

# Nuclear energy

MICRO Reactors are compact reactors that will be small enough to transport by truck and could help solve nuclear challenges in a number of ways.

Factory fabricated can be fabricated and shipped to a location

Transportable smaller unit designs will make them very transportable

Self adjusting simple unit designs will allow micro reactor to self adjust and have passive systems that prevent any potential for over heating or meltdown.

Micro reactors would be able to produce 1-20 megawatts or thermal energy that could be used directly as heat or converted to electric power. The cost of the micro reactor has a capital cost of \$1.98 per watt. This is the capital cost for natural gas reactors. This would be 4 times cheaper than large nuclear reactors in the US. A 20 million reactor produces 10 MW's and fit on a truck.

## OTHER BENEFITS

Seamless integration with renewables within micro-grids

Can be used for emergency response to help restore power nit by natural disasters A longer core life, operating for up to 10 years without refueling. Can be quickly removed from sites and exchanged for new one.

Most designs will require fuel with a higher concentration of U-235

## SMALL MODULATOR REACTORS (SMR)

Small modular reactors are advanced nuclear reactors that have power capacity of up to 300 megawatts. They are small and can be factory assembled and transported as a unit to a location for installation. Generate heat to produce energy. SMRs are a simpler design and relies on a passive system and inherent safety characteristics of the reactor , such as low power and operating pressure. They will require fueling every 3 to 7 years. In comparison for 1 to 2 years for

conventional plants... some can run for 30 yrs. There are currently over 80 being developed in the world. Russia has a floating reactor made from two 35 megawatts plants. Cost is 3 billion per 100 megawatts.

## LARGE NUCLEAR PLANTS

Large nuclear plants generate heat to create steam for steam turbines. They are 300 MW's or larger and cost about 3 billion per 100 MW's. Building a nuclear power plant often spans five to ten years, which can accrue significant costs, , depending on how the initial investments are financed. Because of this high construction cost and lower operations, maintenance, and fuel costs, nuclear plants are used for base load power. There are 410 reactors in the world in operation in 32 countries in the world and 57 under construction. A nuclear plant comparable to coal creek station of 1151 MW's would cost about 25 billion to build vs 2 to 4 billion for a coal plant.

## 1 MEGAWATT

A household consumes about 1 to KWH of electricity per hour. One MWh can supply electricity to approximately 500 t0 1000 households for one hour. An average household consumes around

10,500 KWh annually or about 30 KWh Daily so 1 MWh could power about 300 such homes a day.