Addressing Climate Change Concerns: A Case Study on City of Sunnyvale

AESP National Energy Services Conference

Betty Seto

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Agenda

- Introduction
- Historic emissions trend
- Projected emissions
- Analysis of potential projects
- Cost and carbon impact of action
- Lessons learned

Introduction: Who is KEMA?

- Areas of specialization:
  - Energy efficiency program planning
  - Demand side management services
  - Green building design and services
  - Customer data collection and analysis
  - Greenhouse gas emissions analysis and policy

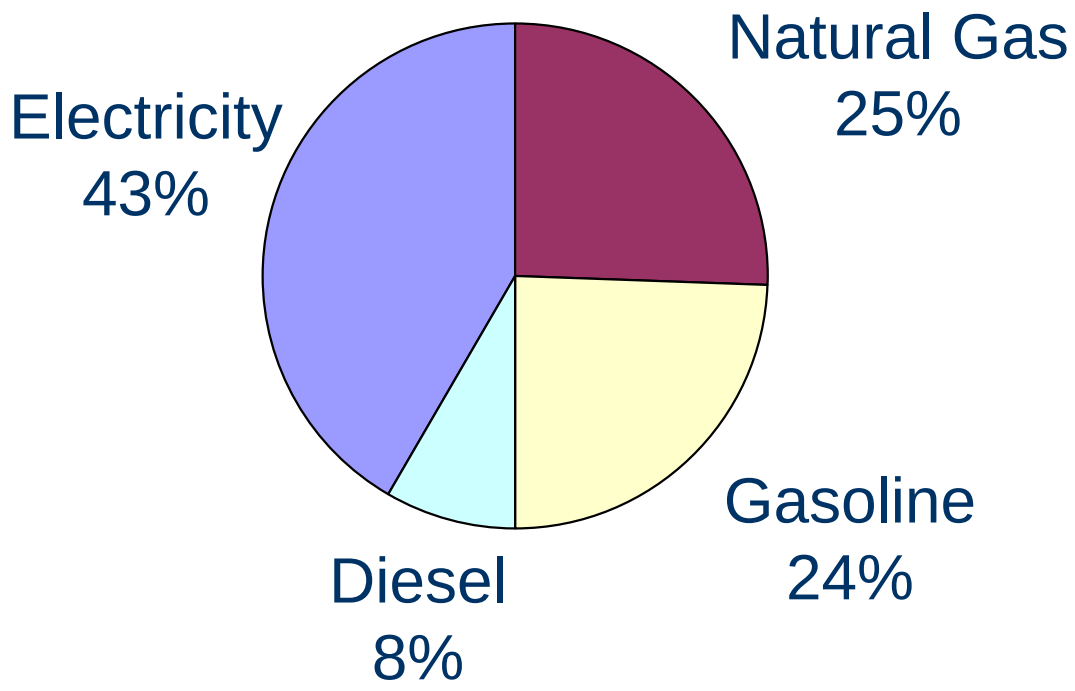
- 300 employees in the U.S. (1400 worldwide)
- KEMA opened 1927, purchased U.S.-based XENERGY in 2000

Introduction: City of Sunnyvale

- Population: 136,000
- Located in San Francisco Bay Area
- Utility service: Pacific Gas & Electric

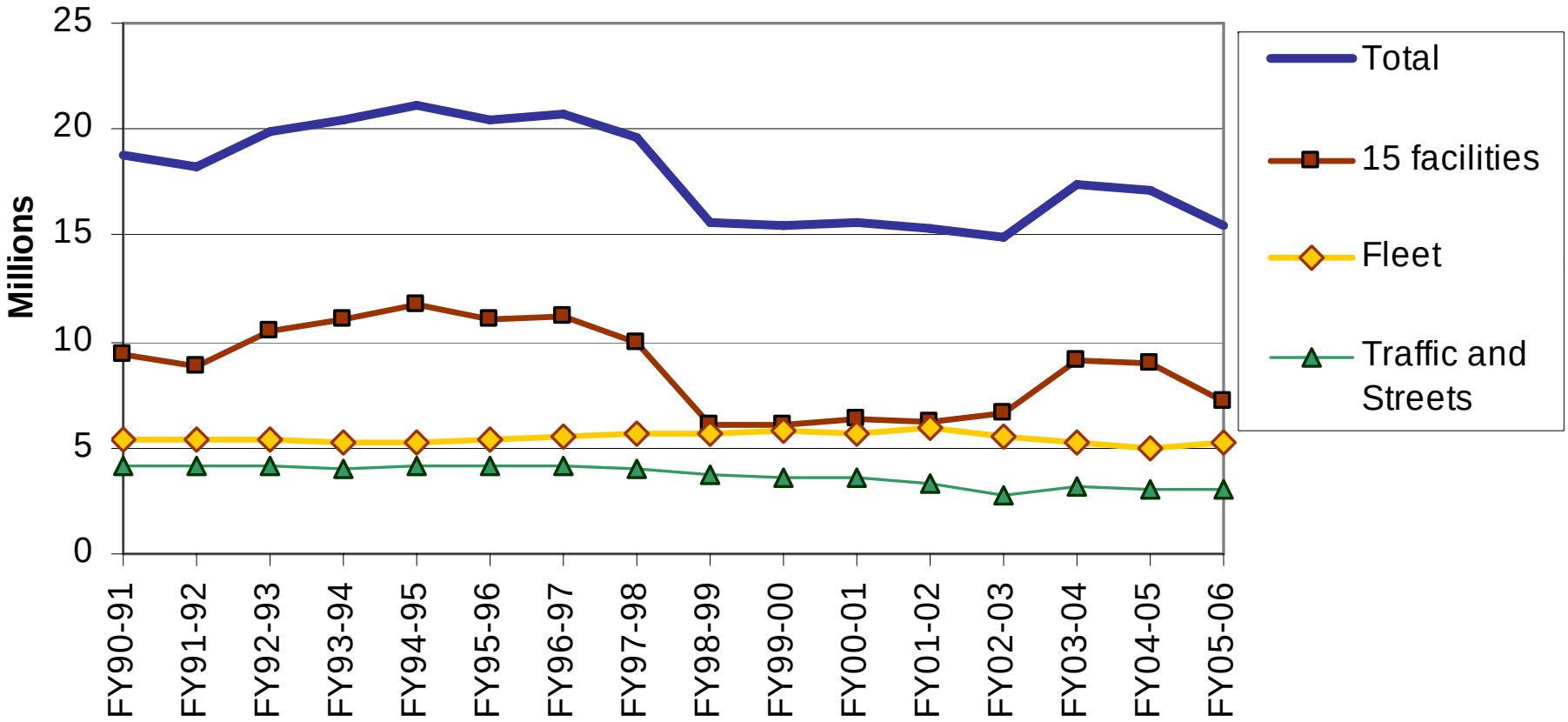
- July 18, 2006: City Council votes on "Carbon Dioxide Emissions Reduction Project"
  - Pledging member of Sustainable Silicon Valley
  - Determine carbon dioxide footprint
  - Develop recommended projects
  - SSV target of 20% below 1990 levels

Historic Emissions – FY05-06 Snapshot

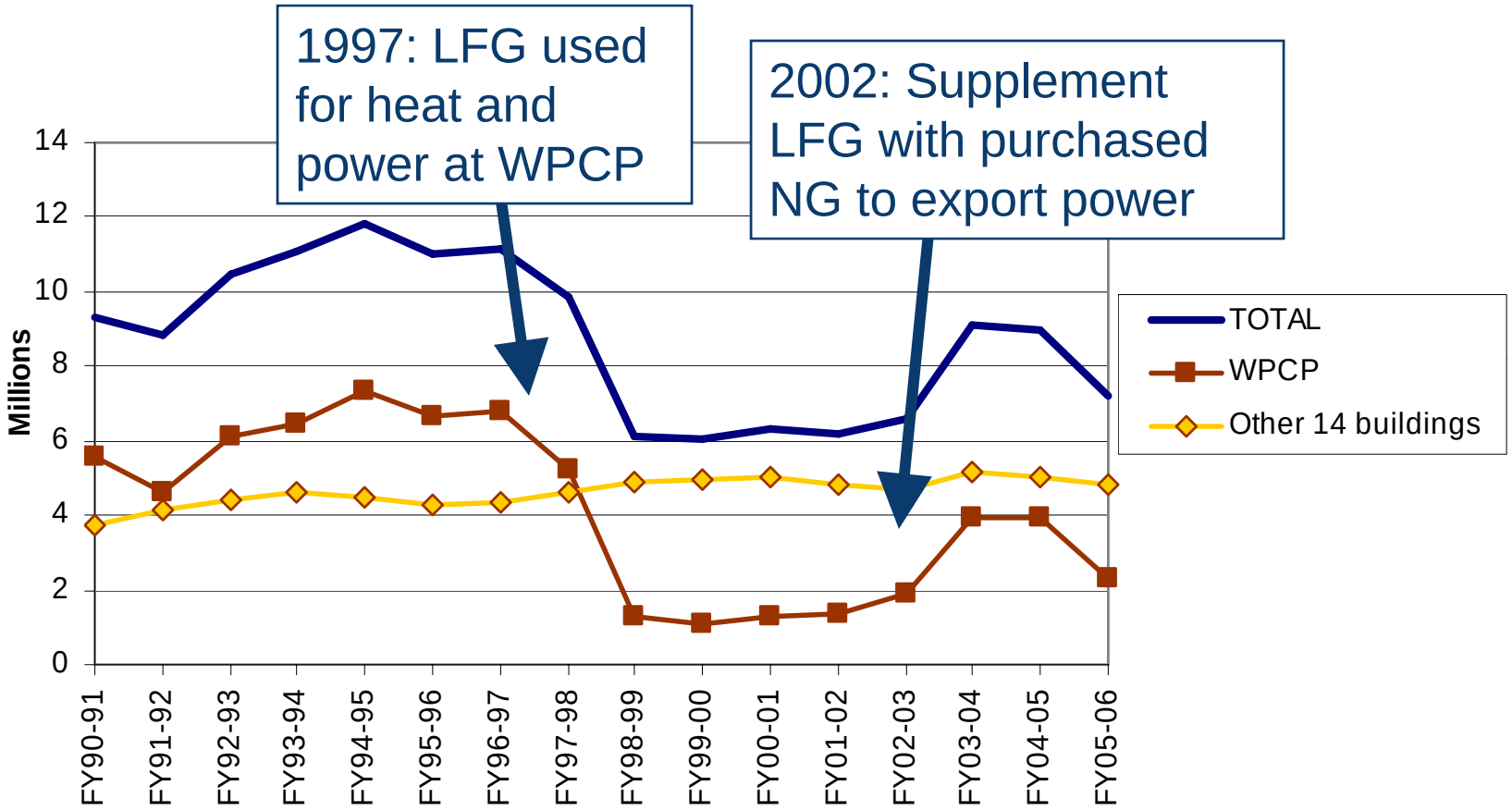


- For FY2005-06, total emissions of 15,553,079 lbs CO2

Historic Emissions Trend (lbs CO_2)

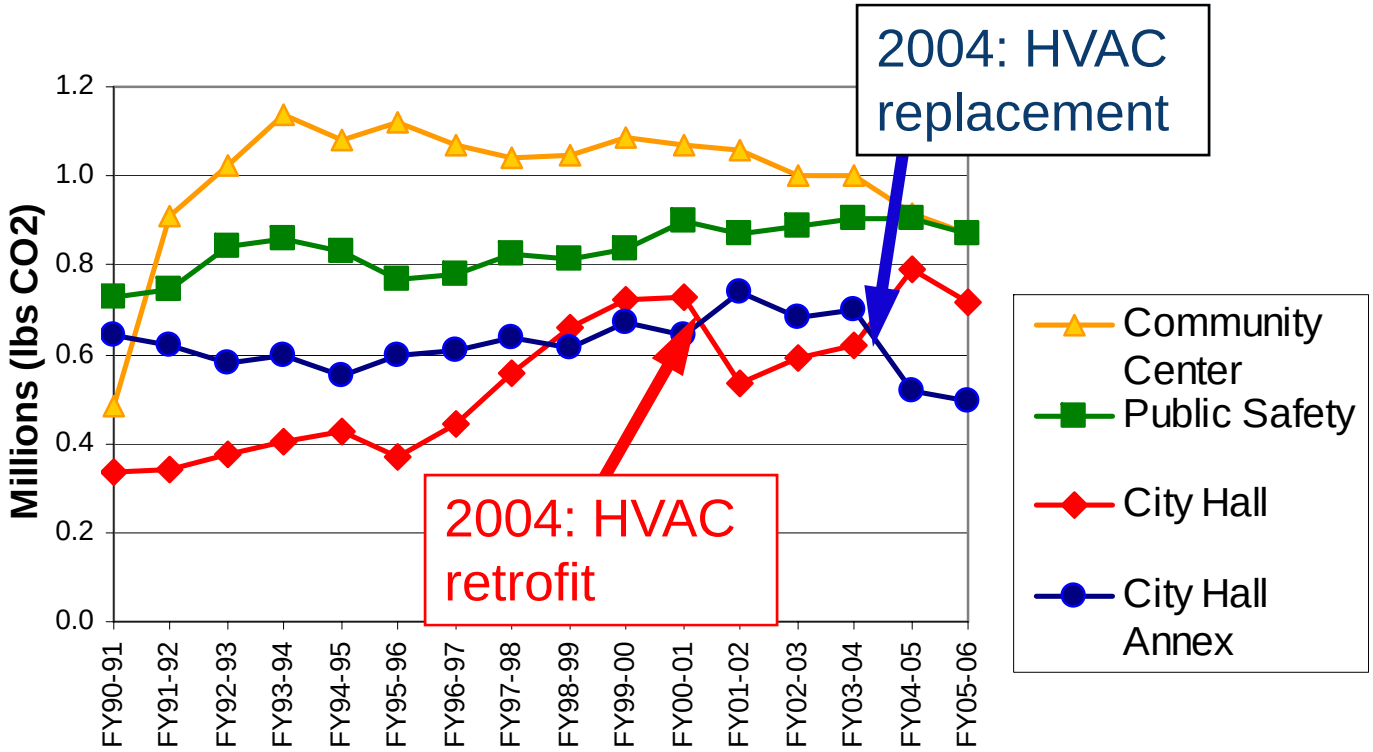


Historic Emissions Trend – 15 Facilities



- Water Pollution Control Plant (WPCP) emissions drives total buildings emissions

Historic Emissions Trend – Other 14 Facilities



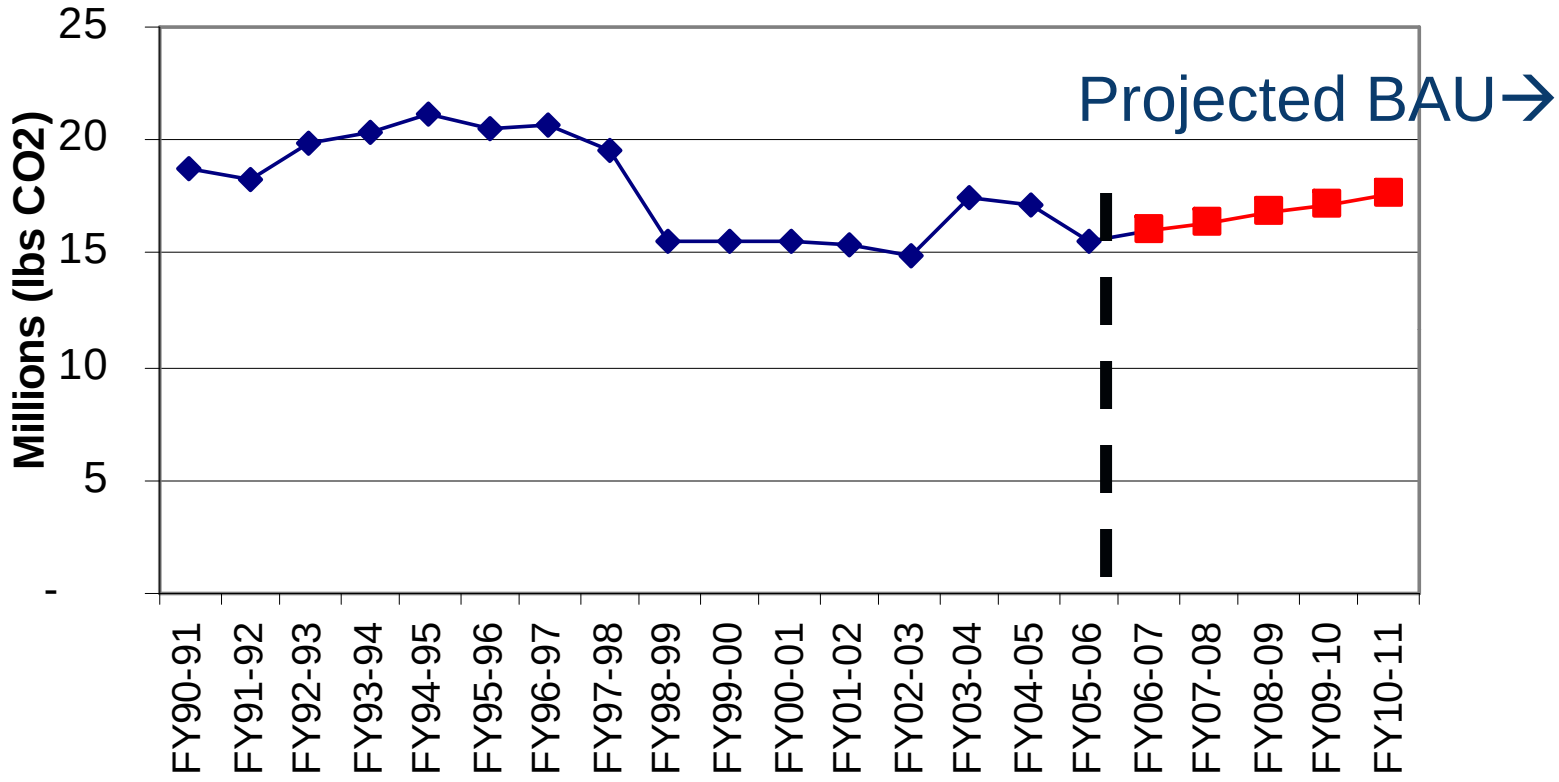
- Building operations patterns visible in CO_2 inventory

Historic Emissions Trend

- Somewhat similar to billing analysis
  - Patterns of energy usage
  - Validates energy efficiency projects
  - Highlights buildings not functioning to design

- Advantages of carbon inventory
  - Assess energy use including different fuel types (normalize to carbon emissions)
  - First step to prioritizing sites for carbon reductions
  - Demonstrate leadership in climate change

Projected Emissions Trend



- Assessing difficulty of meeting future goal, requires understanding of projected BAU trend

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Analysis of potential projects

- Sources for project ideas:
  - PG&E facility audits
  - Solar feasibility study
  - Interviews with City staff
  - If budget allows: on-site assessment, and surveys of City residents and other stakeholders

- Cost-benefit analysis
  - Estimated project costs
  - Estimated energy savings
    - PG&E workpapers
    - California DEER database
    - KEMA engineering estimates

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Analysis of potential projects – Stakeholder concerns

- Sensitivity to portrayal of remaining cost attractive EE opportunities
  - Economizer repair and optimization of controls
- Staff concerns about committing to energy savings estimates
  - City budget process removes operating budget monies based on these estimates
- Facility engineer was not main staff contact or CO_2 project lead

Analysis of potential projects

Project description	Annual electricity savings	Annual CO2 benefit	Annual PG&E bill savings	KEMA estimated project cost	Sunnyvale estimated project cost
	(kWh)	(lbs)	($)	($)	($)
VFD on HVAC fan motors (30 hp fan)	29,340	16,724	$ 4,108	$ 6,660	$ 12,000
VFD on VAV AHU (7.5 hp fan)	7,335	4,181	$ 1,027	$ 1,665	$ 12,000
Metal halide to T5 retrofit (6)	2,820	1,608	$ 395	$ 2,370	$ 7,500
Metal halide to T5 retrofit (6)	5,062	2,886	$ 709	$ 2,370	$ 25,000

- Example of a few revised costs
- Other projects included PV, biodiesel, etc

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Cost and carbon impact of action

- Group project in three tiers:
  - Tier 1 – Most favorable
  - Tier 2 – Moderately attractive
  - Tier 3 – Potentially appropriate

FY10-11 scenario	Emissions reduction vs. FY90-91	Lbs of CO_2 reduced from BAU scenario	Estimated incremental cost to city	Total simple payback
Business as usual (BAU)	- 6.3%	0	$ 0	n/a
Tier 1 projects	- 15.0%	1,628,071	$ 5,371,559	13.5 years
Tier 1 + 2 projects	- 17.1%	2,033,304	$ 7,613,404	18.1 years
Tier 1 + 2 plus offsets	- 20%	2,572,539	$ 7,615,610	18.1 years

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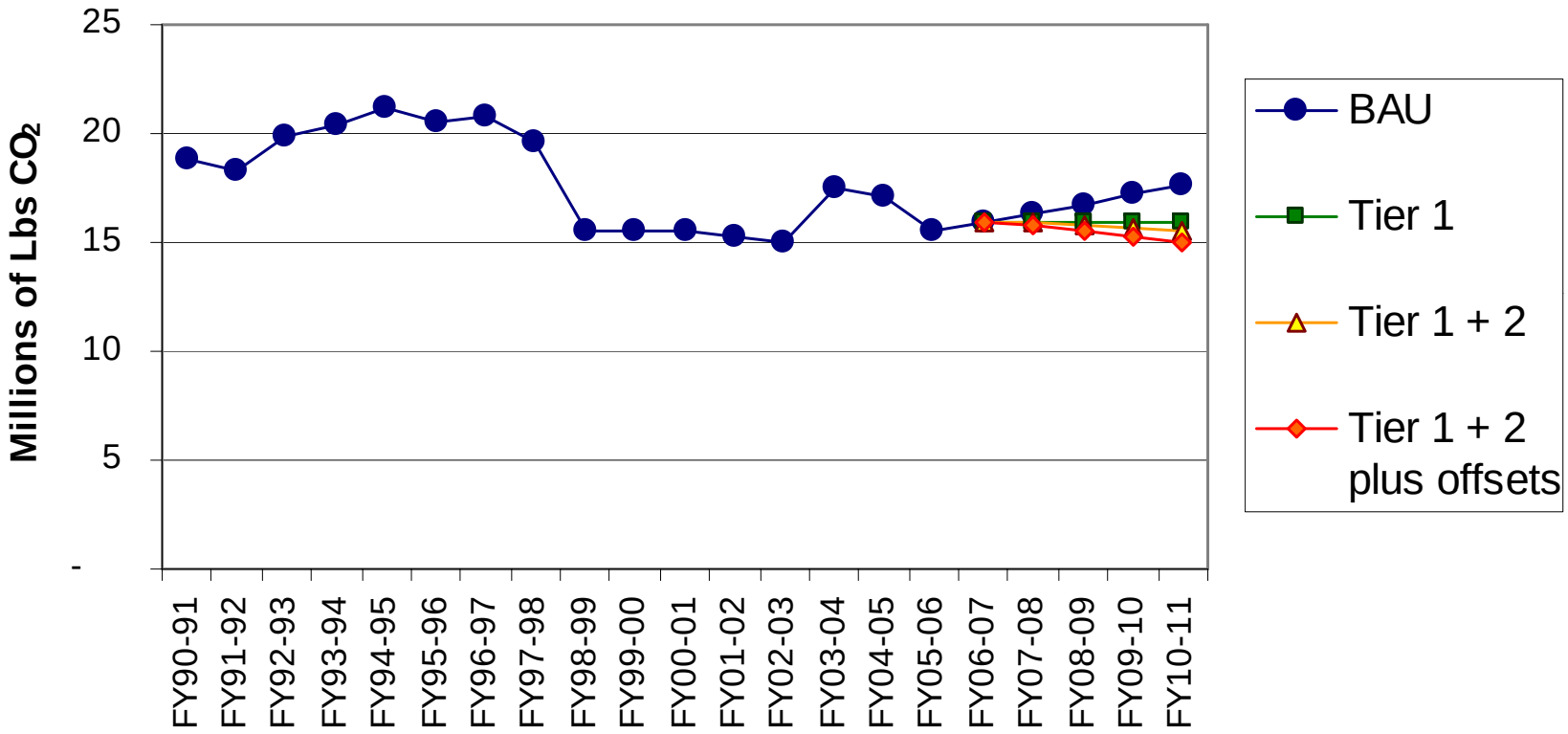
Cost and carbon impact of actions



- Tier 1 + 2 alone takes you to 17% below 1990 emissions levels by 2010.

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Conclusion

- Majority of greenhouse gas inventories only include:
  - Electricity
  - Natural gas
  - Transportation fuels

- Leverages existing skill sets of energy services professionals
  - Understanding billing data
  - Calculating costs and energy savings related to efficiency
- Urgency of cost effective climate mitigation is leading to renewed interest in energy efficiency

Thank you.

Contact info:
Betty.Seto@kema.com
510-891-0446