



Soviet experience of underground coal gasification focusing on subsurface subsidence

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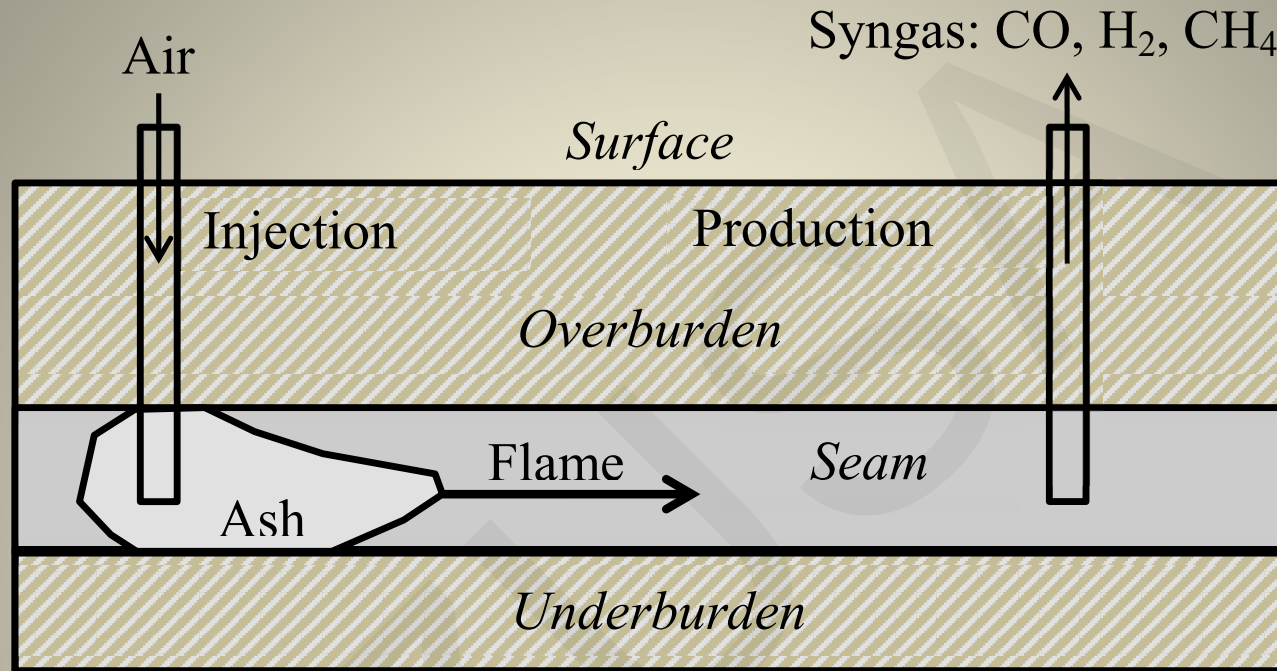
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Underground Coal Gasification (UCG)



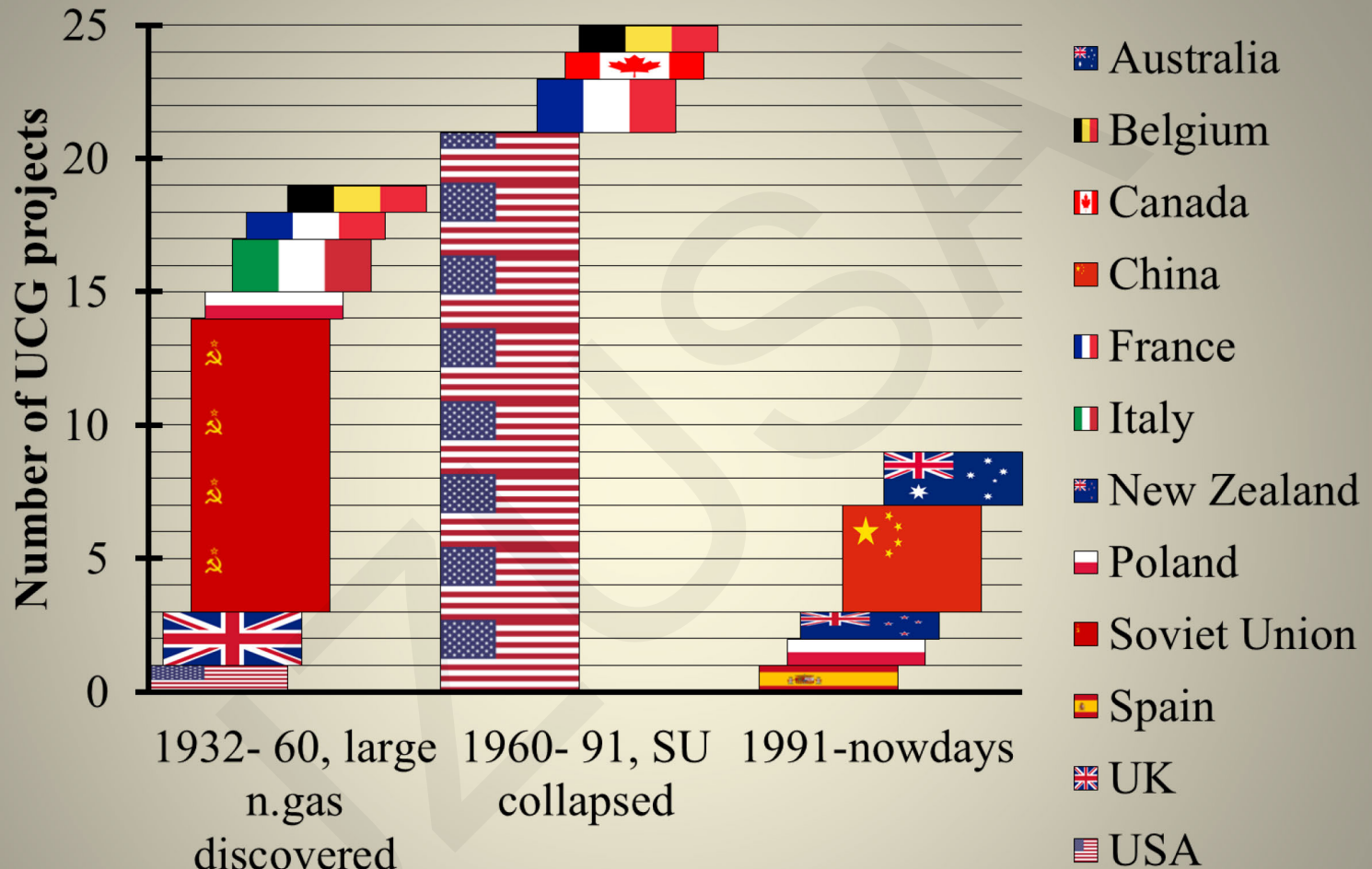
Benefits of UCG include:

- applicability in areas where conventional mining methods are not suitable
- reduces or eliminates human work in hazardous environments
- only requires two boreholes (simplest scheme)
- cheap alternative for producing electricity
- can be coupled with carbon capture and storage.

Potential disadvantages include:

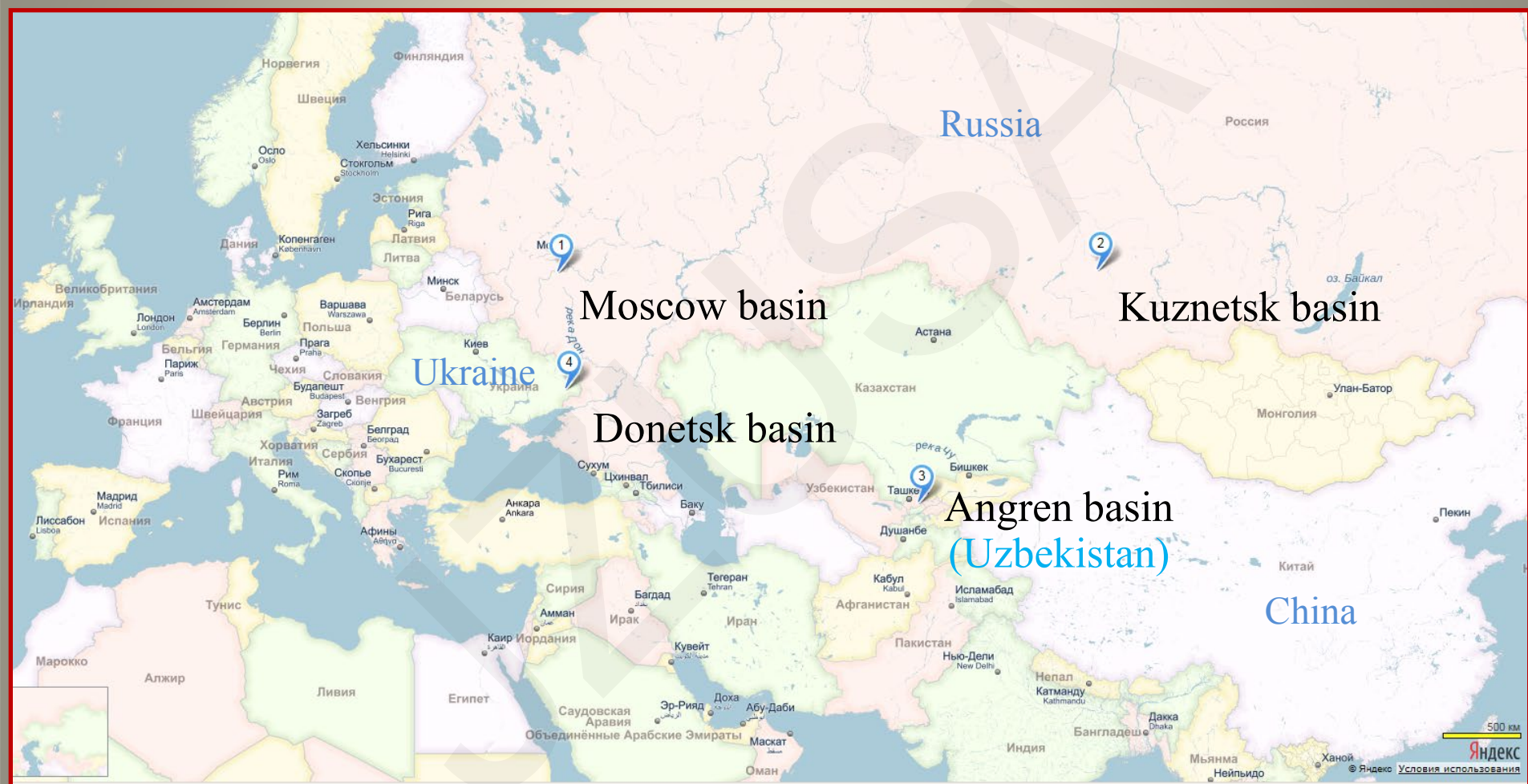
- groundwater pollution and surface subsidence

Timeline of Start of UCG Projects



The largest amount of Soviet research on UCG was done at the beginning of the development of the method. Much of this research is not readily accessible to the English scientific community.

Locations of the Coal Basins where UCG has been implemented in the Soviet Union



Different coal basins with very different geological conditions

Main lessons from Soviet UCG projects

- The weaker the overburden is, the shorter response subsidence time is.
- Limestone as the overburden smoothens a trough. However, the state of the limestone is important. The fractured limestone does not impact the settlement trough.
- Area of burning coal is wider if the roof is sandy.
- Ash in the void after burning mitigates surface subsidence.
- Roof descends gradually which impacts subsidence.
- Under high temperature the geomaterial can become stronger or weaker and change its volume. This influences subsidence.

Summary

- The main sources of the literature were the National Library of Russia in Saint Petersburg & the Russian State Library in Moscow
- This review gives provides more information on UCG to the English-speaking scientific community.
- The data provided can be used for validation of new research tools (e.g. numerical modelling using powerful computers), which may help to broaden the lessons learned from the Soviet projects