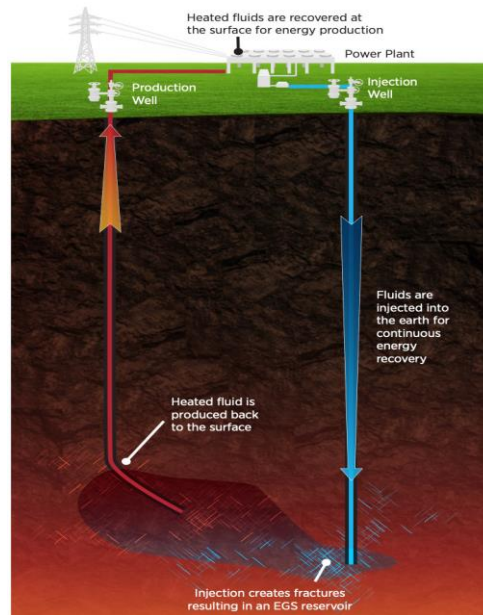


# Enhanced Geothermal Systems Modeling



## 6X: Thermal Hydro-Mechanical Heat Extraction from Hot Dry Rock

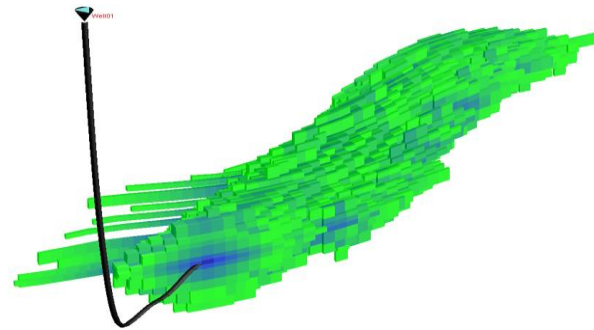
Geothermal energy is an abundant, clean and sustainable energy resource. Extracting underground heat using the efficient hot dry rock (HDR) technique requires hydraulic fracturing of low permeability rock to create pathways for fluid circulation and injector-producer communication. 6X combines in one place all the necessary multi-porosity aqueous mass balance and energy equations with fracture mechanics to model these enhanced geothermal systems (EGS).



U.S. Department of Energy (2019), "GeoVision: Harnessing the Heat Beneath Our Feet."

### Integral Fracture Mechanics

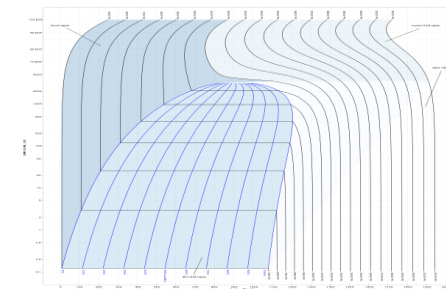
6X has an established and proven workflow for hydraulic fracturing in oil and gas reservoirs. This workflow features dual- and multi- porosity modeling with dynamic fracture creation and evolution, and is fully integrated into the simulator: it doesn't rely on externally coupled models, or an input discrete fracture network topology. This technology has been brought to bear in the EGS workflow.



### Fully Implicit Energy Equation

To capture the dynamics of heat transfer, an extra energy equation is solved fully implicitly with the fluid mass balance equation. This includes energy exchange between injected cold water and hot rock and aquifers,

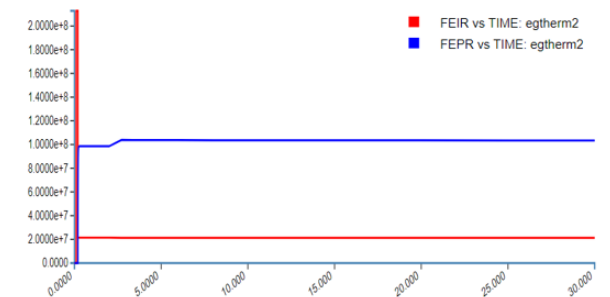
and thermal conductivity through fluid and rock. Integral to the geothermal application is the PVT modeling of the water-steam system.



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### EGS Workflow Optimization

Using all of these components in 6X along with the inbuilt multiple realization capabilities engineers can optimize the EGS energy extracted using just one tool.



Optimize EGS models with hydraulic fracturing and heat flow within one tool