

Energy Generation Comparison



6 kg of thorium metal in a liquid-fluoride reactor has the energy equivalent (66,000 MW*hr electrical*) of:

***Each ounce of thorium can therefore produce \$14,000-24,000 of electricity (at \$0.04-0.07/kW*hr)**

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230 train cars (25,000 MT) of bituminous coal or, 600 train cars (66,000 MT) of brown coal,
(Source: [World Coal Institute](#))



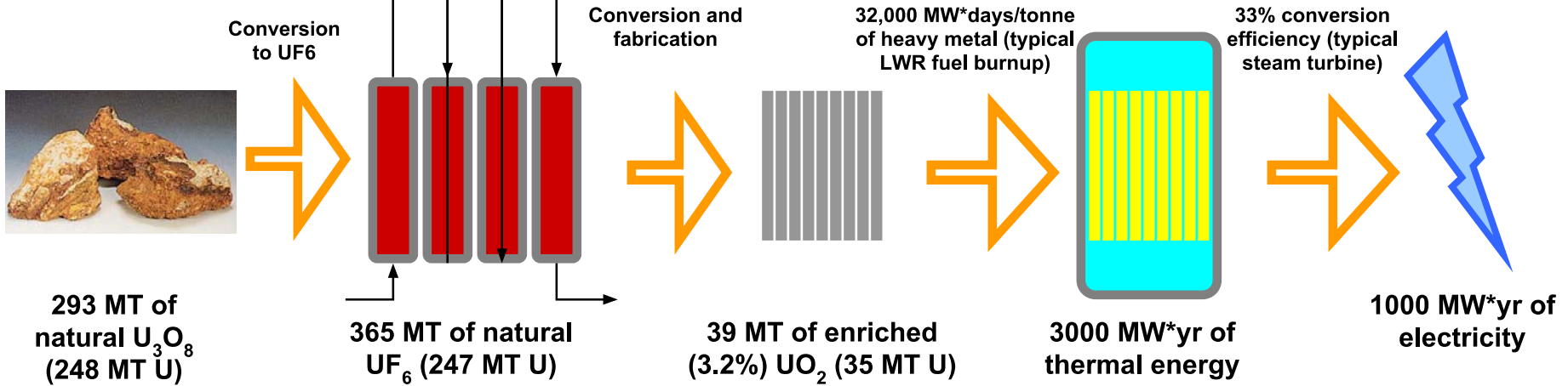
or, 440 million cubic feet of natural gas (15% of a 125,000 cubic meter LNG tanker),



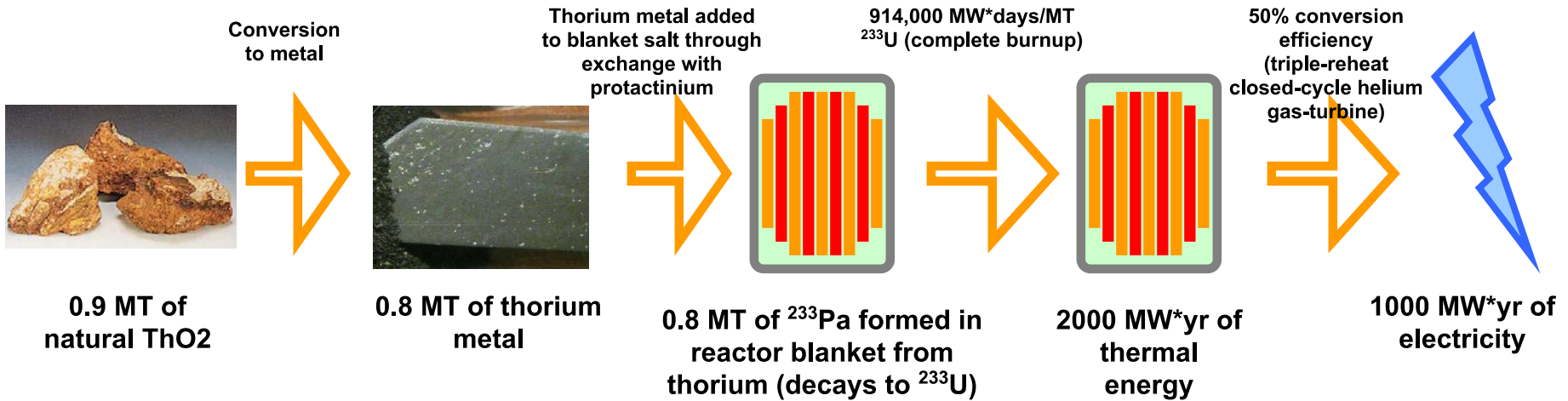
or, 300 kg of enriched (3%) uranium in a pressurized water reactor.

Energy Extraction Comparison

Uranium-fueled light-water reactor: 35 GW*hr/MT of natural uranium



Thorium-fueled liquid-fluoride reactor: 11,000 GW*hr/MT of natural thorium

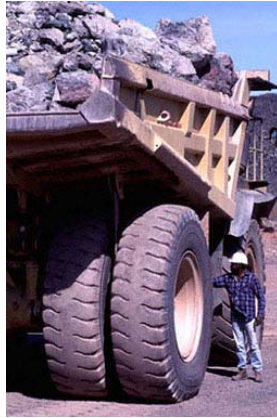


Waste generation from 1000 MW*yr uranium-fueled light-water reactor



Mining 800,000 MT of ore containing 0.2% uranium (260 MT U)

Generates ~600,000 MT of waste rock



Milling and processing to yellowcake—natural U_3O_8 (248 MT U)

Generates 130,000 MT of mill tailings



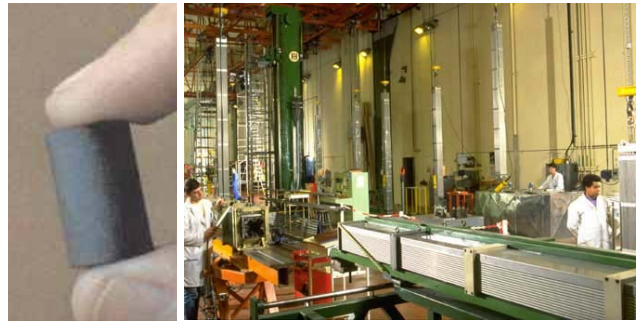
Conversion to natural UF_6 (247 MT U)

Generates 170 MT of solid waste and 1600 m³ of liquid waste



Enrichment of 52 MT of (3.2%) UF_6 (35 MT U)

Generates 314 MT of depleted uranium hexafluoride (DU); consumes 300 GW*hr of electricity



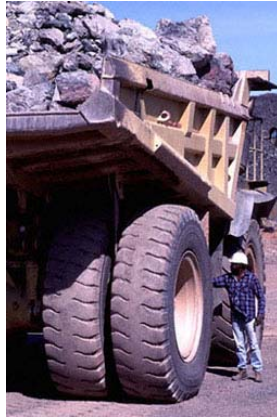
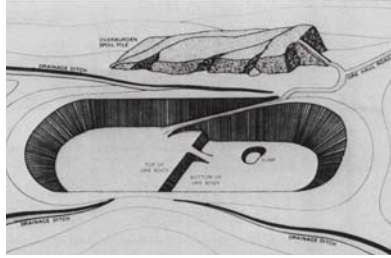
Fabrication of 39 MT of enriched (3.2%) UO_2 (35 MT U)

Generates 17 m³ of solid waste and 310 m³ of liquid waste



Irradiation and disposal of 39 MT of spent fuel consisting of unburned uranium, transuranics, and fission products.

Waste generation from 1000 MW*yr thorium-fueled liquid-fluoride reactor



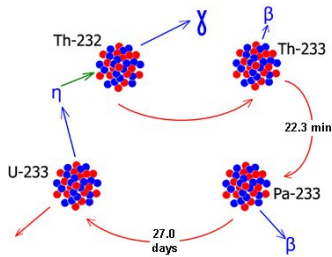
Mining 200 MT of ore containing 0.5% thorium (1 MT Th)

Generates ~199 MT of waste rock



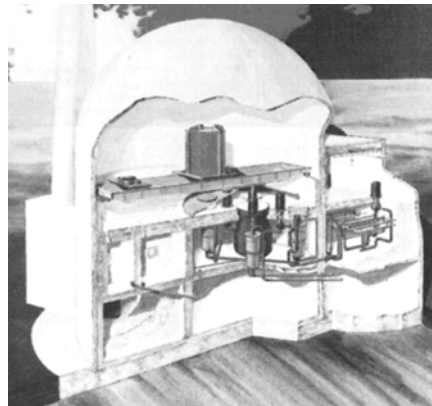
Milling and processing to thorium nitrate ThNO_3 (1 MT Th)

Generates 0.1 MT of mill tailings and 50 kg of aqueous wastes



Thorium Fuel Cycle

Conversion to metal and introduction into reactor blanket



Breeding to U233 and complete fission



Disposal of 0.8 MT of spent fuel consisting only of fission product fluorides

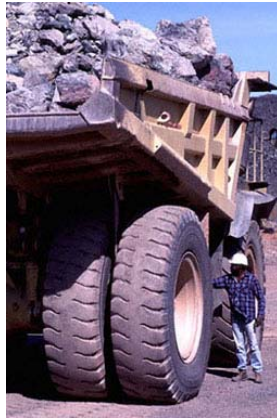
...or put another way...

Mining waste generation comparison

1 GW*yr of electricity from a uranium-fueled light-water reactor



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Milling and processing to yellowcake—natural U_3O_8 (248 MT U)

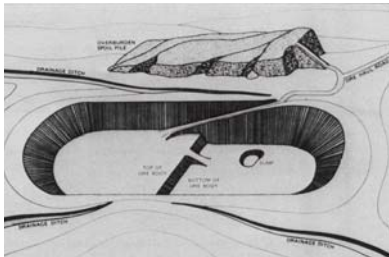
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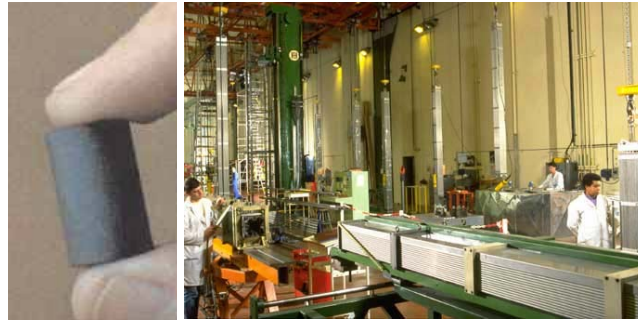
Operation waste generation comparison

1 GW*yr of electricity from a uranium-fueled light-water reactor



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Generates 314 MT of DUF_6 ; consumes 300 GW*hr of electricity



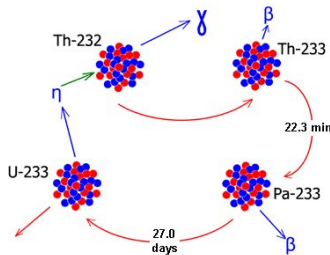
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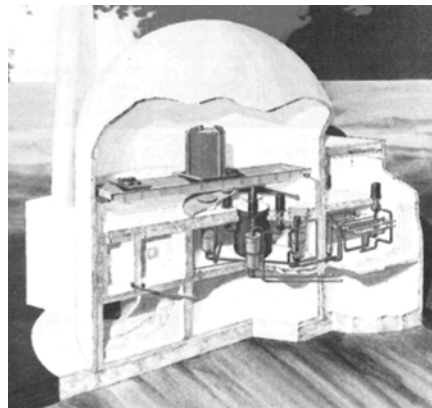
Irradiation and disposal of 39 MT of spent fuel consisting of unburned uranium, transuranics, and fission products.

1 GW*yr of electricity from a thorium-fueled liquid-fluoride reactor



Thorium Fuel Cycle

Conversion to metal and introduction into reactor blanket



Breeding to $U-233$ and complete fission



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