Sector-Based Workshop

Energy Sectors

(Electricity, Natural Gas, and Water)

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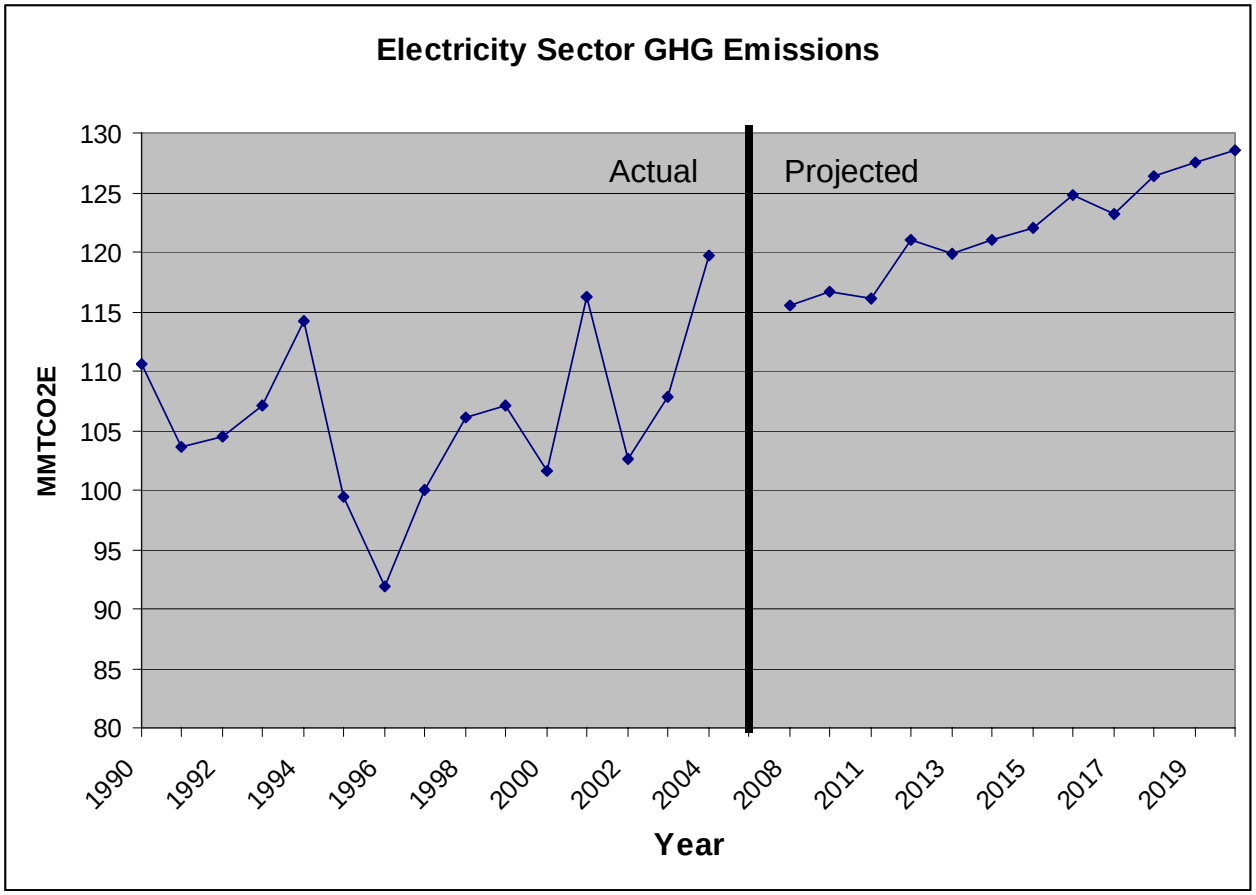
CPUC/CEC Joint Proceeding

- Public Utilities Commission and Energy Commission conducting joint proceeding to make recommendations to the Air Resources Board for AB32 policies in “scoping plan” for energy sectors (electricity and natural gas)

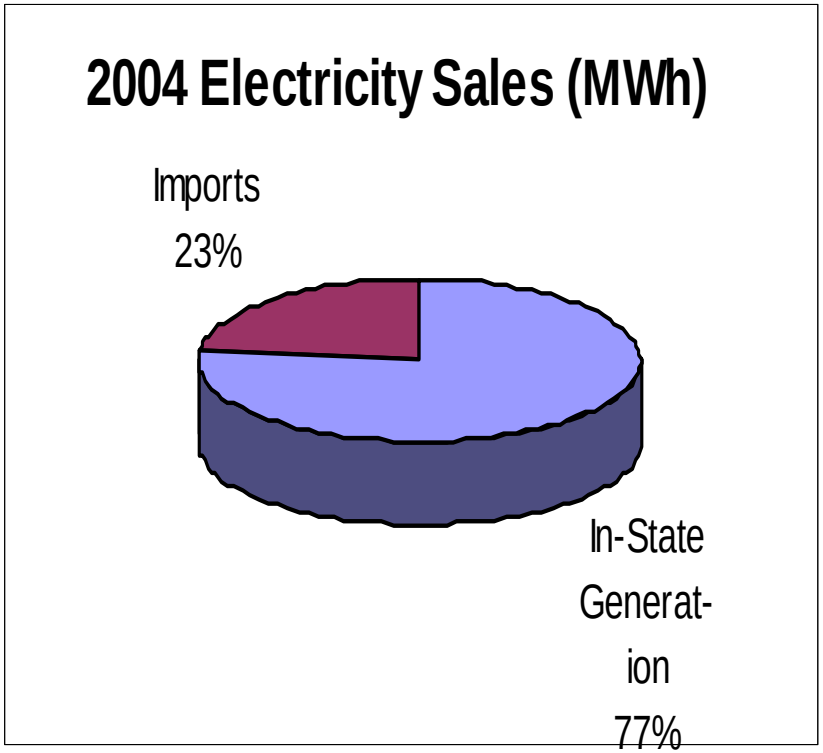
- Rulemaking R.06-04-009 at CPUC and Docket # 07-OIIP-01 at CEC

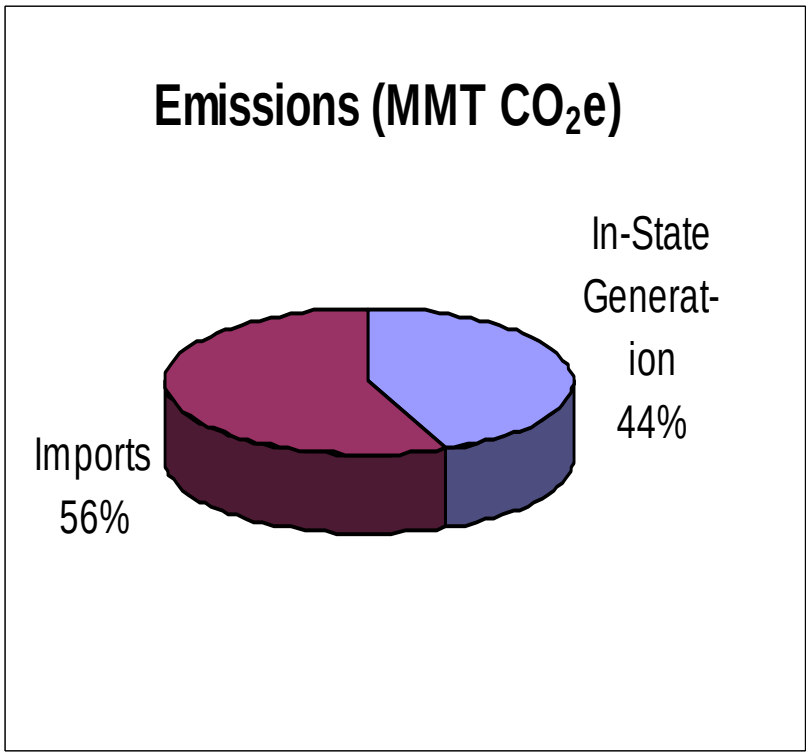
Electricity Background: Emissions Trends



Source: For past years: CARB Inventory – November 16, 2007; for forecast data: CEC Scenarios Project, adjusted for recent CARB inventory methodology updates

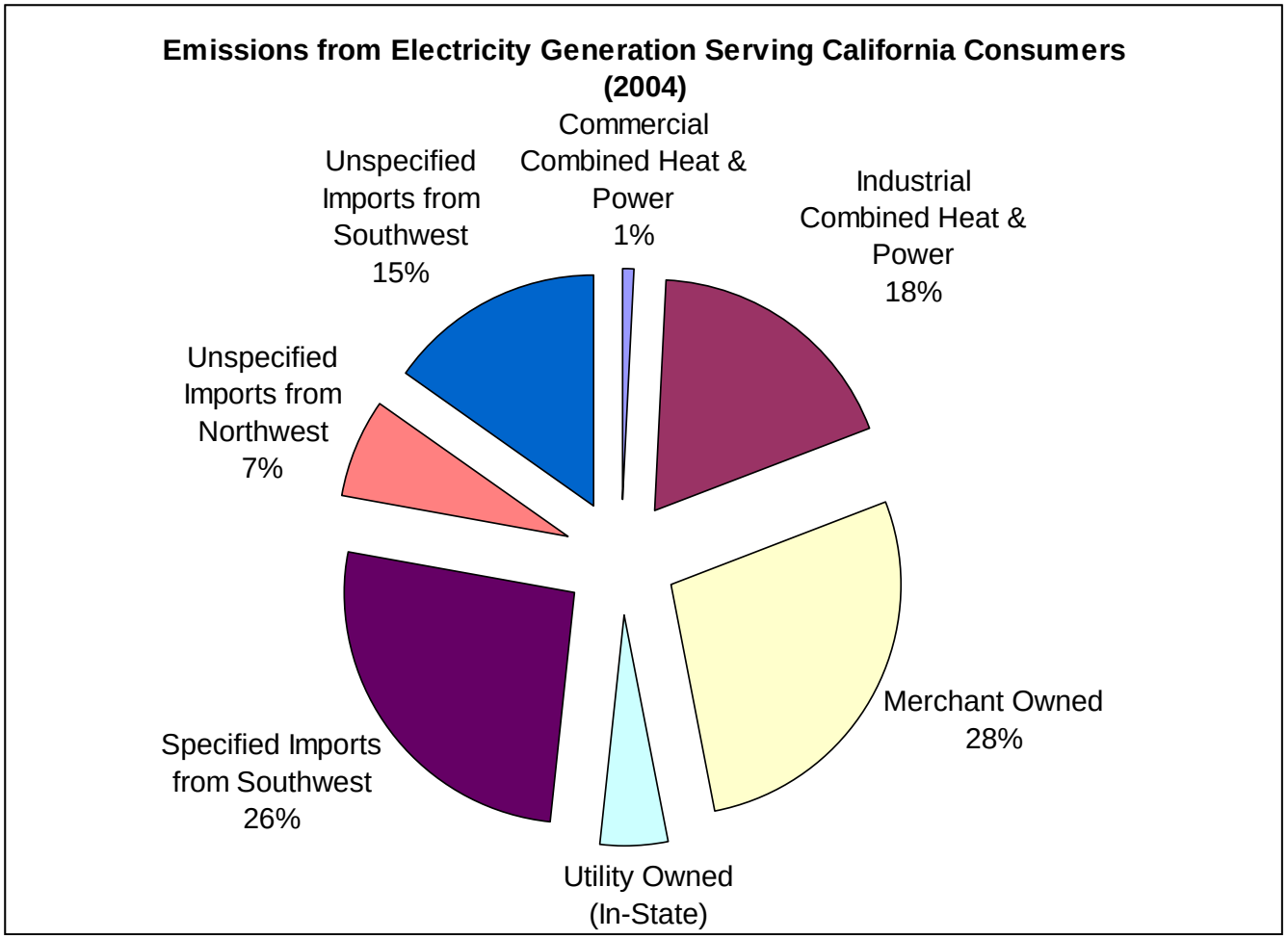
Electricity-Related Emissions: Imports





Source: CEC (for electricity sales); CARB (for emissions inventory)

Electricity-Related Emissions: Sources



Source: CARB Emissions Inventory, November 16, 2007

Overall Electricity Profile

- 3 large investor-owned utilities (IOUs) (PG&E, SCE, SDG&E) and several smaller ones (Pacificorp, Sierra Pacific)
- 2 large publicly-owned utilities (POUs) (SMUD, LADWP) and approximately 40 smaller ones
- More than 20 independent generation owners (not including self-generators), plus some independent transmission
- Mixture of fossil-fueled and renewable generation, plus energy efficiency investments
- ~$33 billion in annual revenue collected from utility bills alone; several billion more likely in economic benefits of energy efficiency, generation and transmission development, employment, etc.

California's Market Structure

- For purposes of identifying imports into California, there are eight (8) balancing authorities -- some coincide with CA state boundaries and some do not
  - California Independent System Operator (CAISO)
  - Imperial Irrigation District
  - Los Angeles Department of Water and Power
  - Pacificorp – West
  - Sacramento Municipal Utility District
  - Sierra Pacific Power Company
  - Turlock Irrigation District
  - Western Area Power Administration, Lower Colorado Region
- Some retail providers participate in CAISO markets (about 70%) – not uniform across investor-owned or publicly-owned utilities

Existing Electric Sector Policies

…that affect

greenhouse gas emissions

Energy Efficiency (EE)

- EE programs have been operating in California for almost 30 years for other environmental and cost saving reasons
- EE= most important tool (least-cost and zero emissions) for reducing emissions
- IOUs required by CPUC and POUs by AB2021 to invest in “cost-effective” EE
- CPUC has set goals through 2013 for IOUs
- CEC identified statewide potential and annual 10-year targets for POUs
- IOUs earn rewards/penalties for progress toward goals
- If successful, IOU programs will remove the need for about ten 500-MW power plants over next decade
- CEC building codes and State and federal appliance standards also contribute very low-cost reductions

Renewables

- California has long-standing policy for renewables, beginning with standard offer contracts in 1980s
- Renewables Portfolio Standard (RPS) in 2001
  - Key driver of emissions reductions
  - Currently 20% renewable requirement by 2010 for IOUs – will be close
  - Potential to go to 33% by 2020 (under consideration)
  - Renewable Energy Transmission Initiative (RETI) to identify California renewable energy zones
  - Currently no POU requirement, but some already voluntarily invest
- California Solar Initiative/New Solar Homes Partnership in 2006
  - 3000 MW of solar installations by 2016, both IOUs and POUs

Emissions Performance Standard

- Required by SB 1368 (2006)
- CEC adopted for POUs; CPUC adopted for IOUs in early 2007
- Limits emissions from long-term commitments by utilities (over five years) to 1100 pounds of CO2 per megawatt hour
- Essentially equivalent to emissions from a new combined cycle natural gas plant
- Permanently sequestered carbon emissions do not count towards total output

Key Policy Questions

- Magnitude of additional emissions reductions beyond existing policies
- Where do emissions reductions come from?
- At what cost?
- Can a cap and trade system facilitate additional emissions reductions at lower cost?
- If so, who should have the compliance obligation in the sector?

Potential Sources and Level of Emissions Reductions from Electricity

- Not much opportunity for incremental improvement to existing fossil-fueled generation
- Most reductions in electricity will come from investment in new infrastructure, which takes 3-10 years to plan, site, and build
- Many cost-effective options exist at end-user level (energy efficiency, new products, clean distributed generation)
- Preliminary analysis suggests we can get down to electricity sector 1990 levels with:
  - More aggressive energy efficiency levels (equivalent to 100% of economic potential)
    - This level of energy efficiency not yet attempted anywhere – ~30-50% higher than existing levels; delivery mechanisms and costs highly uncertain
  - Equivalent of 33% renewables statewide
  - Similar policies in other Western states

Costs

- Extremely preliminary analysis, but GHG policies will create upward pressure on electricity rates
- Assumed cost increases include costs for existing policies (such as 20% renewables) that have not yet been added to current electricity rates
- Key policy question for policymakers will be level of cost/rate increases acceptable/reasonable for additional emissions reductions from electricity sector
  - As compared to costs in other sectors

If cap and trade: Point of Regulation Who has the compliance obligation? 4 options

Load based (LB)

- Load-serving entity or “retail provider” for all power sold in California

Source based

- Generators in California – does not capture imports

First seller (FS) (deliverer)

- Entity with ownership/title that first delivers power at a California point of delivery
- For in-state production, first seller = generator
- For imports, first seller = importer

In-state generator/Import retail provider

- Instate = generators
- Imports = load serving entity or retail provider

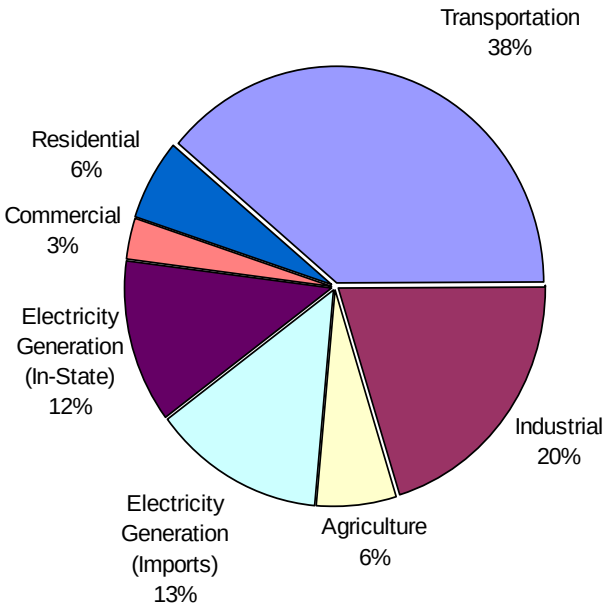
Point of Regulation - continued

- All four options have legal risks and policy pros and cons
- Most legal risks and policy drawbacks related to one state acting unilaterally
- If regional or national system developed, many vulnerabilities and challenges solved
- Thus emergence of 5th option: regional cap and trade system
- CPUC/CEC expect to issue policy decision by mid-late-February

Natural Gas Background

- Likely mostly natural gas (from end-user combustion)
  - Residential: 6%
  - Commercial: 3%
  - Some Industrial: 5-10%

2004 GHG Emissions by Sector



Source: CARB Inventory – November 16, 2007

Overall Natural Gas Sector Profile

- IOU gas providers (local distribution companies) – PG&E, SDG&E, SoCalGas, Southwest Gas
- Small number of POUs
- Interstate pipelines
- Independent storage providers in California
- Marketers/aggregators
- Large component of electric generation from natural gas
- End-user combustion (not counting for electric generation) accounts for ~$12 billion in utility bill collections annually

Existing Natural Gas Sector Policies

- Energy Efficiency
  - As in electricity, the least expensive alternative for emissions reductions from end-user combustion
  - IOUs have mandatory goals
- Leak detection from pipelines and compressor stations
  - Though small, fugitive methane emissions have 21-23 times the global warming potential of CO2
  - Already in interest of utilities and pipelines to reduce leaks to increase revenues; may be able to do more

Key Natural Gas Policy Questions

- Should end-user emissions from natural gas combustion be capped or treated through mandatory/regulatory policies and programmatic strategies?
- Can we get more from the natural gas sector if we utilize cap and trade?
- Is there a relationship to electricity sector policy?

Potential Natural Gas Policies

- Staff preliminary recommendation for capping sector including end-user emissions
- Relationship to electricity sector important
  - If electric sector cap and trade were load-based, model transferrable to local distribution companies for natural gas
  - Approach would minimize incentives for fuel switching
- Options for renewable sources of natural gas – biogas
- CPUC/CEC policy decision in mid-late-February

Next Steps for Energy Sectors

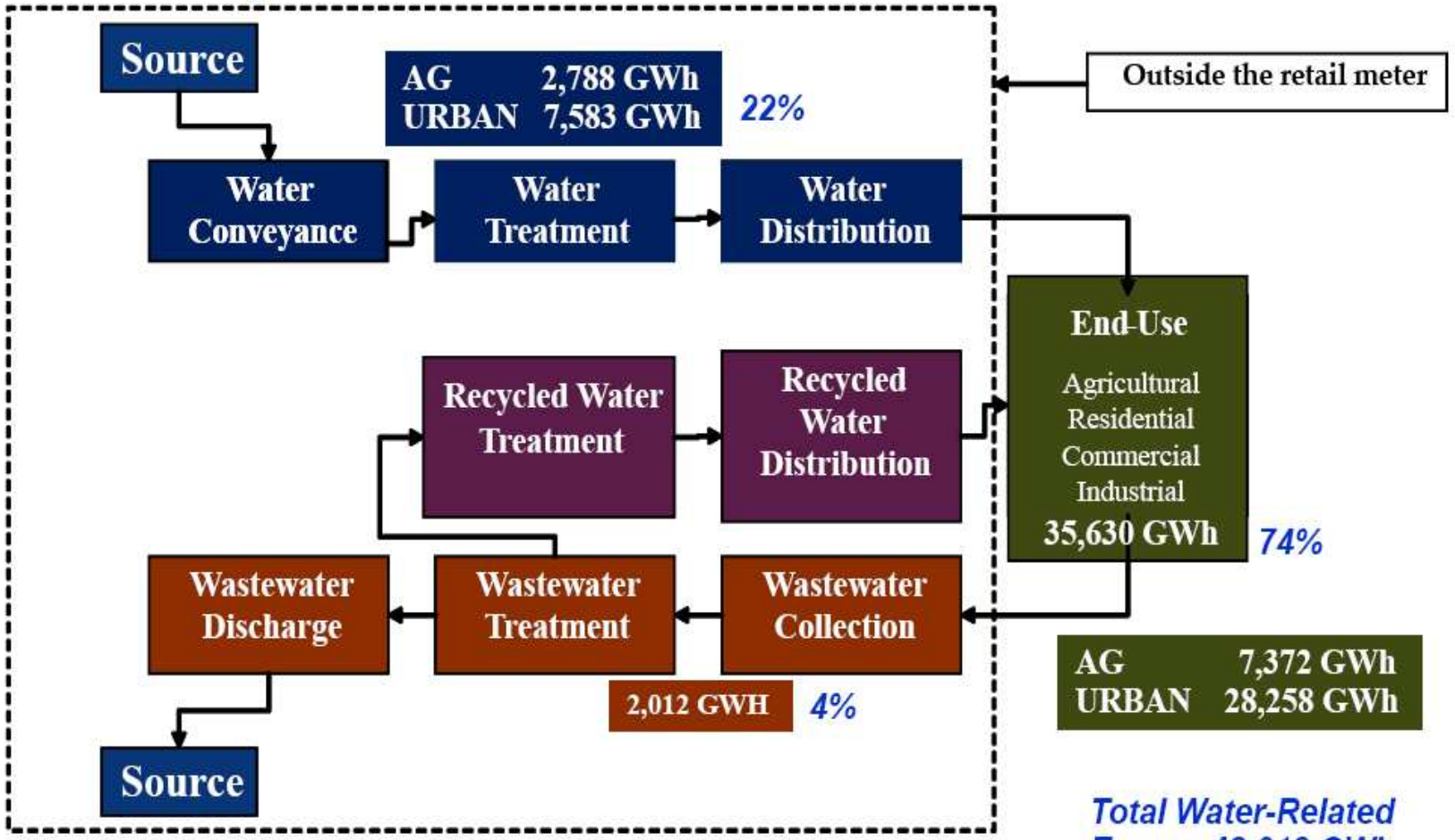
- Mid-late-February decision from CPUC/CEC on type and point of regulation for electricity and natural gas, including preliminary recommendations on allowance allocation policy
- Additional modeling results available March-April 2008
  - Including refined cost estimates
  - Analysis of impacts by utility/retail provider
  - Further details of emissions reductions achievable by various strategies
- Final recommendation to CARB by August 2008

California's Water-Energy Nexus

- Water generates energy.
  - In 2006, 19% of California's in-state electricity was generated from clean hydropower.
- Water uses energy.
  - On average, 19% of electricity use in California is related to water use.
  - On average, 30% of the non-power plant natural gas use (i.e. natural gas not used to generate electricity) is also related to water use.
- The energy intensity of water is primarily in its end uses (i.e. at the customer level).

Framework The Water Use Cycle

Estimates adjusted Oct 2006



Total Water-Related Energy 48,013 GWh

Where are the greatest near-term opportunities for significant energy benefits?

Proposed Water-Energy Strategies

Agency	Strategy Title
SWRCB	Monitor Groundwater Supplies
SWRCB	Increase Use of Recycled Water
SWRCB	Delineate Groundwater Basins
SWRCB	Remediate Contaminated Groundwater Basins
SWRCB	Low Energy Wastewater Treatment Methods
DWR	Water Use Efficiency
DWR	Statewide Water Planning
DWR	Proposal Solicitation Processes
DWR	Hydroelectricity
DWR	California Climate Action Registry
DWR	Renewable Energy for SWP
DWR	Clean Energy for SWP
DWR	Carbon Sequestration
CEC/ CPUC	Renewable Energy Production from Water
CEC/CPUC	Increase Energy Efficiency of Water End Uses
CEC	PIER Roadmap for Water-Energy

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