ADM Meeting
June 20, 2017
1:00 — 3:00 p.m.
Agenda

1:00
Welcome & Announcements
*DEEP Commissioner Klee*

1:05
Review REMI inputs, assumptions, and analysis of the transportation and building sectors to date
*Stanley McMillen, Consultant*

1:35
Discuss and provide guidance on REMI inputs and assumptions

2:30
Public Comments
Review REMI inputs, assumptions, and analysis of the transportation and building sectors to date
Summary of Scenarios Modeled in REMI

• Compare relative costs of 35% and 45% GHG mid-term reduction targets in 2030 on the way to 80% by 2050

• The current REMI analysis focuses on transportation and buildings
LEAP Outputs Used in the Transportation Sector REMI Analysis

• Changes in vehicle purchases relative to the reference case

• Changes in transportation fuel consumption relative to the reference case

• Changes in criteria pollutant emissions relative to the reference case
  – Used to monetize the health benefits of improved air quality (LATER)
Non-residential EV Charging Station Investment, 35% Case

Non-Residential Net New EV Charging Station Investment - 35% Case

- Total installation
- Total Maintenance
- Total Hardware
Residential EV Charging Station Investment, 35% Case

Residential Net New EV Charging Station Investment - 35% Case

- Total Hardware
- Total Maintenance
- Total installation

Millions

$0 $10 $20 $30 $40 $50 $60 $70

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Non-residential EV Charging Station Investment, 55% Case
Residential EV Charging Station Investment, 55% Case

Residential Net New EV Charging Station Investment - 55% Case

- Total Hardware
- Total Maintenance
- Total Installation
Total Retail Fuel Sales, All Cases

Total Fuel Sales for Reference, 35%, 45% and 55% Cases

Billions of Current Dollars

Billions

Reference Total Fuel Sales
35% Total Fuel Sales
45% Total Fuel Sales
55% Total Fuel Sales

• CHEAPR continues at an average of $1.5 million per year through 2021 and induces a switch to EVs (about 600 vehicles per year).

• We assume consumers buy replacement vehicles that cost more.

• Health benefits will be incorporated after each wedge is complete and will be the sum of emissions reductions from each wedge translated into a combined health benefit.
Let’s Go CT Total Investment, All Cases

CT Transportation Total Investment

- Base Capital Program (Federal Funds + State Match)
- Let’s Go CT! Capital Program (Vision Level)
Let’s Go CT Net New Investment & Debt Service, All Cases

Net New 'Let's Go CT' Spending & Debt Service

Millions

Net New Spending

Net New Debt Service

Let’s Go CT Productivity Improvement, All Cases

• There is a large literature on the enhancement of private sector productivity following public sector investment. Such investments increase the efficiency of the movement of goods and people through and throughout the state and improve the productivity of the private sector. We capture this effect by increasing total factor productivity (TFP) by a small increment starting with a lag.

• The Let’s Go CT 5 Year Ramp Up Plan suggests that the lag might be five years before productivity improvement is realized. Estimates in the literature suggest that TFP could be increased by a few tenths of a percent each year.

• A conservative estimate might be an initial 0.1% improvement in 2021 in overall (all industries’) productivity. We assume this initial improvement grows at 1% per year through 2050 at which time total factor productivity improves by 0.133%.
• The improvements to the state’s transportation network not only improve overall productivity by increasing access to commodities, labor and output markets, they also increase safety and reduce vehicle hours traveled (VHT) that in turn reduce GHGs.

• We do not account for these co-benefits of the Let’s Go CT program and to this extent, our estimates of its benefits are conservative. In addition, because we do not account for the decline in gas-powered automobile complementary retail parts and services, our analysis is conservative.
Transportation Wedge 35% Case: Percent Changes in State Revenues & Expenditures

- Total Revenues Thousands of Current Dollars
- Total Expenditures Thousands of Current Dollars

Percent Change from Reference Case

- FY2016
- FY2017
- FY2018
- FY2019
- FY2020
- FY2021
- FY2022
- FY2023
- FY2024
- FY2025
- FY2026
- FY2027
- FY2028
- FY2029
- FY2030
- FY2031
- FY2032
- FY2033
- FY2034
- FY2035
- FY2036
- FY2037
- FY2038
- FY2039
- FY2040
- FY2041
- FY2042
- FY2043
- FY2044
- FY2045
- FY2046
- FY2047
- FY2048
- FY2049
- FY2050

Total Revenues Thousands of Current Dollars: Blue Line
Total Expenditures Thousands of Current Dollars: Orange Line
Transportation Sector REMI Results, 55% Case

Transportation Wedge 55% Case: Percent Change in Macroeconomic Variables

- Total Employment Thousands (Jobs)
- Private Non-Farm Employment Thousands (Jobs)
- Population Thousands
- Gross Domestic Product Billions of Fixed (2009) Dollars
- Personal Income Billions of Current Dollars
Transportation Sector REMI Results, 55% Case

Transportation Wedge 55% Case: Percent Changes in State Revenues & Expenditures

Percent Change from Reference Case
LEAP Outputs Used in the Building Sector REMI Analysis

- Changes in electric demand relative to the reference case
- Changes in the adoption of heat pumps relative to the reference case
- Changes in energy efficiency relative to the reference case
- Changes in criteria pollutant emissions relative to the reference case
  - Used to monetize the health benefits of improved air quality (LATER)
Building Sector Heat Pump Deployment, 35% Case
Building Sector Heat Pump Deployment, 35% Case

Residential & Commercial Heat Pump Investment, 35% Case

Millions of Current Dollars


- Capital (hardware)
- Labor
- Material (wholesale)
- Wholesale Markup (20%)
Building Sector Heat Pump Deployment, 55% Case

Combined Residential & Commercial Demand Changes for Electricity, LPG, Fuel Oil & Natural Gas, 55% Case Heat Pump Deployment

Years: 2016 to 2030

Millions of Current Dollars:
- $2,000
- $1,500
- $1,000
- $500
- $0
- $500
- $1,000
- $1,500
- $2,000

Energy Sources:
- Electricity
- Natural Gas
- Diesel
- LPG

Graph shows the projected demand changes for electricity, LPG, fuel oil, and natural gas over the years from 2016 to 2030 in the context of 55% case heat pump deployment.
Building Sector Heat Pump Deployment, 55% Case

Residential & Commercial Heat Pump Investment, 55% Case

[Graph showing the investment in millions of current dollars from 2016 to 2050, divided into categories such as capital (hardware), labor, material (wholesale), and wholesale markup (20%).]
Building Sector Savings from Energy Efficiency

Natural Gas & Electricity Savings (Reduced Demand via Energy Efficiency)

- Electricity Expenditure Savings; Million$ Res + Comm
- Gas Expenditure Savings; Million$ Res + Comm
REMI Results Building Sector, 35% Case

Percent Differences from Reference Case, 35% Case

- Total Employment Individuals (Jobs)
- Private Non-Farm Employment Individuals (Jobs)
- Population Individuals
- Gross Domestic Product Thousands of Current Dollars
- Personal Income Thousands of Current Dollars
REMI Results Building Sector, 55% Case

Percent Changes in Macroeconomic Variables, 55% Building Sector Case

- Total Employment Individuals (Jobs)
- Private Non-Farm Employment Individuals (Jobs)
- Population Individuals
- Gross Domestic Product Thousands of Current Dollars
- Personal Income Thousands of Current Dollars
REMI Results Building Sector, 55% Case
Discuss and provide guidance on REMI inputs and assumptions
Public Comments