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Governance of exnovation: phasing out non-sustainable structures

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A more detailed paper in German can be found here:
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Abstract

Politics and research have been primarily concerned with the quite appealing side of transformations: the new. But innovations and their promotion are often insufficient for replacing established non-sustainable structures that are still economically functioning (sometimes helped by subsidies). The promotion of renewable energy has for example been insufficient to push climate-damaging coal out of the energy market. The focus on innovation should thus be complemented (not replaced) by a stronger occupation in politics and research with “exnovation”: the exit from non-sustainable infrastructures, technologies, products and practices. Given path dependencies and resistance of established actors, political exnovation intentions face significant challenges. It must thus be asked which measures are appropriate for political enforcement of exnovation, and how the exnovation process can be carried out in a socioeconomically acceptable manner. This paper discusses the challenges as well as governance approaches, based on a combination of scientific literature with past and present political case examples. It is intended to provide a conceptual frame as well as a practically orientated impulse for further discussion on various exnovation and structural change processes that are necessary for environmental reasons.

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1. Introduction: Established structures as neglected issue in sustainability research and policy[1]

The World Wide Fund for Nature estimates the current human consumption of natural resources and services in a year at 1.6 times the biological capacity of the earth (WWF 2016). Rockström et al. (2009) defined nine planetary (global biophysical) limits outlining a safe operating space for humanity. Exceeding these limits could endanger the complex planetary equilibrium and lead to related risks for humanity. Some of these limits can already be considered to be exceeded.

Certain existing economic structures can be associated with particularly high levels of resource consumption, environmental effects and risks. The use of fossil fuels in energy production, for example, contributes 43% of all CO_2 emissions in Germany (UBA 2016). However, according to serious climate protection goals, especially in light of the recent Paris Agreement, energy production and mobility should be almost completely emission-free by 2050.

Such transformation processes towards sustainability indisputably require innovation. Innovations have often been politically supported, as can be seen in the fields of renewable energy or electromobility. Research literature is also rich with analyses on the development and diffusion of innovation and offers recommendations for these processes.

However, less addressed has been the question of how to deal with the old technologies and products. David et al. (2016) point here to the presence of an "innovation bias".

It is becoming increasingly obvious that the analysis and support of innovation alone is not sufficient, as "the new" often simply supplements "the old", creating parallel structures (Arnold et al. 2015; Antes et al. 2012; Geels 2014; Kivimaa & Kern 2016; Paech 2006; Szarka 2012; Thelen 2002). For example, although the German Renewable Energy Act (*Erneuerbare-Energien-Gesetz*, EEG) has led to a significant increase in the production of renewable energy, electricity generated by lignite and hard coal has remained relatively constant.

Rather, transformation also requires an active phasing out of non-sustainable structures. As the counterpart to innovation, the term "exnovation" has started to take hold in the German debate on sustainability (Antes et al. 2012; Arnold et al. 2015; Clausen & Fichter 2016; Paech 2006; Wolff et al. 2007). The term is understood here as the process of phasing something existing completely[2] out of a system. Exnovation can have a wide range, from certain products and consumption habits to entire sectors or technologies so essential to a sector that their absence would equate to a radical change (such as combustion engines in the automobile sector).

Existing literature on exnovation or similar concepts, such as "regime destabilization" in transition literature (see Turnheim & Geels 2012), has thus far been relatively abstract or has only included historical case studies of exnovation occurring through technical advances and shifted demand. In contrast, this paper addresses politically intended exnovation, as was present in Germany and many other countries in the cases of asbestos, DDT, chlorofluorocarbon (CFC), traditional light bulbs and leaded petrol, and currently in the case of nuclear energy. Furthermore, exnovation is arguably deemed necessary in the cases of coal, fossil car fuels and hydrofluorocarbons (HFC).

[1] This paper is the (shorter) English version of a more detailed Working Paper in German (Heyen 2016). I would like to thank the German "Legacy for the Future Foundation" (*Stiftung Zukunftserbe*) for funding the "Exnovation governance" project where these papers have been developed. I would also like to thank several colleagues at Oeko-Institut (in particular Rainer Grießhammer) and all participants of an exnovation workshop on 2 December 2016 in Berlin for their helpful comments, as well as Michelle Monteforte for drafting the English translation.

[2] In contrast, Antes et al. (2012) refer to exnovation gradients with varying magnitudes of phasing out. This would however be indistinguishable from a reduction and would thus lack analytical clarity.

This working paper thus focuses on technologies and products which are economically feasible (some supported by subsidies) but should be phased out on the grounds of ecological sustainability.

Path dependencies and resistance (see the following section) make political decisions on exnovation difficult to achieve. Thus lessons are drawn in this paper from successful past exnovation decisions (mainly in Germany) and from scientific literature, especially transition literature (Geels 2014; Hess 2014; Kivimaa & Kern 2016; Turnheim & Geels 2012) and political science literature on “policy change”, “loss imposition” and “policy termination” (Bardach 1976; Bauer et al. 2012; Behn 1978; Heyen 2011; Kingdon 1995; Pal & Weaver 2003; Pierson 1996). This paper will not only look at political instruments (policy dimension). Rather, given the increased legitimacy demands for political exnovation decisions (due to their destabilizing character), it will also give particular focus to aspects of actors and processes (politics dimension).

This paper aims to contribute to deeper discussions as well as policy actions in view of concrete exnovation cases in practice. While the somewhat technical term “exnovation” does not need to be applied in societal discourses, it can serve more generally as an umbrella concept, allowing for a scientific discourse on such processes.

2. Exnovation challenges: path dependencies and resistance

Existing sociotechnical structures are generally stable and advantaged compared to new ones. This can be attributed to legal, economic, infrastructural, technological, organisational and user-related path dependencies (Clausen & Fichter 2016; Unruh 2000). Resistance emerges when the material and ideological interests related to the status quo are threatened (Geels 2014; Hess 2014; Szarka 2012). Policy termination literature refers here to an “anti-termination coalition” (Bardach 1976; DeLeon 1978). In addition to actors who are directly affected, suppliers of products or expertise as well as politicians and bureaucrats responsible for the sector in question can be part of such a coalition, sharing the same problem perception and values (see Geels 2014; Lindblom 2001; Unruh 2000). In sectors with a significant economic importance to a local community or region, regional governmental actors can be expected to provide further resistance towards exnovation. A good example here is the coal sector in Germany and elsewhere.

While competing coalitions are common in politics, vested interests are especially strong, as they are already well organised, and have usually spent years building up relationships and resources. Furthermore, losses are typically given more weight than (equivalent) gains (Kahneman & Tversky 1979), such that these actors are more motivated to act, meaning to resist (e.g. Pal & Weaver 2003; Pierson 1996). This inclination is exacerbated when the losses or costs are concentrated and obvious, while the benefits (such as ecological improvement) are dispersed and intangible (Wilson 1980). Following the principles of “collective action” (Olson 1965), actors with concentrated costs are more easily mobilised (Wilson 1980).

Established actors utilise various methods for combatting changes which threaten their interests. Geels (2014) refers here to „instrumental, discursive, material and institutional forms of power and resistance“. Discursive methods include, for example, casting doubt regarding the necessity, feasibility and/or utility of a transformation. Resistance might also include attempts to overinflate estimations of the costs or job losses to be incurred, sometimes supported by their own studies.

Furthermore, legal hurdles may exist which could hinder exnovation measures or lead to compensations. Constitutional rights of property and the freedom of occupation, together with the legal principles of proportionality and “legitimate expectations” can act as constraints when seeking

to impose environmental restrictions on existing facilities. International agreements can also be used by foreign companies as an additional, questionable path for legal action, as in the international arbitration between Vattenfall and the Federal Republic of Germany on the country's nuclear phase-out.

However, when in line with the proportionality principle, e.g. by the use of transitional arrangements (see below), ex-post regulations can be constitutional and imposed without compensation. The German Constitutional Court ruling in December 2016 on the nuclear phase-out is encouraging here, as it ruled that deadlines set for the shutdown of nuclear plants were, in principle, constitutionally legitimate and reasonable. Only marginal parts of the regulation were found to warrant compensation. Thus a medium- to long-term coal phase-out should also be possible without significant compensation.

3. Governance of exnovation

3.1. Promoting alternatives, finding support

Besides exnovation, transformation processes need technical, social and institutional innovation. Even the most amenable windows of opportunity, such as a change in government or a crisis or catastrophe, can only be utilised if alternative solutions have already prepared (Kingdon 1995; Turnheim & Geels 2012). The decisions to phase out nuclear power in Germany would, for example, not have been possible without the years of research and development in the field of renewable energy and the existence of alternative visions (Grießhammer & Brohmann 2015).

As is typically the case in politics, exnovation plans, too, require coalition building with multiple actors who can possibly offer various necessary resources and reach various target groups. For exnovation, the support of the innovators of sustainable alternatives and other actors with economic interests in these alternatives are vital. Environmental groups are also valuable here. Greenpeace was, for example, not only involved in the campaign for the exnovation of CFC in refrigerators and paper bleaching with chlorine, but was also active in the development of environmentally-friendly alternatives.

Actors with motives and goals beyond environmental and climate protection should also be engaged, adding problem dimensions of the status quo and broadening the "political arena" (Behn 1978). The phasing-out of subsidies for the black coal mining sector in Germany was supported by environmental politicians but primarily instigated by finance-policy-makers from centre-right parties. The coalition of actors could similarly be expanded in the current challenge of phasing out lignite in Germany and elsewhere, e.g. by including the water industry which suffers from water pollution around lignite mining areas.

In the political debate, exnovation proponents should convey both the costs and damages of existing technologies and the advantages of sustainable alternatives, including economic opportunities. It seems advisable to speak not only about "ending", "termination", etc., but also about "the new". Moreover, in addition to conveying one's own arguments, it is also important to prepare responses for the opponents' arguments. For example, by commissioning independent studies in advance, the overinflated costs and job losses estimated by the opposing interests can be better rebuked.

3.2. Exnovation by consensus?

Precedent examples suggest that negotiation with exnovation-affected actors can offer a chance for legitimacy and a successful exnovation decision. In 2000, the red-green federal government coalition in Germany was able to agree with energy companies on a phase-out of nuclear power. Likewise, in 2007 the "grand coalition" on the federal level and two regional governments were able to come to an agreement with representatives from the hard coal mining industry on the expiration of subsidies and with it, domestic hard coal extraction by the end of 2018 (see Heyen 2011 for an analysis of both cases).

The two cases demonstrate that the biggest advantage of cooperation on exnovation policy lies in the circumvention of resistance and political or legal disputes, which could end up being more time consuming than negotiations would have been. In contrast to the nuclear phase-out in Sweden, the red-green coalition in Germany was able to avoid paying heavy compensation; and in contrast to the closure of coal mines in Great Britain under Thatcher, strong resistance and social unrest was avoided. Naturally compromises had to be made to achieve the agreement, such as on the timeline for the phase-out. However, the "shadow of hierarchy" (Scharpf 2001) and the advantages of planning certainty ensured that industry actors were also open to negotiation (ibid.).[3]

Negotiated compromises will not be necessary, fitting or feasible in all exnovation cases. Rather, this consensual approach appears to be most suitable when substantial legal barriers or serious structural change looms, as is the case for a coal phase-out. While such negotiations should be bound to ambitious climate goals, the exact course of the phase-out can be openly negotiated. As in the German case of hard coal mining, questions on the path of the phase-out, support for structural change (see below) and how to approach the long-term costs of mining sites should be linked together within a package deal (Agora Energiewende 2016).

3.3. Policy instrumentation

Irrespective of the existence of a consensual agreement, the concrete policy instrumentation and formulation of an exnovation process must be determined. One first step towards exnovation might be the dismantling of subsides and the withdrawal of public investment ("divestment"), for example in the area of fossil fuel. For hard coal in Germany, allowing for the expiration of (vital) subsidies was sufficient to achieve exnovation; however, this was an exceptional case.

Generally, direct and indirect instruments for exnovation can be distinguished. Regulatory bans or the withdrawal of (operating) permits for existing facilities constitute direct instruments. Examples are the ban on sales of DDT and leaded fuel in Germany and many other countries. More long-term, possibly gradual phase-out deadlines are also a possibility, as in the case of asbestos and CFC use, or the nuclear phase out in Germany.

In contrast, indirect instruments can include efficiency requirements, limits or taxes. These measures do not consist of a direct ban, but make production or use de facto unfeasible or economically unattractive. For example, efficiency standards were used to gradually phase out classic incandescent and halogen light bulbs in EU countries within the framework of the EU Eco-Design Directive. Likewise, for the exnovation of fossil-fuelled vehicles in the EU a gradual reduction of allowable CO_2 levels towards 0g/km in 2030 has been proposed.

[3] As regards the nuclear phase-out project of the red-green government, both government and energy suppliers were uncertain as to how the Federal Constitutional Court would rule on admissibility and compensation. Thus energy suppliers accepted the temporal limitation for the operation of nuclear power plants (with a medium- to long-term phase-out), while the government promised not to impose further taxes or regulatory restrictions (Heyen 2011).

It should be noted, that there is no one-size-fits-all instrument for exnovation. Imposing taxes making something uneconomical, without a clearly-defined exnovation intention by the legislator could be legally and constitutionally problematic. Rather, a middle- or long-term ban respecting the proportionality principle offers more legal as well as economic planning certainty for stakeholders.

3.4. Early initiation, phased implementation

Extended transition periods can be helpful for reducing resistance in exnovation processes (Bardach 1976; DeLeon 1978; Pal & Weaver 2003; Pierson 1996). They may not be necessary in cases in which goods involve only minimal investment (e.g. patio heaters), or where alternatives are readily available and a long transition period is not ecologically acceptable (as in the case of the short-termed ban on the use of DDT in the agricultural sector in Germany in 1972). However, when a quick exnovation process threatens to cause strong socioeconomic friction, companies and employees should be given sufficient time to adjust to the change.

One downside to a long transition period for exnovation is the potential for revision of the decision, for example after a change in government (Heyen 2011). In the compromise on hard coal subsidies in Germany there was even an explicit option for revision in 2012, although it was not taken advantage of. The interim (after Fukushima reversed) revision in 2010 of Germany's red-green government's nuclear phase-out law (from 2001) by a centre-right government demonstrates the possibility of a revision even without such an explicit option. A ban on old night storage heaters in households by 2020 was similarly reversed by the German Federal Government in 2013.

It is impossible to fully prevent such cases in democratic constitutional systems. A preclusion of reversal would violate the principle of discontinuity after elections and hinder a new majority's ability to rule. The approval of an exnovation decision with broad political support, including from current opposition parties, appears to be the most effective approach for reducing the likelihood of revision. This was done in the expedited nuclear phase-out decision in Germany after Fukushima.

When an exnovation process is to entail a long phasing-out period, it is essential to begin communication and decision-making early on. This allows not only for planning and investment certainty for companies, particularly in branches with long investment cycles, but also for workers regarding their choice of profession and for consumers regarding their purchasing decisions. It also means that action must be taken in the near future, if the last coal plants are to be phased out and no new fossil-fuelled vehicle are to be sold by 2030 or 2035.

3.5. Support for those affected by exnovation

Exnovation can have potentially serious socioeconomic effects on companies, their employees or even entire regions. To reduce the risk of resistance, but also for normative reasons, such effects should not be taken lightly. It is a political responsibility to lessen social and economic hardships while also promoting new and long-term prospects (Vallentin et al. 2016). Setting a timeline for a phase-out as already mentioned is one approach for easing the transition to new business models and employment opportunities. Various structural policy instruments are also available.

In some cases compensation for businesses might be appropriate or even constitutionally required, such as when a quick phase-out is demanded. However, compensation should generally be avoided or at least be conditional, as regards for example investment in new business models. It could cause a chain reaction of compensation claims or windfall profits and false incentives. For example, a company might let a plant, which was going to be shut down anyway, run until it receives compensation through a government-imposed phase-out.

The potentially restricting effects of exnovation on a company's business model can quickly be felt by its employees. When a company is forced to adopt a new business model, downsizing might be required. However, management and employee representatives can negotiate solutions in which part-time or short-time work and early retirement can circumvent employee terminations. In more difficult exnovation cases such as in coal mining, the government can provide additional assistance to employees during the transition (Schulz & Schwartzkopff 2016). Programmes for young employees could also be offered to help with new career opportunities and re-education.

In exnovation cases such as with lignite, where the economic strength and public budgets of an entire region are threatened, support on higher political levels should be provided. In addition to general infrastructural aid, funding should be directed towards sustainable industries such as renewable energy, efficiency technologies or digital business models, taking into account regional potentials and local characteristics. Processes for developing visions and new ideas should take place bottom-up, with participation by stakeholders from the local economy (including start-ups), researchers and civil society (ibid., Vallentin et al. 2016). An example of this approach can be seen in the "*Innovationsregion Rheinland*".

A better focus of existing economic support programmes, e.g. the European structural funds, on sustainable processes offers a potential source of funding for exnovation transitions. Furthermore, special funding programmes could be developed for particularly large processes of structural change. The creation of such a special programme has been proposed by numerous actors for the phase-out of lignite in Germany (Agora Energiewende 2016).

4. Conclusion

The past focus by researchers and political actors on innovation should be complemented (not replaced) by a stronger occupation with exnovation, the phase-out of non-sustainable infrastructure, technologies, products and practices. This paper has sought to shed light on both the challenges and the political options for socially-acceptable exnovation processes. It appears to be politically, legally und socioeconomically advantageous, when dealing with substantial exnovation processes such as the coal phase-out, to allow for long transition periods by beginning planning early and by operating with clear political goals and instruments.

Further research, including in-depth and comparative analyses of past exnovation instances and successful structural transitions, including those abroad, could improve our know-how for future processes. In contrast to the technological exnovation cases presented in this paper, the analysis of more behaviour-related cases could be useful, i.e. the exnovation of societal practices. Lastly, decisions on (product) exnovation by businesses could also be worth looking at.

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