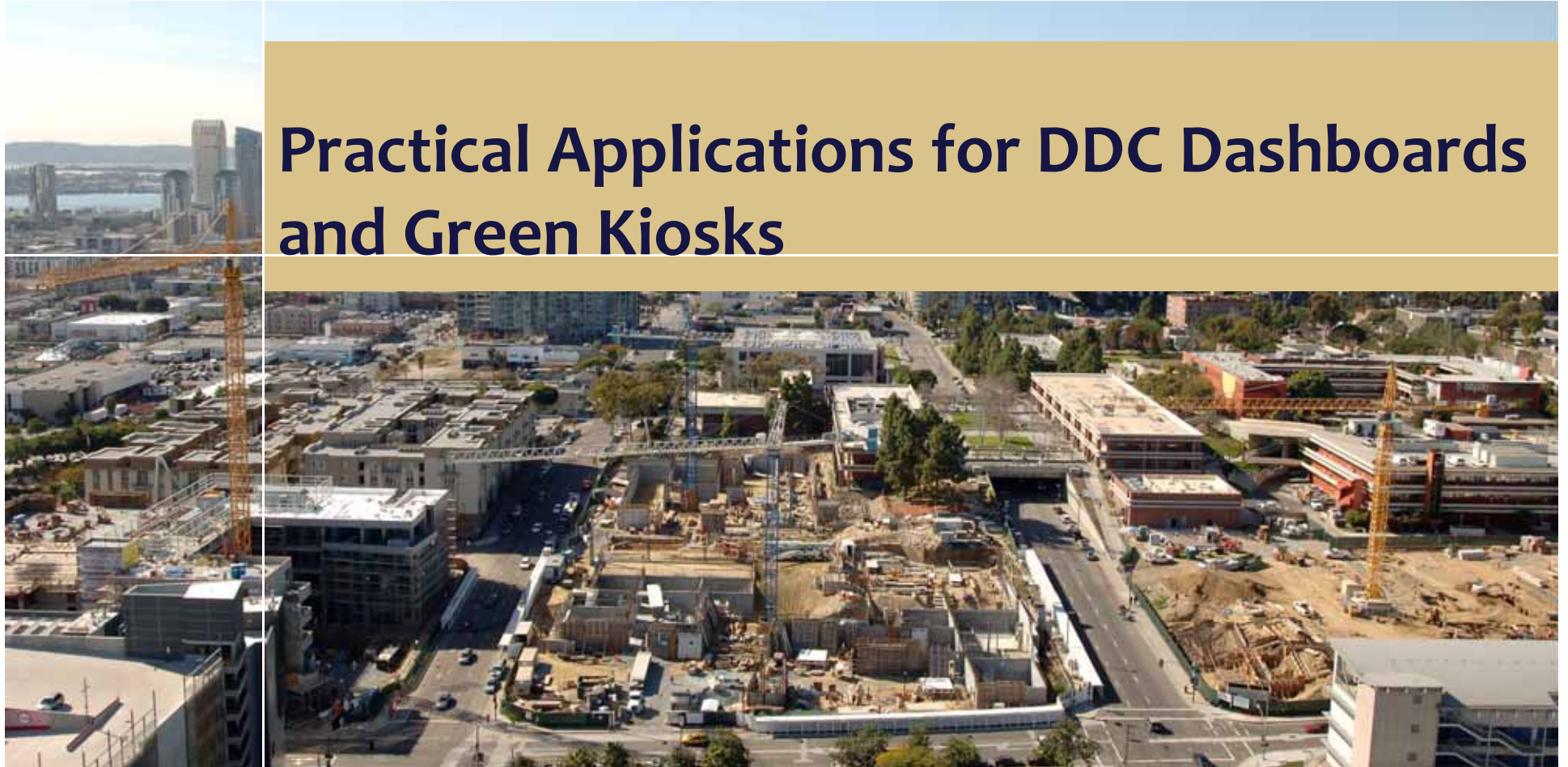




SAN DIEGO COMMUNITY COLLEGE DISTRICT



Practical Applications for DDC Dashboards and Green Kiosks



Presented by

David Umstot, PE

Vice Chancellor Facilities Management, San Diego Community College District

Sunday, June 24, 2012

Learning Objectives For This Session

- 1) Define performance requirements for dashboard protocols**
- 2) Discover additional sources of information associated with their buildings that can be displayed in a facility dashboard**
- 3) Describe techniques to integrate several sources of data into a single front end display**
- 4) Explain how facility operators and end users can use building performance dashboards to reduce energy use**

Learning Objectives For This Session

- 5) Explain how building operators can interpret their energy usage profile information**
- 6) Leverage web services as a means for end users to create custom dashboards to suit their needs.**

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Practical Applications for DDC Dashboards and Green Kiosks

SDCCCD Overview

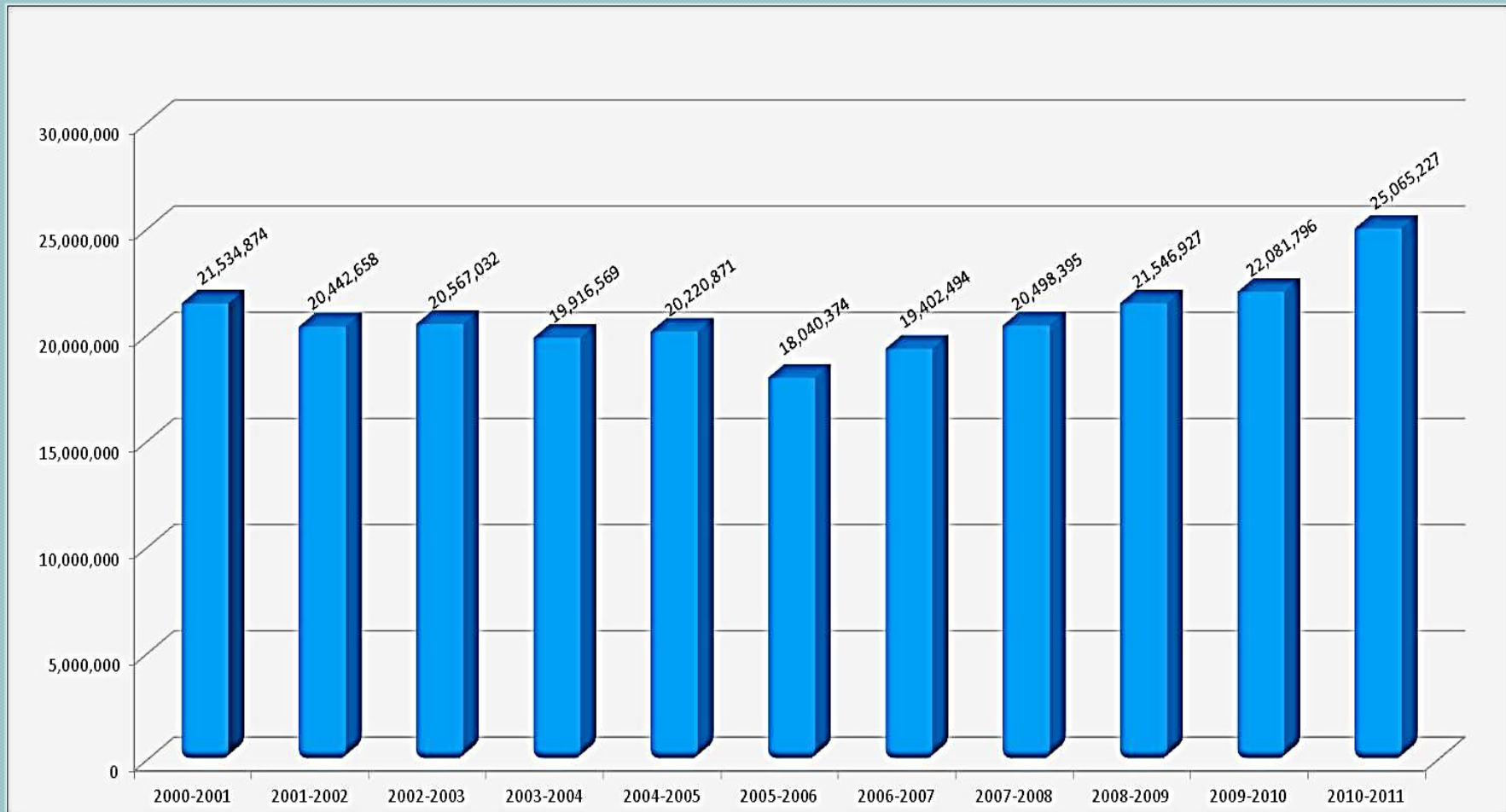
- Second Largest Community College District in CA
- Sixth Largest in Nation
- Three Colleges - City, Mesa and Miramar
- Six Continuing Education Campuses
- 125,000 students served plus 140,000 members of the military nationwide
- Total Square Footage - 2,218,031



San Diego Community College District

The Current State

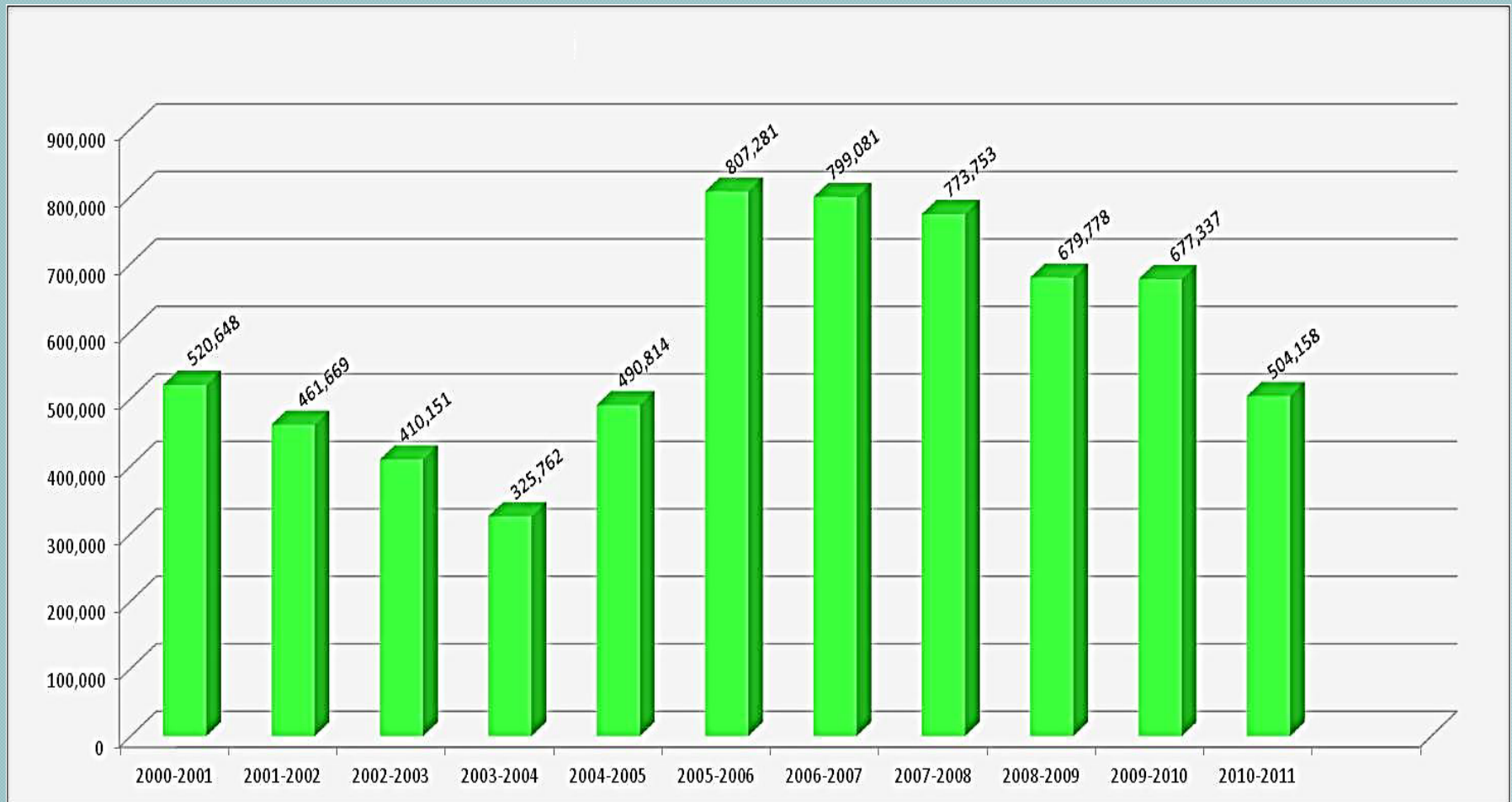
Electrical Usage (kWh) - 2000 – 2011



San Diego Community College District

The Current State

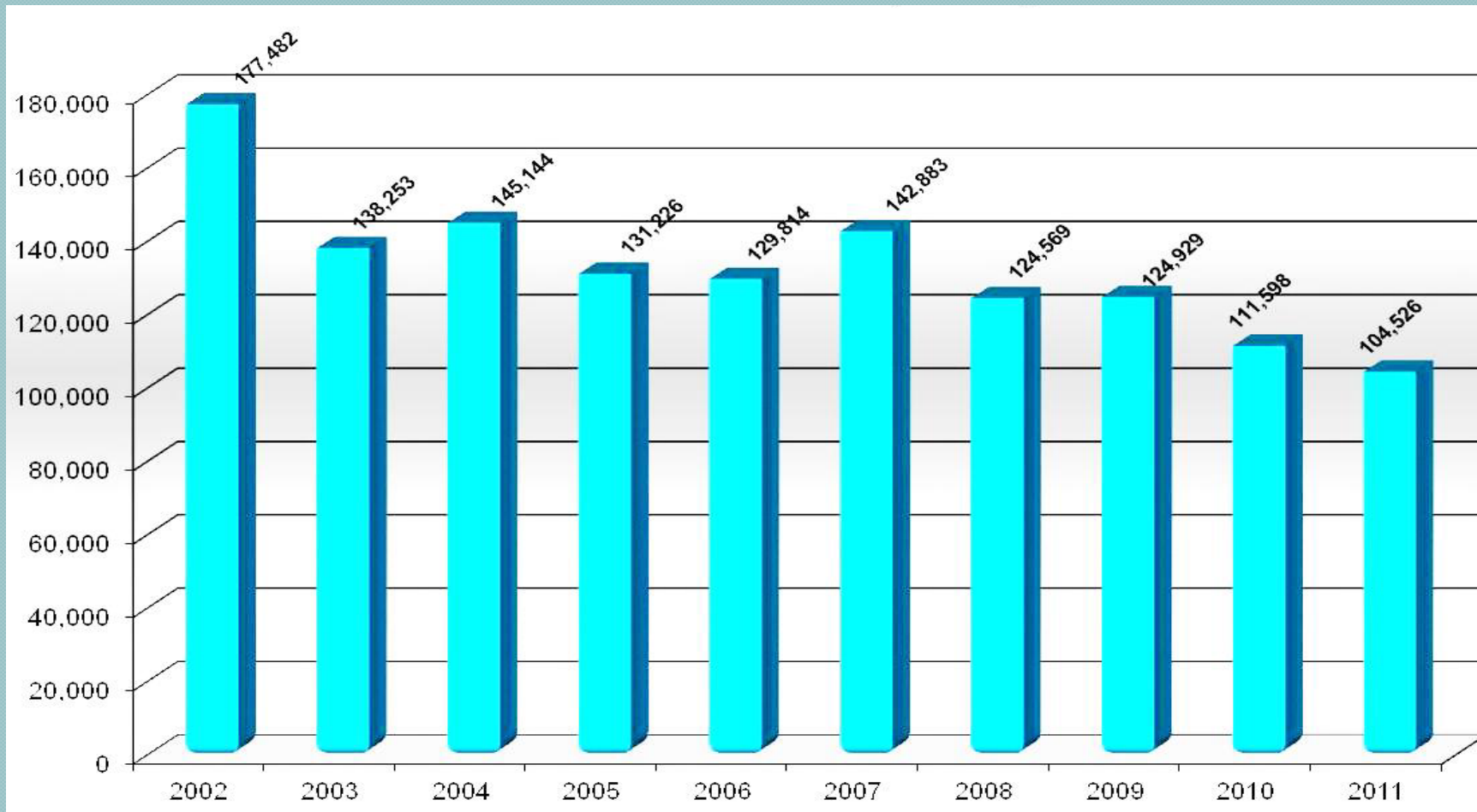
Natural Gas Usage (Therms) -2000 – 2011



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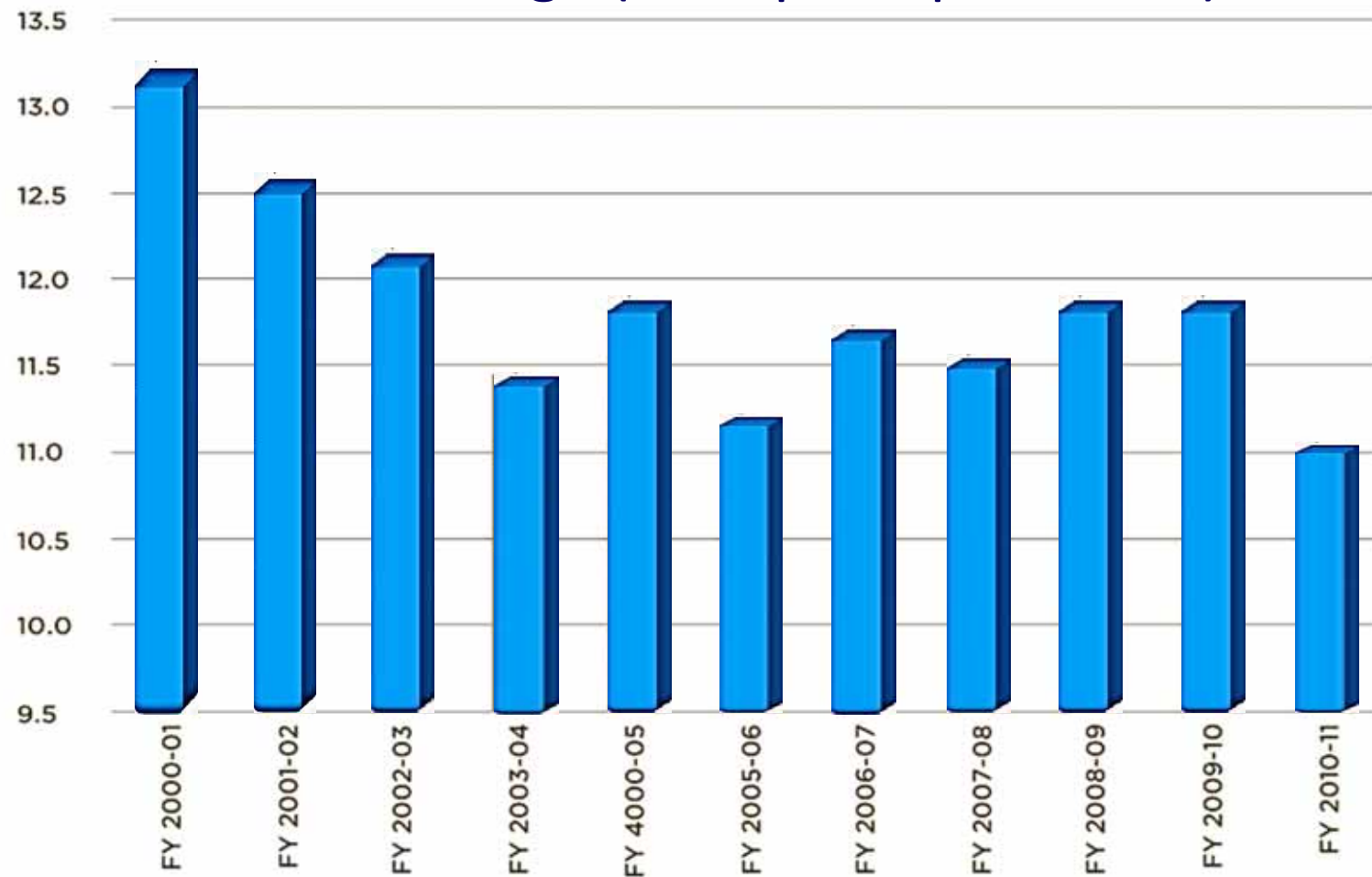
The Current State

Water Usage (HCF) - 2000 – 2011



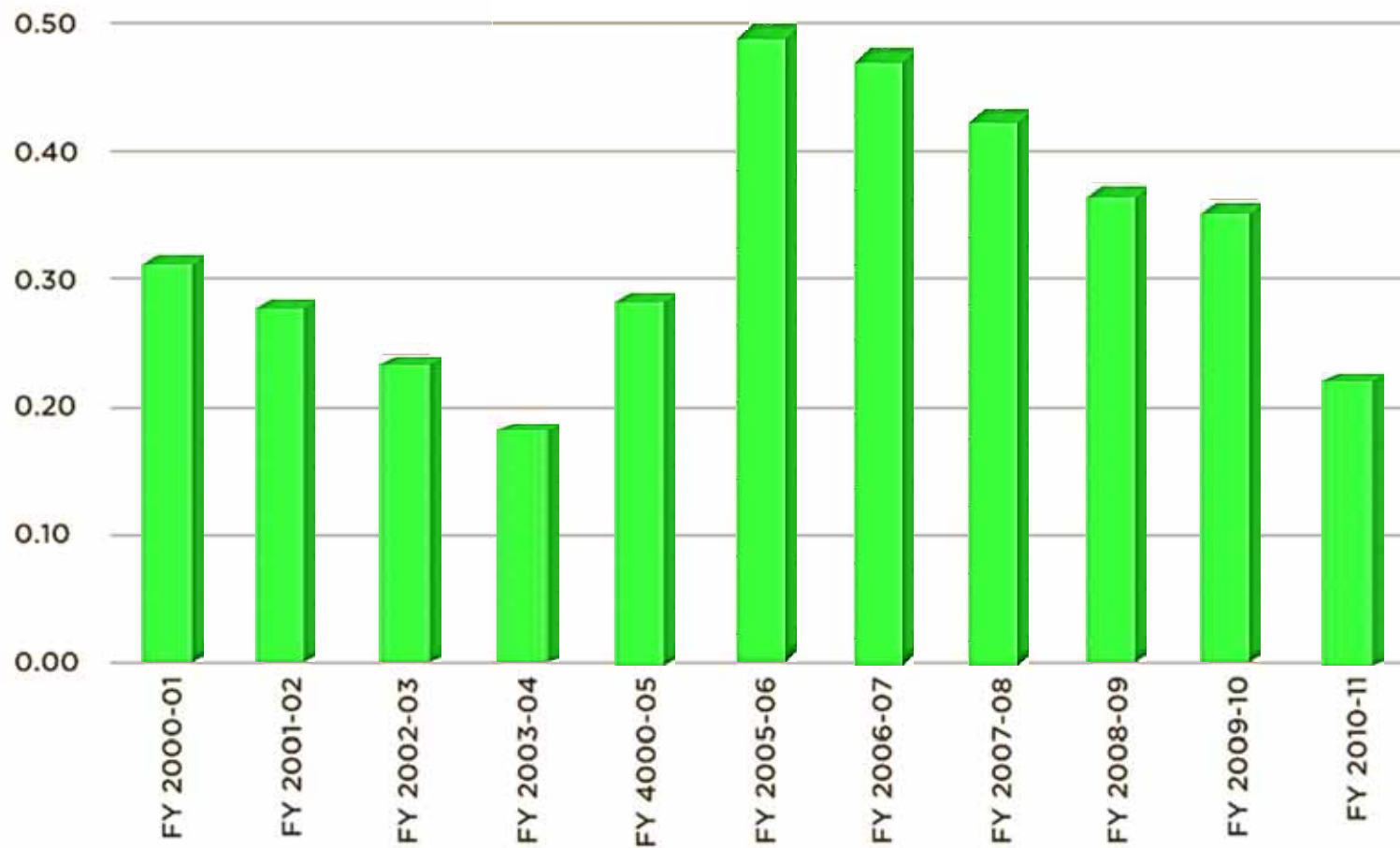
San Diego Community College District Normalized on Square Footage

Electrical Usage (kWh per square foot)



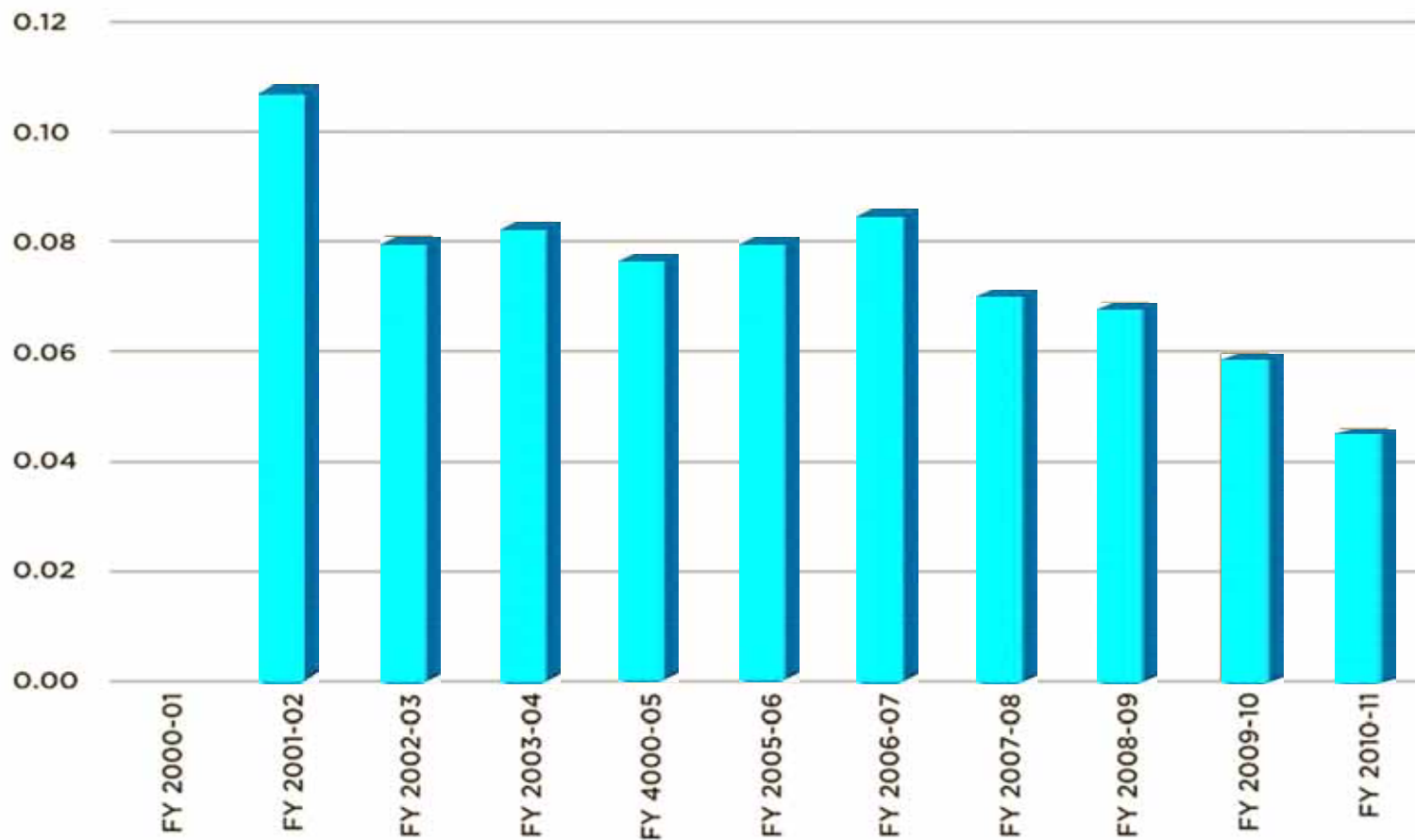
San Diego Community College District Normalized on Square Footage

Natural Gas Usage (therms per square foot)



San Diego Community College District Normalized on Square Footage

Water Usage (HCF per square foot)



San Diego Community College District PV Production – Solar Power



Districtwide - 2.4 MW through Power Purchase Agreement (PPA) generating 4,833 MWh annually

ECC Skills Center - 5.6 kW Utility-owned system generates 98,112 kWh annually

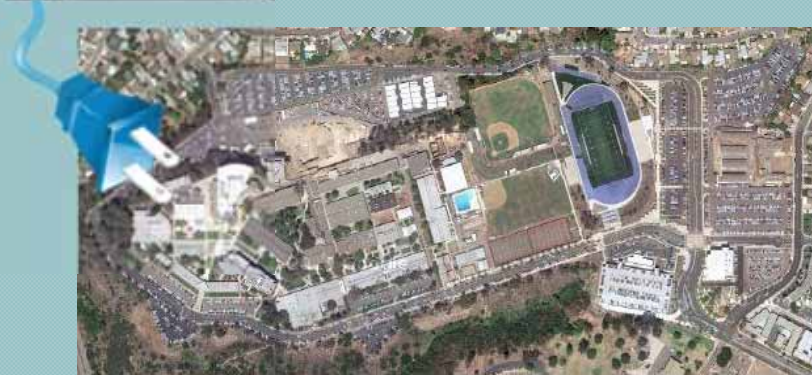
City College CTC - 51 kW District-owned system generates 80,918 kWh annually



San Diego Community College District

The Challenge

Single electrical meters at Mesa and Miramar Colleges



Mesa College
2011 kWh – 4,963,172



Miramar College
2011 kWh – 5,131,596

San Diego Community College District

The Challenge Continued

No monitoring of
chilled/heated hot water
consumption in buildings

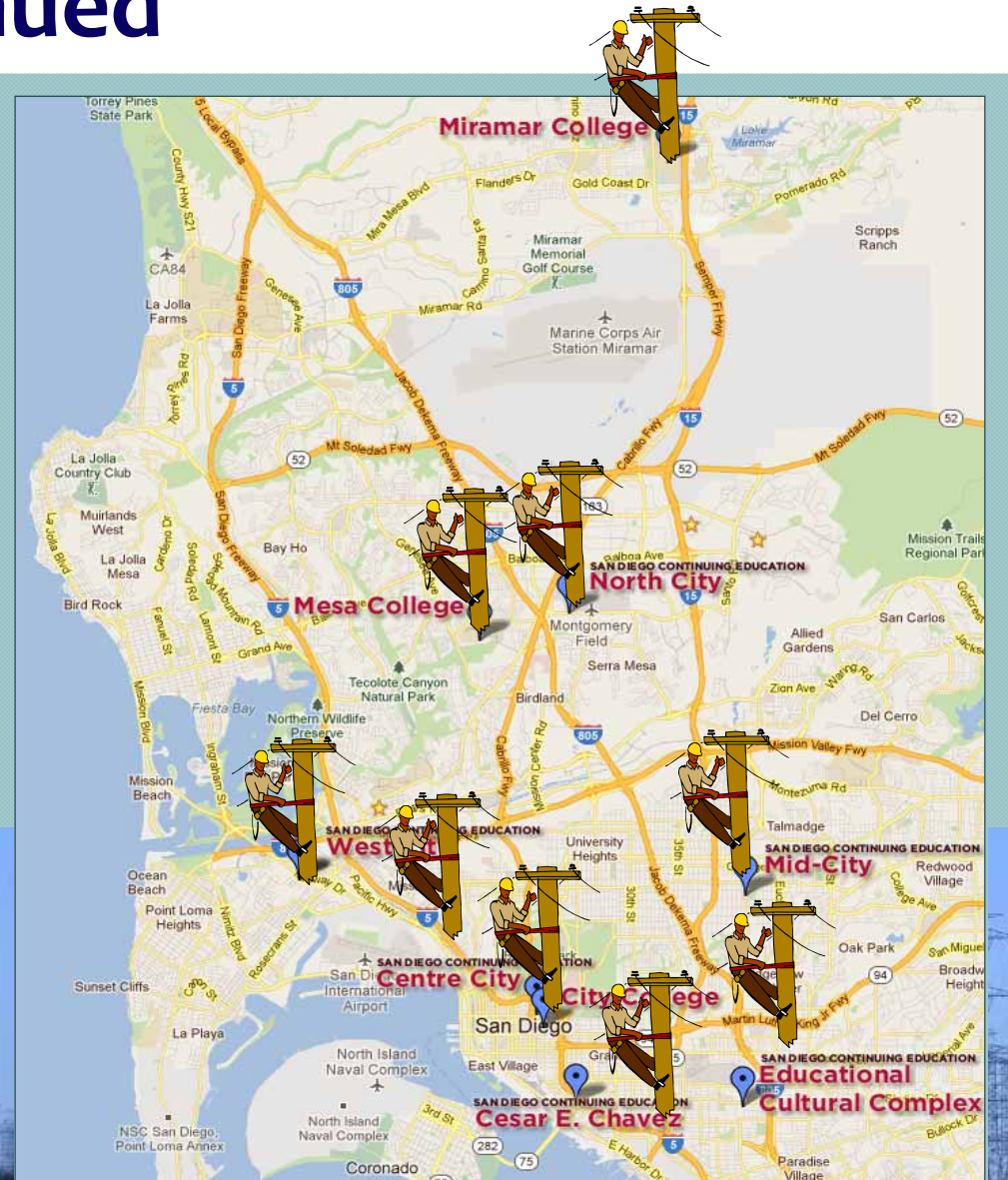


San Diego Community College District

The Challenge Continued

SDG&E Demand
Charges and Demand
Reduction Load
Shedding Response

Rate - **\$1.00 kWh**



San Diego Community College District

The Challenge Continued

How to leverage PV peak production and thermal energy storage to intelligently manage electrical consumption from grid.



San Diego Community College District

The Challenge Continued

Facilities Survey

Too **Cold!**



How do you rate the adequacy of the indoor heating?

Extremely Dissatisfied – 17.60%

Extremely Satisfied – 10.80%

Too **Hot!**



How do you rate the adequacy of the indoor air conditioning?

Extremely Dissatisfied – 23.70%

Extremely Satisfied – 9.00%

San Diego Community College District

The Vision

- Smart metering of energy consumption by building
- Utilize this data to focus maintenance efforts for building performance
- Behavior modification of building occupants



San Diego Community College District

Smart Metering

What is monitored...

- Electrical load
 - ✓ Lighting
 - ✓ Motors
 - ✓ Equipment
 - ✓ Plug loads
- Therms chilled water or heating hot water
- Natural gas therms consumed



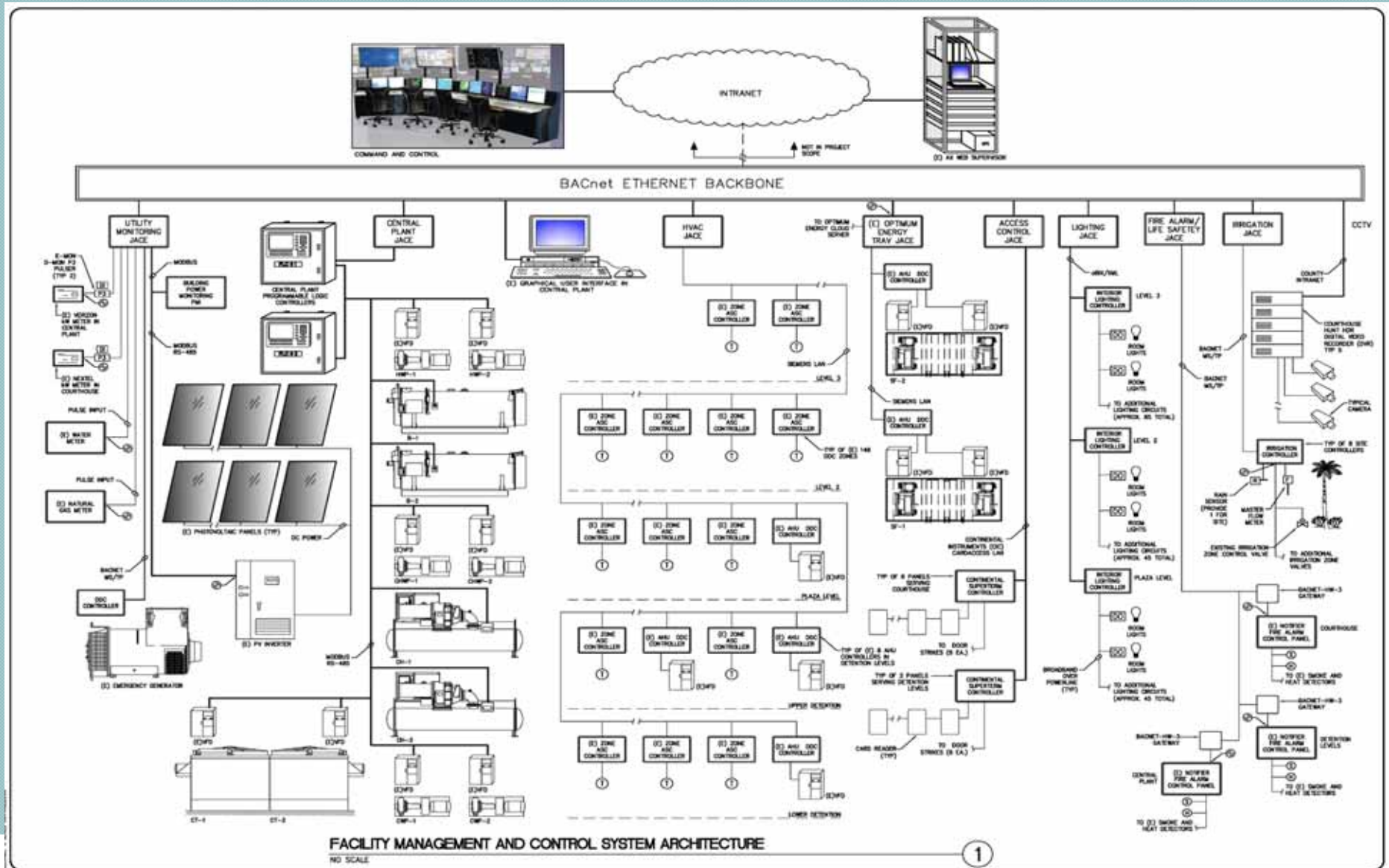
San Diego Community College District

How is data collected and monitored?

- Using standard EMS across the District to monitor building performance
- Electrical metering with IP address
- Natural gas with IP address
- Tie it together with Java Application Control Engine (JACE)



How is data collected and monitored?



San Diego Community College District

The Vision

- Dashboards for each campus
- Dashboards for like type buildings
- Dashboards/algorithms for load shedding
- Dashboards for maintenance planning
- Dashboards for building thermal comfort



San Diego Community College District Monitoring the District Offices – Thermal Comfort

First Floor



San Diego Community College District Monitoring the District Offices – Thermal Comfort

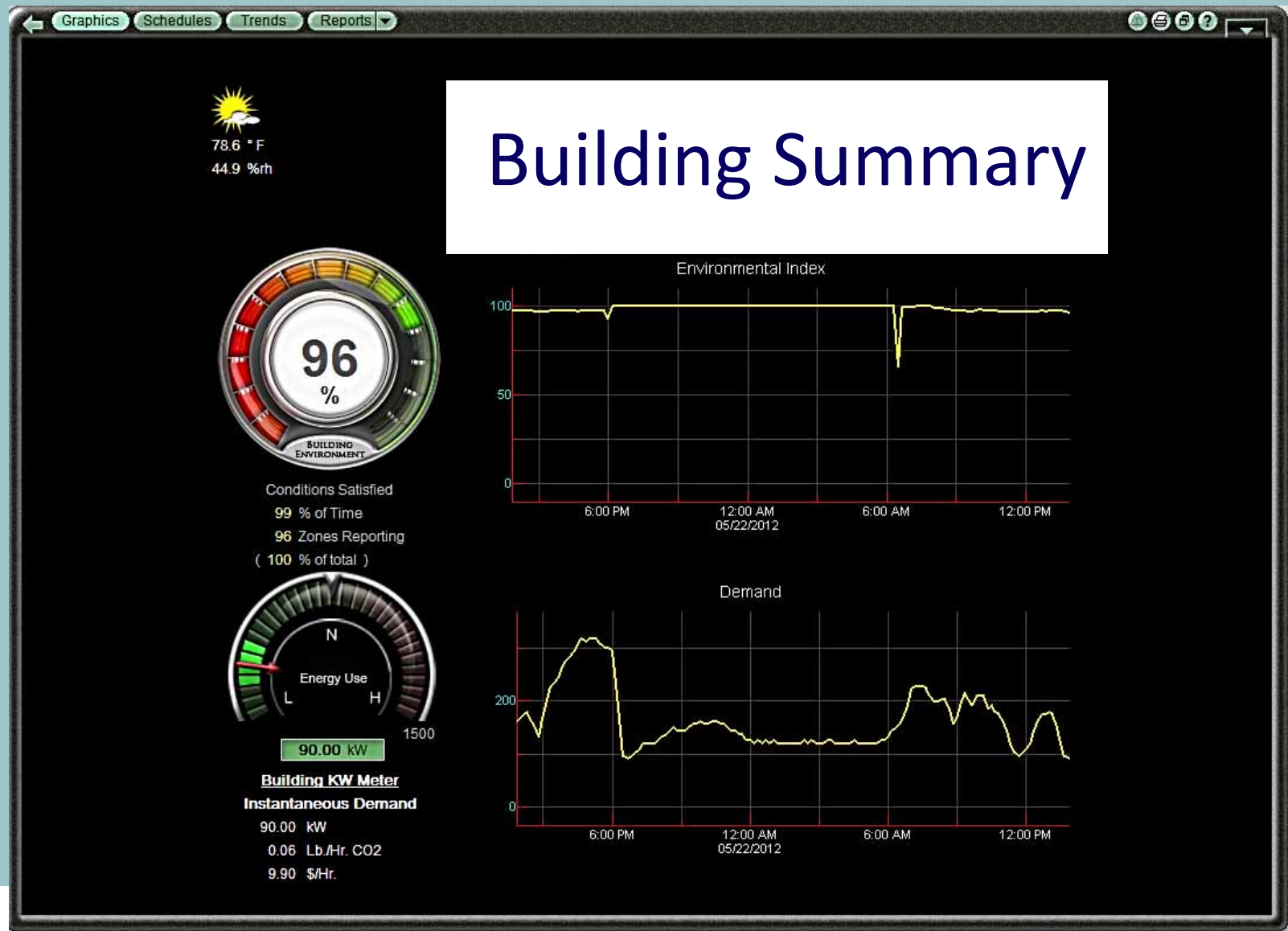
Second Floor



Third Floor



San Diego Community College District Monitoring the District Offices – Thermal Comfort



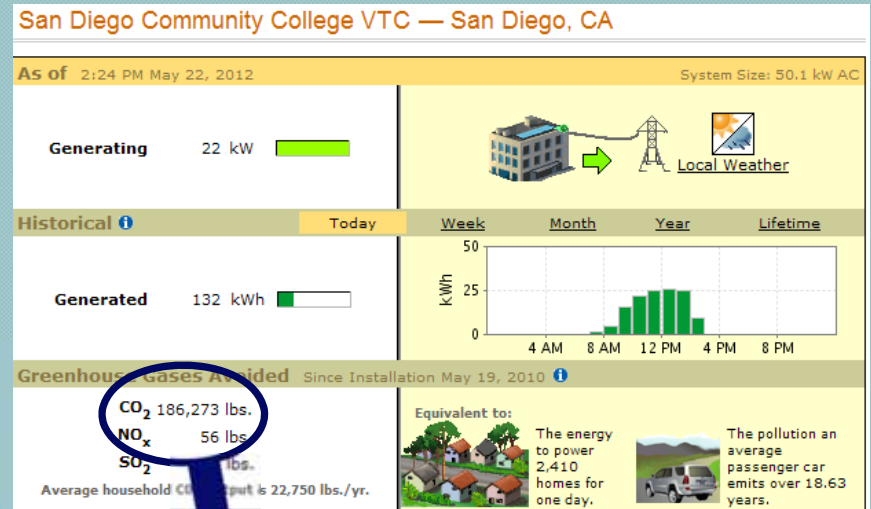
San Diego Community College District Solar PV Power Production Dashboards

SDCCD District Headquarters



San Diego Community College District Solar PV Power Production Dashboards

City College



Learning Resource Center



Career Technology Center

More than
658,000 combined
kWh generated to date –
the equivalent of
CO₂ emissions from burning
50,843 gallons of gas

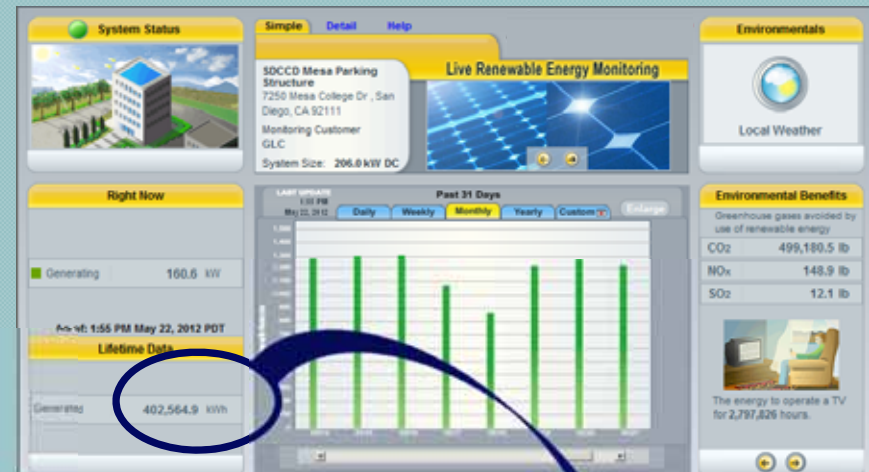
Harry West Gym

San Diego Community College District Solar PV Power Production Dashboards

Mesa College



Parking Lot #1



Parking Structure

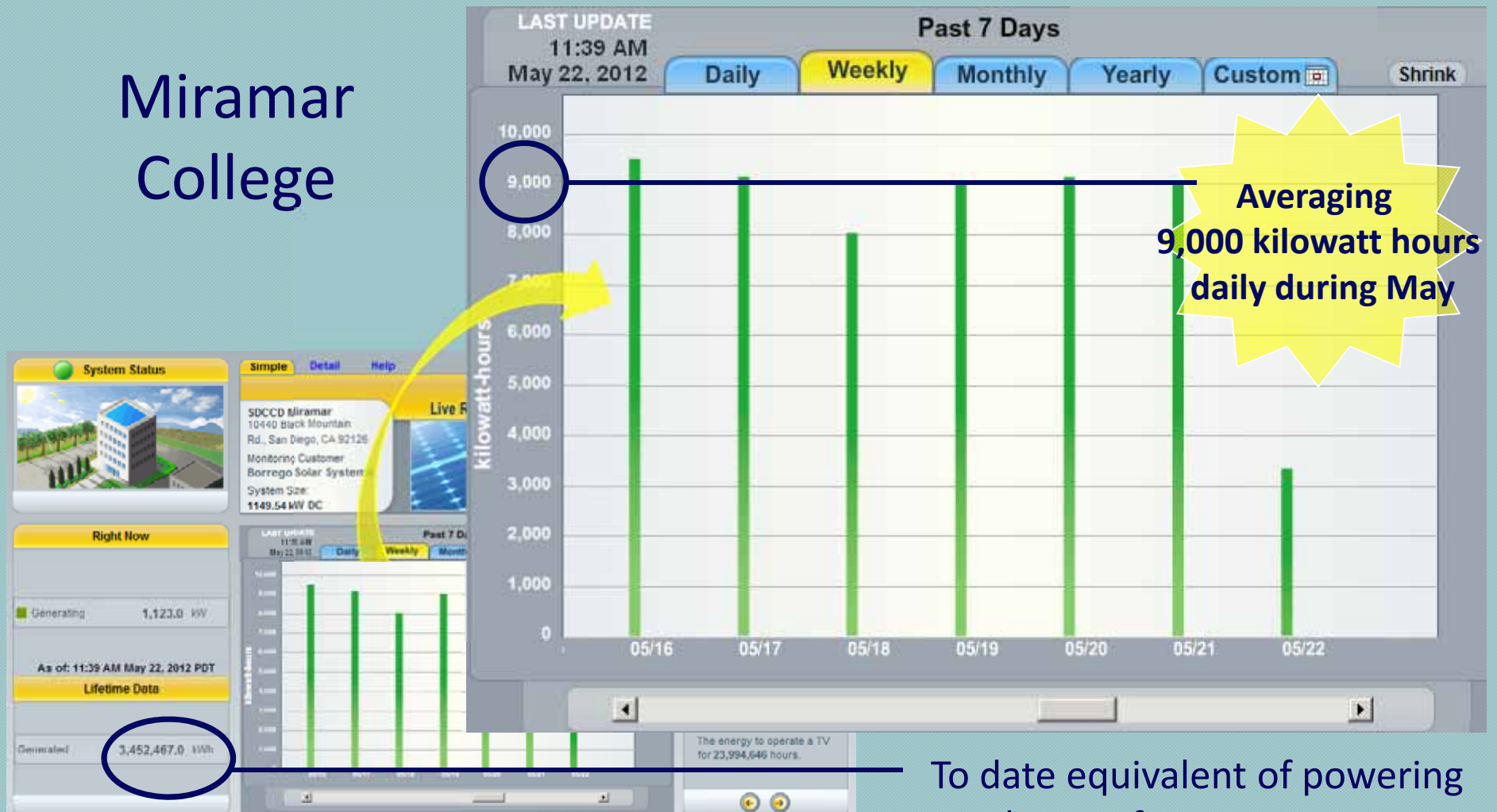


Parking Lot #2

**More than
2.1 million combined
kWh generated to date –
the equivalent of
1,453 metric tons
of CO₂**

San Diego Community College District Solar PV Power Production Dashboards

Miramar College



To date equivalent of powering
297 homes for one year

San Diego Community College District Solar PV Power Production Dashboards

San Diego Continuing Education

Skills Center

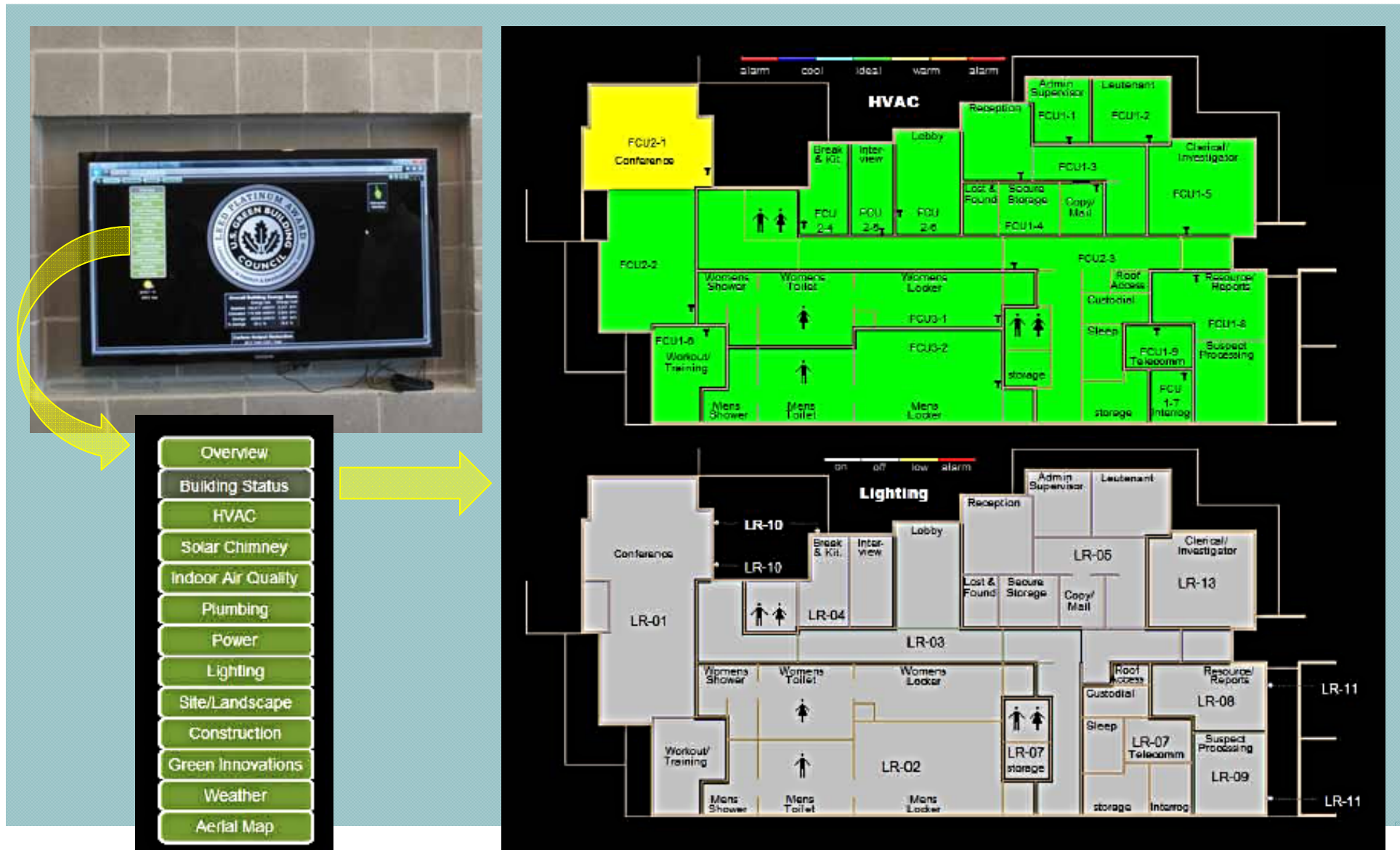


Mid-City Campus



**Combined generation of
353,000 kWh to date –
equivalent to the
greenhouse gas emissions
avoided by recycling
85 tons of waste**

San Diego Community College District Energy Dashboard - Miramar Police Station



San Diego Community College District

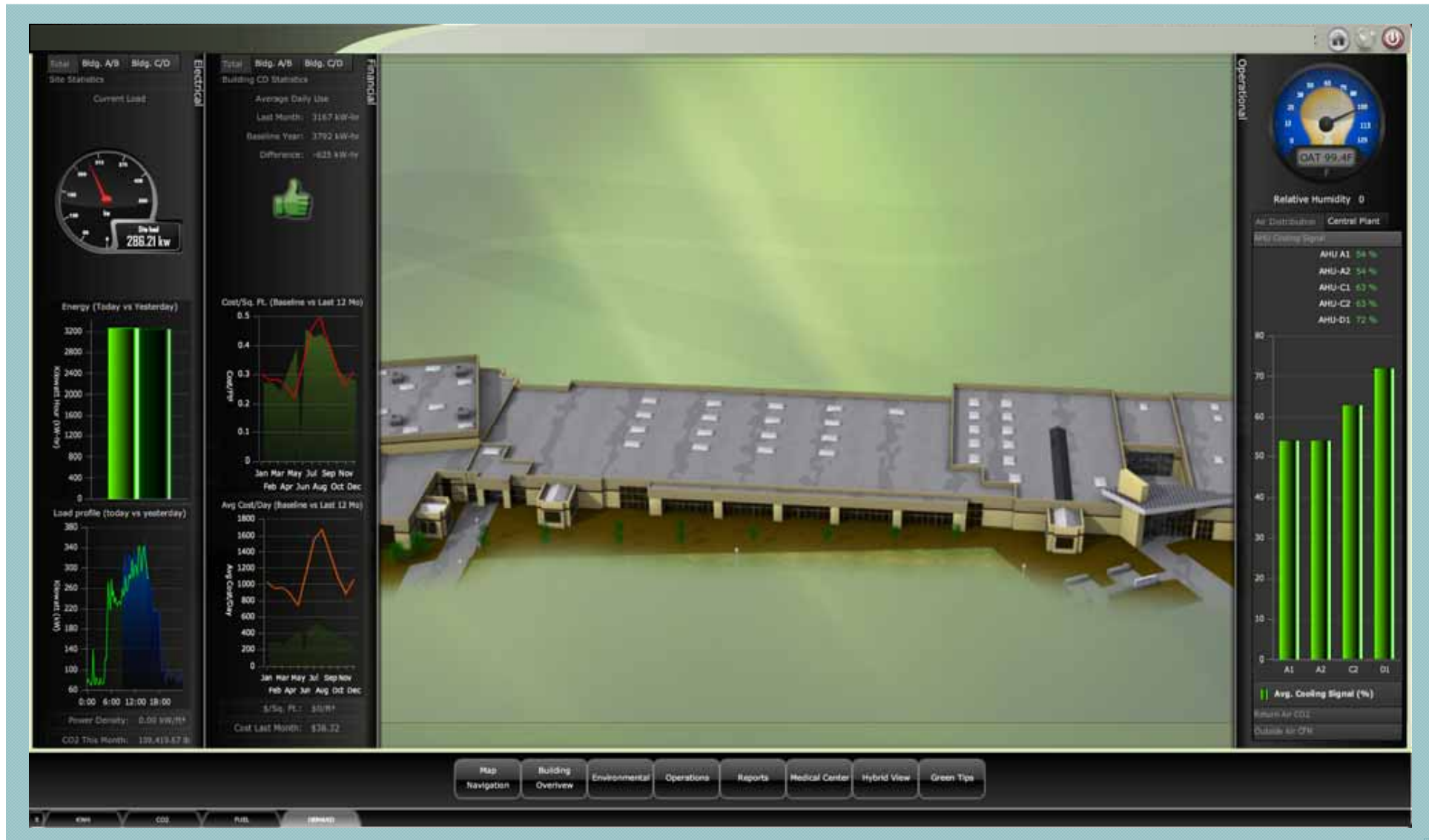
Major elements of campus dashboards

- Total kW instantaneous by:
 - ✓ Plug load
 - ✓ Motor load
 - ✓ Lighting load
 - ✓ Equipment load
- Total kWh consumed/produced daily
- Total MBtu/Sq. Ft.
- % kWh from renewable resources
- \$\$ for energy conserved



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What might these dashboards look like?



San Diego Community College District

What might these dashboards look like?



San Diego Community College District

What might these dashboards look like?

Residential Electricity Use Interactive Map



Courtyard Communities

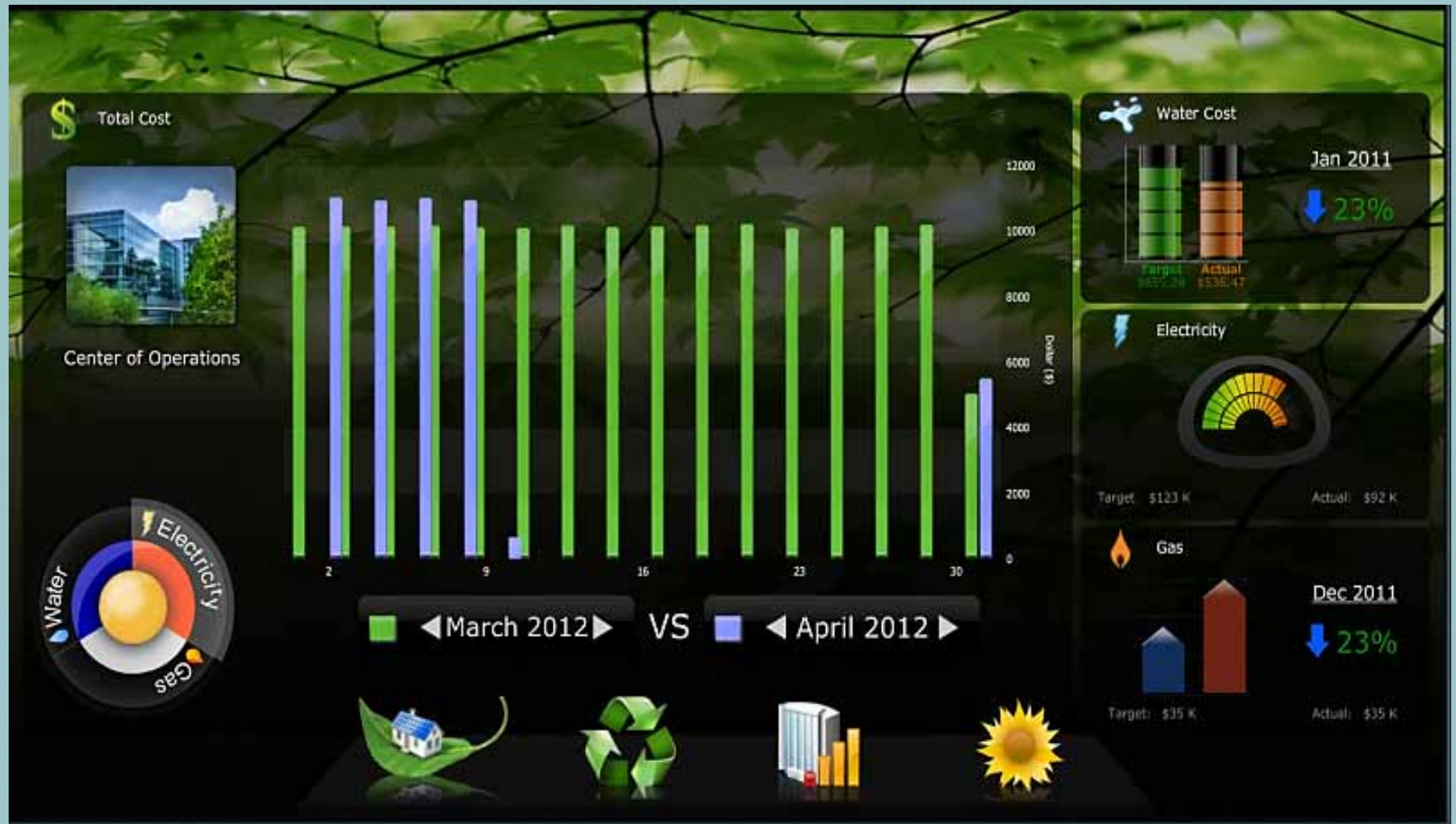
- Family Housing
- Luxury Apartments
- Courtyard Communities**
- Suite Style Halls
- Traditional Halls
- Alarms
- Histories

[Click here to enter text.](#)



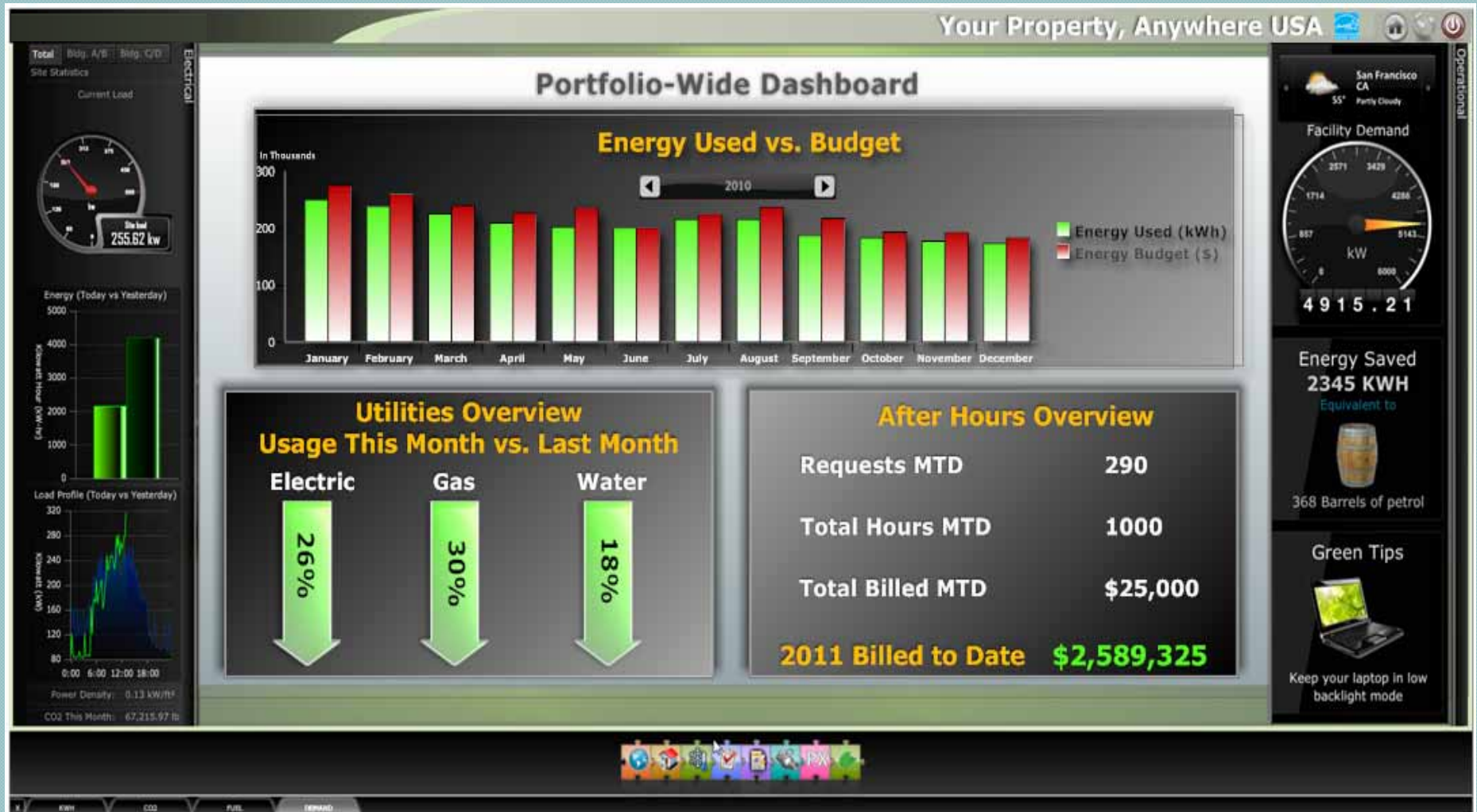
San Diego Community College District

What might these dashboards look like?



San Diego Community College District

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San Diego Community College District

What might these dashboards look like?



Questions?

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