IDAHO
ADVANCED ENERGY
CONSORTIUM

Idaho Advanced Energy Consortium

Kirt Marlow, IAEC Executive Director

June 28th, 2023

Consortium Purpose

- Convene Regional Advanced Energy Industry Stakeholders
  - Clean Energy = Nuclear, Solar, Wind, Battery, Hydroelectric, Hydrogen
  - Construction, Suppliers, Transportation, Manufacturing, State & Local Government, Education, Communities
- Alignment around priorities and pipeline development
- Deliverables to quantify needs and inform strategies
- Third-party advocacy
- Grant coordination

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Working Groups & Deliverables

1. **WORKFORCE & EDUCATION**
2. **STATE AND LOCAL IMPACTS**
3. **SUPPLY CHAIN**

- Gather, validate, and communicate information
  - Workforce and Education needs coming from the industry
  - 2-way communication with elected officials at multiple levels
  - Supply Chain needs and roadblocks
- Publish annual energy report to the State of Idaho and the Leadership in Nuclear Energy (LINE) Commission
  - Recommended actions, insights, and benchmarking from other regions

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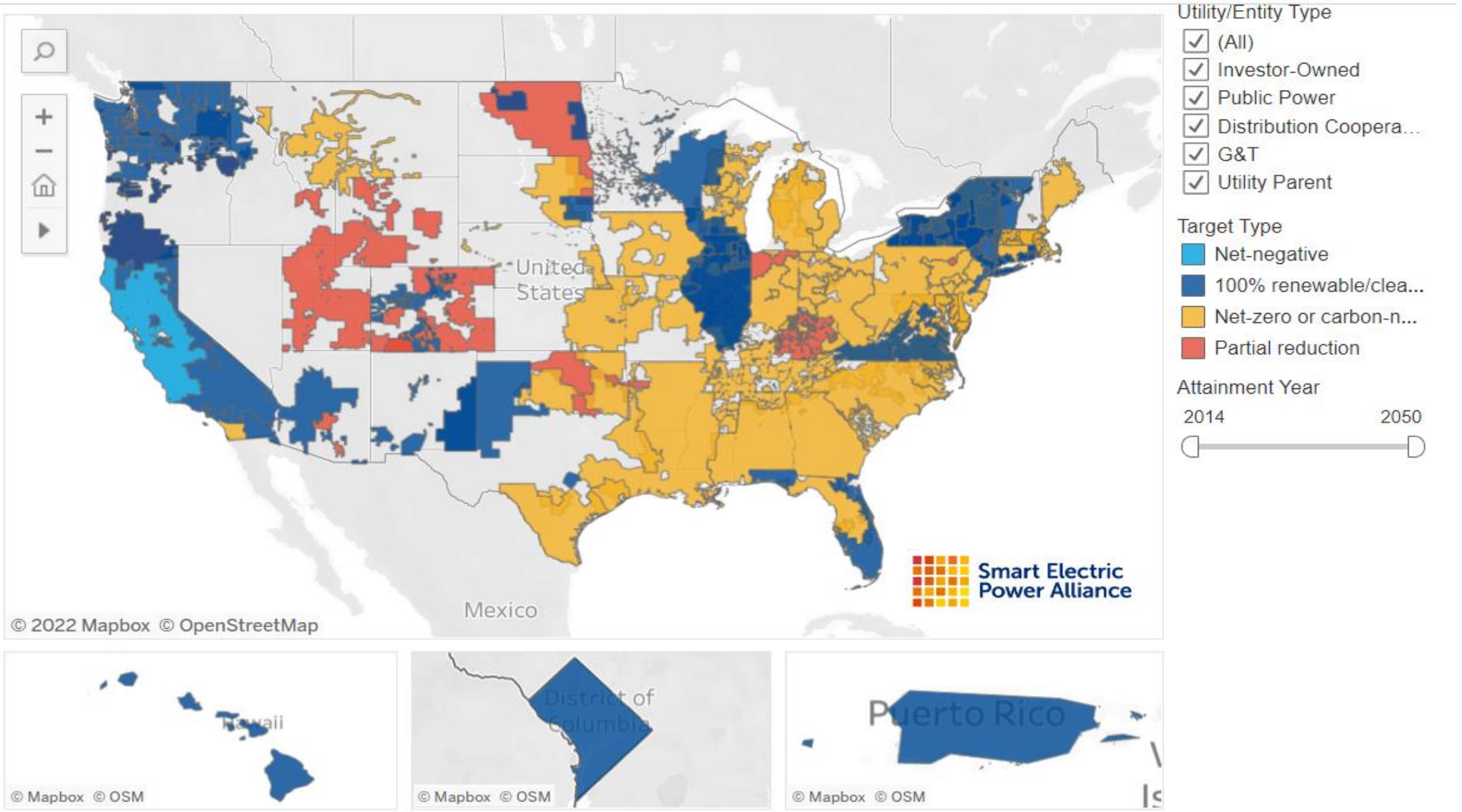
U.S. utilities with emissions reduction targets



Source: https://sepapower.org/utility-transformation-challenge/utility-carbon-reduction-tracker/

Advanced Nuclear Versatility

Spectrum of Sizes and Options

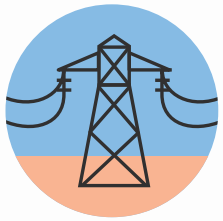
Micro (Few MW)

Mini (10s of MW)

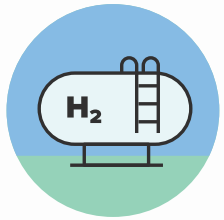
Small (100s of MW)

Large (1,000+ MW)

Variety of Outputs



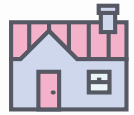
Electricity



H_2 Hydrogen

Process Heat

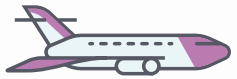
Multitude of Uses



Homes

Vehicles

Businesses



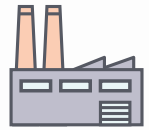
Aviation

Rail

Shipping

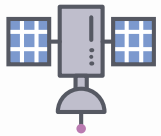
Concrete

Steel



Factories

Water



Space

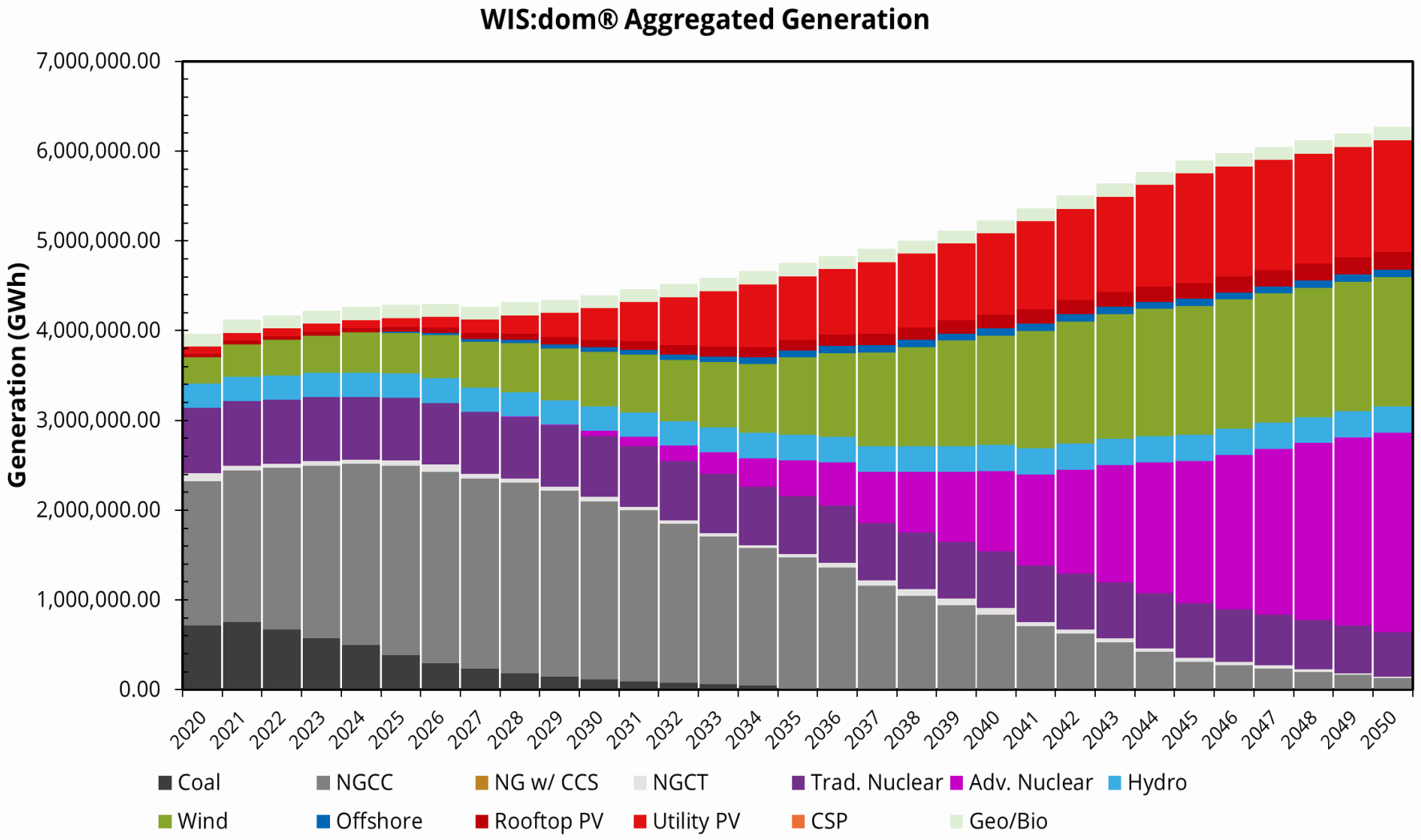
VCE Study - Overview

- Commissioned Vibrant Clean Energy to model electricity system
  - 95% reduction in carbon emissions by 2050
  - Modest load growth, NREL assumptions for renewables, no CCS

- Nominal case
  - $3800/kW overnight cost
  - Non-binding constraint on expansion

- Constrained case
  - $5500/kW overnight cost
  - Conservative capacity to expand

Nominal Case



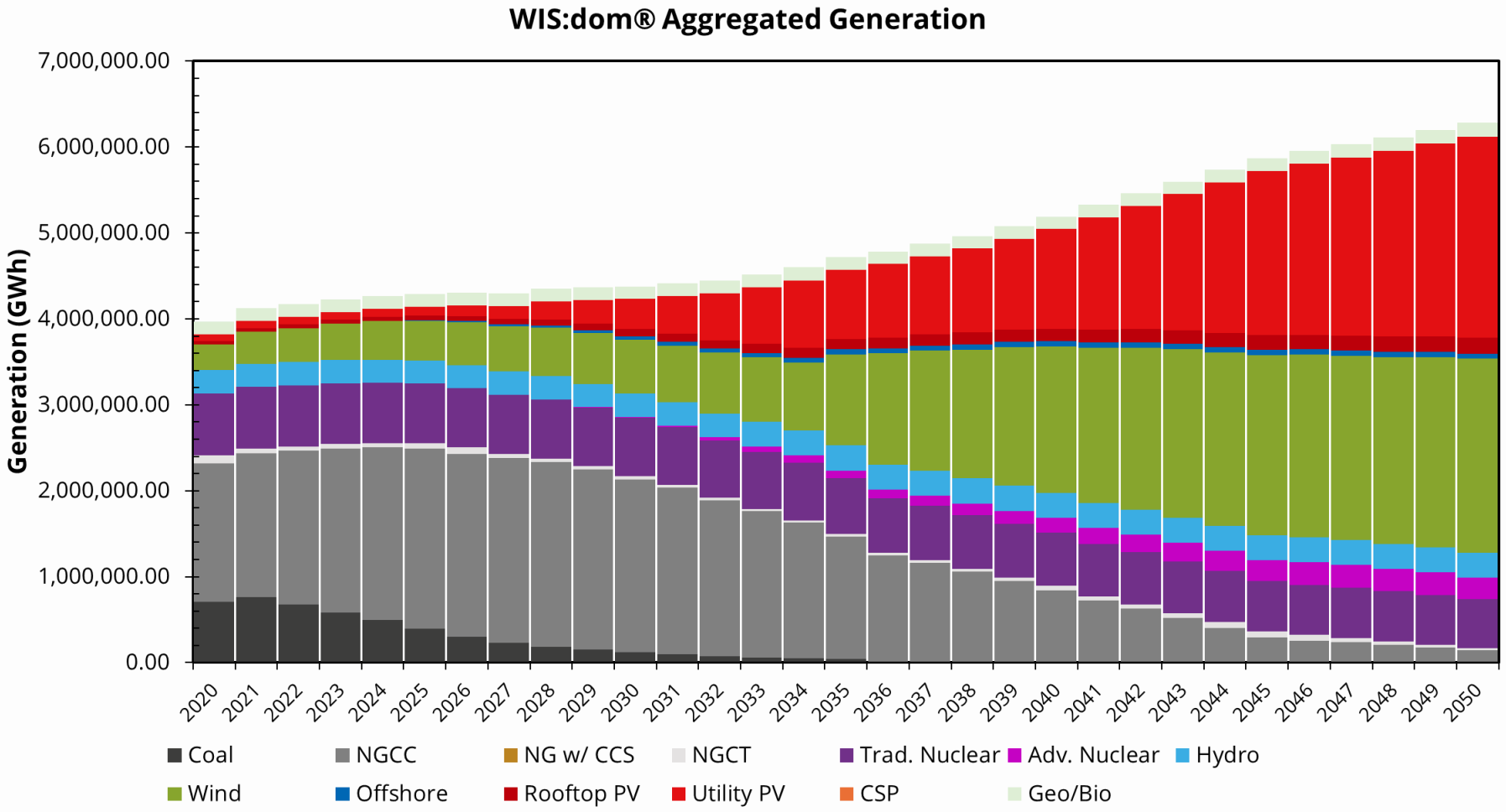
Generation: 2,718 TWh
Legacy: 491 TWh
Advanced: 2,227 TWh

Capacity: 404 GW
Legacy: 67 GW
Advanced: 336 GW

Share: 43%

Converted Fossil: 271

Constrained Case



Generation: 827 TWh
Legacy: 575 TWh
Advanced: 252 TWh

Capacity: 146 GW
Legacy: 85 GW
Advanced: 60 GW

Share: 13%

Converted Fossil: 42

Catalyzing the orderbook may require interventions to help manage completion risk

Nuclear industry is in a stalemate

The nuclear industry is stuck in a stalemate where utilities and other potential owners recognize an increasing need for nuclear power, but are **too afraid of uncontrolled overrun and project abandonment** risk to place committed orders

Developing a committed orderbook could be facilitated by **pooling demand, e.g., with a consortium of utilities**

Participation in such a model could be **accelerated with financial support** (either public or private) to help de-risk the first 5-10 projects

Possible accelerants for generating orders

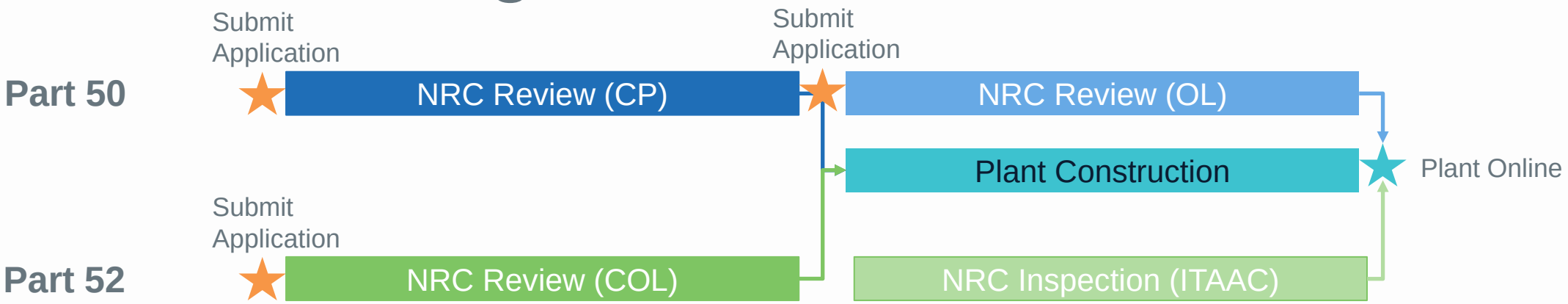
Cost overrun insurance	A percentage of construction costs over and above a certain amount are covered by the government or private insurer
Tiered grant	Large grant amount per kW, ramping down over each successive deployment, e.g., second reactor receives less than the first
Government as the owner	Government commits to build and/or operate reactors to provide pooled demand
Government as the off-taker	Government signs offtake contract for some or all of generation from an orderbook

U.S. DEPARTMENT OF ENERGY

QUESTIONS?

By: Third Way, GENSLER

NRC Licensing Processes



U.S. Licensing Durations and Costs		
Type[1]	Duration[2]	Cost[3]
DC	3 to 4 years (4 to 9)	$45M to $68M
COL	2.5 to 3.5 years (4)	$28M to $30M
ESP	2 years (3 to 6)	$6M to $19M
OL	3 to 3.5 years (8)	$42M

1) DC = Design Certification, COL = Combined Operating License, ESP = Early Site Permit, OL = Operating License
2) NRC Generic Schedules: https://www.nrc.gov/about-nrc/generic-schedules.html
3) NRC Letter to Senator Inhofe April 7, 2015 (ML1508A361)

Advanced Reactor Licensing Progress

Approved	Under Review
1.NuScale Power	

*Non-commercial reactors

Nuclear has a unique value proposition for the net-zero grid

1. Additional applications include clean hydrogen generation, industrial process heat, desalination of water, district heating, off-grid power, and craft propulsion and power
2. Renewables + storage includes renewables coupled with long duration energy storage or renewables coupled with hydrogen storage