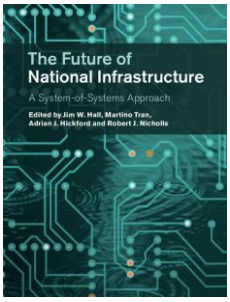
# Appendix C

ITRC energy strategy narratives




## MPI: Minimal policy intervention (EN0)

There is no significant strengthening of climate policies and therefore longer term targets are not necessarily met. Concerns about energy security continue and ensure that there is sufficient investment to ensure reasonable levels of energy security.

Existing long term trends in demand continue with upward pressures from population and economic growth offset by improvements in energy efficiency, but only limited improvements in regulatory standards, some tax incentives and limited support programmes. Smart meters are rolled out, but there is no need for significant use of demand response.

The energy supply sector changes rather slowly, with continued dominance of large scale investments by large companies. There is no significant investment in nuclear or CCS. Renewables investment continues as cost fall, but capacity increases only slowly. Power sector investment continues to rely largely on gas CCGTs with gas supplies from imported, but diverse, sources. Carbon price floor set by the government is enforced.

Heat remains largely dependent on gas although with continued efficiency improvements. Transport remains fuel supply remains largely oil dependent with some slow penetration of biofuels and electricity.

***Supply side option a:*** **Same as MPI, but with 'No carbon price' enforced.**

***Supply side option b:*** **GasWorld**

There is a weakening of climate policies and longer term targets are abandoned. Concerns about energy security continue and increase in the face of global uncertainties, placing increased emphasis on indigenous fossil fuel production. Shale gas technologies rapidly penetrate European markets, and after 2030 UK shale gas captures a major share of energy demand.

Existing long term trends in demand continue with upward pressures from population and economic growth offset by improvements in energy efficiency, but only limited improvements in regulatory standards, some tax incentives and limited support programmes. There is no significant use of demand response or demand reduction.

There is no significant investment in nuclear or CCS. Renewables investment declines as shale gas costs fall. Power sector investment after 2020 is entirely in gas CCGTs with gas supplies initially reliant on imported sources. After 2030 UK shale gas is the dominant source.

The electricity supply sector changes rather slowly, with continued dominance of large scale investments by large companies. There is little change in grid configuration. The gas grid continues to develop and grow, both to supply new CCGTs, but also, after 2030 to transport very large gas flows from the shale gas fields in NW England to the rest of the UK.

Heat remains largely dependent on gas although with continued efficiency improvements. Transport fuel supply remains initially oil dependent. After 2030 there is increased use in CNG vehicles.

## LEB: Local energy and biomass (EN1)

Concerns about energy security continue. Existing long term trends in demand are reduced as upward pressures from population and economic growth are more than offset high efficiency heating systems (heat pumps and CHPs), moderate improvements in energy efficiency, stimulated by a combination of active policies and rising awareness of energy security and need for local action. After 2020, solar PV costs fall to below grid parity and a major paradigm shift occurs, with solar energy deployment becoming mainstream for companies and households.

Smart meters are rolled out. In this case there is less emphasis on demand response, but increased emphasis on consumer information and demand reduction, especially in buildings. New demands for electricity in heating and transport are more moderate. There is moderate investment in heat networks in all large urban areas.

The electricity supply sector changes steadily. Initial investment is largely in wind, but in this case there is greater emphasis on onshore wind with rapid increases in the acceptance of onshore wind turbines, and much increased diversity of ownership, including by community groups, local authorities and cooperatives. Carbon price floor set by the government is enforced.

These changes have implications for networks. There is increased deployment of distributed generation (although not as quickly or as highly distributed as in solar world), resulting in a more active role for electricity distribution grids. Biogas is increasingly introduced into the gas grid and takes a large share of gas demand, as total heat falls.

## EHT: Electrification of heat and transport (EN2)

There is a continued emphasis on strong climate policies with targets generally met. Concerns about energy security continue and are addressed by large investments in low carbon electricity generation. This ensures that there continues to be a reasonable level of energy security.

Existing long term trends in demand continue with upward pressures from population and economic growth offset by improvements in energy efficiency, but only limited improvements in regulatory standards, some tax incentives and limited support programmes. But the priority on the demand side is increased electrification of demand in heat and transport. Smart meters are rolled out and increasingly used in demand response programmes in all demand sectors.

Distributed solar PV is adoption is moderate. Transport electrification provides demand response - the energy storage capacity of vehicle batteries and building heating systems become critical for the effective management of electricity loads. This provides additional drivers for the deployment of electric vehicles and heat pumps.

There are rapid increases in the capacity of electricity grid, especially after 2030. Transmission and distribution networks are strengthened and additional transmission capacity built to bring power from offshore resources. The gas grid falls into decline and large parts are decommissioned between 2030 and 2050.

The electricity supply sector changes quickly to meet rising demand from electrification with government carbon price floor enforced. There is very large and rapid investment in a major low carbon power generation technology, with continued dominance of large companies. Within this there are three broad options:

***Supply-side option a:*** High offshore

There is early and rapid investment in offshore wind, primarily in the North Sea, followed by wave and tidal flow investment, mainly in the Atlantic, after 2030. Both developments are facilitated by major offshore grid extensions and strengthening of north to south transmission.

***Supply-side option b:*** High CCS

Carbon capture and storage is demonstrated on both coal and gas power stations and rapidly becomes the preferred form of generation investment. There is rapid investment after 2030, largely on existing coal and gas power station sites, so that no significant changes in grid infrastructure are needed.

***Supply-side option c:*** High nuclear

There is successful investment in nuclear power before 2020 and a steady growth in investment the next decade, followed by new generation 4 technologies after 2030. Investment is confined to existing coastal nuclear sites, requiring some grid strengthening.

***Sensitivity analysis: High Interconnections***

There is a continued emphasis on strong climate policies with targets generally met. Concerns about energy security continue, not only in the UK but across Europe. As a result there is a planned investment in a European supergrid to ensure energy security.

Large and rapid investment, especially in offshore wind, plays a key role in kick-starting EU-wide collaboration on interconnection, initially in the North Sea states, but after 2030 to accommodate very large supplies of solar PV in southern Europe.

Very large investments are made in electricity transmission, much with EU financial support. This includes new, high capacity, long distance, very high voltage, transboundary lines, but also massive strengthening of north to south transmission within the UK to take wind and marine power from Scotland to the rest of Europe.

## DDBT: Deep Decarbonisation with Balanced Transition (EN4)

There is a continued emphasis on strong climate policies with targets met. Concerns about energy security continue and are addressed by large investments in energy efficiency and conservation, and facilitation of a balanced market competition among various microgeneration and energy sources with adequate carbon prices. Low carbon electricity generation and biomass technologies are adopted with emergence of a largely electrified economy with increasingly lesser dependence on natural gas. This ensures that there continues to be excellent energy security.

Existing long term trends in demand are reduced as upward pressures from population and economic growth are more than offset by improvements in energy efficiency, stimulated by a combination of active policy and rising awareness of the need for local energy action.

Smart meters are rolled out and used effectively for both demand response and demand reduction. Heating demands fall and are met by a combination of low carbon technologies, including heat pumps and CHPs. There is increased investment in heat networks in all large urban areas. Solar PV and thermal costs drop and are adopted widely.

The electricity supply sector changes quickly in line with current policy plans. There is very large and rapid investment in all of the major low carbon power generation technologies with government carbon price floor enforced. As a result the UK decarbonises supply very quickly up to 2030. Falling prices of renewables with open market competition and carbon prices, renewable technologies capture a balanced share in the energy supply mix along with gas that also provides for flexibility in a high renewable mix.