# Deerhaven Unit 2 Dual Fuel Project

June 18, 2020

Item #200029

GRU℠
More than Energy

# Deerhaven Unit 2 Dual Fuel Project

Agenda:

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5. Scope of Work
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# Community Benefits

- Reduces GRU's cost of fuel, which reduces rate pressure.
- Reduces emissions, including CO2, SOX, NOX and mercury.
- Moves GRU toward its goal of 100% renewable by 2045.


# BACKGROUND

# Background

- Background information on Deerhaven Unit 2 (DH2)
  - Entered service in 1980.
  - GRU's largest Generating Unit, 228 MW (net).
  - Primary fuel is Coal with limited capacity to burn Natural Gas (~30 MW).
  - Operates primarily as a base load unit and fulfils a valuable role in GRU's system by following load as it varies throughout the day.
  - Currently planned for continued service through CY 2032
  - Provides fuel storage/and fuel diversity, assuring reliability.
- GRU anticipates significant cost advantage for using Natural Gas in lieu of Coal as primary fuel for DH2.

# Background (Continued)

- The City of Gainesville has adopted a resolution to be 100% renewable by 2045.
- Staff performed an evaluation on adding dual fuel capacity to DH2, giving the unit increased capability of burning up to 100%  Natural Gas.

# Fuel Supply Considerations

- Natural gas is purchased by GRU from suppliers and GRU must also contract for delivery
- Firm gas capacity for all of our requirements is very expensive. By maintaining dual fuel capability we can operate on primarily non-firm transport gas when available (most of the year), and provides a valuable hedge against short term spikes in natural gas prices benefiting customers.
- Obtaining firm natural gas supply may incur significant costs to meet load on extreme temperature days. Dual fuel capability keeps fuel supply costs lower.
- GRU has an inventory of Coal which it can use as a hedge against Natural Gas Constraints
- Coal is currently running approximately 47% more expensive than gas, a situation which is not anticipated to reverse in the next few years.
- Converting to allow for full dual fuel operation could permit DH2 to operate at full load on natural gas yet allow flexibility for reliability and cushion GRU from spikes in natural gas pricing.


# DUE DILIGENCE

- Technical Capability and Operational Merits
- Financial Metrics
- Environmental

# Project Due Diligence

**Staff initiated studies into the following areas:**

- Boiler modeling and analysis to determine if the project would adversely affect equipment performance or longevity.
- Boiler Combustion modeling and analysis to determine air emission impacts.
- Cost estimate for project implementation.
- Environmental permitting.

# Due Diligence - Results

*Study*: Boiler modeling and analysis to determine if the project would adversely affect equipment performance or longevity.

***Result*: Modeling results confirmed that boiler could operate on 100% natural gas with no adverse impact on equipment performance or longevity.**

*Study*: Boiler Combustion modeling and analysis to determine air emission impacts.

**Result: Modeling results predicted reduced emissions during Natural Gas operations (details later in presentation).**

*Study*: Cost estimate for project implementation.

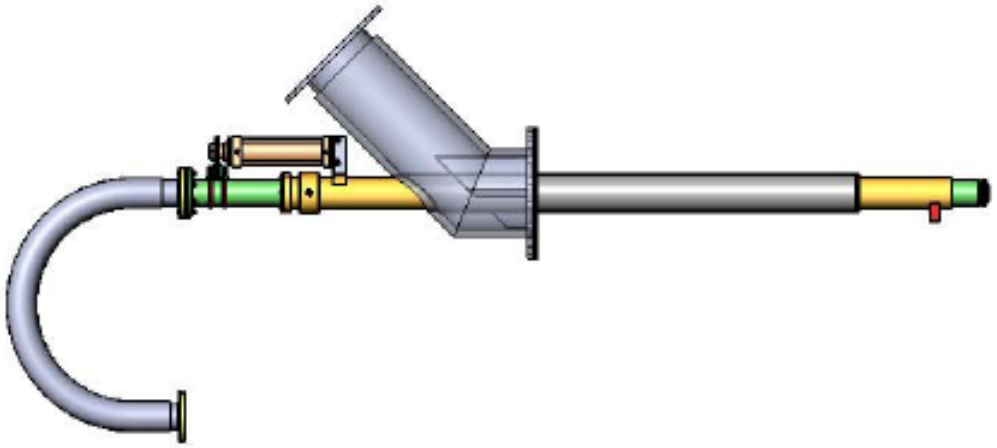
***Result*: Cost estimates forecast project implementation cost support GRU's initial internal cost estimate.**

Study:  Environmental Permitting

***Result:  Permittable within project schedule.***

# Due Diligence – Engineering Solution


Existing Coal Pipe Elbow



New Coal Pipe Elbow with Concentric Gas Burner

# Scope of Work

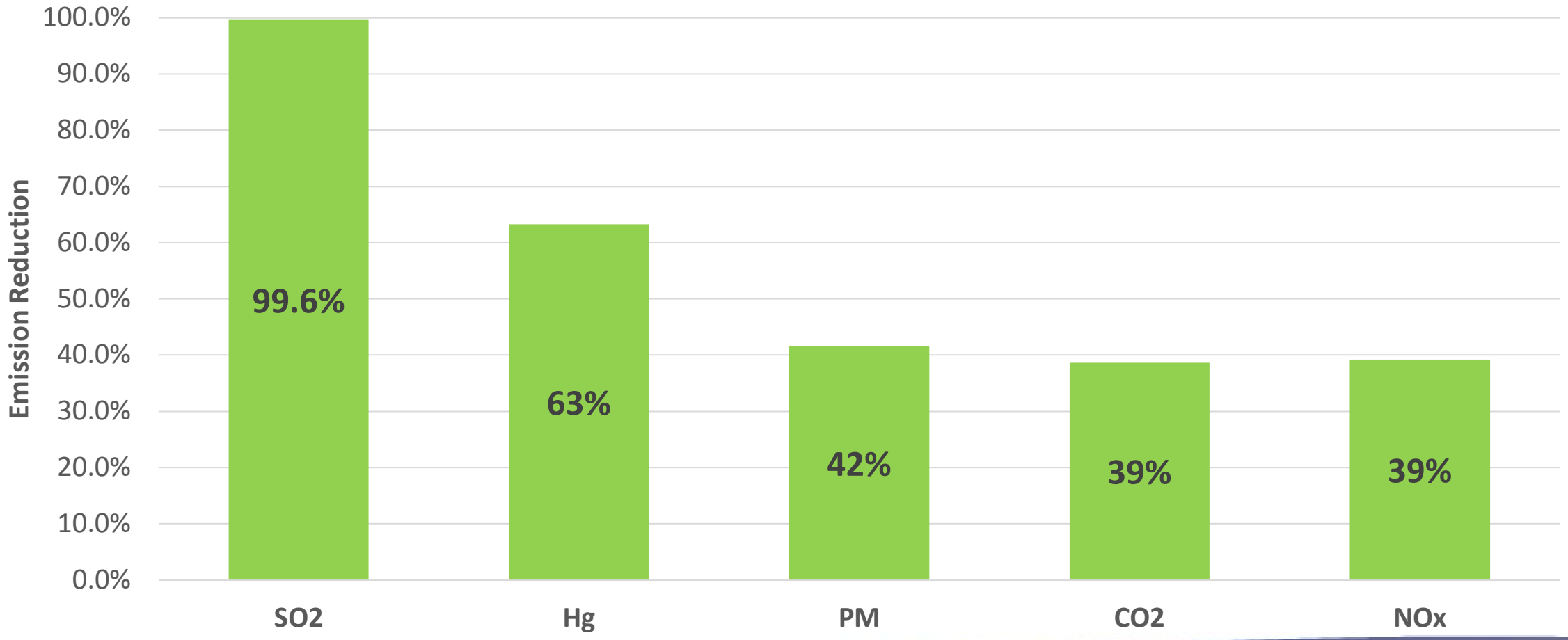
Work will be conducted in three phases:

- Pre-Outage
  - Permitting
  - Order new combustion hardware
  - Piping and installation engineering
  - Design and order required control equipment
  - Begin installation of piping and electrical work

- Outage Critical (2 weeks required)
  - Install new combustion hardware
  - Install new control system hardware

- Post Outage
  - Complete mechanical and electrical installation
  - Commission system

# Emissions Reductions After Project Implementation



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# Emissions Reductions After Project Implementation

| Parameter Tons/Year (or Hg Pounds/Year) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Baseline Case - Coal and NG Mix | | | | | Comparison Case - After Natural Gas Project (no Coal) | | | | | Reduction |
| | SO2 | NOx | Hg | PM | CO2 | SO2 | NOx | Hg | PM | CO2 | CO2 |
| 2020 | 570 | 1,203 | 5.1 | 47 | 701,764 | 2 | 732 | 1.9 | 27 | 430,356 | 271,408 |
| 2021 | 583 | 1,231 | 5.2 | 48 | 718,146 | 2 | 749 | 1.9 | 28 | 440,402 | 277,744 |
| 2022 | 734 | 1,550 | 6.5 | 60 | 904,140 | 3 | 943 | 2.4 | 35 | 554,463 | 349,677 |
| 2023 | 600 | 1,266 | 5.3 | 49 | 738,420 | 2 | 770 | 2.0 | 29 | 452,835 | 285,585 |
| 2024 | 609 | 1,285 | 5.4 | 50 | 749,335 | 2 | 781 | 2.0 | 29 | 459,529 | 289,806 |
| 2025 | 691 | 1,459 | 6.2 | 57 | 851,055 | 3 | 887 | 2.3 | 33 | 521,908 | 329,146 |
| 2026 | 763 | 1,610 | 6.8 | 62 | 939,261 | 3 | 979 | 2.5 | 36 | 576,001 | 363,260 |
| 2027 | 661 | 1,395 | 5.9 | 54 | 813,799 | 2 | 848 | 2.2 | 32 | 499,061 | 314,738 |
| 2028 | 714 | 1,507 | 6.4 | 58 | 878,741 | 3 | 916 | 2.3 | 34 | 538,887 | 339,854 |

The average American car emits about five tons of $CO_2$ annually, according to the EPA.
This project is comparable to taking 60,000 cars off the road. There are 174,000 cars and light trucks registered in Alachua County, so from a CO2 perspective, this project's benefits are equivalent to taking 1/3 of the cars and light trucks in Alachua County off the road.

# Project Cash Flow

| | Quarterly Expenditures ($) | Major Items |
|---|---|---|
| FY2020-Q3 | $176,000 | controls design |
| FY2020-Q4 | $1,959,000 | engineering design, equipment payments |
| FY2021-Q1 | $6,241,000 | equipment payments, installation |
| FY2021-Q2 | $3,780,000 | equipment & installation payments, integration |
| FY2021-Q3 | $343,000 | final controls integration |
| FY2021-Q4 | $0 | |

| | |
|---|---|
| FY2020 Total | $2,135,000 |
| FY2021 Total | $10,364,000 |

| | |
|---|---|
| Project Total | $12,500,000 |

# Savings Opportunity - NG vs Coal

| *Assumed Delivered Cost of Natural Gas ($/MMBTU) ---->* | $2.99 | Deerhaven Unit #2 | | |
|---|---|---|---|---|
| *Assumed Delivered Cost of Coal ($/MMBTU) ---->* | $3.76 | | | |
| **Calculated Cost Delta:** | **$0.77** | | | |
| **Calculated Percent Delta:** | **20%** | | | |
| | **Total Daily Heat Input from Coal (MMBTU/Day)** | **Cost Savings From Dual Fire Project** | **Daily savings if we operated 100% NG only versus 100% of Coal Only** | **Potential Annual Savings from Dual Fuel Project (Assumes 335 operating days)** |
| At 54 MWn (min load), DH2: 782 MMBTU/hr.<br>466 MMBTU/hr from Coal<br>316 MMBTU/hr from Gas | 11,184 | $8,612 | $14,451 | $2,884,913 |
| **At 82 MWn, DH2: 1018 MMBTU/hr.**<br>642 MMBTU/hr from Coal<br>376 MMBTU/hr from Gas | 15,408 | $11,864 | $18,813 | **$3,974,494** |
| At 92 MWn, DH2: 1123 MMBTU/hr.<br>757 MMBTU/hr from Coal<br>366 MMBTU/hr from Gas | 18,168 | $13,989 | $20,753 | $4,686,436 |
| At 104 MWn, DH2: 1249 MMBTU/hr.<br>1013 MMBTU/hr from Coal<br>236 MMBTU/hr from Gas | 24,312 | $18,720 | $23,082 | $6,271,280 |
| At 138 MWn, DH2: 1570 MMBTU/hr.<br>1215 MMBTU/hr from Coal<br>355 MMBTU/hr from Gas | 29,160 | $22,453 | $29,014 | $7,521,822 |

# Project Financials

| | |
|---|---|
| Modified Internal Rate of Return<br>(3% reinvestment rate) | 20% |
| Net Present Value of Project<br>(4% discount rate) | $50.9M |

*Project financials w/ savings thru 2031, NYMEX natural gas futures, GRU coal forecast, and operational savings

# Schedule

- GRU maintains a multi-year coordinated planned unit outage schedule to ensure electric system reliability
- The next full DH2 outage is October 2021
- A Window is available for a Short Duration Outage (2 weeks) to permit installation of certain components in early December 2020 with subsequent commissioning in February 2021.
- Due to lost opportunity cost of delay until October 2021, Staff recommends implementation the earliest opportunity to maximize customer benefit.
- Equipment delivery lead time for outage related components is ~20 weeks from time of order.

# Conclusion

**Three Legs of Stool are Supported**

- Technical and Operational – technically and operationally acceptable
- Financial - All financial metrics met
- Environmental - Will reduce GRU's carbon emissions

**Equity**

- The project would reduce electric rate pressure for all customers, and would reduce ambient air emissions benefiting all customers

**Project Window**

- Staff recommends moving forward with implementation at the earliest opportunity to capture the financial and environmental benefits of the project

# Recommendation

The Commission:

1) Authorize the General Manager or his designee to execute agreements as required to complete the project in accordance with GRU procurement policies and procedures and the approval of the City Attorney as to form and legality.