

A comparison of mental risk concepts on carbon dioxide capture and storage (CCS) and deep geothermal energy (DGE)

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The deployment of low carbon energy technologies is considerably challenged by local public protests. New energy technologies such as carbon dioxide capture and storage (CCS) or deep geothermal energy (DGE) that interfere with the natural deep subsurface are in particular affected by elevated levels of public risk perception. We examined influential factors for increased risk perceptions in two case studies with local residents living near potential geological targets for DGE in Germany and Switzerland. In-depth interviews with laypeople were conducted to study the mental concepts that determine risk perception of DGE. We compared the risk perception characteristics of DGE with existing literature on mental concepts of CCS, and identified similarities and differences between the two technologies. Results indicate that mental concepts about artificial pressure changes in the deep subsurface caused by EGS or CCS operations are leading in both cases to an increased risk perception from movements of the ground and induced seismicity. Both technologies are perceived to tamper with the subsurface and trigger a primal fear among some laypeople. In the case of CCS, the pressure concept also underlies risk perception from leakage of CO₂. For DGE the misconception of a cooling-down of the earth's core seems furthermore relevant for increased risk perception. Awareness of seismic events induced at earlier geothermal projects heavily amplifies risk perception of the local public near some projected locations. This gives an indication on how heavily public attitudes about CCS would be damaged in case of an incident at a CO₂ storage location. Regarding perceived sustainability of the two technologies, the results show a more positive evaluation of DGE than of CCS. CCS is considered as a band-aid for climate change whereas DGE is seen as a contribution to a sustainable energy economy. We conclude that differences in public acceptability of the two technologies are in a large part due to socioeconomic aspects, as both DGE and CCS are perceived as (high)-risk technologies from a technical perspective, but from a socioeconomic perspective, only CCS is perceived as such.