Comprehensive Energy Projects (CEP) and Innovative Financing

June 21, 2011
Sonoma County – CPAP history

2001 Joined ICLEI – Cities for Climate Protection
• First Climate Pledge

2002 County GHG Assessment - Orrett
• Goals, targets, opportunities, cogeneration possible

2006 Climate Protection Action Plan – CPAP
1. Set Policy - BOS Resolution to exceed AB32
2. Recommended Energy & Sustainability Manager/ Division
3. Recommend hire Energy Services Company (ESCO)
4. Recommended EEM’s/ Comprehensive Energy Project (CEP)
5. Set GHG target reduction of GHG by 8,454 tons:
• Buildings - 6,348 tons, Fleet - 436 tons, Commute – 1,670 tons
Sonoma County – Policies

- **2006 BOS Resolution GHG Targets exceed AB32**
  - 20% below 2000 GHG by 2010
  - 25% below 1990 GHG by 2015

- **Permitting and Resource Management (PRMD)**
  - 2008: LEED certified for commercial and BIG for residential
  - 2011: Currently adopted CALGreen Tier 1
  - Next: International Green Construction Code (IGCC)

- **2010 – GS Green Building Policy County Facilities**
  - LEED certified <10,000 s.f.
  - LEED Silver minimum goal >10,000 s.f.
  - LEED Gold minimum goal >50,000 s.f.
  - Maximize green, sustainable and energy efficiency
Sonoma County – Background

Various 20\textsuperscript{th} Century Efficiency Projects

First decade 21\textsuperscript{st} Century Projects:

- 5-6 MW Landfill Gas
- Local Government Electric Vehicle Partnership
  - County plus 9 J\textsuperscript{x} = 240 hybrids, plug-ins and EV’s
- 820 MW Solar 2 projects, more planned
- **CEP w/ 1.4 MW Fuel Cell CHP Power Plant**
- 1MW biogas (compost) in development
- 5MW to date – Sonoma County Energy Independence Program (SCEIP)
- Bloom box technology in consideration
- Off bill, ARRA, and QCEB funded projects
- 5 MW savings – Sonoma County Energy Watch (SCEW)
Sonoma County – Other Agencies

**Sonoma County Water Agency (SCWA)**
- Goal of carbon free water delivery by 2015
- 22.4MW in development including CCA feasibility
- 2.2 MW Solar 3 projects – $15.5M, projects received $4.49M in PG&E rebates
- 2.64 MW Hydro
- 32 hybrids and plug-in hybrids
- Wave power feasibility study – 2 to 5 MW at each of 3 locations, potential expansion 40 MW.
- Geothermal project in development

**Sonoma County Fair and Exposition**
- 1.36 MW Photovoltaic, State grant funding
Sonoma County – Other Agencies

Sonoma County Water Agency (SCWA)
– 5.6 MW Biomass – 1.4 MW Fuel Cell project in development
Sonoma County – CEP history

2006-2008 – Develop CEP (Phase I)
- RFP to select Energy Services Company (1 year)
- Complete Inventory Grade Energy Audit (1 year)

2008-2010 – Execute CEP (Phase II)
- CEP Objectives:
  1. GHG reduction
  2. Positive Financial Impact
  3. Infrastructure Renewal
Comprehensive Energy Project

CEP Process

– Phase I – Inventory County Facilities (1 year)
  • Prepared Investment Grade Audit
  • 180 Energy Efficiency Measures (EEM) assessed
  • 101 EEM’s recommended

– Phase II – CEP
  • Phase IIA – 38 EEM measures, 24 buildings plus Fuel Cell
  • Phase IIB – To be determined from remainder on list of 101 EEMs
Comprehensive Energy Project

- **38 EEMs at 24 buildings**
  - Lighting retrofits, 20 buildings, 1.3 MWh savings
  - HVAC replace or rebuild in 4 buildings
  - HVAC Motors & Controls MADF
  - Central Mechanical Plant (CMP) upgrade
  - Water retrofits, including detention, 20 M gallons/yr.
  - Ozonator for Detention Laundry Water
  - 1.4MW Fuel Cell Cogeneration Power Plant
1.4 MW Fuel Cell Power Plant

Fuel Cell Energy DFC 1500

- Generates 10,693,216 kWh/year
- Produces 45 billion BTUs year
- Produces virtually no NO\textsubscript{x} or SO\textsubscript{x} pollutants
- Reduce GHG emissions by 69% versus grid power
- Designated “Ultra-Clean” by CARB
- Categorically exempt from CEQA
1.4 MW Fuel Cell Power Plant

Fuel Cell Energy Production
Fuel Cell Installations in California:

- City of Santa Barbara, 500KW
- Sierra Nevada Brewing Co., Chico, CA 1MW
- Sheraton Hotel, San Diego 1MW
- Westin Hotel, San Francisco Airport, 600KW
- California State Univ. at Northridge, 1MW
- City of Riverside 1MW
- County of Alameda, 1MW
- Turlock Irrigation District, 1.2 MW
- City of Tulare, 900KW
- Dublin San Ramon Service District, 600KW
- Cache Creek Casino, 750 KW
- Santa Clara 1996 – 4@500MW
1.4 MW Fuel Cell Power Plant

Sonoma County Fuel Cell Power Plant

• Largest fuel cell in California - First article 1.4MW
• 1.4 MW Distributed Generation (DG) creates more reliable power for County Center in brown out situation.
• Adjacent to CMP for Combined Heat and Power (CHP)
  • Certified Combined Heat and Power (CHP) per CPUC §2840 Guidelines, Section III
  • 47% electrical efficiency, plus 20% due to CHP (compare fossil fuel plants 33% efficient)
  • No transmission loss to deliver to 12kV loop
• Natural gas provided by utility non-core.
  • Shopping for renewable gas supply
• SGIP incentive of $3,000,000 from PGE toward the $9,763,271 cost
1.4 MW Fuel Cell Power Plant

County Utility Costs –

- Prior County electric bill $1.5M annually
- New County power costs $1.5M annually
  - Gas bill for fuel cell is $350k
  - Amortize equipment costs (debt repayment)
  - Pay FCE maintenance costs
  - Prepay (amortize) stack replacement @ 5th year

County Load Characteristics –

- Demand at night – 8-900 kW due to detention 24/7
- Demand summer peak – 2,500kW or more
- Supply constant 1.4MW (Part Peak Load match)
- AB1613 Feed in Tariff (FIT) desired.
- Looking at additional load shifting opportunities

Fuel Cell Payback is Seven Years!
1.4 MW Fuel Cell Power Plant

SPECIAL ISSUES:

• Interconnection to utility was difficult
  • Fuel cell module on-site August 2010
  • Turned “on” in December 2010
• Digital Metering desired per building—
  • First meter $25k with software
  • Subsequent meters $15k
• Metering Load –
  • Net generation output meter at the fuel cell
  • No meter at the connection of 12kV loop to PGE
• Maintenance –
  • No problems yet with seamless electric supply
  • Demand charges are severe when FC drops out
Financing

Directive: Make CEP Expense Neutral Day 1 ➔
- California Government Code §4217.10 finance based on savings
- Obtained Private Loan Financing – Bank of America
  - Based on equipment lease model
  - Collateralized on improvements
- Bond package option as backup
Financing

<table>
<thead>
<tr>
<th>Financing Plan</th>
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<tbody>
<tr>
<td>Project Cost</td>
<td>$22,272,029</td>
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<tr>
<td>Incentives, Grants, and Rebates</td>
<td>($3,941,226)</td>
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<tr>
<td>Financed Amount</td>
<td>$18,730,803</td>
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<tr>
<td>Estimated Interest Rate*</td>
<td>4.98%</td>
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<tr>
<td>Repayment Term</td>
<td>16 years</td>
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<tr>
<td>Assumed Closing/Funding Date</td>
<td>1/1/09</td>
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<tr>
<td>Assumed Annual Energy Cost Escalation*</td>
<td>5%</td>
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<tr>
<td>First year of positive cash flow</td>
<td>Year 12</td>
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<tr>
<td>Total payments</td>
<td>$31,794,615</td>
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<tr>
<td>Total cumulative positive cash flow after 25 years (estimate life of equipment)</td>
<td>$38,404,231</td>
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* Rates are estimates and are subject to change. 5.4 was max rate
Rebates played a big part in our total financial package.
Cost Savings

Projected Cost Savings

- Projected Energy & Water Cost
- Total Financing & Maintenance Costs

Year | Projected Energy & Water Cost | Total Financing & Maintenance Costs

1. $- |
2. $1,000,000 |
3. $2,000,000 |
4. $3,000,000 |
5. $4,000,000 |
6. $5,000,000 |
7. $6,000,000 |

Dollars

Year
CEP Results

CEP Objectives Met?

1. GHG reduction 6,135 tons*
   - Electricity reduction 13,365,226 kWh
   - Water savings = 19,138,260 gallons
   - Utility savings = $1,689,316

2. Saving $$, No General fund impact

3. Replaced old worn out equipment

* Now in 1 year Measurement and Verification

+ Created jobs, collaboration, other benefits
Additional Projects

• LED Parking lot retrofit with On Bill Financing
• Sustainable Energy Practices Guidebook

www.sonoma-county.org/gs/energy/index.htm
State of California Trending

Governor Jerry Brown Goals
Distributed Generation Renewable

- 1.3 Million MW feasible CA
- Increase RPS 20% to 33%
- 20,000 MW Distributed Generation – Renewable
  - 8,000 MW utility scale
  - 12,000 MW small projects
    • 2,500 MW state facilities

By 2020 (9 years)
Thank you

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