Brattle Draft Report Outline for FAS CBA

# Introduction

## Purpose of this study

## Background on the FAS proposal

### Motivation

#### Rising penetration of intermittent renewables expected to increase ancillary services needs while reducing the amount of traditional resources online to supply AS (and inertia)

#### New technologies might be able to provide the needed AS at lower cost than committing lots of traditional resources that are not needed for energy, but current AS structure does not fit well with their capabilities

#### Unbundling responsive products will enable specialized technologies to participate and will allow more targeted procurement of services needed for different system conditions.

#### The goal is not to increase reliability, but reliability may increase as a side benefit

#### Many of these changes will likely need to be implemented piecemeal over time if FAST is not implemented; it makes sense to implement them in a more organized, holistic and predictable manner.

### ERCOT’s process for developing the FAS proposal

#### The working group, evolution and timing from the first iteration to the current proposal

### High-level description of the proposal

#### New products (described in more detail in Sect 2).

#### Estimated implementation cost; other implications or stakeholder concerns

## Organization of this report

# Proposed AS Design Changes

## Product definitions

### FAS vs. the current design;

### Summary table of products

## Determination of requirements

### Proposed methodology (to maintain required reliability)

### Procurement options

### Assumptions used for this study

## Resulting requirements

### 2016 Current Trends under CAS and FAS (other scenarios described in section 4)

## Price formation options

### Description of options

#### Extension of status quo: FFR set by PFR price, with appropriate equivalency ratio

#### Recognize all constraints: To recognize the minimum PFR constraint, clear FFR and PFR at separate prices

### Assumptions for this study

#### Extension of status quo (Discuss implications of the alternative in Sect 6)

# CBA Study Base Cases

## Concept

### Model current design but adjust quantities required over time as system conditions evolve

### Case descriptions: 2016 Current Trends (CT), 2024 Current Trends (CT), and 2024 Stringent Environmental (SE)

## Modeling tools

## Base Case inputs

### Data Sources

### Standard assumptions by unit type related to AS provision [Note: See appendix for details]

### Capacity offers

## Base Case validation

### 2016 CT: benchmark to 2013/14

#### Headroom

#### Monthly price patterns

#### Implied market heat rates

#### Dispatch based on basic merit order

#### Average annual capacity factor by unit type

#### Average annual reserve contribution by unit type

#### Unit performance

### 2024 CT: compare inputs and outputs to 2016 CT

### 2024 SE: compare inputs and outputs to 2024 CT

# Impact of FAS before adding new technology

## Scenarios studied

### Tabulate scenarios: 2016 CT FAS, 2024 CT FAS, 2024 SE FAS

### Rational for studying these

## Inputs and results for 2016 CT FAS vs. 2016 CT CAS

### Changes in supply

### Changes in AS requirements

### PLEXOS Results

#### Dispatch and cost patterns (and validate against input changes)

#### Savings from unit commitment costs, dispatch efficiencies, and capacity bid-cost savings (incl. for SRS reduction)

## Inputs and results for 2024 CT FAS vs. 2024 CT CAS

### Changes in supply

### Changes in AS requirements

### PLEXOS Results

## Inputs and results for 2024 SE FAS vs. 2024 SE CAS

### Changes in supply

### Changes in AS requirements

### PLEXOS Results

## Conclusions

### Net savings

### Explanation of differences across scenarios

# Impact of FAS with New Technology (WNT)

## Concept

### Many new technologies that could make the provision of AS more efficient would not be able to participate in the current framework

### New FFR1 product creates opportunities for new fast-ramping (but low energy potential) technologies that would not qualify for current products

### Consider technologies which might be attracted by FAS

## Description of new technologies considered

### Table summarizing costs, performance

### Technologies and products we’ll focus on as being enabled by FAS

## Modeling approach

### 3 candidate penetration levels of new technologies

### 1:1 displacement of conventional tech assuming 1:1 PFR:FFR Ratios at peak

## PLEXOS results for 2024 CT WNT FAS vs. corresponding base case (2024 CT CAS)

### Assessment of credible penetration levels given range of capital costs

### Observations about dispatch and cost patterns; validate against input changes

### Production cost savings (incl. capacity bid-cost savings) and capital cost savings/cost;

### Incremental savings on top of FAS without new tech

## PLEXOS results for 2024 SE WNT FAS vs. 2024 SE CAS (and vs. 2024 SE FAS)

### Assessment of credible penetration levels given range of capital costs

### Observations about dispatch and cost patterns; validate against input changes

### Production cost savings (incl. capacity bid-cost savings) and capital cost savings/cost;

### Incremental savings on top of FAS without new tech

## Qualitative evaluation of impacts of FAS on new techs

### Factors not captured in quantitative analysis

## Conclusions about savings with new tech

### Conclusions from modeling analysis

### Factors not captured in quantitative analysis

# Qualitative evaluation of procurement and pricing options

## Procurement options

### Efficiency gains with option 2 (day ahead) and the inefficiency of other options

### How our modeling representation relates to the options (note if we have to model something slightly simplified, it might understate benefits of the efficient option).

## PFR/FFR price formation options

### Pros and cons of the PFR/FFR price formation options

### How our modeling representation relates to these options (close to an extension of the status quo); possible impacts if we modeled the alternative

# Conclusions: Cost-Benefit Summary

## Summary of benefits and costs from above; note benefits/costs not monetized

## Takeaways

## Recommendations