UC Davis West Village
The largest planned "zero net energy" community in the United States
<table>
<thead>
<tr>
<th>Program</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acres</td>
<td>130 acres</td>
<td>75 acres</td>
<td>205 acres</td>
</tr>
<tr>
<td>Faculty/Staff Housing</td>
<td>343 units</td>
<td>132 units</td>
<td>475 units</td>
</tr>
<tr>
<td>Student Housing Beds (including beds over mixed use)</td>
<td>1,980 beds</td>
<td>1,158 beds</td>
<td>3,000 beds</td>
</tr>
<tr>
<td>Retail/Office Space</td>
<td>up to 42,500 sf</td>
<td>0</td>
<td>up to 45,000 sf</td>
</tr>
<tr>
<td>Los Rios Community College District</td>
<td>20,000 sf</td>
<td>0</td>
<td>60,000 sf</td>
</tr>
<tr>
<td>Recreation Fields</td>
<td>7.61 acres</td>
<td>14.29 acres</td>
<td>21.90 acres</td>
</tr>
</tbody>
</table>
CAMPUS PLANNING

Site Plan

- Village Square
- Mixed-Use (45,000 sf retail + apartment units above)
- Community College (60,000 sf)
- For-sale Faculty/Staff Housing (343 homes)
- Site for Day Care/Preschool
- Student Housing (1,980 beds)
- Water management & open space
- Recreation fields and parks
662 apartments
343 single family homes
42,500 square feet of commercial space
60,000 square feet Community College
Project Goals

- Livable
- Affordable
- Environmentally responsive
Site Environmental Responsiveness
Energy Goals

• Zero Net Energy Use
West Village Energy Initiative
Program Goals

• No higher cost to the consumer
• No higher cost to the developer
• Zero Net Energy from the Grid on an annual basis
• Deep Energy Conservation Measures
• Multiple integrated renewable resources at a community scale
• Smart Grid
UC Davis Energy Efficiency Center assembles advisory committee

EEC report with Davis Energy Group energy efficiency ‘packages’ (funded by DOE Build America Program)

Chevron Energy Solutions conducts financial and technical analysis of Zero Net Energy Concept for WVCP

Davis Energy Group updates energy efficiency packages

UC Davis & WVCP brief EEC Board of Advisors in Washington, D.C.

California Energy Commission awards $2M ‘RESCO’ grant to UC Davis

Department of Energy awards $2.5M Community Renewable Energy Grant to UC Davis

West Village opens with Village Square, Los Rios & Student Housing August 2011
## Energy Efficient Design

**BUILDING ENVELOPE**

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls (Exterior)</td>
<td>2x6 16” o.c. R-21 batt w/ ½” exterior foam</td>
</tr>
<tr>
<td></td>
<td>Quality Insulation Inspection</td>
</tr>
<tr>
<td>Roof (Attic)</td>
<td>R-49 blown insulation</td>
</tr>
<tr>
<td></td>
<td>Radiant barrier roof sheathing</td>
</tr>
<tr>
<td>Roofing Products</td>
<td>Aged solar reflectance ≥ 0.2</td>
</tr>
<tr>
<td></td>
<td>Thermal emittance ≥ 0.75</td>
</tr>
<tr>
<td></td>
<td>(Cool Roofing products)</td>
</tr>
<tr>
<td>Glazing U-Factor/ SHGC</td>
<td>Average U ≤ 0.33 / SHGC ≤ 0.21</td>
</tr>
<tr>
<td>Distributed Thermal Mass</td>
<td>Additional 1/2&quot; gypcrete on Floors 2 and 3</td>
</tr>
</tbody>
</table>
Energy Efficient Design

**HEATING, VENTILATION & AIR CONDITIONING**

- **Cooling**: 15 SEER / 12.5 EER Heat Pump
- **Heating**: 8.5 HSPF Heat Pump
- **Ducts**: R-6.0 ducts in conditioned space
- **Fresh Air Mechanical Ventilation**: *Per ASHRAE 62.2*
- **Ceiling Fans**: In bedrooms

**WATER HEATING**

- **Type**: Central high performance water heater in each building
## Energy Efficient Design

### LIGHTING / APPLIANCES

<table>
<thead>
<tr>
<th>High Efficacy Lighting</th>
<th>Hard-wired lighting fluorescent or LED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Assume 80% hardwired lighting</td>
</tr>
<tr>
<td></td>
<td>Lighting controls / Vacancy sensors</td>
</tr>
</tbody>
</table>

| Energy Star Appliances | Dishwasher, Refrigerator, Washer       |

| Cooktop / Oven         | Standard Electric                      |

| Miscellaneous Load Control | Energy usage displays                  |
Projected Energy Load

Title 24 2008 Baseline
May 2010 – 22 million kWh/year
Projected Energy Load

Deep Energy Conservation Measures
May 2010 – 10 million kWh/year
Solar Panels

• **Multifamily housing**
  - 4 megawatts to be installed
  - Power purchase agreement between WVCP & SunPower

• **Single family homes**
  - Still under evaluation
  - Roof top and community (?)
  - Preparing for high penetration PEV
Campus Biodigester

• **Feed stocks**
  – 25 tons per day from campus and West Village
  – Food waste
  – Animal waste and bedding

• **Gas Production**
  – 32.9 million standard cubic feet per year
  – 21,000 million BTU per year

• **Energy Generation**
  – 250 kw microturbine/ICE
  – 2.0 million kWh per year
  – Tied to campus grid
Energy Spend - Typical

- Energy
- Energy Efficiency Measures
Energy Spend – West Village

- Energy
- Energy Efficiency Measures
- Green Energy
- Energy Efficiency
Other Partners

CARMEL PARTNERS

URBAN VILLAGES

PG&E

U.S. DEPARTMENT OF ENERGY

Chevron

California Public Utilities Commission

STATE OF CALIFORNIA
PUBLIC Utilities COMMISSION
Questions?