



Experiences from TEA's Analytics

~ 42 is not an answer ~

Voices of Experience

January 30, 2020 | San Antonio, TX

The Energy Authority (TEA)

- **The Energy Authority** serves public utilities nationwide for trading and analytics.
- We are owned by several public utilities.



TEA Analytics

Forecasts

- Load Forecasts (ST hourly, LT economic)
- DA Price Forecasting
- Generation Forecasting (LT regional hydro, ST variable generation)



Portfolio Management

- Wholesale market risk analysis
- Transmission + congestion analysis
- Generation asset management
- IRP



AMI Analytics

- Secondary Connectivity Study
- Predictive Asset Management



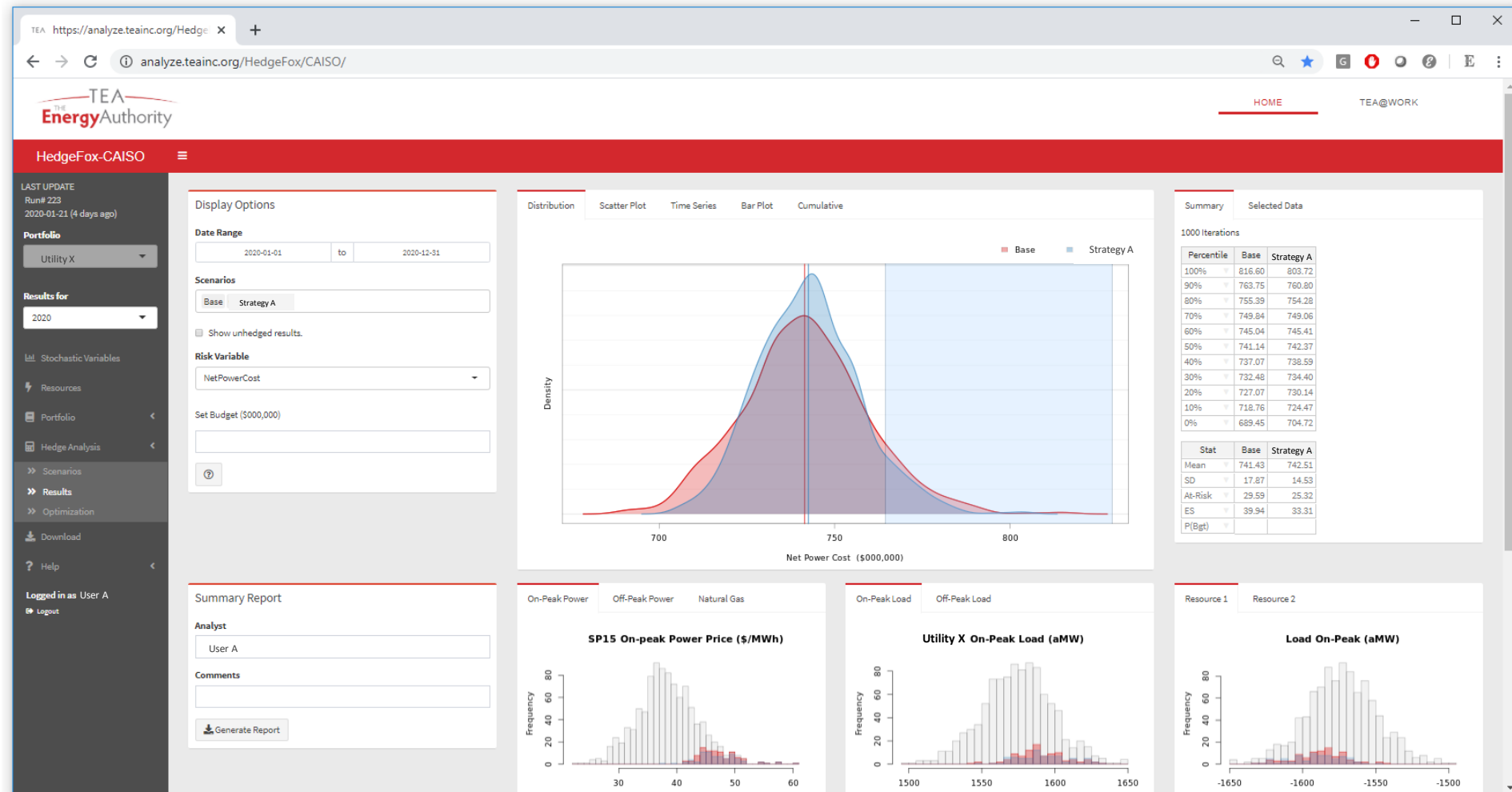
Use of AI

- ML models
 - Feature selection
 - Imputation
 - Cross-validation
 - SVN, ANN, CNN, etc...
 - Graphs
- Data Science Process
 - Lifecycle
 - Source Control via git
 - Branch + merge
 - Issue tracking



Portfolio Risk Analysis

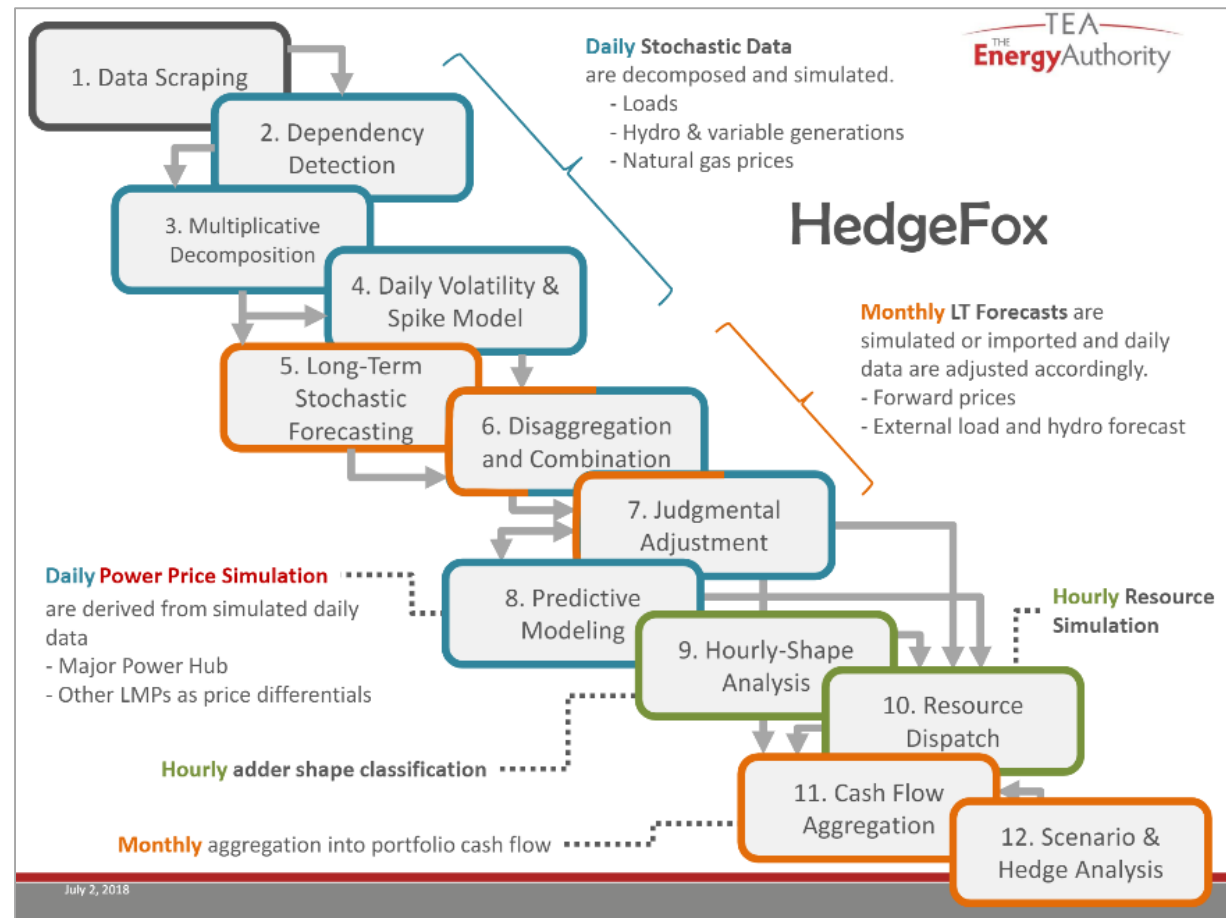
example of human + machine collaboration



Background on this model

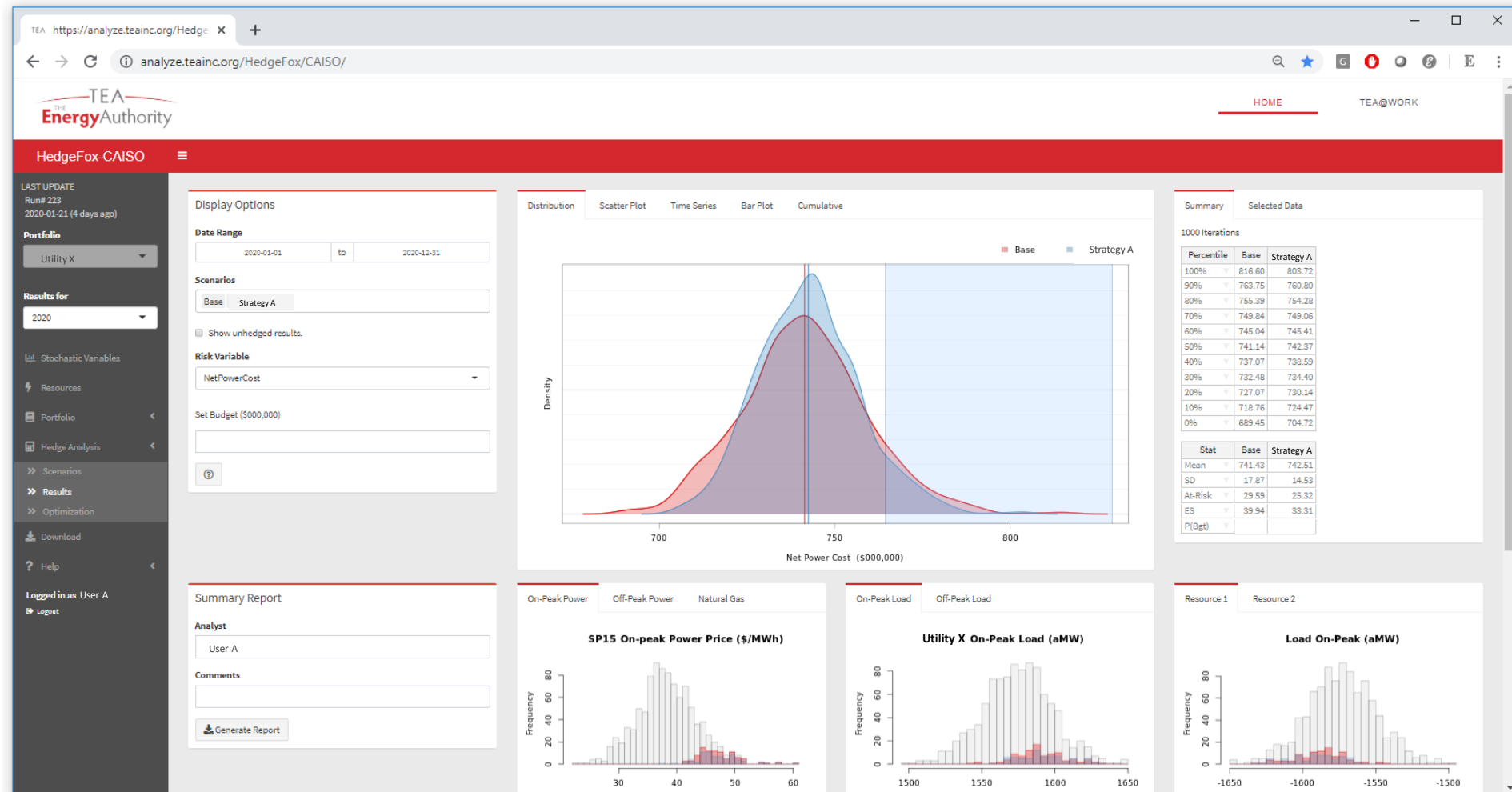
Stats + ML in R

- Quantify portfolio risk
- Combines statistical and, machine learning methods.
- All written in R
 - Scheduled model runs.
 - Interactive shiny UI.



Portfolio Risk Analysis

Analyze hypothetical hedge scenarios

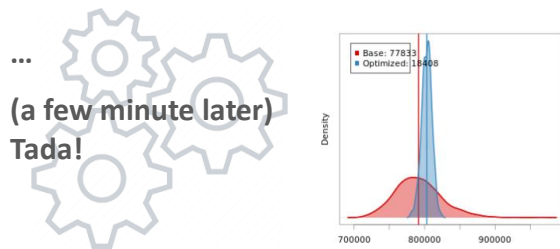


Hedge Optimization

42 is not an answer



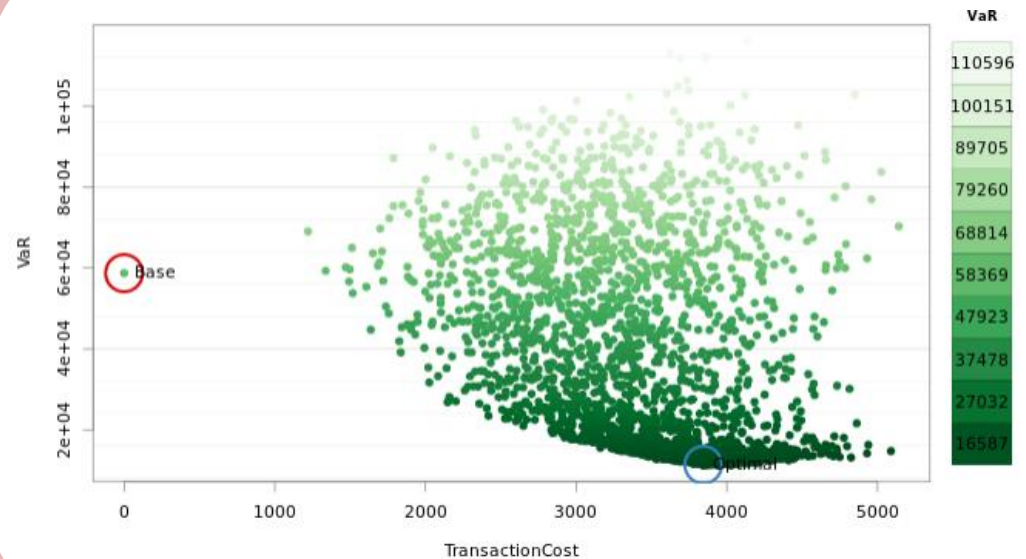
What's my optimal strategy?



| | Scenario | Buy/Sell | Commodity | Type | Period | Quantity | StartDate | EndDate | Adder |
|---|-----------|----------|------------|------|----------|----------|------------|---------|-------|
| 1 | Optimized | Buy | SP15 Power | Swap | On-Peak | 680 | 03/31/2021 | 0.50 | |
| 2 | Optimized | Buy | SP15 Power | Swap | On-Peak | 1400 | 06/30/2021 | 0.50 | |
| 3 | Optimized | Buy | SP15 Power | Swap | On-Peak | 1230 | 09/30/2021 | 0.50 | |
| 4 | Optimized | Buy | SP15 Power | Swap | On-Peak | 1460 | 12/31/2021 | 0.50 | |
| 5 | Optimized | Buy | SP15 Power | Swap | Off-Peak | 690 | 03/31/2021 | 0.50 | |
| 6 | Optimized | Buy | SP15 Power | Swap | Off-Peak | 60 | 06/30/2021 | 0.50 | |
| 7 | Optimized | Buy | SP15 Power | Swap | Off-Peak | 1450 | 09/30/2021 | 0.50 | |
| 8 | Optimized | Sell | SP15 Power | Swap | Off-Peak | 0 | 12/31/2021 | 0.00 | |

How do I know this is optimal?

...

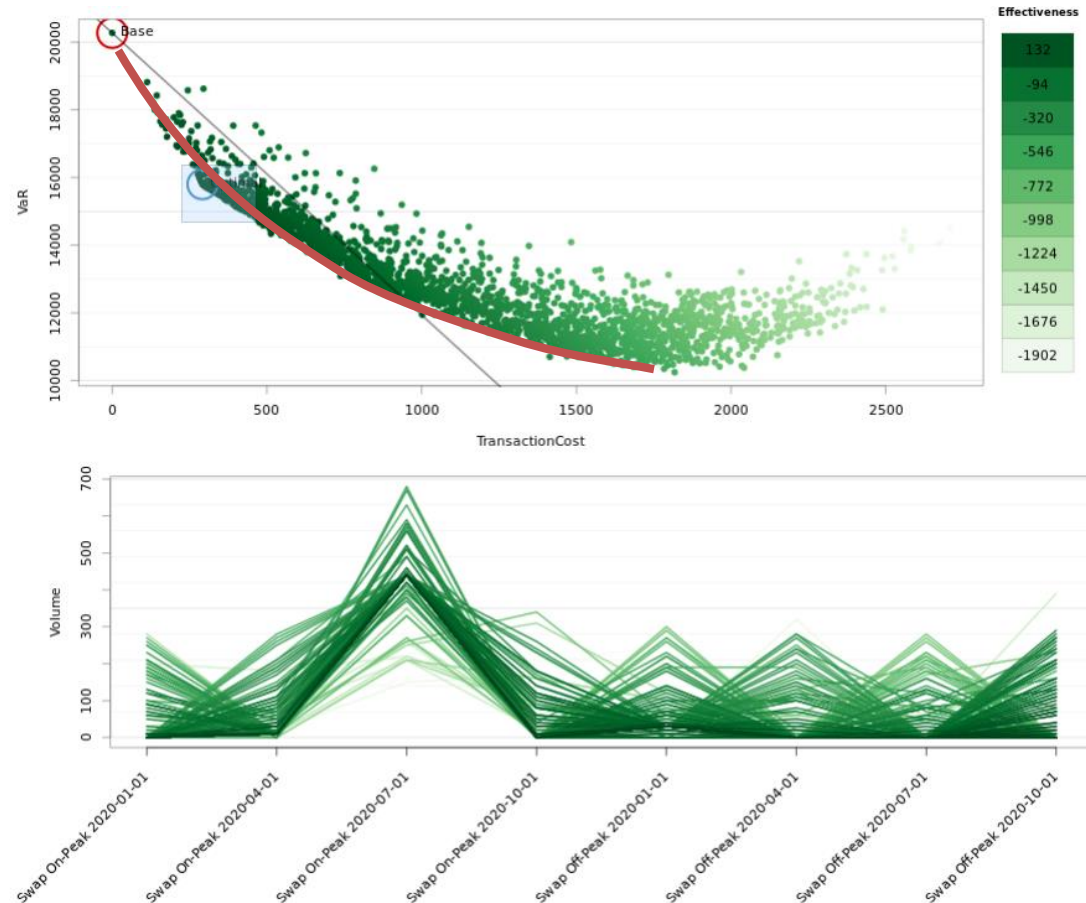


Can I pick another strategy?

Explore alternative solutions

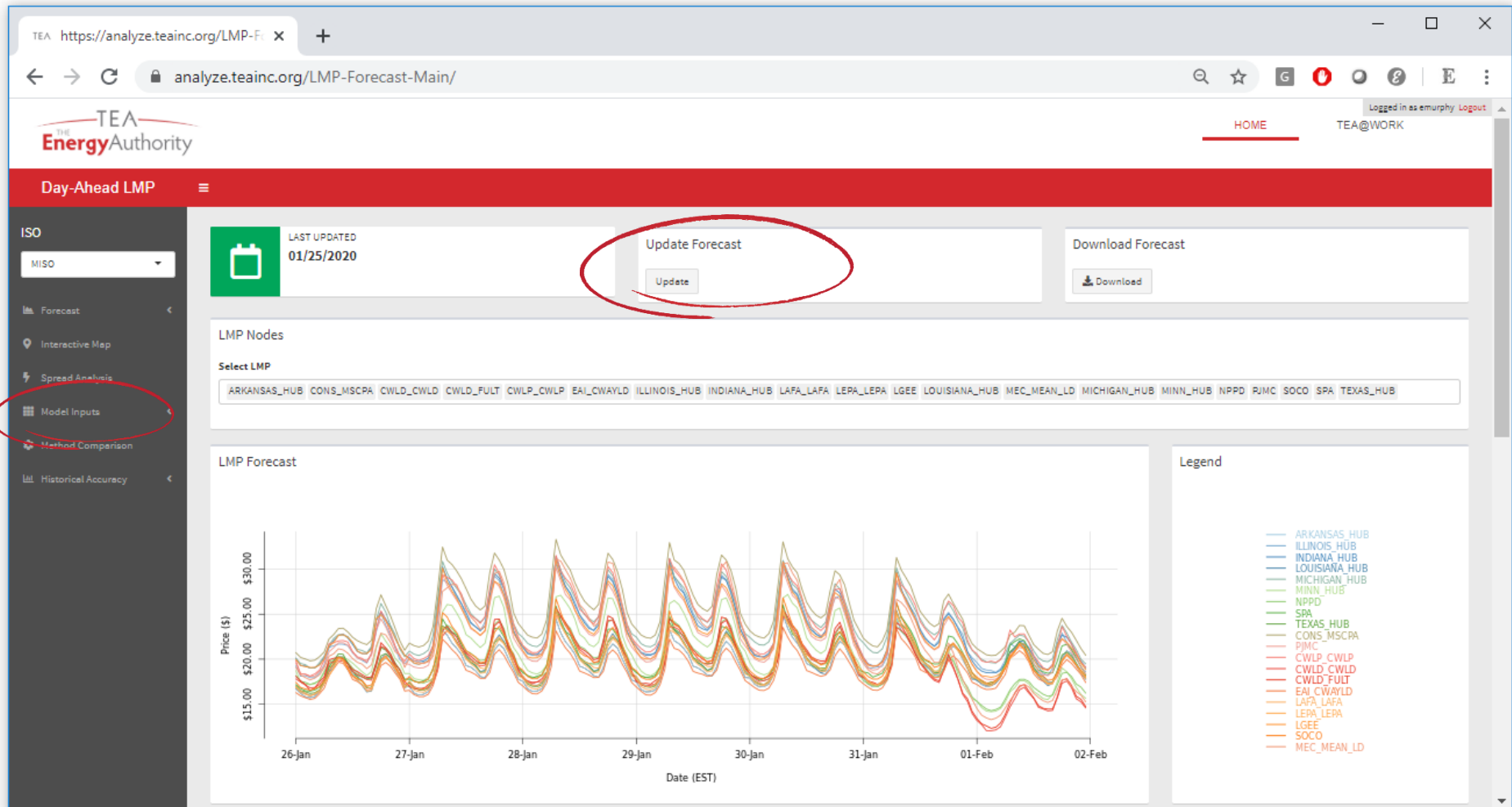
Lessons Learned

- Users didn't want the answer.
- Instead...
 - Get insights.
 - Change input to the model.
 - Explore alternatives.



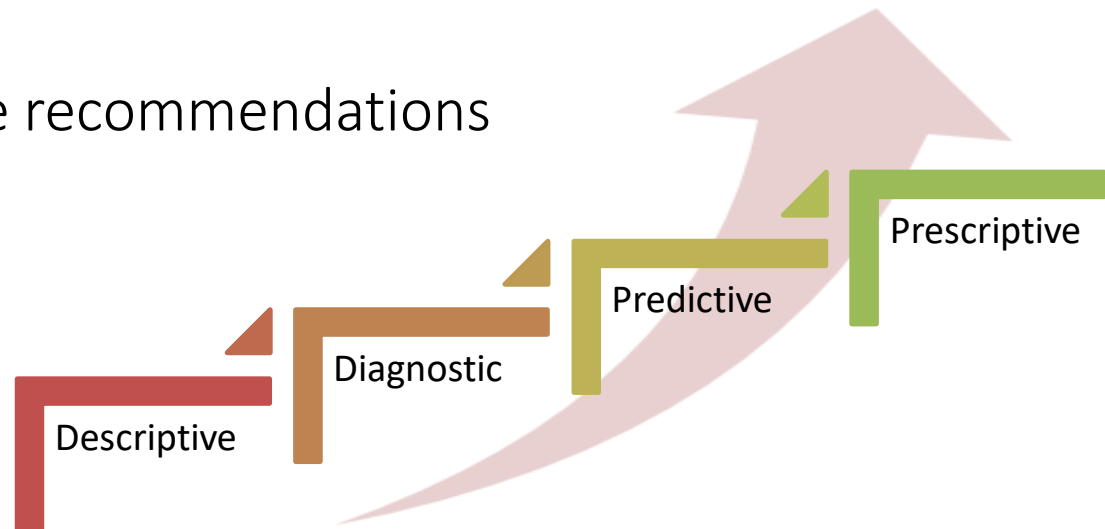
DA Power Price Forecast

Another Example



Human + Machine Collaboration

- As the use of AI spread beyond point-forecasting, to decision making and prescriptive analytics, people will want to **participate in finding a solution**.
- Interactions with AI
 - Explore insights
 - Multiple/alternative recommendations
 - Inputs to AI



Thank you!

Contact:
eooka@teainc.org