Addressing Climate Action, Resiliency, and Education

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Goals for Today

1. Outline the Global Context of Climate Action and Sustainability
2. Highlight critical Frameworks and associated tools
3. Deeper dive into Education for Sustainability including “Key Competencies in Sustainability”
4. Examples of Competencies in sustainability
5. Resources and slide deck link
For millennia, atmospheric carbon dioxide had never been above this line.

1950 level

current level

https://climate.nasa.gov/evidence/
The impact of climate change on human health is multifaceted, leading to exacerbation of existing inequities and creating new challenges. Key impacts include:

- **Air Pollution & Increasing Allergens**: Asthma, cardiovascular disease, respiratory allergies.
- **Extreme Heat**: Heat-related illness and death, cardiovascular failure.
- **Severe Weather**: Injuries, fatalities, loss of homes, mental health impacts.
- **Environmental Degradation**: Forced migration, civil conflict, mental health impacts, loss of jobs and income.

These effects are exacerbated by rising CO₂ levels, leading to more extreme weather, rising sea levels, and changes in vector ecology.

- **Degraded Living Conditions & Social Inequities**: Exacerbation of existing social and health inequities and vulnerabilities.
- **Changes In Vector Ecology**: Malaria, dengue, encephalitis, hantavirus, Rift Valley fever, Lyme disease, chikungunya, West Nile virus.
- **Water & Food Supply Impacts**: Malnutrition, diarrheal disease.
- **Water Quality Impacts**: Cholera, cryptosporidiosis, Campylobacter, leptospirosis, harmful algal blooms.

Adapted from CDC, J. Patz.
Renewable Energy Employment by Country

This dashboard showcases employment figures in the renewable energy sector worldwide by country and technology.

Renewable Energy Employment by Technology

Source: IRENA jobs database. Figures provided are the result of a comprehensive review of primary information sources by national entities such as ministries and statistical agencies, and secondary data sources such as regional and global studies. This is an ongoing effort to update and refine available knowledge. Totals may not add up due to rounding. 'Other Technologies' include jobs which are not technology specific.


https://www.irena.org/Statistics/View-Data-by-Topic/
“Climate change is one of the greatest challenges facing the planet today, and we believe businesses are an essential part of the solution. Representing more than 200 CEOs from America’s leading companies, the new Business Roundtable position on climate change reflects our belief that a national market-based emissions reduction policy is critical to reducing greenhouse gas emissions to levels designed to avoid the worst effects and mitigate the impacts of climate change.”

Doug McMillon
Chairman, Business Roundtable
President & CEO, Walmart
November

Lynna Odel

If I can't save us
then let me feel you
happy and safe
under my chin.
If this will drown
or burn
then let us drink starlight
nap under trees
sing on beaches—
the morning rush to sit indoors
what, again?
If we are dying
then let me rip open
and bleed Love,
spill it, spend it
see how much
there is
the reward for miser is
what, again?
If this life is ending
then let me begin
a new one
The Sustainability Tracking, Assessment & Rating System (STARS) is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance.

A global sustainability standard created by and for higher education

Recent Ratings

Northern Arizona University
Kalamazoo College
Gonzaga University
Key Competencies in Sustainability Framework

- Systems Thinking
- Futures Thinking
- Values Thinking
- Strategic Thinking

Interpersonal Competence

Problem Solving Competence

Sources: Wiek et al (2011)
Brundiers and King (2020)
The ability to analyze sustainability problem cutting across different domains and scales, thereby considering agents, cause-effect structures, cascading effects, inertia, feedback loops, etc.

Why we need it: Critical foundation for anticipating future trajectories, identifying potential intervention points and crafting intervention strategies.
The ability to anticipate how sustainability problems and solutions might evolve over time, considering alternative development pathways for current systems and crafting new and different pictures of the future.

Why we need it: Critical for orienting the planning activities, developing adaption responses, exercising precaution in decision making.
The ability to collectively map, specify, apply, reconcile and negotiate sustainability values, principles, goals, and target (not about dictating values, but identifying one’s own values and applying/understanding them as part them to the thinking process)

Why we need it: Critical for assessing the un-sustainability of current and future systems for creating sustainability visions of those systems
Strategic Thinking

The ability to collectively design and implement transformational (systemic) intervention and transition strategies toward a sustainable outcome

Critical for designing and implementing plans that create the intended transformational change or outcome
Interpersonal Competency

The ability to motivate and facilitate research and solution sets for sustainability outcomes. I.e:

- Communication and negotiation skills
- Team work
- Participatory and collaborative skills within and outside of academia (govt. business and society)

Why we need it: The other competencies rely on this – in essence
The ability to apply different problem solving frameworks to complex sustainability problems and develop viable solution options

Why we need it: Enables meaningful integration of problem analysis, sustainability assessment, visioning and strategy building
<table>
<thead>
<tr>
<th>Key Competency in sustainability</th>
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<tbody>
<tr>
<td>Systems-thinking</td>
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<tr>
<td>Futures-thinking</td>
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<td>Values-thinking</td>
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<td>Strategic-thinking</td>
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<tr>
<td>Interpersonal</td>
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<td>Integrated Problem-Solving</td>
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<tr>
<th>Steps of Problem-Solving Process</th>
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<tr>
<td>1. Problem Analysis &amp; Framing</td>
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<tr>
<td>2. Scenario-developments</td>
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<td>3. Visioning</td>
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<td>4. Assessments</td>
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<td>5. Strategy creation</td>
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<td>6. Synthesis</td>
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<th>Activities?</th>
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Integrated Problem Solving Competency

Current state

Sustainability Transition Strategies

Sustainability Intervention

Sustainable Future State

Un-Sustainable Future State
**Backcasting**

A. Awareness & Defining success

C. Creative Solutions

B. Baseline Current state

D. Decide on Priorities

Visioning

Future

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SMCCCD Sustainability Initiative
ZNE Strategy
Cañada College Building EUI
College of San Mateo Building EUI
Skyline College Building EUI

<table>
<thead>
<tr>
<th>EUI (kBtu/ft²/year)</th>
<th>Color</th>
<th>Bldg #s</th>
</tr>
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<tbody>
<tr>
<td>31-40</td>
<td></td>
<td>4,8,19</td>
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<tr>
<td>41-50</td>
<td></td>
<td>5</td>
</tr>
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<td>51-60</td>
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<td>3</td>
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<td>61-70</td>
<td></td>
<td></td>
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<tr>
<td>71-90</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>91-100</td>
<td></td>
<td>1,6</td>
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<tr>
<td>101-125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>126-150</td>
<td></td>
<td>2.7A,11,14,21</td>
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</tbody>
</table>
All Buildings

Existing Buildings

1. Older buildings with high EUI
2. High Energy Use Buildings
3. Remaining buildings

Planned Demolished/Renovated Buildings
Next Steps

- ZNE Ready New Buildings
- Building Occupancy vs. Building Schedule Analysis
- Massive MBCx Effort
- Renewable Energy and Other DER Analyses
- Training and development of staff with emphasis on trouble shooting and PM
- Plug-Load controls integration
- Continued Coordination/Collaboration with BUG’s and other stakeholders
<table>
<thead>
<tr>
<th></th>
<th>Cañada</th>
<th>College of San Mateo</th>
<th>Skyline</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Square Footage</td>
<td>318,255</td>
<td>710,169</td>
<td>540,538</td>
<td>1,568,962</td>
</tr>
<tr>
<td>Number of Buildings</td>
<td>28</td>
<td>39</td>
<td>33</td>
<td>100</td>
</tr>
<tr>
<td>Student Headcount</td>
<td>6,449</td>
<td>8,992</td>
<td>9,158</td>
<td>24,649</td>
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<tr>
<td>Faculty and Staff Headcount</td>
<td>399</td>
<td>642</td>
<td>643</td>
<td>1,684</td>
</tr>
<tr>
<td></td>
<td>Cañada</td>
<td>College of San Mateo</td>
<td>Skyline</td>
<td>Total</td>
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<tr>
<td>Electricity from Grid (kWh)</td>
<td>1,755,848</td>
<td>8,578,269</td>
<td>5,017,897</td>
<td>15,352,014</td>
</tr>
<tr>
<td>Gas Usage (Therms)</td>
<td>136,611</td>
<td>524,895</td>
<td>311,485</td>
<td>972,911</td>
</tr>
<tr>
<td>Carbon Emissions from Utilities (Metric tons CO₂e)</td>
<td>1,146</td>
<td>4,844</td>
<td>2,857</td>
<td>8,847</td>
</tr>
<tr>
<td>Total Energy Spending</td>
<td>$372,863</td>
<td>$1,395,106</td>
<td>$901,106</td>
<td>$2,669,006</td>
</tr>
</tbody>
</table>
Large-Impact Decarbonization Measures

ANNUAL GHG EMISSIONS SAVINGS (METRIC TONS OF CO2E)

- No Cost
- ~ $1-9M
- ~ $25 M
- ~ $24 M
- Sustainable Procurement, 2,446
- Central Heat Plant Recovery System, 3,181
- Boiler Electrification, 5,438
- Generation - Renewable Energy and Storage, 6,054
SMCCCD Electric Vehicle Charging Program

1. First 4 hours free for SMCCCD faculty, staff, and students

2. Sign up information on smccd.edu/sustainability website
GREEN OFFICE PROGRAM

Interested in reducing your campus carbon footprint and promoting sustainable office choices?

Participate in the district-wide voluntary Green Office Program!

**Empower** yourself by utilizing sustainable practices in your office / cubicle to promote operational efficiency and increase cost savings

**Take Action** by actively helping to reduce waste, energy, and water usage on campus

**Become a Leader** by spreading the word and promoting a sustainable campus lifestyle to help the district reduce greenhouse gas emissions
Zero Waste by 2025

Decrease Waste Production + Increase Waste Diversion = ZERO WASTE
Work to Create Constructive Alignment

Constructive alignment makes sure that these three elements work together to create a richer teaching and learning experience.

<table>
<thead>
<tr>
<th>Group Type</th>
<th>Typical Characteristics of the Group/Person</th>
<th>Typical Group Size and Academic support</th>
<th>Typical Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice (Mild)</td>
<td>Has a little to no previous interaction with sustainability. May not know how to define or describe sustainability.</td>
<td>20-40 learners with class time only and 1-3 faculty and/or staff facilitators.</td>
<td>Large data gathering and/or processing exercises as part of a class activity.</td>
</tr>
<tr>
<td>Intermediate (Medium)</td>
<td>Has some interest and exposure to sustainability topics as well as some grasp of sustainability key competencies.</td>
<td>3-20 learners with some time over a semester to devote outside of class to an issue.</td>
<td>Likely analyzing data or outcomes of a novice group or generating primary data and actionable information for a specific task.</td>
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<tr>
<td>Advanced (Spicy)</td>
<td>Individual or small group (honors students, for instance) that is concerned about a specific issue and exhibits several sustainability key competencies</td>
<td>1-3 learners that require 1:1 interaction and guidance at beginning, middle and end of an effort.</td>
<td>Often have at least one semester to devote to a specific issue, concern or effort and can offer professional level support, strategic direction, and insight on an issue or topic.</td>
</tr>
</tbody>
</table>
Knowledge of Water Resources and Conservation Before vs After

- **Excellent**
- **Very Good**
- **Good**
- **Fair**
- **Poor**

**Question 1:** Level of knowledge about local and global water resources and the importance of water conservation BEFORE this lecture and lab.

**Question 2:** Level of knowledge about local and global water resources and the importance of water conservation AFTER this lecture and lab.

![Bar Chart](chart.png)


Resources

• ASU’s School of Sustainability Instructor Resources: https://schoolofsustainability.asu.edu/instructor-resources/who-we-are/

• Campus as Lab Community of Practice monthly webinar series: Contact Rachelle Haddock at: rachelle.haddock@ucalgary.ca

• Centers for Sustainability Across the Curriculum: https://www.aashe.org/partners/centers-for-sustainability-across-the-curriculum/

• Disciplinary Associations Network for Sustainability (DANS): https://www.aashe.org/partners/dans/

• COVID-19 Resources for the Higher Education Sustainability Community: https://docs.google.com/document/d/1UMU-nt2LS0jF-GWCS14fFZuMNyYtLXJDG85NlqWxMz0/edit#heading=h.knr67fk9yxfa

• Rutgers Coastal Climate Risk and Resilience Certificate: https://c2r2.rutgers.edu/certificate-program/

• San Mateo County Community College Sustainability Team: www.smccd.edu/sustainability

• Sustainability Improves Student Learning (SISL): https://serc.carleton.edu/sisl/index.html


• The National Academies of Sciences, Engineering and Medicine: https://www.nationalacademies.org/our-work/strengthening-sustainability-programs-and-curricula-at-the-undergraduate-and-graduate-levels

• The U.S. Partnership for Education for Sustainable Development: https://uspartnership.org/
Other Useful Research

Contact

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