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Coal reserves and resources as well as potentials for underground coal gasification in connection with carbon capture and storage (CCS)

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Coal is the energy source with the largest geological availability worldwide. Of all non-renewable energies coal and lignite accounting for 55 % of the reserves and some 76 % of the resources represent the largest potential. Reserves are those geological quantities of a mineral which can currently be mined under technically and economically viable conditions. Resources are those quantities which are either proven but currently not economically recoverable or quantities which can still be expected or explored on the basis of geological findings.

The global availability of energy source does not only depend on geological and economic factors. The technical availability, e.g. mining and preparation capacities, the sufficient availability of land and sea-borne transportation as well as transloading capacities and also a political availability are required likewise. The latter may be disturbed by domestic-policy disputes like strikes or unrest or by foreign-policy disputes like embargos, trade conflicts or even tensions and wars in the producing regions.

In the energy-economic discussion the reach of fossil primary energies plays a central role with the most important questions being: when will which energy source be exhausted, which impact will future developments have on the energy price, what does the situation of the other energies look like and which alternatives are there? The reach of coal can only be estimated because of the large deposits on the one hand and the uncertain future coal use and demand on the other. The stronger growth of population and the economic catching-up process in the developing and threshold countries will result in a shift of the production and demand centres in the global economy. However, also in case of further increases the geological potential will be sufficient to reliably cover the global coal demand for the next 100 years.

The conventional mining of seams at great depths or of thin seams reaches its technical and economic limits. However, these otherwise unprofitable coal deposits can be mined economically by means of underground coal gasification, during which coal is converted into a gaseous product in the deposit. The synthesis gas can be used for electricity generation, as chemical base material or for the production of petrol. This increases the usability of coal resources tremendously. At present the CCS technologies (carbon capture and storage) are a much discussed alternative to other CO_2 abatement techniques like efficiency impovements. The capture and subsequent storage of CO_2 in the deposits created by the actual underground gasification process seem to be technically feasible.