



# Wisdom to guide mobility transformations at U.S. ports



Athena is a U.S. Department of Energy (DOE) national lab-led project aimed at improving the efficiency of transportation hubs through advanced high-performance computing.

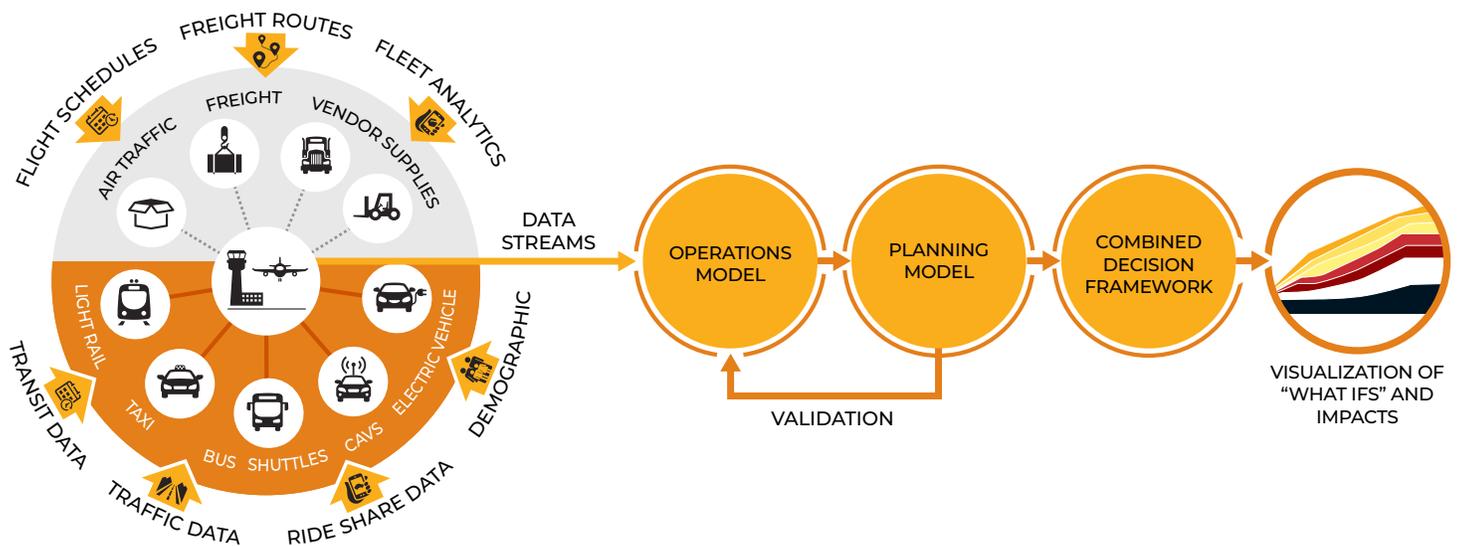
Athena is a collaborative effort funded by the DOE Vehicle Technologies Office and industry and led by the National Renewable Energy Laboratory (NREL) in partnership with Oak Ridge National Laboratory (ORNL) and Dallas-Fort Worth International (DFW) Airport.

Athena will provide complex transportation hubs with decision support and actionable insight to reduce uncertainty and mitigate risk for long-term planning through the use of technology integration. This will help them integrate and adapt to transformative technologies and understand their use to develop modern, efficient ports that can achieve ambitious energy goals.

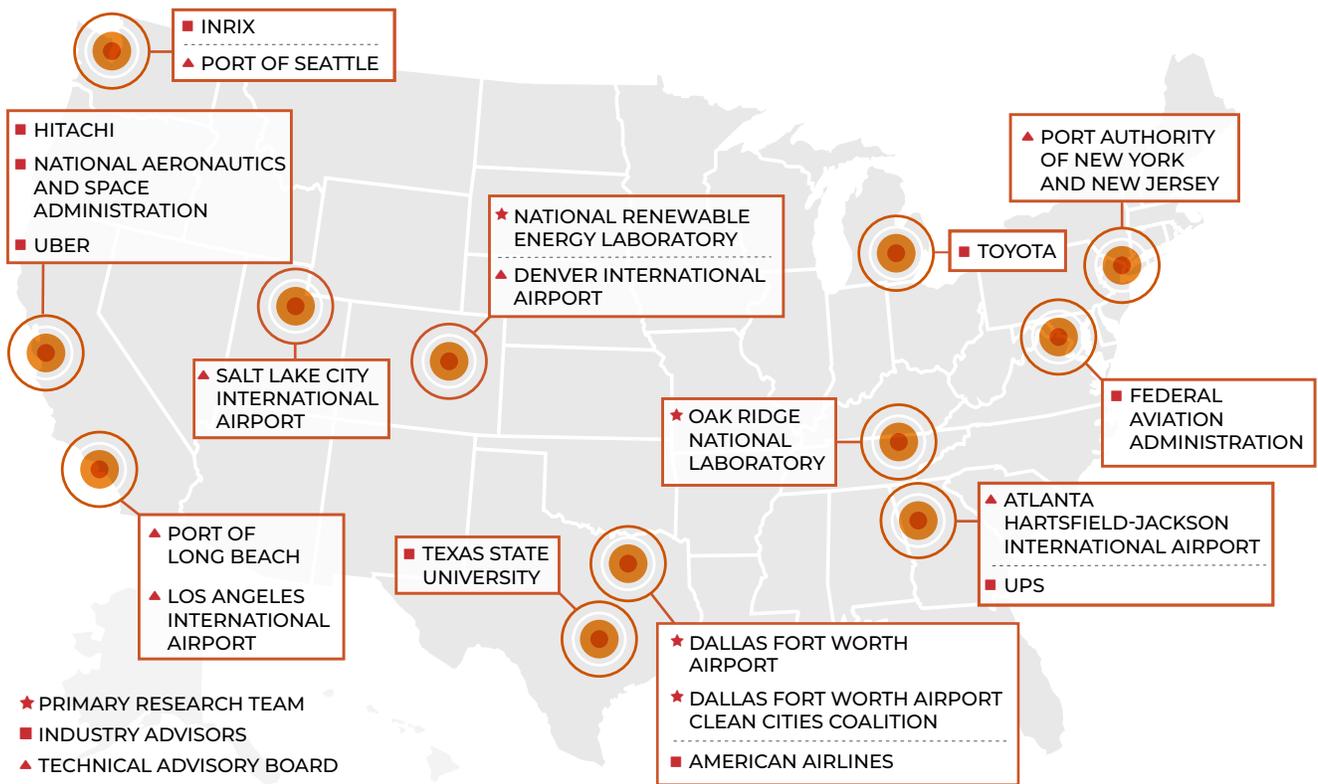
### The Challenge

Airports are complex transportation hubs that coordinate the movement of passengers, goods, and services from the surrounding urban area. They need decision support and actionable insight to reduce uncertainty and mitigate risk for long-term planning.

The increased use of smart mobility technologies holds the promise of providing consumers and businesses with many benefits. But there are significant challenges in adapting complex transportation networks to rapidly evolving technology megatrends—and poor planning or execution may result in increased energy use, costs, and system inefficiencies.



Athena will feed supercomputers with DFW Airport data from various sources. The models developed will investigate numerous future scenarios with respect to energy cost per trip. The resulting data insights and visualizations will help ports integrate and adapt to transformative technologies and understand their use and impacts.



## Our Approach

NREL and ORNL experts are leveraging the powerful scientific computing capabilities at the labs to develop sophisticated models of current and future behaviors based on expanded mobility choices to and from transportation hubs, increased freight volume, and anticipated dynamics of airport access.

Athena is developing a “digital twin” model of DFW Airport with data from individuals, traffic, freight routes, flight schedules, autonomous vehicles, and other sources. Using data-driven statistical modeling and artificial intelligence, this model can simulate the impacts of future capacity expansion scenarios. It will also identify options that maximize the value of passenger and freight mobility per unit of energy and/or cost.

## The Impact

The model results, combined with insights from DFW Airport and its operating partners, will inform realistic recommendations for guiding long-term investments at the airport and other transportation hubs over the next 20 years.

## Our Team

The primary Athena research team includes:

- NREL
- ORNL
- DFW Airport
- The North Texas Council of Governments
- DFW Airport Clean Cities Coalition

Airport/seaport partners include:

- Denver International Airport
- Los Angeles International Airport
- Atlanta Hartsfield-Jackson International Airport
- Salt Lake City International Airport
- Port Authority of New York and New Jersey
- Port of Long Beach

“By helping the nation’s transportation hubs model possible future scenarios, these insights will help them navigate the rapidly emerging energy-efficient technologies that will change mobility plans for years to come.”

– Principal Investigator  
Dr. Caleb Phillips, NREL

Photos by Dennis Schroeder, NREL.  
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