Demand-Side Management (DSM) Opportunities in the Southern Loop

April 27th 2006

VELCO/CVPS Community Working Group

Achievable Potential

Energy Efficiency over 10 years (2007-2016)

- 30 MW cumulative annual winter peak demand savings at generation by 2016 (22% of projected annual use)
- 159 GWh/yr cumulative annual energy savings at generation by 2016 (25% of projected annual use)
- $80.4 million budget (10-year total, present worth 2006$)

Combined Heat & Power (CHP)

- Estimated 12.8 winter MW of generation
- $12.6 million budget (10-year total, present worth 2006$)

Photovoltaics (Solar Electricity)

- Estimated 0.44 MW of generation (summer)
- $1.4 million budget (10-year total, present worth 2006$)
- 0.23 MW of winter MW output

DSM Components

Residential efficiency

- Such as electric heat and hot water fuel switch, lighting, appliance replacement

Commercial efficiency

- Such as lighting, air conditioning, refrigeration, motors, ventilation controls, facility system tune-up, hot water fuel switch

Industrial efficiency

- Such as process improvements, compressed air, lighting

Combined Heat & Power (CHP)

- Needs significant thermal demand (minimum 4,500 hours per year)

Photovoltaics (Solar Electricity)

- Looking at ski areas, schools, businesses, residences

Residential Efficiency Analysis

Identify technologies

- Reflect existing installations in the Southern Loop, both prior to and by Efficiency Vermont

Identify eligible populations

- Work with CVPS to establish number of homes with electric space heat, domestic hot water, and appliances

Establish strategies

- "Direct install" of comprehensive, cost-effective efficiency measures

Estimate participation rates

- Number of customers installing efficiency measures

Residential Efficiency, cont.

New program concepts evaluated

- Ski Area Residential/Multifamily New Construction
- Enhanced Community Challenges
- Targeted High-Use Residential Direct Install
- Appliance Turn-In
- Ski Area Fuel Switch (condo space heat and DHW)

Plus "standard" Efficiency Vermont offerings

- Efficient Products
- Low Income (single- and multifamily)
- HVAC lost opportunity (heating, ventilation and air-conditioning)
- Home Performance with ENERGY STAR®

Commercial & Industrial Efficiency Analysis

Site visits to "large" commercial and industrial (C&I) customers

- About 140 accounts with demand > 100 kW
- Visited 44 locations
- In addition, Efficiency Vermont completed projects with 8 more

Site visits to customers accounted for 61 percent of annual large C&I MWh energy use

Commercial & Industrial Efficiency, cont.

Site visits to limited number of small- to medium-sized customers

- Walkthroughs of 50+ locations

Important Findings

- Lighting systems generally efficient (standard T8s)
- Relatively little electric space heat

Commercial Efficiency, cont.

Program concepts evaluated

- Small-Medium Commercial Direct Install
- Targeted Large Commercial & Industrial Retrofit
- Combined Heat & Power (CHP)
- Enhanced Prescriptive Offers
- C&I New Construction/Major Renovation

Combined Heat & Power

- Surveyed C&I customers with profiles for cost-effective CHP applications
- Contacted hospitals, food processors, ski areas, wood products manufacturers, wastewater treatment facilities, schools
- Completed surveys only yielded evaluations of 7 locations, with potential 13 MW generation capacity

Photovoltaics

Evaluations of available area for PV installations at:

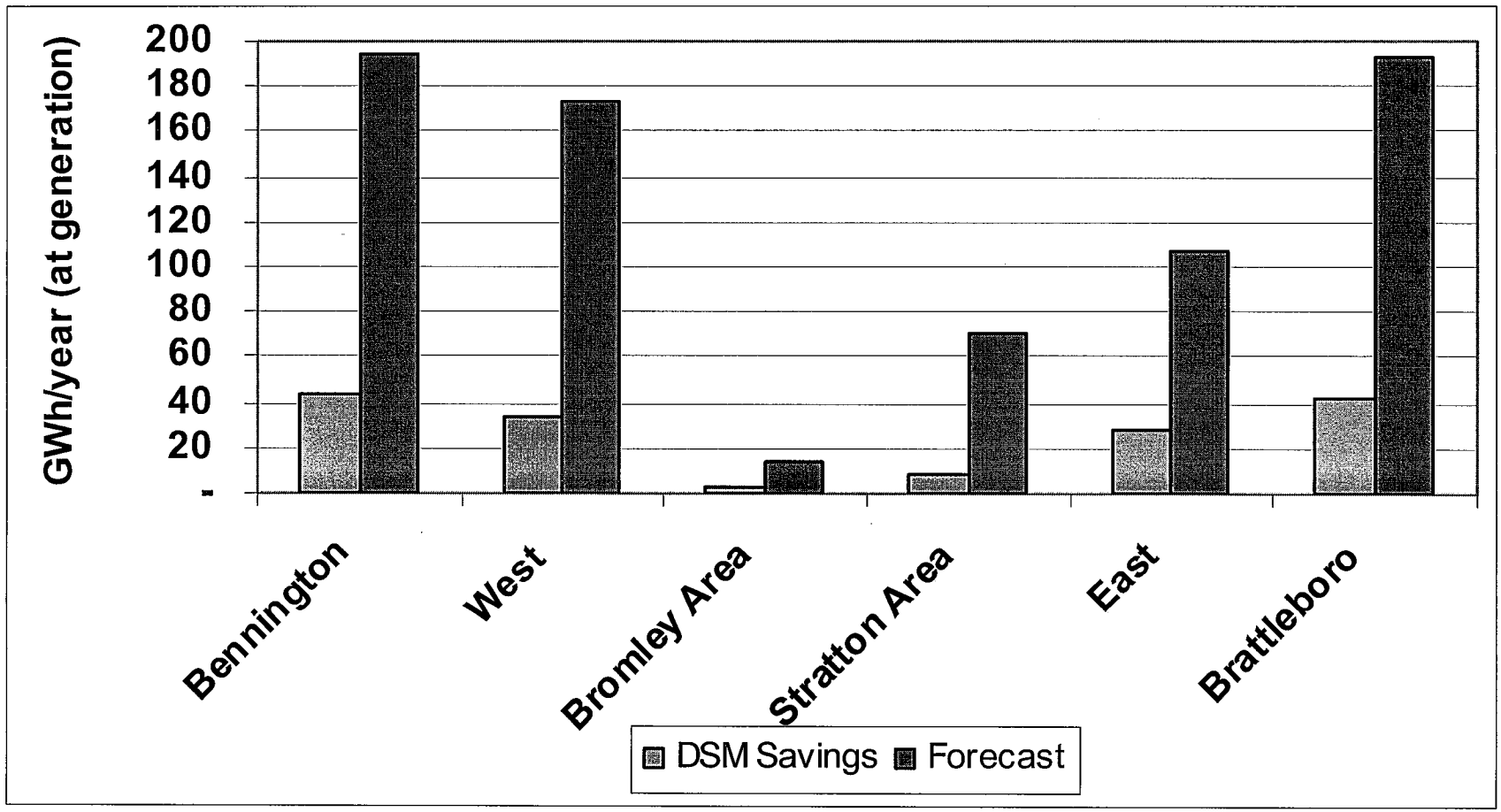
- Ski areas
- Schools
- Business
- Residences

Used standard assumptions for system size, capacity, and output to develop generation profiles

Analysis Results

2016 Cumulative Annual Savings at Generation	Winter Peak Demand (MW)	Annual Energy Savings (GWh)	Budget Million $ (2006$)	Total Resource Net Benefits Million $ (2006$)
Residential DSM	20.9	90.7	$52.1	$49.6
Commercial & Industrial DSM	8.8	68.6	$28.3	$32.9
Combined Heat and Power	12.8	69.2	$12.6	$5.9
Photovoltaics	0.23	0.57	$1.4	($2.5)

DSM Energy Impacts - 2016



DSM Demand Impacts - 2016

Winter Peak Demand Savings (MW) at Generation	**Residential**	**C&I**	**Forecast**
Bennington	5.4	2.5	22.2
West	4.4	2.1	36.1
Bromley Area	0.4	0.1	6.2
Stratton Area	1.5	0.4	26.7
East	4.9	0.9	22.1
Brattleboro	4.2	2.9	22.5
TOTAL	20.9	8.8	135.7

Analysis Results, cont.

Top Residential DSM Technologies

- Compact fluorescent lighting
- Electric clothes dryer fuel switch
- Residential new construction (comprehensive)
- Electric hot water tank fuel switch (uncontrolled)

Top Commercial & Industrial DSM Technologies

- Large C&I Sites (comprehensive)
- Facility System "Tune Up"
- High Performance "Super" T8 Lighting
- Water heat fuel switch

Conclusions

Energy efficiency offers significant opportunities to defer investments

- Residential sector has substantial opportunities given electric heat for appliances, space heating, and hot water
- Commercial & Industrial sector opportunities may be greater, depending upon evaluation of process changes

Combined Heat & Power offers sizable potential

- Air quality and other impacts need to be evaluated further

Photovoltaics offers small potential