

A glimpse into the “Electricity Initiative” at the U.S. Energy Information Administration



For

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Overview

I. EIA's Electricity Initiative

II. Electricity market basics

- a) RTOs (Regional Transmission Organizations)
- b) ISOs (Independent System Operators)
- c) LMPs (Locational Marginal Prices)

III. Project progress and hurdles

IV. Example of future analysis possibilities

EIA

- Federal Statistical Agency within the Department of Energy, independent and policy-neutral by charter (only one political appointee)
- World-class energy statistics, primarily from surveys, as well as projections forward under assumed policy scenarios
- Weekly Natural Gas Storage Report is a “Principal Economic Indicator”



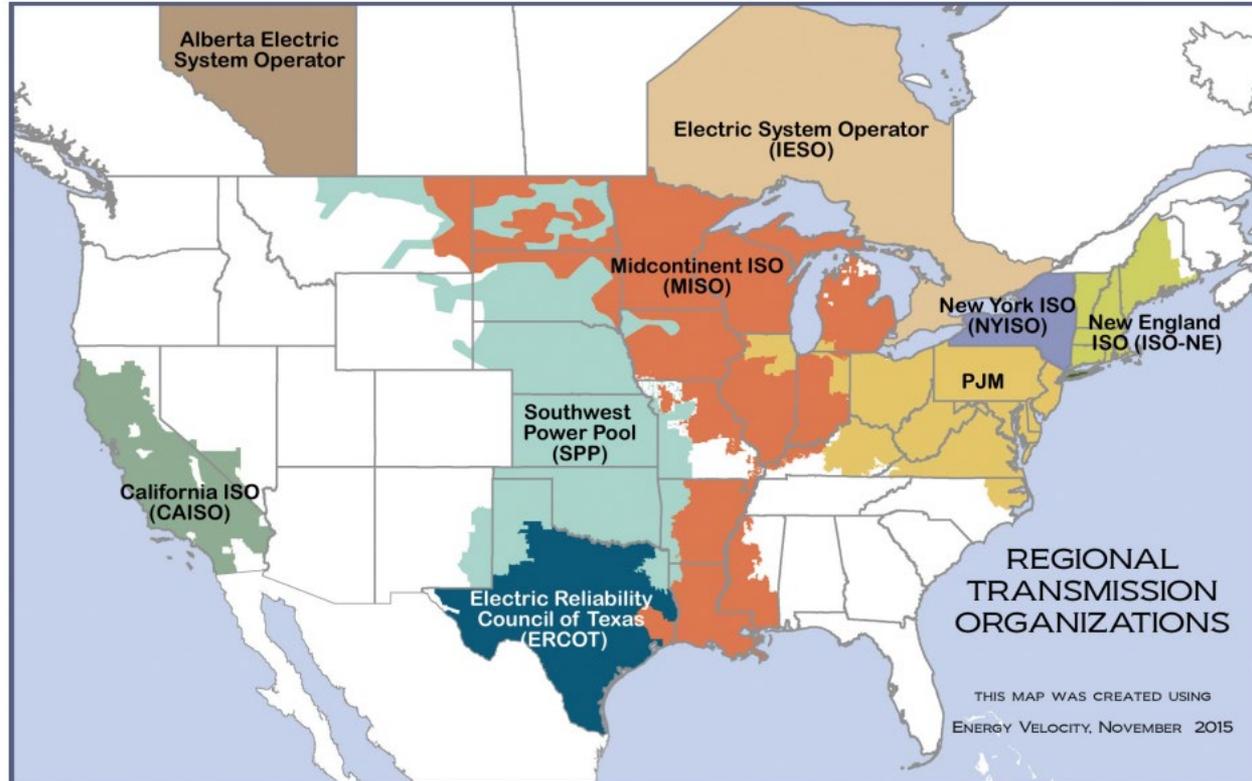
<https://www.eia.gov/>

Electricity Initiative

- EIA's administrator, Linda Capuano, has announced an "Electricity Initiative" as one of her key priorities
- Extant data offerings are strong, but EIA seeks to expand the offering by covering wholesale electricity markets, the engines by which supply and demand are ultimately met and by which local prices of electricity are set
 - N.B., wholesale prices are different than retail prices, which residential consumers often pay to their utilities
- About 2/3 of the U.S. have structured, coordinated wholesale electricity markets, referred to as either "ISOs" or "RTOs"
 - Independent System Operators
 - Regional Transmission Organizations

RTOs & ISOs

- All of these RTOs & ISOs make troves of data public
- Instead of creating a new survey to collect this data, EIA proposes to begin its Electricity Initiative by first collecting the publicly available data



<https://www.ferc.gov/industries/electric/indus-act/rto/elec-ovr-rto-map.pdf>

Value Proposition: Collocation & Demystification

- 7 different U.S. RTO/ISOs means 7 different data providers, each with its own formatting, conventions, definitions

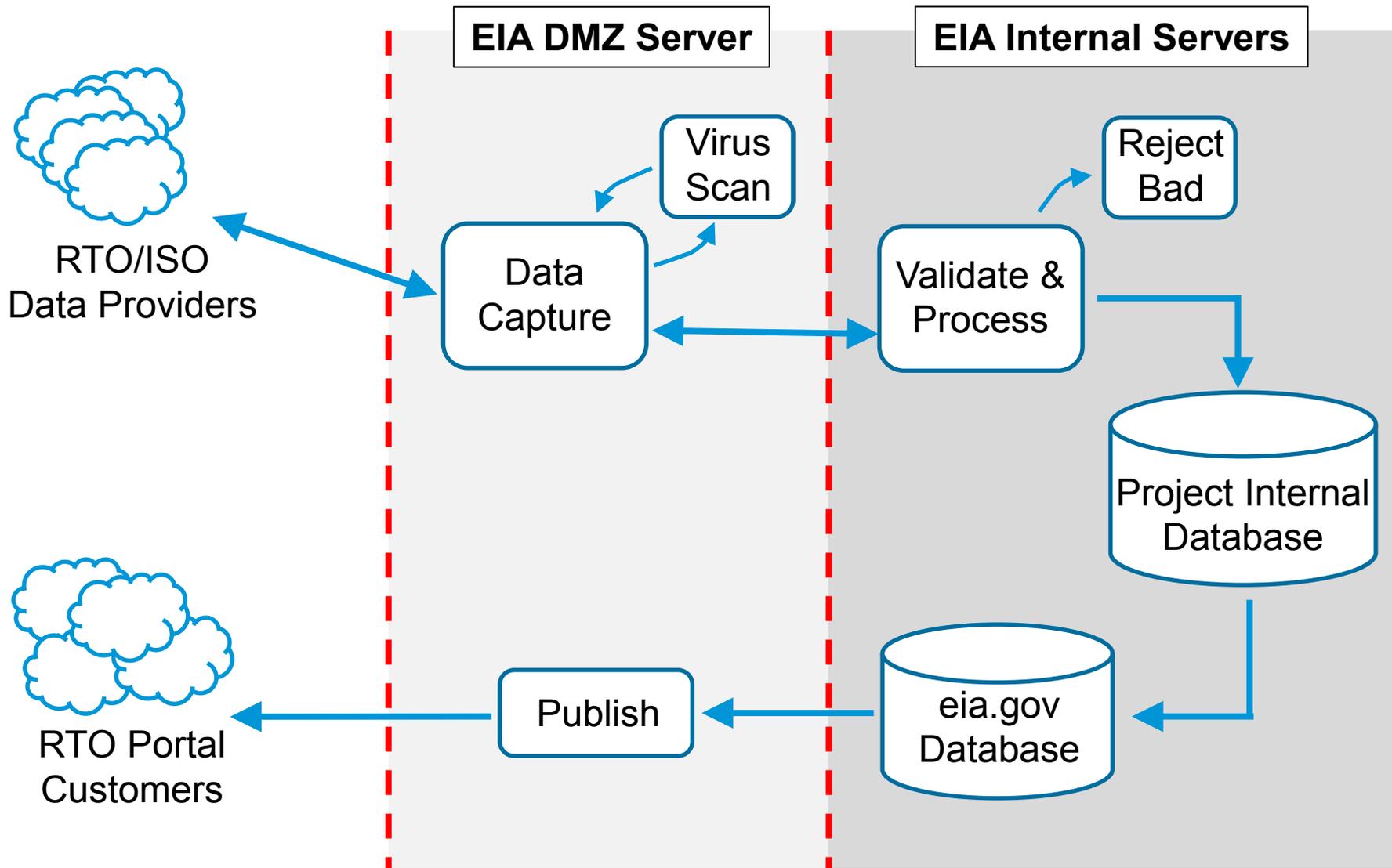
Subtly, ISO/RTO data are not quite apples-to-apples

- Housing the most salient public information in one location at EIA will:
 - Increase ease of access and use for most EIA stakeholders
 - Provide a “curated” data offering for the non-expert
 - Allow for naturally interleaved educational material and explainers
 - House data alongside valuable, complementary datasets, like EIA’s 930 survey of hourly data from Balancing Authorities, including generation by fuel, demand, and interchange

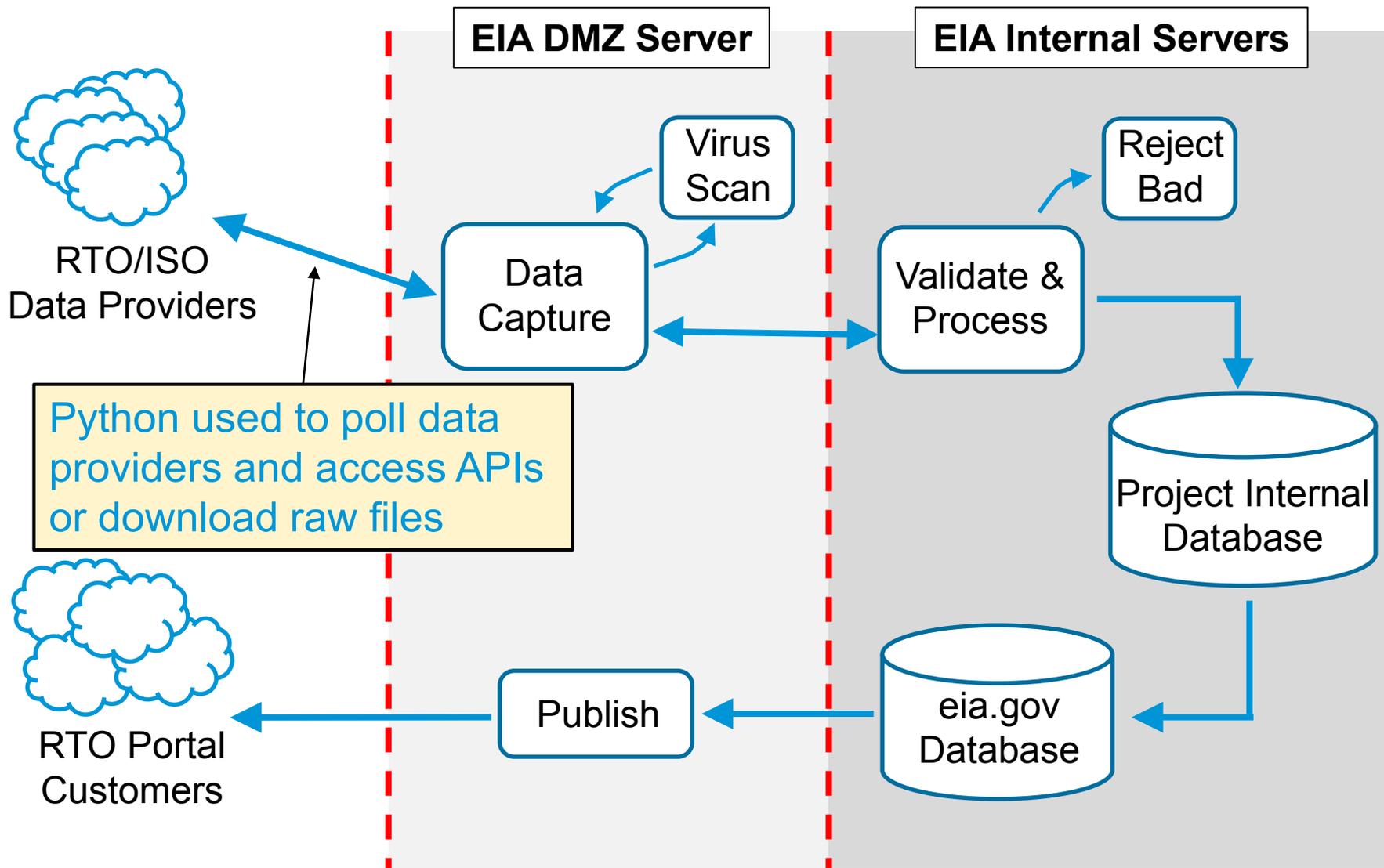
Example: Locational Marginal Prices

- Wholesale prices are cited as LMPs (“Locational Marginal Prices”)
 - “**Price**” --- values are in US Dollars per MW of power purchased for delivery
 - “**Marginal**” --- the intersection of supply and demand sets the price of power
 - *Supply offers*: generating units offer into the market how much power they would be willing to generate at what price
 - *Demand bids*: consumers bid into the market how much power they expect to need and at what price point(s) their demand might change
 - *Marginal unit*: if all supply offers are ranked by their offer price, then the generating unit that supplies the final demanded MW of power is the marginal unit, and its cost sets the cost that all generators will get paid for their power
 - “**Locational**” --- prices vary geographically based on the network topology of suppliers and consumers and how **congestion** and **losses** will affect the ability to deliver power

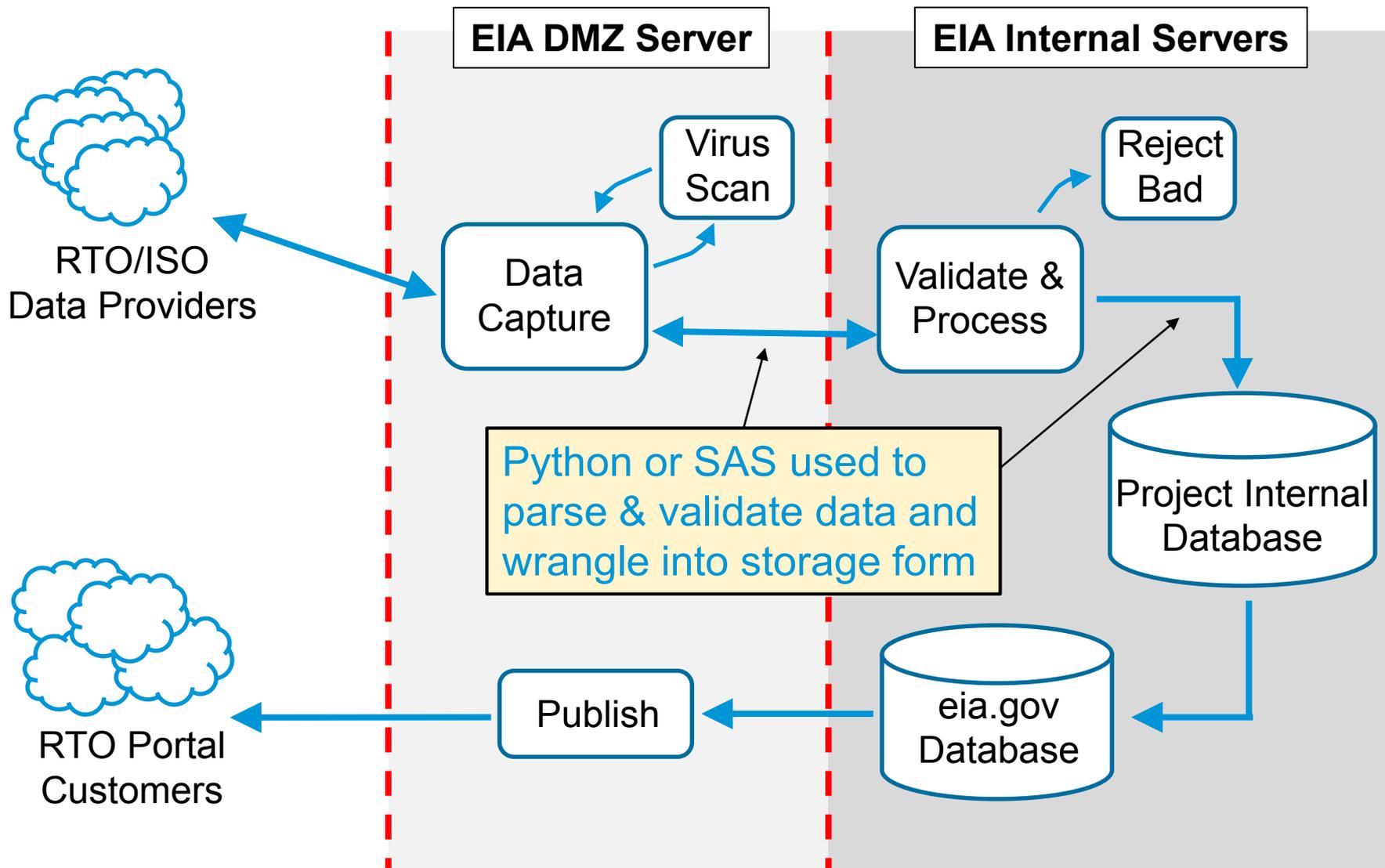
Technical Approach



Technical Approach



Technical Approach



Progress and Hurdles

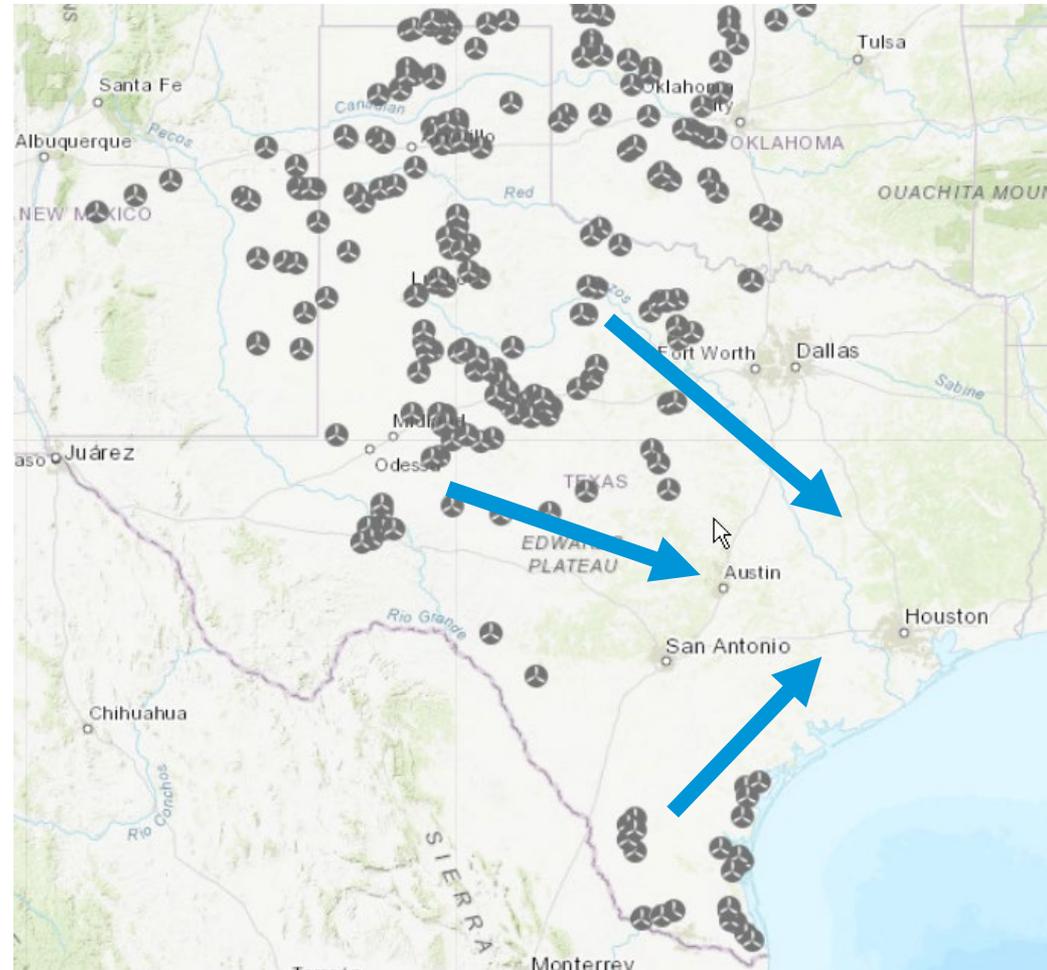
- Progress has been forward, but we are trying to accelerate...
- Hurdles:
 - **Coding:** scraping public data is a different mode than what EIA typically does with its survey collections, so devising robust, operational code requires care
 - Operational mode to keep up-to-date
 - Historical mode to back-fill archives
 - **Republishing rights:** All RTOs/ISOs have warnings about trying to republish their data, so those rights need to be established, which takes time
 - **Front-end display:** EIA's website has high standards for its display, dissemination, and interactivity, and these standards demand material development time to deliver a new product

Future Analysis...

- Once the data is housed at EIA and able to be disseminated, then further analysis will be possible into the following types of problems, without leaving the EIA website
- Other useful data and content to be added:
 - Weather
 - Fuel supply & prices
 - Demand response
 - Renewable penetration
 - Capacity markets
 - Ancillary services
 - Market rules
 - ...

Texas Wind Power

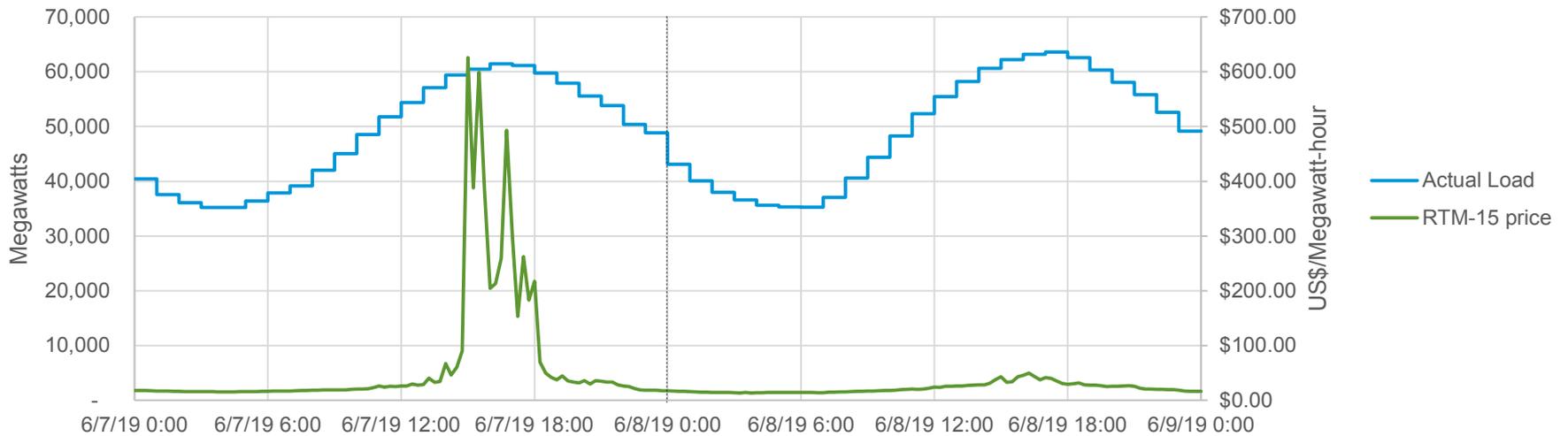
- Wind power is plentiful in TX
- Generation is often far from load centers
- Transmission can get congested, leading to *negative* power prices near generating units
- Balance of supply and demand *depends on accurate wind power expectations*



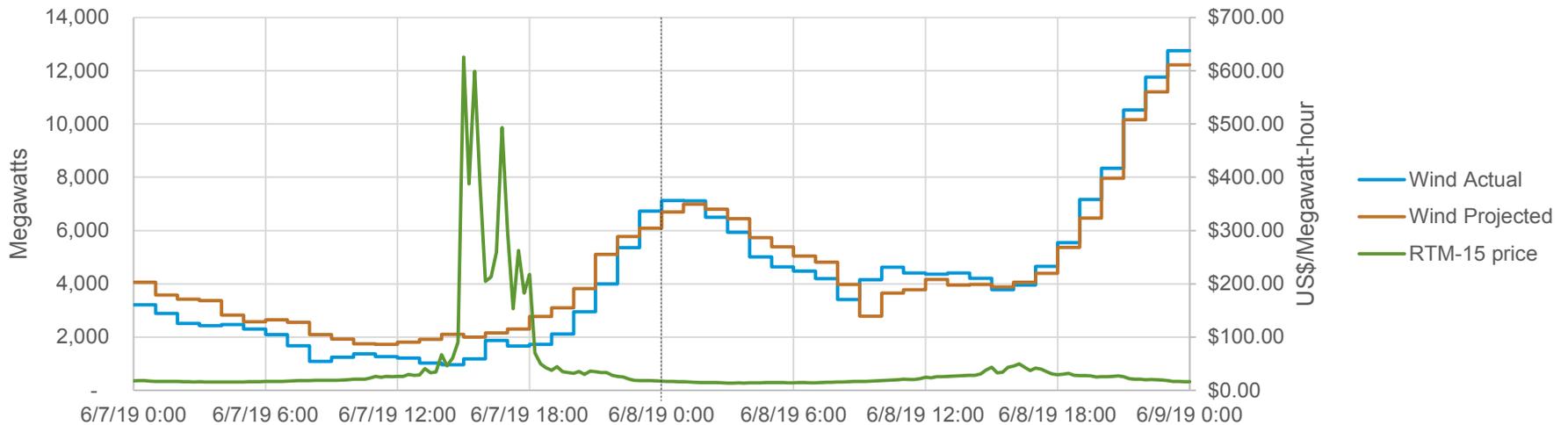
<https://www.eia.gov/state/?sid=TX>

ERCOT: Wholesale Price Spike (6/7/2019)

ERCOT Hourly load & 15-minute Real-Time Market prices



ERCOT Hourly wind generation & 15-minute Real-Time Market prices



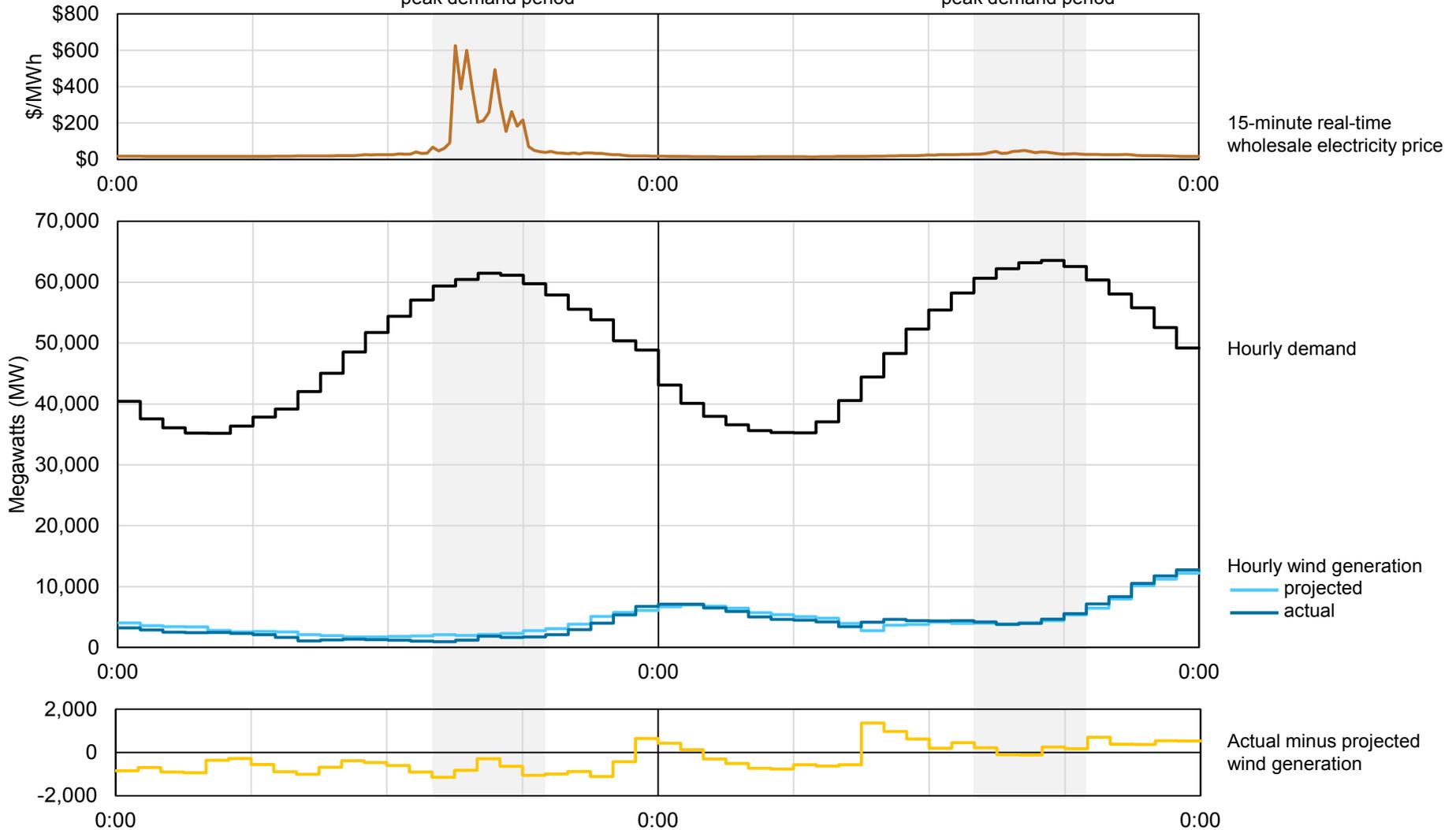
ERCOT: Wholesale Price Spike (6/7/2019)

Friday 6/7/19

Saturday 6/8/19

peak demand period

peak demand period



Summary

- RTO/ISO data is a key piece of the Electric Industry
- The “RTO/Wholesale Power Portal” project will bring these data to EIA’s collection of world-class data and statistics
- Work is advancing...
- Analytical capabilities will be increased without needing to leave EIA’s site