Scenarios Modeling Macroeconomic Impacts of a California-style Low Carbon Fuel Standard in Oregon

Scott Williamson & Michael Lawrence

Jack Faucett Associates

Bethesda, MD 20814

January 23, 2012

swilliamson@jfaucett.com

lawrence@jfaucett.com

Economics
Public Policy
Planning
Jack Faucett Associates
Since 1963

Today's Discussion

- Economic Truths
- Impacts of Change
- Types of Impacts
- Defining Scenarios
- Results

Economics Tenets

- Consumers Are Generally Rational
- General Rule: There Is No “Free Lunch”
  - Gains in one sector are generally losses elsewhere
- But - Petroleum Changes that Rule!
  - Oil imports ship dollars overseas
  - Replacing imports with domestic sources lets local economy capture producer surplus, profit, employment, etc.
  - Displacing Petroleum: *local* gains, *foreign* losses

Oregon and Transportation Fuel

- Oregon Imports 100% of its Gasoline and Diesel
  - No Refineries in-State
  - No Extraction in-State

- Has Potential for Domestic Production
  - Keep dollars spent inside Oregon
  - Supply-side investment, revenue, employment all move into Oregon from around the world

Key Assumptions

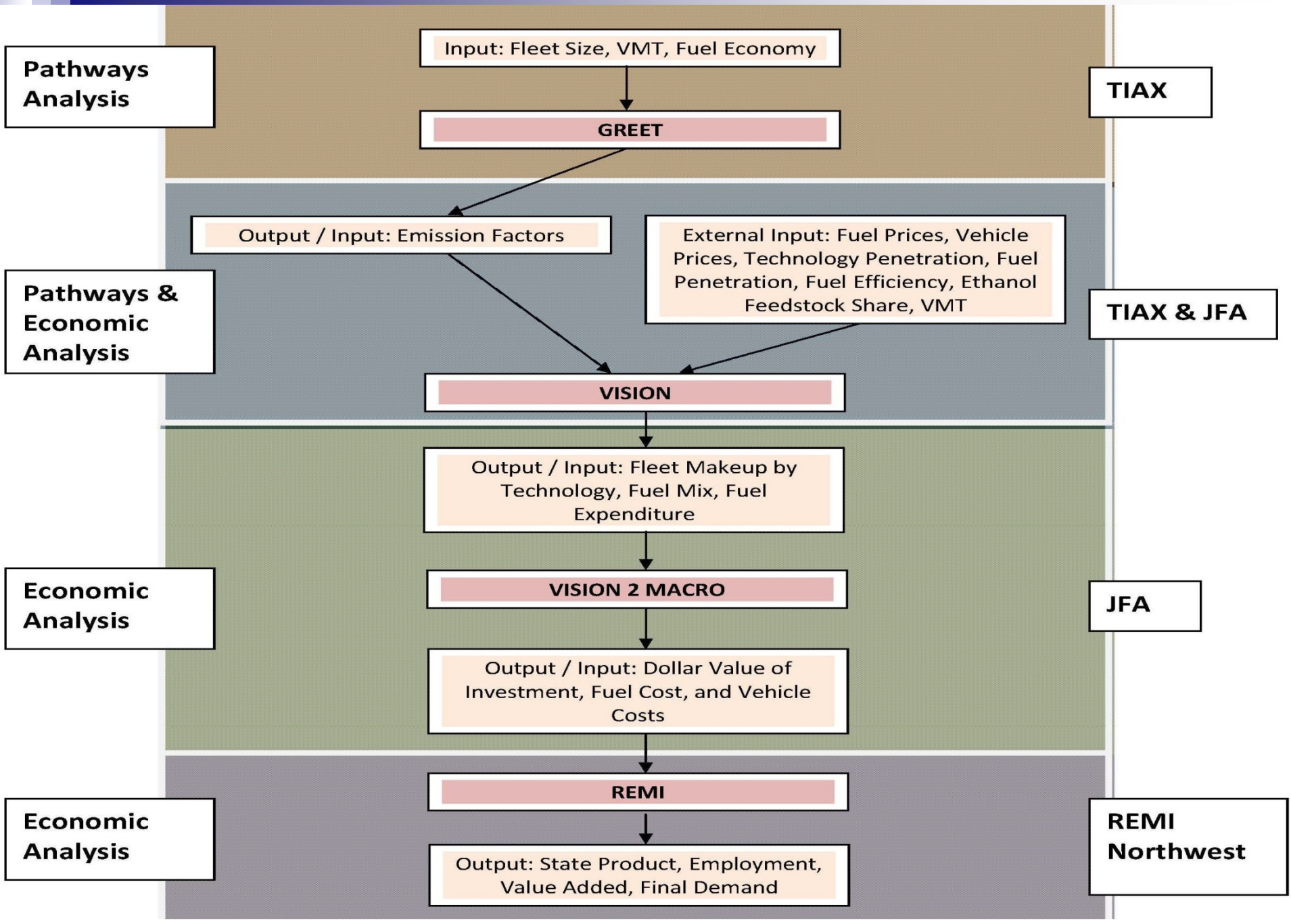
- Fuel Price Projections
  - Annual Energy Outlook (DOE)
- Fleet Fuel Efficiency
  - Annual Energy Outlook (DOE)
- New Capital Spending
  - Refining Facilities
  - Equipment
  - Infrastructure

Defining Scenarios Carefully

- 8 Scenarios: Possible Responses to LCFS
  - All Displace Petroleum with Alternate Fuels
  - All Hit LCFS Target – 10% Cleaner Fuels Mix in 10 Years
- Scenarios Covered:
  - Variety of Biofuels Options (domestic and foreign, cellulosic and traditional)
  - Electric and NG Vehicle Fleet Growth
- Comparison based on Projections
  - Projections built on assumptions; Projections are *not* predictions of future

Defining Scenarios Carefully: Oregon LCFS Example

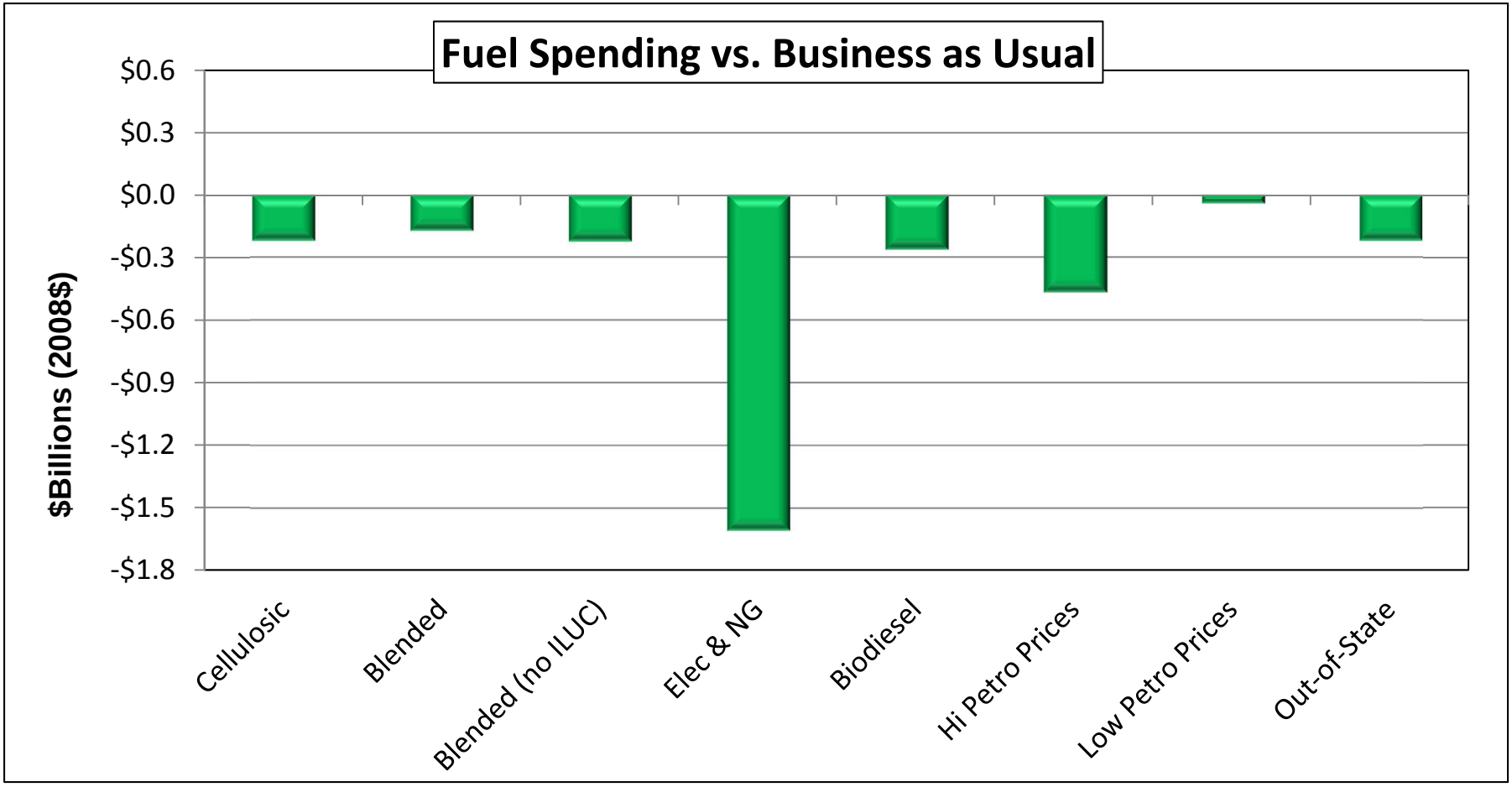
- Scenario Design Included:
  - Period of Analysis (2012 to 2022)
  - Ramp-up of Impact (gradually reaching 10%)
  - Fuel Price Projections for Many Fuels
  - Vehicle Fleet Changes (w/ associated costs)
  - Capital Costs for Alt-fuels Production
  - Infrastructure Requirements
  - And Many More…


Pathways Analysis
Input: Fleet Size, VMT, Fuel Economy
GREET
TIAX
Pathways & Economic Analysis
Output / Input: Emission Factors
External Input: Fuel Prices, Vehicle Prices, Technology Penetration, Fuel Penetration, Fuel Efficiency, Ethanol Feedstock Share, VMT
VISION
TIAX & JFA
Output / Input: Fleet Makeup by Technology, Fuel Mix, Fuel Expenditure
Economic Analysis
VISION 2 MACRO
Output / Input: Dollar Value of Investment, Fuel Cost, and Vehicle Costs
JFA
Economic Analysis
REMI
Output: State Product, Employment, Value Added, Final Demand
REMI Northwest

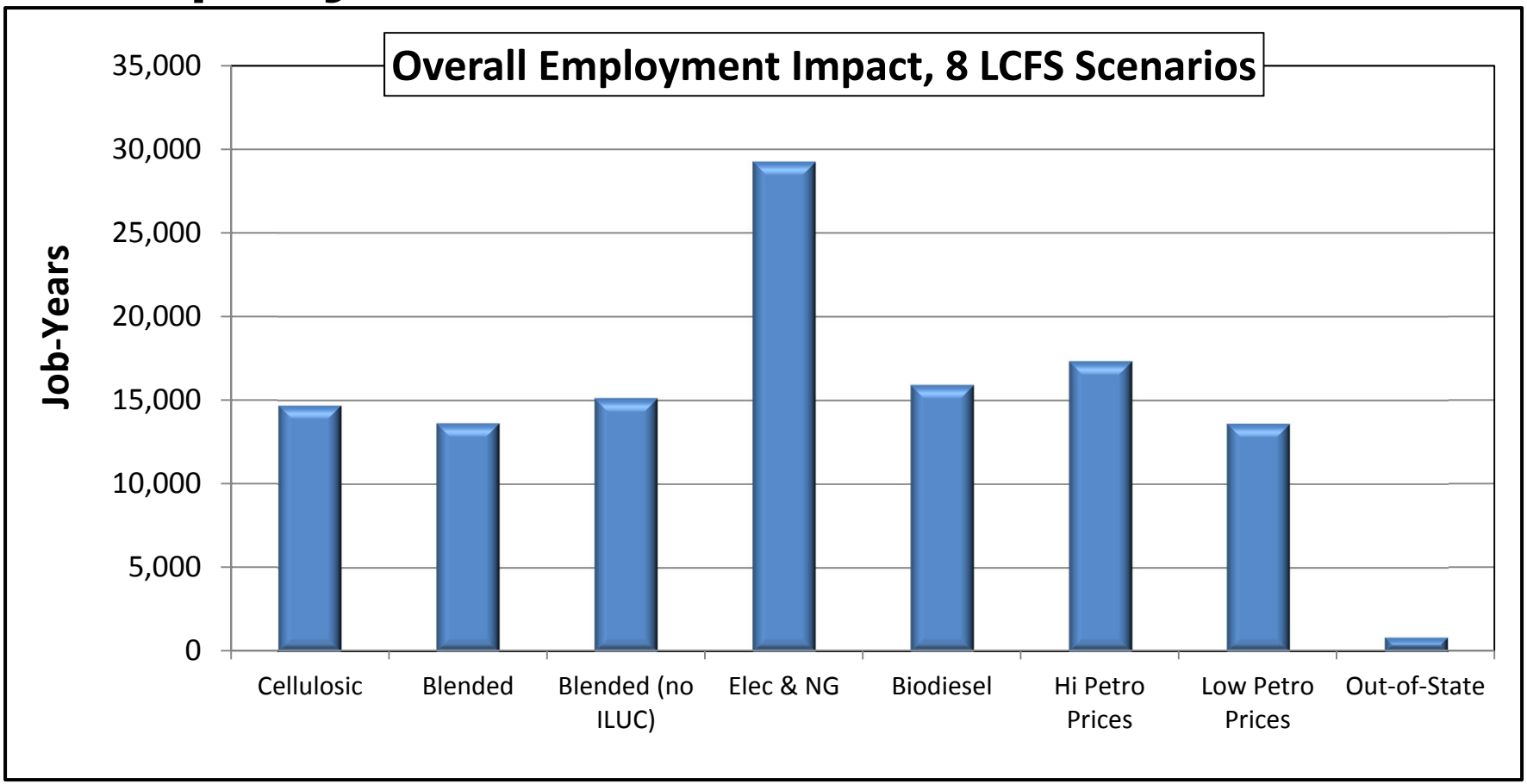
Calculation Approach

- Catalogue All Costs
  - Direct
  - Indirect
- Quantify All Costs, And All Savings
- Macroeconomic Analysis (REMI PI+):
  - Applying costs and savings to larger economy
  - Measuring economy-wide changes

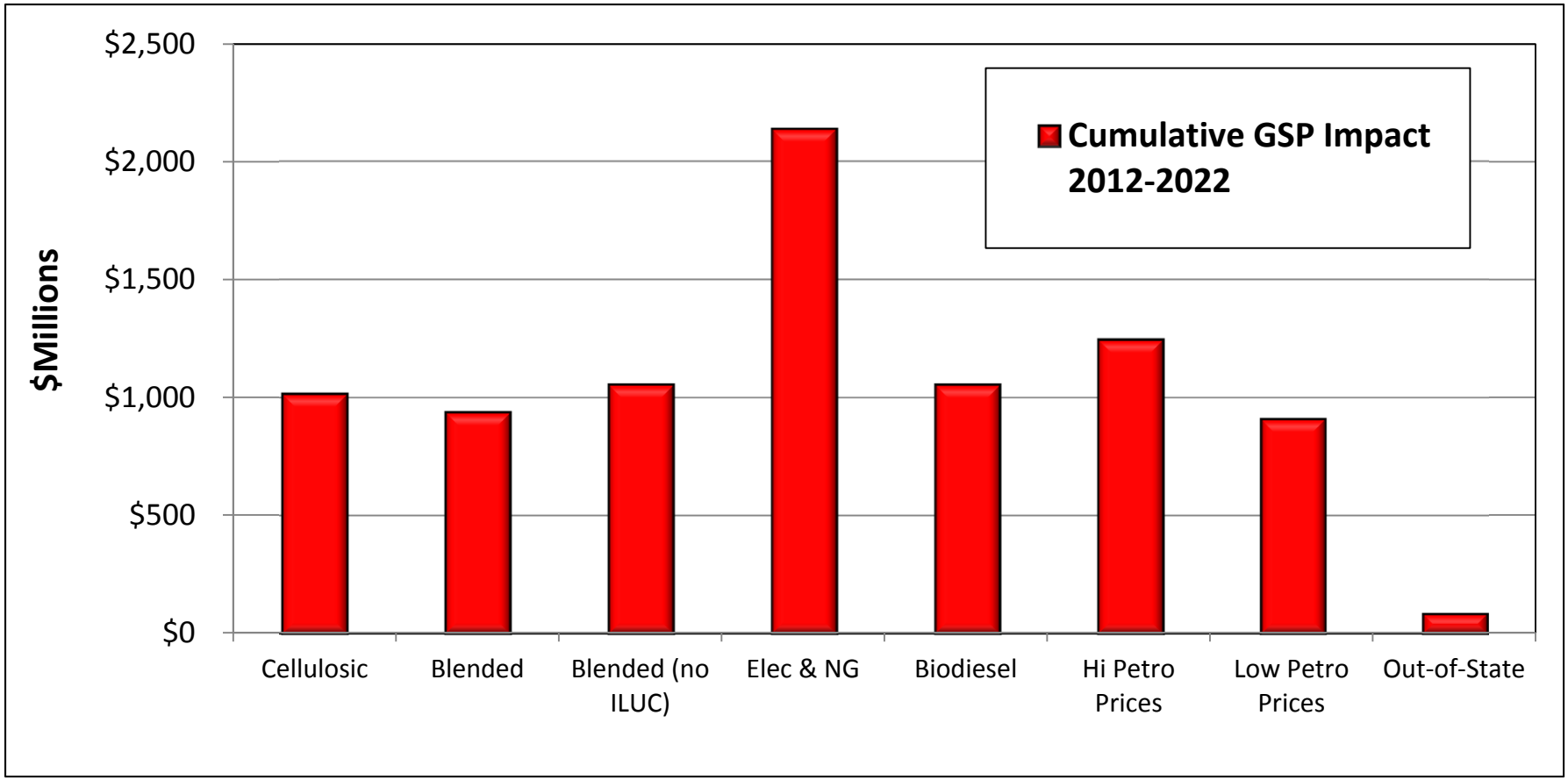
Oregon LCFS Reduces Fuel Expenditures



Oregon LCFS Increases Employment



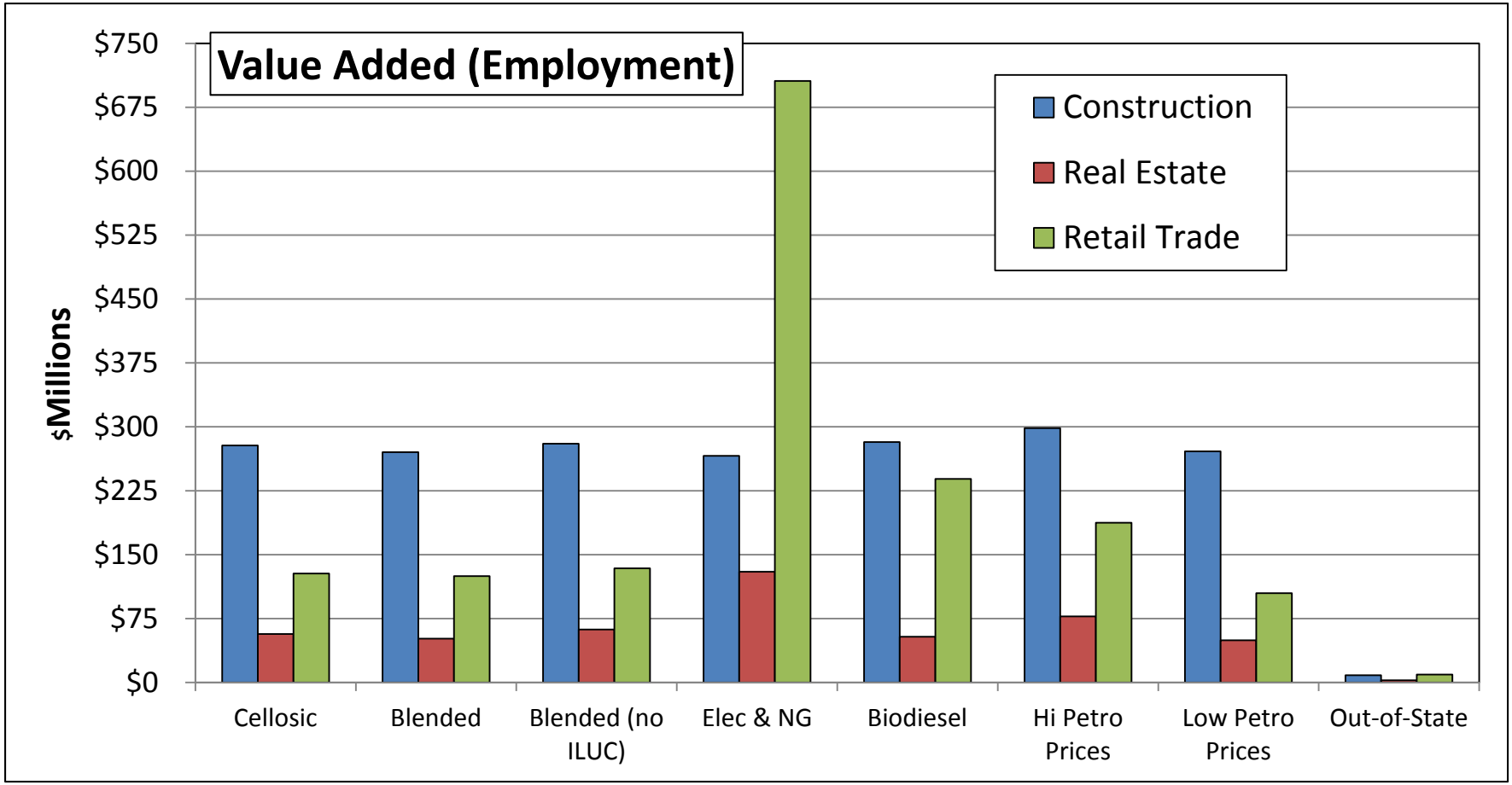
Oregon LCFS Enhances Gross State Product



Economic Changes by Sector

- 9 Sectors Most Heavily Affected
  - Construction, Real Estate, Retail & Wholesale Trade, Professional Services, Health Care, Banking, Waste Management and Administrative Services
- For all 9: Impacts Positive in All Scenarios
  - No sector showed significant economic losses

Oregon LCFS Benefits Multiple Sectors



Summary of Benefits

	Range of Benefits Over 10-Years
Employment	863 – 29,290 Jobs
Fuel Savings	$43 – $1,607 Million
Personal Income	$60 – $2,630 Million
Gross State Product	$70 – $2,140 Million

Takeaways

- Scenario D (high EV, NG, some BF): Earlier investment, big fuel savings drive largest positive economic impacts
- Even when fuel prices are low, in-state biofuels bring positive impact through investment
- But: Importing low-carbon fuels leaves economy similar to when importing petroleum

Uncertainties

- 10-year study captures capital growth phase
  - Biofuels: Construction of refineries
  - Electricity: Installation of charging capacity
  - Liquid Fuels: Pumping and distribution infrastructure

- Study stops just as construction tapers off
  - What will longer-term economic effect be?
  - What effect of a mature, rather than newborn, alt-fuels industry?

Uncertainties (2)

- Fuel price projections are important to result, yet projections are of limited confidence
  - Benefit from natural gas & electricity: some fuel price stability
- Would all capital investment actually come from outside state?
  - Domestic capital would reduce scale (not direction) of positive impacts

Other Studies

- Other state-level studies (Washington, California): generally positive economic impacts

- National-level studies: Supply limits drive expectations of inflated prices for low-carbon fuels; generally negative economic impacts

Questions and Discussion

- Thank You Very Much!

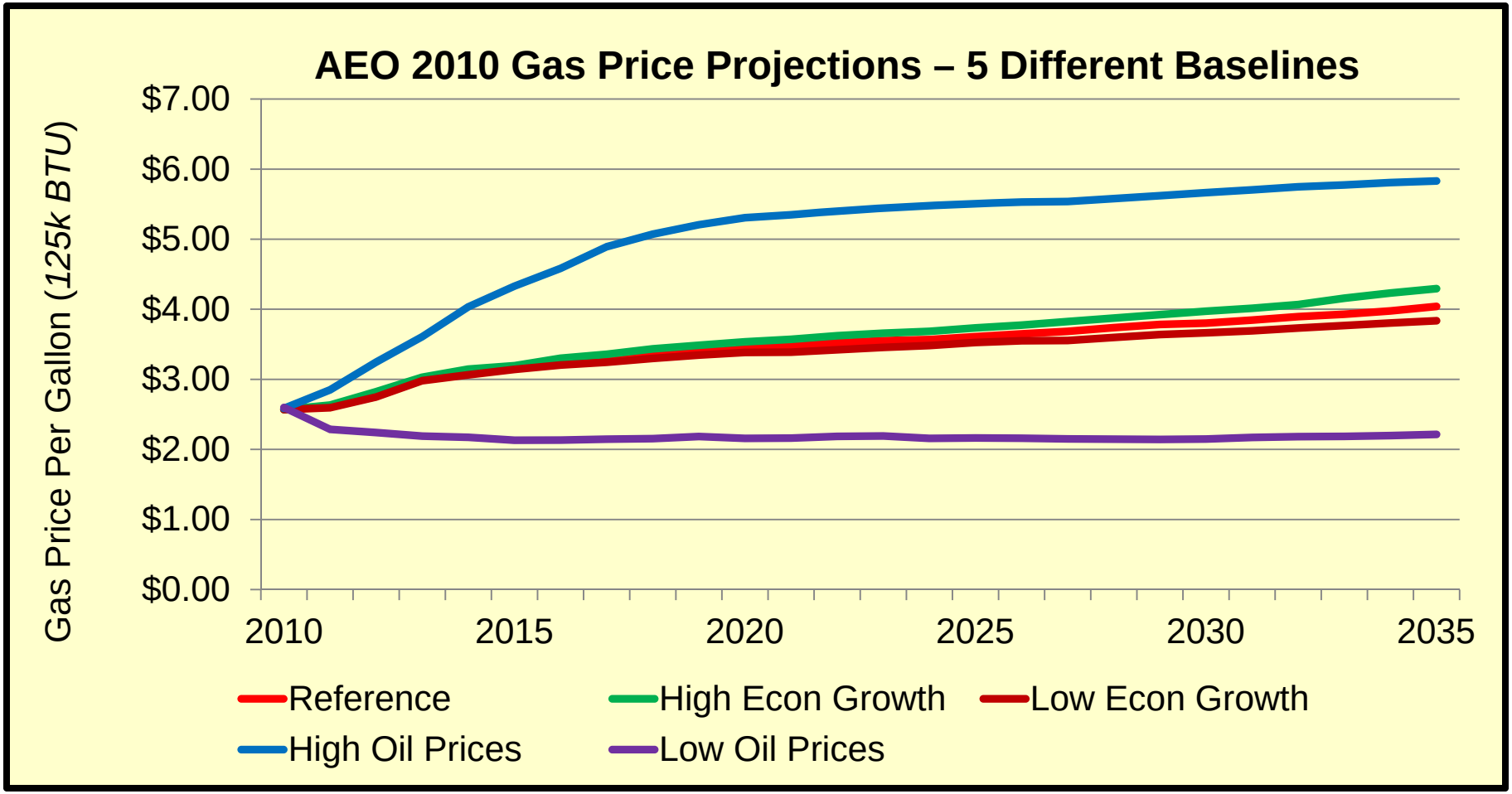
Scott Williamson
Jack Faucett Associates
4550 Montgomery Ave., Suite 300N
Bethesda, MD 20814
301-961-8835
swilliamson@jfaucett.com

Economics
Public Policy
Planning
Jack Faucett Associates
Since 1963

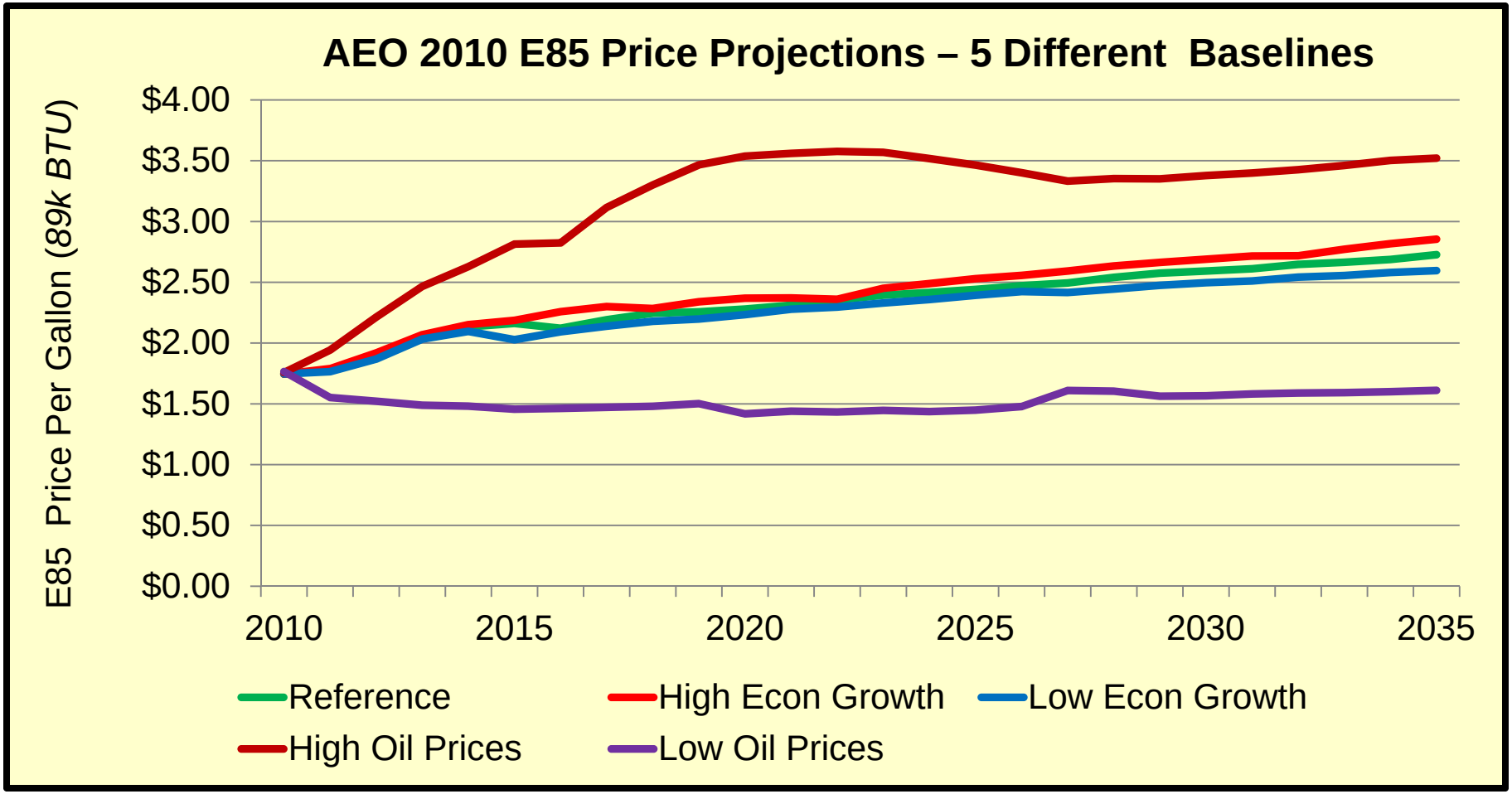
Reference Slides

- *Variability of Fuel Price Assumptions – 3 Slides*
- *Economic Changes by Sector – 2 Slides*
- *Details of Low-Carbon Fuel Assumptions for Each of Eight LCFS Scenarios – 2 slides*

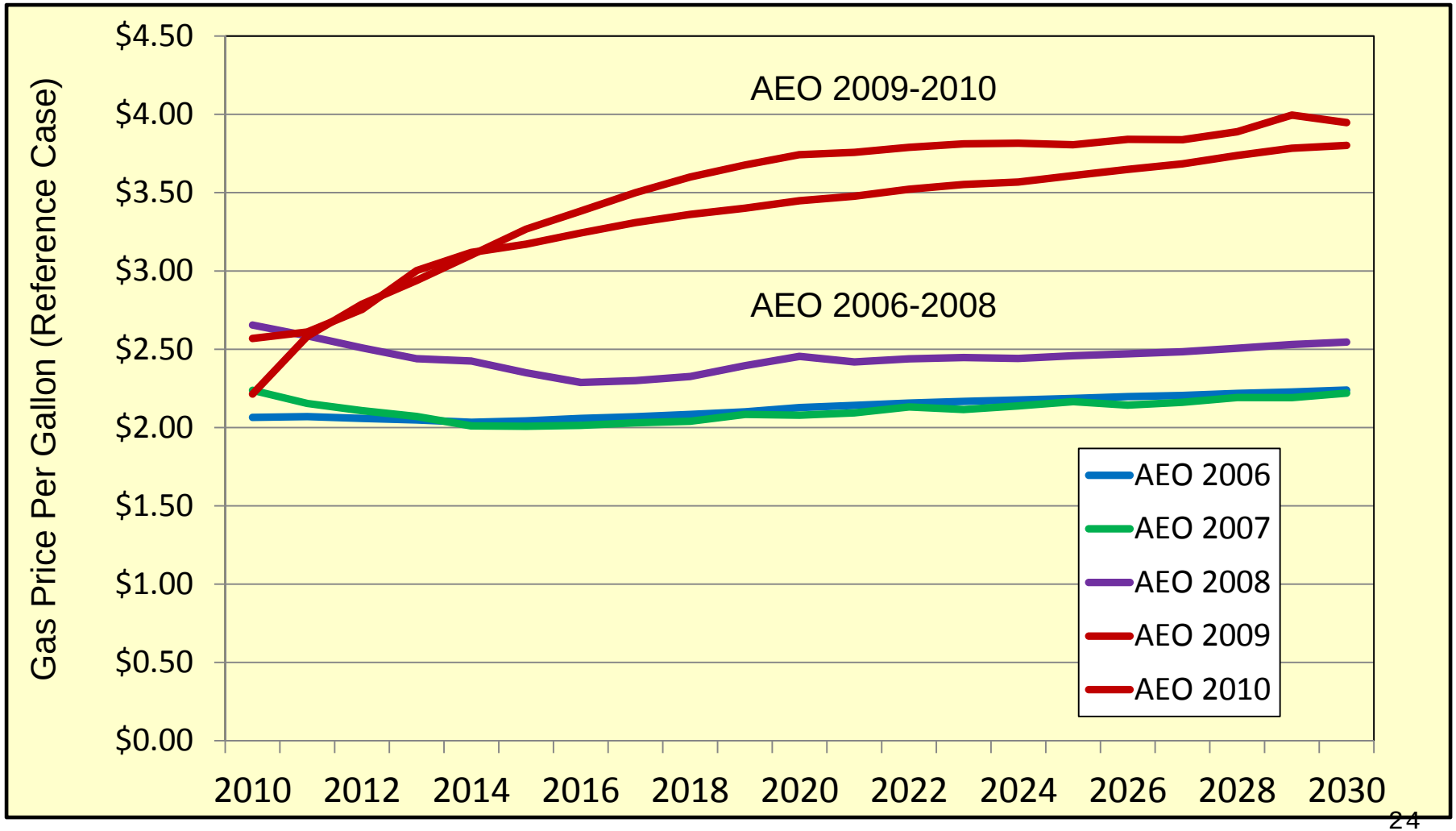
Growth and Oil Price Assumptions Determine Gas Price Projections



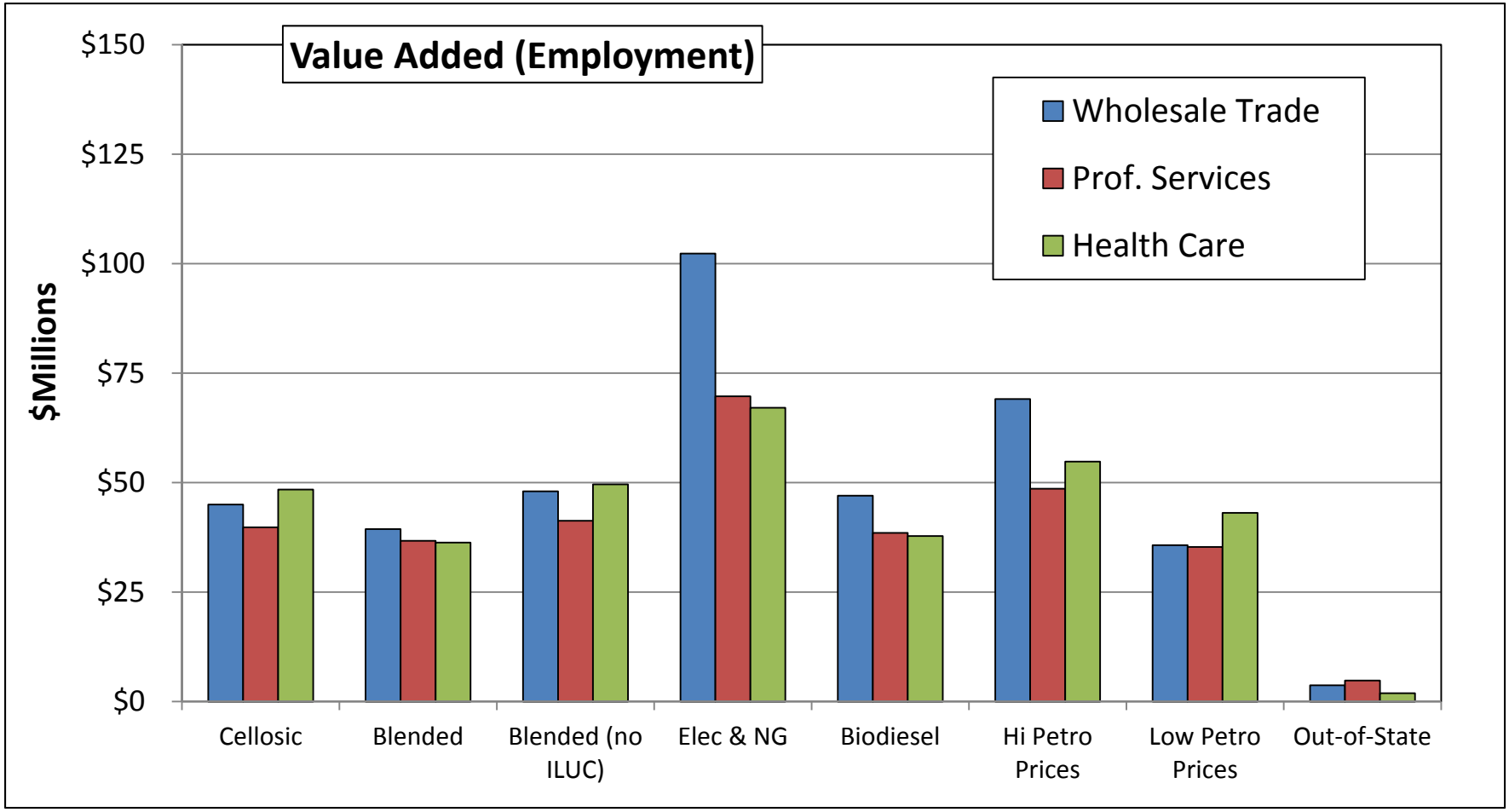
E85 Prices are Similarly Sensitive to Assumptions



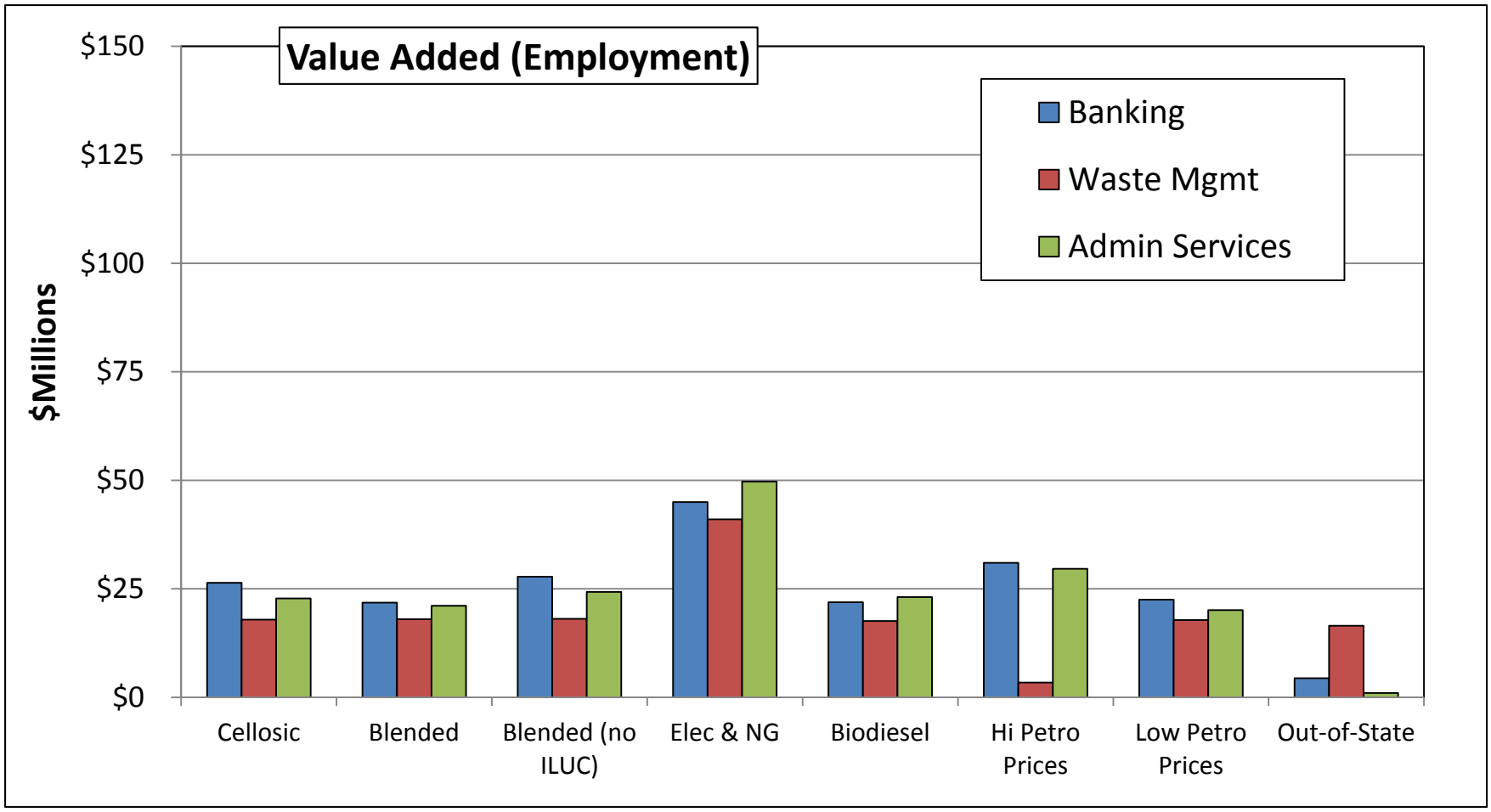
Fuel Price Forecasts Change Over Time



Economic Changes by Sector



Economic Changes by Sector



Oregon LCFS Scenarios A-D

- A: Maximizing in-state biofuels production
  - All cellulosic biofuels
- B: Maximizing in-state biofuels production
  - Blend of feedstocks, includes ILUC
- C: Same as B, but…
  - No ILUC assumed
- D: High Electric Vehicle (EV) growth
  - And CNG for the heavy duty fleet

Oregon LCFS Scenarios E-H

- E: One-Pool Scenario
  - EER Applied for Diesel, some electric & CNG
- F: High Fuel Price Scenario
  - Same as C, but assumes high fuel prices
- G: Low Fuel Price Scenario
  - Also same as C, but assumes low fuel prices
- H: Out of State Biofuels Supply
  - Same as A, but no new production in Oregon