

# Operational Forecasting Trends and Challenges

ESIG 2024 Forecasting & Markets Workshop

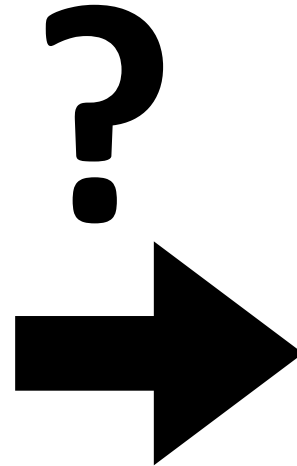


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# Forecasting in System Operations

## Now

- Deterministic forecasts
- Single forecast model
- Transmission
- Hourly resolution
- Load, solar, wind



## Future

- Probabilistic forecasts
- Multiple forecast models
- Transmission & Distribution
- Sub-hourly resolution
- Load, solar, wind, storage, hybrids, DERs, etc.

# Four Challenges and Opportunities

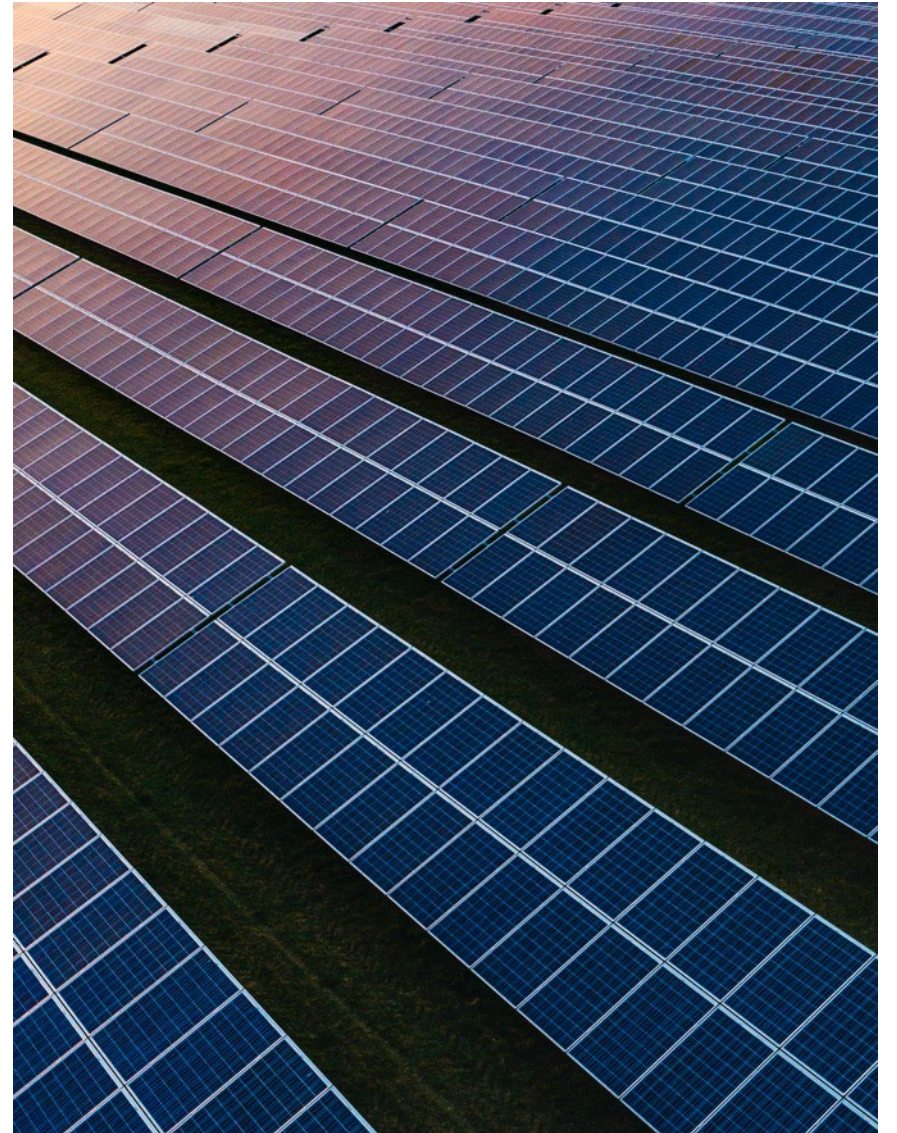
1. Integrating **probabilistic forecasts** into operations
2. Forecasting with limited **DER visibility**
3. Forecasting **tail events** with limited historical data
4. Open **data and validation** of forecasts

The background of the slide features a faint, semi-transparent image of a hand holding a globe. A solar panel is overlaid on the globe, with lines indicating its structure. The overall color scheme is a gradient of blue, from a darker blue at the top to a lighter blue at the bottom.

# Deterministic Solar Power Forecast Trial

# Solar Power Forecast Trial (EPRI + partner utility)

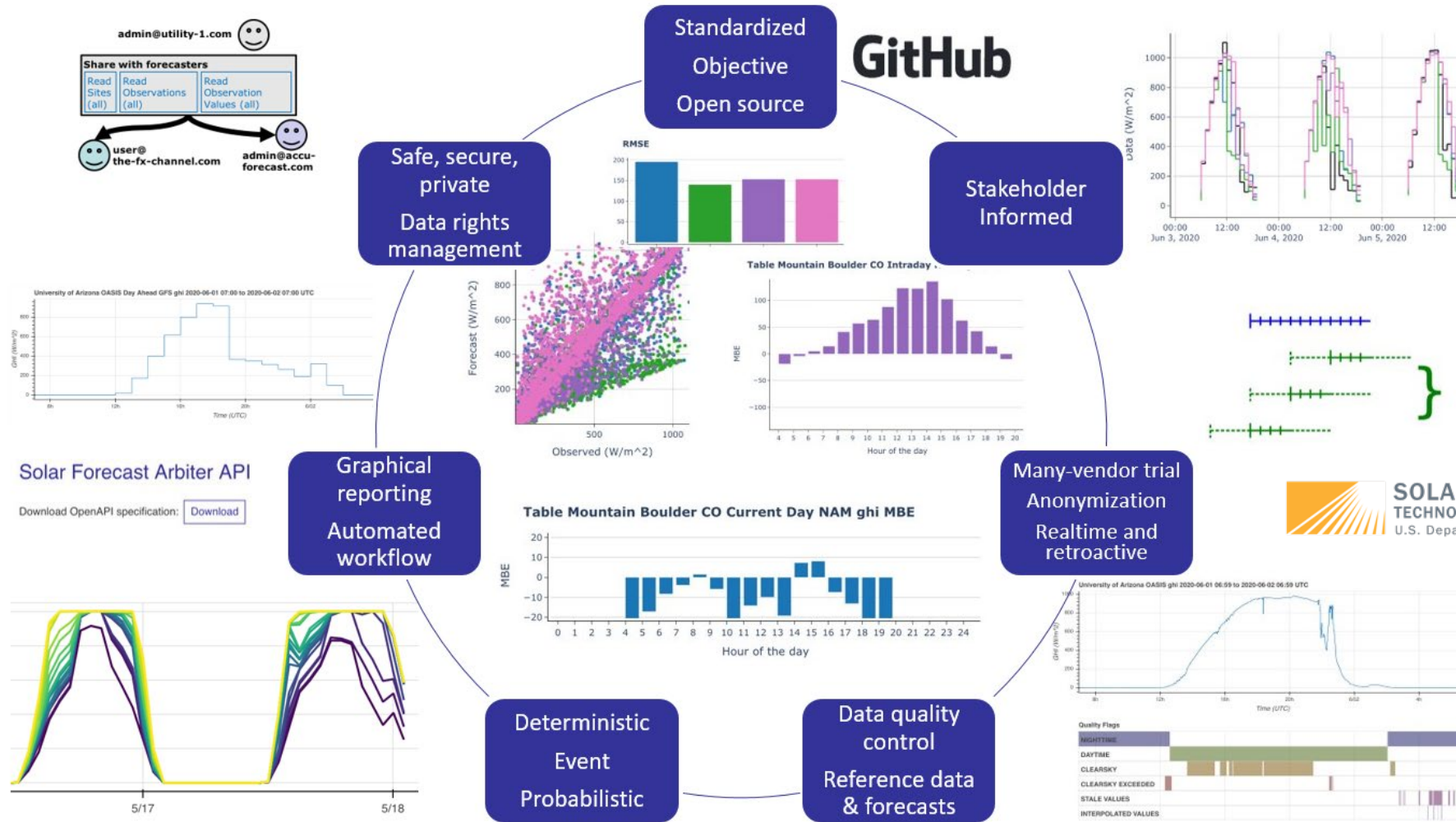
- **Deterministic power forecasts**
- **4 utility-scale PV plants** in the Southeast US
  - 130, 50, 20 and 0.2 MW<sub>AC</sub>
  - ~1.4 DC:AC ratios
  - single and fixed tracking
- **5 forecast schedules**
  - day-ahead (hourly) down to real-time (5-min)
- **9 forecasters** (anonymized commercial forecast vendors)
- **12 weeks** of “live” forecast submissions



# Forecast Arbiter (aka Solar Forecast Arbiter)

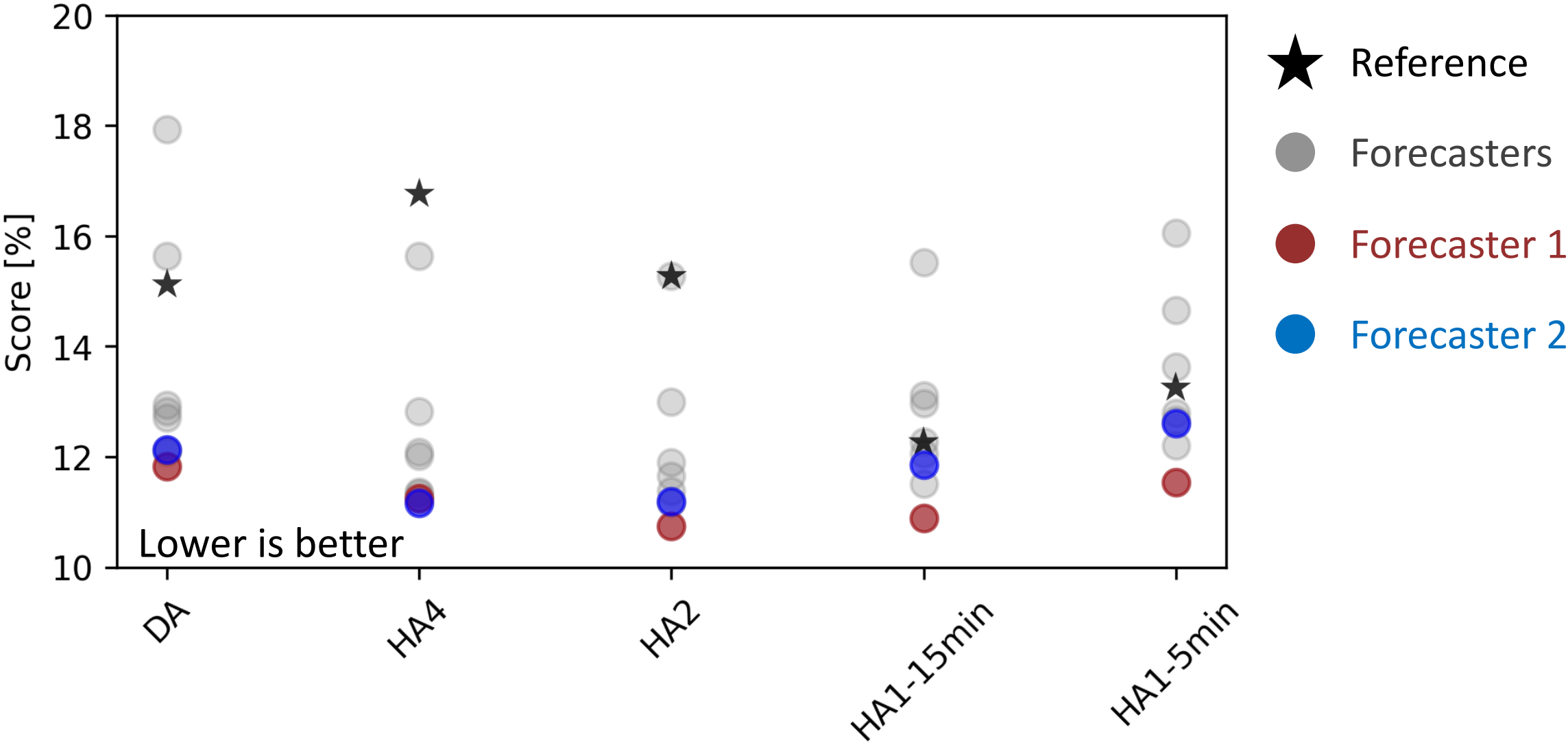


[forecastarbiter.epri.com](https://forecastarbiter.epri.com)



**Clear, transparent forecast evaluation tool**

# Forecast error varied by horizon (forecast schedule)



# “Best” forecaster was not constant over the trial

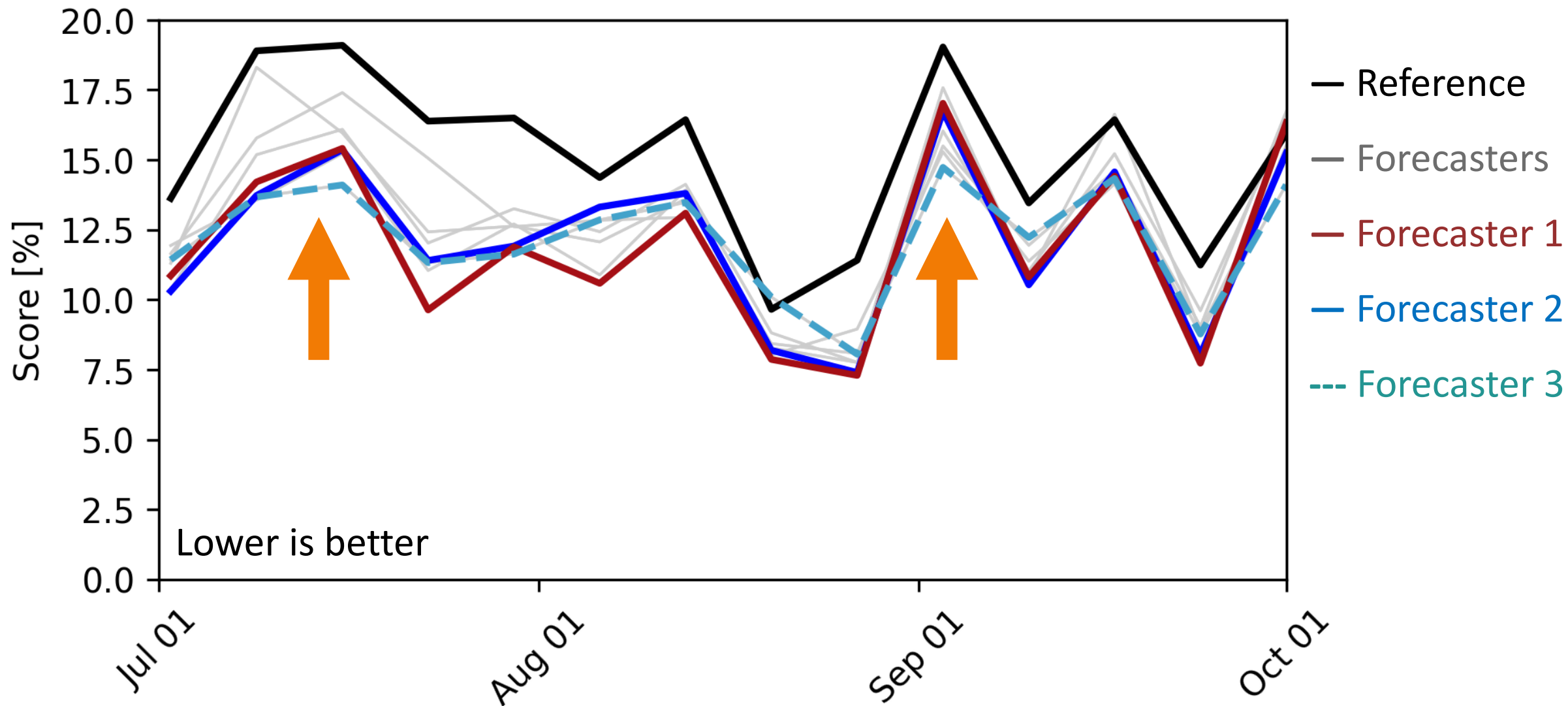
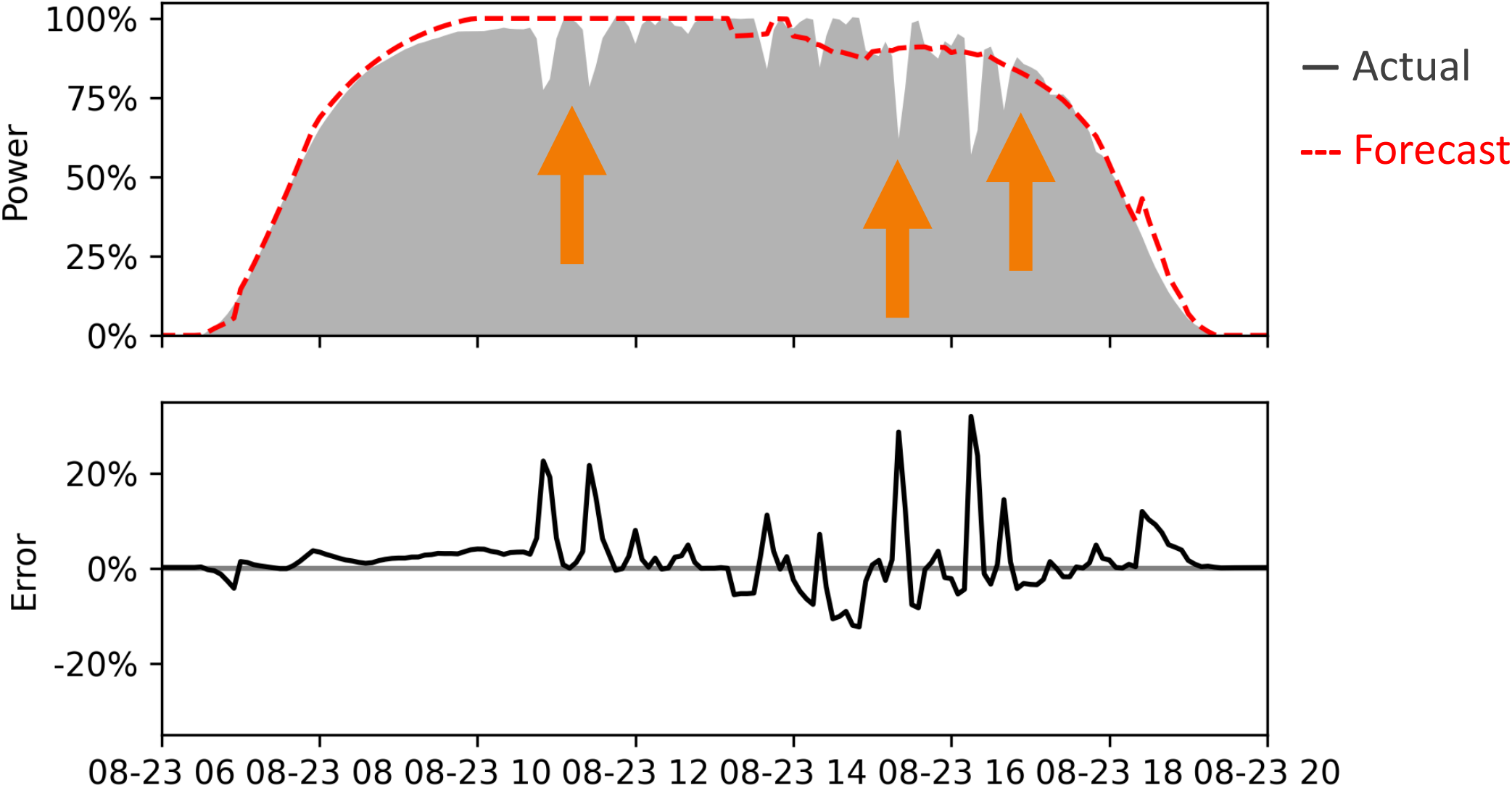
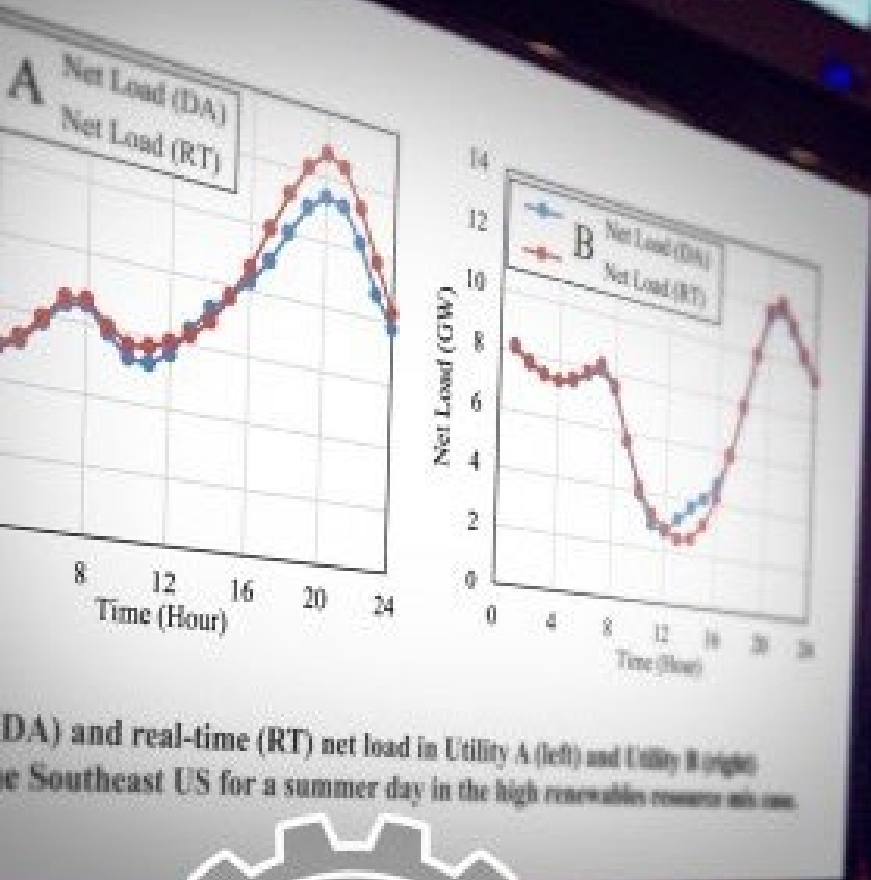


Figure: Day-ahead (DA) forecasts, weekly-average error

# “Best” forecasts still don’t capture ramps





DA) and real-time (RT) net load in Utility A (left) and Utility B (right) in the Southeast US for a summer day in the high renewables resource mix case.



# Net Load Forecasting Prize

# Net Load Forecasting Prize (EPRI + DOE)

- **Probabilistic, day-ahead net load forecasts**
- **4 substations** from across the US
  - Hawaii, Oregon, Texas and Georgia
  - High solar penetrations (BTM PV)
- **~70 forecasters** (universities, startups, etc.)
- **\$600,000 in prizes** (funded by DOE)
- **4 weeks** of “live” forecast submissions



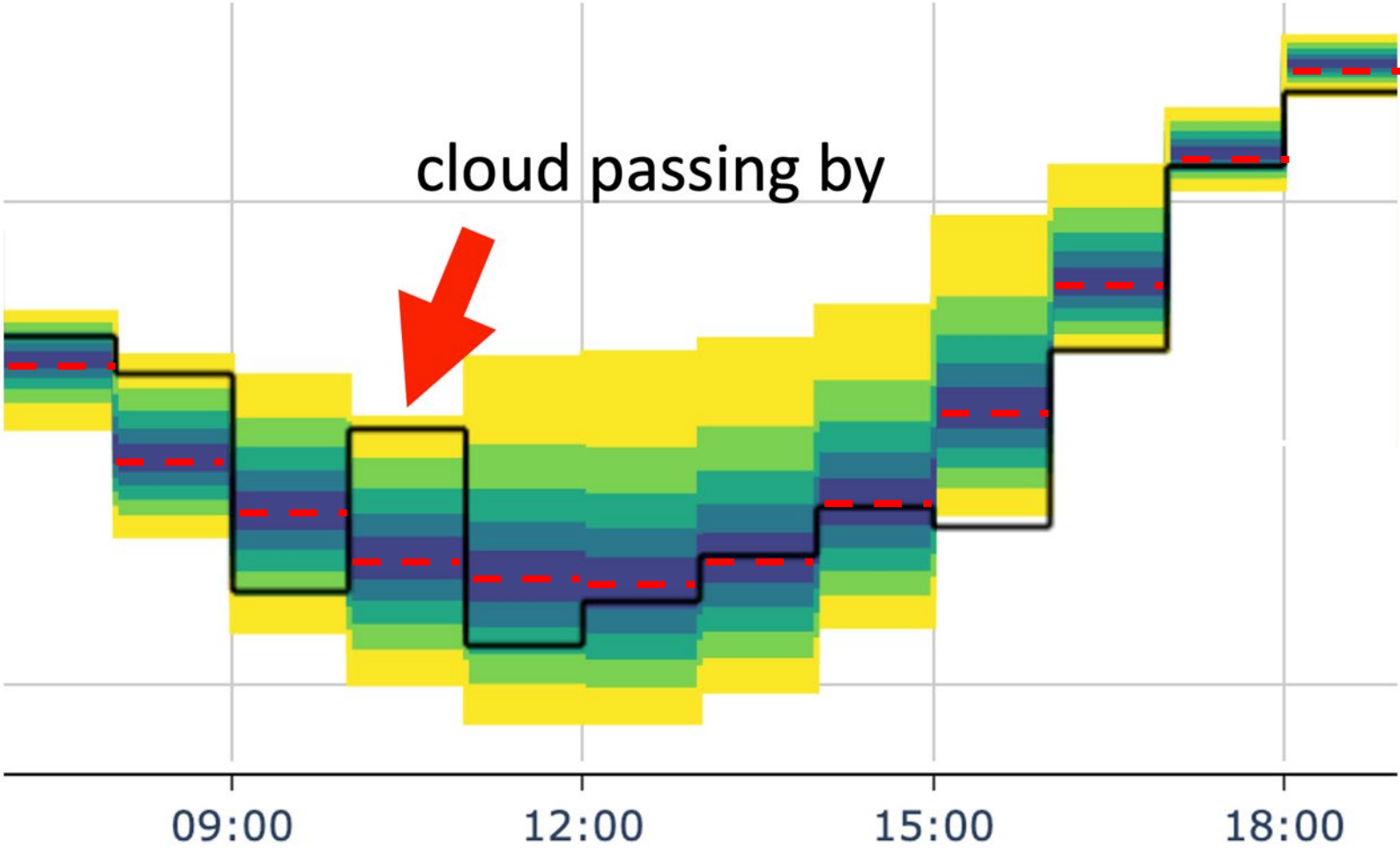
# Probabilistic forecasts capturing cloud event

--- Deterministic forecast

— Observation



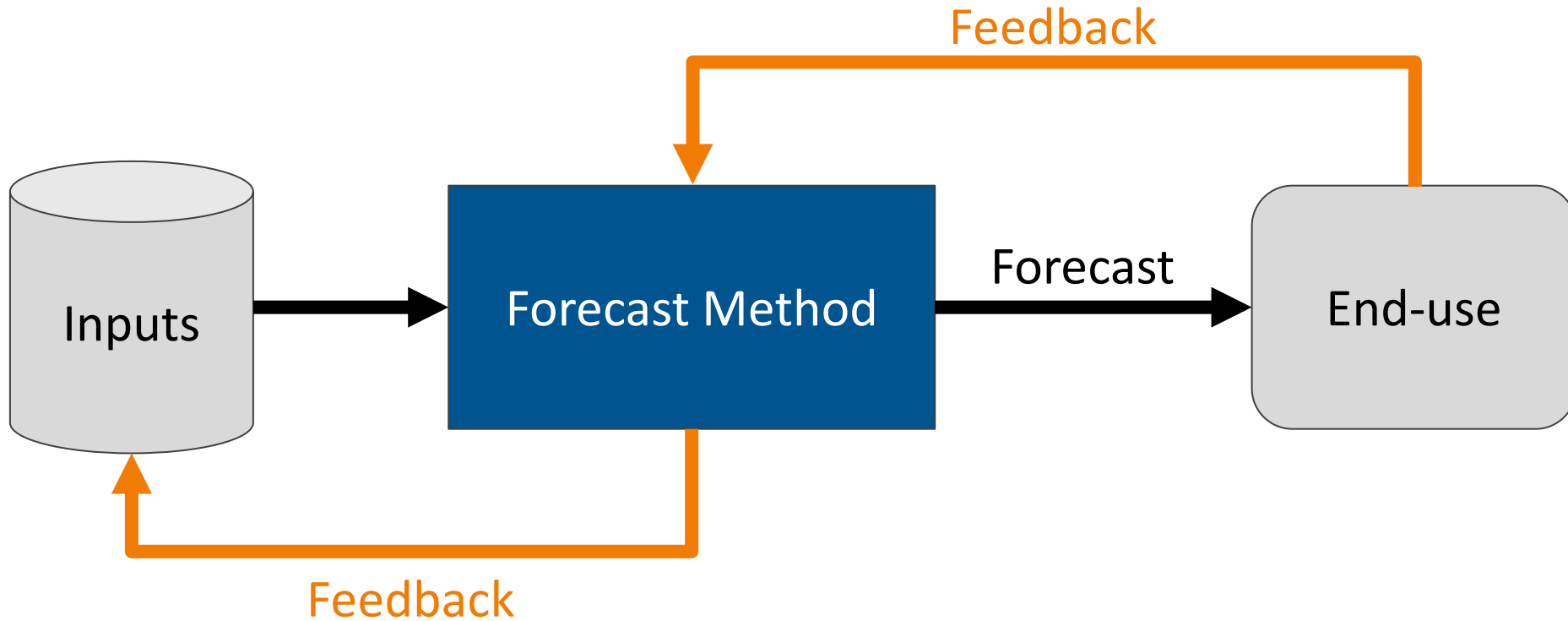
Probabilistic forecast



The background is a solid blue gradient, transitioning from a darker blue at the top to a lighter, teal-like blue at the bottom. In the center, there is a faint, semi-transparent image of a pair of hands holding a globe of the Earth. The hands are positioned as if supporting the globe from below. The globe shows latitude and longitude lines.

**Where do we go?**

# Need to consider how forecasts are created *and* used



**Focusing only on “reduce average error” no longer enough**

# EPRI Load Forecasting Initiative

Improved load forecasts at [operational and planning timescales\\*](#) will drive more efficient investment decisions and better grid performance.

EPRI launched a 24-month initiative to [address critical needs](#) in load forecasting that will work across [three areas](#):

**01 Industry Coordination**  
Enable knowledge-sharing and collaboration among utilities, ISOs/RTOs, etc.

**02 Long-Term Forecasting (Planning)**  
Develop methodologies and guidance to incorporate new load drivers

**03 Short-Term Forecasting (Operations)**  
Develop methodologies and guidance to mitigate changes in forecast accuracy



[msites.epri.com/LFI](https://msites.epri.com/LFI)

\*we are defining “planning timescales” as >1-year ahead



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