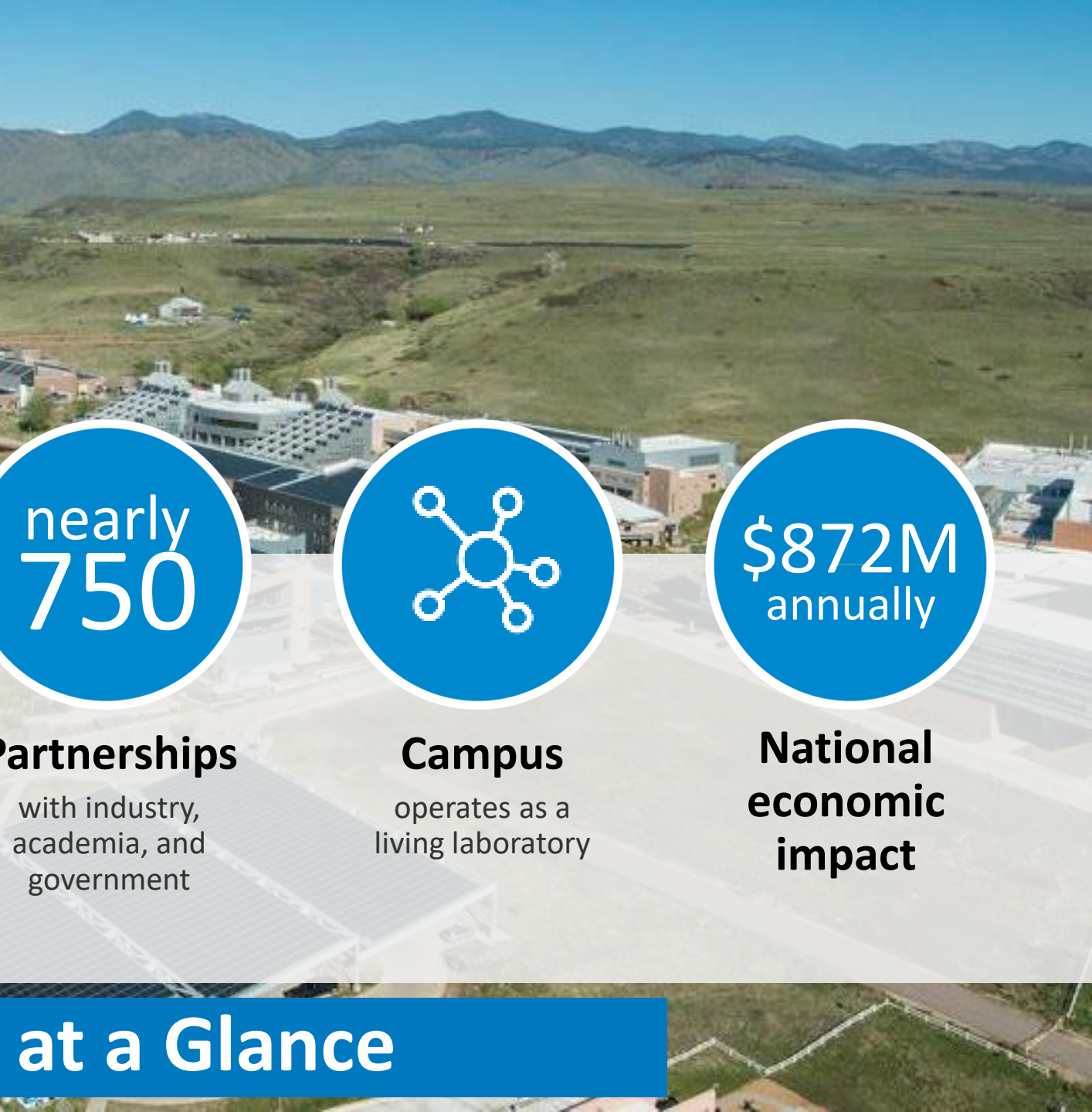


Mobility: Fleet Electrification

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Senator Heinrich's Energy Summit
Albuquerque, NM
August 5th, 2019

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and visiting scientists



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**National
economic
impact**

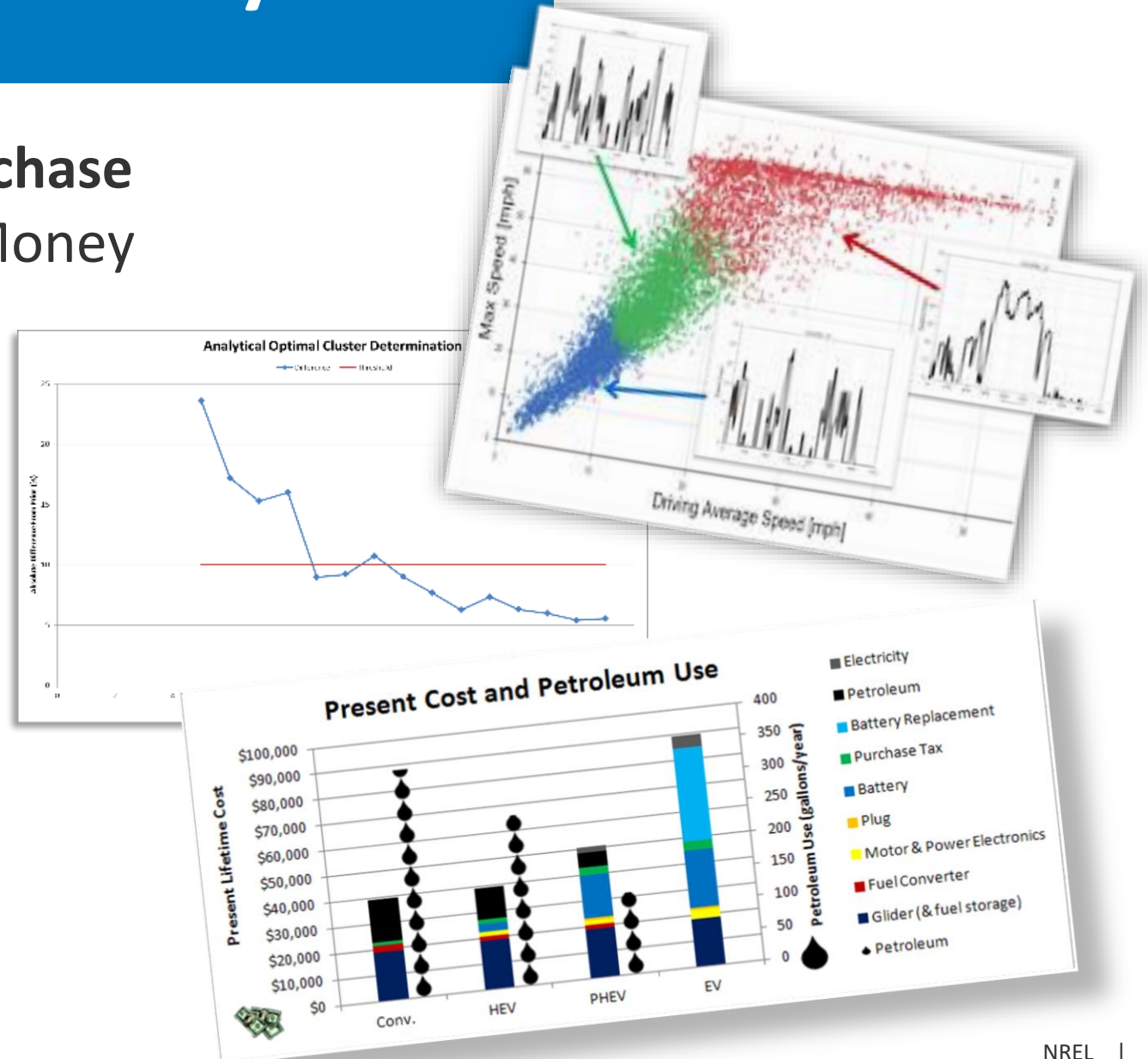
NREL at a Glance

Fleet Electrification Analysis

Make it an Acquisition, Not a Purchase

- Reduce Fleet Costs by Saving Money
 - Improve Efficiency
 - Fuel
 - Route
 - Operator
 - Maximize ROI
 - Minimize Fuel Costs
 - Minimize Lifecycle Costs

- HOW CAN I DO THAT??



Designing Your Work Truck

Define the Objective

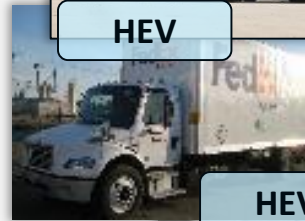
- Meeting the Demand
 - Appropriate Technologies
- Total Return on Investment
 - Fuel Economy Improvements
 - Work Efficiency Improvements



HEV



EV



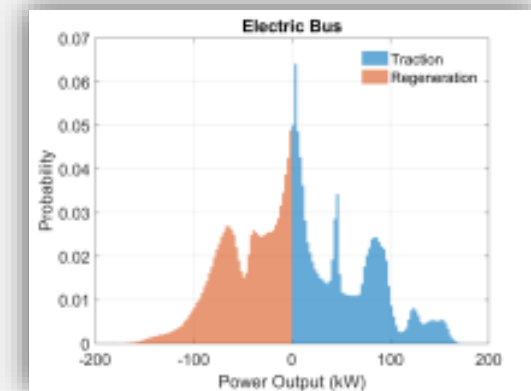
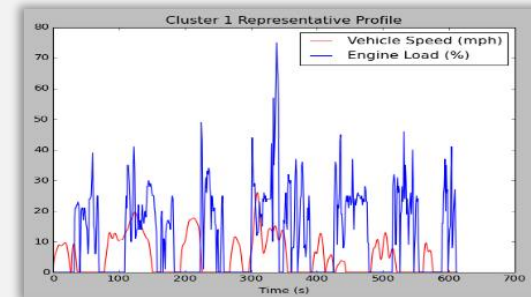
HEV



HEV & EV



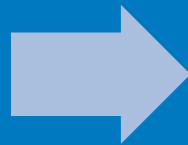
Conventional



Conduct the Analysis

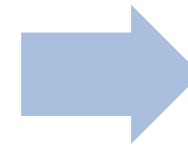
What?

- Fuel Logs
- Mileage Records
- Purchase Histories
- Maintenance Schedules



Why?

- Telematics
- Data Analytics
- Duty Cycle



How?

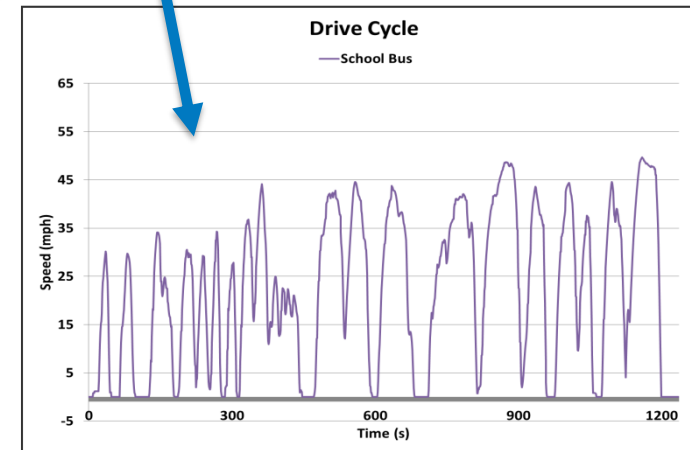
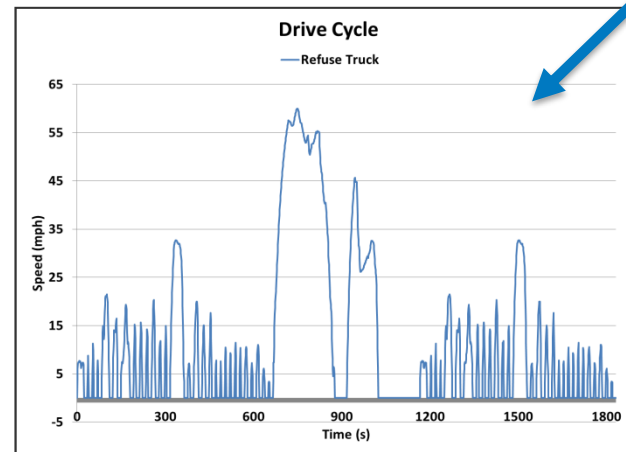
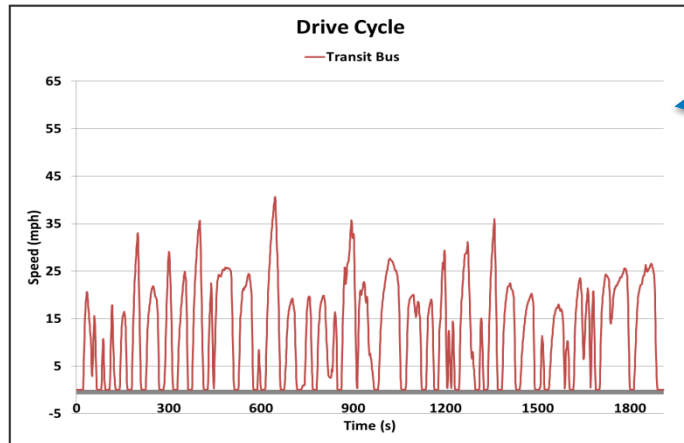
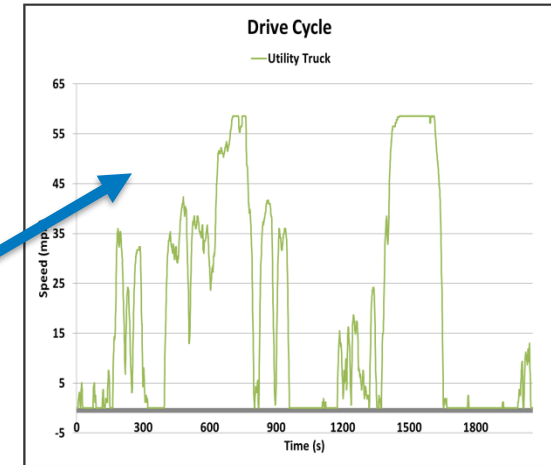
- 3rd Party Assistance
- Vehicle Modeling
- Fleet Optimization

Matching the Right Tools with the Right Questions

Why? - Explaining the Present

Telematics, Data Analytics, and Duty Cycle – Utilize Them!

- Why is Truck A's mpg higher than Truck B?
- Why is half my fleet averaging 2x repairs as the other?



School Buses



Transit Buses



Refuse Trucks



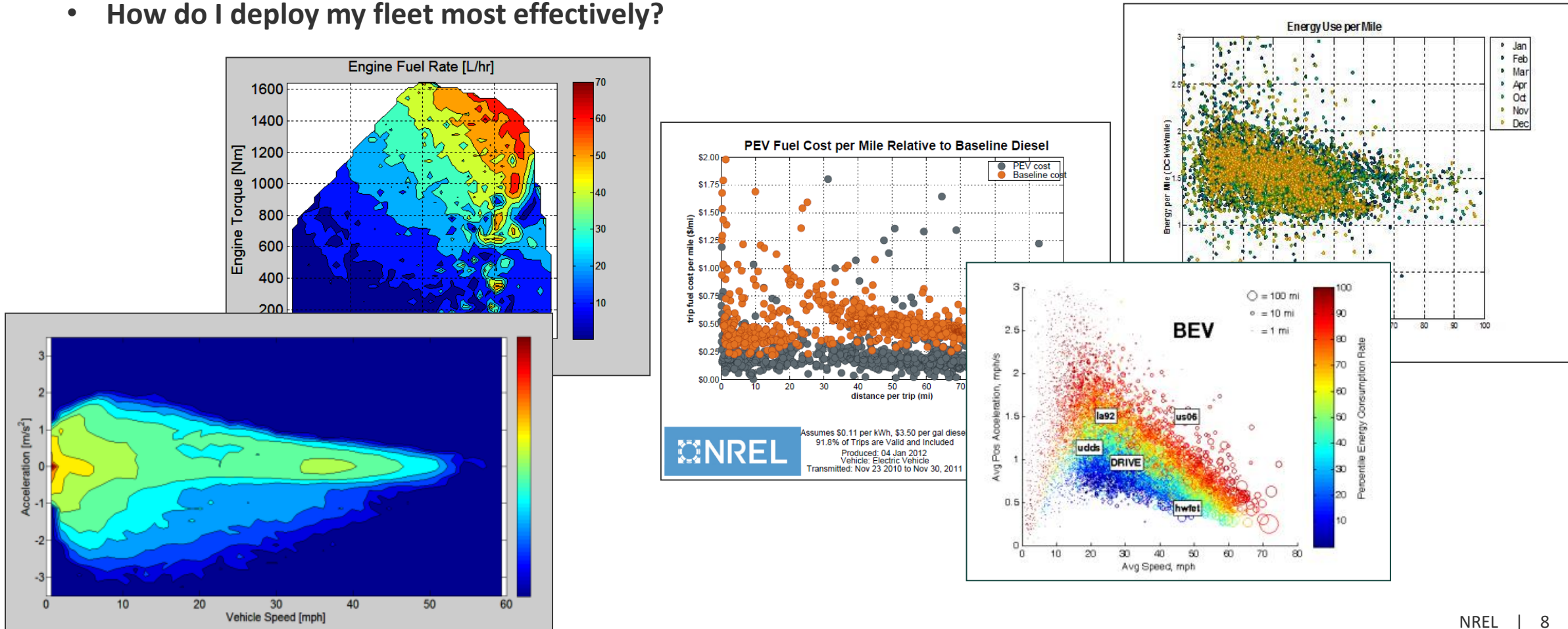
Utility Trucks



How? - Forecasting the Future

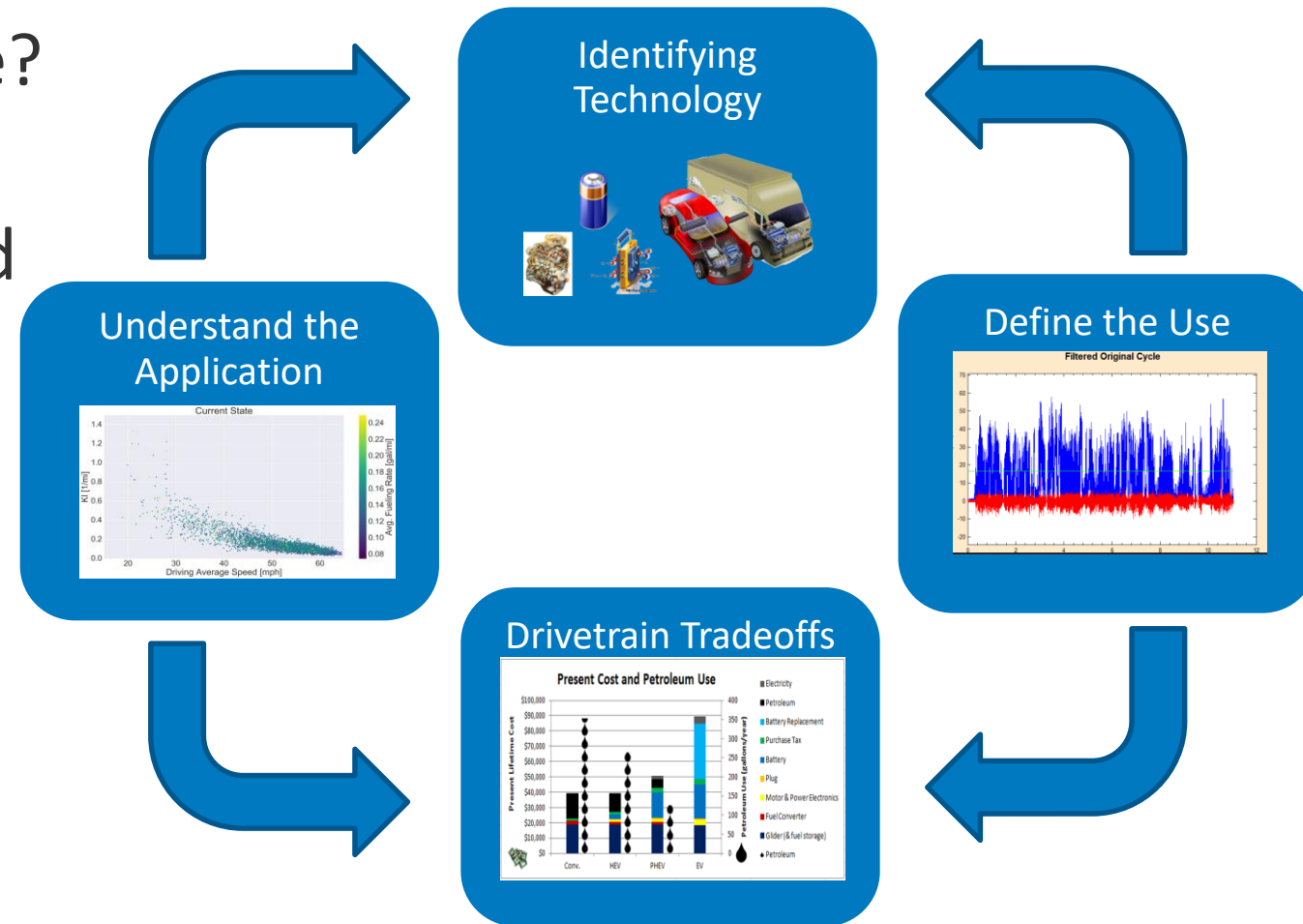
Making Informed Decisions

- How do I configure my next truck?
- How do I deploy my fleet most effectively?



Fleet Electrification Analysis

- What Decision is Being Made?
 - Define the objective
- What Type of Analysis Should I do?
 - Reduce Risk
 - Reduce Uncertainty
- How do I do that Analysis?
 - 3rd Party Assistance
 - Vehicle Modeling
 - Fleet Optimization



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