

Energy and GHG Master Planning

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Kids say the darndest things about Water!

- “A city purifies its water supply by filtering the water then forcing it through an aviator.”
- “Water is composed of two gins. Oxygin and Hydrogin. Oxygin is pure gin. Hydrogin is gin and water.”



Presentation Roadmap

- 1. Water-Energy-Carbon Nexus**
- 2. Benefits of Energy & GHG Master Planning**
- 3. Energy-Efficiency**
- 4. Renewables**
- 5. GHG Inventory & Climate Action Plan**
- 6. Planning Case Study: Irvine Ranch Water District**

Why is Energy & GHG Master Planning Important?

- **Ever rising costs**
- **Pressure to reduce costs**
- **Public & Political pressure to do energy efficiency, renewables and deal with climate change.**
- **Water-Energy-Carbon Nexus**



Embedded Energy in Water

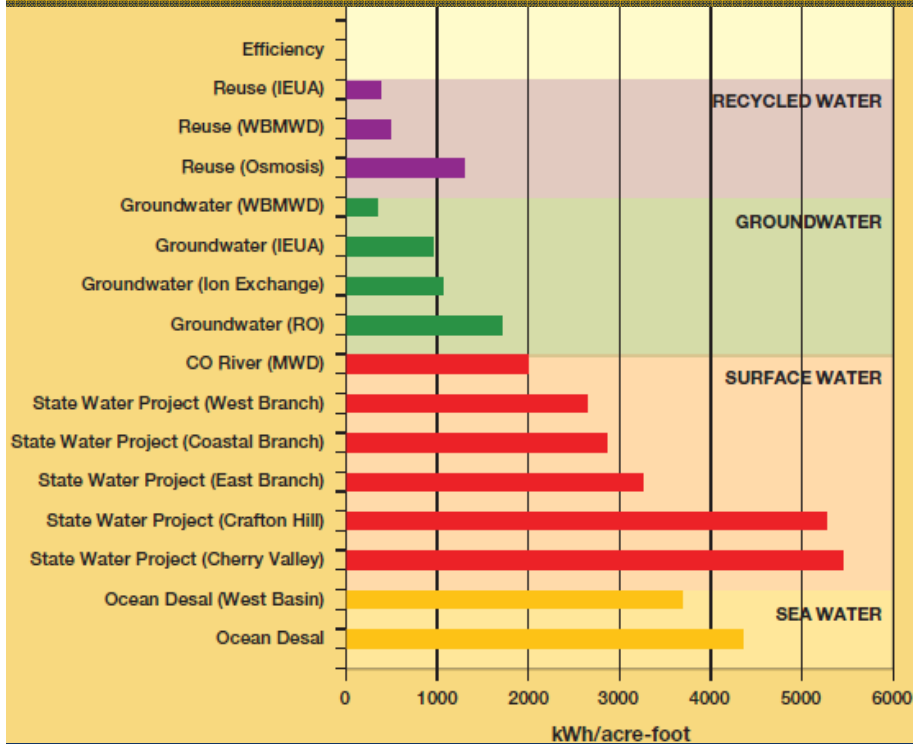
Water Use Cycles Segments	Range of Energy Intensity (KWh/MG)	
	Low	High
Water Supply & Conveyance	0	14,000
Water Treatment	100	16,000
Water Distribution	250	1,200
Wastewater Collection & Treatment	700	4,600
Wastewater Discharge	0	400
TOTAL	1,050	36,200
Most Utilities	1,250	6,500

Water/Wastewater treatment use 75 billion kWh per year, represents:

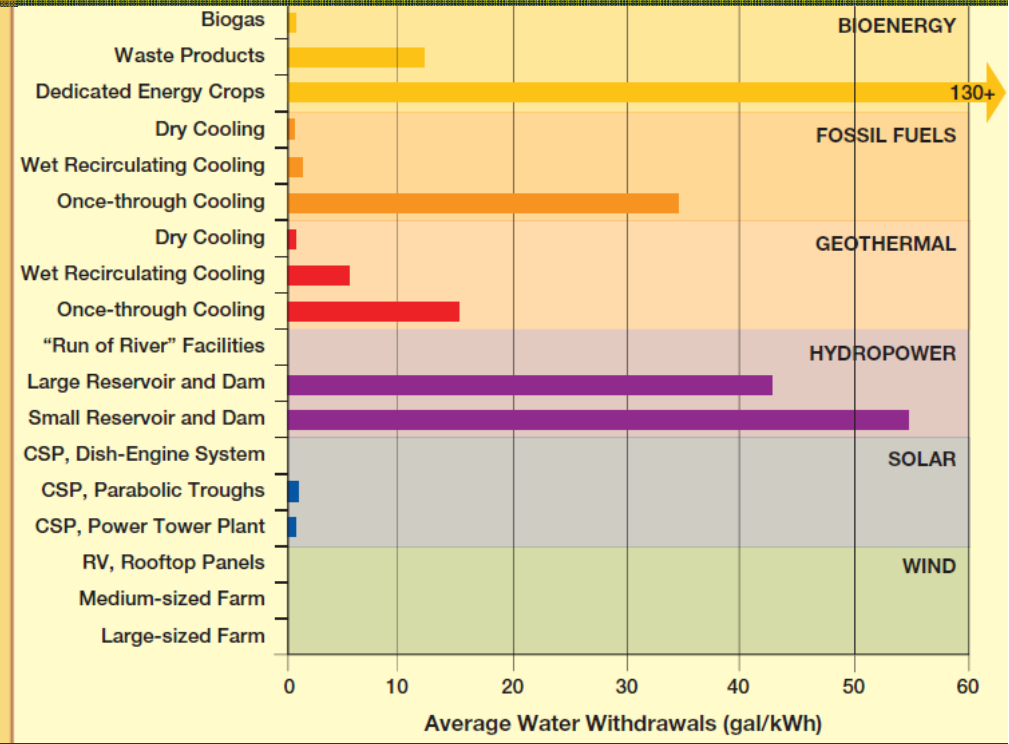
- 3% of the nation's energy consumption
- \$4B a year in spending
- enough electricity to power 6.75 million homes for an entire year.

The Energy-Water Nexus

Energy Intensity of Water Supplies

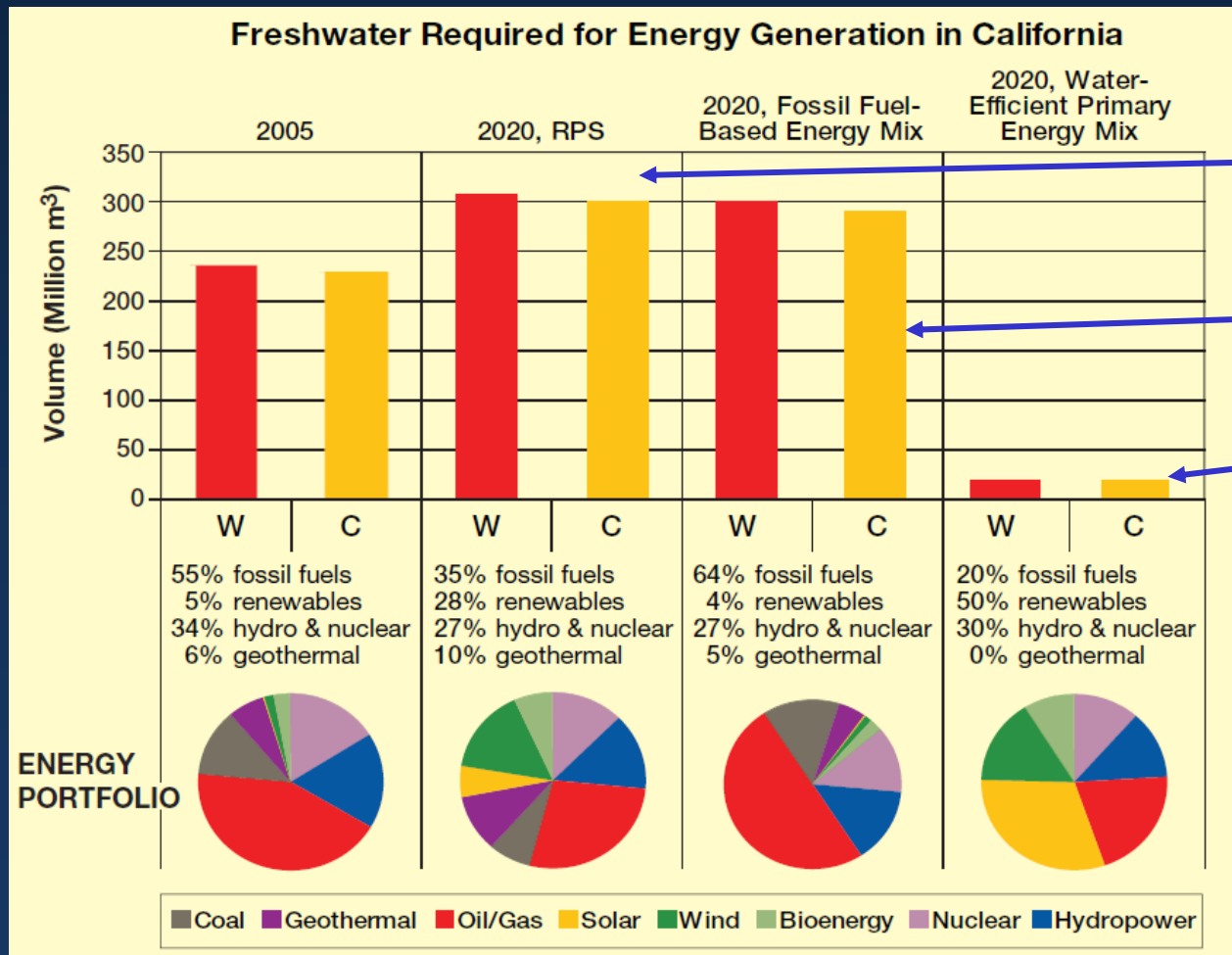


Water Intensity of Energy Production



Source: *Southwest Hydrology, Sep/Oct 2007*

Example of Energy-Water Nexus



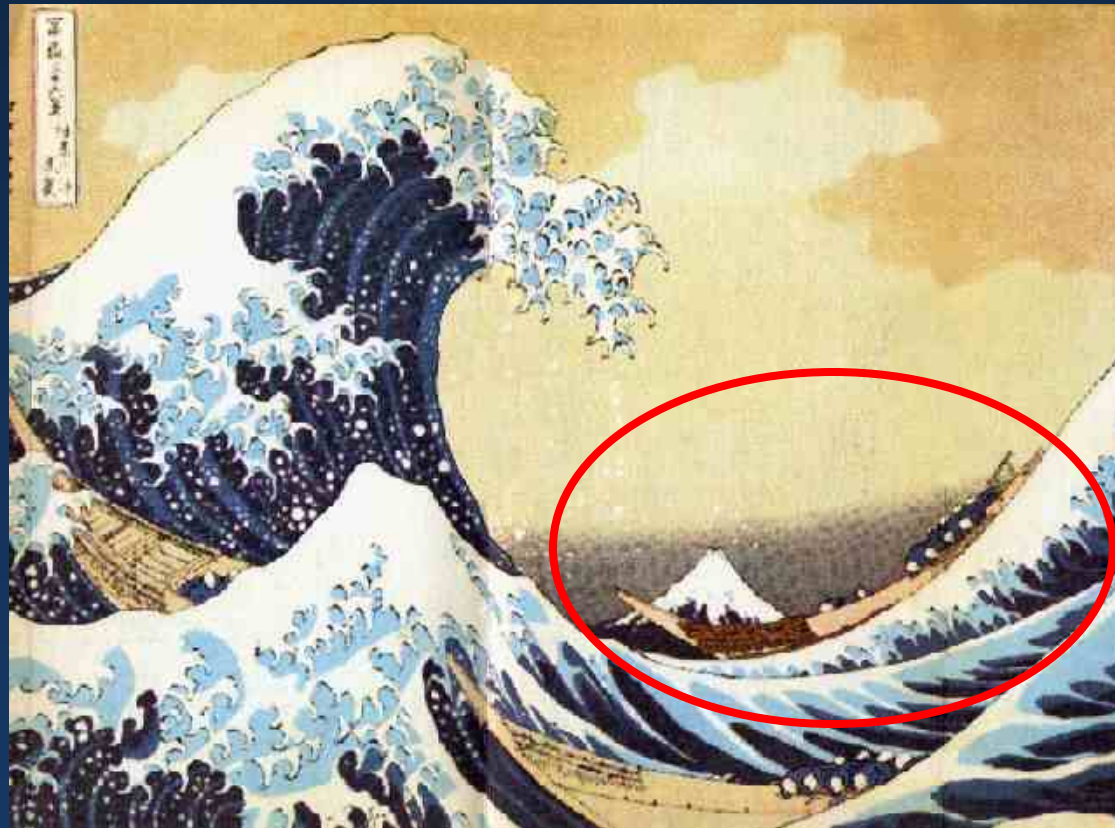
Low Carbon
High Water

High Carbon
High Water

Low Carbon
Low Water

Average water required (W= withdrawals, C= consumption).

Planning Can Help!



Energy & GHG Master Planning

Benefits:

- Comprehensive, systematic, and focused Energy Program
- A customized Action Plan with a discrete list of options that YOU helped develop
- Can save money
- Enhance environmental stewardship

Energy & GHG Master Planning

Benefits:

- Improve public relations
- Obtain the greatest benefit per dollar invested, identifies the best "bang-for-the-buck"
- Brings existing and potential future energy programs under one umbrella and into one process

Energy Efficiency is a Hot Topic!



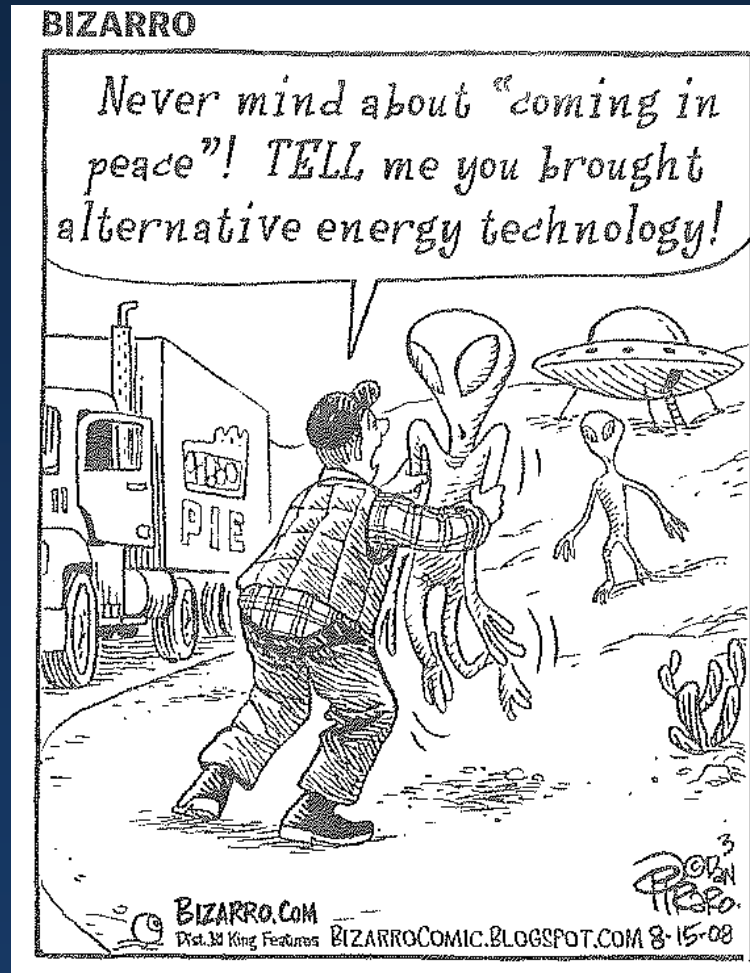
Energy-Efficiency First!

- **Most Cost-Effective Option**
- **Biggest Bang-for-the-Buck!**
- **Lowest Environmental Impacts**
- **Lowers Your Operating Cost**

Examples of EEMs: "Lucky 13"

1. Premium efficiency motors
2. Variable Frequency Drives (VFD)
3. Optimize pump station wet well set points
4. Reduce water pressure
5. Energy efficient lighting
6. Occupancy sensors
7. HVAC improvements
8. Water conservation programs
9. Recycled water programs
10. Water conservation & recycling education programs
11. Rate design
12. Energy management
13. Demand control (time of use rate, interruptible rate, power factor correction)

Everybody Wants Renewables!



Renewables and Alternatives Available

- **Solar PV**
- **Wind**
- **Small Hydro**
- **Rankin Cycle for waste heat**
- **Fuel Cells**
- **Microturbines**
- **IC Engines**

Kids say the darndest things about Climate!

- **“The Climate is hottest next to the Creator.”**
- **“Please define H₂O and CO₂. H₂O is hot water and CO₂ is cold water.”**

Climate Action Plan Steps

1. Set your goal or target
2. Conduct a GHG inventory and reporting
3. Identify and evaluate GHG mitigation options
4. Chose best and most cost-effective options
5. Implement the plan
6. Annually update & renew the plan



CLIMATE SUMMIT

WHAT IF IT'S
A BIG HOAX AND
WE CREATE A BETTER
WORLD FOR NOTHING?

- ENERGY INDEPENDENCE
- PRESERVE RAINFORESTS
- SUSTAINABILITY
- GREEN JOBS
- LIVABLE CITIES
- RENEWABLES
- CLEAN WATER, AIR
- HEALTHY CHILDREN
- ETC. ETC.



12/7/19 USA TODAY

JUL PITT

Not All GHGs Are Created Equal!

Greenhouse Gas	Global Warming Potential
Carbon Dioxide (CO₂)	1
Methane (CH₄)	23
Nitrous Oxide (N₂O)	296
Hydrofluorocarbons (HFCs)	120-12,000
Perfluorocarbons (PFCs)	5,700-11,900
Sulfur Hexafluoride (SF₆)	22,000

* 1 Metric Ton of CH₄ = 23 MT CO₂e

3 Ways of Reporting GHG Emissions

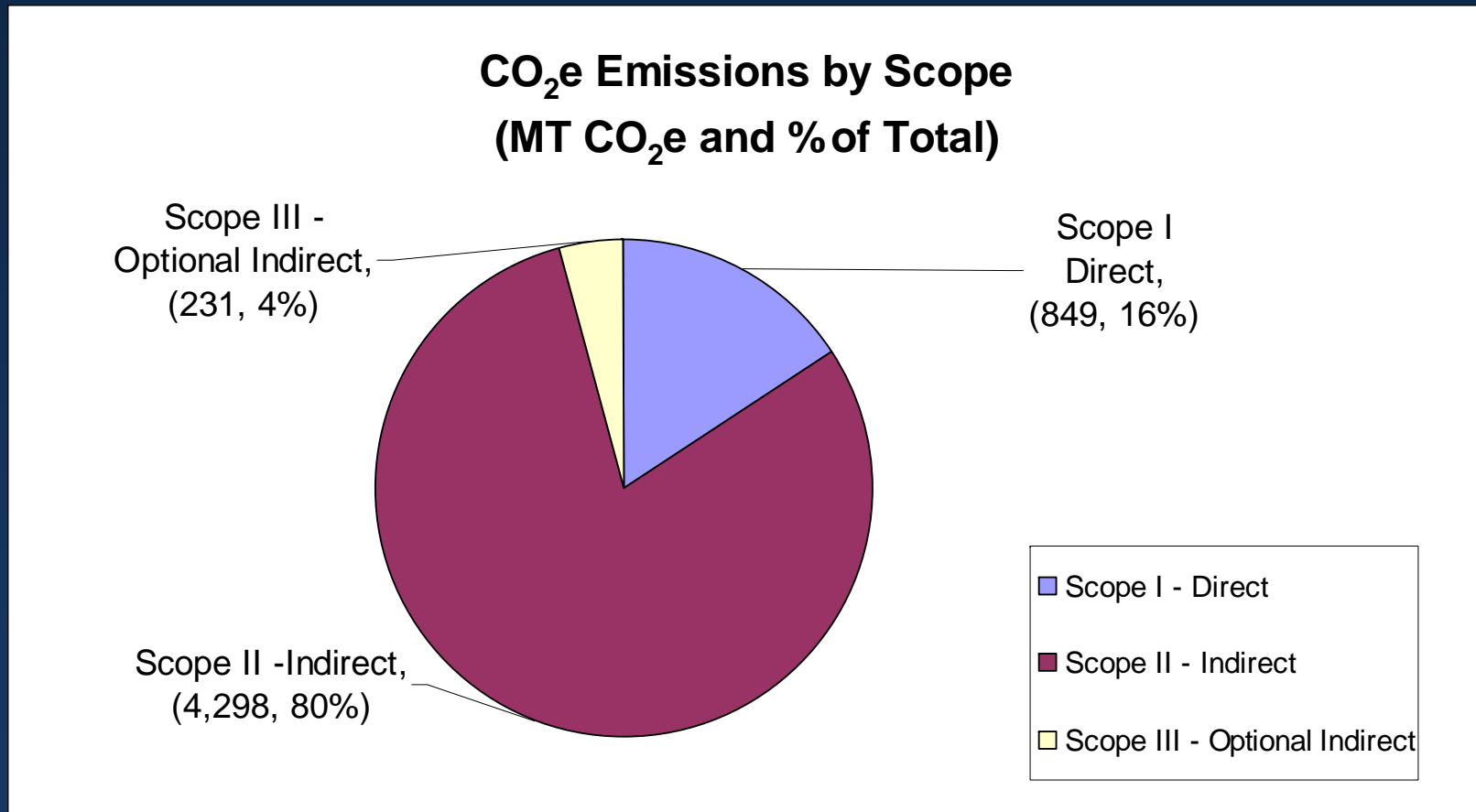
1. **Scope**

- **Scope I – Direct Emissions**
- **Scope II – Indirect Emissions**
- **Scope III – Optional Indirect Emissions**

2. **Category** – by activity

3. **Source** – by type of fuel or GHG

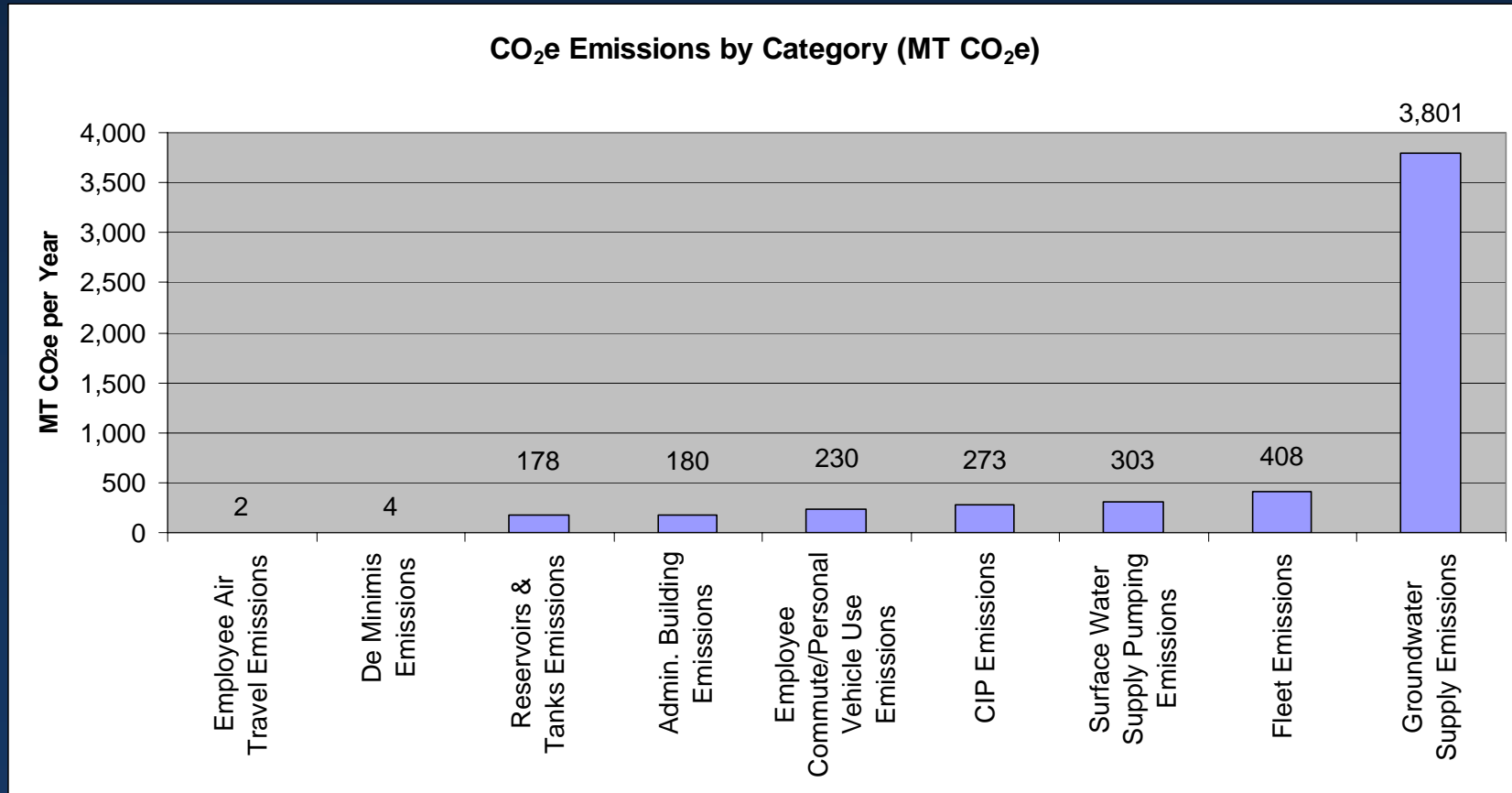
CO₂e Emissions by Scope



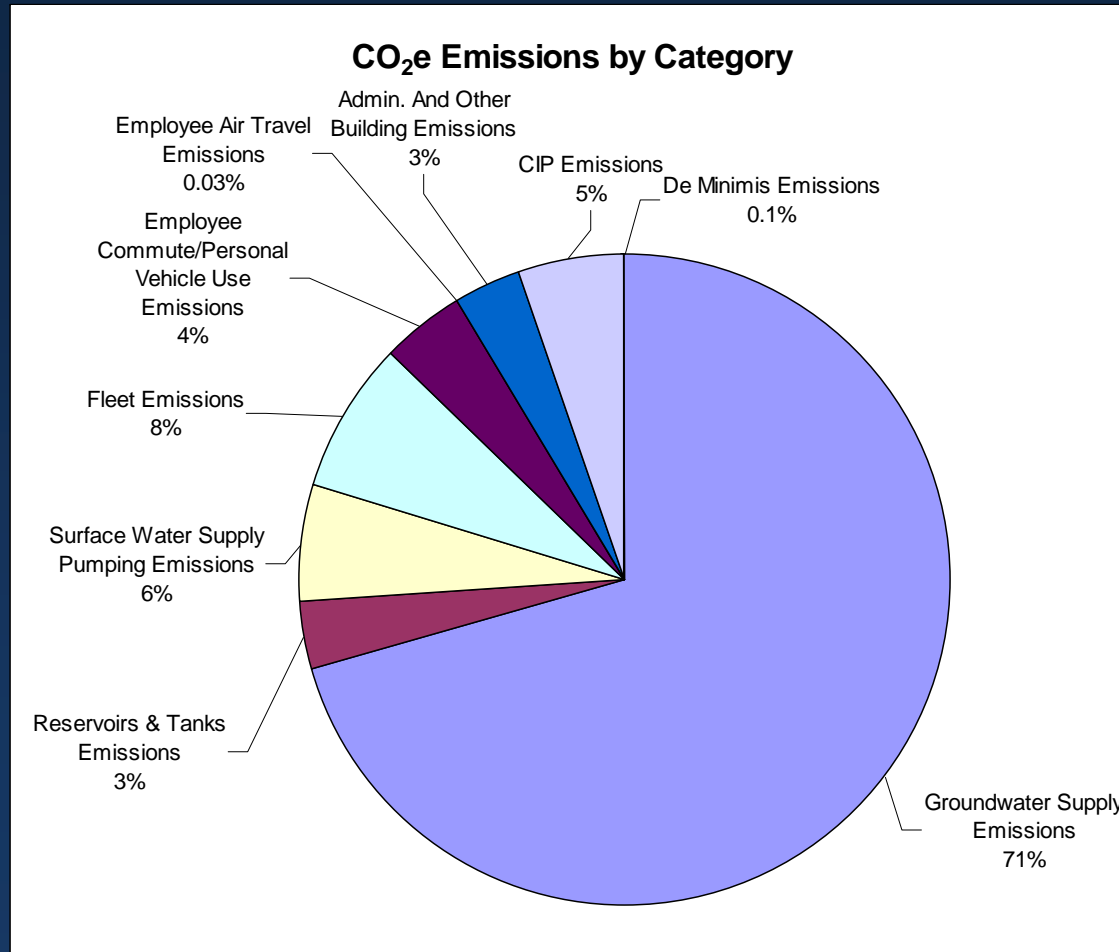
CO₂e Emissions by Category

- **Groundwater Supply**
- **Fleet**
- **Surface Water Supply Pumping**
- **Capital Improvement Projects**
- **Employee Commute/Personal Vehicles**
- **Administration Buildings**
- **Reservoirs and Tanks**
- **De Minimis Uses**
- **Employee & Board Air Travel**

CO₂e Emissions by Category



CO₂e Emissions by Category



Areas of Focus for CO₂e Reductions

- Largest contributing emissions category is **Groundwater Supply**
- Largest contributing emissions source is **Electricity**
- Primary focus on more efficient **electric well pumps**
- Secondary focus on improving **fleet fuel efficiency**
- Tertiary focus on promoting **more fuel efficient methods for employee commuting**

ACWA Energy Independence



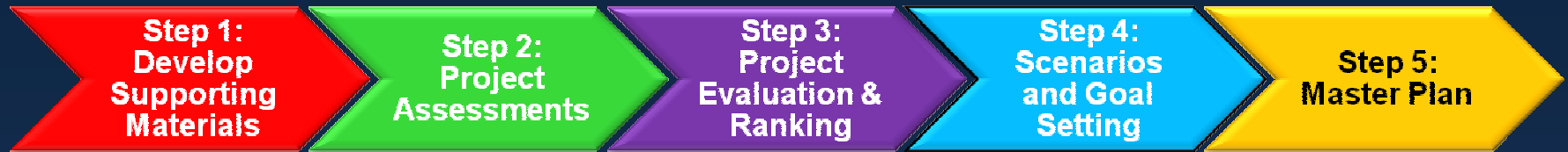
**ACEC Oregon
2009 Project of the Year**

**AAEE 2009 National
Grand Prize for
Planning**



Kennedy/Jenks Consultants
Engineers & Scientists

Energy & GHG Master Plan Irvine Ranch Water District



Major Steps:

1. Develop Supporting Materials
2. Projects Assessments
3. Project Evaluation, Scoring and Ranking
4. Scenarios and Goal Setting
5. Master Plan

Master Plan Creates a Systematic Road-Map for the Future

- **Step 5 – Master Plan**
- **Develop DRAFT Action Plan (review by TAC)**
- **Draft Energy and GHG Master Plan**
 - **Technical Memos become Chapters**
- **Board Meeting to explain process, describe short- and long-term actions, and seek Board input (PowerPoint)**
- **Finalize Energy and GHG Master Plan, providing a “road map” for future actions**

Thank You for Your Time!



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