

# Annual Energy Outlook 2018

*Modeling updates in the transportation sector*



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*For*

*AEO2018 Transportation Working Group*

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*By*

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# Updates to the *Annual Energy Outlook 2018*

- Transportation demand model highlights
  - Data updates
    - Bus and passenger rail transportation
    - Truck, rail, and marine travel demands
    - LDV and HDV stock history
    - Military fuel use
    - Recreational boating fuel use
  - Modeling updates
    - Expand macro drivers of freight sector
    - Add ZEV credit banking to LDV model
    - Addition of autonomous vehicles and ridesharing

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# Data updates

# Bus and passenger rail data update

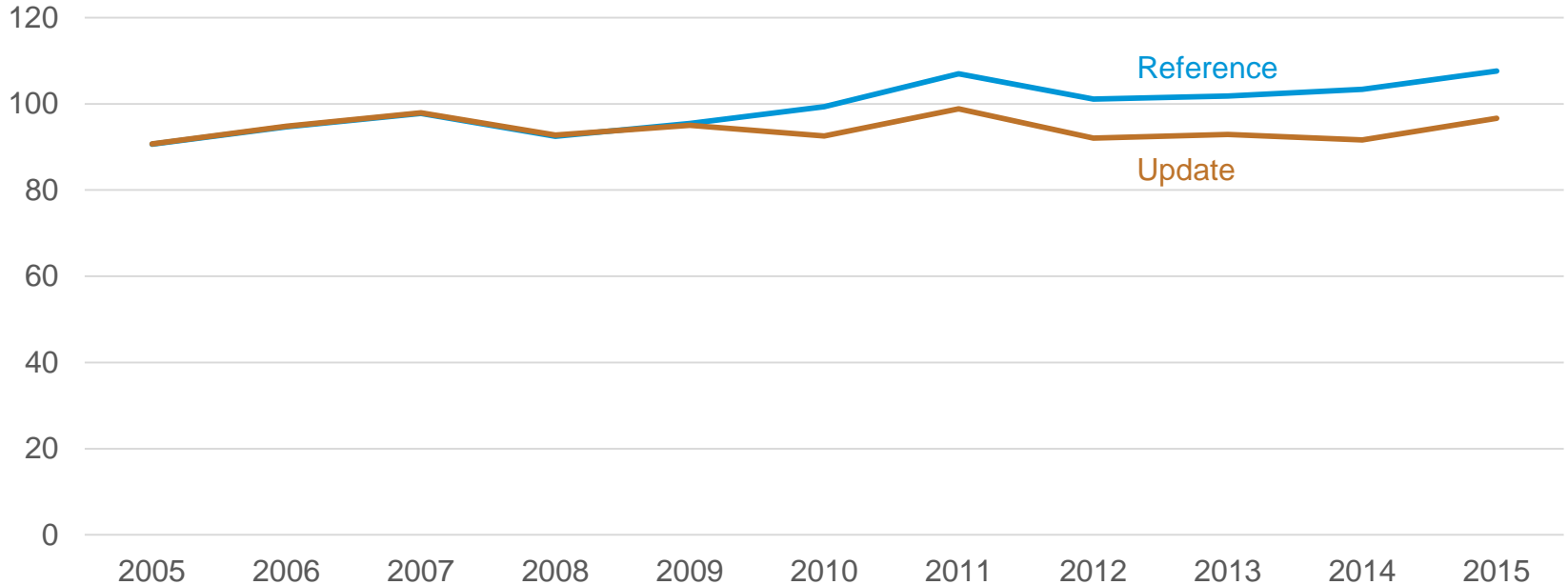
- Updating travel, fuel use, and efficiency data
  - Transit, Intercity, and School Buses
  - Transit, Commuter, and Intercity Rail
  - Adding history through 2015, from previous last history year of 2008
  - Estimating intercity and school bus passenger-mile travel and efficiency after 2000 based on population growth and bus travel from national highways

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# Change in transit bus energy consumption

Transit bus energy consumption

trillion Btu

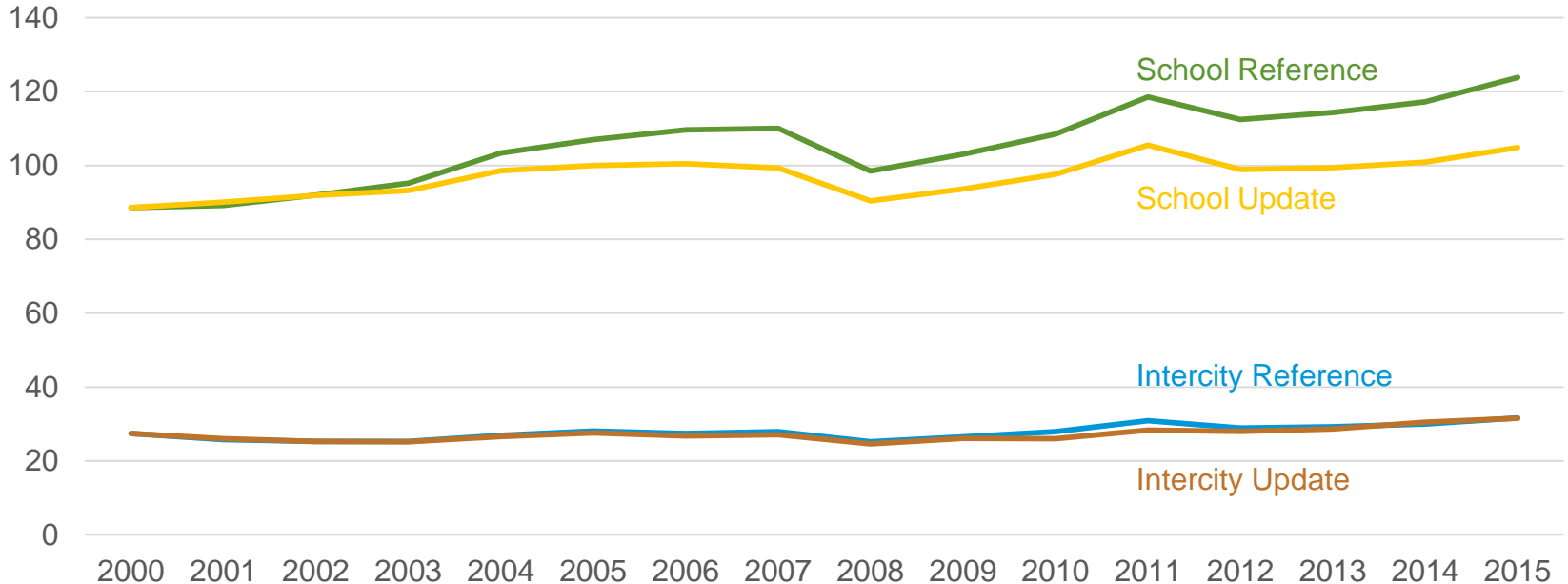


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# Change in intercity and school bus energy consumption

Intercity and school bus energy consumption

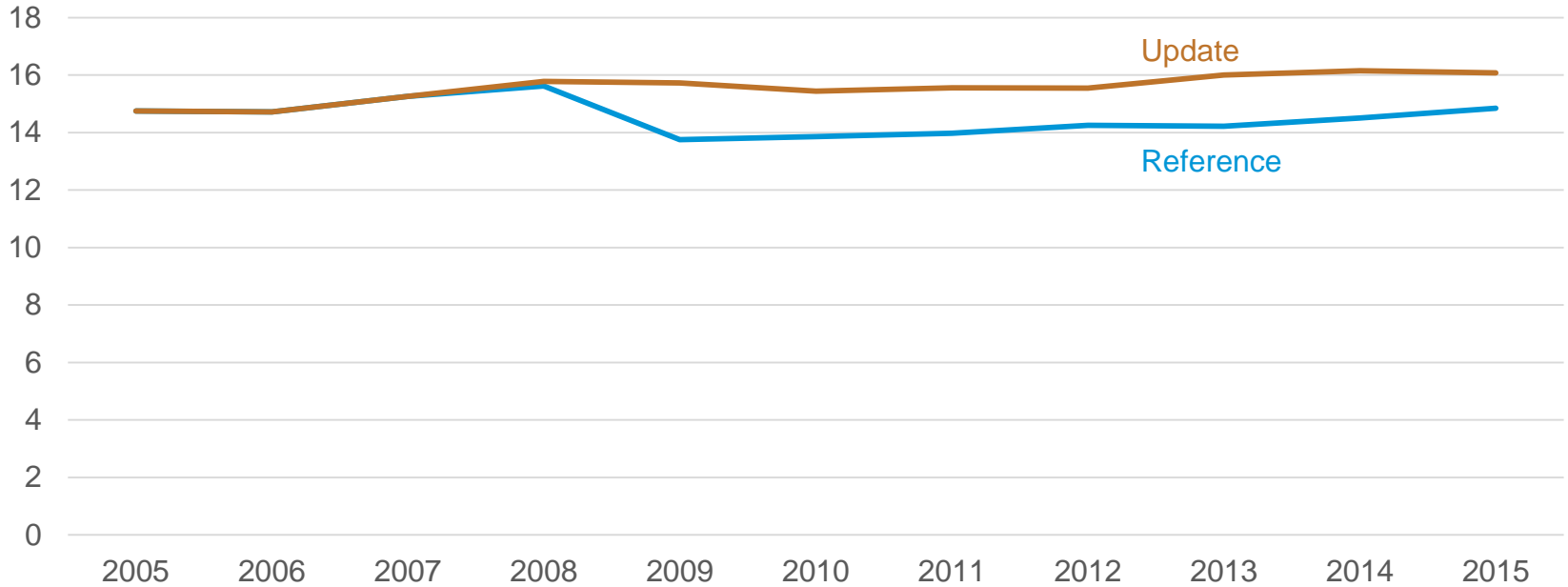
trillion Btu



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# Change in transit rail energy consumption

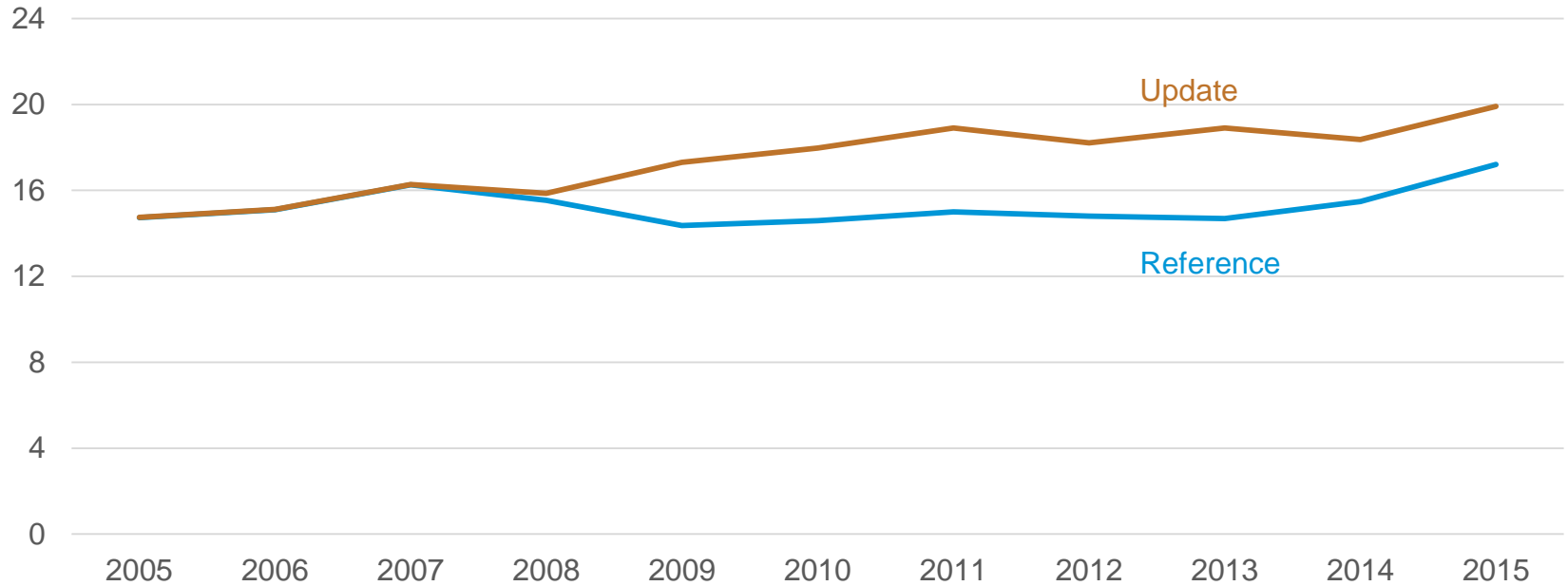
Transit rail energy consumption  
trillion Btu



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# Change in commuter rail energy consumption

Commuter rail energy consumption  
trillion Btu



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# Other data updates

- Update LDV and HDV stock
  - Registration data are from 2016
  - Includes updates to the LDV fleet model
- Military fuel use
  - 2009 – 2015
  - From the Defense Logistics Agency
- Recreational boating fuel use
  - 2009 – 2015
  - From the Transportation Data Book
- Truck, rail, and domestic marine travel/demand (various DOT/DOE sources)

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# Modeling updates

# Freight driver expansion planned

- Goal is to analyze and then re-align commodity transport flows with industrial and service activities
- Prior AEOs projected freight travel based on gross output from 10 industrial groups
- AEO2018 proposes 17 industrial groups
- Secondary analysis goals
  - Isolate high value, high growth commodities
  - Include physical drivers

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# California zero-emission vehicle (ZEV) program modeling

- Adding credit banking and spending
  - Reflecting data collected and external model developed from EIA contracted report
  - Alternative compliance pathway highlighted by CARB midterm review to become primary pathway
    - 90% of large manufacturers have elected to use alternative pathway
- Potential for credit banking and spending scenario development
  - Projecting scenarios developed in contracted report
  - Potential scenarios
    - Early push to bank credits and spend later as requirements increase
    - No additional banking (spending existing credits and only selling for requirement in future)
    - Etc.

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# Autonomous vehicles and ridesharing

- Autonomous vehicles and ridesharing will be included in the Reference case and highlighted in two side cases
- Areas of focus for model development
  - LDV
    - Consumer owned
    - Ridesharing owned
    - Vehicle Design
    - Transit
  - HDV
    - Platooning
    - GPS

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# Autonomous vehicles and ridesharing - LDV

- Consumer owned
  - Travel
    - No occupancy trips (burrito effect)
    - Travel distances (work commute – does travel time play less of a role?)
    - Induced demand (non-licensed rider trips – handicapped, children, aged)
    - Implications for long distance travel
    - Shared use
  - Vehicle Ownership Rates
    - Impact of ridesharing services on ownership rates
    - Redesigned vehicles to improve service/efficiency
    - Technology evolution and vehicle replacement
    - Consumer preference/acceptance (age, income)
    - Shared use

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# Autonomous vehicles and ridesharing - LDV

- Ridesharing Owned
  - Travel
    - Growth in ridesharing
      - Geographic (urban, suburban, rural)
      - Demographics (age, income, employment status)
    - Percent of travel deadheading
    - Delivery services
    - Average annual vehicle travel and vehicle scrappage
    - Synergies with other modes/travel services
  - Vehicle Ownership Rates
    - Relationship between cost of service and capital investment (business model)
    - Shared use – privately owned
    - OEM relationships with ridesharing companies

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# Autonomous vehicles and ridesharing - LDV

- Vehicle Design
  - Specialization to meet use (single occupant vehicle, simple box delivery vehicle)
  - Technology development (synergies with other advanced powertrain platforms)
  - Cost and performance
  - Infrastructure requirements
- Transit
  - 1<sup>st</sup> mile/last mile or substitute for transit trip
    - Metro bus, metro rail, commuter rail

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# Autonomous vehicles - HDV

- Platooning
- GPS guided efficient driving

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# Discussion/questions

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