GAIN MSR TWG Update

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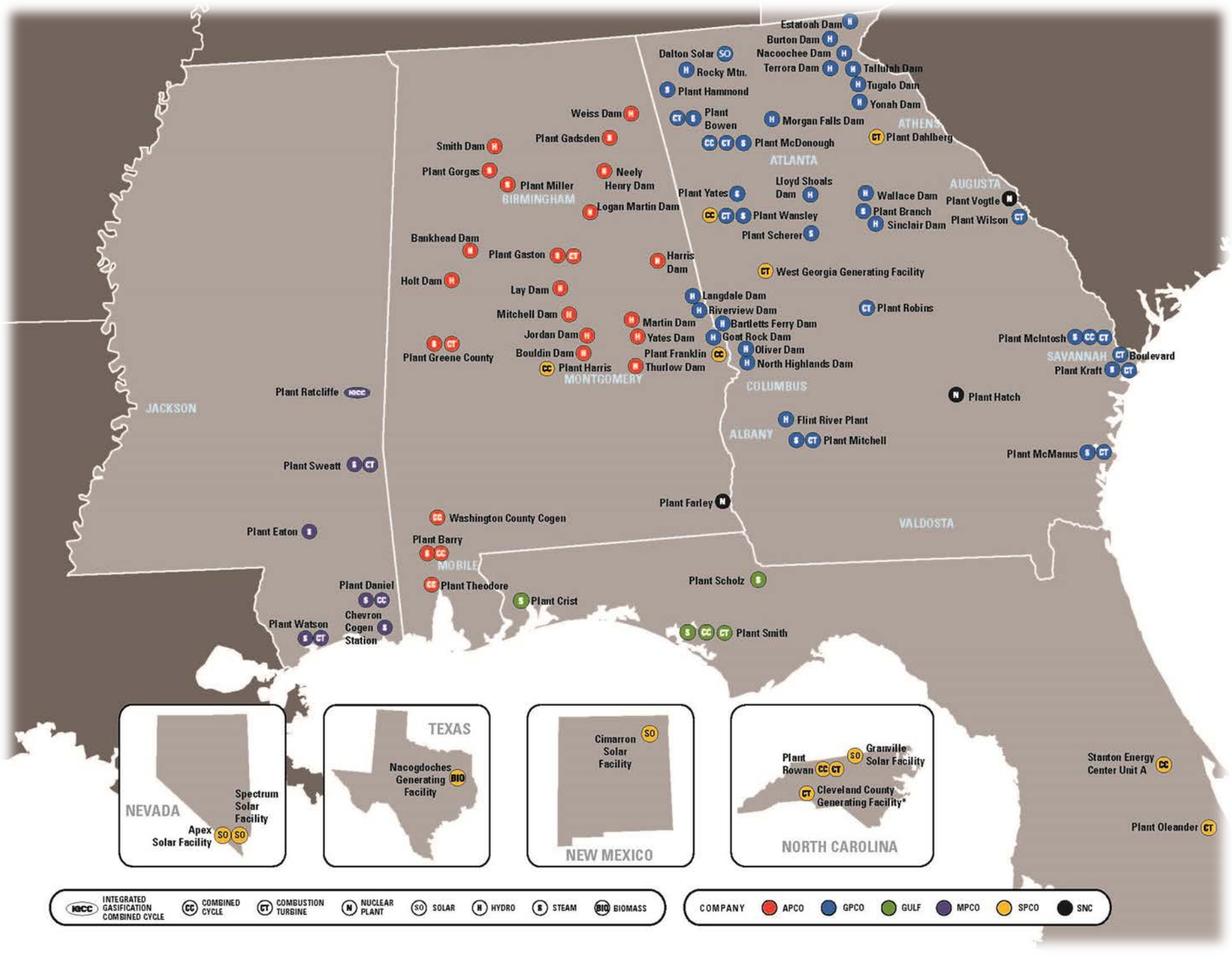
R+D

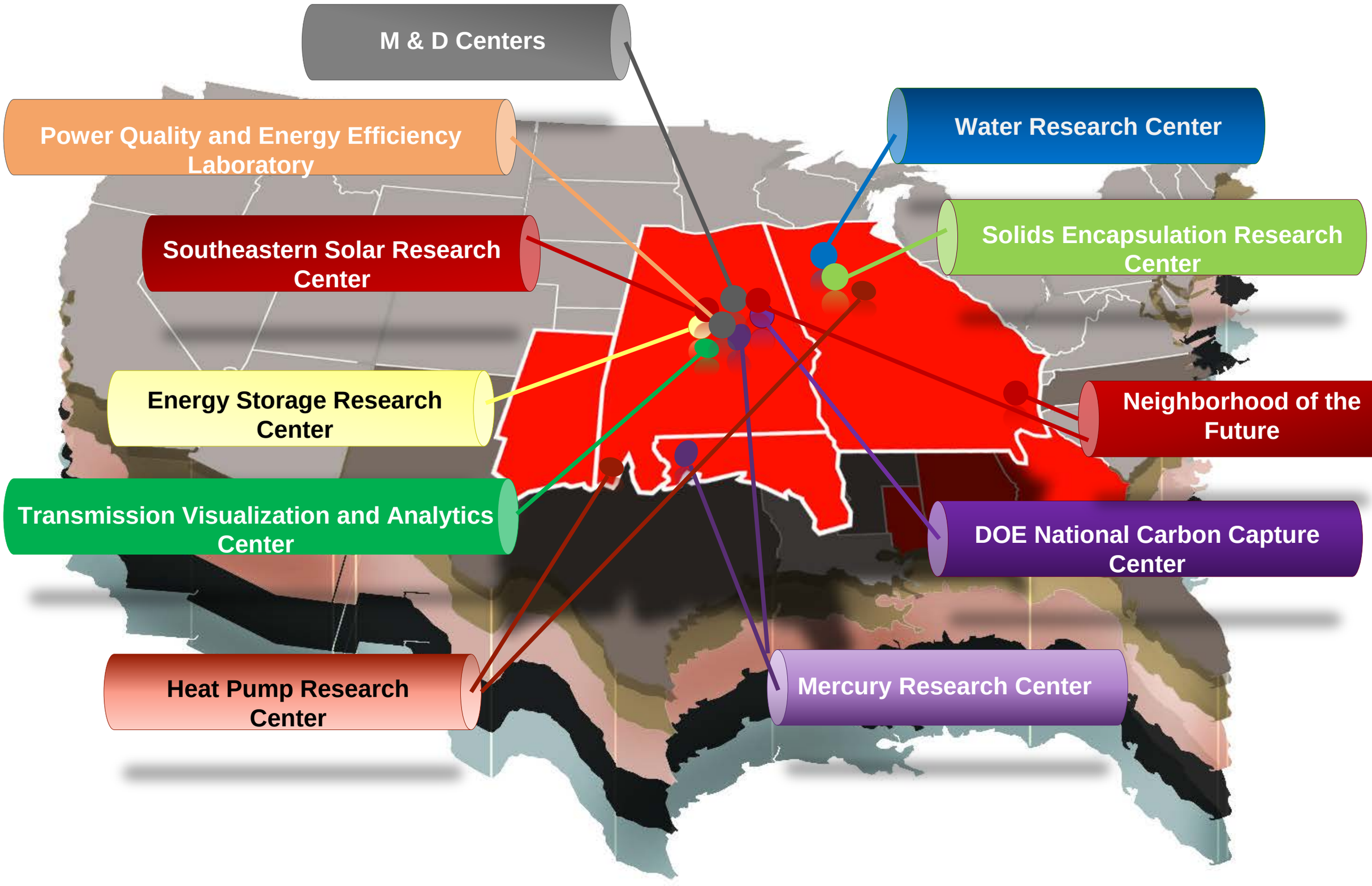
Generating
the **Greatest**
Good ↗

Southern Company



- Founded in 1912
- More than 4.4 million customers
- Nearly 46,000 megawatts of generating capacity
- Approximately 26,000 employees
- 120,000 square miles of territory
- 2015 Net Income ~$2.36B
- Building two new nuclear units at Plant Vogtle near Augusta, Ga. (2,200 MW)

R&D Centers Across Southern Company



What's the definition of utility?

1. the state or quality of being useful; usefulness

2. the capacity of a commodity or a service to satisfy some human want.

3. the principle and end of utilitarian ethics; well-being or happiness; that which is conducive to the happiness and well-being of the greatest number.

Generating the Greatest Good ↗

In the next 50 years, we must replace over 50% of the energy currently on the grid.

Even with massive investment, renewables cannot generate the capacity or the consistency that our society requires.

50 MILLION

The multiple of energy released from the nuclear fission of a uranium nucleus as compared to the chemical combustion of a carbon atom.

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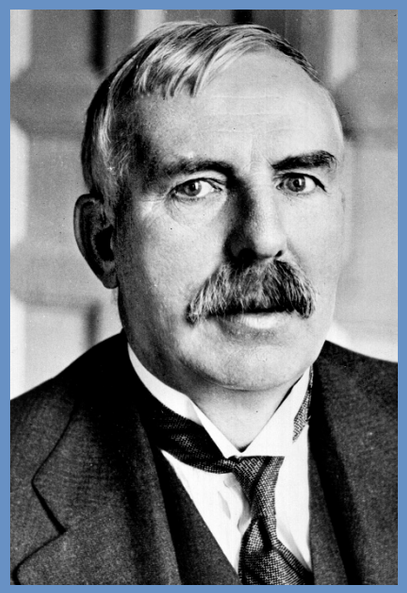
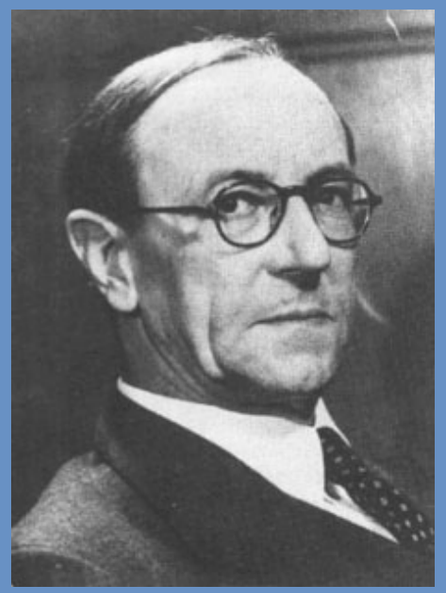
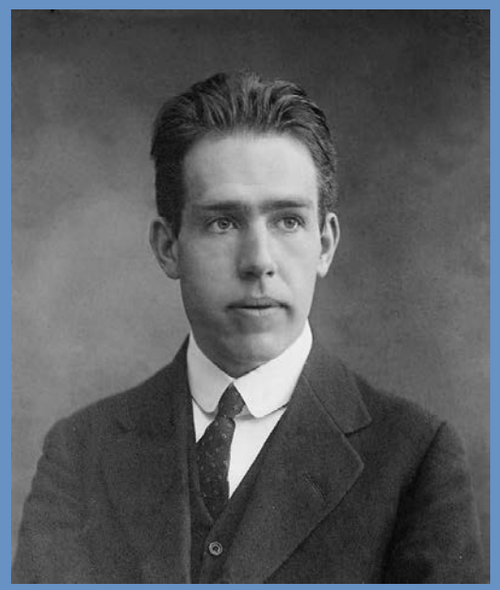
Nuclear Reactor History →

1920 – Ernest Rutherford (Experiments with Alpha Particles)

1932 – James Chadwick (Discovers Neutron)

1939 – Niels Bohr (Classical Analysis of Fission)

1942 – Enrico Fermi (Chicago Pile 1 Reactor)

1953 – Admiral Hyman Rickover (Father of Nuclear Navy)

1960 – Yankee Rowe (Westinghouse 250 MWe PWR)

The Problem →

The budgetary constraints of funding a project of this magnitude.

The future of energy generation in a carbon-restricted world.

People's irrational fears about nuclear power.

Replacing the energy generation moving off line in the next 30 years.

But just maybe,
to answer the first challenge, you have to answer them all at the same time.

Nuclear Reactor Design →

Fast	vs	Thermal
Breeder	vs	Burner
Liquid Fuel	vs	Solid Fuel
Thorium	vs	Uranium

COOLANT CHOICE

Salt, Water, Gas, Metal

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GAIN Gateway for Accelerated Innovation in Nuclear

U.S. DEPARTMENT OF ENERGY | Office of Nuclear Energy

Gateway for Accelerated Innovation in Nuclear

GAIN MSR TWG Members →

ONE

TerraPower

Fast
Breeder
Liquid Fuel
Salt Cooled
Uranium
(Could use Th)

TWO

Thorcon

Thermal
Burner
Liquid Fuel
Salt Cooled
Thorium

THREE

Terrestrial Energy

Thermal
Burner
Liquid Fuel
Salt Cooled
Uranium
(Could use Th)

FOUR

Flibe Energy

Thermal
Breeder
Liquid Fuel
Salt Cooled
Thorium

FIVE

Transatomic Power

Hybrid
Burner
Liquid Fuel
Salt Cooled
Uranium

SIX

Elysium Industries

Liquid Fuel
Salt Cooled

Southern Company

EPRI

NEI
NUCLEAR ENERGY INSTITUTE

Exelon

DUKE ENERGY®

GAIN MSR TWG Meeting→

Vision – US will be the leader in MSR technology

Rationale – MSRs provide a path to Abundant, Clean, Safe, Reliable and Affordable energy for the foreseeable future

Mission – Engage with DOE NE to accelerate the MSR technology space

GAIN MSR TWG →

Common R&D needs for MSRs:

- Access to 20% enriched HEU
- Multi-physics packages for MSRs
- Testing and development of advanced materials
- MSR off-gas systems
- Remote Maintenance
- MSR ISG for NUREG – 1537
- Digital repository of MSR documents
- Build a salt fueled Engineering Test Facility

GAIN MSR TWG →

Salt Fueled Engineering Test Facility Feasibility Study:

1. Testing and Demonstration Requirements (Oct 17th)
2. Determine Facility Criteria (Nov ‘16)
3. Define Representative Point Designs (Dec ‘16)
4. Identify Suitable Locations (Dec ‘16)
5. Prepare Cost Estimate (Jan ‘17)
6. Propose Reference Approach (Feb ‘17)
7. Summary Report (Mar ‘17)

Status quo is **unsustainable.**

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