

Supplemental Report to the STB on Freight Rail Capacity and Infrastructure Investment



CHRISTENSEN
ASSOCIATES

Presentation to RETAC
Mark Meitzen and Tom Bozzo

June 2009

Outline

- ❑ Project background
- ❑ Review of Cambridge Systematics study of future rail capacity needs
- ❑ Implications of alternative macroeconomic forecasts
- ❑ Implications of alternative commodity-specific forecasts (focus on coal)
- ❑ Summary

Project Background

- ❑ Analysis of long-term freight rail demand forecasts and implications for future capacity needs
- ❑ Focus on DOT Freight Analysis Framework (FAF) commodity flow forecasts
 - Basis of Cambridge Systematics (CS) railroad capacity study
- ❑ We benchmarked FAF commodity flow forecasts against alternative macroeconomic and commodity-specific forecasts
- ❑ We analyzed implications of alternative forecasts on projected railroad investment needs and funding ability
 - Limited by proprietary elements of FAF and CS models
- ❑ Other aspects of project included
 - Assessment of rail capacity definitional issues
 - Public infrastructure investment policies

Cambridge Systematics Study

- ❑ Conducted in response to NSTPRSC request for a *first approximation* of railroad infrastructure investment needs
- ❑ Projection of 2035 capacity needs based on freight rail demand forecasts derived from FAF commodity forecasts
 - FAF based on 2002 Global Insight (GI) macroeconomic forecasts
 - No forecast ranges provided by FAF – only point estimates at five-year intervals (detail not used by CS)
- ❑ Both FAF and CS are proprietary models not amendable to testing or sensitivity analysis

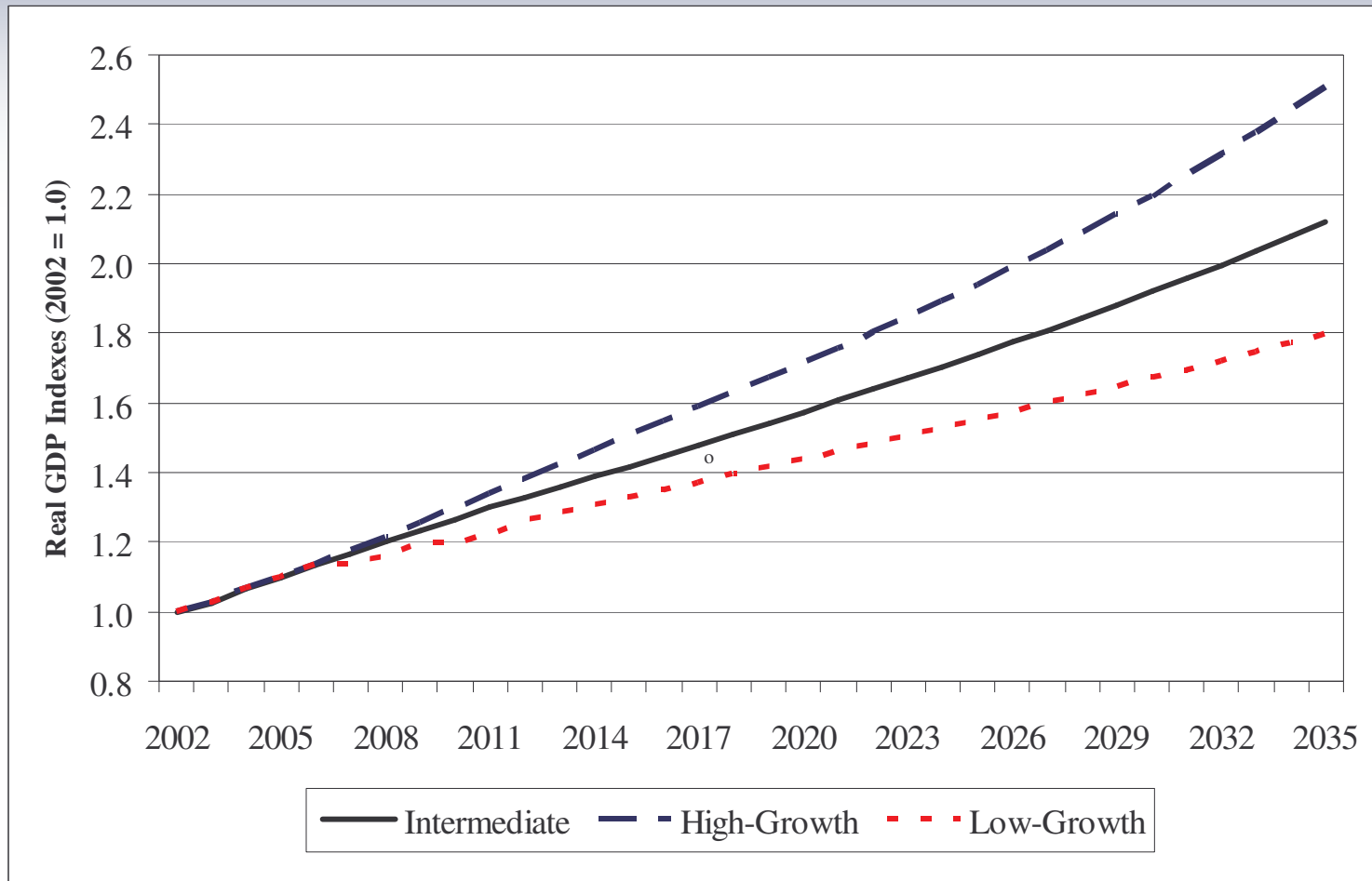
Cambridge Systematics Study

- ❑ Key assumptions of CS model include
 - Railroad investment needs and revenue growth proportionate to forecasted freight demand growth
 - No major technological innovations
 - NOTE: while innovations like PTC may reduce required “capacity,” these innovations are not costless to implement
 - Effects of passenger rail initiatives not considered
- ❑ Key assumptions of FAF model
 - Modal shares assumed to be constant
 - Different growth rates by commodity and origin-destination pair can affect effective modal shares
 - No supply or demand response to price changes

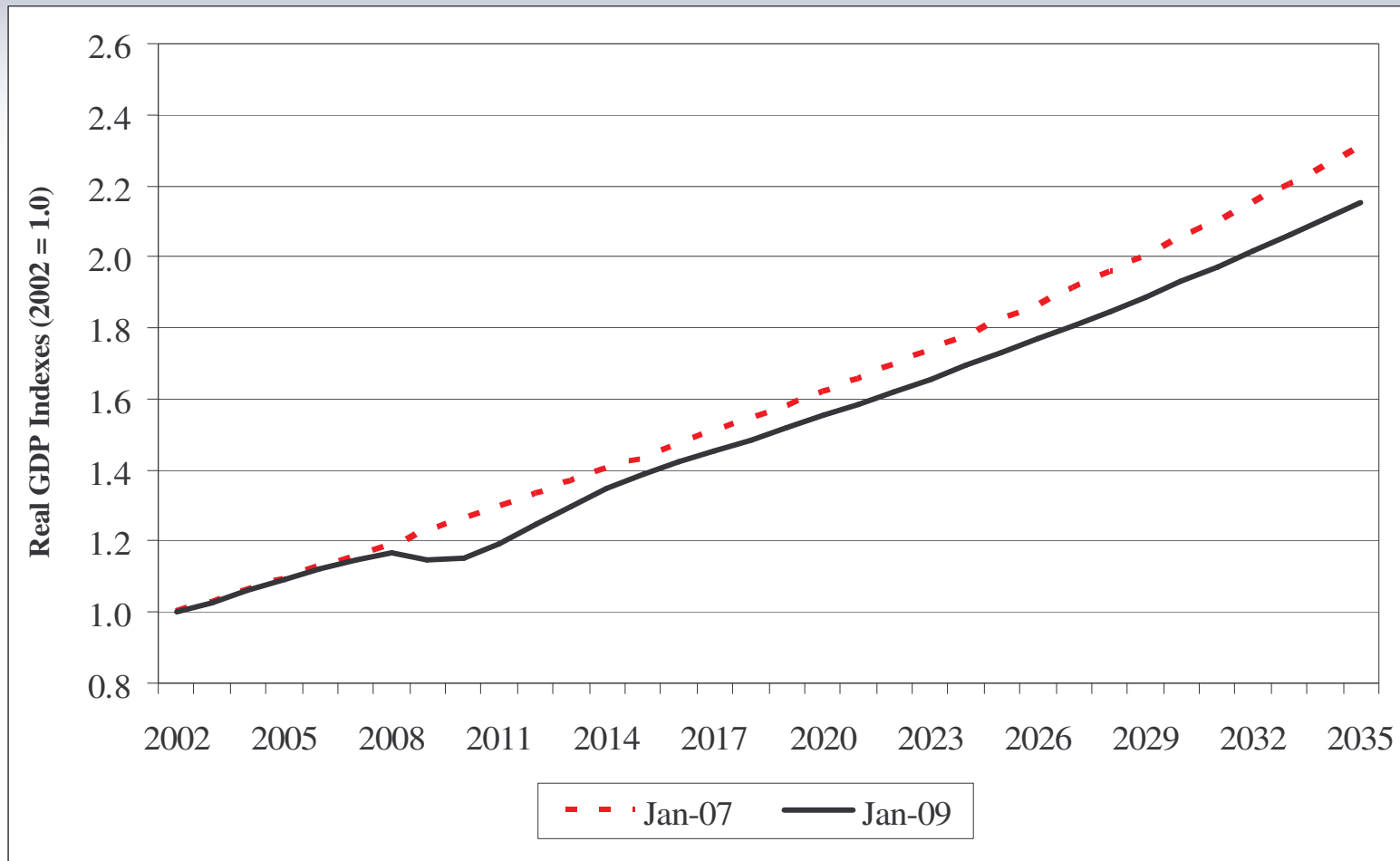
Alternative Macroeconomic Forecasts of Real GDP Growth, 2002-2035

- ❑ FAF uses proprietary forecast data from Global Insight
 - We examined two public macro forecasts to illustrate effects of forecast uncertainty and impact of current recession
- ❑ GDP growth scenarios from 2007 Social Security (OASDI) long-range projections
 - Illustrate the inherent uncertainty in any forecast
 - Cumulative 2002-2035 growth range: 80% (low growth), 112% (intermediate case), 151% (high growth)
- ❑ 2007 and 2009 CBO forecasts
 - Illustrate changes due to recent (post-FAF) economic downturn
 - Cumulative 2002-2035 real GDP growth reduced from 131% in Jan 2007 pre-recession forecast to 115% in Jan 2009 forecast
 - Deep and persistent GDP shortfall from the ‘Great Recession’

2007 OASDI Real GDP Forecast Scenarios



2007 and 2009 CBO Real GDP Forecasts



Implications of Alternative Macro Forecasts

- ❑ Substantial uncertainty in long-term growth rates
 - Compounding leads to large out-year impacts of small growth differences
- ❑ Effects of recent economic downturn (unforeseen in 2002) still uncertain because of unknown timing and strength of recovery,
 - However, it is clear that near-term freight transportation demand will be lower than pre-recession baselines
- ❑ Lower near-term rail transportation demand means lower capacity needs, but also lower ability of railroads to fund such needs

Implications of Alternative Macro Forecasts

- ❑ Additional impacts on future freight rail demand and capacity needs that have not been accounted for include
 - Fuel price impacts
 - Public policy impacts
 - Technological impacts (and investment required to implement new technologies)
- ❑ Additional impacts may tend to increase freight rail demand relative to FAF baseline
 - Combined with forecasting issues discussed above means that long-term freight rail demand could be higher or lower than FAF baseline

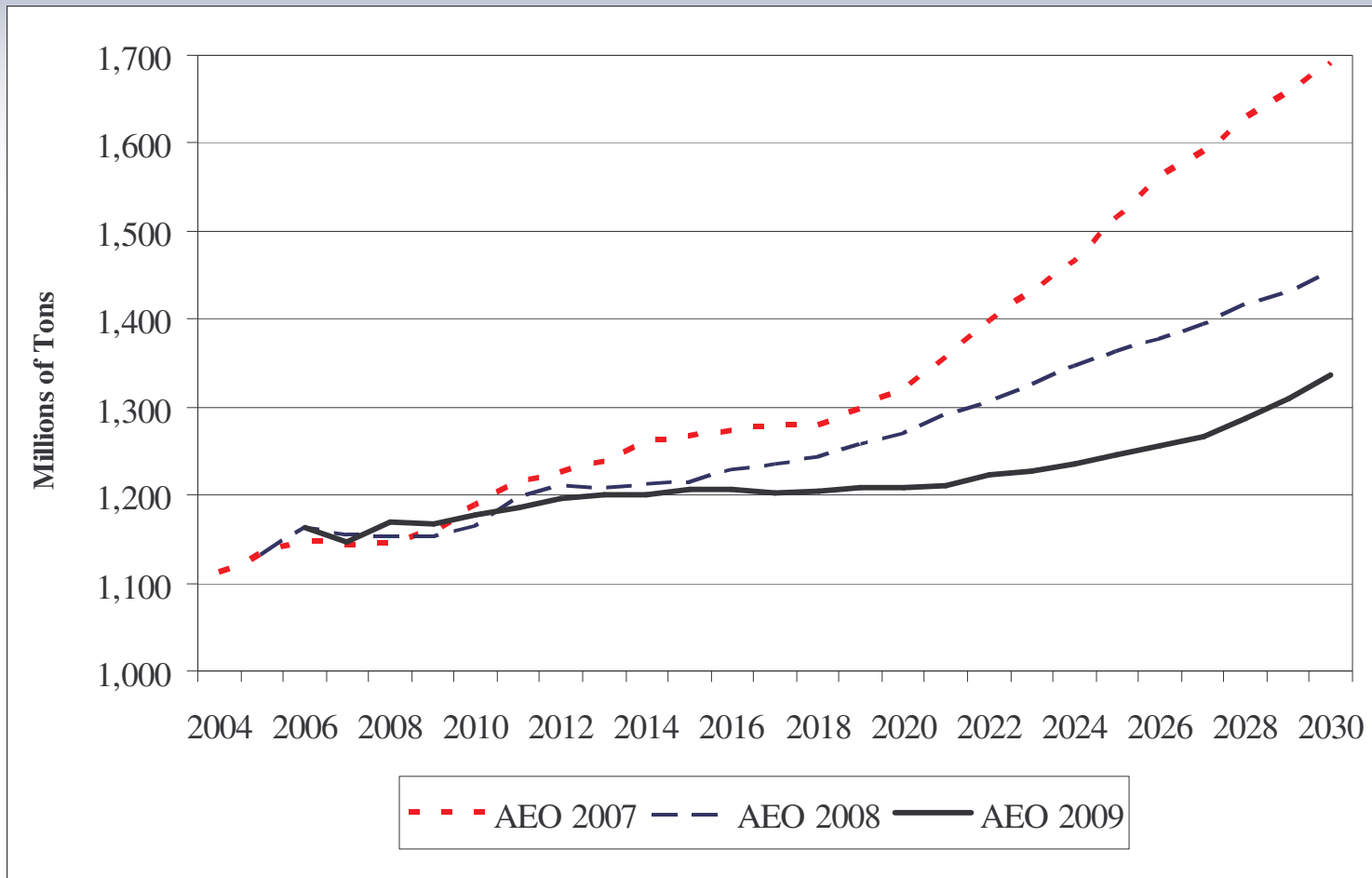
Commodity-Level Analysis for Rail

- ❑ Uncertainties notwithstanding, FAF transportation demand forecasts are in line with GDP forecasts on which they are based
 - Pass “laugh test” of not requiring freight transportation demand (including rail) to grow dramatically relative to the overall economy
- ❑ However, overall growth rates are less informative for rail
 - Composition of rail freight is much different than truck freight
 - Coal accounts for about half of the projected rail tonnage growth in FAF
 - Projected increases for other bulk commodity shipments also are large contributors
- ❑ Proprietary commodity-level forecasts used in FAF also can be cross-checked against alternative sources

Alternatives to FAF Forecast of Coal Demand Growth

- ❑ Energy Information Administration (EIA) forecasts for coal production, supply, and demand through 2030
 - Use National Energy Modeling System (NEMS)
 - Regional production detail available
- ❑ Recent NEMS coal production forecasts for EIA's Annual Energy Outlook (AEO) have been progressively lower
 - Due to reductions in assumed economic growth rates and incorporation of “cost of capital penalty” for GHG-intensive energy projects
 - Decrease in growth rate of 0.4 percent reduces reference case coal production forecast from 1700 MT to 1450 MT in 2030
 - Additional 100 MT decrease in 2030 from GHG treatment
 - By implication, lower future coal production will reduce corresponding rail shipments

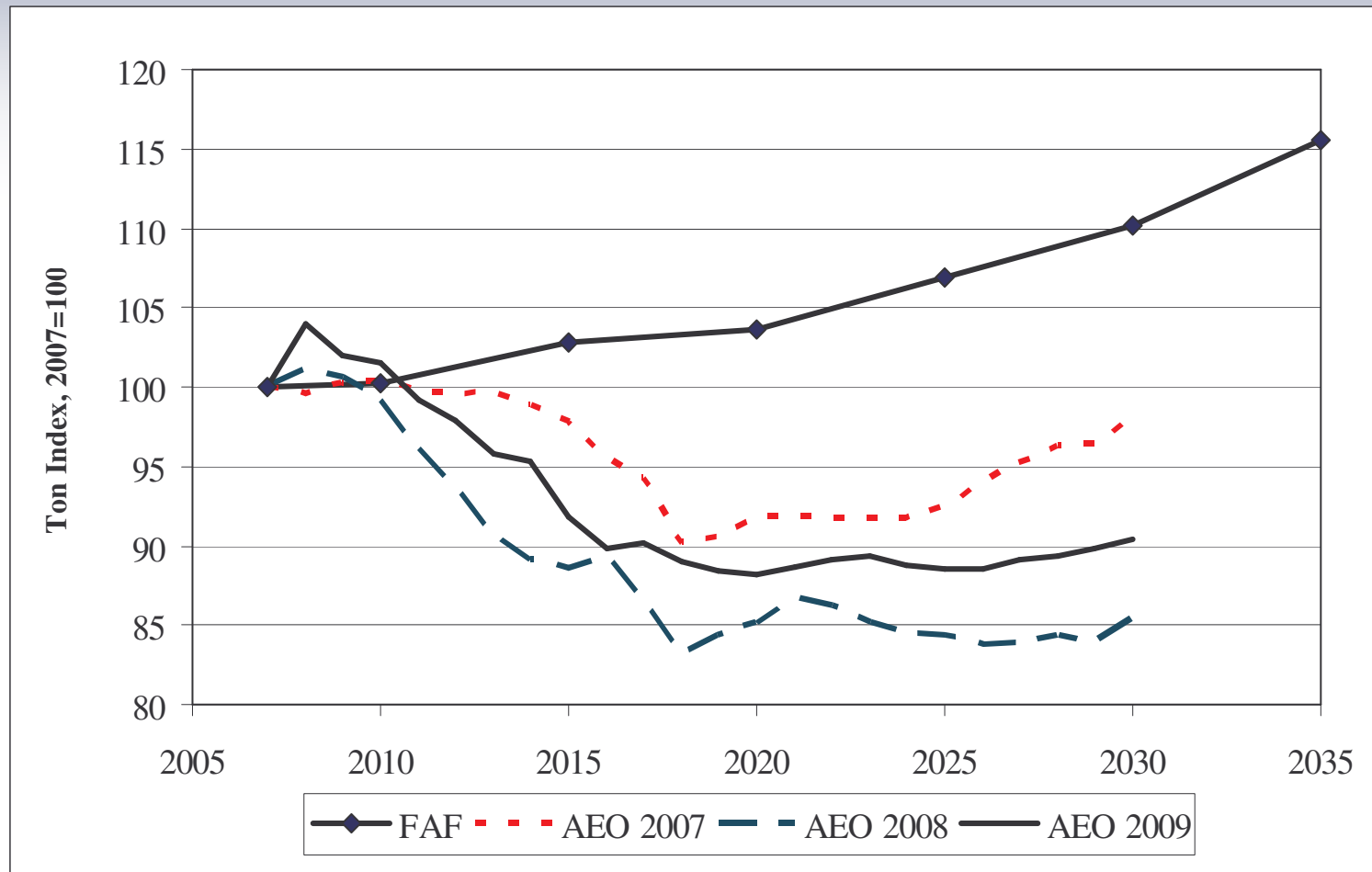
Reference Case Forecasts for U.S. Coal Production, AEO 2007-2009



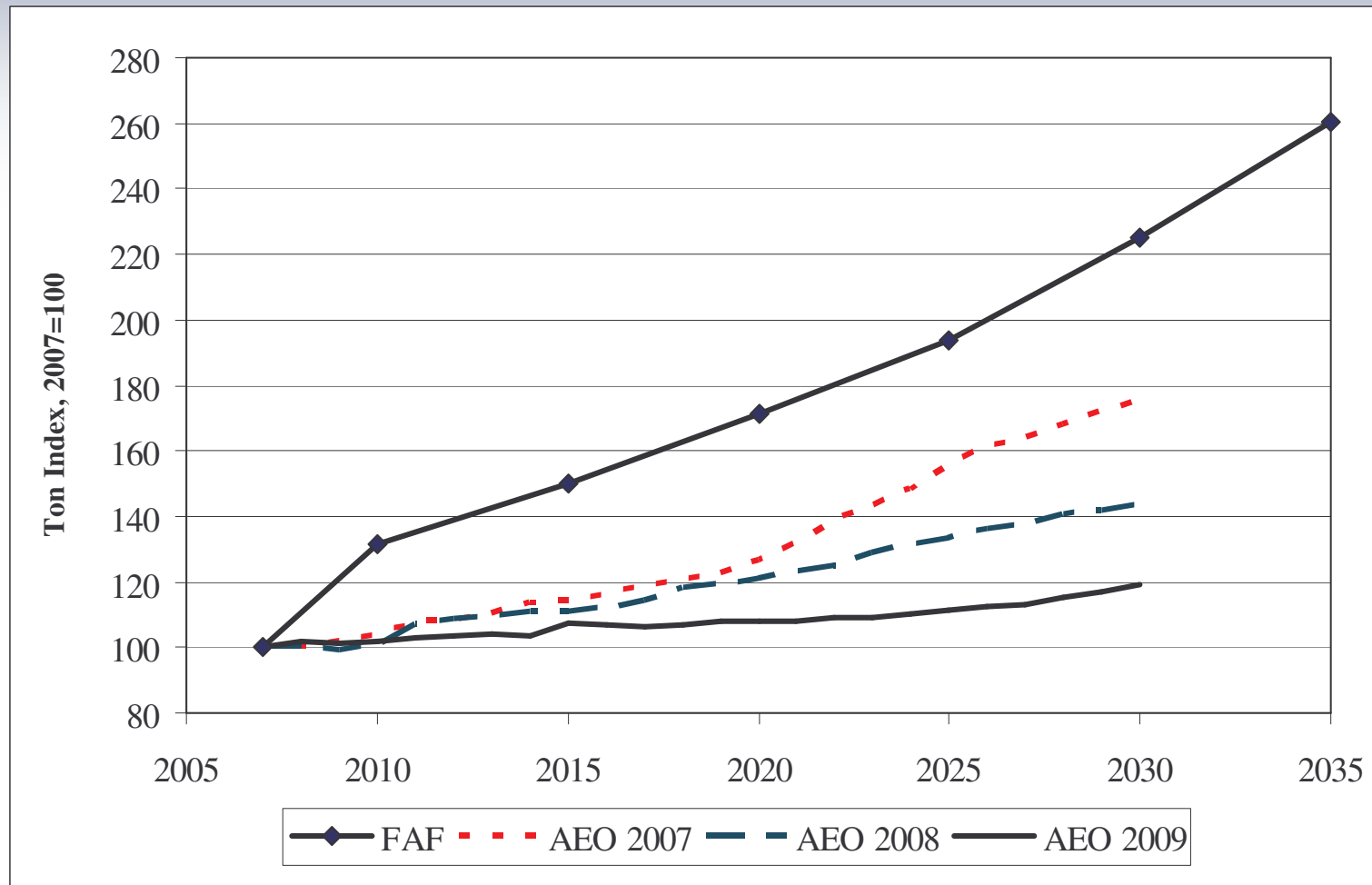
AEO Coal Demand Growth Forecasts

- ❑ EIA forecasts are based on “current law” and do not encompass all downside risks for coal production
 - In particular do not incorporate potential effects of GHG reductions not yet enacted
 - Also assume sunset of renewables subsidies as enacted, though likely to be renewed under “current policy”
- ❑ Significant regional variations
 - Appalachian
 - Western
 - Interior

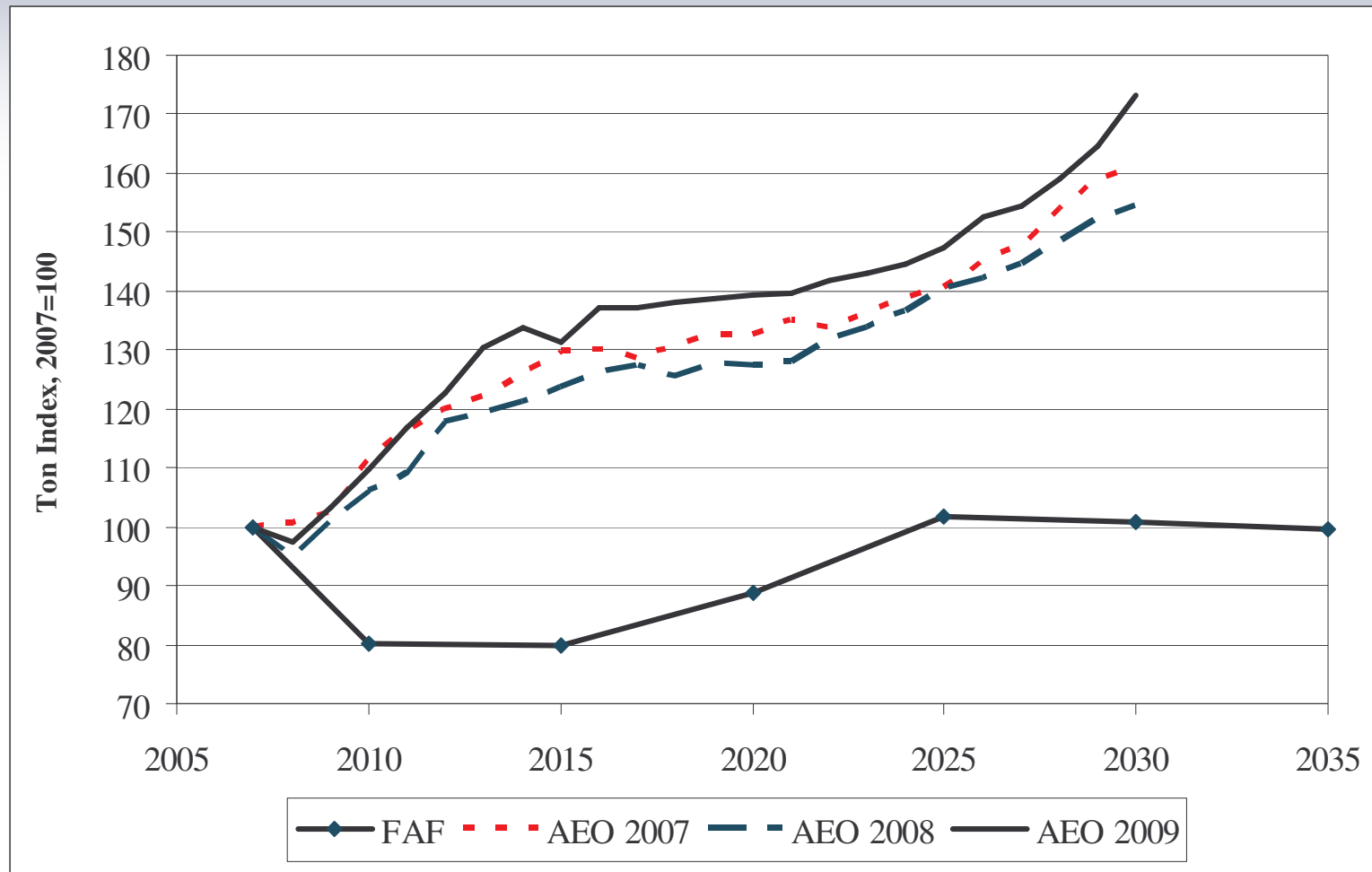
AEO Production and FAF Rail Tonnage Coal Forecasts, Appalachian Region



AEO Production and FAF Rail Tonnage Coal Forecasts, Western Region



AEO Production and FAF Rail Tonnage Coal Forecasts, Interior Region



Implications of AEO Coal Demand Forecasts

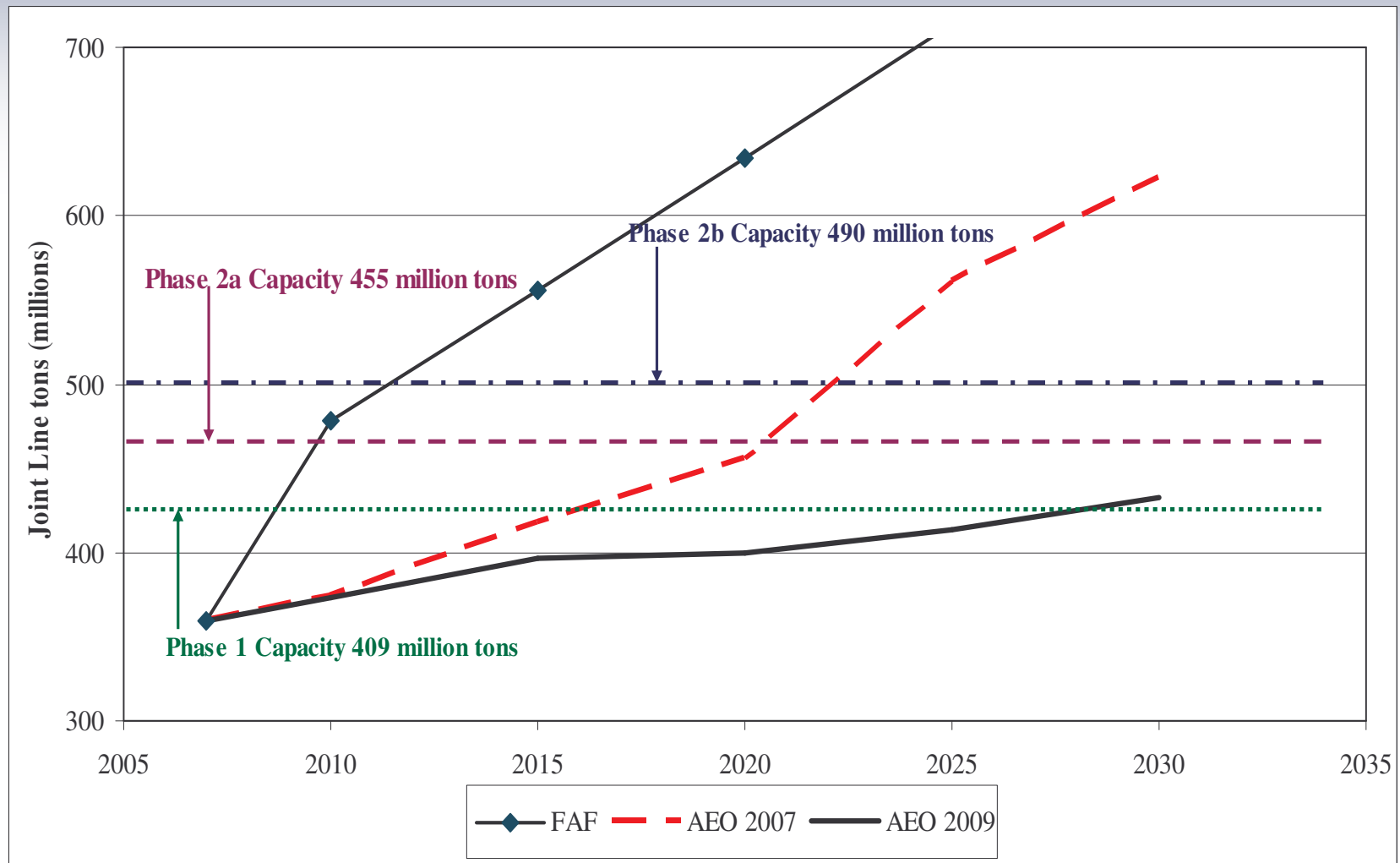
- ❑ 2009 AEO coal projections much lower than FAF
 - 0.7% CAGR (AEO) vs. 2.1% CAGR (FAF)
- ❑ Calibrating FAF to 2009 AEO growth rates, 2002-2030 coal ton-mile growth is 23%, versus FAF forecast growth of 107%
- ❑ Assuming rail capacity investment requirements are proportional to ton-mile growth, implies nearly 80% reduction in capacity investment requirements relative to CS/FAF baseline
 - Caveat – since we did not have access to proprietary models, we could only approximate the capacity effects of lower forecasts

Implications of AEO Coal Demand Forecasts

- ❑ However, coal revenue and “contribution” over shipment marginal cost will also decline markedly relative to CS/FAF baseline
 - 2030 revenues reduced by \$8.5 billion (2000\$)
 - 2030 contribution reduced by \$3.6 billion
 - Still a funding gap?

- ❑ Implications for SPRB capacity
 - Recalibrated FAF using Wyoming coal production growth
 - Planned improvements for Joint Line required much later
 - Affects economic case for alternative route

PRB Joint Line Traffic Scenarios and Capacity Thresholds



Other Commodities

- ❑ Alternative forecasts also suggest that FAF forecasts are optimistic for other major commodities
 - Grains
 - Waste and scrap material
 - Petroleum and coal products (other than fuels)
- ❑ Intermodal depends in part on modal preferences in transportation policy
 - Not isolated in FAF
 - Large ‘reservoir’ of long-distance truck shipments

Summary

- ❑ Examination of alternative forecasts to FAF (both macro and commodity-specific) implies
 - Greater uncertainty and, likely, lower future demand for freight rail
 - Corresponding effects on railroad capacity investment needs, but also revenues and ability to fund investments privately
- ❑ Other factors not explicitly accounted for by CS would affect freight rail demand and capacity needs, including
 - Technological innovations
 - Future fuel prices
 - Public policy initiatives
- ❑ Overall effects of forecasting issues and consideration of other factors could result in actual future freight rail demand being higher or lower than FAF projections