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Invited background document on economic transformation, to chapter:  
Transformation: The Economy

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## **GOVERNANCE OF ECONOMIC TRANSITION**

We live in an era of turmoil and profound change in the energetic and material underpinnings of economies. The era of cheap energy is coming to an end (Murphy 2014, Lambert et al. 2014, Hall et al. 2014, Hall et al. 2009, Hirsch et al. 2005). Because economies are for the first time in human history shifting to energy sources that are less energy efficient, production of usable energy (exergy) will require more, not less, effort on the part of societies to power both basic and non-basic human activities. Sink costs are also rising; economies have used up the capacity of planetary ecosystems to handle the waste generated by energy and material use. Climate change is the most pronounced sink cost.

What will happen during the oncoming years and decades when we enter the era of energy transition, combined with emission cuts, and start to witness more severe effects of climate change? That is the big question. What kind of economic understanding and governance models do we need, now that economies are undergoing dramatic rather than incremental change? While economists typically emphasize carbon pricing as a policy tool for tackling climate change, natural scientists and multidisciplinary environmental research groups argue for more profound political engagement and proactive governance of economic transition (Chapin et al. 2011, Steffen et al. 2018) – something akin to a global Marshall Plan (Aronoff 2017, Gore 1992). This difference in perspective is in part due to relatively recent advancements in environmental research, which have revealed a faster-than-expected decline in natural ecosystems and take into account the whole range of human-induced pressures, and not merely climate emissions (Barnosky et al. 2014).

### **New economic thinking for the turbulent years ahead**

Decades of academic work in ecological economics have gone into integrating energetic and material stocks, flows, and boundaries into economic thinking (van den Bergh 2001, Røpke 2005). Although some progress can be seen on the economic-theoretical level, the economic models which inform political

decision-making in rich countries almost completely disregard the energetic and material dimensions of the economy (Hall and Klitgaard 2011).

As Hall and Klitgaard (2011) have shown, today's dominant economic theories, approaches, and models were developed during the era of energetic and material abundance. These theories were challenged only temporarily by the oil crises of the 1970s and the 1990s; no significant theoretical or political changes were made. Thus, dominant economic theories as well as policy-related economic modeling rely on the presupposition of continued energetic and material growth. The theories and models anticipate only incremental changes in the existing economic order. Hence, they are inadequate for explaining the current turmoil.

In addition to rapid climate change, biodiversity loss, and other environmental hazards, societies are witnessing rising inequality, rising unemployment, slow economic growth, rising debt levels, and governments without workable tools for managing their economies. Central banks in the US and the Eurozone have resorted to unconventional measures such as negative interest rates and buying up significant amounts of public debt. This has relieved some economic pressure, but many commentators are worried about what can be done after these extraordinary measures are exhausted and the next economic crisis hits (Stein 2018).

It can be safely said that no widely applicable economic models have been developed specifically for the upcoming era. Here we highlight underutilized tenets of existing economic-theoretical thinking that can assist governments in channeling economies toward activity that causes a radically lighter burden on natural ecosystems and simultaneously ensures more equal opportunities for good human life. Our focus is on the transition period, the next few decades.

### **What needs to be done – in social and material terms?**

Let us first take a glance at what economies need to accomplish, in concrete terms. They need to transform the ways in which energy, transport, food, and housing are produced and consumed (O'Neill et al. 2018). The result should be production and consumption that provides decent opportunities for a good life while dramatically reducing the burden on natural ecosystems. In terms of greenhouse gases, global net emissions should be zero around 2050 – in Europe and the US by around 2040. (Rockström et al. 2017)

*Energy.* Currently, approximately 80% of the global net primary energy supply comes from fossil fuels – oil, natural gas, and coal (IEA 2017). Good quality, easily available fossil fuels have powered the industrialization of nations world-wide. Now, the entire energy infrastructure needs to be transformed. The energy return on investment (EROI) decreases across the spectrum – unconventional oils, nuclear and renewables return less energy in generation than conventional oils, whose production has peaked – and societies need to abandon fossil fuels because of their impact on the climate. Because renewables have a lower EROI and different technical requirements, such as the need to build energy storage facilities, meeting current or growing levels of energy need in the next few decades with low-carbon solutions will be extremely difficult, if not impossible. Thus, there is considerable pressure to lower total energy use. The development of energy production will also need to be closely linked with the development of the systems and practices of energy consumption, for example, the electrification and sharing of transport vehicles. (Murphy 2014, Lambert et al. 2014, Hall et al. 2014, Hall et al. 2009)

*Transport.* In cities, walking and biking should be emphasized and the remaining public or semi-public transport in and between cities should be largely electrified. This will require changes in city planning (for

example, how homes and workplaces are connected to each other and how convenient biking is), in vehicle production, in transport infrastructure such as railways, roads and charging stations, and in energy production and storage. Due to the decreased need and capacity for rapid transit, the overall result will most likely be less transport rather than more. (Banister 2011, Geels 2012) In addition, international freight transport and aviation cannot continue to grow at current rates, because of the need to cut emissions and the lack of low-carbon alternatives to current technologies.

*Food.* In developing countries, the regime of exporting a narrow selection of commodities and raw materials and importing cheap basic food items has not worked for local communities. A wide array of research shows that developing countries ought to focus on providing diverse nutrition for their own people and thereby increase local livelihood opportunities and improve socio-material conditions in general. Simultaneously, most countries, affluent and developing alike, face great environmental challenges in food production. It will be too risky to rely on the functioning of only a few main food production areas in the future. (FAO et al. 2015, FAO et al. 2017) This will have repercussions for international food trade, also in Europe and the US. Countries currently relying on significant amounts of food imports will have to attain a high degree of food self-sufficiency, with international food trade regaining its position as a crucial component of food security rather than serving as a commodity market. With regard to both production and consumption practices, dairy and meat should make way for largely plant-based diets (Poore & Nemecek 2018).

*Housing.* The construction industry is currently dominated by concrete and steel, whose manufacturing and other life-cycle processes are very energy-intensive and cause significant climate emissions and other types of waste (ECORYS 2014). Long-lasting wood buildings, on the contrary, can provide carbon storage (Pingoud et al. 2003, Soimakallio et al. 2016, Gustavsson et al. 2017). A significant shift toward using wood in construction would require changes in the entire production network, starting from forestry, in which construction uses compete for example with paper and energy uses. In addition to manufacturing, cooling and heating are the most significant drivers of lifetime emissions from housing. As for transport and food, the level of emissions caused by cooling and heating is closely tied with the mode of energy production on the one hand and with housing practices – e.g., the level and means of convenience – on the other hand (Shove 2003).

### **Rapid economic transition requires proactive governance – markets cannot accomplish the task**

It is clear from these examples that strong political governance is required to accomplish the key transitions. Market-based action will not suffice – even with a high carbon price. There must be a comprehensive vision and closely coordinated plans. Otherwise, a rapid system-level transformation toward global sustainability goals is inconceivable. Mazzucato (2013, 2018) has examined this topic from the perspective of innovation policy and argues that historically, major system-level innovations such as the US Apollo program have required the state to set the mission and coordinate and finance much of the related research and development. According to her research, achieving system-level transition has required and will require proactive mission-oriented innovation – it will not be enough for the state to fix “market failures” reactively. Of course, innovation alone is not enough, and we will return to the question of limiting resource use and organizing jobs below.

The typical opposition to the need for rapid coordinated transition in most Western countries begins with the influential idea that only under a regime of limited government “intervention” can the market sustain its efficiency. Thus, if the state prioritizes one technology over the other, it will most likely prioritize the wrong one. If the state employs people to build new infrastructure, it will crowd out private enterprise. From this standpoint, many economists have settled for carbon pricing as the least interventionist, economically

most efficient “first-best” policy for cutting greenhouse gas emissions (Jenkins 2014). Carbon pricing can be accomplished via carbon taxes or emissions caps and permit trading (“cap-and-trade”). A carbon price is a “Pigouvian fee” (Pigou 2017 [1932]) designed to correct undesired, unpriced market externalities.

A key problem with carbon pricing has been that states, federations, or unions have not implemented it on a sufficiently high level, fearing industrial leakage to less environmentally-regulated countries. For this reason, many economists and politicians hope for global carbon pricing. But if we return to the four examples above, energy, transport, food, and housing, we can see that it would be highly unlikely that even global carbon pricing would guide economic activity in the right direction – at least with sufficient speed and breadth. As a policy tool, carbon pricing lacks the crucial element of coordinating a diverse set of economic actors toward a common goal. Individual actors would have an incentive to decrease carbon emissions, but they would still compete through their own business logics; there would be nothing to ensure that any one business logic would support the transition to sustainability on a systemic level. Moreover, it has been extremely difficult in recent years to settle almost anything with such a wide impact on an international level.

Another influential idea opposing state-guided transition to sustainability is the goal of a balanced state budget, which is considered essential even in the relatively short run. This means, on the one hand, that states should avoid spending to avoid running budget deficits, and on the other hand, that they should avoid regulation that negatively affects existing private enterprise and consequently tax revenues. Thus, states have not been keen to invest in sustainability transformation or limit resource-intensive economic activity.

Both a priori arguments against strong state governance presented above depend on a particular kind of economic theory, namely the neoclassical school. If we switch to another theoretical lens, looking at the economy from another perspective, these arguments lose their effect. The theoretical move is analogous to a shift from a focus on individual cognition to social or structural dimensions of human behavior, where we begin to see that individual wants, for example, are not merely individual but are produced or conditioned by a set of extra-individual dimensions. This kind of theoretical shift is a normal procedure for any student of the social or human sciences.

### **Economic theory to support transition governance**

Whereas the neoclassical school of economic theory starts from a set of theoretical axioms depicting reality in terms of simplified mathematical functions leading to equilibrium and presupposed to hold in any historical situation, the Post-Keynesian school (Hein and Stockhammer 2011, Lavoie 2009) builds its theories on existing economic institutions. Post-Keynesian analysis is historical in nature; markets would not and do not exist without political regulation. Consequently, the Post-Keynesian approach is not a priori wary of the state’s role in the market. It does not assume that markets always seek equilibrium, but maintains instead that capitalist economies tend to generate market bubbles and other crises. Markets do not lead to socially and ecologically desirable outcomes on their own, but require active political guidance.

Many Post-Keynesians, working through the framework of modern monetary theory, emphasize the economic role of states or unions of states with their own currencies and central banks (Wray 2015, Mitchell 2015, Lavoie 2013). A central claim of these scholars is that states can never run out of their own currency. Unlike natural, social, and technological resources, sovereign currencies are not a limiting factor in collective action such as the transition to sustainability. This has been the case since the gold standard was abandoned and fiat money adopted in the 1970s. The state can always spend and invest in its own currency. Moreover, it does not have to hold on to particular jobs or industries for the sake of tax

revenues. In other words, from this perspective, collective action, organized at least partly through the state, should be guided not by the need to secure public funds, but on the basis of social goals and material boundary conditions.

As a practical policy tool, Post-Keynesians have suggested a so-called job guarantee (Cook et al. 2008, Murray and Forstater 2017, Tcherneva 2018), which would ensure that all people capable and willing to work would be able to get a permanent, state-funded, and locally administered job. The most suitable jobs for the program would be those that almost anyone can do with limited training. The jobs could be modeled to serve the transition to sustainability and to build capacities to adapt to climate change: for example, installing decentralized energy solutions and preparing for floods. In addition to triggering the transition, the job guarantee would ensure full employment. It would lessen insecurity and the need to compete for environmentally destructive jobs on the individual and the collective level.

The Post-Keynesian approach challenges economic orthodoxy and supports sustainability transitions in the current economic and political context of Western and other similarly ordered countries. Developments in China serve as a reminder that economic theories other than neoclassical ones are already effective in the world. In China, economic transitions have not been held back by the ideas of minimum state intervention or a balanced budget. Past transitions have, however, been ecologically unsustainable in many ways. Beyond Post-Keynesian theory, there can be a variety of economic theories that support rapid materially and ecologically beneficial transitions. The key theoretical requirement is that they must enable politics to acknowledge transformational social goals and the material boundaries of economic activity.

### **The new geopolitical order during and after transition governance**

Taken together, what would these policy measures mean for the world economy and geopolitics? Of course, as is always the case in large-scale societal transformations, it is difficult to predict the overall outcome when there are multiple variables, but generally the direction would be toward “a Keynesian world with planetary boundaries”: unique, autonomous economies and societies engaging in regulated international trade for specific reasons, such as food security, rather than for the sake of free trade as a principle. Individuals, organizations, and nations would approach the economy as a tool to enable a good life rather than as an end in itself. Economic activity will gain meaning not by achieving economic growth but by rebuilding infrastructure and practices toward a post-fossil fuel world with a radically smaller burden on natural ecosystems. In rich countries, citizens would have less purchasing power than now, but it would be distributed more equally. Citizens in all countries would have access to meaningful jobs and they could trust that a desirable future is being constructed on the collective level.

The focus on life-improving and emissions-reducing goals rather than abstract economic goals would also characterize the relations between developing and developed countries; economic activity between them would consist of bidirectional learning in order to build new, locally suitable infrastructure and practices at both ends. This kind of proactive state-led economic governance oriented toward self-sustained, low-emission production and consumption runs contrary to the currently dominant world political order, which has been organized around international free trade. Key international institutions, such as the International Monetary Fund, which has been known for its policies of privatization and export-led industrialization, will need to be reconfigured accordingly.

Climate change and other environmental changes threaten livelihoods across the planet and thus give cause for mass migration. It is in the interest of all countries to maintain local opportunities for a good life. Because different countries and areas have different path-dependencies and goals, there is no socio-

technical solution that fits all. One especially important constraint for rich countries is that dramatic reductions in emissions at current high levels of consumption are very challenging, if not impossible. Some developing countries, in contrast, can make significant improvements in their people's wellbeing with new investments in low-carbon solutions. These developing countries do not need to begin by dismantling the fossil-fuelled infrastructure that has provided a range of low-cost production and consumption opportunities in rich countries for decades. Shifting climate zones towards the Earth's North and South Poles adds another imperative for learning: for example, food producers in northern Europe have a lot to learn from their southern colleagues.

In view of the challenges encountered today in implementing meaningful international agreements, the most likely option for initiating transitions to sustainability would be for a group of progressive states to take the lead. This would require economic thinking that enables large public investment programs on the one hand and strong regulation and environmental caps on the other. In the modern global economy, states are the only actors that have the legitimacy and capacity to fund and organize large-scale transitions.

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## REFERENCES

- Aronoff, K. (2017). Could a global Marshall plan for the planet tackle the climate crisis? *The Nation*. <https://www.thenation.com/article/could-a-marshall-plan-for-the-planet-tackle-the-climate-crisis/>, (visited on August 14, 2018).
- Barnosky, A.D. et al. (2014). Introducing the Scientific Consensus on Maintaining Humanity's Life Support Systems in the 21st Century: Information for Policy Makers. *The Anthropocene Review*, 1(1), 78-109.
- van den Bergh, J. C. (2001). Ecological economics: themes, approaches, and differences with environmental economics. *Regional Environmental Change*, 2(1), 13-23.
- Banister, D. (2011). Cities, mobility and climate change. *Journal of Transport Geography*, 19(6), 1538-1546.
- Chapin F.S., III, et al. (2011). Earth stewardship: A strategy for social-ecological transformation to reverse planetary degradation. *Journal of Environmental Studies and Sciences*, 1:44-53.
- Cook, B., Mitchell, W., Quirk, V., & Watts, M. (2008). Creating effective local labour markets: a new framework for regional employment policy. Centre of Full Employment and Equity report prepared for Jobs Australia.
- ECORYS, 2014. Resource efficiency in the building sector. A report for DG Environment, Rotterdam.
- Gore, A. (1992). *Earth in the Balance: Ecology and the Human Spirit*. NY: Houghton Mifflin.

- FAO, IFAD & WFP. (2015). *The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress*. Rome, FAO.
- FAO, IFAD, UNICEF, WFP & WHO. (2017). *The State of Food Security and Nutrition in the World 2017. Building resilience for peace and food security*. Rome, FAO.
- Geels, F. W. (2012). A socio-technical analysis of low-carbon transitions: introducing the multi-level perspective into transport studies. *Journal of transport geography*, 24, 471-482.
- Gustavsson, L., Haus, S., Lundblad, M., Lundström, A., Ortiz, C. A., Sathre, R., Le Truong, N. & Wikberg, P. E. (2017). Climate change effects of forestry and substitution of carbon-intensive materials and fossil fuels. *Renewable and Sustainable Energy Reviews*, 67, 612-624.
- Hall, C. A., Balogh, S., & Murphy, D. J. (2009). What is the minimum EROI that a sustainable society must have?. *Energies*, 2(1), 25-47.
- Hall, C. A., & Klitgaard, K. A. (2011). *Energy and the wealth of nations: understanding the biophysical economy*. Springer Science & Business Media.
- Hall, C. A., Lambert, J. G., & Balogh, S. B. (2014). EROI of different fuels and the implications for society. *Energy policy*, 64, 141-152.
- Hein, E., & Stockhammer, E. (Eds.). (2011). *A modern guide to Keynesian macroeconomics and economic policies*. Edward Elgar Publishing.
- Hirsch, R. L., Bezdek, R. M., & Wendling, R. M. (2005). *Peaking of world oil production: impacts, mitigation, & risk management* (No. DOE/NETL-IR-2005-093; NETL-TPR-2319). National Energy Technology Laboratory (NETL), Pittsburgh, PA, Morgantown, WV, and Albany, OR.
- Jenkins, J. D. (2014). Political economy constraints on carbon pricing policies: What are the implications for economic efficiency, environmental efficacy, and climate policy design?. *Energy Policy*, 69, 467-477.
- Lambert, J. G., Hall, C. A., Balogh, S., Gupta, A., & Arnold, M. (2014). Energy, EROI and quality of life. *Energy Policy*, 64, 153-167.
- Lavoie, M. (2009). *Introduction to post-Keynesian economics*. Springer.
- Lavoie, M. (2013). The monetary and fiscal nexus of neo-chartalism: a friendly critique. *Journal of Economic Issues*, 47(1), 1-32.
- Mazzucato, M. (2013). *The Entrepreneurial State: debunking public vs. private sector myths*. Anthem.
- Mazzucato, M. (2018). *Mission-Oriented Research & Innovation in the European Union*. European Commission.
- Mitchell, W. (2015). *Eurozone Dystopia: Groupthink and Denial on a Grand Scale*. Edward Elgar Publishing.

- Murphy, D. J. (2014). The implications of the declining energy return on investment of oil production. *Phil. Trans. R. Soc. A*, 372(2006), 20130126.
- Murray, M.J., & Forstater, M. (Eds.). (2017). *The Job Guarantee and Modern Money Theory: Realizing Keynes' Labor Standard*. Palgrave MacMillan.
- O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature Sustainability*, 1(2), 88.
- Pigou, A. (2017 [1932]). *The economics of welfare*. Routledge.
- Pingoud, L., Perälä, A.-L., Soimakallio, S., & Pussinen, A. (2003). Greenhouse gas impacts of harvested wood products – Evaluation and development of methods. VTT Research Notes 2189.
- Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, 360(6392), 987-992.
- Rockström, J., Gaffney, O., Rogelj, J., Meinshausen, M., Nakicenovic, N., & Schellnhuber, H. J. (2017). A roadmap for rapid decarbonization. *Science*, 355(6331), 1269-1271.
- Röpke, I. (2005). Trends in the development of ecological economics from the late 1980s to the early 2000s. *Ecological economics*, 55(2), 262-290.
- Soimakallio, S., Saikku, L., Valsta, L., & Pingoud, K. (2016). Climate change mitigation challenge for wood utilization – the case for Finland. *Environmental Science & Technology*, 50, 5127-5134.
- Steffen, W. et al. (2018). Trajectories of the Earth System in the Anthropocene. *Proceedings of the National Academy of Sciences* Aug 2018, 201810141; DOI: 10.1073/pnas.1810141115.
- Stein, G. (2018). The Challenges for Central Banks. *Economic Affairs*, 38(1), 131-138.
- Tcherneva, P.R. (2018). *The Job Guarantee: Design, Jobs, and Implementation*. Levy Economics Institute of Bard College Working Paper No. 902.
- Wray, L. R. (2015). *Modern money theory: A primer on macroeconomics for sovereign monetary systems*. Springer.