environmental taxes, as important instruments to drive the necessary ecological transformation, is increasingly being under-used, in relation to GDP and in terms of their contribution to overall tax revenue (EEA, 2022; European Commission, 2024). The CO_2 prices that apply in the European emissions trading system or are levied at member state level (World Bank, 2023) are far below the CO_2 price that would be required to achieve the climate targets according to current estimates (see e. g.,

www.iea.org/reports/global-energy-and-climate-model/macro-drivers). On the other hand, environmentally relevant tax bases beyond emissions (which will decrease in the long run if economies are decarbonized successfully) are insufficiently used, for example waste, land consumption or electric vehicles, which are also associated with negative environmental effects (e. g., resource and electricity consumption or particulate matter). At the same time, the steering effects of existing climate and environmental taxes are counteracted by extensive environmentally harmful tax exemptions, which have hardly been successfully restricted so far (EEA, 2022; Parry et al., 2021).

The share of wealth taxes in overall tax revenues is moderate in Europe. Taxes on wealth currently hardly support the necessary socio-ecological transformation despite increasing wealth inequality in many countries and although higher income groups cause a significantly disproportionate share of GHG emissions (WID World, n.d.). As of now, wealth taxes do not support environmental goals and contribute only modestly to a more equal distribution of wealth. Taxes on large inheritances, which are likely to become more important in the future (Krenek et al., 2022), or property taxes have a high revenue potential but remain underutilized. This is the more problematic as environmental taxes will generate less revenue over time if they are effective in containing the environmental externalities they address (Bailey, 2015).

7.2 Approaches to a Socio-Ecological Transformation in the Financing of Welfare States

A transformative reform of the financing of European welfare states requires a shift of the tax burden away from taxes on labor towards environmental taxes and certain wealth-based taxes. A more equal distribution of paid work and thus implicitly of care work between men and women could be supported by reducing the tax burden on second earners, in addition to a general reduction in the tax burden on lower and middle incomes in particular. This should stimulate the particularly tax-sensitive labor supply of women and mothers in particular.

Forgone revenue from a reduction in labor taxes should be partially offset by a gradual increase in environmental taxes. Options include more ambitious price paths for national CO_2 pricing systems and further taxes on motorized individual mobility. Attention should be paid to compensation measures for CO_2 taxes and energy levies, which can place a particularly large burden on lower incomes or vulnerable groups.

The recently suggested differentiation of carbon pricing according to basic goods and services on the one hand and luxury goods on the other (Oswald et al., 2023) appears problematic, however. The implementation problems are significant: delineation of "luxury consumption", administrative burden, treat-

ment of imports in the absence of a carbon border adjustment mechanism. Moreover, it is questionable whether the "luxury consumption" of upper income groups reacts strongly to price signals. The CO_2 price should reflect the environmental and climate damage caused, regardless of income, for reasons both of economic efficiency and fairness. It is arguably not just to differentiate between harmful actions based on people's income.

More use should be made of tax instruments that can curb land use, such as property taxation (European Commission et al., 2022; OECD, 2022), taxes on second homes or vacancies, or municipal taxes and levies (parking or congestion charges). Also, taxes on the use of natural resources should be reinforced. Thus, environmental externalities beyond greenhouse gas emissions could be addressed, and these tax bases could replace greenhouse gas emissions as a tax base disappearing in the long term in a low- or zero-emission world.

A second financing source with long-term revenue potential are certain wealth taxes. Property taxes have been mentioned. In addition, inheritance and gift taxes could help to increase equality of opportunity and reduce wealth inequality. A net wealth tax, on the other hand, is difficult to implement at national levels (Krenek and Schratzenstaller, 2022), and recent empirical studies suggest that it may be associated with stronger behavioral reactions than an inheritance and gift tax (Advani and Tarrant, 2021).

Climate change impacts and insufficient climate policy are associated with considerable budgetary costs and future budgetary risks that are already noticeable and limit budgetary space in general and for the welfare state in particular in the short as well as in the long run (Sanderson and O'Neill, 2020). These costs of climate inaction (e. g., expenditure on climate change adaptation measures or environmentally harmful subsidies), future climate change-related budgetary risks (e. g., a long-term increase in financing costs for government debt due to deficits in climate resilience, damage to be remedied by the public sector due to extreme weather events, or the need to acquire emission certificates in the event of a possible failure to meet European climate targets) and ways of avoiding them must be taken into account explicitly when assessing the costs and benefits of climate policy measures.

In order to ensure the financial basis of the welfare state in the long run and to accommodate additional spending for climate investment and universal basic services, measures to expand budgetary space are required. Several such measures offer themselves; however, their realization may be challenging politically. This applies in particular to the dismantling of environmentally harmful subsidies, which are still substantial in many European countries. Less controversial may be a shift from cash benefits to universal basic infrastructure.

8. Conclusions

For the welfare state, climate change brings along the additional task of protecting citizens from the consequences of climate change and cushioning the negative social consequences of climate protection and adaptation measures, with special consideration for vulnerable groups. At the same time, welfare state provisions and social policy measures need to be designed in a climate-friendly way in order to reduce their carbon footprint and contribute to adapting to the unavoidable consequences of climate change. Beyond individual measures, the ecologically sustainable welfare state must be understood and conceived as an overarching guiding principle underlying the decisions of all political actors in a future-proof political system. In terms of policy integration, the silo thinking in environmental and social policy must be overcome, especially as manifold co-benefits can be achieved, and a substantial equivalence of environmental and social policy objectives can often be assumed. Following a mainstreaming approach, decisions must therefore always (also) be assessed in terms of the extent to which they contribute to ensuring that planetary boundaries are not exceeded, and social boundaries are not undercut. The transformation of the traditional into an ecologically sustainable welfare state actively contributing to climate policy also means turning away from the conventional understanding of the welfare state as a purely reactive safety net and towards a more preventive more proactive – by making investments – and more transformative welfare state design.

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