

**Duke Energy  
Oconee Nuclear Station  
Subsequent License Renewal  
Safety Application Pre-Submittal Meeting  
January 26, 2021**





# Agenda

- Opening Remarks/Background
- Overview of Oconee Nuclear Station
- Safety Application Approach/Management
- Overview of Integrated Plant Assessments
- Overview of Aging Management Programs
- Overview of Time Limited Aging Analyses
- Questions/Closing Remarks

# Opening Remarks/Background: Introductions

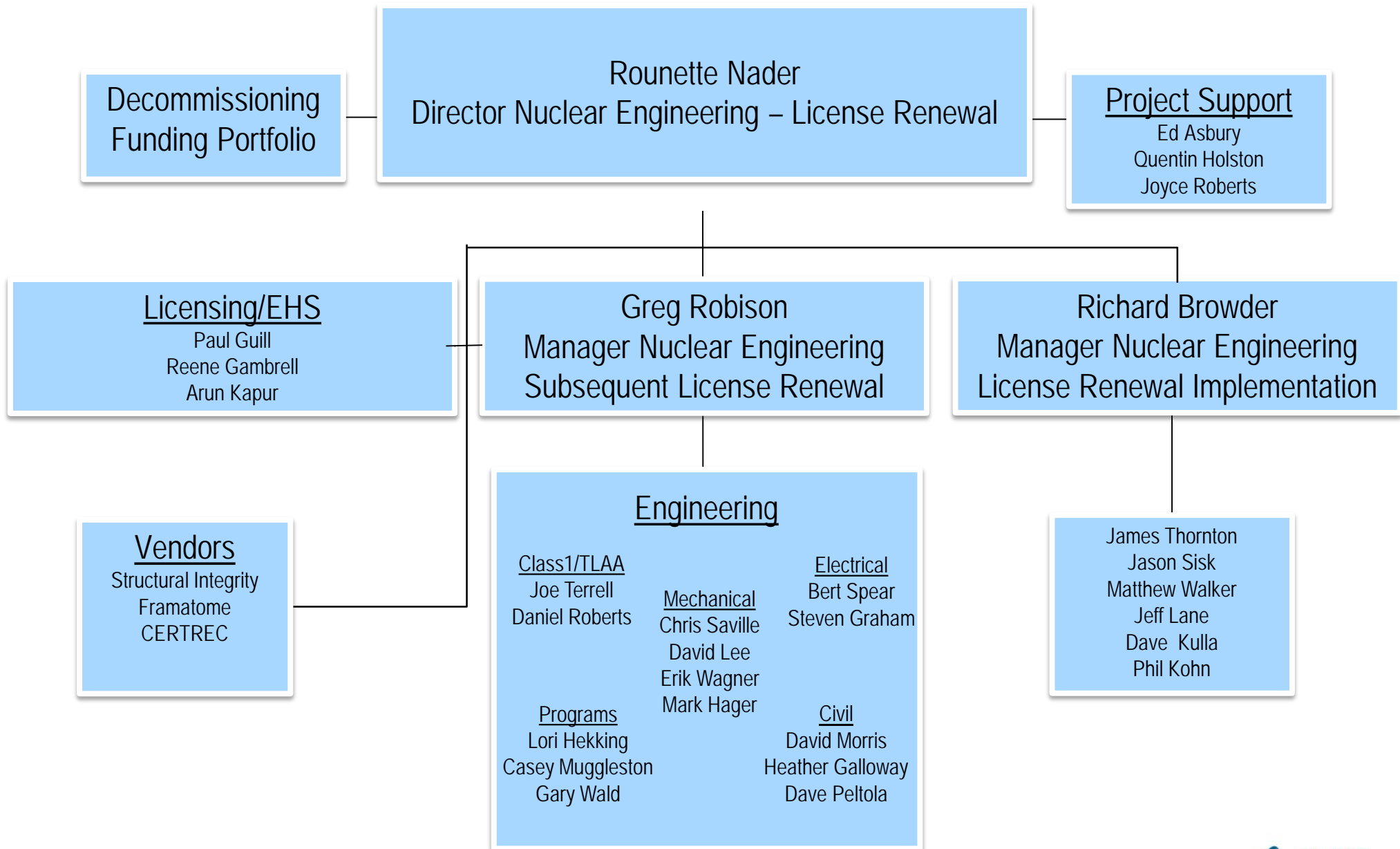
## Speakers

- Rounette Nader (Duke Energy)
- Greg Robison (Duke Energy)

## Attendees/Safety SLRA Contributors

- Duke Energy SLR Team
- Key Vendors
  - Framatome
  - Structural Integrity

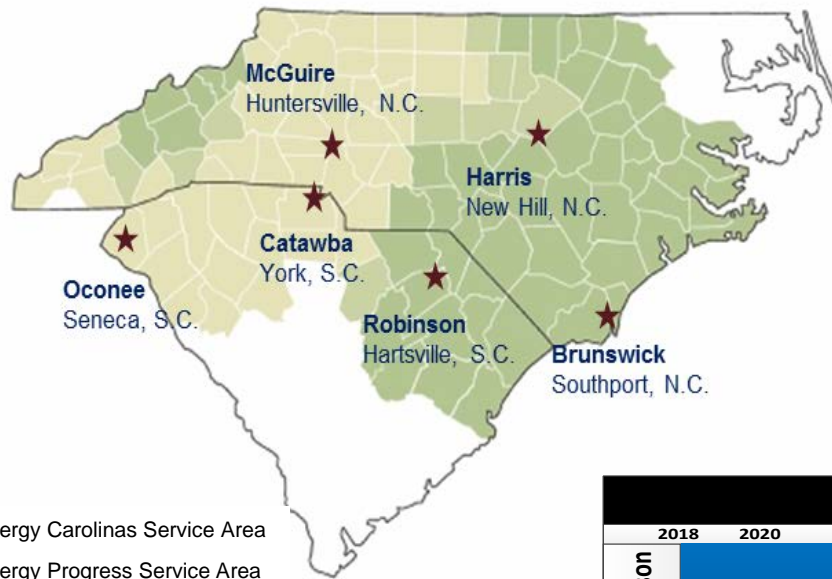
# Opening Remarks/Background: Introductions



# Opening Remarks/Background: Duke Energy

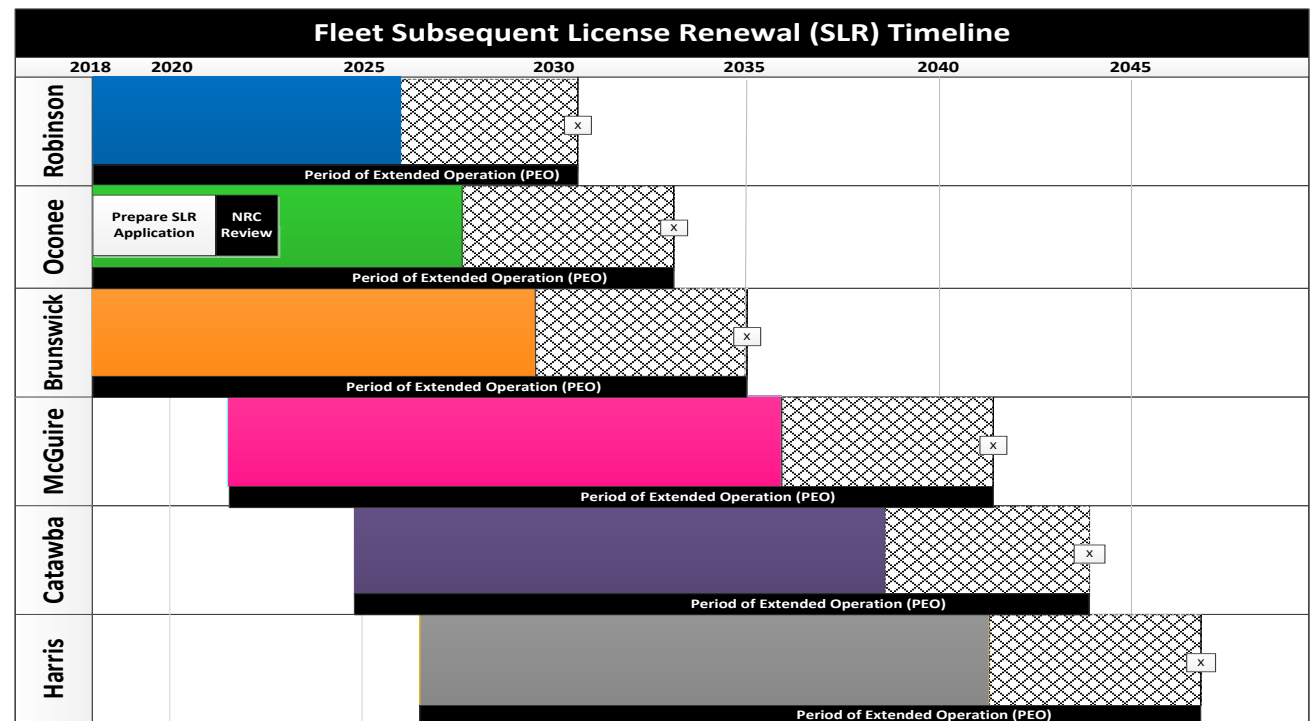
- As we plan to meet our customers' future energy needs and continue to reduce our carbon footprint, we are seeking to renew the licenses of the 11 nuclear units we operate at six plant sites in the Carolinas
- This provides the option to operate these plants for an additional 20 years
- Relicensing our nuclear fleet is critical to meet Duke Energy's goal of net-zero carbon emissions by 2050
- We expect to submit the license renewal application for Oconee Nuclear Station in March 2021

# Opening Remarks/Background: Nuclear Fleet



- Duke Energy Carolinas Service Area
- Duke Energy Progress Service Area
- Overlapping Areas

Each Duke nuclear unit has obtained renewed licenses to operate beyond 40 years.



\* Duke Energy owns 100% of all units except the Catawba units.

# Overview of Oconee Nuclear Station: Plant

- ONS is a three-unit, B&W NSSS, PWR plant
- Station Output: 2554 MWe
- ONS Initial Renewed License was issued May 23, 2000 (Pre-GALL Plant)
- Emergency power supplied by Keowee Hydro
- SSF is backup to existing safety systems (additional “defense in depth”)
- MUR LAR submitted February 19, 2020



	OLs	40 Yrs	60 Yrs	80 Yrs
Unit 1	1973	2013	2033	2053
Unit 2	1973	2013	2033	2053
Unit 3	1974	2014	2034	2054

# Overview of Oconee Nuclear Station: Initial License Renewal

- Initial License Renewal Application submitted July 7, 1998 and was approved May 23, 2000
- IP-71003, Phase 1: Unit 1 completed April 14, 2011; Unit 2 completed November 30, 2011; Unit 3 completed June 2, 2014
- IP-71003, Phase 2 completed August 23, 2012
- Entered PEO 2013 (Units 1 & 2) and 2014 (Unit 3)
- IP-71003, Phase 4 scheduled for June 2022



# Overview of Oconee Nuclear Station: Plant Operation

- Plant Reliability -
  - 2020 capacity factor – 96.02%
  - Ten-year average capacity factor – 95%
- Plant Performance – All three units in Column 1 of NRC Action Matrix
- Plant Enhancements - Over \$4 billion on capital improvements since initial LR approval
- Notably, last two cycles for Unit 2 have been successive breaker-to-breaker runs with the last Unit 2 reactor scram in 2008

# Safety Application Approach

- Use of Contemporary Guidance
  - Comprehensive Scoping & Screening was performed based on NUREG-2192, NEI 17-01, and Regulatory Guide 1.188
  - Integrated Plant Assessment results will be presented consistent with contemporary style and detail
  - SLR AMPs have been harmonized with NUREG-2191
- Use of SLR Lead Plants Lessons Learned
  - Lessons learned from previous SLRA submittals were applied, including review of RAIs to understand current NRC expectations
  - Oconee SLR Team participation in NRC-related SLR meetings and conferences

# Safety Application Management

- Peer Reviews
  - Participated in peer reviews of other SLRA submittals
  - A peer review of ONS SLRA is being performed
- Application Processing
  - CERTREC Electronic Reading Room Portal to support NRC review
  - Support NRC LR Project Manager throughout the NRC Review process
    - Frequent project calls
    - Support in-office and on-site Audits
    - Ensure RAI/RCI Responses meet NRC schedules



# Overview of Integrated Plant Assessment

## Scoping & Screening

- Scoping & Screening
  - ONS approach utilized a full review, not a gap approach
  - Methodology related to (a)(2) scoping was consistent with current standards resulting in more systems scoped-in
  - Screening of electrical and I&C components used a bounding approach as described in NEI 17-01
  - Selected structural items and electrical components were scoped and screened as commodities and assigned to commodity groups based on NUREG-2192, Table 2.1-6

# Overview of Integrated Plant Assessment Aging Management Review

- The aging management review aspects of the Integrated Plant Assessment were performed to current standards
  - NEI 17-01 methodology utilized throughout IPA process
  - Results from the aging management review are presented in the standard 9 column table format
- AMR Highly Consistent with GALL-SLR: > 99% with A through E notes (approximately 9200 line items)
- SLRA Plant-Specific reviews for the NUREG-2192 Further Evaluation GALL items provided in SLRA and resulted in aging management considerations

# Overview of Aging Management Programs

- Forty-eight (48) AMPs developed to maximize consistency with NUREG-2191 (GALL-SLR)
  - Enhanced several existing AMPs to be consistent with GALL-SLR AMPs
- AMP Detailed Development
  - Use of GALL-SLR guidance for program elements
  - Informed through review of Industry RAls and participation in Industry Peer Reviews
  - AMP Effectiveness Reviews performed on existing AMPs using elements of NEI 14-12
- Industry OE and 10 years of plant-specific OE reviewed
  - Informed and verified effectiveness of AMPs
  - No new aging effects identified



# Overview of Aging Management Programs

Oconee SLR – 47 GALL-AMPs & 1 Plant-Specific AMP

	Consistent with GALL	Consistent with Enhancement	With Exception Only	With Exception and Enhancement	Plant Specific
Existing 34	8	18	2	5	1
New 14	13	0	1	0	0
Total 48					

# Overview of Aging Management Programs

- Key AMP Specifics
  - GALL AMP not required – High Voltage Insulators
  - Structural AMPs address alkali-silica reaction (ASR) and irradiation of concrete
  - NRC Interim Staff Guidance (ISG)
    - Draft guidance affecting Mechanical, Structural and Electrical AMPs has been addressed
    - Final guidance for the Reactor Internals AMP has not been incorporated. Duke continues to evaluate how best to address
  - Oconee has one plant-specific AMP, *Secondary Shield Wall Tendons* aging management program.

# Overview of Time Limited Aging Analyses

- TLAA Identification and Evaluation
  - 10CFR 54.21(c) requires that an evaluation of TLAA be provided as part of the Oconee SLR Application
  - The six criteria from 10 CFR 54.3(a) were used to identify the Oconee TLAA evaluated in Section 4 of the Application
  - Forty-two (42) TLAA or categories of TLAA were identified with many evaluations being grouped in order to demonstrate acceptability for 80 years of operation in accordance with 10 CFR 54.21(c)(1)
  - No exemptions pursuant to 10 CFR 50.12 have been granted based on a TLAA as defined in 10 CFR 54.3



# Overview of Time Limited Aging Analyses

- Key TLAA Specifics
  - Reactor vessel
    - Oconee is the first SLR applicant with B&W NSSS, but not first B&W-manufactured reactor vessel reviewed by NRC for SLR
    - TLAA demonstration for the reactor vessel is comprehensive and consistently aligned with ongoing practice at Duke and among the owners of B&W reactor vessels
    - Aging management programs for Reactor Vessel Materials Surveillance and Neutron Fluence Monitoring are cornerstone reactor vessel programs for SLR

# Overview of Time Limited Aging Analyses

- Key TLAA Specifics
  - Metal Fatigue TLAA Evaluations include:
    - Class 1 fatigue analyses
    - Non-class 1 fatigue analyses
    - Environmentally-Assisted Fatigue
    - Various analytical evaluation of flaws – real and postulated, including ISI indications and LBB assumptions
    - Containment Liner Plate Penetration Fatigue
  - Only New SLR TLAA is Reactor Internals materials work related to MRP-227

# Closing Remarks

- Oconee SLR application will be consistent with GALL-SLR and Industry Guidance to the greatest extent possible
- Duke Energy has been engaged with the development of SLR industry guidance and SLR-ISGs
- Duke Energy has supported recent and SLR application reviews and incorporated recent RAI responses
- Duke Energy will submit a high quality SLR application to support an 18 month staff review
- Oconee SLRA submittal remains on schedule to submit 1Q21

# Acronyms

- AMP – Aging Management Program
- AMR – Aging Management Review
- B&W – Babcock and Wilcox
- CFR – Code of Federal Regulations
- GALL – Generic Aging Lesson Learned
- IP – Inspection Procedure
- IPA – Integrated Plant Assessment
- ISG – Interim Staff Guidance
- LBB – Leak Before Break
- LAR – License Amendment Request
- LR – License Renewal
- MUR – Measurement Uncertainty Recovery
- NEI – Nuclear Energy Institute
- NRC – Nuclear Regulatory Commission
- NUREG – Nuclear Regulatory Guide
- NSSS – Nuclear Steam Supply System
- OE – Operating Experience
- OL – Operating License
- ONS – Oconee Nuclear Station
- PEO – Period of Extended Operation
- PWR – Pressurized Water Reactor
- RAI – Request for Additional Information
- RCI – Request for Confirmation of Information
- SSF – Standby Shutdown Facility
- SLR - Subsequent License Renewal
- SLRA – Subsequent License Renewal Application
- TLAA – Time Limited Aging Analysis