

# Global Energy Policy Research | GEPR

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## CO2

?? ?? · Friday, April 30th, 2021

2050?CO2



katerina\_Simonova/iStock

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	2020-2029	2030-2049	2050 Absolute Zero	Beyond 2050
<b>Road vehicles</b>	Development of petrol/diesel engines ends; Any new vehicle introduced from now on must be compatible with Absolute Zero	All new vehicles electric, average size of cars reduces to ~1000kg.	Road use at 60% of 2020 levels - through reducing distance travelled or reducing vehicle weight	New options for energy storage linked to expanding non-emitting electricity may allow demand growth
<b>Rail</b>	Growth in domestic and international rail as substitute for flights and low-occupancy car travel	Further growth with expanded network and all electric trains; rail becomes dominant mode for freight as shipping declines	Electric trains the preferred mode of travel for people and freight over all significant distances.	Train speeds increase with increasing availability of zero emissions electricity
<b>Flying</b>	All airports except Heathrow, Glasgow and Belfast close with transfers by rail	All remaining airports close		Electric planes may fly with synthetic fuel once there are excess non-emitting electricity supplies
<b>Shipping</b>	There are currently no freight ships operating without emissions, so shipping must contract	All shipping declines to zero.		Some naval ships operate with onboard nuclear power and new storage options may allow electric power
<b>Heating</b>	Electric heat pumps replace gas boilers, and building retrofits (air tightness, insulation and external shading) expand rapidly	Programme to provide all interior heat with heat pumps and energy retrofits for all buildings	Heating powered on for 60% of today's use.	Option to increase use of heating and cooling as supply of non-emitting electricity expands
<b>Appliances</b>	Gas cookers phased out rapidly in favour of electric hobs and ovens. Fridges, freezers and washing machines become smaller.	Electrification of all appliances and reduction in size to cut power requirement.	All appliances meet stringent efficiency standards, to use 60% of today's energy.	Use, number and size of appliances may increase with increasing zero-emissions electricity supply
<b>Food</b>	National consumption of beef and lamb drops by 30%, along with reduction in frozen ready meals and air-freighted food imports	Beef and lamb phased out, along with all imports not transported by train; fertiliser use greatly reduced	Total energy required to cook or transport food reduced to 60%.	Energy available for fertilising, transporting and cooking increases with zero-emissions electricity
<b>Mining material sourcing</b>	Reduced demand for iron ore and limestone as blast furnace iron and cement reduces. Increased demand for materials for electrification	Iron ore and Limestone phased out while metal scrap supply chain expands greatly and develops with very high precision sorting	Demand for scrap steel and ores for electrification much higher; no iron ore or limestone.	Demand for iron ore and limestone may develop again if CCS applied to cement and iron production
<b>Materials production</b>	Steel recycling grows while cement and blast furnace iron reduce, some plastics with process emissions reduce.	Cement and new steel phased out along with emitting plastics. Steel recycling grows. Aluminium, paper reduced with energy supply.	All materials production electric with total 60% power availability compared to 2020	Material production may expand with electricity and CCS. CCL hydrogen may enable new cement and steel.
<b>Construction</b>	Reduced cement supply compensated by improved material efficiency, new steel replaced by recycled steel	All conventional mortar and concrete phased out, all steel recycled. Focus on retrofit and adaptation of existing buildings.	Any cement must be produced in closed-loop, new builds highly optimised for material saving.	Growth in cement replacements to allow more architectural freedom; new steel may become available.
<b>Manufacturing</b>	Material efficiency becomes paramount as material supply contracts	Most goods made with 50% as much material, many now used for twice as long	Manufacturing inputs reduced by 50% compensated by new designs and manufacturing practices. No necessary reduction output.	Restoration of reduced material supplies allows expansion in output, although some goods will in future be smaller and used for longer than previously.
<b>Electricity</b>	Wind and solar supplies grow as rapidly as possible, with associated storage and distribution. Rapid expansion in electrification of end-uses.	Four-fold increase in renewable generation from 2020, all non-electrical motors and heaters phased out.	All energy supply is now non-emitting electricity.	Demand for non-emitting electricity drives ongoing expansion in supply
<b>Fossil fuels</b>	Rapid reduction in supply and use of all fossil fuels, except for oil for plastic production	Fossil fuels completed phased out		Development of Carbon Capture and Storage (CCS) may allow resumption of use of gas and coal for electricity

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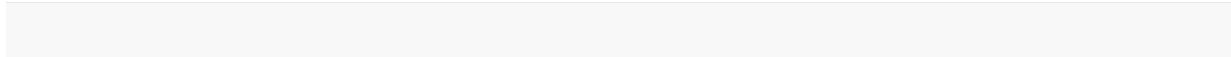
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