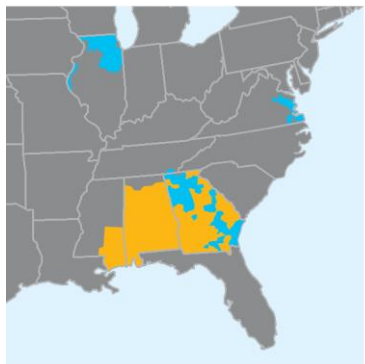


Southern Company R&D

Enabling a Net Zero Economy

Lauren Lathem
July 19, 2021

Southern Company provides clean, safe, reliable, affordable energy and customized solutions.



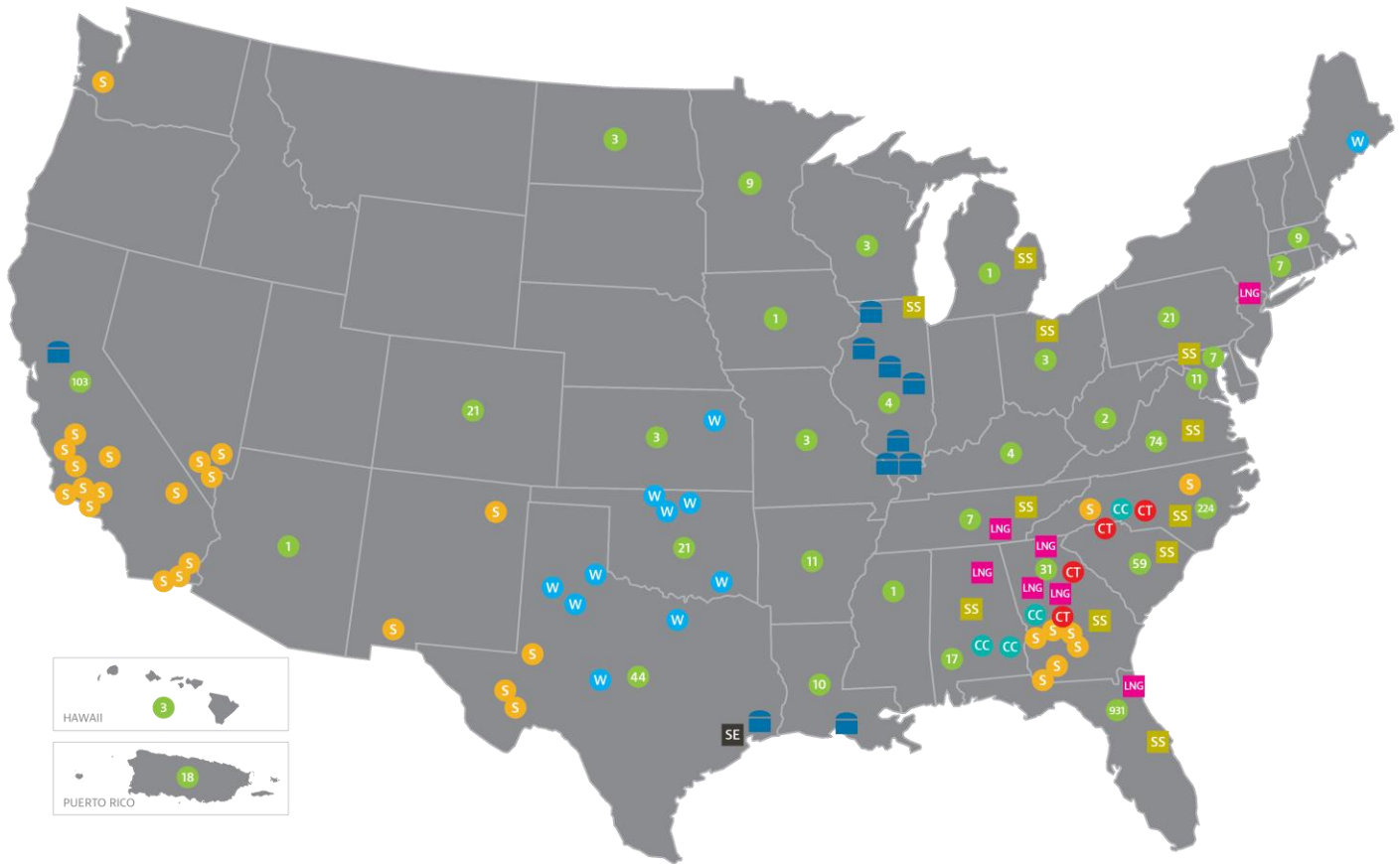
Service territories

- Electric
- Gas



Gas pipelines

- Southern Natural Gas
- Southern Company Gas
- Pipeline projects



Southern Power

- CC Combined-cycle facility¹
- CT Peaking facility
- B Biomass facility
- S Solar facility
- W Wind facility

Southern Company Gas

- LNG LNG facilities
- SE Sequent Energy Management
- SS SouthStar
- Natural gas storage

PowerSecure

- # Owned and managed sites per state

¹In November 2018, Southern Power agreed to sell its combined-cycle facility in Mankato, Minnesota.

Capabilities in
50 States

7
Electric & Natural
Gas Utilities

9 Million
Customers

Approximately
29,000
Employees

Approximately
44,000 MW
of Generating Capacity

Current state

Reduce our own carbon footprint

Facilitate economywide net reductions

0 NET ZERO

→ Affordable, Reliable, Net-Zero *Electricity*



Generation Technologies

- Renewables
- Storage (short & long)
- Post-combustion capture
- Oxycombustion
- Advanced Nuclear

Alternative Energy Carriers

- Hydrogen / Ammonia
- RNG

Grid Modernization

Distributed Infrastructure

Cross-cutting

- Advanced power cycles
- Water
- Advanced materials
- Circular economy

→ Affordable, Reliable, Net-Zero *Energy*

Research and Development

- Comprehensive technology portfolio – energy production, delivery & use
- Transformational technology solutions for utility and economywide decarbonization
- Industry leadership & unique partnerships
- Public-private cost share to magnify investment

Electrification

- Electric transportation
- Customer-sited reliability & resiliency

Beyond Electrification

- High-grade heat
- Clean fuels
- Post-combustion capture

→ Affordable, Reliable, Net-Zero *Economy*



Industrial Decarbonization

- Clean feedstocks
- Chemical process emissions reductions
- Industrial clusters

Net Negative Solutions

- Direct air capture
- BECCS

Quality requires participation

UTILITIES MUST PLAY A PROACTIVE ROLE

- requires deep thinking & a positive deterministic attitude

LEARN BY DOING

- collaborate with industry experts
- test & integrate early
- deployment necessitates demonstration

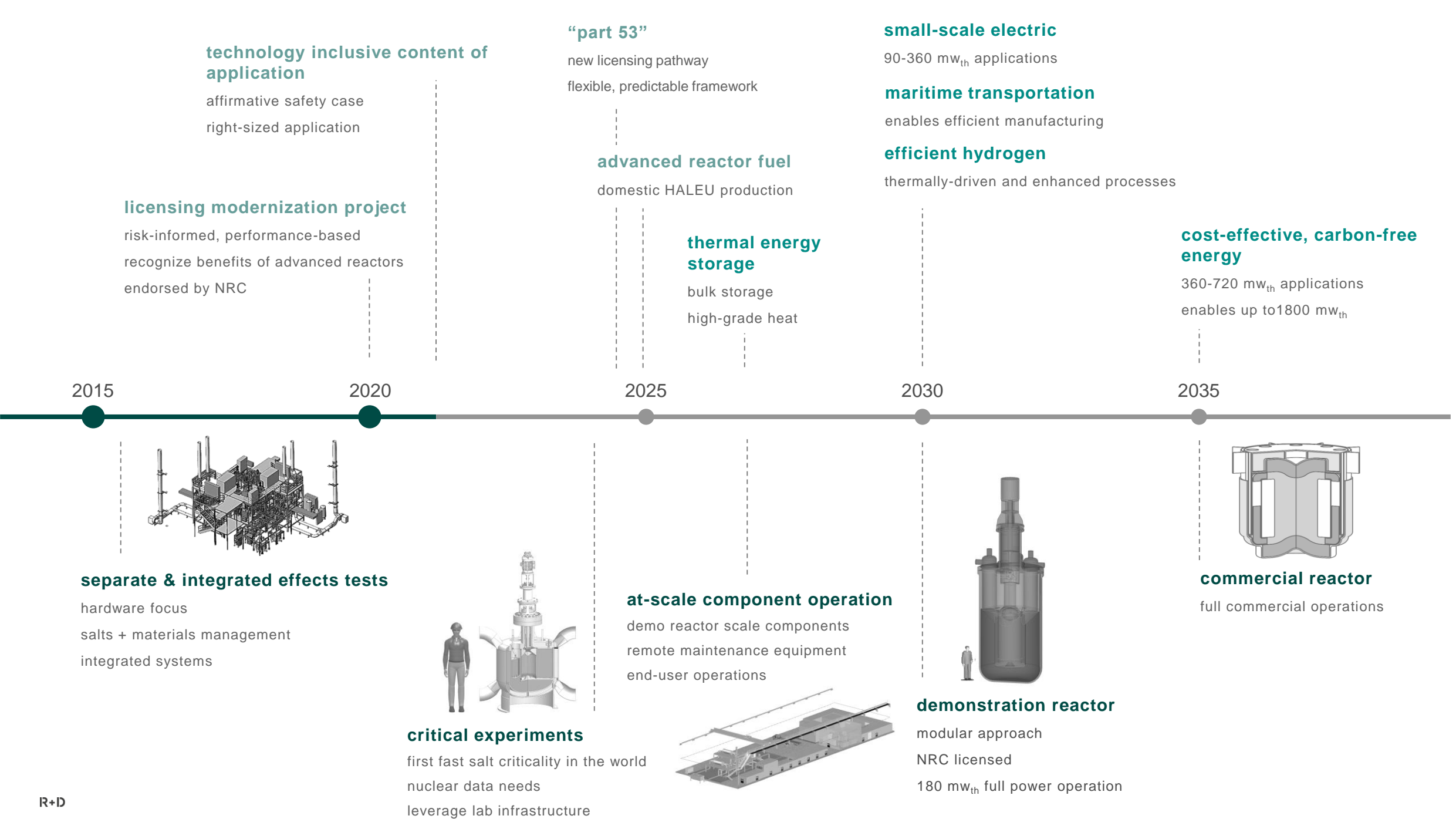
GOVERNMENT MUST PLAY A SIGNIFICANT ROLE

- should be responsive to thoughtful utilities
- engage in cost & risk-sharing mechanisms with industry
- development & demonstration funding must continue to grow

TerraPower Molten Chloride Fast Reactor



Research & Development



Advanced Reactor Concepts (ARC)

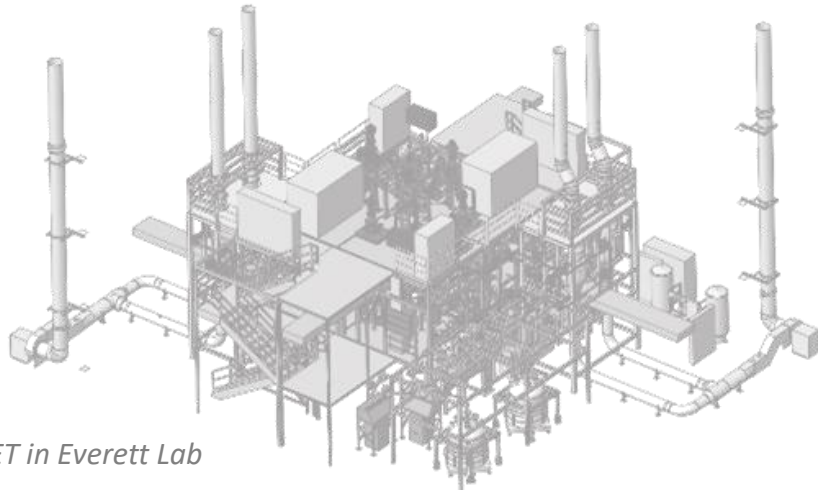
Rebuilding lost infrastructure for high potential technology

SEPARATE EFFECTS TESTS

- microloops for salts and materials compatibility including uranium chloride salt
- isothermal loop – *world's largest pumped chloride salt system*

INTEGRATED EFFECTS TEST (IET)

- <1 mw electrically heated, multi-loop system
- 2022 operation



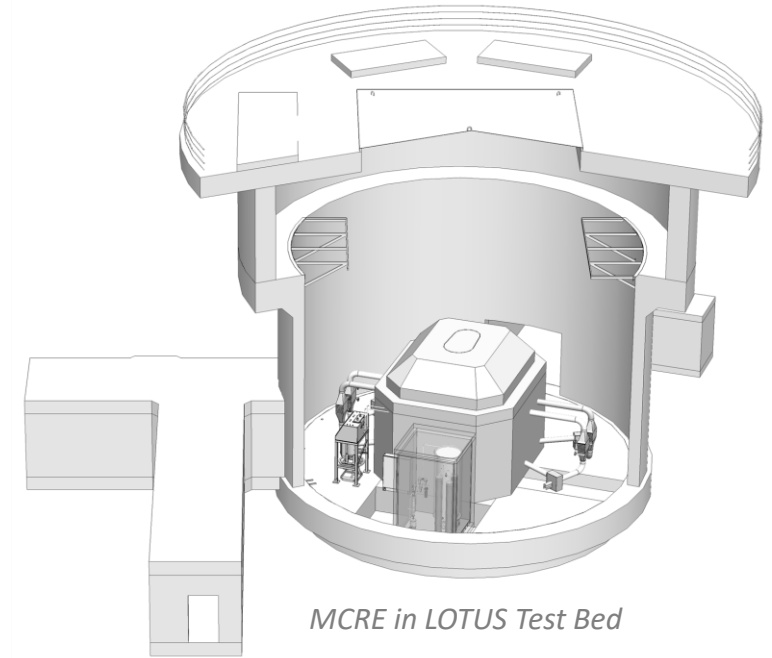
IET in Everett Lab

Advanced Reactor Demonstration Program (ARDP)

World's first fast chloride salt reactor to gather nuclear phenomena data

MOLTEN CHLORIDE REACTOR EXPERIMENT (MCRE)

- advance an unexplored class of reactors
- confirm key physics phenomena
- INL sited & DOE authorized
- year 5 critical operations



MCRE in LOTUS Test Bed



Southern
Company