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# A social contract for low carbon and sustainable development Reflections on non-linear dynamics of social realignments and technological innovations in transformation processes

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## ABSTRACT

The transition to a low carbon and sustainable economy represents a major transformation that can only be compared to one other comprehensive transition in modern human history: the industrial revolution. Like the low-carbon transformation, the process of industrialisation was above all an energy regime change. However, industrialisation cannot be solely reduced to a fundamental change in the energy system. The “global metamorphosis” towards industrial societies was driven by economic, cultural and social processes progressing at different speeds. Transformations are actually the result of “Häufigkeitsverdichtungen von Veränderungen” (Osterhammel, 2009), a concurrence of multiple changes. The non-linearity of far-reaching transformations becomes particularly apparent in the non-parallelism between the history of ideas and real socio-economic changes. The social, cultural and cognitive “software” of modern societies was already developed by the thinkers of the Enlightenment. The concept of “Sustainability” follows very similar trajectories. Against this background the concept of a social contract for sustainability gains relevance. It symbolises that the transformation to sustainability implies a fundamental realignment of societies, which requires the legitimation of their citizens. In the last part of his paper the author describes emerging pillars for the social contract of sustainability. An optimistic interpretation of these trends would be: although global emissions are still rising, in many societies the cognitive, normative and cultural conditions for a sustainability transformation are now being established.

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## 1. The three phases of climate protection strategies

The debate regarding climate protection strategies has thus far undergone three phases. Within the scope of international climate negotiations the first phase was primarily concerned with reducing the greenhouse gas emissions of states and the 2-degree upper limit for the global warming process. The crucial question during this phase was: how large should the reductions in greenhouse gas emissions be for which countries? Implicit here were naturally also the costs of avoiding greenhouse gas and consequently issues of apportionment and

fairness. During this phase efforts to protect the climate system were primarily viewed as environmental policy challenges. The analogy of the climate negotiations was the Montreal Protocol, in which the successful withdrawal from CFC-based economic processes was agreed. However, the difference between CFCs and CO<sub>2</sub> emissions, as the key engines of global warming, is striking. CFCs only affected a few economic fields and businesses; the substance was easily substituted and the costs of conversion limited. Economies as a whole were scarcely affected by the Montreal Protocol. In contrast, the burning of fossil fuels concerns the core elements of the global economy, such as the global energy system, mobility and residential infrastructures as well as significant parts of industrial production. Reductions in greenhouse gas emissions

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compatible with the 2-degree target therefore imply the extensive restructuring of the global economy – ultimately the departure from the fossil fuel economy that has arisen since the industrial revolution.

It was only after the climate conference held in Copenhagen in 2009 that the climate protection discussion entered a second phase, in which it became more systematically linked to the question of the transformation of economies in the direction of climate-compatible, low carbon development trajectories. The climate protection discussion evolved successively into a debate regarding technological innovations, the transformation of economic structures and the transition to a new stage of development. This shift in discourse was significant, as it led the climate debate out of the close environmental protection community into the big arena of the global economy. Examples of this shift in climate protection discourse include a series of comprehensive reports of multilateral organisations detailing the transition to a global low carbon economy (OECD, 2011a; UNEP, 2011; World Bank, 2012). This pattern is similar to earlier sustainability debates. At the beginning of the 1970s the “Limits to growth report” (Meadows et al., 1972) focused on the basic idea of bringing resource consumption down. Time was needed to translate this resource challenges into action oriented sustainability strategies (WCED, 1987).

The discussion regarding the low carbon transformation was initially focused on the analysis of technological options for the conversion of energy and industrial systems, increasing greenhouse gas efficiency, the costs of introducing low carbon technologies and policies and incentive systems for managing the switch to a climate-compatible economic structure (Edenhofer et al., 2009; IPCC, 2011; IRENA, 2013; GEA, 2012). However, when taking into account the breadth and speed of the necessary structural transformation that the global economy and national economies would be faced with if the 2-degree goal was consistently pursued, it becomes apparent that the transformation will not only be based upon the introduction of optimally greenhouse gas-efficient technologies at prices that are as reasonable as possible, on the basis of smart incentive structures (WBGU, 2011; World Bank, 2012). Beyond this, the economic business model of the past 250 years with its regulations, research landscapes, education systems, social and cultural concepts as well as the corresponding foreign, security, development, transport, business and innovation policies, based on the use of fossil fuels, is called into question (Mitchell and Maxwell, 2010; Blowfield and Johnson, 2013; Messner, 2015; Scoones et al. 2015). Social, normative and cultural innovations will therefore be as significant as technological change processes. This perspective has heralded the third phase of the climate protection discussion, which this paper intends to contribute to. The remainder of this article develops the following arguments.

The transition to a low carbon economy represents a major transformation that can only be compared to one other comprehensive transition in modern human history: the industrial revolution (WBGU, 2011). It is therefore helpful to cast a look back to the history of the industrial revolution. This reveals that the industrial revolution, like the low carbon transformation of the present day, required the establishment of a new energy infrastructure as a prerequisite (Pearson and Foxon, 2012). However, the energy revolution in the transition to the industrial society was prepared, accompanied and

interwoven with far-reaching cultural and cognitive innovations originating in part from the concepts of the theorists of the Enlightenment, which pointed out the significance of the law, science, the rationality and own responsibility of people as well as democracy for modern societies. The transition to the industrial society was also based on the “invention” of industry-related research, for example in Wilhelmine Germany, and accompanied the rise of a new science of economics (as promoted by John Stuart Mill, for example), which addressed the transformation from an agrarian to an industrial society. The comprehensive transformation of the economic and social system over the course of the 19th century, therefore, extended far beyond technological innovation.

However, a look at history not only reveals the mutual relationships between technological change and cultural, cognitive and normative realignment, but also that these processes are characterised by non-linear dynamics and asynchronicity. History does not occur in accordance with the “political cycle” (May and Wildavsky, 1978) still so popular amongst political scientists (social pressures arise–these are analysed by academic and scientific actors–proposals are drafted for the resolving of these problems–political actors make decisions on the basis of these–these cause effects in society–these are evaluated by academic actors–corrections are undertaken ... and the ideal cycle begins once again). Actual change dynamics occur in a far more complex, deferred manner, there are steps and feedback loops both forwards and backwards. Looking back at history therefore indicates that it is by no means trivial to determine in the present if transformation processes such as the transition to a climate-compatible society are progressing, treading water or facing failure. It is only when looking back – i.e. in the future – that it becomes apparent if a transformation (in this case towards climate compatibility) has been a success or a failure.

It is against the background of these historic perspectives that the concept of the German Advisory Council on Global Change (WBGU) regarding a “social contract for sustainability” (WBGU, 2011) has been sketched out. The social contract for sustainability follows on from the social contract concepts of the intellectual fathers of the transition from the agrarian to the modern industrial societies (such as Rousseau, 1762; Locke, 1689; Kant, 1797). The core elements and the significance of such a social contract for the “great transformation” are detailed. In conclusion, three actual change dynamics are depicted, which show that mental, normative and cognitive realignments are currently underway in many societies which could be interpreted as sources for a social contract for sustainability: discussion covers the altered values of people, the increasing acceptance of low carbon development concepts in business, society and international organisations as well as new welfare concepts that acknowledge ecological limits and identify the non-economic conditions of a “good life”. A complex picture emerges. Low carbon business models are becoming increasingly attractive in many countries. Dynamism in the direction of climate compatibility is no longer restricted to niche projects, but instead stands in the focus of a comprehensive structural transition towards sustainability, for example in the case of the German energy transition (Kemfert et al., 2015). Nevertheless, greenhouse gas emissions worldwide continue to rise. At the same time, there is some

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