Energy Forecasting in California

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California Energy Commission
June 19th, 2008

California Energy Commission

- Created in 1974 by California legislature for energy planning
- Funded by utility bill surcharge (.022 cents/kWh), various other sources
- 5 Divisions:
  - Efficiency and Renewables
  - Energy Facilities Siting
  - Energy Research and Development
  - Fuels and Transportation
  - **Electricity Supply Analysis**

Analysis of Electricity Market

- Demand Analysis Office (DAO) and Electricity (supply) Analysis Office
- DAO forecasts electricity and natural gas demand consumption (except natural gas for generation)
- 9 full-time personnel year equivalents

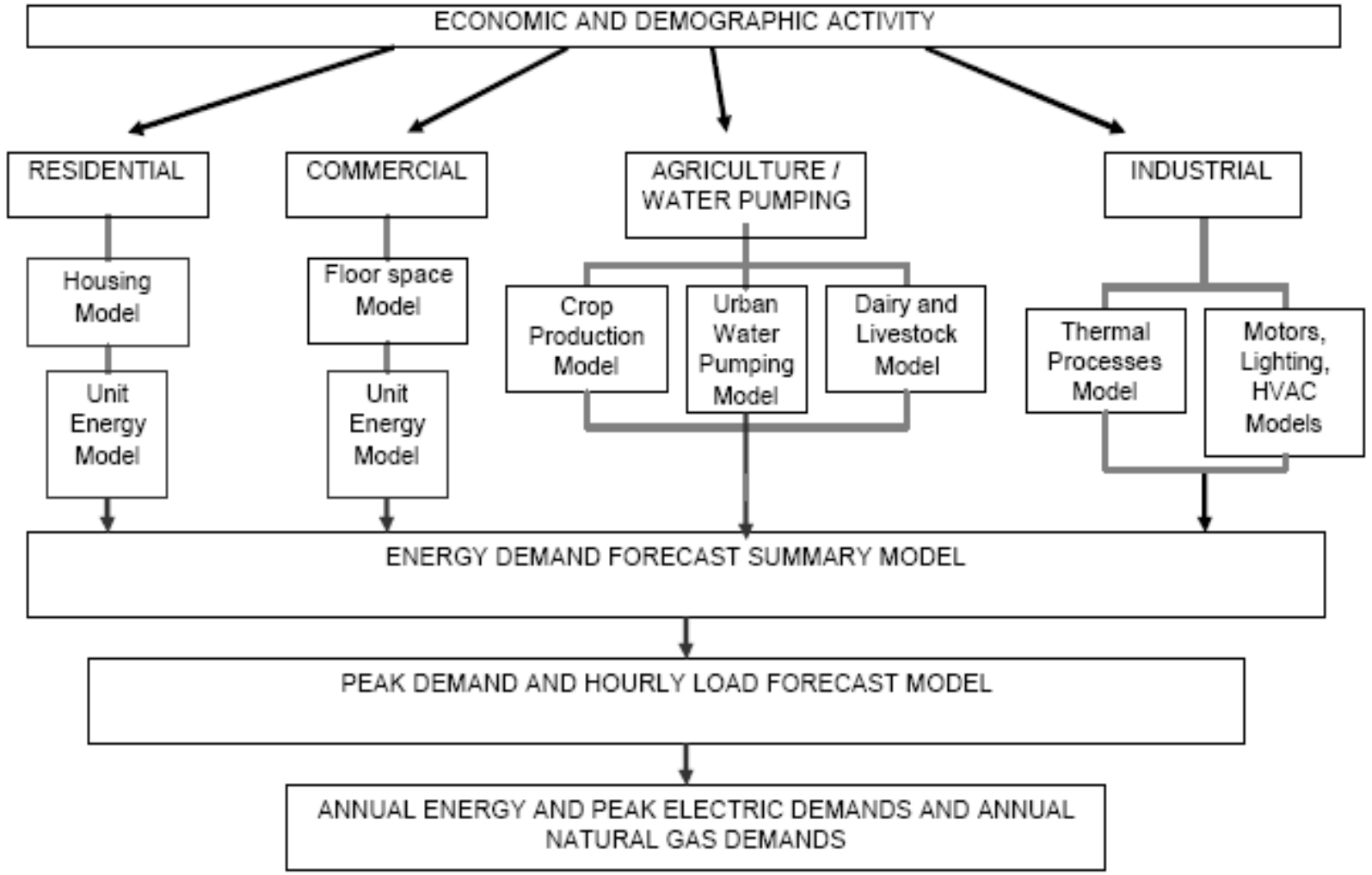
Electricity and Natural Gas Forecast

- Residential: End Use model
  - 3 housing types, 24 appliance and space conditioning categories
- Commercial: End Use model
  - 12 building types, 10 equipment and space conditioning categories
- Industrial (process, extraction, assembly): mixed model
  - Econometric model of production by sector, end use models derive kWh given production (EPRI “Inform”)
- Agricultural and Water Pumping: econometric model
  - crops, dairy, livestock, urban water pumping

Important Inputs

- Economic data (Economy.com)
- Demographic data (Calif.Department of Finance)
- Residential Appliance Saturation Surveys
- Commercial End-Use Surveys
- Utility load data, historic electricity and natural gas consumption
- McGraw Hill (formerly Dodge) floor space
- Weather data
- Electricity and natural gas price forecasts
- Agricultural production data

Framework for Energy Demand Forecast Models



Source: California Energy Commission staff, May 2005

10-Year Forecast Outputs

- Annual Peak and Energy Forecasts
- Climate Zone Level (16 climate zones)
- Impact of Efficiency and Conservation Programs

Forecast Usage

- Integrated Energy Policy Report (biannual)
- Assembly Bill 2021 (efficiency targets)
- Long-Term Procurement
- Resource Adequacy
- Greenhouse Gas Reduction (Air Resources Board)
- Grid Studies/Transmission Planning
- Natural Gas Assessment

Related Efforts

- Year-ahead Peak Demand forecast for resource adequacy
- Summer Outlook
  - Assessment of the overall capability of the physical electricity system to provide power to meet electricity demand in the following summer
  - Probabilistic analysis

Related Efforts

- Scenarios Analysis Project
  - Designed to develop greater understanding of actions needed to achieve major reductions in greenhouse gases in electricity sector
  - Analysis of consequences and tradeoffs involved
  - 13 thematic scenarios testing for sensitivities to high and low fuel prices, high and low hydro-electric generation, different levels of efficiency measures and renewables
  - Methodology: “Market Analytics” by Global Energy Decisions

Improvements to Methodology:

Ongoing Demand Forecast Assessment Project

- Increased attention to forecasts uncertainties to complement current “point forecasts”
- Model revision to provide more detail on impacts of building and appliance standards and other conservation and efficiency measures
- More formalized short-term forecasting effort

Extra Slides

Residential Energy Demand Forecast Model

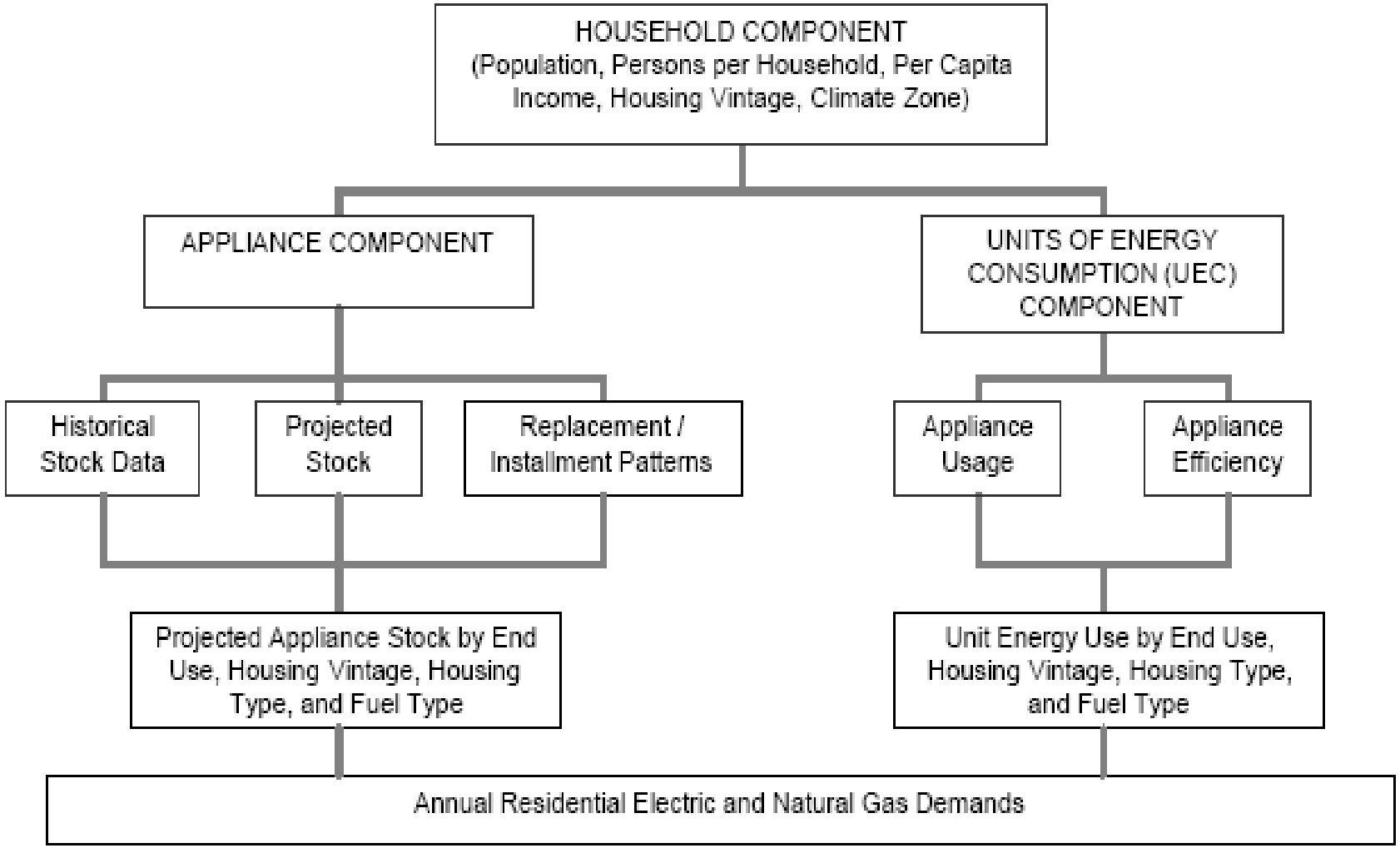


Figure 3-1

Commercial Energy Demand Forecast Model

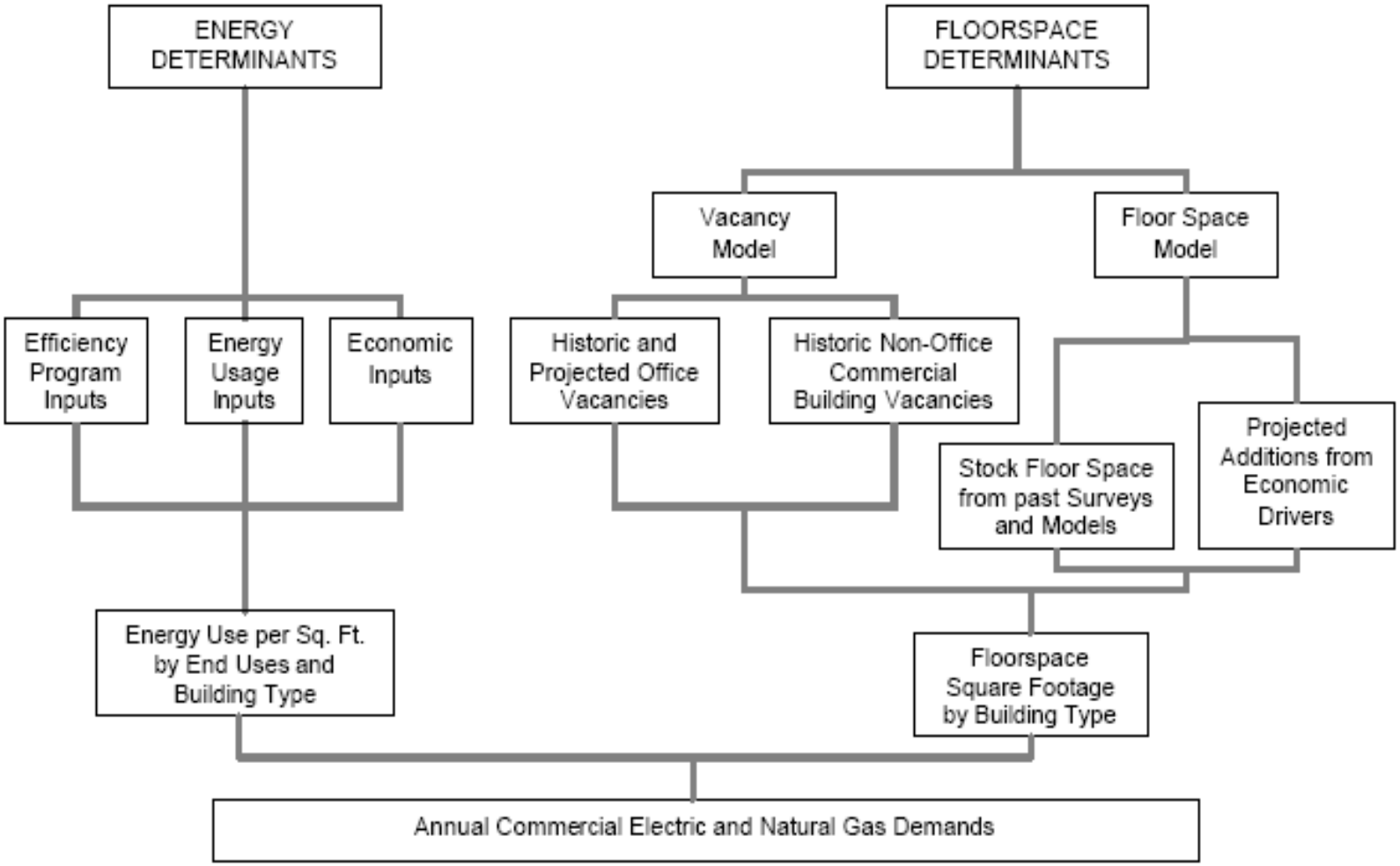
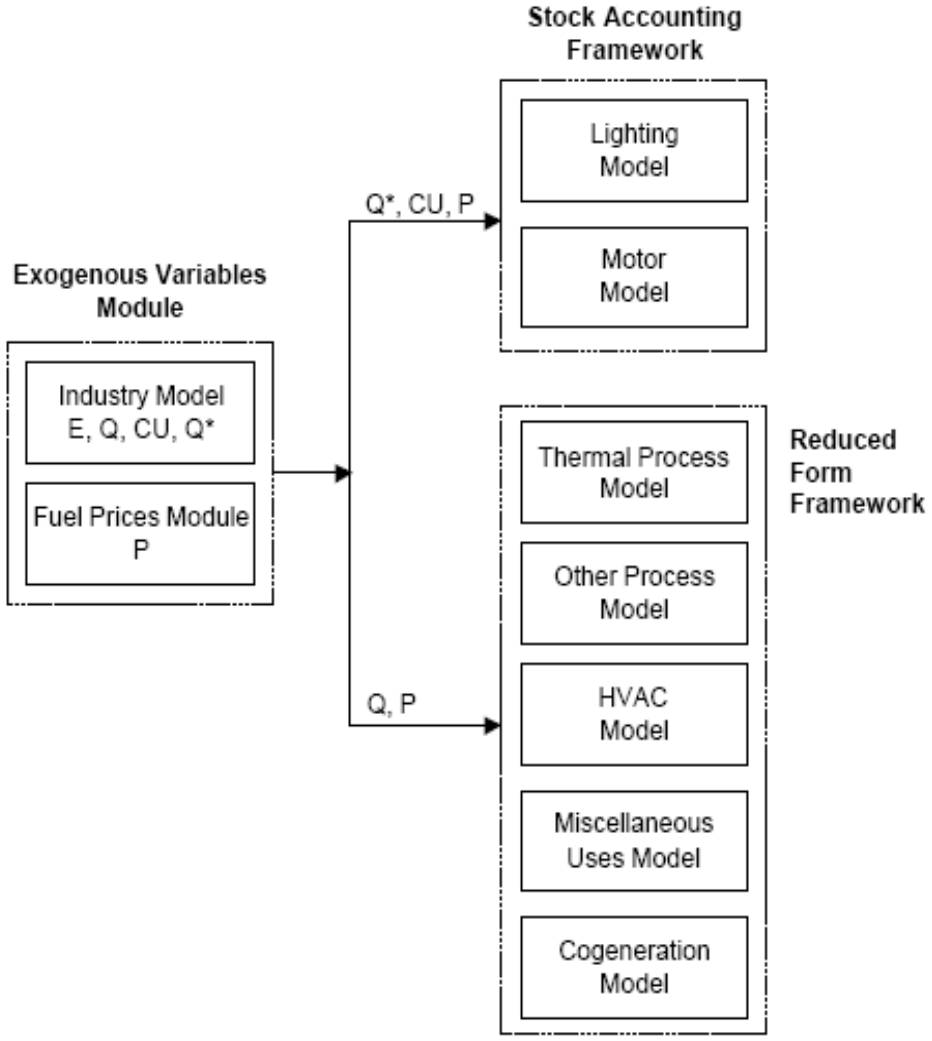


Figure 4-1
Industrial End-use Forecasting Model Structure



INFORM Forecast Structure

Agricultural and Water Pumping Energy Demand Forecast Models