San Diego State University: Sustainability Starts Here
Sustainability at San Diego State University

- Carbon
- Energy
- Water
- Waste Reduction
- Transportation
- Green Buildings
- Food
- Academics
- Research
- Get Involved
Carbon
• In March 2014, President Hirshman signed American College and University Presidents Climate Commitment

• Commits campus to develop a Climate Action Plan to achieve carbon neutrality
Climate Challenge

- Over-reliance on fossil fuels: catastrophic climate disruption and national security threat
- Threat to human progress
- Halt growth of global warming pollution & cut GHG emissions by 80%
- Transformation of economy, institutions & daily lives
- Vision & leadership of higher education

_Reversing global warming is a defining challenge of the 21st century!_
Commitment requirements

SDSU

First 2 Months
Create institutional structures & initiate two of seven suggested actions

Within 1 Year
Complete inventory of emissions
1/15/16
1/15/18
1/15/20
1/15/22
1/15/24

Within 2 Years
Develop institutional climate action plan
1/15/17

ongoing
Submit periodic progress reports
1/15/19
1/15/21
1/15/23
1/15/25
1/15/27
Initiate two or more of the following tangible actions to reduce greenhouse gases while the more comprehensive plan is being developed.

- **Establish a policy that all new campus construction will be built to at least the U.S. Green Building Council’s LEED Silver standard or equivalent.**
- **Adopt an energy-efficient appliance purchasing policy requiring purchase of ENERGY STAR certified products in all areas for which such ratings exist.**
- Establish a policy of offsetting all greenhouse gas emissions generated by air travel paid for by our institution.
- Encourage use of and provide access to public transportation for all faculty, staff, students and visitors at our institution.
- Within one year of signing this document, begin purchasing or producing at least 15% of our institution’s electricity consumption from renewable sources.
- Establish a policy or a committee that supports climate and sustainability shareholder proposals at companies where our institution’s endowment is invested.
- Participate in the Waste Minimization component of the national RecycleMania competition, and adopt 3 or more associated measures to reduce waste.
Within one year of signing this document, complete a comprehensive inventory of all greenhouse gas emissions (including emissions from electricity, heating, commuting, and air travel) and update the inventory every other year thereafter.
Greenhouse Gas Inventory

Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g. T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc.

FY 14/15
Greenhouse Gas Trends

Operational Emissions (Scopes 1 and 2)

Metric Tons CO2e per year


- 10,000 20,000 30,000 40,000 50,000 60,000 70,000

Transportation
Purchased Electricity
Non-Cogen Natural Gas
Cogen Natural Gas
Greenhouse Gas Trends

Operational Emissions (Scopes 1 and 2)
Normalized to Square Footage

kg CO2e/GSF per year

Within two years of signing this document, develop an institutional action plan for becoming climate neutral, which will include:

• Actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students.
• Actions to expand research or other efforts necessary to achieve climate neutrality.
• Mechanisms for tracking progress on goals and actions.

Make the action plan, inventory, and periodic progress reports publicly available by submitting them to the Reporting System for posting and dissemination.
Within two years of signing this document, develop an institutional action plan for becoming climate neutral, which will include:

- A target date for achieving climate neutrality as soon as possible.
- Interim targets for goals and actions that will lead to climate neutrality.
Overview of Presidents Climate Commitment – Carbon Goals

**California State University System**
Reduce direct (Scope 1 and 2) greenhouse gas (GHG) emissions to 1990 levels by 2020 and 80% below 1990 levels by 2040.

For SDSU, this would require 37% reduction from current levels in next five years
And 87% reduction in next 25 years.

**University of California System**
In 2013, President Janet Napolitano committed UC system to operational carbon neutrality by 2025.

**State of California**
AB 32 and Executive Order S-3-05 call for 1990 levels by 2020 and 80% 1990 levels by 2050.

Renewable portfolio standard – 33% electricity renewable by 2020, 50% by 2030
Energy
Most energy on campus provided by cogeneration plant

Natural Gas → Cogen → Steam → Electricity

Reduces energy costs

Islanding capability

Historically, reduces environmental impact; but the grid is getting cleaner

Optimization effort expected to reduce operational emissions by nearly 10%
Energy - Chillers

20% of campus electricity
Energy - Thermal Storage
Nearly 1 MW of Solar photovoltaic panels on campus – up to 10% of peak, 3% total use
Monitoring Based Commissioning

Monitoring Based Commissioning – make a building work right.
Deferred maintenance, optimize HVAC sequences, efficiency upgrades

Arts and Letters MBCx Results

Next up: GMCS, Peterson Gym, Fowler Athletics
Energy Revolving Fund

utility savings → revolving fund → energy-efficiency projects
Energy Information System

New system will be advanced energy and sustainability data collection and analysis

Utility bill management, auxiliary billing, portfolio snapshot, comparisons, public dashboards, and fault detection diagnostics
Water
Water Overview

Water Use Breakdown (FY14)

- Cooling Towers
  - Evaporation
  - Blowdown
- Irrigation
  - Measured
  - Estimated
- Domestic/Unidentified
- Housing
- Associated Students
- Off Campus
- Aztec Shops

Annual Water Use (Hundred Cubic Feet)

- On-Campus, Non-Auxiliary
- Foundation
- Off Campus (Other General Fund)
- Contractors
- Aztec Shops
- Associated Students
- Parking
- Housing
• Chancellors Office funding – collaboration between Facilities Services and academics (Dept. of Geography, Dr. Diana Richardson)
• Students identified biggest needs were shading and seating
• Redirected from proposed site
Water – Campus as a Living Lab

- Turf removal, shade trees
- Enhanced irrigation
- Biochar – water conservation amendment
Waste Reduction
Waste Reduction

Non C&D Diversion (7/15 to 6/16)

- Non C&D Landfill: 1889.5 tons (66%)
- Non C&D Recycle: 658.8 tons (23%)
- Compost: 317.4 tons (11%)
- Non C&D Reuse: 15.6 tons (0%)

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Compost: 317.4 tons (11%)
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Non C&D Reuse: 15.6 tons (0%)
Non C&D Recycle: 658.8 tons (23%)
Compost: 317.4 tons (11%)
Non C&D Landfill: 1889.5 tons (66%)
Waste Reduction

Total Diversion (7/15 to 6/16)

- C&D Recycle, 2186.3 tons, 41%
- Non C&D Recycle, 658.8 tons, 12%
- Compost, 317.4 tons, 6%
- Non C&D Reuse, 15.6 tons, 0%
- C&D Landfill, 305.5 tons, 6%
- Non C&D Landfill, 1889.5 tons, 35%

Total Diversion: 5424.6 tons, 100%

Sources:
- C&D Recycle
- Non C&D Recycle
- Compost
- Non C&D Reuse
- C&D Landfill
- Non C&D Landfill

Total Diversion (7/15 to 6/16)
Waste Reduction

FY 15-16 Diversion Rate by Dumpster Location

- TEPEYAC - RESIDENCE HALL: 10.00%
- TACUBA - RESIDENCE HALL: 10.00%
- CHAPULTEPEC - RESIDENCE HALL: 15.00%
- TENOCHCA - RESIDENCE HALL: 20.00%
- VILLA ALVARADO: 25.00%
- ZURA - RESIDENCE HALL: 30.00%
- MAYA: 35.00%
- OLMECA: 35.00%

San Diego State University
Waste Outreach

- Launching recycling outreach effort
  - Spearheaded by student intern, Taylor Flores
- New recycling and waste bins with new contract
- Piloting sidecar landfill bins
**HOW IT WORKS:**

CLEAR bag + BLUE bin = RECYCLABLE

BLACK bag + BLACK bin = LANDFILL

For more rules on SDSU recycling, visit: edcodisposal.com
2015

AZTEC MOVE-IN

SOURCE: EDCO

2.5% landfill

6.3 tons cardboard and other packaging

97.5% waste recycled

film plastics 750 lbs

2016 – 98.5% Diversion!
Hydration Stations
Mode Split Comparison

Faculty/Staff – 2015 Data
Students – 2012 Data
Geocoded students in San Diego County. Units represent student residences per square mile.
Buffer Analyses

Faculty: 18% live within 3 miles of campus
Staff: 20% live within 3 miles of campus
Students: 23% live within 3 miles of campus

Created by Dr. Bruce Appleyard and Jeremy McKinstry
Buffer Analyses

- Faculty: 33% live within 5 miles of campus
- Staff: 37% live within 5 miles of campus
- Students: 36% live within 5 miles of campus

Created by Dr. Bruce Appleyard and Jeremy McKinstry
Distance to main transit routes
- Faculty: 24% live within 0.5 miles
- Staff: 22% live within 0.5 miles
- Students: 30% live within 0.5 miles

Distance to main transit routes
- Faculty: 39% live within 1 mile
- Staff: 38% live within 1 mile
- Students: 45% live within 1 mile
Sustainable Commuting

Trolley
SDSU is located on the Green Line of the MTS Trolley system, connecting campus to Downtown San Diego and Santee.

Bus
There are several MTS bus lines that directly service campus. Check out the MTS site for up to date information. All SDSU routes are "bike buses" and provide wheelchair lift service.

Bike & Skateboard
Biking, skateboarding, or walking to campus is as green as you can get! Campus has a network of bike lanes and streets that allow for easy bike and skateboard access.

Rideshare
Have a car? Split the costs by driving fellow SDSU student, faculty, and staff. Don't have a car? Find a ride where you need to go.

Carshare
Get access to a car without the hassle or cost of ownership. SDSU has partnerships with Car2Go and Zipcar.

Charging Stations
SDSU has a partnership with Blink Networks offering electric charging stations across campus: Parking Structures 4, 5, 6, and 8, Children's Center, and fast chargers in Lot G.

Created by Dr. Bruce Appleyard and Jeremy McKinstry
Green Building
LEED

- Location and Transportation - 15%
- Sustainable Sites - 9%
- Water Efficiency - 10%
- Energy and Atmosphere - 30%
- Materials and Resources - 12%
- Indoor Environmental Quality - 15%
- Innovation and Regional Priority - 9%

Certifications:
- Certified: 40 - 49 Points
- Silver: 50 - 59 Points
- Gold: 60 - 79 Points
- Platinum: 80+ Points
LEED Certified Buildings

Student Union

ARC

Zura Hall

Storm-Nasatir Complex

MBAC

Children’s Center
## Storm & Nasatir Expansion Project

**LEED BD+C: New Construction (v2.2)**

### Sustainable Sites

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Awarded</th>
<th>Total</th>
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<tbody>
<tr>
<td>SS1</td>
<td>Site selection</td>
<td>1/1</td>
<td>1/1</td>
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<tr>
<td>SS2</td>
<td>Development density and community connectivity</td>
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<tr>
<td>SS3</td>
<td>Brownfield redevelopment</td>
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<tr>
<td>SS4</td>
<td>Alternative transportation - public transportation access</td>
<td>1/1</td>
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<tr>
<td>SS5</td>
<td>Alternative transportation - bicycle storage and changing rooms</td>
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<tr>
<td>SS6</td>
<td>Alternative transportation - low-emitting and fuel-efficient vehicles</td>
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<tr>
<td>SS7</td>
<td>Alternative transportation - parking capacity</td>
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<tr>
<td>SS8</td>
<td>Site development - protect or restore habitat</td>
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<td>SS9</td>
<td>Site development - maximize open space</td>
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<tr>
<td>SS10</td>
<td>Stormwater design - quantity control</td>
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<tr>
<td>SS11</td>
<td>Stormwater design - quality control</td>
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<tr>
<td>SS12</td>
<td>Roof heat island effect - cool roof</td>
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<tr>
<td>SS13</td>
<td>Roof heat island effect - warm roof</td>
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<tr>
<td>SS14</td>
<td>Light pollution reduction</td>
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### Water Efficiency

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<tbody>
<tr>
<td>WE1</td>
<td>Water efficient landscaping - reduce by 50%</td>
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<tr>
<td>WE2</td>
<td>Water efficient landscaping - no potable water use or no irrigation</td>
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<tr>
<td>WE3</td>
<td>Innovative wastewater technologies</td>
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<tr>
<td>WE4</td>
<td>Water use reduction - 20% reduction</td>
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<td>1/1</td>
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<tr>
<td>WE5</td>
<td>Water use reduction - 30% reduction</td>
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### Energy & Atmosphere

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<th>Code</th>
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<tr>
<td>EA1</td>
<td>Optimize energy performance</td>
<td>5/10</td>
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<tr>
<td>EA2</td>
<td>On-site renewable energy</td>
<td>2/3</td>
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<tr>
<td>EA3</td>
<td>Enhanced commissioning</td>
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<tr>
<td>EA4</td>
<td>Enhanced refrigerant Trane</td>
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<td>1/1</td>
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<tr>
<td>EA5</td>
<td>Measurement and verification</td>
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<tr>
<td>EA6</td>
<td>Green power</td>
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### Material & Resources

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<th>Code</th>
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<tbody>
<tr>
<td>MR1</td>
<td>Building reuse - maintain 75% of existing walls, floors &amp; roof</td>
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<tr>
<td>MR2</td>
<td>Building reuse - maintain 50% of existing walls, floors &amp; roof</td>
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<tr>
<td>MR3</td>
<td>Building reuse - maintain 50% of interior non-structural elements</td>
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<td>0/1</td>
</tr>
<tr>
<td>MR4</td>
<td>Construction waste Mgmt - divert 50% from disposal</td>
<td>1/1</td>
<td>1/1</td>
</tr>
<tr>
<td>MR5</td>
<td>Construction waste Mgmt - divert 75% from disposal</td>
<td>1/1</td>
<td>1/1</td>
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<tr>
<td>MR6</td>
<td>Materials reuse - 5%</td>
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## Indoor Environmental Quality

### CONTINUED

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<tbody>
<tr>
<td>EQ1</td>
<td>Outdoor air delivery monitoring</td>
<td>1/1</td>
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<tr>
<td>EQ2</td>
<td>Increased ventilation</td>
<td>1/1</td>
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</tr>
<tr>
<td>EQ3</td>
<td>Construction Mgmt plan - during construction</td>
<td>1/1</td>
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<tr>
<td>EQ4</td>
<td>Construction Mgmt plan - before occupancy</td>
<td>1/1</td>
<td>1/1</td>
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<tr>
<td>EQ5</td>
<td>Low-emitting materials - adhesives and sealants</td>
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<td>1/1</td>
</tr>
<tr>
<td>EQ6</td>
<td>Low-emitting materials - paints and coatings</td>
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<td>1/1</td>
</tr>
<tr>
<td>EQ7</td>
<td>Low-emitting materials - carpet systems</td>
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<td>1/1</td>
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<tr>
<td>EQ8</td>
<td>Low-emitting materials - composite wood and agrifiber products</td>
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<tr>
<td>EQ9</td>
<td>Indoor chemical and pollutant source control</td>
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<tr>
<td>EQ10</td>
<td>Controlability of systems - lighting</td>
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<tr>
<td>EQ11</td>
<td>Controlability of systems - thermal comfort</td>
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<tr>
<td>EQ12</td>
<td>Thermal comfort - design</td>
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<tr>
<td>EQ13</td>
<td>Thermal comfort - verification</td>
<td>1/1</td>
<td>1/1</td>
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<tr>
<td>EQ14</td>
<td>Daylight and views - daylight 70% of spaces</td>
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<tr>
<td>EQ15</td>
<td>Daylight and views - views for 90% of spaces</td>
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### Innovation

<table>
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<th>Code</th>
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<tbody>
<tr>
<td>IC1</td>
<td>Innovation in design</td>
<td>3/4</td>
<td>3/4</td>
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<tr>
<td>IC2</td>
<td>LEED Accredited Professional</td>
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<td>1/1</td>
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</tbody>
</table>

**TOTAL**

45 / 69
Storm-Nasatir

50% lower irrigation need
50% lower interior water use
77% of Waste Recycled
23% recycled content
90% of spaces have views
• In 2015, SDSU Dining became the first campus to require all of its tenants to meet the GRA's Certified Green Restaurant® environmental standards
• Nearly two dozen entities on campus have received this certification.
• SDSU organizations have over twenty plots at the College Area Community Garden
• Associated Students leads a campaign against food insecurity
  • Mobile food pantry
  • Twitter alerts to students when extra catered food is available

http://www.aztecshops.com/sustainability
https://as.sdsu.edu/foodinsecurity/
• Sustainability Major and Minor
• Many other programs offer classes related to sustainability

• Sage Project connects nearby communities with student classes to solve real world issues, with a focus on sustainability

http://sustainability.sdsu.edu/
http://sage.sdsu.edu/
• Several research efforts including:
  • Industrial Assessment Center
  • Center for Sustainable Energy
  • Blue Gold
• Research on Climate and Sustainability part of campus Strategic Plan
What can you do to pitch in on campus?

- Recycle
- Turn off lights
- Use responsible temperature setpoints
- Commute to campus by biking, carpooling, trolley, or bus
- Eat more plants
- Use hydration stations instead of bottled water
- Report issues to Facilities Services Center
  - (leaks, excessive flushing, daytime exterior lighting, etc)
- Spread the word
How YOU can GET INVOLVED

Student Organizations
- Green Love
- Enviro-Business Society (E3)
- GreenFest Committee
- Association of Environmental Professionals (SD Student Chapter)

Campus Committees
- Environment & Safety Committee
- Sustainability Committee

Internships
- Look for local and on-campus internships related to sustainability
How YOU can GET INVOLVED

Recycling outreach – classroom talks, office walks, tabling
Count bins for new containers
Reduce bottled water usage
Advocate for recycling changes
Lobby for composting facilities
Food service recycling program
Reduction, Reuse, Recycle – in that order
Potential internships
Questions/Contact

Tom Abram
tabram@mail.sdsu.edu