

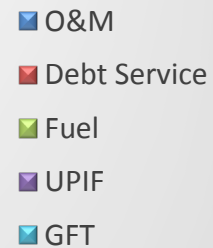
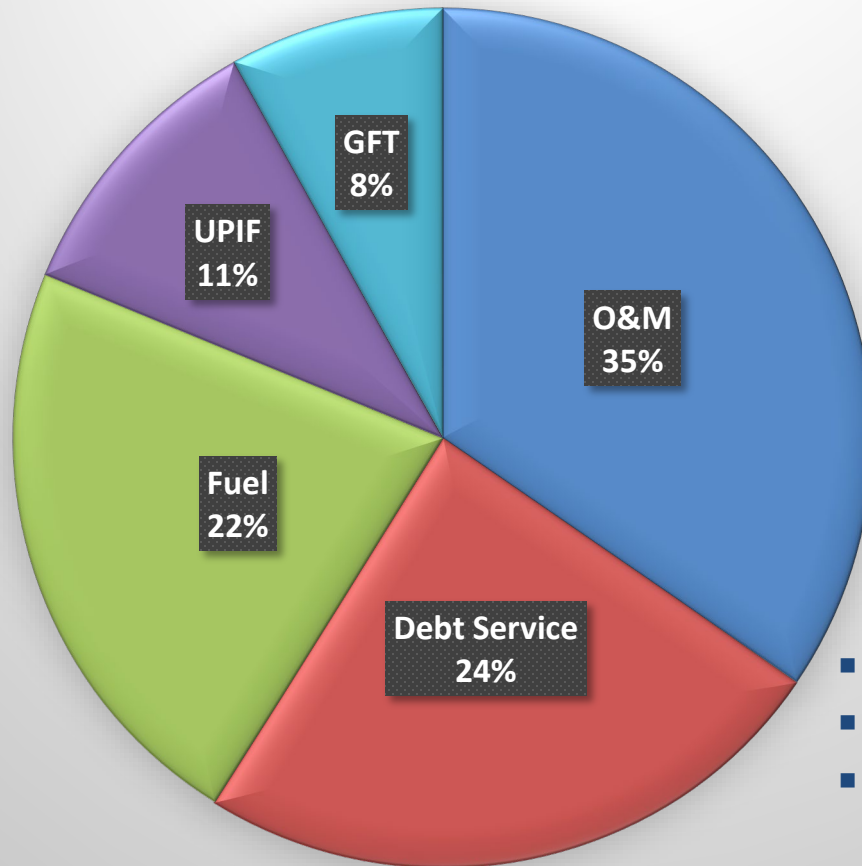
Item #181004

Fuels Baseline Budget Overview

City Commission
May 1, 2019

Fuels Budget Overview

Expenditures by Percentage of Budget



- Fuel is 22% of budget
- Not part of base rate
- Part of fuel adjustment

Fuels Baseline Budget Overview

Budget Comparison

	FY19	FY20
Generation	\$69,550,967	\$67,926,164
Purchased Power	\$14,260,355	\$13,007,918
Local Distribution C	\$8,449,129	\$8,601,893
Total	\$92,260,451	\$89,535,975

Fuels Budget Overview

Our process

- Generation Model
 - Economic Dispatch
 - Modeling Process
- Fuels Budget Overview
 - Methodology
 - Process
 - Components
 - Natural Gas Example

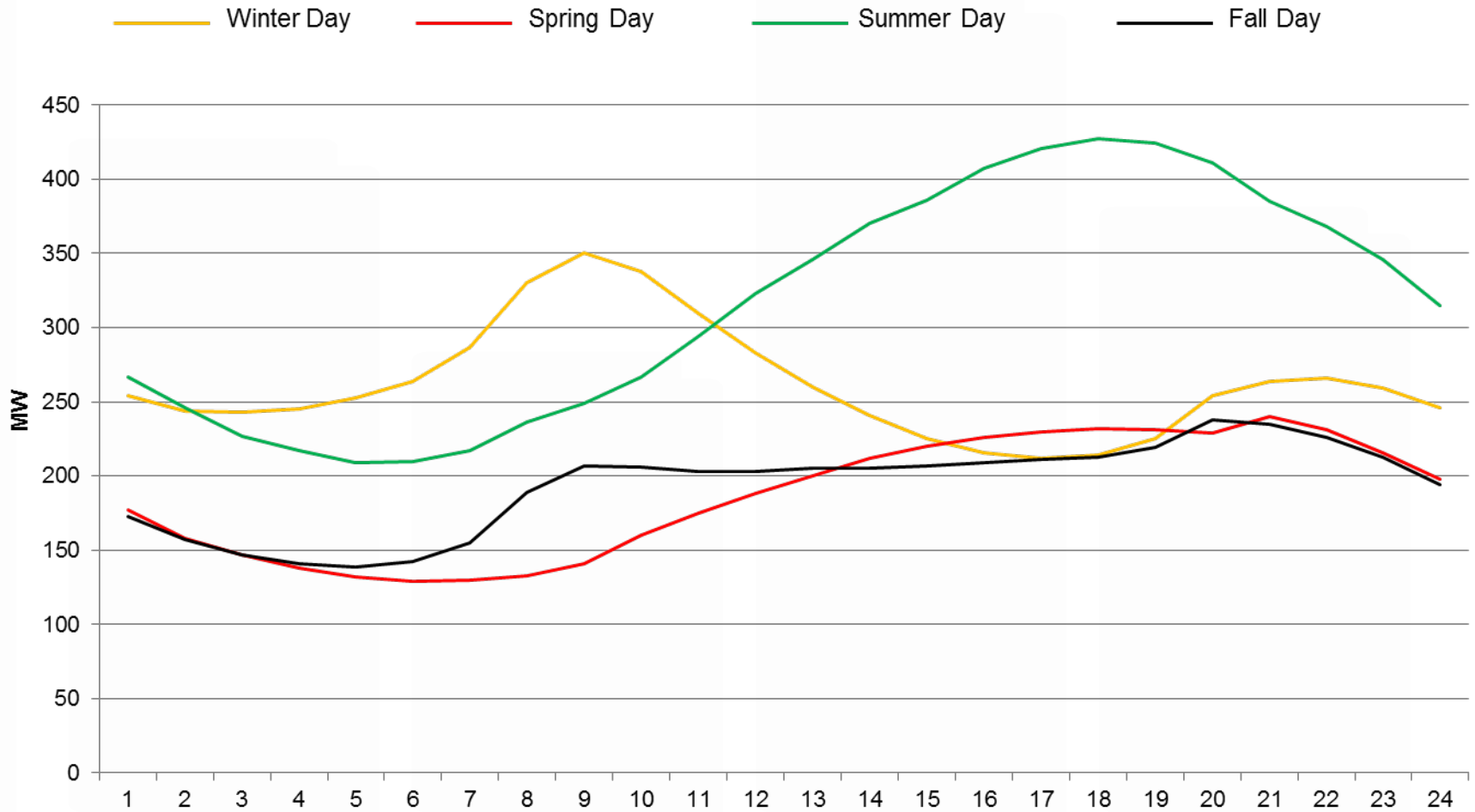
Fuels Budget Overview

It starts with the concept of economic dispatch

The operation of generation facilities to produce energy at the *lowest cost to reliably serve consumers*, recognizing any operational limits of generation and transmission facilities [and regulatory requirements].

Fuels Budget Overview

Seasonal Load Shapes



Fuels Budget Overview

Key Terms

Unit Commitment (UC) - Schedule of the most cost effective generation units to meet load forecasts and regulation and reserve requirements.

Average Net Operating Heat Rate (ANOHR) - The common measure of system efficiency for a generating unit

Incremental Heat Rate (IHR) - The change in fuel/heat input for a one-unit change in output.

Start-up or Shut-down Cost - Costs of fuel, life-cycle maintenance, and other items related directly to the start-up or shutting down of a generating unit.

Fuels Budget Overview

Modeling Process

1. Start with the load data for the defined period
 - *Hours, days, weeks, or years*
2. Select available generating units for the study period
 - *Input-defined outage dates for each unit*
3. Recognize each generating unit's operating limits
 - Ramp rates, maximum and minimum generation levels, etc.
4. Cost of generating, which depends on:
 - Its efficiency (heat rate)
 - its variable operating costs (fuel and non-fuel)
 - Variable cost of environmental compliance
 - Start-up costs

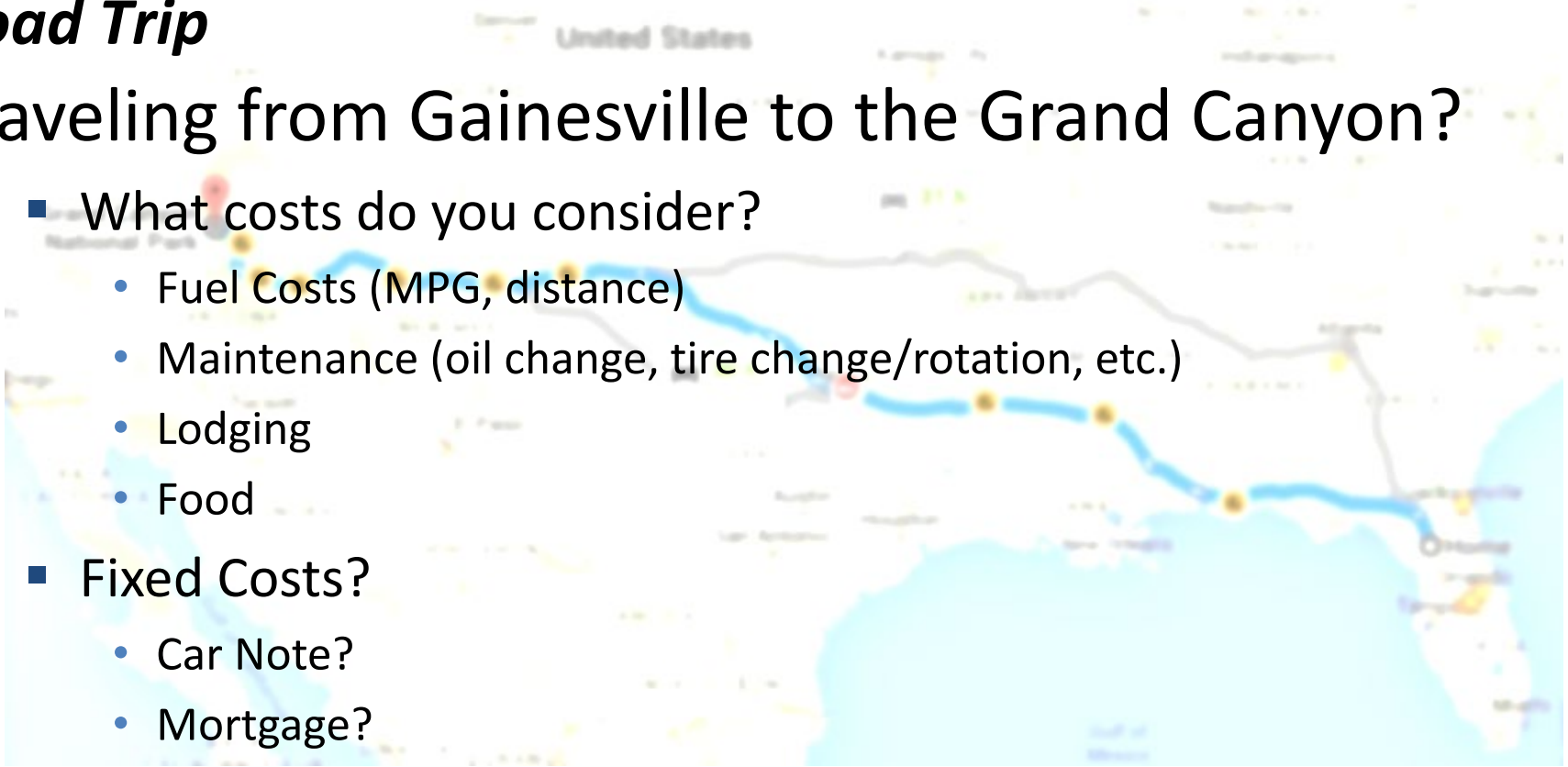
Note: Fixed costs (fixed O&M, debt service, etc.) are never used in economic dispatch

Fuels Budget Overview

Road Trip

Traveling from Gainesville to the Grand Canyon?

- What costs do you consider?
 - Fuel Costs (MPG, distance)
 - Maintenance (oil change, tire change/rotation, etc.)
 - Lodging
 - Food
- Fixed Costs?
 - Car Note?
 - Mortgage?



Fuels Budget Overview

Modeling Process

- Load forecast and ANOHR are used to create the Unit Commitment:
 - What generating units have the MW range to meet needs every hour of the modeling period?
 - Ramp rates and response time must be considered (Tesla Roadster vs. Prius)
- Once units are online, the Incremental Heat Rate determines where the units are loaded

Fuels Budget Overview

Incremental Cost Decisions

- Incremental costs of units at minimum load:
 - CC1 - \$14.80/MWh
 - DH2 - \$23.70/MWh
 - DHR - \$19.25/MWh
- Where do we get the next, most economical megawatt?
 - CC1

Fuels Budget Overview

What Crunches the Numbers?

GenTrader®

- Energy model that determines the most economical scenario
- Used for Unit Commitment and long-term planning
- Deterministic Model

Fuels Budget Overview

Unit Data:

- Heat Rate Curves
- Dispatch Limits
- O&M Costs
- Start-up Profiles
- Ramp Rates
- Scheduled Outages
- Forced Outage Rates
- On or Off Restrictions
- Min/Max Up or Down Times
- Reserve Requirements

Fuel Data:

- Coal Prices
- Gas Prices
- Nuclear Fuel Prices
- Oil Prices
- Other Fuel Prices
- Contract Limits

Power Purchases and Sales:

- G2 PPA
- Solar FIT
- Market Opportunities

Load Data:

- Native Load
- Alachua
- Seminole/Clay
- Winter Park

GenTrader

Output by Unit (hourly, daily, weekly, monthly, seasonal, annual):

- Generation (MWh)
- Fuel Consumption (MMBtu)
- Fuel Expense (\$)
- Variable O&M (\$)
- Hours Run

Post-modeling processing and analysis:

- GenTrader Reports & Graphics
- Export to Access
- Excel Analysis and Reports

Methodology

Fuels Budget Overview

What do we consider?

Prices

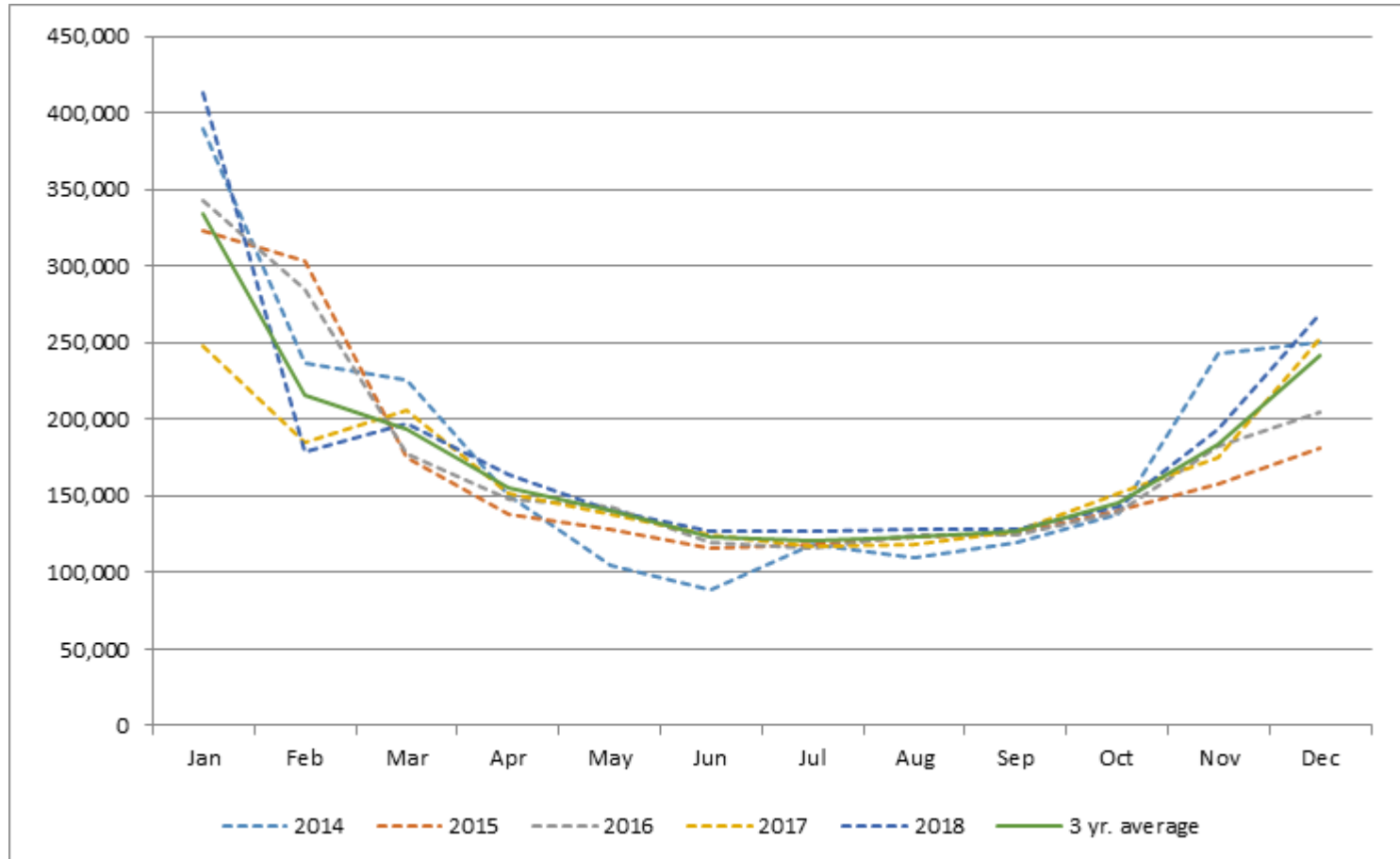
- Contracts
- Industry publications
- Federal agencies
- Indices

Volume

- Generation model
- Volume drivers
- History
- Averages

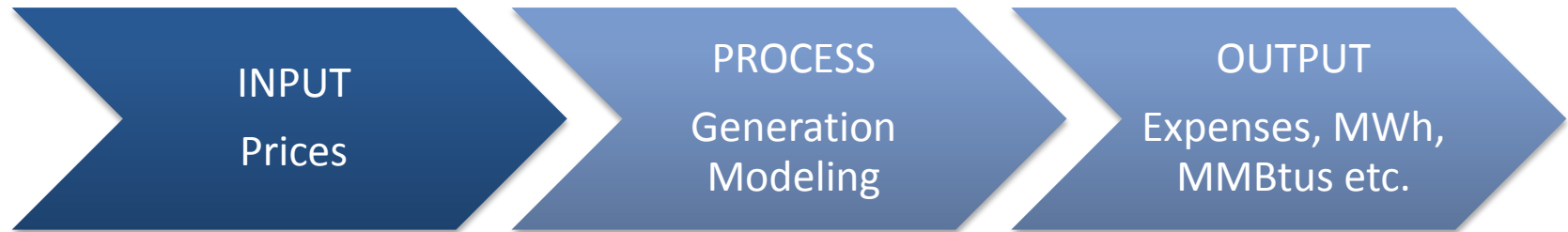
Fuels Budget Overview

Forecasting Local Distribution Company (LDC)



Fuels Budget Overview

Process for major fuel types



- Biomass
- Coal
- Natural gas
- Purchased power

Fuels Budget Overview

Biomass Cost Components

- Delivered commodity
- Fuel procurement service fee
- Environmental commodities
 - Sodium Bicarbonate
 - Ammonia
- Combustion by-products
 - Bottom ash
 - Fly ash
- Miscellaneous expenses (e.g. lab equipment maintenance, surveys, audits)
- Diesel for pile maintenance

Fuels Budget Overview

Coal Cost Components

- Commodity
- Transportation
- Environmental commodities
 - Lime
 - Urea
- Combustion by-Products
 - Scrubber by-Product
 - Fly ash
- Railcar maintenance
- Miscellaneous expenses (e.g. taxes, prices analyses, quality analyses, audits)
- Diesel for pile maintenance

Fuels Budget Overview

Natural Gas Cost Components

- Gas Commodity
- Pipeline Transportation
 - Firm
 - Non-firm
 - Capacity charges
- Fuel
- Baseload contracts
- Hedging expenses
- Price analyses

Fuels Budget Overview

Purchased power Cost Components

- Market purchases (hourly, day ahead, etc.)
- Solar – FIT
- G2 – Landfill gas
- Costs associated with Renewable Energy Credits

Questions?