Towards a Green Economy

Shaping business sector transformations

The climate crisis requires a transformation towards a climate-neutral economy. This implies considerable pressure for business sectors with a high carbon footprint. The key challenge here is to shape the structural change in a way that is ecologically, economically and socially successful.

By Dirk Arne Heyen

1 Introduction

The ecological challenges of our time are immense – and with them the risks for humanity. In particular, the consequences of increasing climate change and massive biodiversity loss threaten the prosperity and peaceful coexistence of present and future generations. Against this backdrop, the European Union (EU) and the German government have set ambitious targets, particularly to halt climate change. Within less than thirty years, the EU (2050) and Germany (2045) want to achieve climate neutrality. Further ambitious environmental goals include, for example, reducing the pollution of air, soil, and water, and halting the loss of species. With its European Green Deal, the EU has declared biodiversity and "zero pollution" to be priorities alongside climate change [1].

To achieve these goals, it is not enough to make existing production processes and products slightly more environmentally friendly, for example by increasing efficiency of resource use. Rather, a far-reaching transformation towards a Green Economy is needed that fundamentally changes many production and supply structures, as well as consumption patterns in industrialised countries. In particular, the Paris climate agreement requires rapid, far-reaching and unprecedented changes (IPCC 2018).

Overall, a shift to a Green Economy is expected to bring not only environmental and public health benefits but also positive net effects regarding the economy and employment (ILO 2018; NEC 2018; OECD 2017). In addition, it is economically cheaper in the long term to avoid significant climate change than to have to deal with its effects (IPCC 2014; Stern 2006).

However, resource- and/or emissions-intensive business sectors come under pressure: Namely those sectors that – in absolute terms and/or relative to their value added – have high environmental footprints. Thus, climate and environmental challenges and policy goals nowadays add to technological innovations and changes in demand as drivers of economic structural change [2]. Depending on where the pressure for change is localised, three types of (ecological) structural change can be broadly distinguished: Resource-related, production-related and product-related structural change (cf. Heyen et al. forthcoming; Hünecke et al. forthcoming) [3]. For example, while in the automotive industry it is primarily the end product (vehicle) that is facing disruption, in the basic chemicals industry it is primarily the fossil raw material and energy basis of production (IPCC 2014; Stern 2006).

Not only companies, but also their employees and the regions, which are strongly dependent on the respective industries, are confronted with challenges. In terms of a fully sustainable development, the aim of political action should be to shape the change in such a way that (regional) economic adjustment processes are facilitated, social hardships are avoided, and the economic and social opportunities of a Green Economy are exploited. The United Nations Agenda 2030, the Paris Agreement and the European Green Deal speak of a "just transition" that "leaves no one behind".

Against this background, the German Environment Agency (UBA) had commissioned a research project on drivers, challenges and governance of ecological structural change [1]. Within this project, Oeko-Institut and the Fraunhofer Institute for Systems and Innovation Research ISI conducted a broad sector screening, a broad literature review on past processes of structural change, as well as in-depth case studies on two important industries (car manufacturing, basic chemicals) and one new business model (second use of batteries from electric cars) (for detailed results, see Heyen et al. forthcoming and Hünecke et al. forthcoming).

The research results show, inter alia, that public policy has an important role to play in pushing and shaping ecological structural change. However, it needs to be clear that economic prosperity cannot be simply planned and implemented. The political ability to steer the economy and society has clear limits. Therefore, government, business and society must work together as much as possible.

In this article, I summarise the project's main (cross-sectoral) conclusions and recommendations for shaping structural change in such a way that it helps to achieve climate and environmental policy goals, and at the same time is economically successful and socially just [4]. The recommendations are based on literature as well as stakeholder discussions (cf. Heyen et al. forthcoming).

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2 Governance approach: Proactive, participatory and cross-sectoral

Past processes of structural change have been more successful when challenges had been identified early on and addressed proactively (Caldecott et al. 2017; Keltaniemi et al. 2013). This gives companies and employees more time to adapt to new business models or job requirements. It avoids wrong decisions on investments or job trainings in the short term, and structural breakdowns in the long term. Foresight is particularly important in sectors with long planning and investment cycles. For example, production plants in the chemical industry and other energy-intensive sectors have a service life of several decades. It is therefore crucial which technologies are invested in over the next few years (Agora Energiewende and Wuppertal Institut 2019).

Policymakers and industry actors should regularly conduct in-depth analyses to clarify which business sectors could come under pressure because they cause high environmental impacts and/or because megatrends (such as climate change or resource scarcity) require adjustments to production processes or products. Sound analyses can uncover risks that are not yet broadly discussed. To do so, it is possible to build on the method-mix approach for a sector screening undertaken in the above-mentioned UBA project (cf. Hünecke et al. forthcoming).

In view of combined ecological, economic and social challenges, it is important that policymakers, social partners, regional and civil society actors jointly and constructively discuss how best to shape structural change processes in different industries (Binder et al. 2001). Evaluation of past processes shows that transformation strategies with a high degree of consensus between key actors are more effective and robust (Binder et al. 2001; Botta 2018; Gambhir et al. 2018).

A common understanding of the problem and the goal is an important starting point. This does not necessarily mean agreement on specific policy measures, but rather a consensus on the need for and direction of change (Wehnert et al. 2018) – and ideally a shared vision of the future for the sector which then also shapes corporate mission statements. Advantages and disadvantages of different technologies, concrete measures, and conflicting goals in achieving the vision can then be openly discussed within the common goal framework. In addition to climate change mitigation, other sustainability aspects should also be considered in order to avoid ecological problem shifting.

Furthermore, a cross-sectoral approach is necessary in view of major interrelationships and dependencies between sectors. For example, there may be competition between energy-intensive industries (but also with the transport sector) for large quantities, but limited supply, of renewably produced electricity and hydrogen (cf., Heinemann et al. 2019; Matthes et al. 2020).

The UBA project's case study on the chemical industry recommends a multi-actor, cross-sectoral as well as transnational dialogue and roadmap for climate neutrality in this and related industries. Among the issues to be addressed are the required quantities of green electricity, of hydrogen and its prioritised use, and suitable interfaces between domestic and foreign value chains from an energy and material (resources) point of view (cf. chapter 4 in Heyen et al. forthcoming).

3 Environmental policy: Forward-looking, ambitious, coherent and adaptive

By formulating clear, ambitious, medium- and long-term sustainability targets, policymakers can create planning and investment security. This is advantageous for companies, investors and (future) employees alike – for example with regard to investments in R&D or in durable production facilities, the future product line-up, and with regard to career choices or further training. Wherever possible, targets should be specified at a sectoral level (as in the case of the German Climate Change Act) in order to avoid mutual shifting of responsibility between sectors. It is also important to look beyond individual goals to identify and address potential tensions and trade-offs at an early stage. Coherence between policy goals of different governance levels and departments must also be ensured (Binder et al. 2001; Kern/Howlett 2009; Rogge/Reichardt 2016).

In addition to ambitious targets, shaping ecological structural change also requires sophisticated policy instruments that ensure the phasing-out (exnovation) of problematic processes and products (David 2017; Heyen 2017; Kern et al. 2017; Rogge/Johnstone 2017) and their replacement with ecologically advantageous ones. It is not possible here to list specific policy instruments that should be used across all sectors and sub-issues.

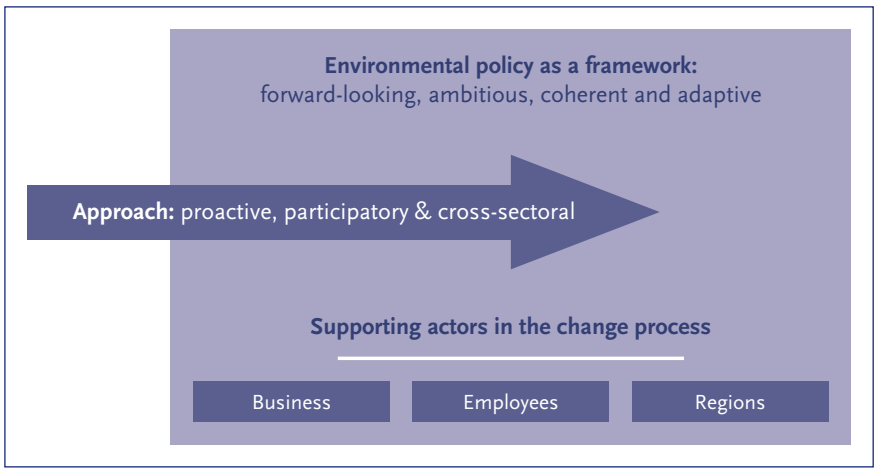

Figure 1: Overview on recommendations for the governance of ecological structural change

As a rule, profound change rather requires a policy mix that includes not only information and advice but also financial incentives and regulatory instruments that promote sustainable practices while restricting or financially burdening unsustainable ones (ibid.; Rogge et al. 2017). To allow business actors time to adjust, policy instruments can be tightened over time – like in the case of annually increasing CO_2 taxes, the decreasing number of emissions trading certificates, or decreasing CO_2 emission limits for manufacturers' car fleets.

Although aiming for long-term policy goals and measures, policymakers must also allow sufficient leeway for innovation and learning, as structural change takes place in a dynamic environment with high levels of uncertainty, especially at the beginning. Therefore, an adaptive policy must include a regular review of goals and measures and, if necessary, adjust or specify them.

A specifically important framework condition for ecological structural change is the availability of large (and relatively inexpensive) quantities of renewable energy: Directly as electricity, but also, for example, for the production of hydrogen as an energy storage option and raw material. The future cross-sectoral demand for it in ambitious climate protection scenarios clearly exceeds the current ambitions for and speed in the expansion of renewable energies, and foreseeably depends also on imports from abroad (Heinemann et al. 2019; Matthes et al. 2020). Thus, a successful ecological structural change must be linked to a faster expansion of renewable energies. The medium term must also include international cooperation with countries with greater production capacities for electricity, hydrogen and raw materials based on renewable energies.

"Ambitious and coherent climate policy instruments need to be combined with smart support for companies, employees, and regions under pressure."

4 Supporting business in the transformation

An ambitious climate and environmental policy in Germany and Europe must ensure that measures do not merely result in emissions being shifted abroad ("carbon leakage"), whether through relocation or the replacement of domestic production with imports. Internationally binding instruments would be desirable for the regulation or pricing of greenhouse gas emissions, or the extraction and consumption of resources. These are, however, usually very difficult to implement. A good alternative could be an EU carbon border adjustment mechanism as proposed by the European Commission – although this involves substantial challenges with regard to methodology, WTO law and global trade politics (i. e. a risk of countermeasures by trading partners).

In addition, policymakers can support companies affected by structural change through the standard range of instruments for promoting innovations and investments, for example through direct investment grants, favourable loans, government guarantees, tax-advantageous depreciation schemes – and free advisory services on funding options. Given the considerable investment required for ecological structural change, public innovation funding should be geared more consistently than before to climate and environmental criteria. This also applies to economic stimulus programmes worth billions, such as those launched in the wake of the Corona crisis.

In view of short innovation cycles, bureaucratic processes around R&D subsidies, grants or loans, which are often tied to specific sub-technologies, should be simplified and made more flexible. One example of good practice – mentioned in the stakeholder discussions within the project case study on car manufacturing – is the "innovation vouchers" scheme of the state of Baden-Wuerttemberg. These are programmes that specifically support small and medium-sized enterprises (SMEs) and start-ups in the planning, development and implementation of innovative products, services or production processes in selected high-tech fields.

The needs of SMEs should generally be given particular consideration. Smaller and young companies tend to find it more difficult to finance necessary investments because their costs are higher relative to their size, they have lower capital surpluses and find it more difficult to obtain loans from banks. They also incur higher relative costs in overcoming bureaucratic hurdles. Some SMEs are specialised in technologies that are losing importance as a result of structural change – the combustion engine, for example. These companies must be supported in transferring their expertise to, in this case, new types of engines, cars and new forms of mobility.

In a market economy, however, there can be no guarantee of survival or support for companies "at all costs"; some will disappear from the market. At the same time, new companies with new business models and jobs are created. It is important to remove barriers and shape the framework conditions in such a way that sustainable business models and start-ups become more attractive (Medhurst/Henry 2011; cf. Heyen et al. forthcoming, chapter 5, for a case study on business models around the second use of batteries from electric cars). However, new business models and start-ups do not automatically benefit those employees and regions affected by the decline of certain industries. Therefore, they often need some support as well – as discussed in the following.

5 Supporting employees in the transformation

Workers in declining industries or sectors undergoing major change should be supported, in particular through further training and retraining in promising fields of activity, taking into account people's existing competencies (Binder et al. 2001; Keltaniemi et al. 2013; Medhurst/Henry 2011). For example, as vehicle power trains and business models in the automotive industry change, skills requirements will also change significantly.

Given that companies benefit from the newly acquired skills of their workers, they are mainly responsible for such training, in cooperation with works councils, social partners and training centres. The German Skills Development Opportunities Act provides additional financial support for employee training. In case of far-reaching structural change processes, such as in the automotive industry, the German trade union IG Metall has proposed transformation-specific short-time work benefits *("Transformationskurzarbeitergeld")*. Under this scheme, structural-change related short-time work would be systematically used for training measures in new work areas. The employees would remain employed by the company during the training, with their wages subsidised by the Federal Employment Agency. This proposal deserves more reflection in the political discourse.

If employment in the current company is no longer possible, the usual job search support measures should take effect. These include counselling and placement services offered by employment agencies, relocation assistance, recruitment and employment incentives for companies, or support for business start-ups. In the case of major economic disruptions, employment companies *("Beschäftigungsgesellschaften")* can be set up with public funding to provide temporary employment, further training or retraining for those employees affected, and to support them in their job search. For older employees, early retirement schemes can be offered.

6 Supporting industrial regions in the transformation

The more regionally concentrated an industry is, and the more pronounced its change or even its decline, the more likely it is that the affected regions will also need support. A current extreme case is the German region of Lusatia with regard to the phase-out of lignite, which has dominated the regional economy for a long time. In these cases, a key objective is to promote the establishment of new companies with sustainable business models in order to diversify and green the regional economic structure. Measures for this can include investment incentives, start-up support and infrastructure development (Agora Energiewende 2017; Koschatzky 2018; Medhurst/Henry 2011).

In addition, a well-developed research and training infrastructure is seen as an important success factor. It ensures the availability of know-how and the innovative capacity in a region. However, research institutions also tend to align themselves with the needs of the regionally dominant industry. Diversification of the economy requires diversification of research, with a focus on sustainable business areas. In this context, strong basic research (initially) has the advantage of being more open in its orientation and usability (Koschatzky 2018).

In the case of the automotive and chemical industries, it is not necessarily a matter of regional diversification in view of an industry's decline, but of change within the established industries. However, key production locations might still face challenges – especially if new manufacturers settle in completely different locations, as the example of Tesla in Brandenburg shows. Regional innovation clusters including competence centres for new technologies and a stakeholder dialogue can be steps to cope with structural change of a key industry within a region.

7 Concluding remarks

The key challenge in ecological structural change is to shape the transformation in such a way that climate and environmental policy goals are achieved while at the same time maintaining value creation and employment (in aggregate), leaving no one behind. To this end, ambitious and coherent climate and environmental policy instruments need to be combined with smart support for companies, employees, and regions under pressure. The focus here should not be on compensation for revenue losses from past business models, but rather on investment in new technologies and products, the essential infrastructures and qualifications.

To adjust to the challenges and opportunities, a forward-looking and proactive approach is required. Given the relatively short time horizon to achieve climate neutrality, for example, and long planning and investment cycles in many sectors, the course must be set now. In case of the automotive industry, German car manufacturers had rather been laggards in the past, now switching hastily to electric mobility. With regard to climate-neutral (basic) chemicals and other energy-intensive products such as steel and cement, German and European producers can be at the forefront of change, if also governments do their part.

While big challenges lie ahead and no role model approach with success guarantee exists, leaving production and products in many industries as they are would be worse both ecologically and economically.

Annotations

[1] This paper is based on results from the research project "Strategies for ecological structural change towards a Green Economy", conducted by Oeko-Institut and Fraunhofer ISI, commissioned by the German Environment Agency (UBA) as part of the departmental research plan (project number 3716141010) and financed with federal funds. The sole responsibility for the paper's content lies with the author.

[2] Economic structural change, in its original definition by French economist Jean Fourastié, meant the shift from the so-called primary sector

(agriculture and forestry) towards industry as the secondary sector and finally services as a third sector. Since then, however, the term has come to further encompass shifts between more specific economic (sub-)sectors and industries, such as the change from a fossil-fuel- to a renewable-based energy system. As done in the UBA research project on which this paper builds, I understand structural change even more broadly to also include fundamental changes in production processes or products within a sector or industry.

[3] In the case of resource-related structural change, the pressure arises from the scarcity or increase in price of the raw materials or energy required. In the case of production-related structural change, the pressure arises from new, better and more efficient production processes, or from ecological problems in previous production patterns. In the case of product-related structural change, the pressure manifests itself at the level of the end product due to its emissions in the use phase, for example.

[4] Economic success is primarily understood here in macroeconomic terms. Not every company will survive structural change processes, and not every job will be saved. Overall, however, macroeconomic and regional economic disadvantages as well as negative effects on the quantity and quality of employment should be avoided. And at the same time, the socioeconomic opportunities of a Green Economy must be exploited: In other words, new business models fit for future must be developed and new jobs created.
Social justice means here that not only positive net employment effects are created but that all population groups – regardless of age, gender and level of education – have the opportunity to benefit from the change and are supported in doing so, if necessary. This also applies to regions whose economic structure is strongly characterised by a shrinking industry.

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