

THEME 02

Deep Transitions

INNOVATION

ECONOMY

TECHNOLOGICAL
REVOLUTIONS

We have written before about the notion of technological revolutions (e.g. the steam engine, electricity or IT) and how these revolutions, for better or worse, have radically reshaped the economy, society and our everyday lives. In a recent paper, scholars now argue that these subsequent revolutions can also be regarded as a single “Deep Transition” to industrial modernity. Moreover, they claim that we are on the brink of the next Deep Transition to a more inclusive and sustainable economy.

Our observations

- [Carlota Perez](#) and others define five technological revolutions with roughly similar macro-economic and financial dynamics. Each wave, or surge, results in a new “techno-economic paradigm” consisting of generic technological and organizational best practices.
- In [From Luxury to Necessity](#), our team-member Sjoerd Bakker describes how these revolutions changed our everyday lives and our patterns of consumption. In a previous note, we also suggested that the next technological wave is about to take place, based on AI, 5G and quantum computing.
- Since the 1990s, the scholarly field of “[transition studies](#)” has sought to explain how major shifts take place within individual socio-technical systems (e.g. the energy or mobility system) and how governments and other actors may stimulate such shifts and steer them in (societally) desirable directions.
- More recently, Johan Schot introduced the notion of [Deep Transitions](#) to describe the overarching changes that our world has undergone since the late 18th century. He defines these as “a series of connected and sustained fundamental transformations, of a wide range of socio-technical systems in a similar direction”. Over the last two and a half centuries, subsequent technological revolutions were uniformly headed for industrial modernity (i.e. mass-mechanization, rising labor productivity, intensive use of energy and natural resources and the globalization of value chains).
- According to Schot and his co-authors, a Second Deep Transition may be necessary to solve the structural problems caused by the first. That is, a truly sustainable and inclusive economy can only be realized through a radical and fundamental overhaul of the economic and societal “rules” that have emerged over the course of the First Deep Transition. While still in its early days, the first signs of this process are already visible in the transitions that are taking place in individual systems of, for instance, (renewable) energy and (smart and sustainable) mobility.

[>> see next page](#)



Connecting the dots

The basic tenet of the Deep Transition framework is that seemingly separate historical technological revolutions can share a single directionality. Looking back, we have seen waves of change that may have looked different (i.e. driven by distinct technologies), but in reality, they shared an underlying principle of a “relentless emphasis on productivity growth”. In the process, persistent societal problems emerged, or existing ones worsened, which are now deeply entrenched in current modes of (mass) production, distribution and consumption.

To solve these problems, the authors argue, change is needed on a similar scale and with a similar depth. More precisely, instead of “mass-production for global markets” we need “socially useful and craft-based production for local markets”, today’s “linear resource-intensive economy based on the use of fossil fuels” must give way to a “circular waste-free economy based on the use of organic materials” and instead of individual modes of consumption we need more collective forms of consumption. In the current stage of development, many of today’s efforts to realize these grand ambitions are still organized on the level of individual systems; renewable electricity in the energy system, electrification in the mobility system or local sharing platforms for household items. These system-level transitions are worthwhile in their own right, but in order to truly make a difference they cannot (and will not) remain isolated from each other. While they are already

driven by a shared set of factors (e.g. societal or political pressure), they will also add to an overarching set of (written and unwritten) economic and societal meta-rules (e.g. the circular economy). Such new rules are necessary, since the existing rule-set is geared towards the very technologies and solutions that created the problems in the first place. These old rules thus block the widespread adoption of technologies, business models and forms of consumption that may solve the problems of the first Deep Transition.

While the notion of Deep Transitions and the characterization of the first one is quite convincing, it is less obvious why the next Transition would indeed take place along the lines sketched by the authors. The authors acknowledge this uncertainty and point out that there is always competition between diverging solutions or (meta-)rules and their proponents (e.g. states or businesses). Moreover, exogeneous events or shocks like wars or natural disasters may very well change the course of a Deep Transition. For instance, the authors argue that WWII provided a massive stimulus for the industrial modernization of Europe. We could well imagine how a major climate-related catastrophe could radically change our thinking, but at the same time we could also see how a new global conflict could lead nations and industries to abandon all efforts towards equality and sustainability in favor of short-term thinking along the lines of the old, problematic, rule-set.

Implications

- **There’s clearly momentum for several system-level transitions towards sustainability and equality. Whether or not these will result in a radical overhaul of the economic and societal rule-set is questionable. It seems that many of today’s solutions actually perform quite well within the existing framework (e.g. renewable electricity reaching price parity with fossil-based electricity).**
- **Alternative explanations of the current “greening of capitalism” include that it is the result of the IT revolution, which enables the roll-out of smart grids, along with other enablers (Perez herself). Others claim that green technologies are the next, sixth, technological revolution. We have argued that the sixth wave will instead be driven by Artificial Intelligence and Quantum computing.**
- **From our perspective, one could also argue that the rise of Information Technology by the end of the 20th century actually marked the start of the “real” second Deep Transition towards something like the smart economy. While the first Deep Transition was driven by mechanization (i.e. artificial muscle), the second one would then be driven by digitization (i.e. artificial intelligence).**