

Energy2020 Business-as-Usual Case

**Scoping Plan Workshop
May 19, 2008**

Air Resources Board

Presentation Outline

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Project Background

- ARB needed the capability to analyze policy options for reducing greenhouse gas emissions.
- Model Requirements
 - cover all sectors of the economy
 - able to model direct measures and flexible compliance mechanisms such as cap and trade or fees
 - accounts for policy interactions
 - accounts for GHG emissions and other criteria pollutants
 - usable in conjunction with a macroeconomic model
- ICF/SSI chosen to deliver ARB with a version of the Energy2020 model.

Overview of ENERGY 2020

- Integrated North American economy, energy and emissions model
- Includes all U.S. States and Canada Provinces
- Energy demand by sector and end-use
- Energy supply for electricity, oil, gas, coal, and other
- Separate outputs are provided for each type of air emission:
 - Greenhouse Gas (CO₂, N₂O, CH₄, SF₆, HFC, PFC)
 - Clean Air Contaminants (SOX, NOX, VOC, CO, PMT, PM₁₀, PM_{2.5})

Overview of the Base Case

- The Base Case is a representation of expected GHG emissions under a business-as-usual scenario over 2008-2020.
- Policy Cases will be compared with the Base Case to determine the extent to which these policies reduce future emissions.

Development of the Base Case

- The Base Case has been designed so that it is in reasonable agreement with:
 - Energy Commission 2006 Net System Power Estimate
 - Energy Commission Statewide California Energy Demand 2008-2018
 - ARB GHG Emissions Inventory
 - EPA Vehicle Efficiency
- Differences in definitions make matching exactly difficult.
- The remaining slide provide some comparisons between the Energy2020 Base Case and these sources of information

Base Case Economic

Economic Driver	Ave. Annual Growth 2006-2020
Personal Income	2.8%
Gross State Product	3.1%
Population	1.2%
Coal Price	-0.4%
World Oil Price	-0.7%
Natural Gas Wellhead Price	-1.4%
Passenger VMT	1.2%
Freight VMT	1.5%

Base Case Generation Output

Generation Output (GWh/year)	Energy 2020 2006	California Energy Commission 2006¹
Natural Gas/Oil	104,455	106,968
Coal	2,972	17,573 ²
Hydro ³	48,114	43,088
Nuclear	31,560	31,959
Other	305	-
Renewables	23,164	30,514
Total In-state	210,570	230,102
Imported Electric	81,325	64,763
Total	291,895	294,865

1. 2006 Net System Power Report, Energy Commission Publication # CEC-300-2007-007.
2. Includes electricity generated from several out-of-state coal-fired power plants that are owned by and reported by California utilities.
3. Includes existing small Hydro

Base Case Generation Output

Generation Output (GWh/year)	Ave. Annual Growth 2006-2020
Natural Gas/Oil	0.2%
Coal	-0.1%
Hydro	0.0%
Nuclear	0.0%
Other	0.0%
Renewables	1.6%
Total In-state	0.3%
Imported Electric	3.2%
Total	1.2%

Base Case Generation Capacity

Generation Capacity (MW)	Ave. Annual Growth 2006-2020
Natural Gas/Oil	6.2%
Coal	0.0%
Hydro	0.0%
Nuclear	0.0%
Other	0.0%
Renewables	2.6%
Total	4.5%

Base Case Electricity Sales

Sales (GWh)	Ave. Annual Growth 2006-2018	
	Energy2020	CEC Forecast¹
Residential	1.8%	1.8%
Commercial	1.4%	1.4%
Industrial	-0.2%	0.3%
Street Lights/Misc.	0.0%	0.9%
Total Sales	1.2%	1.3%

1. Form 1.1b – Statewide California Energy Demand 2008-2018 Staff Revised Forecast Electricity Sales by Sector (GWh)

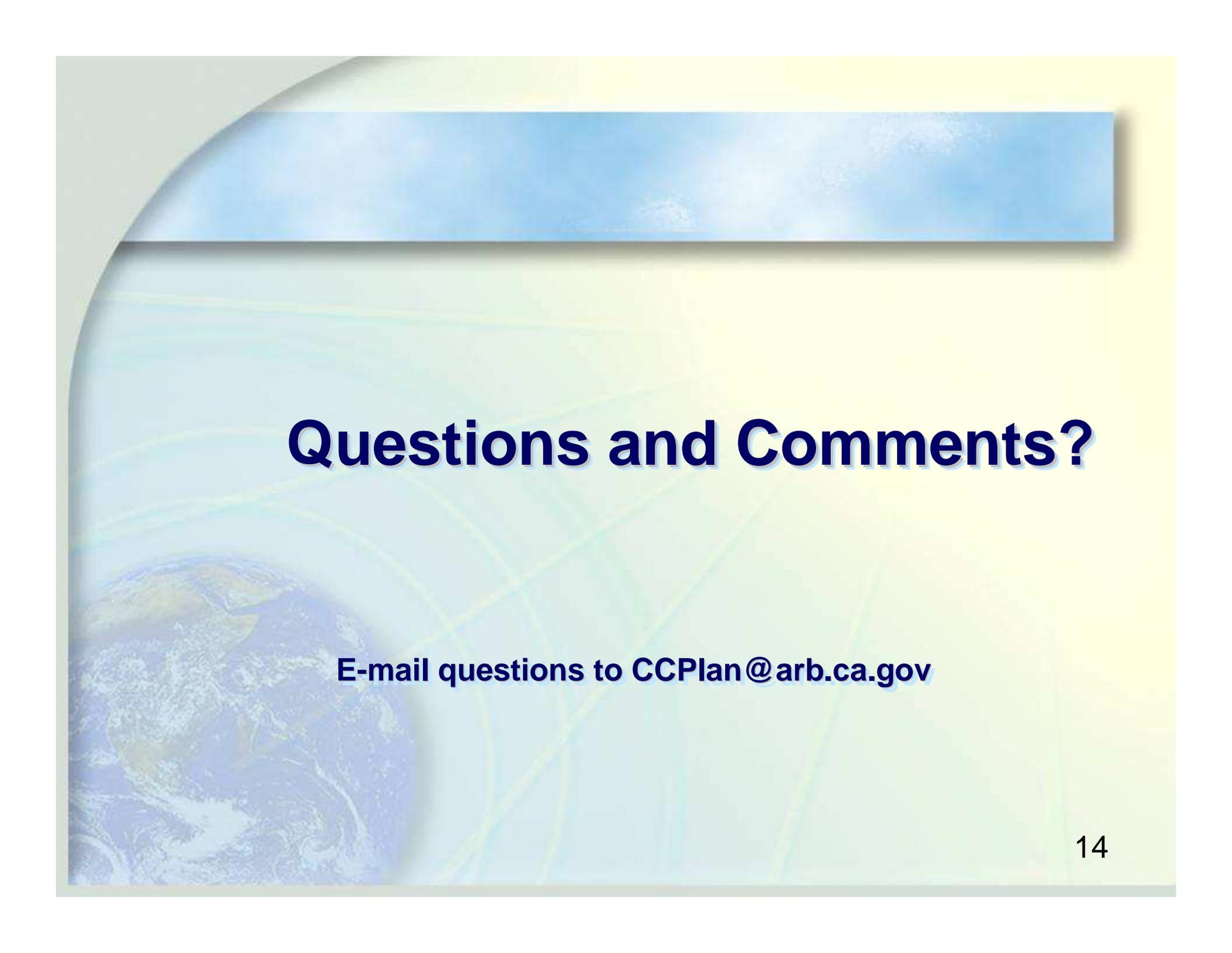
Base Case GHG Emissions

	Ave. Annual Growth 2004-2020	Ave. Annual Growth 2006-2020
GHG Emissions MMTCO₂E	ARB Inventory	Energy2020
Residential	0.6%	0.9%
Commercial	0.8%	1.0%
Industrial	0.4%	1.7%
Power Sector	1.2%	1.5%
Transportation	1.6%	1.1%
Waste and Wastewater	1.7%	1.7%
Unknown ¹	6.1%	-
Total	1.5%	1.3%

1. Unknown include fuel use that is not mapped to a specific sector or Ozone Depleting Substance Substitutes. These emissions are accounted for in the individual Energy2020 sectors.

Next Steps

- Continued refinement of the mapping between the ARB emissions inventory and Energy2020.
- Better accounting of imported electricity and emissions.
- Refinement of Device and Process Efficiency Investment amounts.
- Modeling policy cases
- Macroeconomic analysis

The background features a stylized globe on the left side, partially obscured by a large, semi-transparent blue rectangular bar at the top. The globe shows continents and oceans. Overlaid on the globe and the rest of the slide are several thin, curved lines in shades of blue and green, creating a sense of motion or a network. The overall color palette is light and airy, with a gradient from yellow at the top to light blue at the bottom.

Questions and Comments?

E-mail questions to CCPlan@arb.ca.gov