



The primary issue with coal-fired and gas-fired power plants are the emissions. The number one push-back from the general public regarding nuclear energy is nuclear waste. Technology now exists that can render all coal-fired and gas-fired plants emissions free on-site and permanently dispose of nuclear waste on-site. These types of emissions are described as “point source” waste. Technology has been developed that can turn SoX and NoX emissions from fossil fuel burning power plants into fertilizer and separate all N₂ from the remaining gases that includes CO₂. This process to separate out N₂ greatly reduces the volume of gases needed to be sequestered. N₂ can be vented to the atmosphere since it makes up the majority of the gases in our atmosphere. EGT will then construct a hazardous waste disposal well to sequester the remaining gases such as CO₂ using the well design described in US Patent # 11,732,929. Another important feature of the well design is the recovery of geothermal heat from the same well without any additional drilling related cost. The well is drilled and constructed the same way whether it is to be a sequestration well or a geothermal well or both. Each well is expected to generate 25 MWe of electricity while at the same time generating \$85 per mton in revenue from the permanent geologic sequestration of CO₂.

The same geothermal well can also be used to dispose of nuclear waste where the heat from the spent fuel enhances the amount of heat recovered from the downhole geothermal heat exchanger. A cement plug can be placed over the nuclear waste above the subsurface containment structure and will not interfere with recovery of heat produced by both the spent fuel and radiogenic heat produced from the decay of radioactive minerals contained within basement granite. This method of disposal is actually returning the spent fuel to the formation from which it was mined. The disposal / sequestration / geothermal well can be drilled anywhere onshore because the premier formation for disposal of hazardous waste and recovery of heat is from hot dry rocks is basement granite which blankets all continents. It's just a matter of drilling deep enough. This means the entire sedimentary section above the granite will serve as the cap rock for ultra safe disposal / sequestration. This also means no pipelines.

Basement granite is the primary source of radiogenic heat from earth's crust and is an ideal disposal zone because of granite's ubiquitous & deep vertical natural fractures which may serve as conduits into the mantle and allow super high temperatures to reach the wellbore without having to drill to those depths. These high temperatures and bottom hole pressures will cause any CO₂ from a power plant that is injected into the sequestration annulus to become supercritical. Supercritical CO₂ has several advantages such as it is eight times more effective as a heat transfer fluid than water which will greatly enhance the geothermal potential. It is also inert and will not react with other minerals and thus won't reduce storage space for scCO₂. It also has a density slightly higher than water so it will sink deeper into the vertical fracture system and not spread horizontally which translates into less pore space having to be leased.

The objective of the patent is to ensure the future of the coal, natural gas, nuclear and geothermal industries. Geothermal projects have been known for being marginally economic at best. Enhancing the recovery of heat by the sequestration of emissions (CO₂) or disposal of nuclear waste will improve the MWe output which means more revenue. Profits can also be increased by reducing cap-ex expenditures since only one dual-purpose well is required, because heat recovery will be combined with disposal or sequestration. Having a good reason to drill deep wells into basement granite provides a serendipitous opportunity to discover hydrogen, helium or lithium.

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