



Energy Efficiency and Demand Response Program Overview

Recommendations from the Energy Road Map

Port District Environmental Committee

May 7, 2009



Introduction - Sustainable Energy Partnership

- The Port and SDG&E signed a memorandum of understanding (MOU) to work together on energy issues
- “Official” Local Government Energy Efficiency Partnership is anticipated in 2009-2011
- In the interim, the relationship will be referred to as the *Sustainable Energy Partnership*



Introduction - What is the Energy Road Map?

The Energy Road Map

- Analysis of and recommendations for Partnership components
- Furthers Port's goals of environmental stewardship
- Identifies opportunities to:
 - Increase energy efficiency and
 - Reduce greenhouse gasses

The next steps in this process will include:

- Designing programs to achieve the Port's goals
- Developing a Sustainable Energy Plan
- Developing a Climate Protection Plan



What is EE and DR?

Energy Efficiency – Permanently saving energy through the installation of energy efficient equipment.

- Example: Replacing incandescent lights with compact fluorescent lights (CFL)

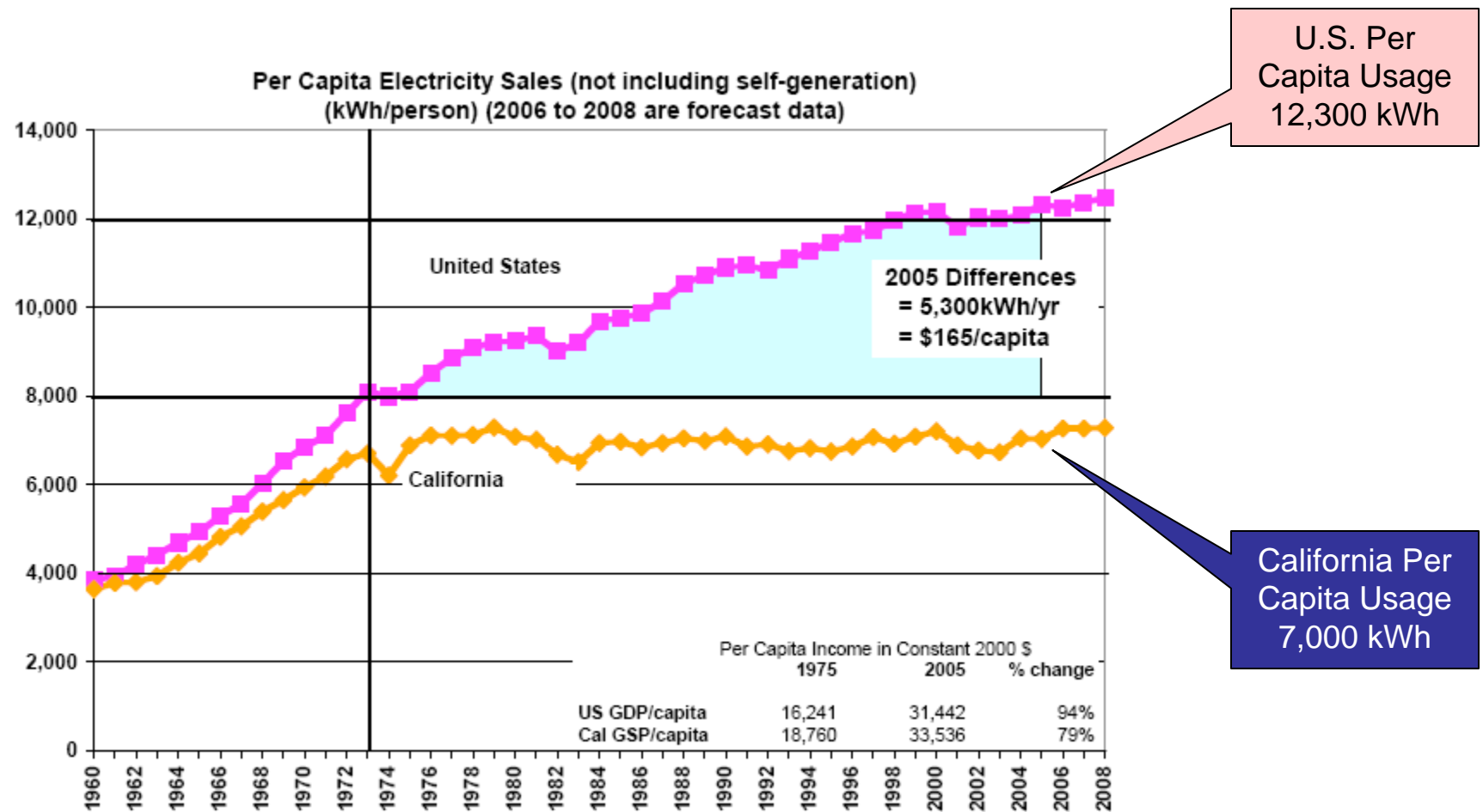
Demand Response - Saving energy during critical times by volunteering to temporarily reduce load when called upon.

- Example: Temporarily raise your thermostat 78° or higher during peak hours of the day.

Implementing Energy Efficiency and enrolling in a Demand Response program have many benefits:

- Financial incentives
- Lower energy costs and bill savings
- Public recognition

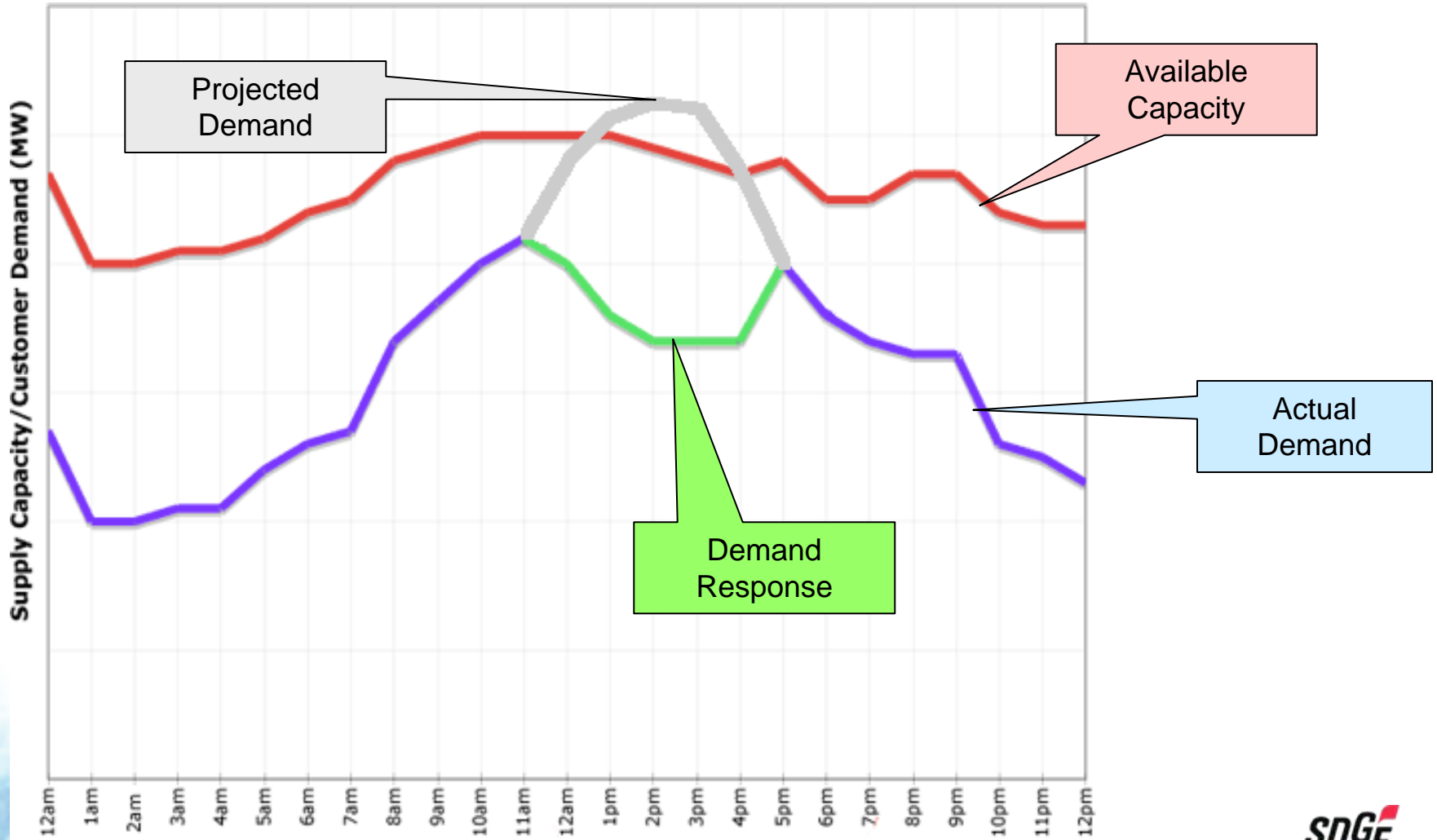
Energy Efficiency Illustrated



Source: California Energy Commission

<http://www.energy.ca.gov/2007publications/CEC-999-2007-026/CEC-999-2007-026.PDF>

Demand Response Illustrated



Source: Flex Your Power

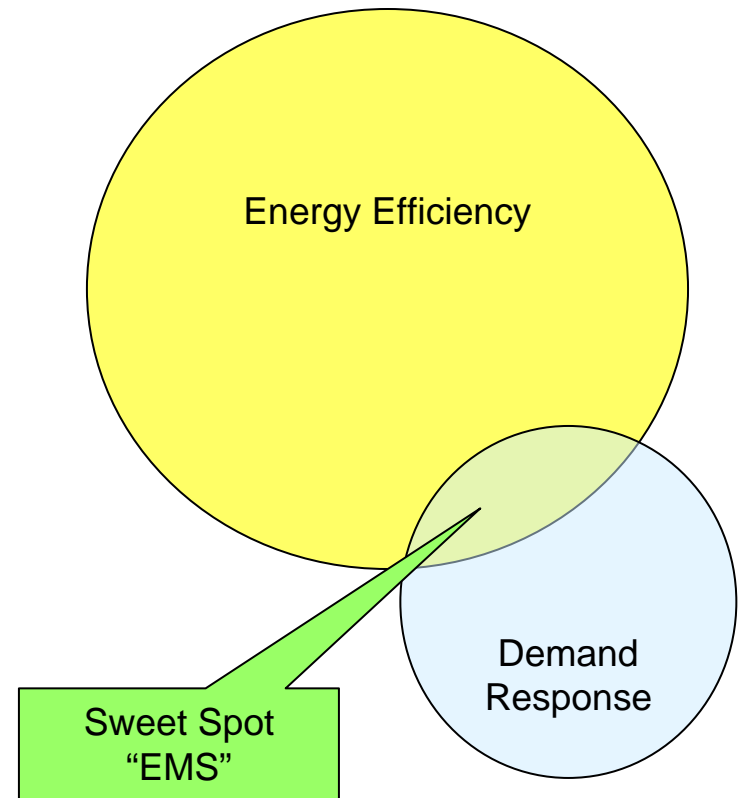
http://www.fypower.org/flexalert/demand_resp.html

Interrelationships

Energy efficiency and demand response are interrelated

The “sweet spot” includes:

- Shedding non-essential lighting loads (hallways, common areas)
- Reducing lighting in appropriate areas
- Increasing thermostat cooling set points (76°F to 78°F)
- Reducing air flow requirements
- Pre-cooling of building



*Energy Management Systems (EMS)

Ways To Participate in EE

Energy Efficiency

- **Rebate Programs**
 - Offer cash rebates to help business customers offset the cost of retrofitting or installing energy-efficient equipment
- **Incentives Programs**
 - Offer cash incentives based on measured and documented savings to offset the cost of retrofitting or installing energy-efficient equipment. Incentive can be higher than rebates.
- **Services**
 - On Bill Financing - Offers zero percent financing; monthly payments are billed to SDG&E energy bill creating a bill neutral payment
 - Facility Audits - Onsite and online energy audits to identify energy efficiency opportunities.
- **Third Party Programs**
 - Approved by the California Public Utilities Commission, administered by SDG&E, and implemented by various contractors.

Ways To Participate in DR

Demand Response

- Two Types of Programs:
 - Day-ahead notification (Peak Day, Demand Bidding, Critical Peak Pricing)
 - Day-of notification (CPP-Emergency, BIP, standby generator programs)
- Services
 - KWickview - Online energy management tool for DR participants to monitor and analyze their business energy use
 - Technical Assistance/Technical Incentives (TA/TI) - A free facility assessment of demand response potential, and incentives for installing demand response technologies
- Third Party Programs
 - Approved by the California Public Utilities Commission, administered by SDG&E, and implemented by various Aggregators.

Background - Loading Order

GOAL: Decrease electricity demand

1. Increase energy efficiency
2. Increase demand response
3. Meet generation needs **first** with renewable and distributed generation resources, and
4. Meet new generation needs **second** with clean fossil-fueled generation



Recommendations - Summary

- Retrofits – Port facilities
- Explore opportunities for renewable energy at the following facilities :
 - General Services Building
 - 10th Avenue Marine Terminal
 - National City Marine Terminal } Based on audits
- Develop Climate Protection Plan to add to the Port’s Master Plan
- Education and Outreach – Employees, tenants, general public
- Update Environmentally Preferable Procurement Policy for Port fleet
- Explore opportunities to replace conventional vehicles with electric vehicles (e.g. forklifts, electric cars)
- Target LEED NC for new Port facilities; target LEED EB for existing Port facilities
- Work with SDG&E to identify opportunities for Emerging Technologies projects

Port Facilities Retrofits - Audit Results

	Energy Efficiency Measures	kWh Saved per Year	Annual Savings	Total Cost	Simple Payback (Yrs)
B Street Cruise Ship Terminal	Vending Misers at 3 soda machines	3,784	\$530	\$630	1.2
	Convert 17 Pkg. lot HPS to T5H0	19,660	\$2,752	\$8,925	3.2
	Convert 21 wall mtd. HPS to T5H0	15,288	\$2,140	\$10,500	5.0
	Convert 12 Merc. Vapor to CFL	4,193	\$587	\$3,000	5.1
Administration Building	1 VendingMiser at soda machine	1,261	\$177	\$210	1.2
	3 CoolerMisers at glass coolers	3,784	\$530	\$630	1.2
	Basement - Retrofit T12s to T8s	837	\$117	\$560	4.8
	Occ. Sensors for 60+ offices	6,403	\$896	\$4,500	5.0
	Retrofit Parking lot to F54T5H0	12,696	\$1,524	\$7,700	5.1
	Convert HPS at Bridge to CFL	2,446	\$294	\$1,750	6.0
General Services Building	Vending Miser at soda machine	1,261	\$151	\$210	1.4
	Replace 28 M. Halide Pkg Lgts	25,393	\$3,047	\$15,400	5.1
	Replace 11 M. Halide Wall Fixt.	5,583	\$670	\$3,025	4.5
10th Ave. Marine Terminal	Vending Miser at soda machine	1,261	\$177	\$210	1.2
	Replace 18 400w MH - signs	18,570	\$2,228	\$14,850	6.7
	Replace 40 55w LPS at TS 1&2	5,990	\$719	\$10,000	13.9
	Repl 80 100w HPS@TS 1&2+C	27,955	\$3,355	\$20,000	6.0
National City Marine Terminal	4-Lamp F54T5H0s	16,324	\$1,959	\$9,900	5.1
TOTAL		172,691	\$21,852	\$112,000	5.1

Port Facilities Retrofits - Clean Generation

- 1. B Street Cruise Ship Terminal**
 - No shading obstructions
 - Structural load capacity is uncertain due to age of building
- 2. Administration Building**
 - Many shading obstructions
 - Difficulty in connecting to switchgear
- 3. General Services Building**
 - Good potential on roof of main building
 - No shading obstructions
- 4. 10th Avenue Marine Terminal**
 - Roofs on Transit Shed 1 and 2 and Warehouses B and C offer good potential
- 5. National City Marine Terminal**
 - Roofs on 24-1, 24-A and 24-B offer good potential
 - Minimal shading obstructions

**Always link
renewable energy
with energy
efficiency
measures**



Incentive: Sustainable Communities Program





Port Facilities Retrofits - Server Virtualization

- **Server virtualization** consolidates many servers into one
- The Port has ~ 40 servers, but will soon face issues such as:
 - Lack of space to meet future computing needs and
 - Uninterruptible Power Supplies (UPS) are nearing the maximum load capacity
- Server Virtualization may be a viable solution to resolve these issues.
- **Incentives: Energy efficiency - \$0.08 / kWh saved**

Example:

- Twenty conventional servers consume ~90,000 kWh / year
- One new server, supporting twenty virtual machines, consumes ~6,600 kWh/year
- **RESULT: ~83,400 kWh savings; \$6,672**





Land Use Planning and Development Opportunities

Analysis of Port's Master Plan - Current plan begins to support Partnership goals

Recommendations:

Develop a **Climate Action Plan** that will:

1. Address greenhouse gas reductions
2. Incorporate sustainable land use and planning guidelines into the environmental review process
3. Commit to the use of green building standards
 - **Incentive: Sustainable Communities Program; Savings by Design**

Education and Outreach

Three Target Audiences:

1. Port employees

- BOC
- Certified Energy Manager
- The Biggest Loser
- LEED AP

2. Port tenants

- EPA Energy Profiler Training
- Annual Environmental Excellence Awards
- Green Port online information center

3. General Public

- Green Port program branding
- Building Energy Information and Monitoring Systems
- LED holiday light exchanges and displays
- Holiday Boat Parade

Incentive / Funding:

The official partnership will provide funds for these programs *and*

SDG&E / CCSE offer free workshops (seminars.sdge.com)





Clean Transportation

- **Environmentally Preferable Procurement Policy**
 - Most fuel efficient model available, or fueled by non-petroleum derived fuels
 - Evaluate hybrid and plug-in hybrid electric vehicles, battery electric vehicles, and alternative fuel vehicles (e.g. biodiesel, compressed natural gas, liquefied natural gas, hydrogen-enriched compressed natural gas, and hydrogen)
- **Nissan - electric vehicles pilot program**
- **Electric forklifts**

Incentive / Funding: Public Funds -

- **Prop 1B - The Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006**
- **AB 118 - Alternative Fuels and Vehicle Technologies Act**
- **Carl Moyer Program - Air Quality Standards Attainment Program**



Broadway Pier Cruise Ship Terminal

Planning and Design Phase

- Targeting LEED New Construction certification
- Planning to install two 30-kW PV systems (one owned by the Port; one owned by SDG&E)
- This facility will serve as an educational tool for the public to learn about renewable energy and the benefits of energy efficient building design

After building is constructed...

- Benchmark the building each year to document energy efficiency improvements.
- Adopt a measurement and verification program
- Target certification under LEED Existing Buildings (after LEED for New Construction is achieved)

Incentive:

Sustainable Communities Program; Savings by Design



B Street Pier Cruise Ship Terminal

Status: Scoping and Feasibility Phase (but on hold)

- If a new building is *not* constructed, the Port should explore the recommendations from the audit

B Street Cruise Ship Terminal				
Energy Efficiency Measures	kWh Saved per Year	Annual Savings	Total Cost	Simple Payback Years
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Convert 21 wall mtd. HPS to T5H0	15,288	\$2,140	\$10,500	4.9
Convert 12 Merc. Vapor to CFL	4,193	\$587	\$3,000	5.1
TOTAL	42,926	\$6,010	\$23,055	3.8

- If a new building *is* constructed, the Port should consider:
 - LEED for New Construction
 - Renewable Energy

Shore Power

- The Port and SDG&E are already working together to install electrical infrastructure so ships can shut down their diesel engines while at berth.
- This project is expected to remove significant amounts of air emissions and greenhouse gases annually.
- It is recommended that the Port continue to investigate the use of alternative energy to further reduce emissions from ships.

Funding: Public Funds

- Prop 1B - The Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006
- AB 118 - Alternative Fuels and Vehicle Technologies Act
- Carl Moyer Program - Air Quality Standards Attainment Program



Emerging Technologies

- Potential new technologies to explore:
 - Exterior LED lighting
 - Induction lighting
 - Interior LED lighting
 - New Boiler Controls / Condensing Economizers
 - Tankless water heating
 - Hydronic Loop Control optimization
 - Guest room controls (in hotels)

Incentive: Each project is determined on a case-by-case basis



Thank you!