Economic Impacts of Reducing GHG Emissions

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Michael Siers, Senior Economist
Catherine Menking, Research Associate II

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Project Background

- Towson University's Regional Economic Studies Institute (RESI) has a long history with MDE.
- Most recently, RESI has been involved in estimating the economic impact of efforts to reduce greenhouse gas emissions.
- In 2015, RESI evaluated two spending levels for GHG mitigation:
  - Status Quo Program Spending
  - Potential Enhanced Program Spending

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Findings From 2015 Analysis

Status Quo Scenario:

- Approximately **26,322** jobs maintained in 2020
- **$36.2** billion in output between 2010 and 2020
- Total cost approximately **$33.6** billion
- Total net benefit of **$2.5** billion

Enhanced Spending Scenario:

- Approximately **33,443** jobs maintained in 2020
- **$49.3** billion in output between 2010 and 2020
- Total cost approximately **$45.8** billion
- Total net benefit of **$3.5** billion

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Project Background

- In 2016, RESI completed a “true-up” analysis for MDE, evaluating whether previous estimates of job gains as a result of 3 GHG mitigation strategies held true.
  - RGGI
  - EmPOWER
  - RPS
- Impacts appear to be positive, though precise estimates are difficult
  - Numerous confounding variables (i.e., economic recovery)

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Project Background

- This current project continues and expands previous analyses
- Added a GHG Emissions component to verify new programs will help achieve GHG reduction goals
  - Emissions modeling conducted by E3
- Current analysis includes examining changes in health outcomes
- Current analysis explores equity concerns
  - Who gains and loses under various policy scenarios?

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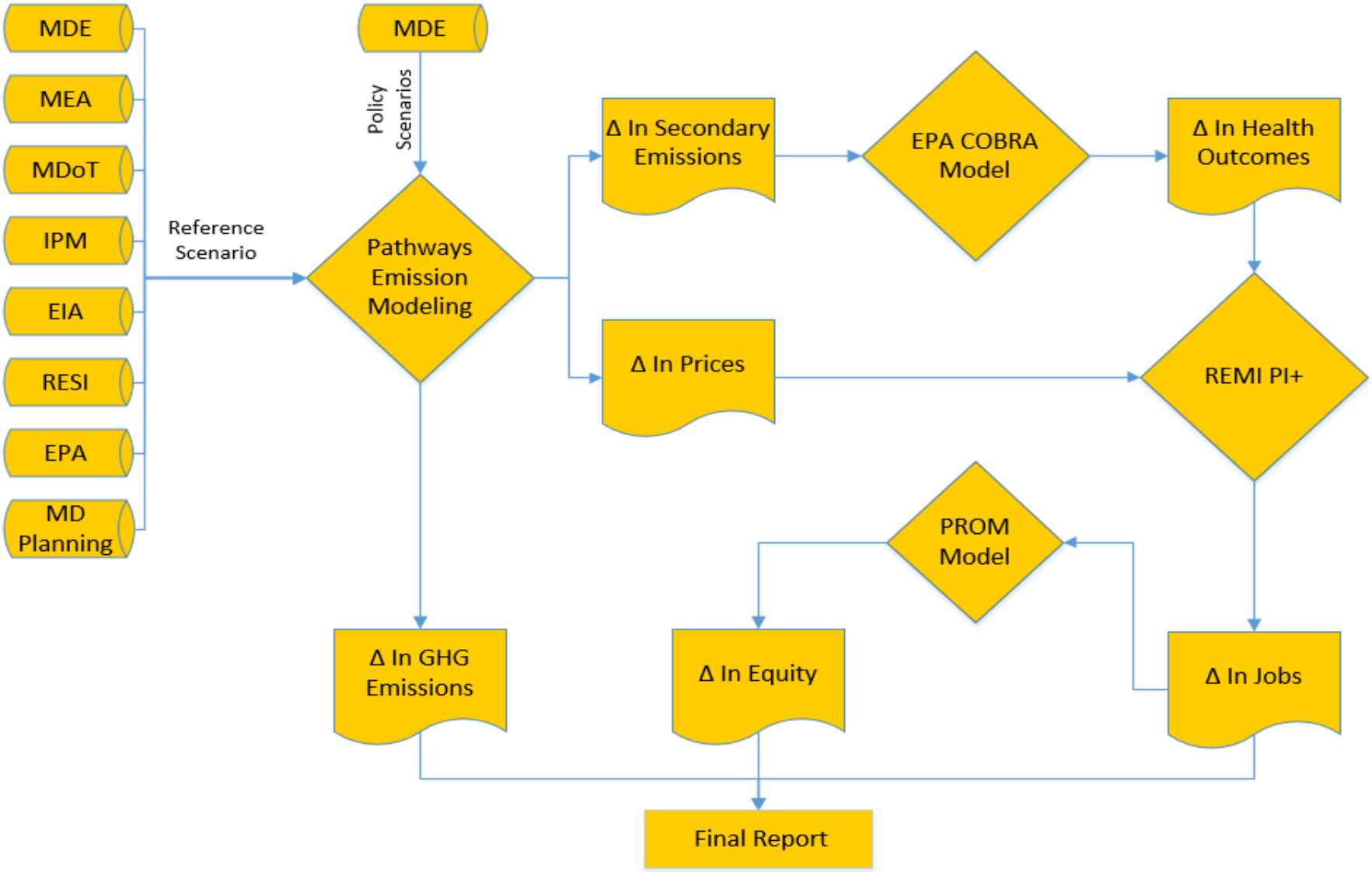
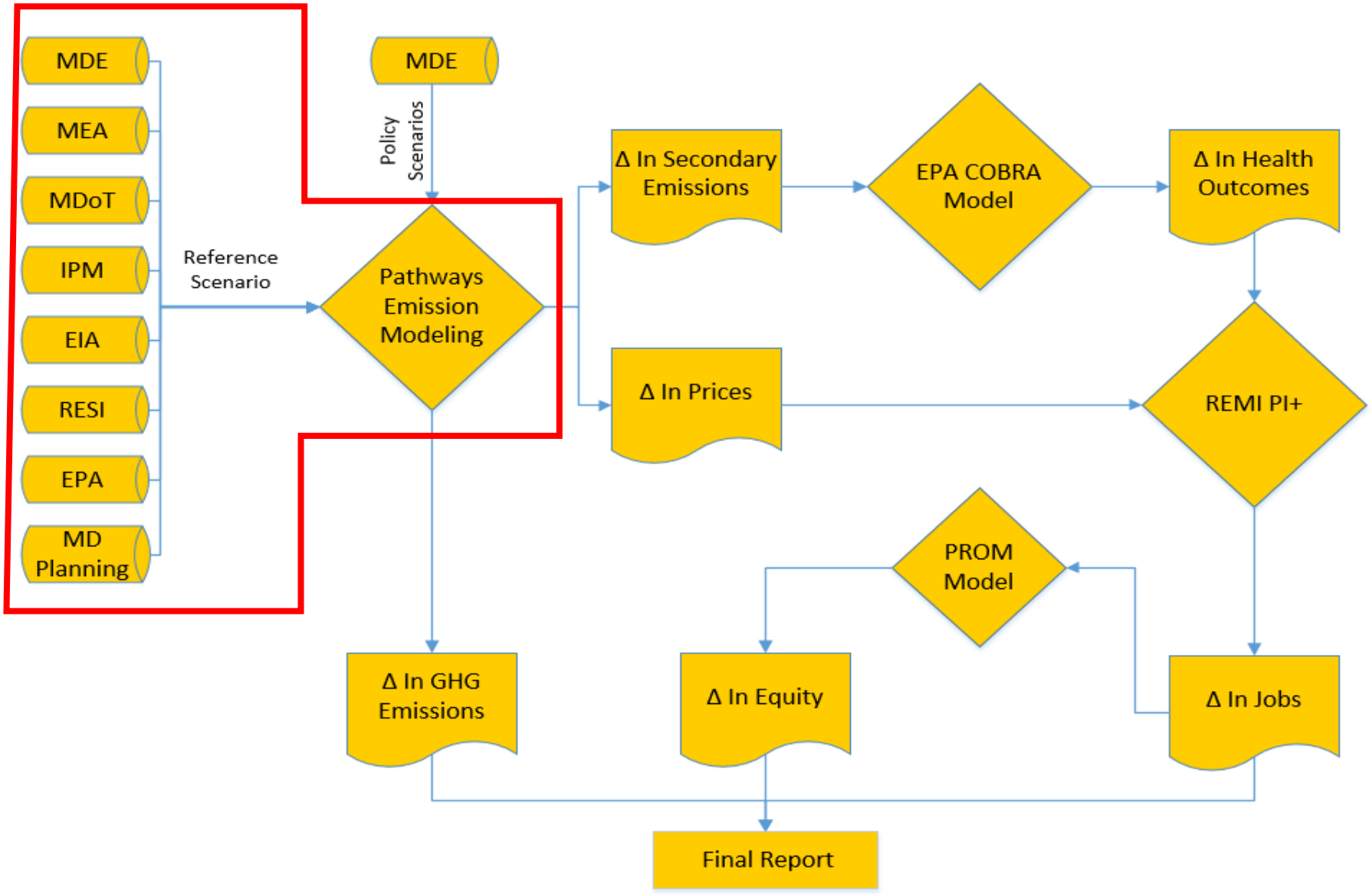
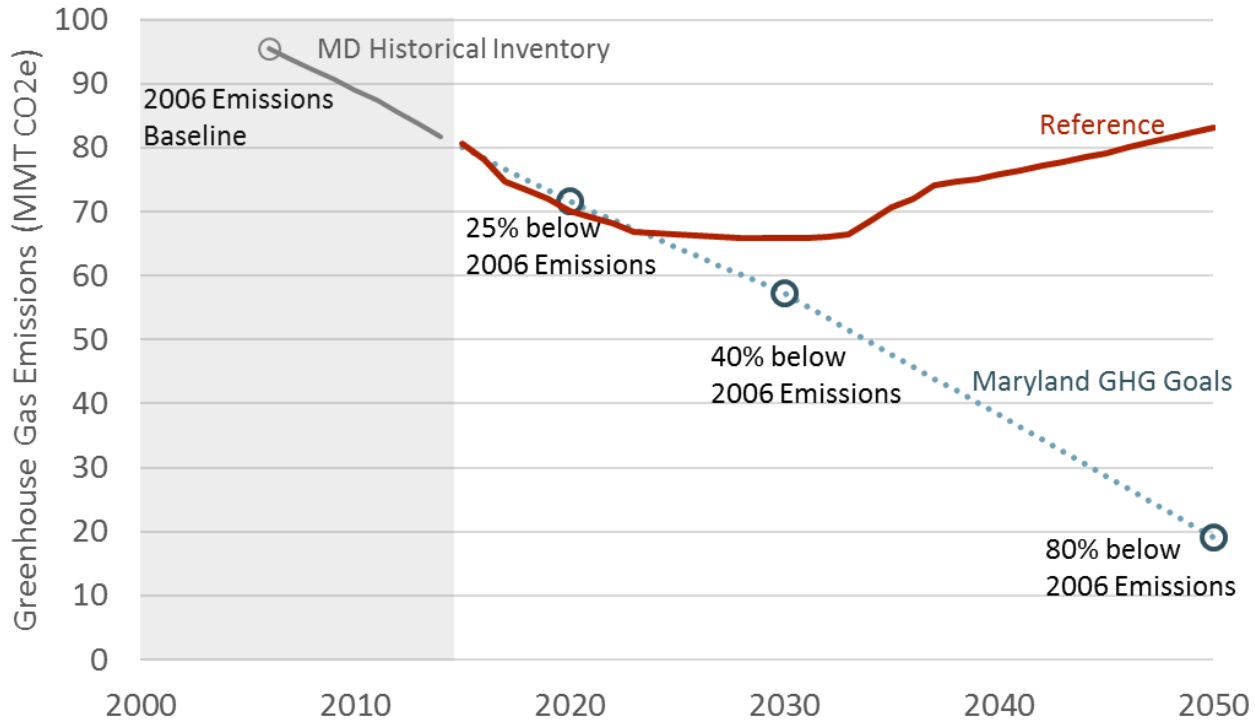
Analysis Framework



Reference Scenario Construction



Initial Reference Scenario Results



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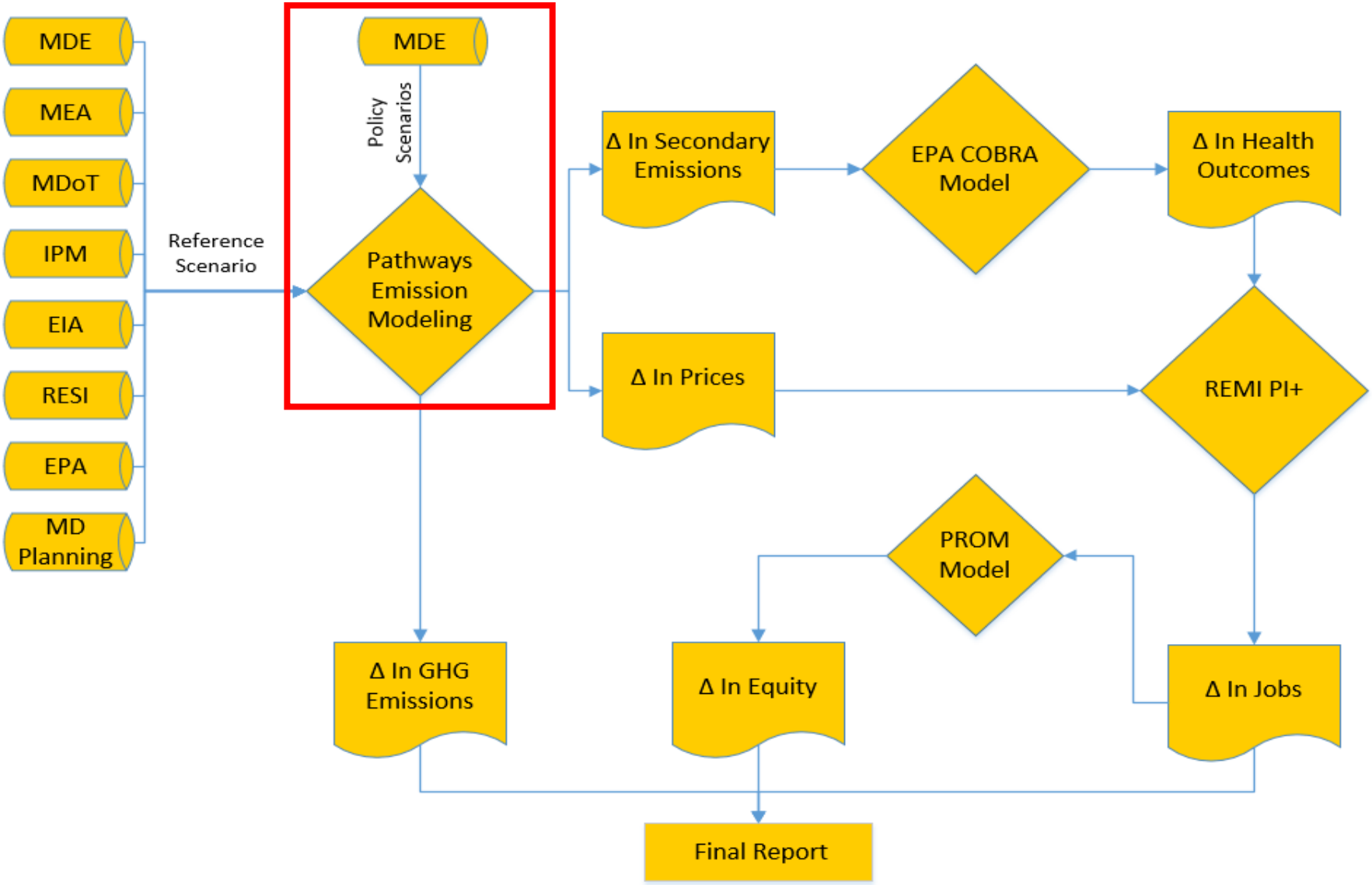
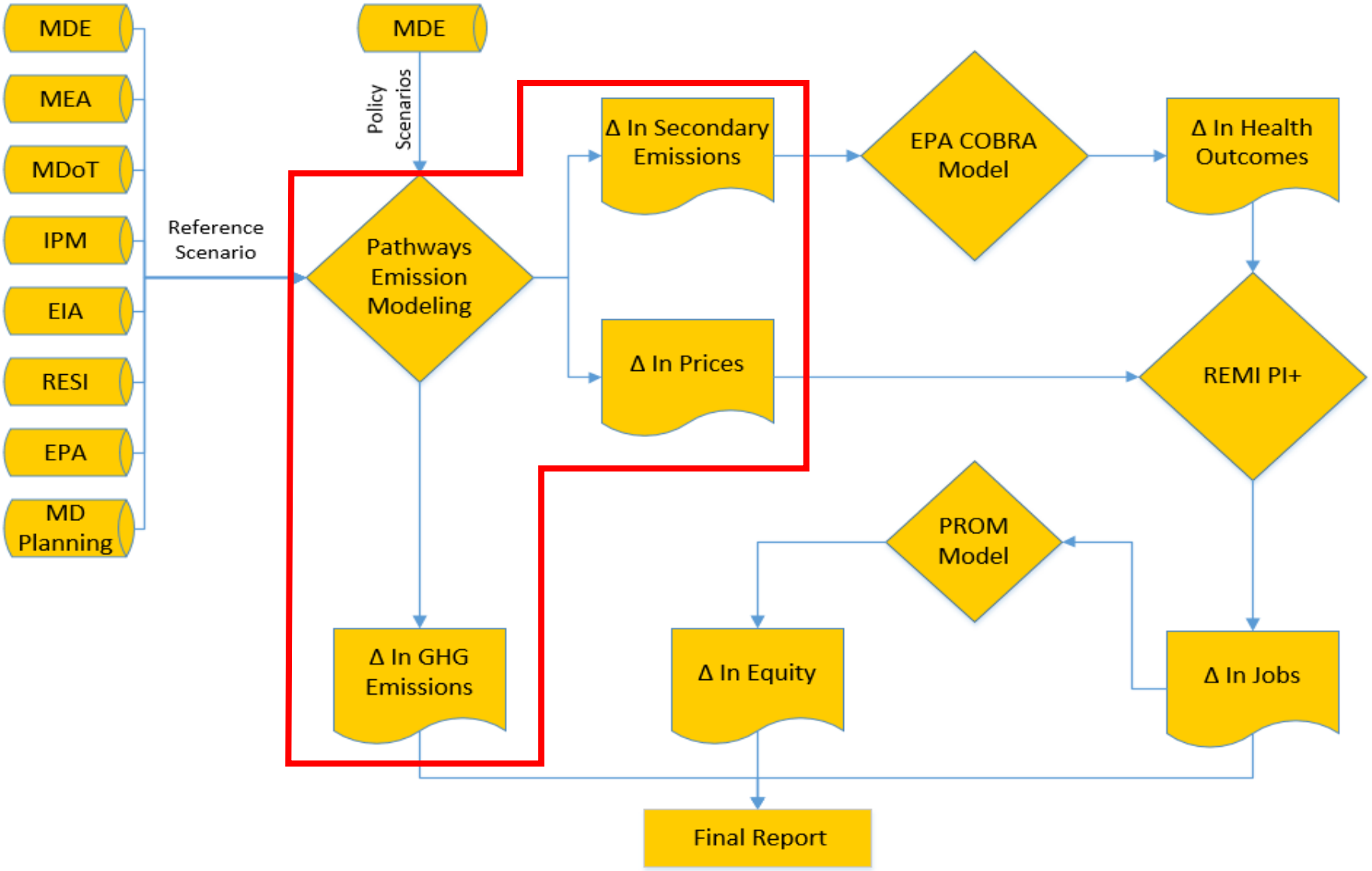
Policy Scenario Construction



Pathways Outputs



Pathways Output: Change in Prices

- Pathways outputs price changes for 42 different items:
  - Two Main Cost Types:
    - Equipment Costs and Fuel Expenditures
  - Six Sectors:
    - Households, Commercial, and Industrial
    - Light Duty Vehicles, Passenger Transport, Freight Transport
  - Six Fuel Types:
    - Oil, Gas, Electricity
    - Biofuels, Hydrogen, Waste Heat

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Pathways Output: Change in Secondary Emissions

- Pathways outputs changes in fuel consumption
- Fuel consumption multiplied by emission rates for co-pollutants yields changes in co-pollutant emissions, which are fed into EPA's COBRA Model.
- Pollutants other than GHG analyzed include:
  - SO2
  - PM2.5
  - NOx
  - VOCs

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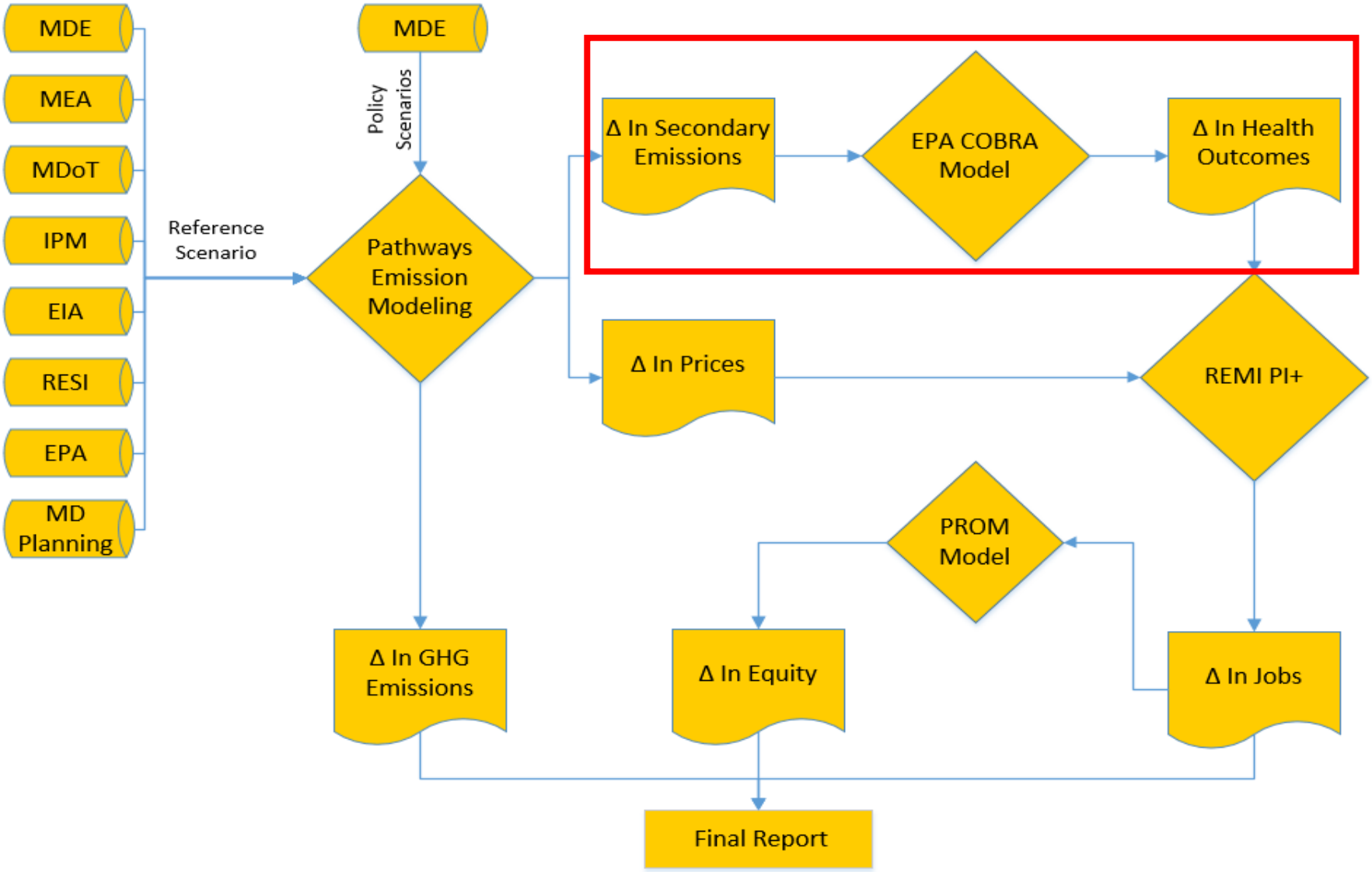
Health Outcomes Analysis



Health Outcomes Analysis

- Conducted using EPA's CO–Benefits Risk Assessment (COBRA) model
- Model translates changes in air pollution to economic values including:
  - Value of reduced morbidity and mortality
  - Value of reduced sick days
  - Value of increased health
- Economic values are then used in economic impact analysis

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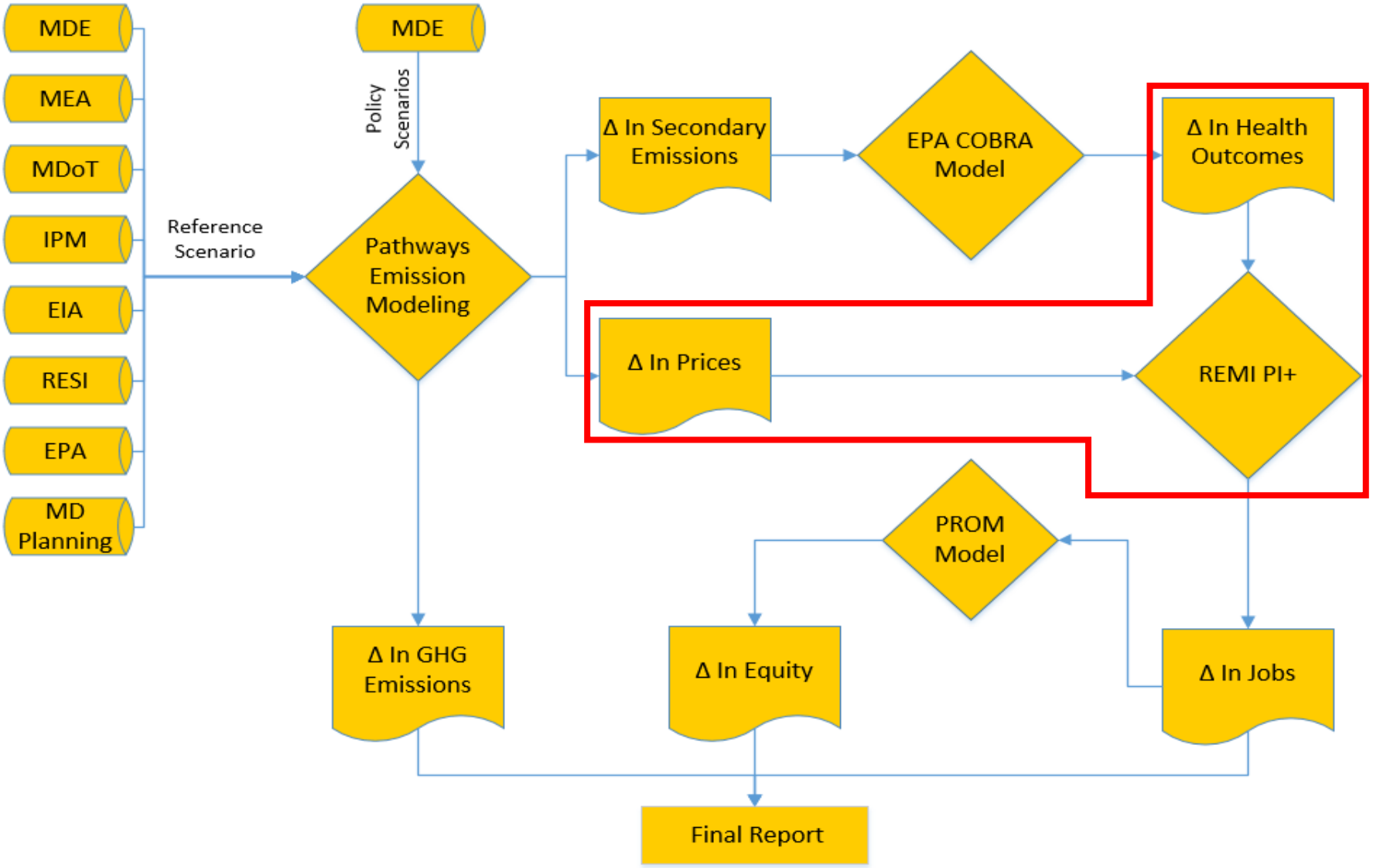
Economic Impact Analysis Within REMI PI+



Economic Impact Analysis Within REMI PI+

- REMI PI+ is a dynamic economic impact analysis software
  - Similar to IMPLAN or RIMS II
- REMI PI+ adds a time component to the analysis, allowing for economic migration in response to various shocks
  - Dynamic model is perfect for this analysis given the need to examine public health impacts and to extend the analysis over a long period
- For this project, inputs consist of:
  - Price changes from Pathways,
  - Changes to location desirability,
  - Changes in labor productivity
  - Changes in household spending patterns
    - Less on healthcare, more on other goods

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Economic Impact Analysis Within REMI PI+

- REMI Outputs:
  - Tabulated for five regions within Maryland
  - Employment changes by industry/occupation
  - Wages
  - Output
  - Population
- REMI Outputs are displayed relative to baseline estimates of growth
  - Negative job predictions do not necessarily imply layoffs, but just hiring that does not happen
- Economic impacts only cover program changes and do not include broader benefits of reducing GHGs.
  - Social Cost of CO_2 will be added separately to show impacts on productivity, health, damages from flood risk, etc

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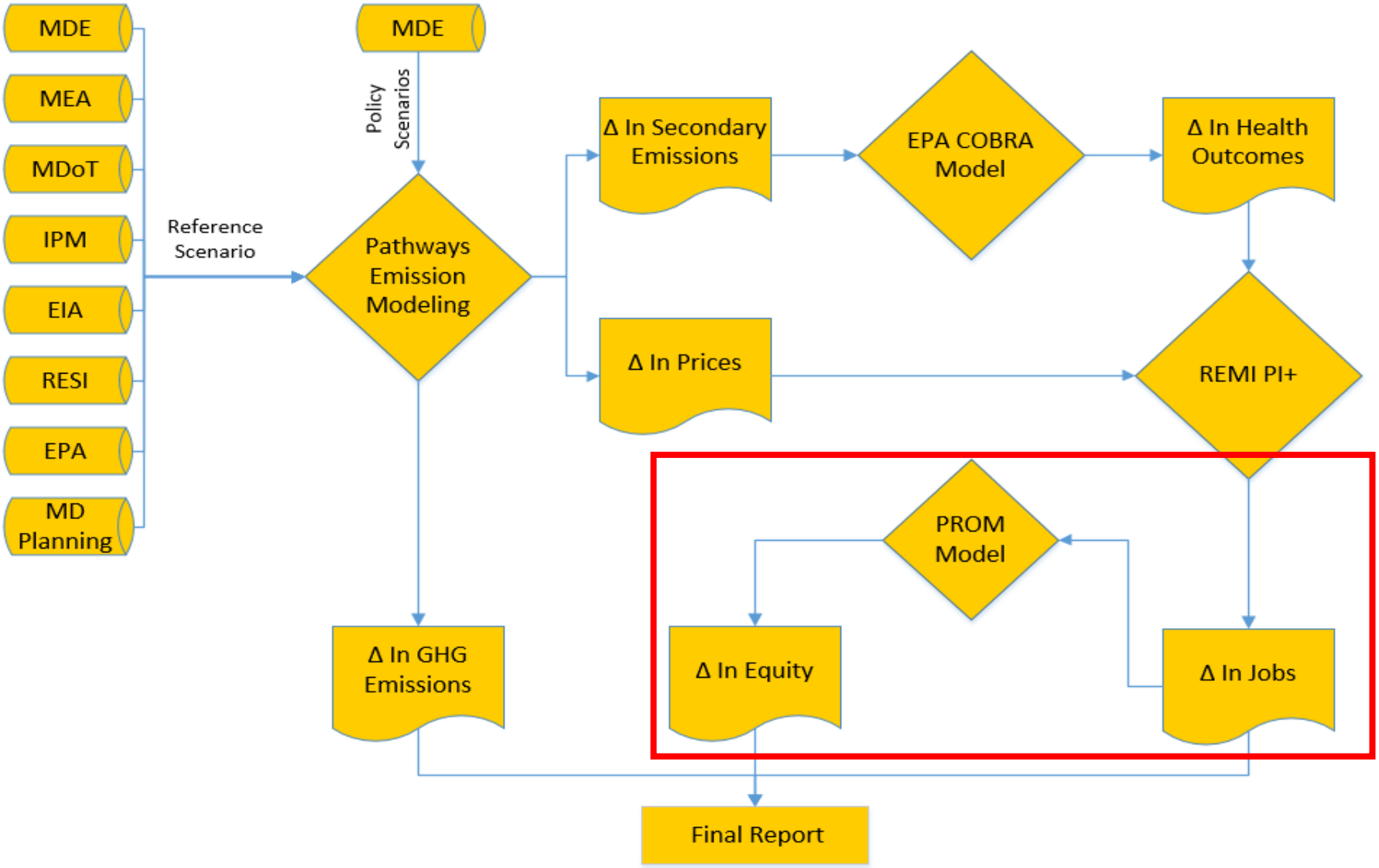
Equity Analysis



Equity Analysis

- Equity Analysis relies on RESI's proprietary PROM Model
  - Incorporates public and private data to produce demographic forecasts of employment by occupation.
- Examine job creation and losses as relevant and identify equity across:
  - Income
    - Are job gains for high or low-wage earners?
  - Education and Training
    - Will job gains require extensive training, serving as a barrier to entry?
  - Race and Ethnicity
    - How will job gains be distributed across racial and ethnic groups?

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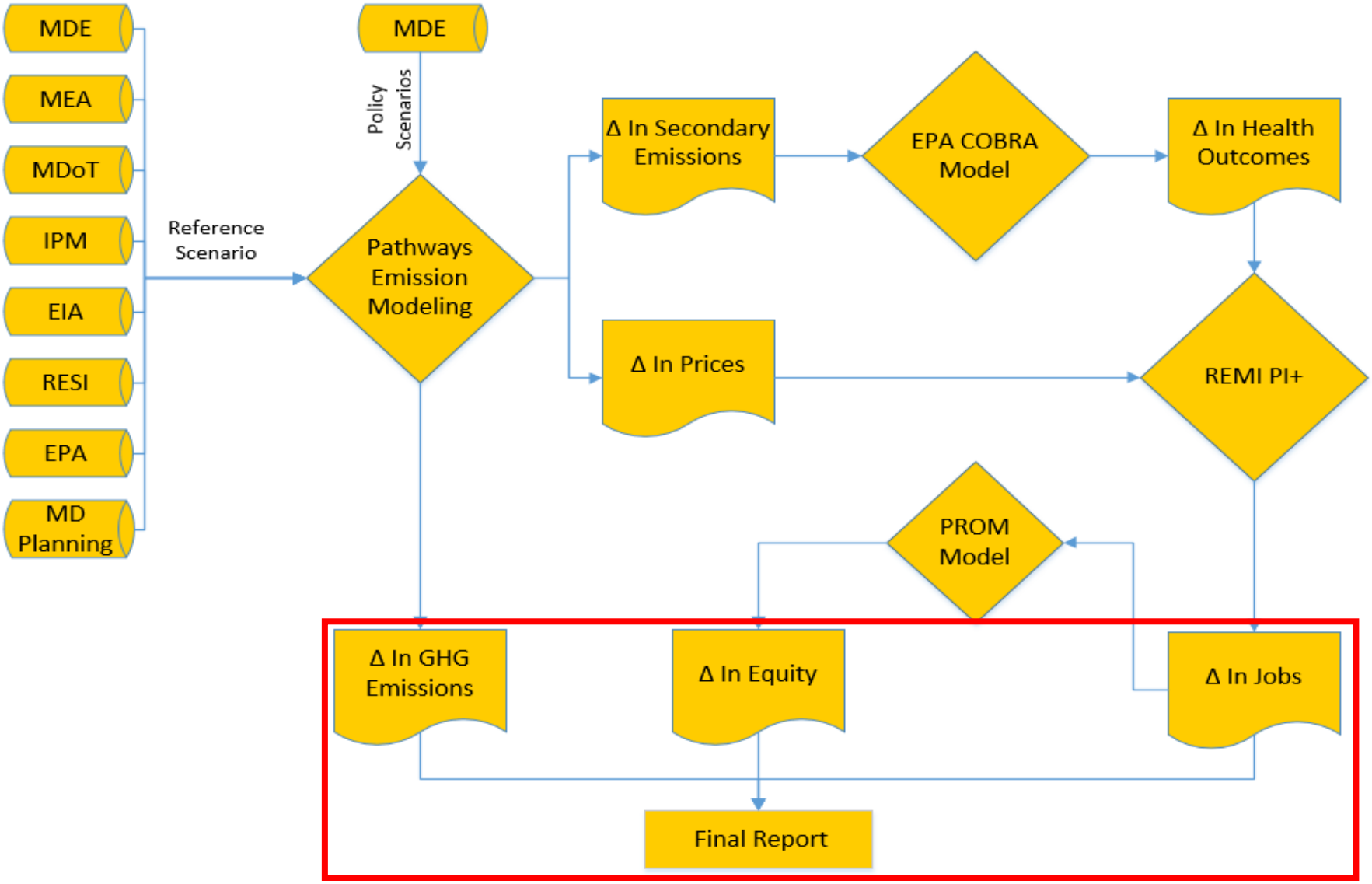
Final Report Construction



Questions?

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