Frequently Asked Questions About Enhanced Geothermal Systems (EGS)

What are Enhanced Geothermal Systems?

Most conventional geothermal power plants rely on hot rock, and a conductive channel in the crust (fracture or fault) that allows hot water to circulate through the rock. In conventional geothermal systems one or more wells are drilled to intersect these conductive channels and heated water/steam is brought to the surface to spin a turbine and generate electricity. This works effectively in parts of the country where temperature increases relatively rapidly with depth. Suppose that we can drill deeper to find hot rock but there are no conductive fractures/faults and no water can be produced? We can still create geothermal energy but we need to intervene by creating the fractures and providing an infrastructure to circulate water through this engineered reservoir. Cool water can be pumped underground down one well, where it is heated by the hot rock as it travels to the second well where it is pumped back up to the earth's surface to the power plant. We call this Enhanced - or Engineered - Geothermal Systems (EGS).

Will EGS development result in the earthquakes like those occurring in oil and gas operations?

It is important to understand the differences between EGS development and oil and gas operations. All geothermal systems naturally experience some seismic activity, but it is generally too small to be felt by humans. When oil and gas are produced, water naturally present in these reservoirs is co-produced with the hydrocarbons. In many places, the produced water is reinjected into deep dedicated disposal wells. If the disposal wells are not appropriately engineered, the large injected volumes can lead to earthquakes.

In EGS development, two or more wells are drilled into the same volume of rock and water circulated through the hot fractured rock heats up. The volume of water injected into an EGS reservoir is very similar to the volume produced. This is different from oil and gas development where the fluids are extracted from one area of the subsurface and injected into another. The balance of water put into, and removed from the ground in an EGS system minimizes the environmental impact and reduces the potential of large earthquakes resulting from human activities.