U.S. MARKAL Model Sensitivity to Value of Carbon

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BNL 10 Region US MARKAL

• Calibrated to EIA’s Annual Energy Outlook for 2007
  – Scenarios are generally run in parallel with NEMS. US MARKAL tends to be more responsive than NEMS (i.e. greater difference between scenarios)
• Covers all sectors of the economy
• Designed to handle analysis of DOE technology programs
• Uses latest version of MARKAL, GAMS and Answer
  – Solves in approx. 5 minutes
  – 2 minutes for writing output tables
10 Region US MARKAL continued

- Electricity sector
  - Relatively high level of technology detail.
  - Vintaging and option to re-power coal fired stations.
  - Size distribution of generators
  - Renewable technologies subdivided by resource class and cost category
- Transport sector
  - LDV demand by market size (Small, Medium, Large)
- Industrial sector
  - Detailed representation of steam heat demand
  - Rest of explicit industrial demand technology descriptions have been removed to fit DOE Industrial EE program

Multiregion US MARKAL continued

- Residential/Commercial sectors
  - Description of building shells and major demand technologies
  - Lighting demand is binned based on hours of use and CRI
- Other
  - Exogenous technology learning
  - Elastic demands to be introduced this summer
  - More detailed time-slice resolution for the electricity sector to be introduced this summer/autumn
Work in progress

- CCS
  - Adding regional sequestration curves
  - Adding regional CO2 transportation costs
- Increased time slice resolution for the electricity sector
  - Data under development by sub-contractor
- Elastic demands
  - Data under development by sub-contractor
Carbon Abatement Curves Over Time

Electric Sector Carbon Abatement Curve
Base Case Technology Set Without Carbon Sequestration

Effect of Carbon Sequestration on Carbon Abatement Curves

Electric Sector Carbon Abatement Curve
2050 Base Case Technology Set
Effect of R&D on Carbon Abatement Curves

Electric Sector Carbon Abatement Curve 2050 Without Carbon Sequestration

Total U.S. Carbon Emissions by Carbon Value
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