



September 7, 2017

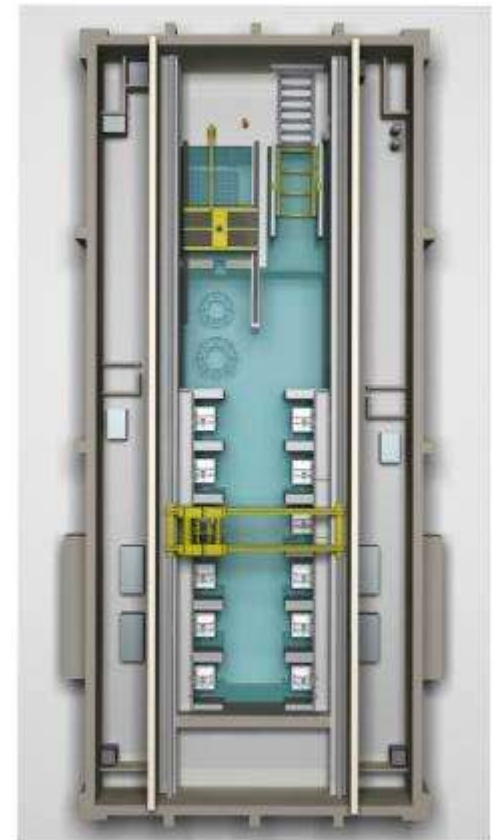
NuScale: Enhancing Generation Reliability

Dan Ingersoll
Jeremiah Doyle



Introduction

- Need for highly reliable power generation
 - Many customers require 24/7/365 power with a high level of certainty
 - Includes defense facilities, data centers, chemical producers, medical facilities, etc.
- Unique features of NuScale design
 - Independence and redundancy among modules
 - Incremental power generation
 - Power island mode sustainable without offsite power
- Redundant Array of Integral Reactors (RAIR)
 - Similar to Redundant Array of Independent Disks (RAID)
 - Generates power independently from multiple reactor-BOP trains
 - Modules can be removed from service for refuel or repair while others remain operational
 - Dedicated microgrid loads take priority for supply of power
 - Excess power provided to the macrogrid



NuScale Reliability Study

- Redundant Array of Integral Reactors
 - Array of 12 reactors, each operating in a similar and independent fashion to generate power
 - Plant supplies microgrid; when a module is removed from service, power supplied to the macrogrid is reduced to assure power to the microgrid
- Plant island mode option
 - One module supplies house load during loss of offsite power from macrogrid (utility power grid)
 - Modules power dedicated microgrid, with remaining modules placed in turbine bypass or shutdown
- Included several sensitivity cases
 - Explored alternate assumptions and methods



© NuScale Power, LLC. All Rights Reserved

Base Case 1a

UTILITY MACROGRID



NuScale 12-Module Plant



MISSION CRITICAL FACILITY



- Case 1a: Traditional configuration with no island mode and no microgrid connection
 - Can only distribute power through utility macrogrid
 - All modules are placed in cold shutdown following a LOOP
 - Once offsite power is restored, modules are returned to service with a staggered restart

Base Case 1b

UTILITY MACROGRID



- Case 1b: Added island mode but no microgrid connection
 - Can only distribute power through utility macrogrid
 - Duty module supplies house loads
 - Remaining modules placed in turbine bypass
 - All modules returned to service when offsite power is restored

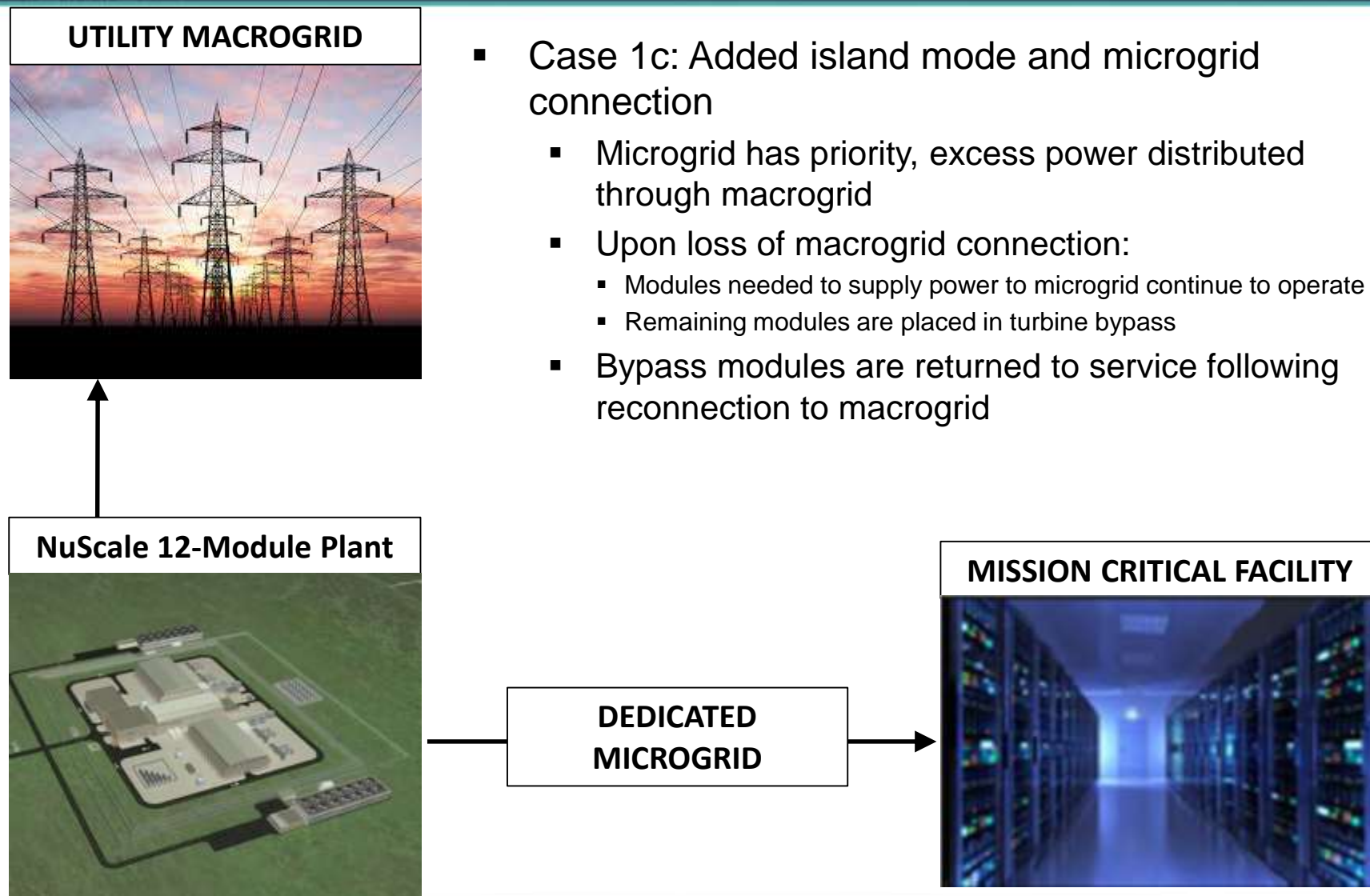
NuScale 12-Module Plant



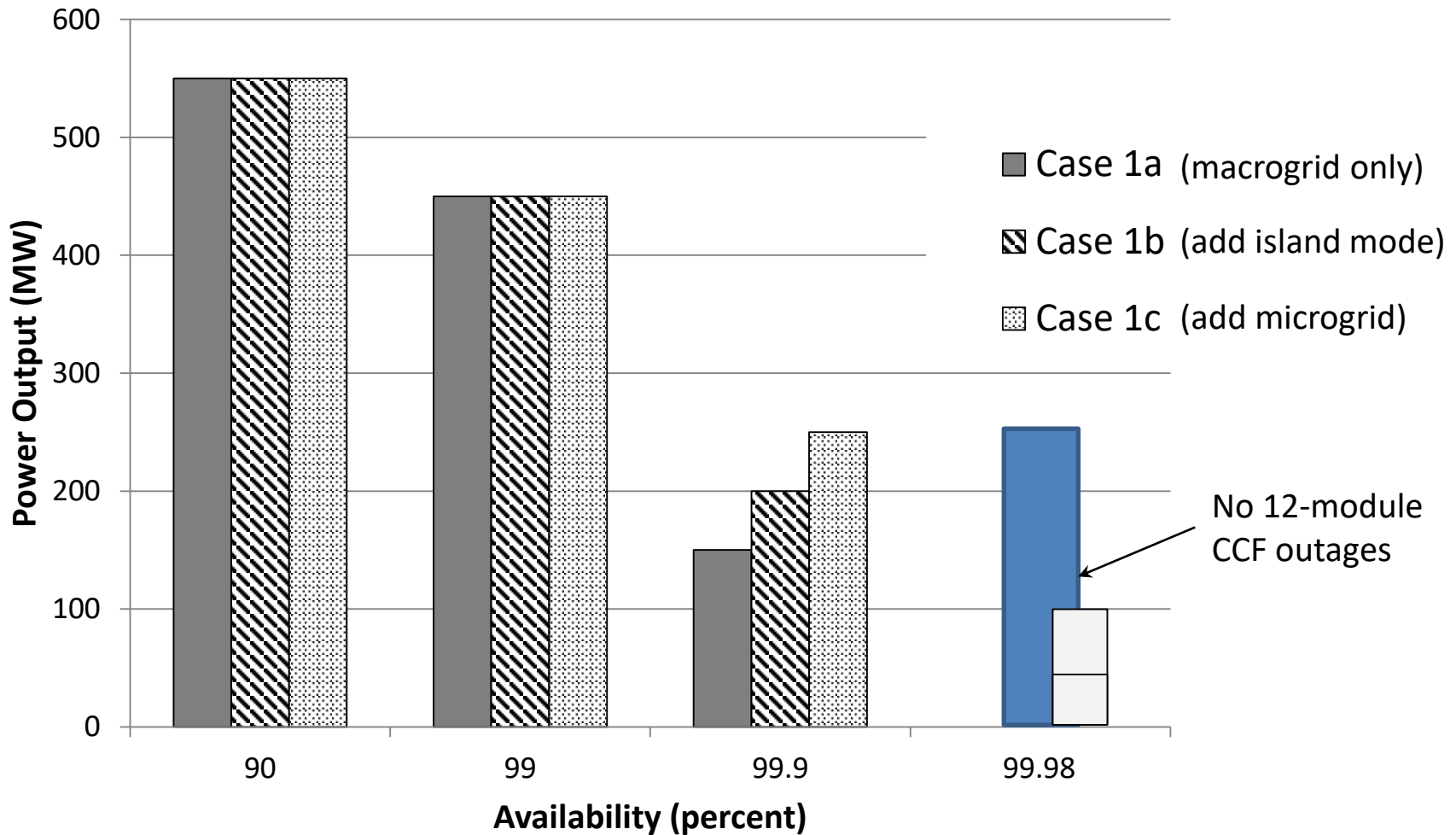
MISSION CRITICAL FACILITY



Base Case 1c



Sustained 60-yr Power Levels



Conclusions

UTILITY MACROGRID



470 MWe (net)
> 95% Capacity

NuScale 12-Module Plant



- The robust NuScale module design and unique multi-module plant design allows for highly reliable power to mission-critical facilities
- Connection to a microgrid, combined with the ability for 100% turbine bypass, allows a NuScale plant to assure at least 100 MWe net power at 99.95% reliability over a 60 year lifetime
- Further enhancements to NuScale's plant design can enable even higher levels of reliability

MISSION CRITICAL FACILITY



DEDICATED
MICROGRID
100 MWe (net)
> 99.95% Availability

6650 SW Redwood Lane, Suite 210
Portland, OR 97224
971.371.1592

1100 NE Circle Blvd., Suite 200
Corvallis, OR 97330
541.360.0500

11333 Woodglen Ave., Suite 205
Rockville, MD 20852
301.770.0472

6060 Piedmont Row Drive South, Suite 600
Charlotte, NC 28287
980.349.4804

1933 Jadwin Ave., Suite 130
Richland, WA 99354

1st Floor Portland House
Bressenden Place
London SW1E 5BH
United Kingdom
+44 (0) 2079 321700

<http://www.nuscalepower.com>

Twitter: @NuScale_Power

