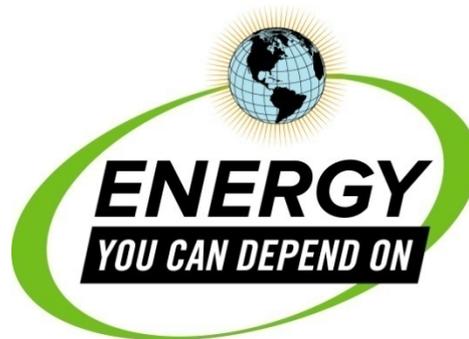


Western States Petroleum Association

Combined Heat and Power



Evelyn Kahl
California Energy Commission
IEPR Workshop
July 23, 2009

Topics

- CHP's role in AB 32 goals
- CHP benefits
- Overview of oil and gas industry CHP facilities
- Status of California CHP policy
- Barriers to CHP retention and development
- Opposition to CHP
- Observations on ICF findings
- Need for integrated state CHP policy

CHP Supports AB 32 Goals

- CHP adopted as GHG reduction strategy in ARB Scoping Plan
- CHP reductions complement other electricity sector measures
 - RPS: 21.3 MMTCO₂e
 - Energy Efficiency: 19.6 MMTCO₂e
 - CHP: 6.7 MMTCO₂e
- Failure to retain *existing* efficient CHP will increase required Scoping Plan reductions
- How will the ICF report influence ARB?

CHP Benefits – More Than Just GHG Reductions

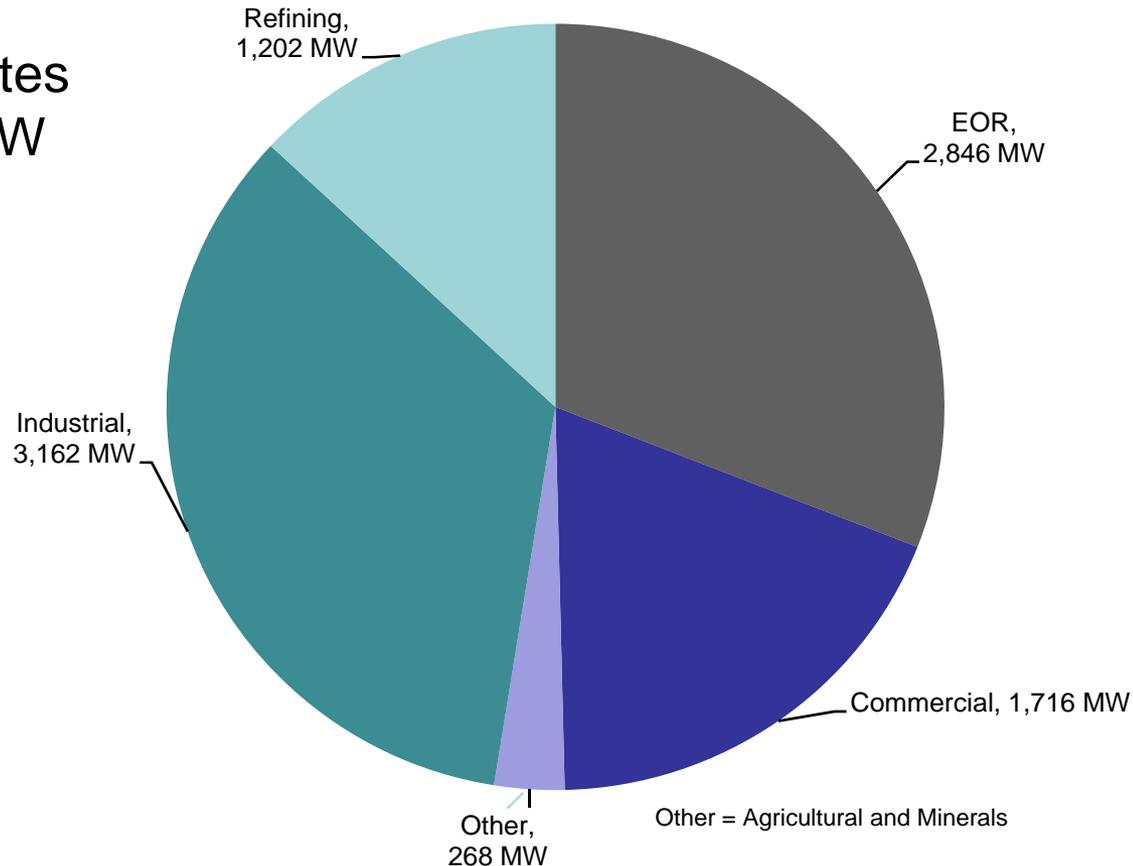
- Customer benefits
 - On-site reliability
 - Cost control
 - Business certainty
- Societal benefits
 - Fuel efficiency
 - Reduction in GHG and criteria pollutant emissions
 - Grid reliability
 - Not dependent on transmission investment
 - Reduced transmission and distribution energy losses

Agency Support for CHP

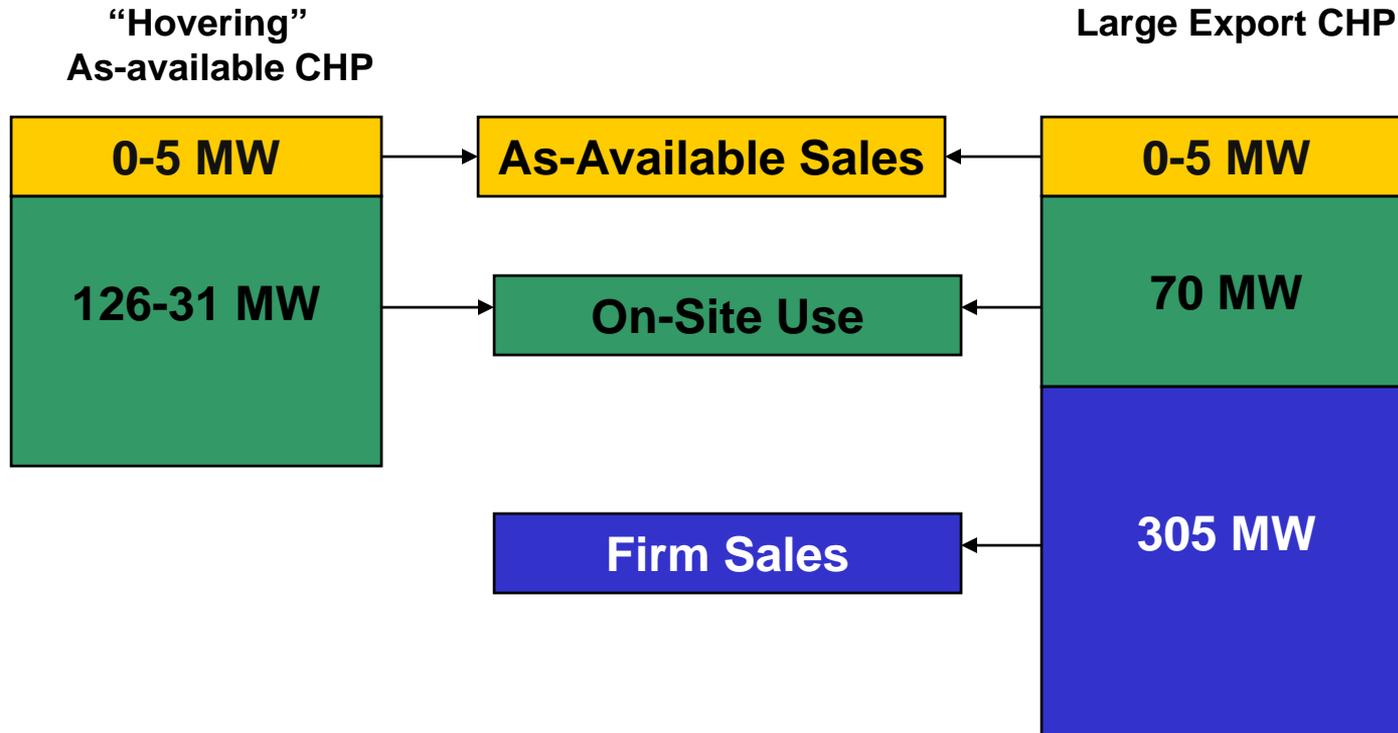
- **CPUC:** *“We support the treatment of CHP as an emission reduction measure and the goal to encourage cost-effective, fuel-efficient, and location-beneficial CHP.”*
- **CEC:** *“Combined heat and power in particular offers low greenhouse gas emissions rates for electricity generation taking advantage of fuel that is already being used for other purposes...”*
- **ARB:** *“ARB recommends that California take steps to encourage the development of new CHP facilities, with a target of an additional 4,000 MW of installed CHP capacity by 2020.”*

Oil and Gas Industry Share of CHP

- 1,186 Sites
- 9,194 MW



Typical Large Customer CHP Scenarios



Oil and Gas Industry CHP Facilities

- ~ 2800-3000 MW CHP capacity*
- Built in response to PURPA and 2000-01 energy crisis
- Roughly half of electricity exported
- Enhanced oil recovery/Refining CHP among most efficient
 - ♦ General range from 60-80% HHV**
- GHG Savings for existing facilities (based on EIA data for 2589 MW)
 - ♦ **4.54 MMtCO₂e** annually with vintaged benchmark
 - ♦ **2.94 MMtCO₂e** annually benchmarked against current vintage combined cycle

* EIA, CEC, CAISO and private data bases present varying views of installed CHP MW in the oil and gas industry.

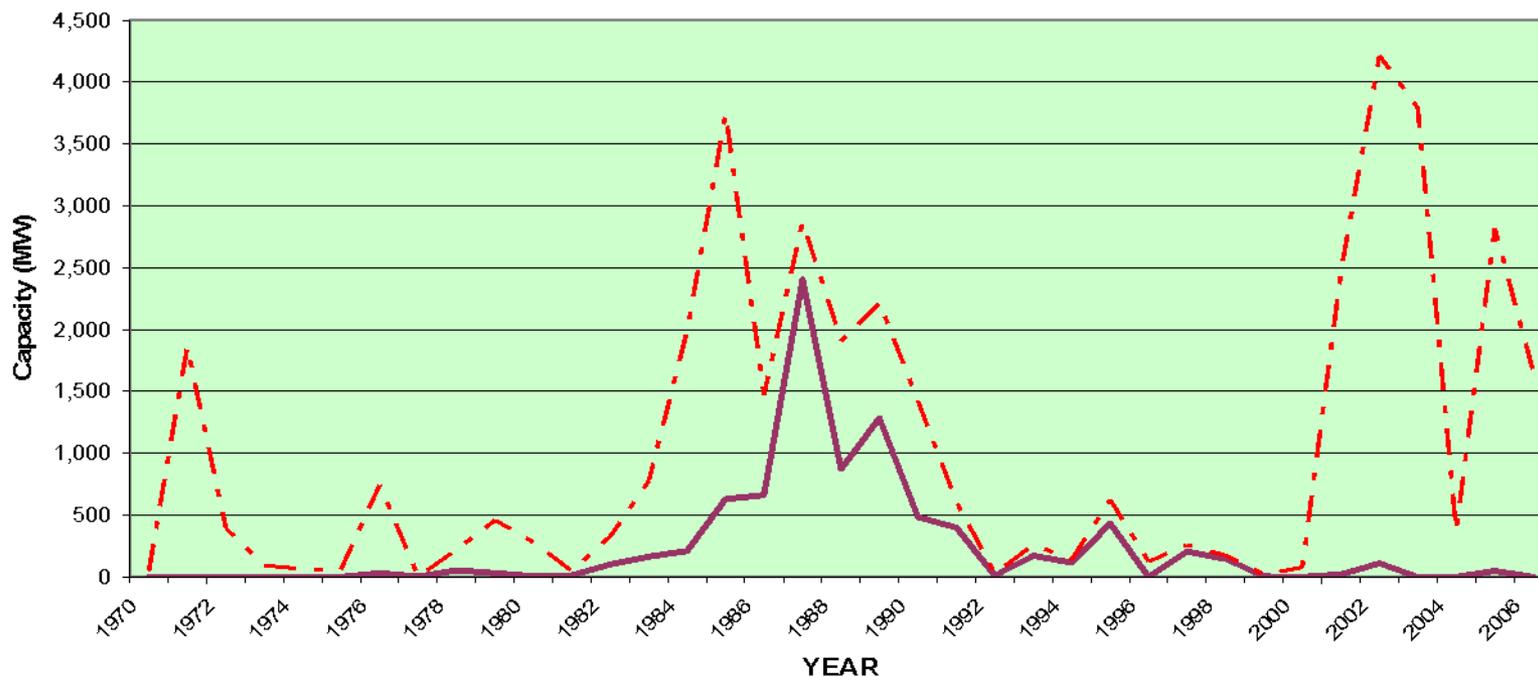
** Based on EIA 2008 data, for comparison purposes, SCE's Mountainview efficiency was 46% (7460 HR); average California gas-fired non-CHP generation averaged 42.5% (8032 HR).

WSPA Company CHP Potential

- With supportive CHP policy WSPA members could add more than 1722 MW of thermally matched CHP capacity
 - ◆ EOR: 1070 MW
 - ◆ Refining: 652 MW
 - ◆ Potential varies materially by facility
 - Additional CHP capacity would result in additional GHG savings of **1.7-2.0 MMtCO₂e** by 2020
 - Represents roughly half of the 3551 MW developed by 2020 under the ICF “all-in” scenario and two-thirds of the estimated 2.52 MMtCO₂e savings estimated by ICF by 2020
- * Calculated by RCS Inc. against benchmark using following assumptions: 70 - 72% total CHP efficiency; 1.5 H/P ratio; 85 - 90% capacity factor; 80% avoided boiler efficiency; avoided electricity benchmarks based on 2008 EIA data for California gas-fired generation.

CHP Development has Stalled

California Capacity Additions
CHP vs Total Capacity Additions
1970 Through 2006 (in MW)



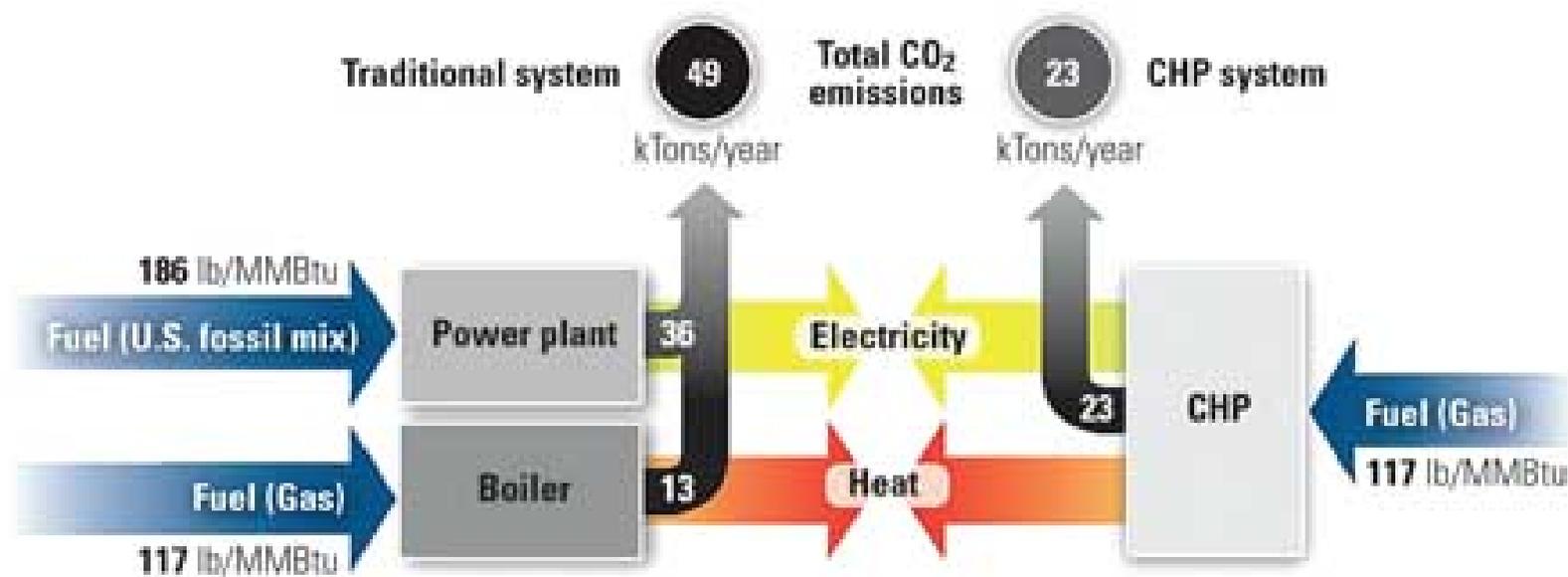
Source: CEC Database of California Power Plants.

— CHP — Total Capacity Additions

Barriers to CHP Operation & Development

- Limited export opportunities for excess power
 - ◆ No PURPA enforcement despite years of proceedings
 - PURPA undermined by EPCRA 2005
 - ◆ No state CHP policy to complement PURPA
 - ◆ No real “market” alternatives to utility purchases for CHP products
 - ◆ No “carrot” or “stick” to encourage utility purchases
- Unknown GHG costs; no recovery assurance
 - ◆ CHP increases host GHG compliance obligation
- Utility departing load fees added to customer capital costs (\$9.17 - \$21.38/MWh)
- Complex grid interface and interconnection rules
- AQMD restrictions

CHP Increases Host GHG Compliance Obligation



Source: ICF International

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Existing Customer Generation Departing Load Charges Applicable to Cogeneration/CHP Facilities > 5 MW (as of May 14, 2009)

<i>IOU</i>	<i>Charge</i>	<i>Rate (\$/MWh)</i>	<i>Exemption</i>
PG&E E-20T	Public Purpose Program Charge	\$5.16	none
	Nuclear Decommissioning	\$0.28	none
	Competition Transition Charge (CTC)	Exempt (\$4.79)	Public Utilities Code § 372
	DWR Bond Charge	\$4.91	none
	DWR Power Charge Indifference Adjustment	Exempt (\$15.21)	D.03-04-030
	PG&E Energy Cost Recovery Amount	Exempt (\$2.31)	D.04-02-062, D.04-11-015
	2009 Vintage CRS (Procurement NBC)	Exempt (\$2.96)	D.08-09-012; PG&E AL 3446-E
	TOTAL KNOWN PG&E NBCs	\$10.35	
SCE TOU-8- Sub	Public Purpose Program Charge	\$3.67	none
	Nuclear Decommissioning	\$0.59	none
	Competition Transition Charge (CTC)	Exempt (\$4.11)	Public Utilities Code § 372
	DWR Bond Charge	\$4.91	none
	DWR Power Charge Indifference Adjustment	Exempt (\$17.22)	D.03-04-030
	SCE Historical Procurement Charge	customer-specific calculation; fully paid	D.03-04-030
	2008 Vintage CRS (Procurement NBC)	\$12.21	D.08-09-012 exemption; SCE AL filing 2320-E (updated 2336-E) applies to CGDL departing after 2008; protested
	New System Generation Charge (CAM NBC)	Exempt (\$0.28)	D.08-09-012
	TOTAL KNOWN SCE NBCs	\$9.17-\$21.38	

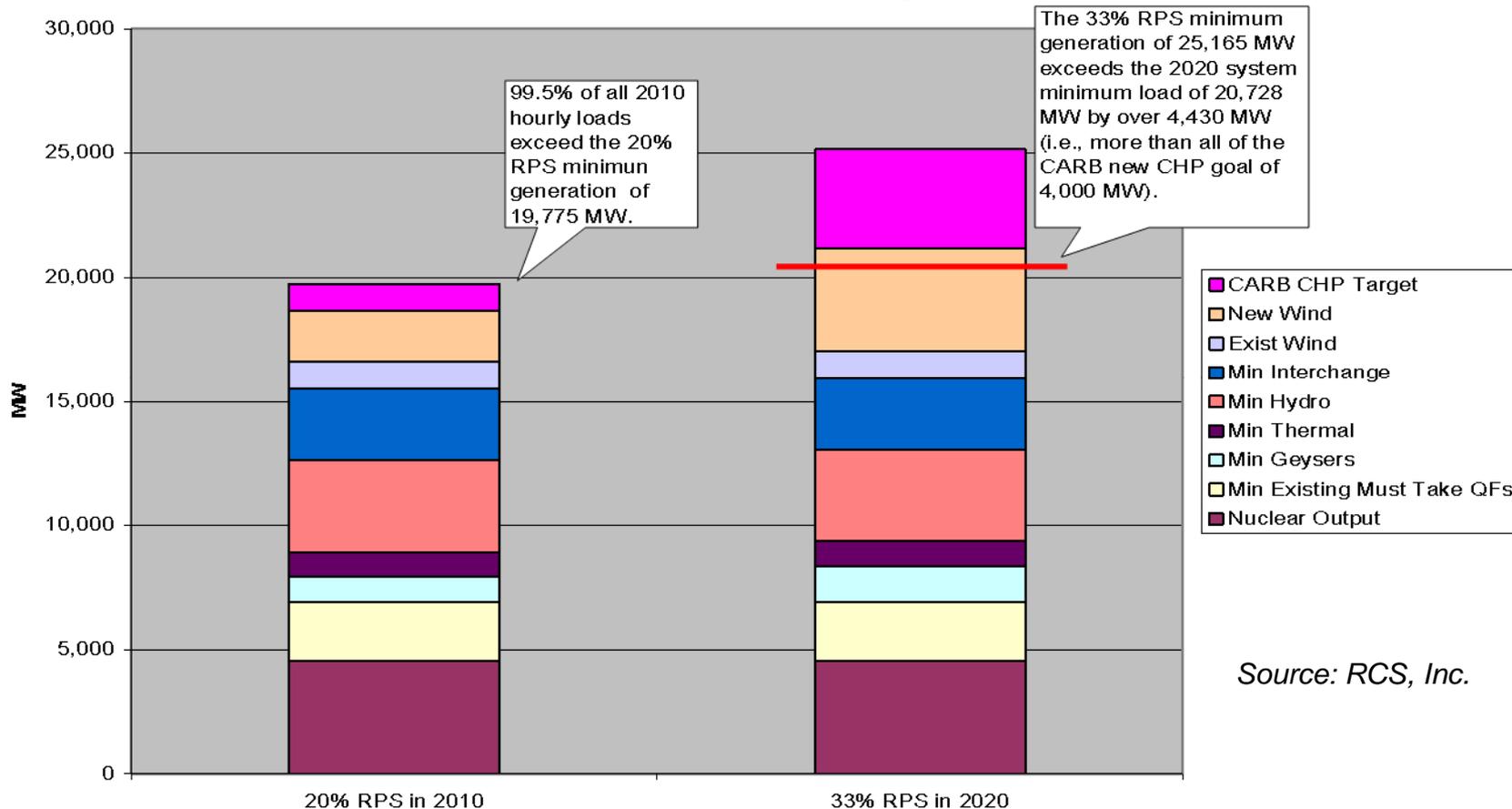
Interface of CHP/Renewables Policy

- Utilities' ability to accommodate electricity from CHP is critical; in many cases CHP delivers 24/7
- Ability to accommodate CHP power is challenged during off-peak periods due to overgeneration
 - ◆ Several categories of facilities, including nuclear, hydro spill, wind, etc. are "must run" during off-peak periods
 - ◆ Depending on resource mix during low-demand periods, increased renewable portfolio may "crowd out" CHP
- Further study required as noted by CEC June 2009 Staff Report
- *CHP isn't uniquely the cause of overgeneration and should not bear all of the consequences*

Increased RPS and CAISO Over-Generation

Illustrative Impact of Increased RPS on CAISO Over-Generation

(Based on November 2007 CAISO Renewable Integration Report)



Source: RCS, Inc.

Opposition to a State CHP Policy

- CHP can sell directly into the market
 - ◆ No real alternatives; utility remains the primary purchaser
 - ◆ MRTU lacks depth and certainty necessary to support CHP
- Utilities don't need power with CHP characteristics
 - ◆ Ignores full range of CHP benefits
 - ◆ Places burden of solving overgeneration solely on CHP policy
 - ◆ Issue can be addressed with Time of Delivery pricing
- CHP isn't as efficient as separate production alternative
 - ◆ True in some cases, but not in all
 - ◆ Issue is moot under policy that places greater emphasis on efficiency

Opposition to a State CHP Policy (2)

- It's cheaper to reduce GHG by planting trees in Brazil
 - ◆ Ignores full range of CHP benefits and co-benefits
 - ◆ California needs to maximize reductions to achieve AB 32 goal
- CHP has matured and doesn't require policy support
 - ◆ Maturity isn't the issue with CHP; need for policy support arises out of the unique characteristics of CHP generation
 - Benefits and operations span electricity and industrial sector
 - Need to follow thermal load sets CHP apart from other generation
 - Third-party CHP development is “double trouble” to the utilities: competes with utility shareholder-return generation projects and takes load off system

Comparison of CEC CHP Market Assessments

Date of Report	Technical Potential (MW)		Aggressive Deployment (MW in 2020)				GHG Savings
	All CHP	Industrial CHP	All CHP	AC CHP	On-site CHP	Export CHP	All CHP (MM tonnes/yr)
April 2005	30,232	6,418	7,340	-	4,471	2,869	6.7
July 2009	18,417	8,701	3,550	239	2,431	880	2.5
May 2009		6,132					
<i>Note: Updated survey of industrial CHP only.</i>						<u>5 - 20 MW</u> 263 <u>> 20 MW</u> 4,000	

Source: Crossborder Energy

Observations on ICF CHP Potential Analysis

- Important ICF findings
 - ◆ Under current policies, CHP will fall well short of ARB goals
 - ◆ With *aggressive* CHP stimulation (all-in case) the market penetration goals can be met a few years beyond 2020
 - ◆ Greatest market and GHG benefit comes from preserving existing large CHP and pursuing remaining large CHP technical potential
- Conclusions regarding GHG savings would benefit from reviewing additional sensitivities
 - ◆ Heat rate used in benchmark to calculate GHG savings
 - ◆ Power price forecast assumptions for export program
 - ◆ Capacity factors for new CHP
 - ◆ Efficiencies for new CHP
 - ◆ Market penetration of large CHP

Next Steps?

- Refine and implement CPUC Decision 07-09-040 as a bridge to a more stable policy
 - ◆ Proceeding opened early 2004
 - ◆ Decision issued two years ago
- Analyze overgeneration potential and consider solutions if necessary
- Bring coordinated action among CEC, CARB and CPUC to develop a comprehensive and durable state CHP policy that:
 - Recognizes the *full range* of CHP benefits; and
 - Addresses comprehensively the barriers to CHP operation and development