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Regulated & Renewable Energy

East Bend Coal Reliability Assurance Initiative DE-FE0032775

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Acknowledgment and Disclaimer

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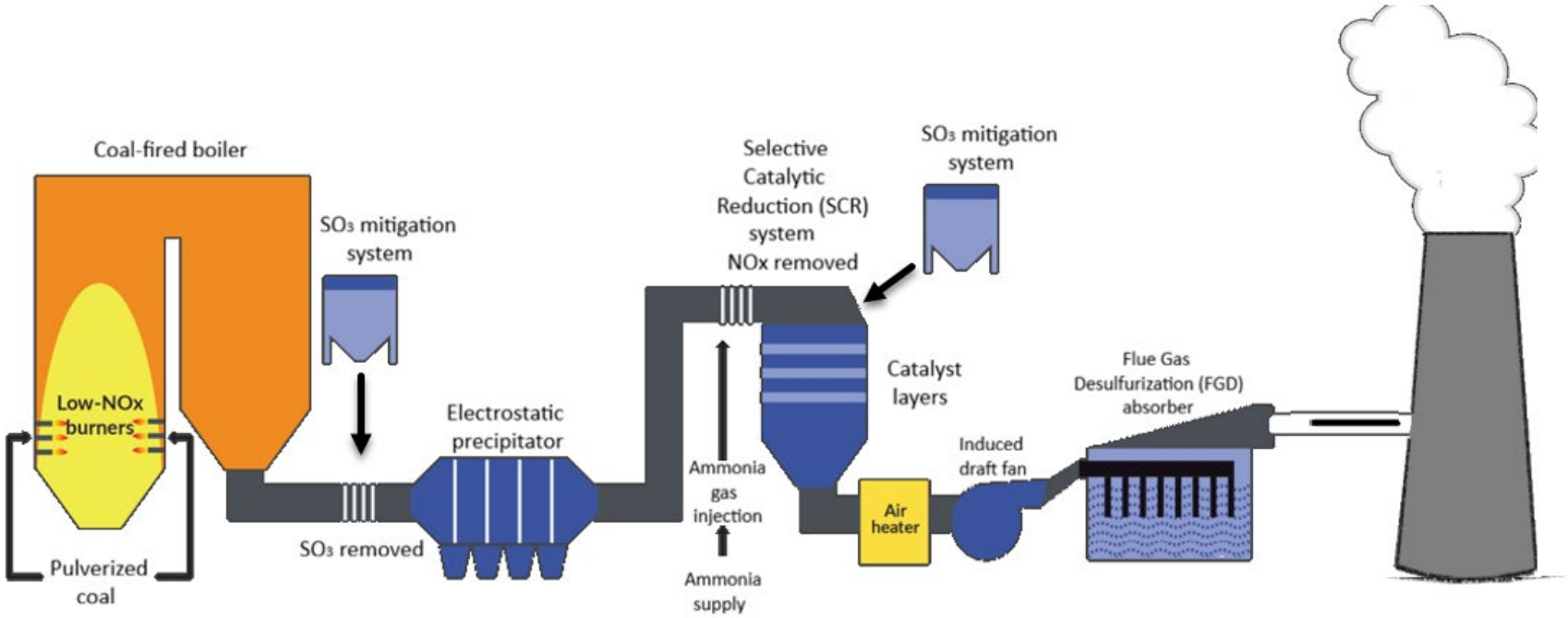
Project Overview

- **Location** – East Bend Station in Rabbit Hash, Boone County, KY
- **Project Goals**
  1. Increase by 14-17 MW net capacity
  2. Increase operational flexibility by reducing minimum load from 400 MW to 250 MW
  3. Improve unit reliability through replacement of critical turbine equipment and modification of boiler equipment
- **Performance Period:** 9/1/2026 – 3/31/2031

Station Background

East Bend Station Background

- 600 MW gross, 600 MW net summer capacity, bituminous coal-fired, single-unit station
  - B&W Boiler with a Westinghouse turbine train
  - Equipped with a hot side electrostatic precipitator for particulate control, SCR system for NOx, wet magnesium-lime FGD scrubber for SO_2, and lime injection for SO_3, with an on-site landfill for scrubber waste Poz-o-Tec
- Operation commenced in 1981 and featured an electrostatic precipitator. The SCR was installed in 2002, and the FGD system was upgraded in 2005



Intended Impact

Customer Benefit

- 14-17 MW of additional generation capacity
- Outage savings from extending HP turbine maintenance interval from 64,000 to 100,000 EOH
- Improved operational flexibility by reducing minimum load from 400 MW to 250 MW, while maintaining the SCR operation
- Improved reliability and availability through replacement of aging turbine components and modifications to major boiler equipment

Community Benefit

- Sustains 600+ MW of dispatchable generation serving Northern Kentucky and PJM region
- Supports long-term skilled jobs now and further into the future by renewing turbine rotating assets, steam turbine valves, and boiler economizer temperature controls
- Generates substantial economic activity in Boone County across the Fall 2029 and Fall 2030 outages
- Northern Kentucky Chamber of Commerce: Supports one of Kentucky's fastest-growing regions by providing the energy infrastructure needed for continued investment and expansion

Funding Summary

- **Total Project Cost: $84,141,695**
  - Duke Energy Share: $50,741,695
  - Federal Share: $33,400,000

Milestone	Description	Federal Share	Non-Federal Share	Total	DOE Share Timing
M1	Initial BCA	$136,948	$208,052	$345,000	Q4 2026
M2	Split Economizer Engineering	$403,906	$613,619	$1,017,526	Q1 2027
M3	Split Economizer Matl. Delivery	$627,134	$952,749	$1,579,883	Q3 2029
M4	Split Economizer Installation	$2,788,598	$4,236,473	$7,025,072	Q4 2029
M5	Steam Turbine LP/IP Major	$10,150,138	$15,420,216	$25,570,354	Q4 2029
M6	Steam Turbine HP Engineering	$83,459	$126,792	$210,251	Q1 2027
M7	Steam Turbine HP Equip. Delivery	$6,564,511	$9,972,887	$16,537,397	Q3 2030
M8	Steam Turbine HP Installation	$9,974,903	$15,153,997	$25,128,901	Q4 2030
M9	Steam Turbine Valves	$2,533,227	$3,848,510	$6,381,736	Q4 2030
M10	Final BCA	$137,176	$208,399	$345,575	Q1 2031
	Total	**$33,400,000**	**$50,741,695**	**$84,141,695**	

Key Project Participants (Potential)

- Department of Energy
- Duke Energy Teams
  - Regional
  - Station
  - Environmental
  - Central Operations Services & Oversight
  - Supply Chain
  - Finance
- Engineering Services
- Installation Contractor Services
- Turbine Suppliers
- Boiler Suppliers

Project Scope / Technical Approach

- **HP Turbine Rotor**
  - Replace the rotor and associated steam-path components to increase capacity and extend the maintenance interval
- **IP Turbine**
  - Replace Row 1 blades and seal rings to improve reliability
- **LP Turbine**
  - Replace Row L-0, L-1, L-2 blades on Rotor LPA and Rotor LPB to improve reliability
- **Steam Turbine Valves - (8) Governor, (4) Throttle, (2) Reheat stop, (4) Intercept, and Actuators**
  - Overhaul includes replacement of internal trim, stems, seats, bushings, linkages, actuators, or hydraulic components to improve reliability
- **Boiler Split Economizer**
  - Install new header, valves, instrumentation, and control logic to establish necessary flow splits to achieve required economizer exit-gas-temperature targets for low-load operation

Execution Plan

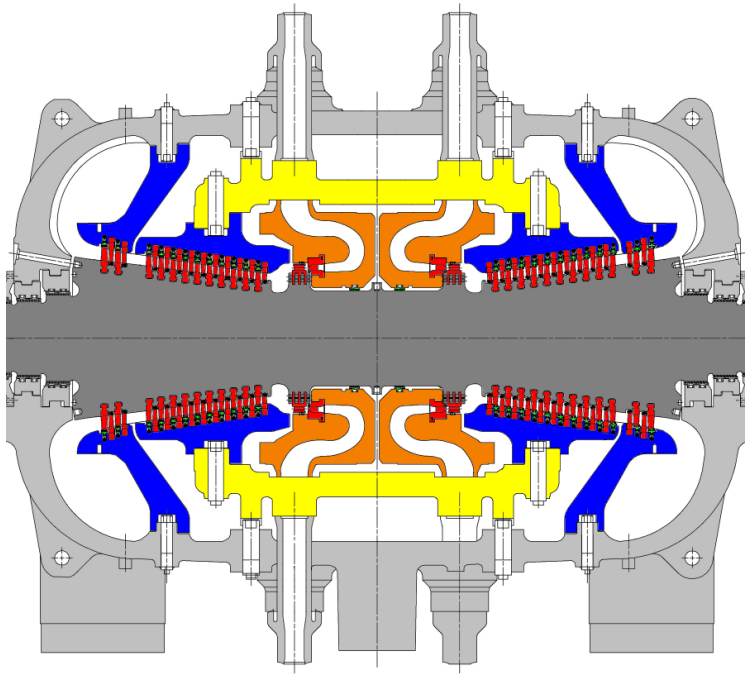
- **Engineering:**
  - Conduct preliminary engineering for HP rotor & boiler split economizer to support permitting
  - Complete detailed engineering for HP turbine, LP/IP turbine blades, steam valve overhaul, and boiler split economizer
- **Permits:**
  - Environmental Permitting
    - Evaluation of required permit modifications, including potential New Source Review and Prevention of Significant Deterioration requirements for air permits
  - State of Kentucky
    - Certificate of Public Convenience and Necessity (CPCN)
- **Procurement:**
  - Reserve shop space for HP rotor and long lead components
  - Procure HP rotor and split economizer equipment following required CPCN approval
  - Procure turbine blading, seals, valves and hardware in advance of stated lead times
  - Contract outage services: millwrights, boilermakers, scaffolding, insulation, and instrumentation & controls
- **Construction:**
  - Boiler Split Economizer - Fall 2029 outage
  - LP & IP Turbine Blades - Fall 2029 outage
  - Steam Turbine Valves - Fall 2030 outage
  - HP Turbine Rotor - Fall 2030 outage

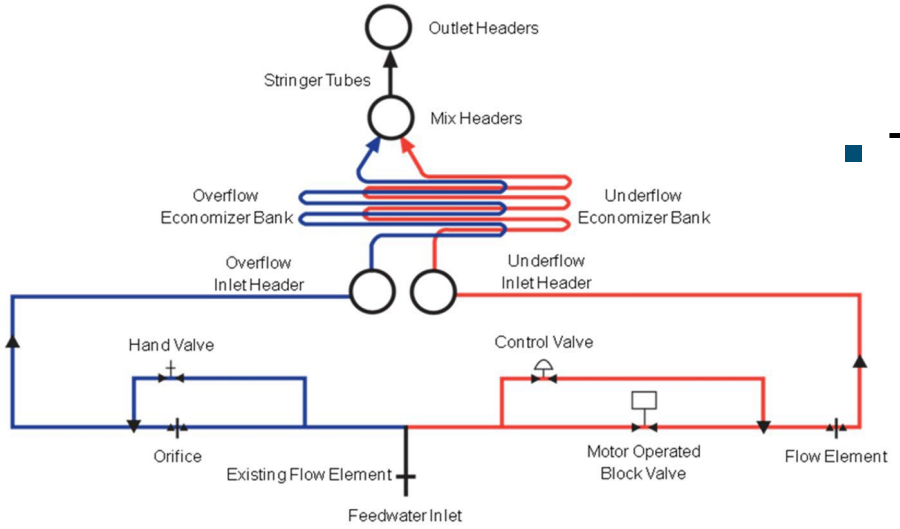
Project Schedule

East Bend U2 - 2029 Technical Objectives	Outage Timing	Qtr.
Initial BCA		Q4 2026
Permitting	T-28 to T-26 months	Q2 2027
Long Lead Equipment Purchase	T-17 to T-14 months	Q2 2028
Contracts Issued	T-3 months	Q2 2029
Outage Readiness Review	T-1 month	Q3 2029
Fall 2029 Outage	T-0 to T+3 months	Q3 2029
Work Complete Verification	T+4 months	Q4 2029

East Bend U2 - 2030 Technical Objectives	Outage Timing	Qtr.
Permitting	T-40 to T-38 months	Q2 2027
Long Lead Equipment Purchase	T-29 months	Q1 2028
Contracts Issued	T-3 months	Q2 2030
Outage Readiness Review	T-1 month	Q3 2030
Fall 2030 Outage	T-0 to T+3 months	Q3 2030
Work Complete Verification	T+4 months	Q4 2030
Final BCA		Q1 2031

Performance / Success Metrics





- HP Rotor
  - 14-17 MW net capacity increase
  - Successful completion of OEM testing / startup plan
  - Rotor vibration < 5 mils
- Boiler Split Economizer
  - Minimum load reduced from 400 MW to 250 MW
  - Welds accepted in accordance with approved inspection plan
- LP & IP Blades
  - Successful completion of OEM testing / startup
  - Rotor vibration < 5 mils
- Turbine Valves
  - Valve blue-check pass
  - Proper valve operation during post maintenance testing
  - Successful startup plan

Project Related Risk Evaluation

TECHNICAL RISK

Integration of new technology with existing plant systems may present design and performance challenges.

MITIGATION
OEM engineering and detailed design reviews

LOW RISK

COST RISK

Inflation and market volatility may increase project costs.

MITIGATION
Phased funding, estimate validation, and contingency

MEDIUM RISK

SCHEDULE RISK

Long-lead equipment manufacturing and outage off-site repair timing.

MITIGATION
Early procurement and shop reservation commitments

MEDIUM RISK

REGULATORY RISK

CPCN and environmental compliance activities could impact project timing.

MITIGATION
Proactive permitting and stakeholder engagement

LOW RISK

COMMERCIAL RISK

Expected generation reliability benefits may vary from projections.

MITIGATION
Performance guarantees and validation testing

LOW RISK

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