

# ***THE POLITICAL ECONOMY STRUCTURES OF ENERGY TRANSITIONS: FROM SHALE GAS TO RENEWABLE ENERGY***

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## **Overview**

We compare the energy transitions in the USA and Germany, both of which shape crucially the agenda of the international political economy (IPE) of energy. The ‘shale revolution’ since the late 2000s has increased the production of oil and natural gas in the USA significantly and reduced the country’s imports correspondingly. The resulting oversupply in the global markets has decreased prices. Some scenarios expect the possible exports of shale gas to reduce the dependence of the EU market on Russian supplies. The German *Energiewende* for its part is a political decision made in 2010 for switching to renewable sources of energy, which creates an ‘almost a lab-type situation to study the emergence, success and possibly failure of various governance arrangements in energy infrastructure’ (Goldthau 2014, 139).

Our approach links together the actors, their interests and their embeddedness in the surrounding structures, which both enable and constrain their activities. Drawing upon the theory of structuration, we utilise a purposefully open framework of analysis (Aalto et al. 2014). This is in order to be sensitive to how in the context of energy transitions, for example liberal interests of profit-maximising market actors exploiting their comparative advantage can coexist and enmesh with the interests of states in sovereignty and national self-sufficiency, energy security and with generic interests in global environmental stewardship.

Although the energy transitions in the USA and Germany, major economies of global significance pursuing unprecedented measures in the shale and renewable sectors respectively, are both landmark cases for the IPE of energy, no direct comparisons between them exist. We will ask: 1) what interests drive the actors responsible for the energy transitions in the USA and Germany; 2) how do the complex structures of political economy enable and constrain the two energy transitions?

## **Methods**

The wealth of individual studies of the two cases will form the main body of material for our comparative purposes alongside document material. Our methodological approach is theory informed and guided by the structuration approach, featuring a qualitative comparison of the similarities and differences in the two cases. We utilise this approach since it serves well the need for multi-perspectival and interdisciplinary analysis of the IPE of energy. It builds on a typology of the changing landscape of actors in energy transitions. Incumbent actors face new demands while power struggles emerge between established and new actors. Hence in the USA and German cases the actors include federal-state level actors, producers of fuels, electricity and heat; equipment, service and consultancy companies; network infrastructure developers; regional and local actors, consumers and prosumers; and financial institutions. A crucial political economy challenge in the energy transition is that the relevant actors hold numerous interests not all of which are easily combinable: profit interests of market actors and fiscal interests in the tax income that market actors enable; interest in the energy sector’s implications for employment and wider economy; exports of energy & technology and the related foreign policy implications; security of supplies; and environmental stewardship. We furthermore propose that the actors’ pursuit of interests is conditional upon the enabling and constraining qualities of structures within which they act and interact. The structure hence forms the operating or policy environment the actors must master or ‘navigate’. We discern four analytically separate dimensions in these structures (cf. Aalto et al. 2014): *resources, technology and infrastructure, finance, markets and business models*; the *institutions*; and the *ecological* dimension.

## **Results**

The USA and German based actors seek to promote their various interests vis-à-vis the dimensions of structure:

1. *Resources, technology and infrastructure*: in the USA the adaptation of established technologies to shale gas production, new decentralised production infrastructure and access to pipelines helped to substitute imports of natural gas and some of the coal use; potentially some of the oil in transport. In Germany, wind

and solar generation replace nuclear power with the help of both centralised and decentralised infrastructures but so far also increase the use of coal. The transition presupposes overcoming many vested interests and path-dependencies bent on maintaining existing technologies and infrastructures.

2. *Finance, business models and markets dimension*: in the USA bottom-up proliferation of actors creates gas-to-gas competition; the emergence of renewable production also helps to support the federal interest of keeping prices down. In Germany, renewables introduce near zero cost production entering a more oligopolistic, top-down created market with somewhat higher subsidies than in the USA. At the same time, new business models emerge owing to the highly variable output of solar and wind power. This presupposes aggregators of small-scale production and storage to enable more flexible consumption.
3. *Institutions*: the energy transitions at hand require new formal regulation. In the USA, several rounds of regulation facilitated the breakthrough of the shale industry, supporting the business and fiscal interests by mitigating the related environmental concerns, while also responding to security of supply issues in global markets. The German feed-in-tariff for its part brings incumbent and emerging market actors together around a common profit interest in continued feed-in tariffs. Some of the institutional change takes place on the EU level, where energy market and environmental regulation, and the evolving of the Energy Union, shape national measures. EU level integration supports the German transition with back-up capacity through cross-border trade in electricity and natural gas, and through appropriate policy coordination.
4. *Ecological dimension*: vis-à-vis the environmental interests, the shale oil and gas transitions involve several risks and in the long run can only modestly lower GHG and other emissions. In the German renewable transition, the long-term decarbonisation prospects are more genuine but land use and maritime landscape issues set constraints for wind power. However, this sector fares better than the German bioenergy sector.

## Conclusions

Our comparison revealed multiple interests defining both cases: security of supply, profits of companies, the associated fiscal interests of the country as a whole and other public actors and R&D. Regarding the wider economic implications, low energy prices are indispensable to the USA, whereas in Germany large industrial consumers benefit from policies to this effect; employment gains feature similar positive externalities in both cases. In the USA environmental stewardship narrowly targets the negative externalities like environmental risks and excessive emissions of production. In Germany, it takes the broader form of controlling risks of nuclear energy and combatting climate change in the long run, although progress so far has been modest. Foreign policy interests surface more directly in the case of the US shale revolution. In Germany, the focus is on technology exports. Energy efficiency is more a German than a US concern.

The materialities of the resources, technology and infrastructure dimension constitute the foundation for any analysis of the IPE of energy and owing to their 'sticky' character, account for the inertia and path dependencies characteristic of this field. Regarding the finance, markets and business models dimension, energy transitions may be market-driven or state-driven but require other actors, including individual citizens, in various capacities. Although the end products of electricity and heat/cool remain the same, energy production no longer occurs predominantly in remote locations or in power plants in the suburbs, but becomes a more integral part of everyday life and landscape, regardless of whether we speak of armies of shale gas wells on farmers' fields or of solar panels on rooftops. Increasing use of renewable sources, however, will require a profound transformation of society and therefore wider mobilisation of energy consumers (and prosumers) in terms of our institutional dimension. Finally, the constraints of the ecological dimension also hamper renewable energy and make outcomes uncertain without a long-term perspective. This complex end result serves as a reminder of how the structuration approach assumes several interrelated structures in its attempt to account for the structures of energy transitions more comprehensively than existing approaches do. If this theoretical choice is a compromise in theoretical parsimony, its advantage is that it reveals the difficulty for actors 'out there' to consistently steer energy transitions in a given direction.

## References

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