MEMORANDUM

TO: Council Members

FROM: Steven Simmons

SUBJECT: Transportation Forecast

BACKGROUND:

Presenter: Steven Simmons

Summary: In preparation for the 2021 Power Plan, staff will be providing the Power Committee a series of presentations on different aspects to developing the Plan. Staff has worked to implement a transportation module into the long-term load forecasting model Energy 2020. This module is brand new for the 2021 Power Plan. The presentation will provide an overview of the transportation forecasting process.

Relevance: Though demand for electricity from the transportation sector is relatively small now, the increasing sales and operation of light duty electric vehicles will result in a growing electrical load for the region’s utilities. Electric vehicles are more efficient, emit less pollution, and in many cases offer lower ownership costs than traditional internal combustion engine powered gasoline cars. As more fully electric car models are made available for purchase or lease along with infrastructure buildout, the resulting long-term load in the region over the next twenty years could become significant.

Workplan: A3.2 Forecasting and Economic Analysis - Transportation Forecast
Background: The transportation – the movement of people and goods - is a large energy consumer. In the US, as much as 28% of all the energy consumed annually is for transportation, and most of the energy is from petroleum-based fossil fuels. In the Northwest, carbon-dioxide emissions from the transportation sector are more than twice as high as from the electric generation sector, due to the abundance of clean generation in the region. Transitioning from petroleum based transportation fuel to electricity could help to limit greenhouse gas emissions.
Transportation Forecast -

Process for the 2021 Northwest Power Plan

Power Committee - May 7, 2019 – Boise Idaho
Steven Simmons

Agenda

1. The Transportation Forecast, where it fits in, and why it’s important
2. General Approach and Methodology
3. Wrap Up
Transportation Forecast

1. Long term demand forecast for the Northwest transportation sector
2. Full fuel & technology forecast with a focus on estimating the future market share of electric passenger vehicles and their impact on regional electricity load
3. It is a module within the long term load forecast model – Energy 2020
4. It is a new methodology for the Council’s Power Plan load forecast
5. Key products include: fuel consumption, electricity load, vehicle unit sales & stock
Transportation Forecast

1. Electric vehicles are on the market now and offer some advantages over traditional, gasoline fuel vehicles (ICE)
2. Although limited in market share now, sales could take off within the next 20 years
3. In the Northwest, the Transportation Sector is a big contributor to regional CO2 emissions from fossil fuel combustion
   1. The regional electricity power sector is not heavily fossil fuel driven
   2. Switching from gasoline/diesel as a fuel to electricity fuel would reduce CO2 emissions
4. If sales of electric vehicles were to take off, it would present the region with new electricity load and could impact peak loads in the late afternoon
The transportation sector stands out as a significant CO2 emitter in the Northwest - and the West Coast in general.

Due to the relatively clean Power Sector in the region, a Power Sector that is becoming even cleaner in terms of CO2 emissions.

Electric Vehicle Charging Profiles – by Category

Estimate of Electric Vehicle Charging Profiles assuming a mix of:
- 70% home
- 20% home + workplace
- 10% public (retail shopping, grocery shopping...)

CO2 Emissions from Fossil Fuel Combustion in 2016:
- Northwest
- California
- United States
Estimate of Electric Vehicle Charging Profiles

- 70% home
- 20% home + workplace
- 10% public (retail shopping, grocery shopping...)

General Approach & Methodology

1. Module within the Energy 2020 Model - consumer choice model
2. There is a calibration to historic data to set price-effect and non-price effect variables to model future choices
3. New demand must be met – due to stock retirement and growth via the forecast economic drivers
4. Note – this is an “energy” based model, not units based
5. Technologies compete in terms of price (vehicle capital cost, fuel cost, efficiency) and non-price factors to set market shares
6. The slowly changing makeup of the vehicle stock over time can impact electric loads and emissions
Key inputs

- Vehicle capital and maintenance costs
- Fuel prices
- Vehicle efficiency
- Emission factors
- Economic growth
- Charging profile
- Vehicle lifetime

Key outputs

- Electricity Demand
- Contribution to electricity peak load
- Pollution
- Vehicle unit sales & stock

Wrap Up

- In addition to a base forecast, some scenarios will likely be built – such as looking at a case of 100% electric vehicle sales market share by 2050
- Some components of the forecast may be exogenously calculated
- Work on the forecast is on-going thru the summer of 2019