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Temporary Natural Gas Generators and Drake Decommissioning

Society of American Military Engineers

January 11, 2022

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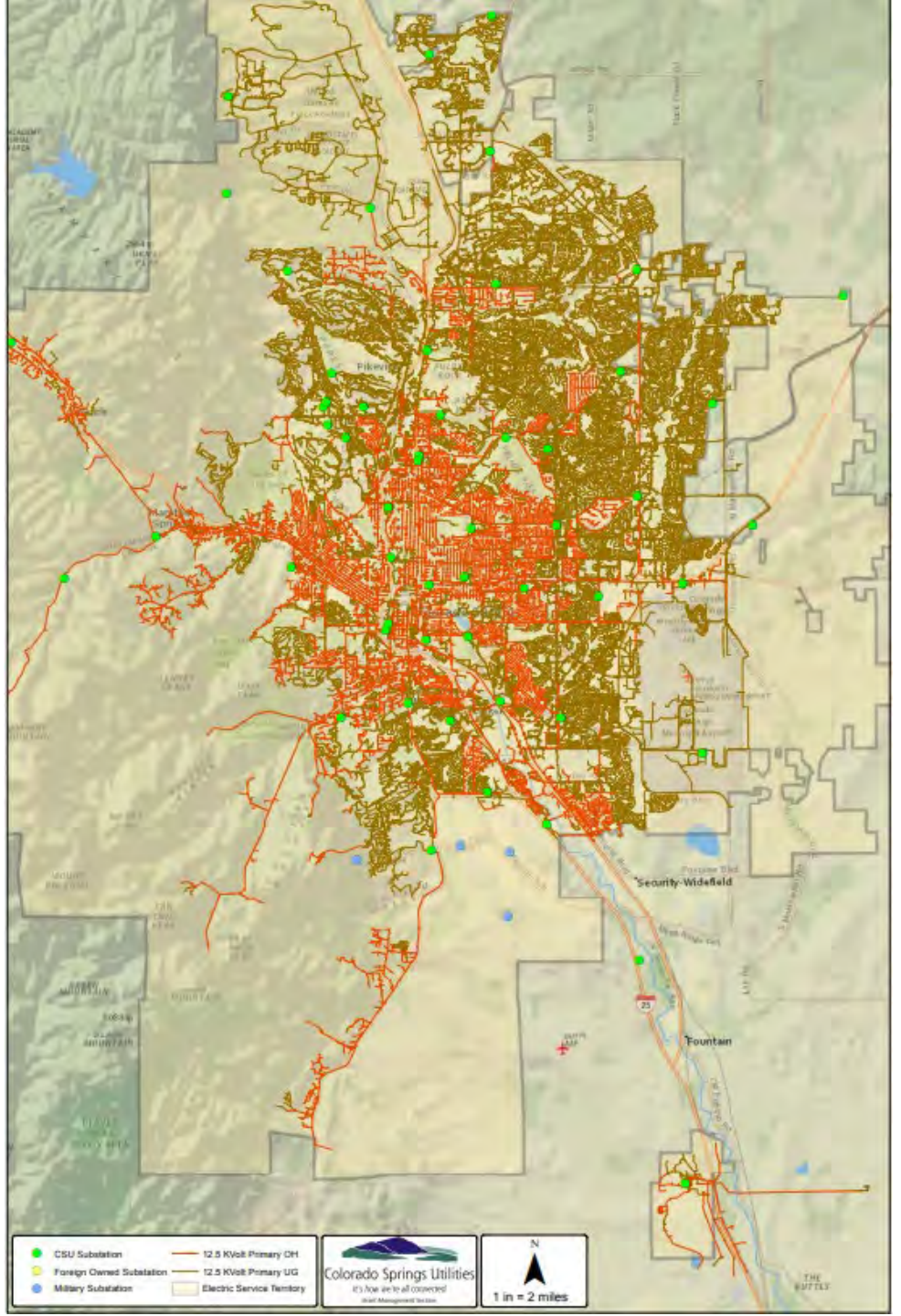
Colorado Springs Utilities

Agenda

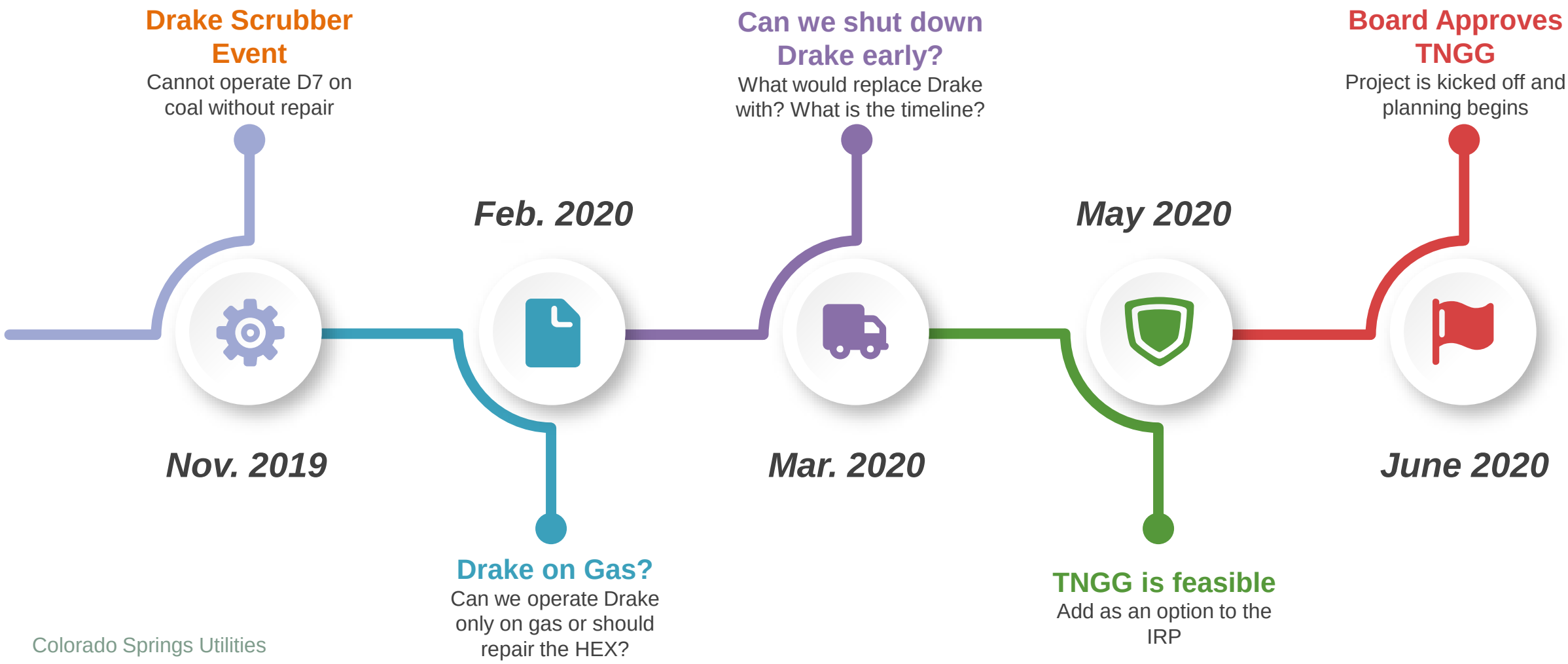
- Temporary Natural Gas Generators (TNGG)
- Drake Decommissioning

Energy Supply Generation Portfolio

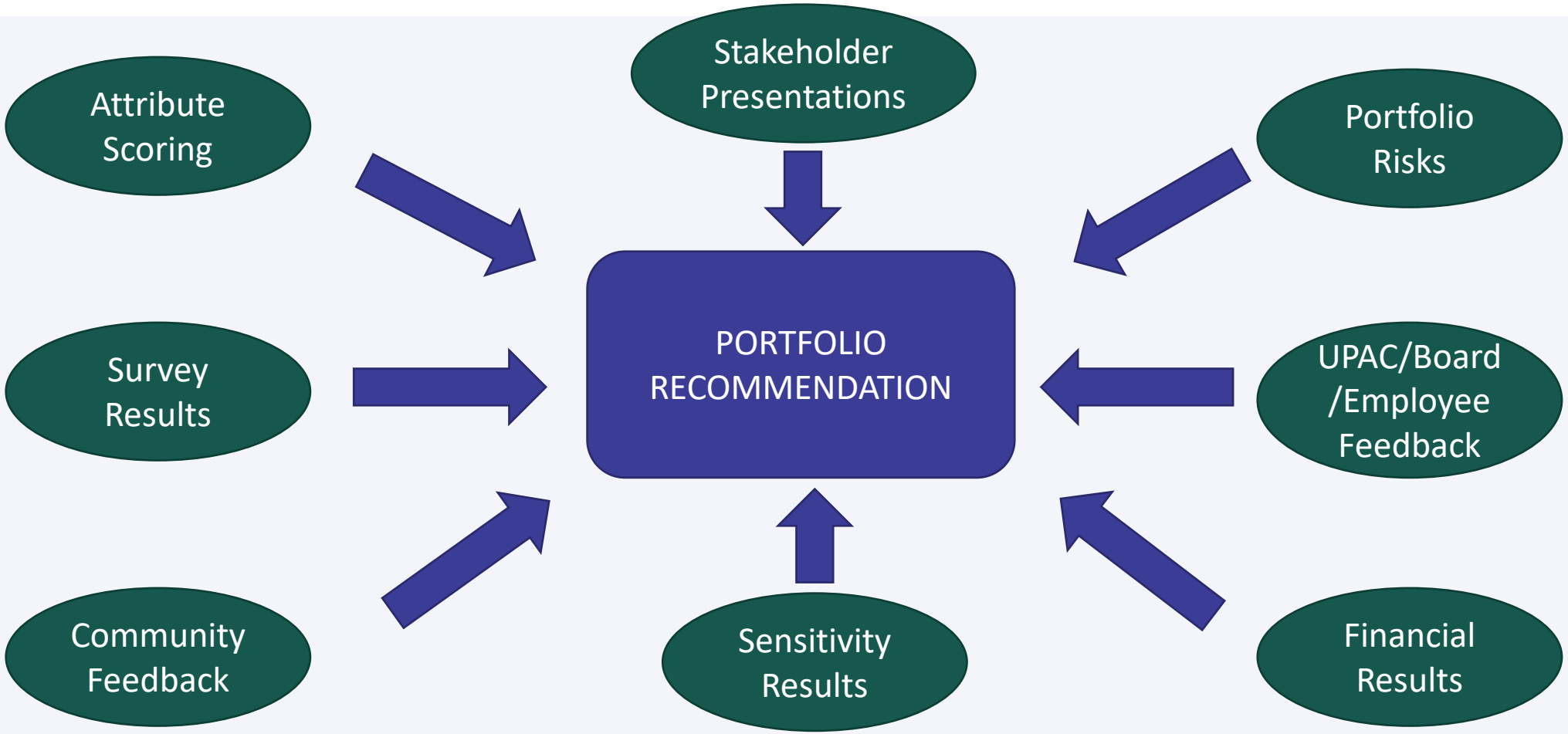


Project Timeline

Need to address the level of organization and speed that this project is undergoing, Major hurdles that happened as the project has transitioned into reality.



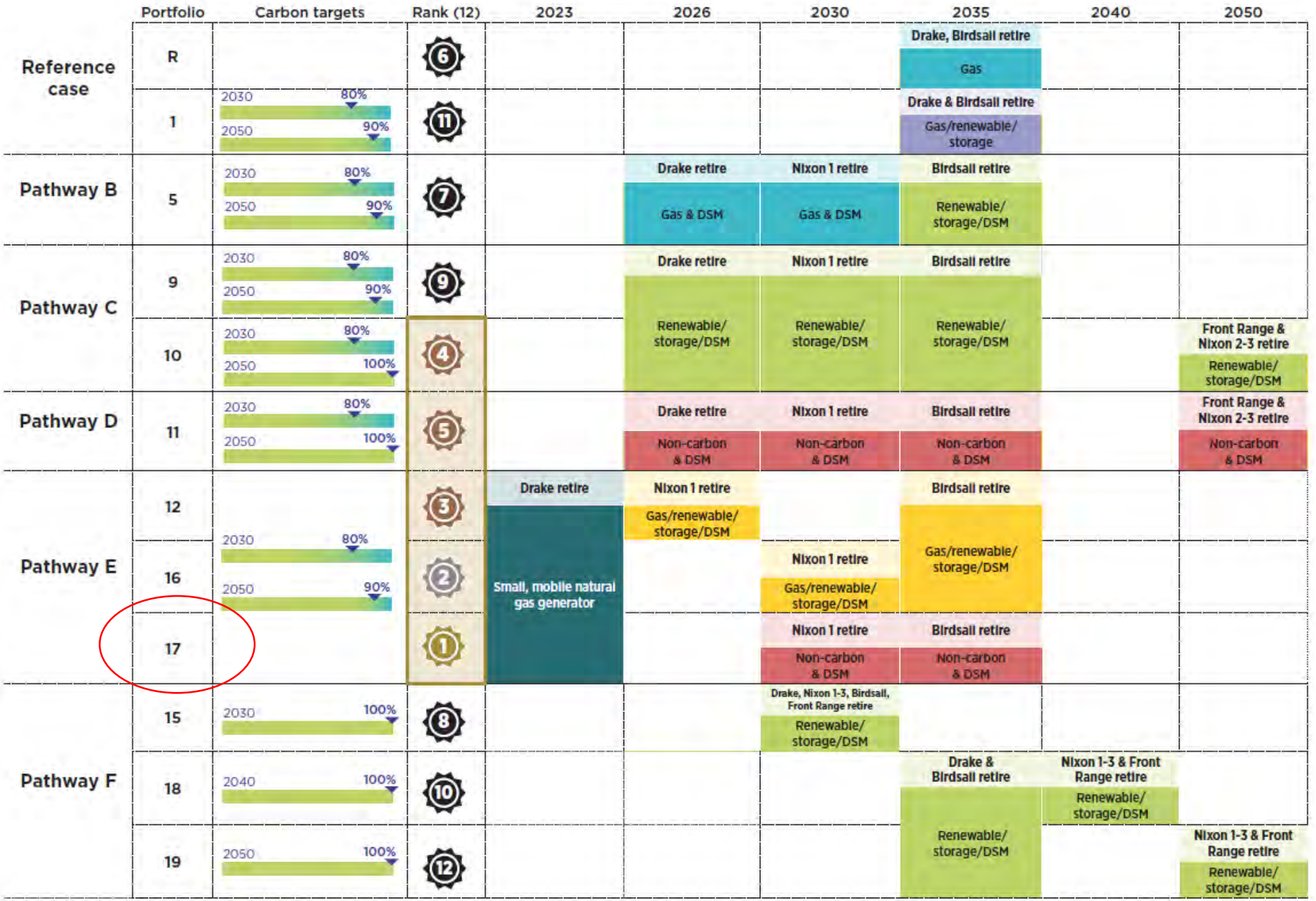
Inputs to Portfolio Recommendation



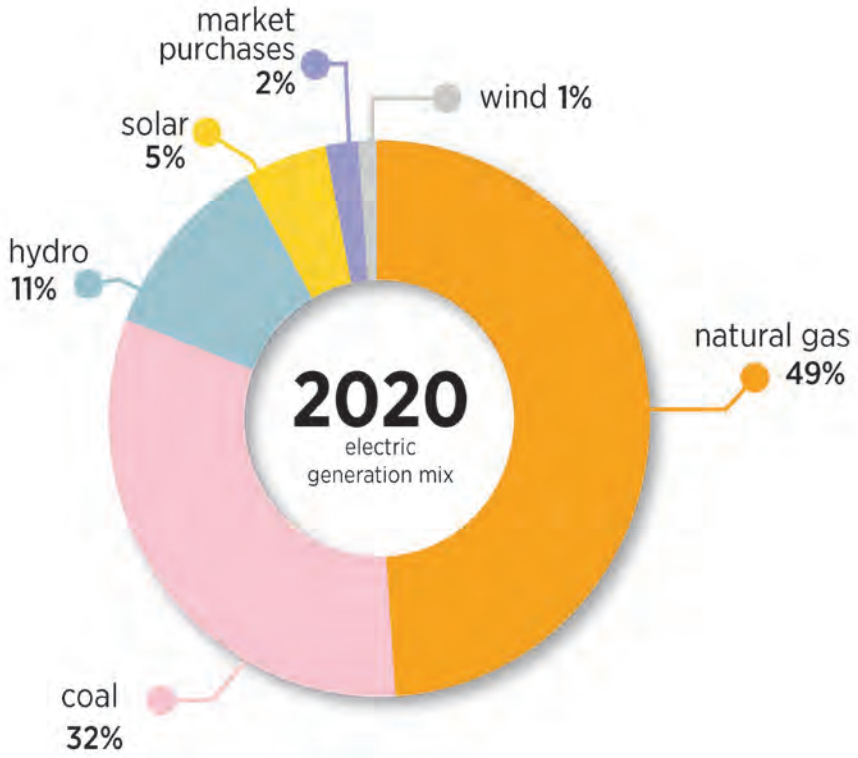
IRP Attributes and Weighting

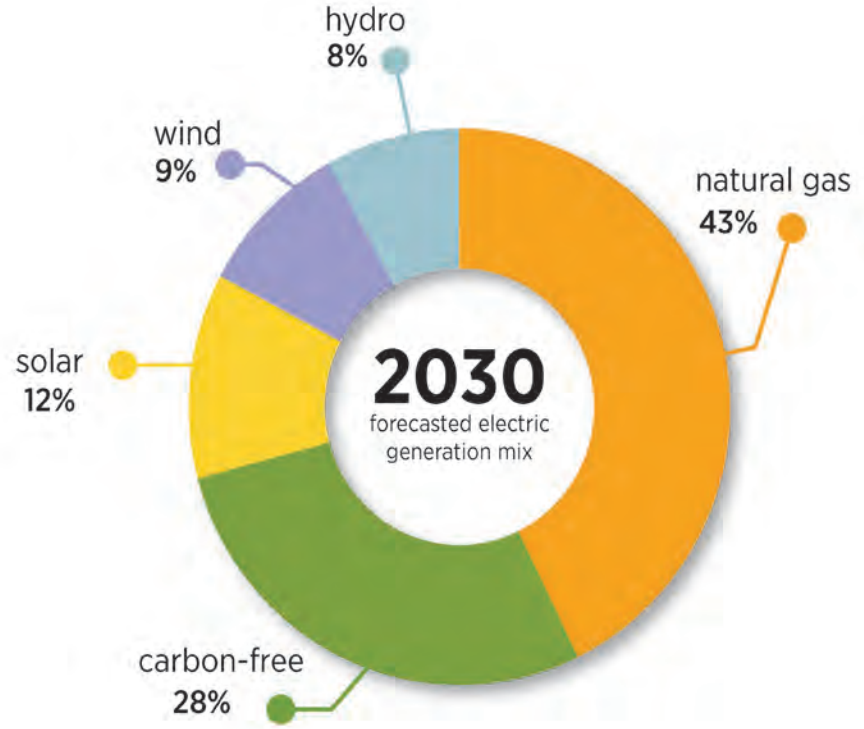
Attribute	Weight	
Reliability	32%	Ability to react to variable or extreme daily operating conditions (i.e., the lights stay on).
Cost/Implementation	22%	Cost-effectively maintain competitive, affordable rates and the financial health of the utility to drive a strong economy with ability to execute portfolio in desired timeframe.
Environment/Stewardship	22%	Sustainably grow renewable portfolio, reduce carbon footprint and meet all environmental regulations while responsibly protecting and supporting quality of life now and for the future.
Flexibility/Diversity	14%	Ability to adapt to regulatory and market disruptions by balancing multiple types of generators and fuel sources, including distributed generation, and reduce reliance on fossil fuels.
Innovation	10%	Proactively and responsibly integrate technologies and programs.

Electric Integrated Resource Plan | pathways and portfolios selected by UPAC for further evaluation



a greener FUTURE





Future Generation

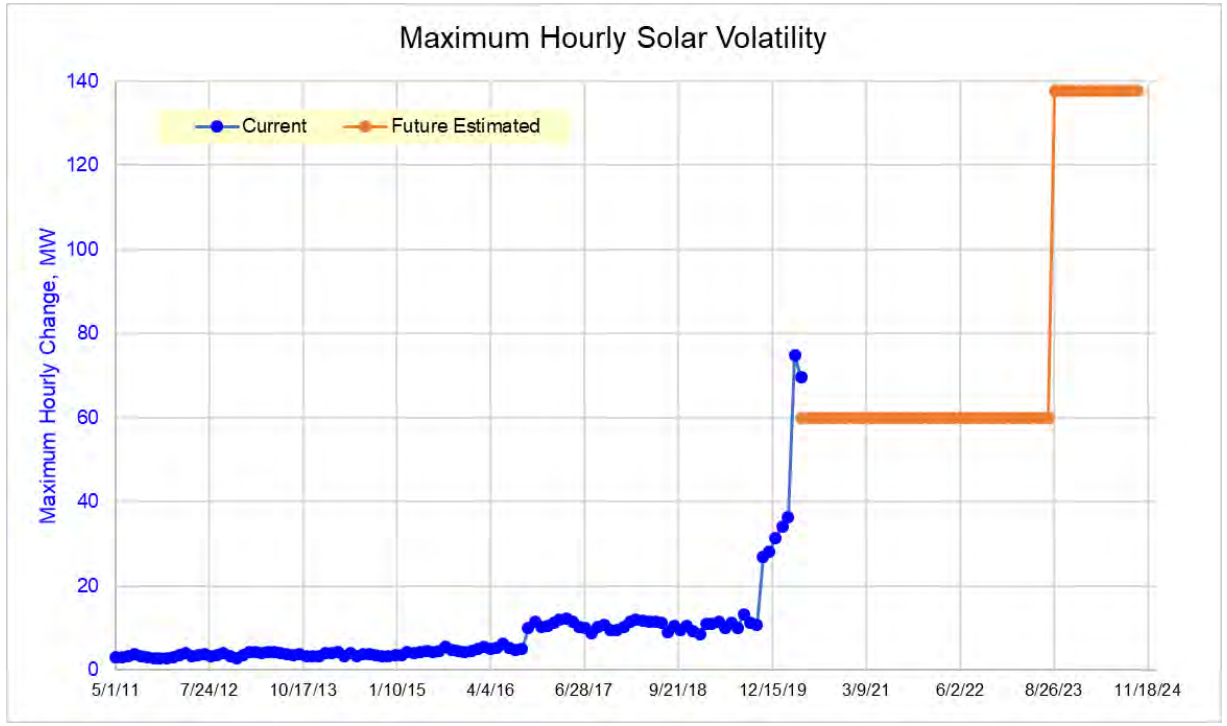
Solar/Wind	Increasing
Gas	Decrease
Coal	Ceasing

Quiz Question #1

How many coal plants were retired during the period of 2015-2020?

Why?

- Carbon reduction goals (80% by 2030)
- Community interest in decommissioning of Drake
- 2023: Total solar capacity – 265 MW
- Fast-start, reliable generation will help maintain system reliability
- Planning reserves requirement
- Dual fuel robustness



Solution

Temporary Natural Gas Generators (TNGG)

- Temporary at the Drake site
- Modular Gas Turbines

Why Modular Combustion Turbines?

Fast-start, reliable

- Great for load following (renewables)
  - 8-minute fast start
- Better power / weight ratio
- Smaller footprint
- Short Lead time

Low cost of ownership

- Minimal staff required
- Lower O&M costs
  - No water injection
  - No starts-based maintenance

Fast construction timeline

- Minor modification air permit
- We have rights to the site

Relocatable

- Ability to move the units when our transmission system is upgraded
- Skidded design

Why Modular Combustion Turbines?

Key LM2500+G4 Xpress Unit Characteristics

- 34.6% efficiency (gas, site conditions; note Drake plant is 28.3% efficient)
- Dry Low NOx (DLE)
- Full Load in 8 minutes
- Dual fuel

LM2500 History

- Aviation Legacy: C5/DC-10 aircraft
- Stationary Generation
- Nautical Install: 1st Unit 1975 (DD963)

> 500 million operating hours

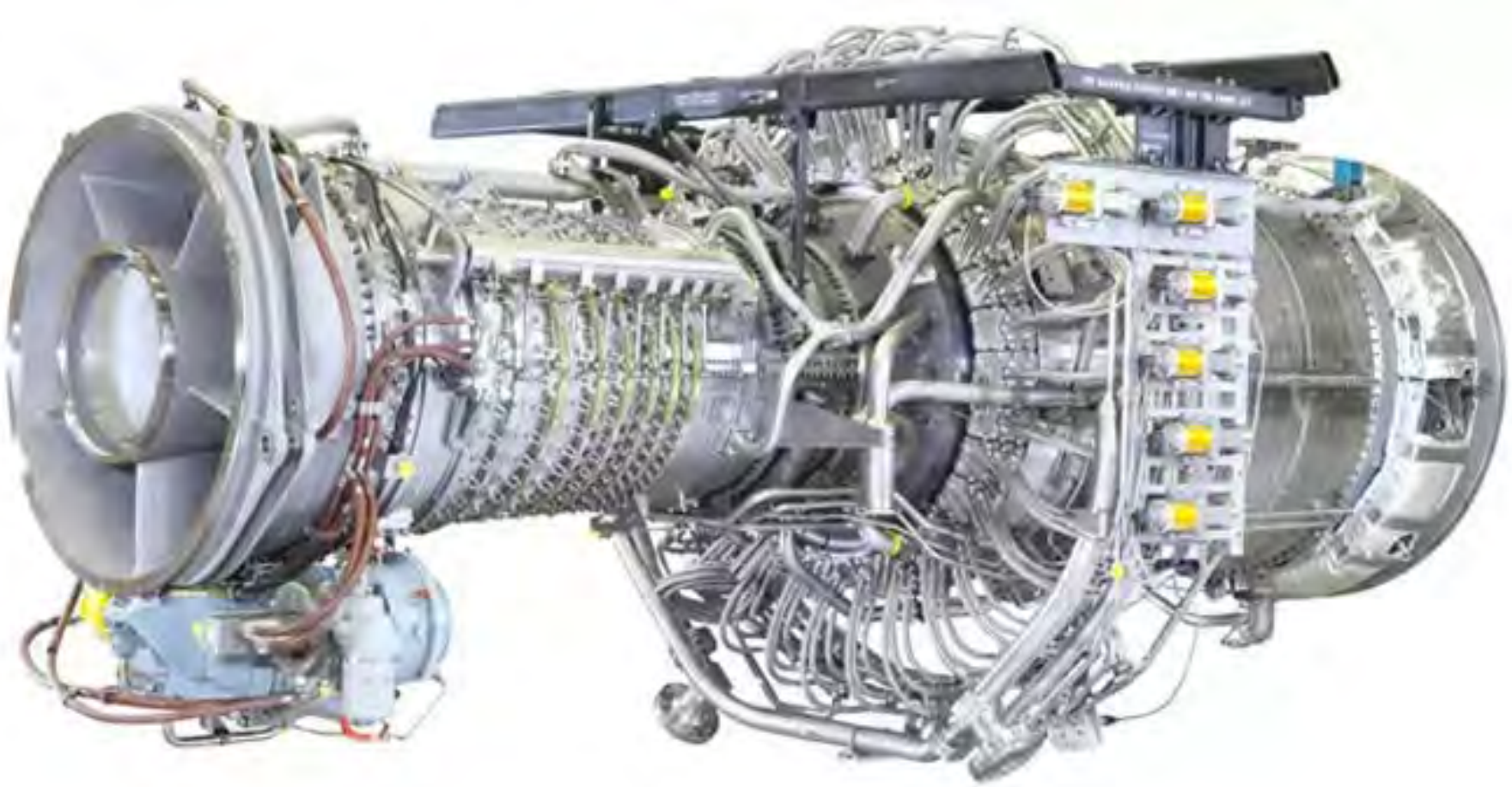
Schedule Overview

Internal Work

- Project Management
- Preliminary Design
- Substation
- Gas Supply
- Electrical / Piping

External Work

- Permitting
- Final Design
- Construction
- Installation
- Commissioning



Quiz Question #2

How many land-based LM2500's are installed in the US?

First Steps: Belt Decom and Site Prep

BC1 Belt

First Steps: Belt Decom and Site Prep

BC2 Belt

First Steps: Belt Decom and Site Prep

UTUF / Stackout Belt

TNGG Project Scope

TIC
Construction Management
Commissioning/ Quality Management
Installation of LM2500s
Foundations/ Undergrounds
Demolition

ESD
Design reviews
QA/QC of install
Installation of mechanical equipment
Operation plans
Training Plans

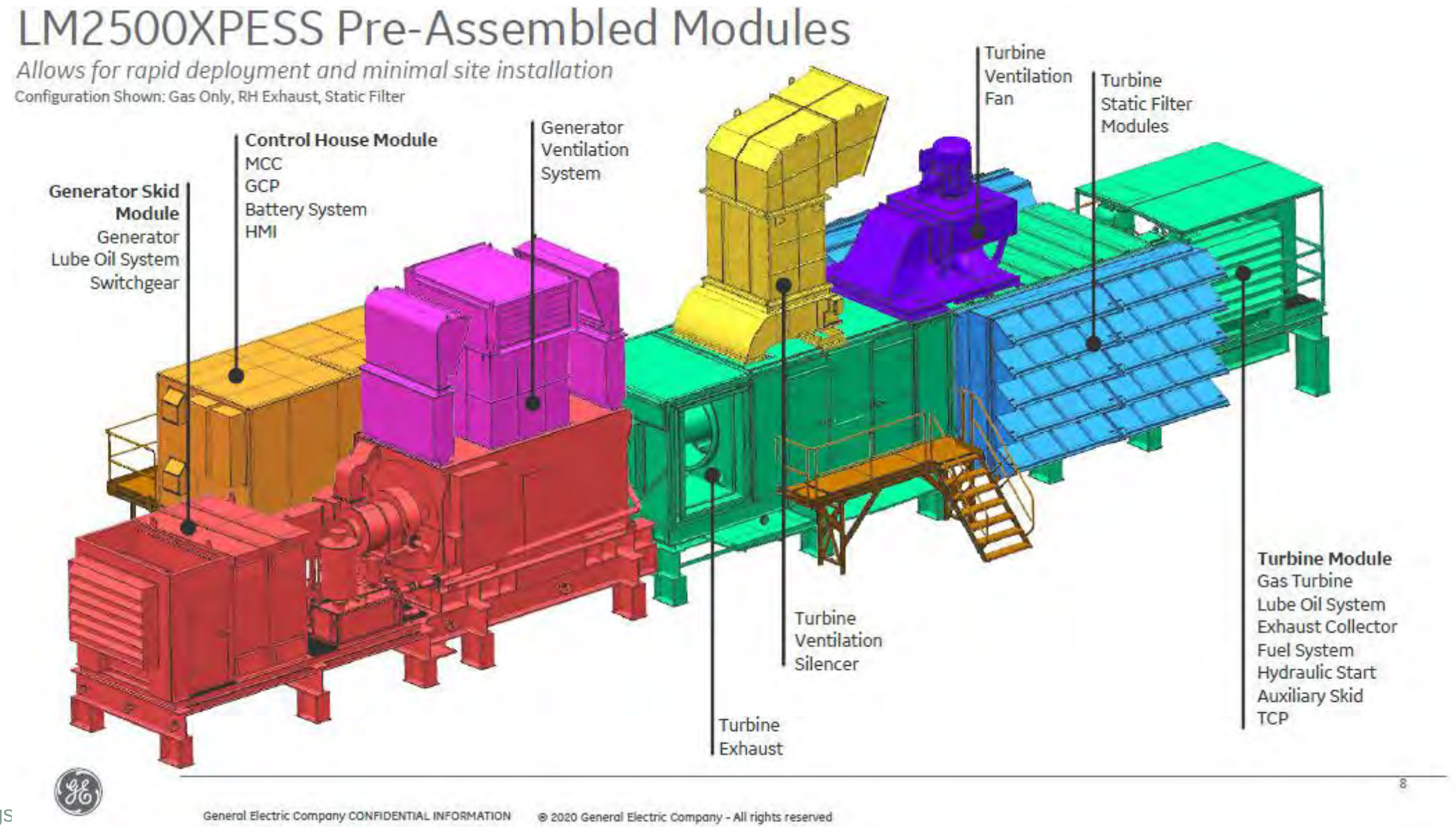
Other Contractors
Electrical Install
3rd Party Inspections
Support Services

Stanley Consultants
Engineering & Design
Owners Engineering
Specification of all materials, equipment
Construction support

GE
Six LM2500 Xpress
Six natural gas compressors
DCS
Emissions monitoring
Performance testing

Springs Utilities
Substation design & install
Meter set design & install
Air permit
IT/ Cyber/ PI Networking and Infrastructure
Procurement
Permitting

TNGG Engine Installation



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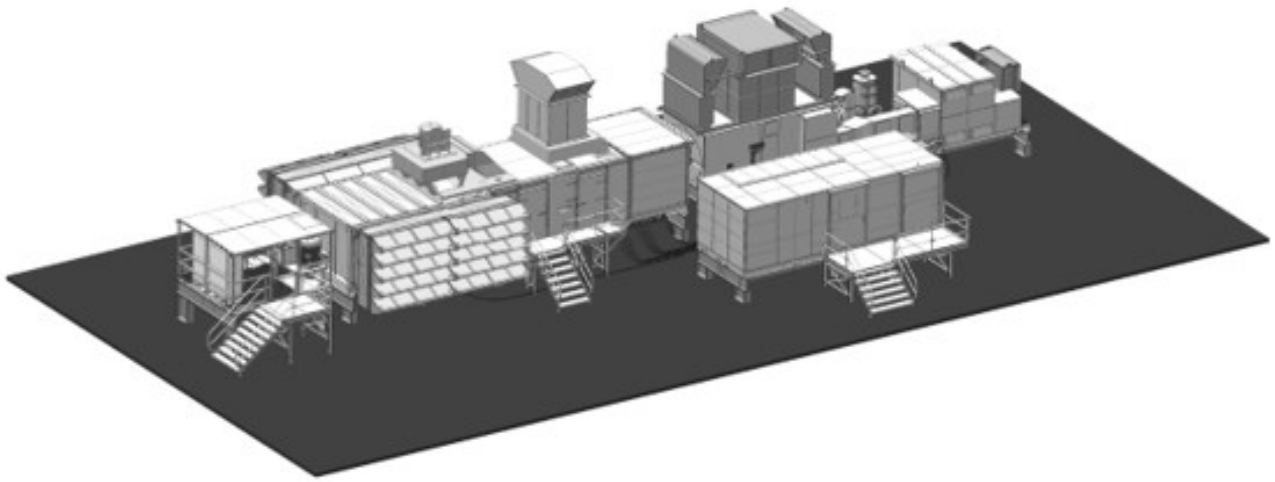
Installation

Major Project Completion Milestones

- Engine Contract 10/1/20
- Engineering Contract 11/16/20
- Construction Finished 6/1/22
- Commercial Operation 12/31/22

Initial milestones



Initial Rendering

Dispatching

NOW

- Replace Drake generation
- Planned for 2% - 4% capacity factor
- Additional analysis
  - Emissions Compliance
  - Cold weather operations

FUTURE

- As we join new markets, these units will add a lot of value
  - Fast start, peaking
- Could see increase in capacity factor

Quiz Question #3

What aircraft is the LM2500 engine commonly found on?

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Martin Drake Decommissioning

Decommissioning

- Education
  - Market Intelligence
  - Scope of Work, Define End Point
- Define the Approach
- Scope
- Schedule
- Budget
- Resources

Decommissioning Market Intelligence

1. **Market Overview**
   - Market size, growth rate and outlook
   - Market drivers and constraints
   - Regulatory trends impacting the market
2. **Decommission, Demolition and remediation – approach and techniques**

   Coal plant demolition techniques / costs

   Remediation techniques – (Site / Ash ponds)

   Abatement techniques for Asbestos and Lead
3. **Hypothesis to be tested**

   Best method to decommission underground piping (removal, fill, abandonment in place or others?)

   Flexibility/potential of brownfield sites to be transitioned into greenfields

Decommissioning Market Intelligence, continued

4. **Industry Best Practices**
   - Approach adopted to optimize salvage value such as contract tied to index price
   - Cost estimation for powerplant decommissioning.

5. **Contractor Landscape**
   - List of key contractors with capability matrix for services like decommissioning, deconstruction, and remediation
   - Detailed profiles for key contractors

Decommissioning Target

Brownfield ← Target

"A property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." (defined by federal statue).

- After decommissioning, major issues of concern for power plant brownfields include soil contamination from leaks of petroleum or other liquids, CCR-related soil or groundwater contamination, and the presence of asbestos, PCBs, lead, or other regulated materials
- ***For Drake, the target is a flat, grassy brownfield with no remaining above-ground structures and subterranean structures strategically and safely abandoned.***

Decommissioning Target, continued

Greenfield

- Indicates remediation of a site suitable for residential redevelopment, where the extent of environmental cleanup satisfies local requirements, but does not return a site to preconstruction conditions.

Decommissioning Future: Vision

Decommissioning Approach

Decommissioning Plan is the overall planning activity for the complete decommissioning of a plant or site.

Decommissioning Plan is broken into Subplans to manage scope:

- Decommissioning Safety
- Decommissioning Staffing & Resource
- Site Security
- Coal Pile Management
- Chemical Management
- Regulated Construction Materials (Includes asbestos and lead paint)
- Asset Use and Salvage
- Deconstruction
- Remediation and Site Restoration

Decommissioning Scope

Phase 1

- Majority of the site scope
- Units retired when GSU's unplugged
- Completed when Drake Plant physical deconstruction is finished

Phase 2

- Commences when TNGG units have all been relocated
- Completed after TNGG site has been deconstructed

Decommissioning Approach

Leverage the industry experience of consultant (Burns & McDonnell) to ensure we have appropriately planned and have a solid Statement of Work.

- Ensure we are judicious with need and level of engagement
- Greatest area of engagement will be:
  - Initial plan review
  - Support for Deconstruction contractor Statement of Work

Decommissioning Scope

Phase 1

- Development of Deconstruction Scope of Work (Burns & McDonnell)
- Salvage Value
- Move GSU's for TNGG: Unit is retired when GSU is disconnected
- Disconnect equipment / isolate services
  - Remove coal, oil, water, natural gas, hydrogen (no heat, temporary lighting)
- Commence abatement (asbestos, lead): Select contractor
- Deconstruction
- Remediation

Other Activities

- Rail spur endpoint
- Easements
- Legal

Decommissioning Approach

Plant Staff

- Collect drawings (OEG)
- Disconnect all equipment
- Drain all systems
- Plant isolation at site boundary
- Remove / dispose oil, greases, solvents
- Drain water
- Remove / purge Hydrogen
- Relocate salvageable equipment (to Front Range, Nixon, Remotes)
- Contractor coordination, Point-of-Contact Support

Decommissioning Approach, continued

Decommissioning Budget Estimate:

- 9 Colorado coal plants (Burns & McDonnell study)
- 2017 Study Decommissioning US Power Plants (https://media.rff.org/documents/RFF20Rpt20Decommissioning20Power20Plants.pdf)
- Coal residual and Lead / Asbestos are high uncertainty

Deconstruction Approach

Statement of Work	Developed by Burns & McDonnell Sufficient detail to decom Drake & Birdsall Structured sufficiently to be used for Nixon and Birdsall
Deconstruction Endpoint	Brownfield
Soil Remediation	TBD / Material Management Plan
Historical building designation	None
Buildings/structure demo	All aboveground structures Future: TNGG relocated / deconstructed
Stacks	Muncher/nibbler or explosives
Basements	Filled with crushed concrete
Circ Water Lines	Filled with controllable density fill (CDF)

Deconstruction Approach

Shooting vs. Tripping

- The industry standard has been for years to piece the boiler to the ground.

  Risk-men and equipment in the fall radius of the equipment

- The second phase was to trip the boiler.

  Risk-Men an equipment outside of the fall radius, but still in close proximity of the fall

- The latest phase is to shoot the structure.

  Risk-Men and equipment outside are outside of the radius of the fall. By far the safest approach when done using the best available engineering

Decommissioning asset use and salvage

Salvage Approach
- ESD, Utilities, Contractor

Departmental Assessment
- Warehouse parts review
- Key Systems / components: to other plants or salvage
- Air compressors: some to be reused
- Other equipment?

Utilities
- Other departments potential uses
- Office furniture
- IT (servers, equipment)

Contractor
- Include in bid. Deconstruction contractor manages salvage.

Quiz Answers:

How many coal plants were retired during the period of 2015-2020? 122

How many land-based LM2500’s are installed in the US? 231

What aircraft is the LM2500 engine commonly found on? DC10

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