<table>
<thead>
<tr>
<th>THEME</th>
<th>GUIDING PRINCIPLE</th>
<th>2025 GOALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLIMATE ACTION</td>
<td>We will pursue energy efficiency and fiscally-responsible energy sourcing strategies to reduce greenhouse gas emissions toward long-term carbon neutrality.</td>
<td>Reduce scope 1 &amp; 2 greenhouse gas emissions by 25%.</td>
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<td>Decrease carbon intensity of passenger trips on U-M transportation options by 30%.</td>
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<tr>
<td>WASTE PREVENTION</td>
<td>We will pursue purchasing, reuse, recycling, and composting strategies toward long-term waste eradication.</td>
<td>Reduce waste tonnage diverted to disposal facilities by 40%.</td>
</tr>
<tr>
<td>HEALTHY ENVIRONMENTS</td>
<td>We will pursue land and water management, built environment, and product sourcing strategies toward improving the health of ecosystems and communities.</td>
<td>Purchase 20% of U-M food in accordance with U-M Sustainable Food Purchasing Guidelines.</td>
</tr>
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<td>Protect Huron River water quality by reducing runoff from impervious surfaces and reducing the volume of land management chemicals used on campus by 40%.</td>
</tr>
<tr>
<td>COMMUNITY AWARENESS</td>
<td>We will pursue stakeholder engagement, education, and evaluation strategies toward a campus-wide ethic of sustainability.</td>
<td>No formal goal adopted, but U-M will invest in programs to educate our community, track behavior, and report progress over time.</td>
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</tbody>
</table>
Current Initiatives

North Campus Chiller Plant (NCCP)
• Results in more than 2 million kWh of electricity purchases being avoided /yr.
• Annual Greenhouse Gas reduction of more than 1400 MTCO$_2$e.

Sustainable Buildings
Four LEED certified buildings:
• Dana
• Ross
• C.S. Mott/Von Voigtlander
• Law School’s South Hall

Scheduled for certification:
• ISR Addition
• GG Brown Addition

Energy Conservation Measures (ECMs)
2012 ECMs will result in a GHG avoidance of more than 1000 MTCO$_2$e/yr.

- Scope 1 emissions: stationary and mobile source emissions
- Scope 2 emissions: purchased electricity.
- Emissions have been adjusted in an effort to include University expansion at NCRC.
- 2006 baseline is 680,000 MTCO$_2$e.
- Target for this goal is a 25% reduction of the FY2006 baseline or 510,000 MTCO$_2$e.
## Energy Conservation Projects

<table>
<thead>
<tr>
<th>Proposed Initiatives</th>
<th>Building</th>
<th>Annual Projected Savings ($)</th>
<th>Annual Projected Carbon Savings (MTC0₂/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Windows</strong></td>
<td>Dentistry Hatcher South Modern Languages Building</td>
<td>39,000 43,000 28,000</td>
<td>137 147 101</td>
</tr>
<tr>
<td><strong>Chiller Plants</strong></td>
<td>Palmer-Fletcher Rackham-Dentistry or Rackham-MLB</td>
<td>950,000 140,000</td>
<td>3,600 ?</td>
</tr>
<tr>
<td><strong>VAV Projects</strong></td>
<td>Chemistry (partial) Dow (partial) SPH II (partial)</td>
<td>373,000 130,000 50,000</td>
<td>2,006 ? 70</td>
</tr>
<tr>
<td><strong>Other ECMs</strong></td>
<td>MLB lighting upgrades SPH II occupancy sensors Botanical Gardens heat pump</td>
<td>24,000 25,000 15,000</td>
<td>129 124 ?</td>
</tr>
</tbody>
</table>
Decrease Vehicle CO2 Output by 30% by 2025

- **Commute Options**
  - Transit
    - M-Ride (AATA)
    - Commuter Express Bus Service (ExpressRide)
    - U-M Bus Service
    - Link with Park & Ride and Commuter Lots
  - Ridesharing [Carpool, Vanpool and Car-sharing (Zipcar)]
  - Emissions Free (Bike, Walk and Telecommute)
    - Bike Rental Program
    - Bike Friendly University
  - Other (Guaranteed Ride Home Cab Service)

- **Largest university alternative fuel fleet**
  - 7 Hybrid buses
Decrease Vehicle CO2 Output by 30% by 2025

- **Upcoming**
  - Electric Vehicle Charging Stations
  - Fleet replacements with more efficient models
  - Further growth of commute options
    - Bike Share in 2013

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University of Michigan Passenger Trip Carbon Intensity

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<tbody>
<tr>
<td>Kg CO₂e/trip</td>
<td>1.17</td>
<td>1.00</td>
<td>0.95</td>
<td>1.00</td>
<td>0.95</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Goal (0.82)

Source: Parking & Transportation Services
Reduce Waste to Landfills by 40% by 2025

- **New Initiatives**
  - Back-to-Basics Campaign
  - Food Waste Composting Pilot

- **Ongoing Initiatives**
  - Student Move In & Move Out Programs
  - Zero Waste Events
  - Pre-Consumer Waste Food Composting

- **Challenges**
  - Expanded Campus
  - Financial Constraints

![Waste Tonnage Graph](Source: U-M Waste Management Services)
40% Fewer Chemicals, 30% Less Stormwater Runoff by 2025

Chemical Reduction

- 2006 + data
- Developed Guidelines
  - Reducing applications
  - Prioritize environmentally friendly options
  - Reduce maintenance area and levels
- Compost-tea pilot
- Golf-course eco-certifications

Stormwater

- OSEH/UPO Best Practices guidelines, NPDES permitting
- Best Practices Checklist
- Integrated approach to open space and stormwater management

Source: U-M Office of Campus

University of Michigan Synthetic Land Management Chemical Applications

Source: U-M Office of Campus
20% Sustainably Sourced Food by 2025

- Establishing baseline & tracking system
- Working with vendors
- Res Halls, Hospital & Unions: local menu items, locally sourced dairy
  - Res Halls: Go Blue, Eat Local
  - Meals prepared with locally sourced items
- Local produce carts
  - (Hospital, Wolverine Tower and student cart at League)
- Farmers market pilot expands
- Efforts to establish UM Sustainable Food Program and Campus Farm
- Cross-disciplinary “cluster” hire re: Sustainable Food Systems
Community Awareness

• PBA Programs
• Planet Blue Room
• Planet Blue Student Innovation Fund
• Sustainable Labs & Workplace Certification
• Faculty, Staff and Student Sustainability Survey (SCIP)
• Events
  o Earthfest – Party for the Planet!
  o DSA Sustainability Fair
  o Erb Speaker Series
  o Wege Lectures on Sustainability
  o Regular town halls
Welcome

Dr. Raymond De Young
Associate Professor of Conservation Behavior, SNRE
Adjunct Associate Professor of Program in the Environment, LSA
Enduring Behavior
The need for patience and perseverance

Raymond De Young
Environmental Psychology and Planning
Promoting Enduring Behavior

1. Behavior is **hard to change**, but its **stability is good**

2. Behavior has multiple causes offering options

3. Use interventions that match goal of durability

4. Change can happen, but **experts need to change** first
Science → Policy Making → Behavior Change
- 100 billion neurons in brain, each with up to 10,000 branches
- Thus $10^{15}$ connections (petabyte)

What can be stored:
- 5 Megabytes = All of Shakespeare
- 2 Gigabytes = 20 meters of shelved books
- 10 Terabytes = Library of Congress
- 200 Petabytes = All printed material
Behavior Change

Values

Character Strengths (wisdom, courage, humanity, justice, temperance, transcendence)

World View

Intrinsic Motives (competence) (participation) (frugality)

Norms

Sense of Responsibility

Behavior Change

Attitudes

Declarative Knowledge (know why)

Procedural Knowledge (know how)
Behavior Change

World View

Intrinsic Motives

Character Strengths

Values

Norms

Sense of Responsibility

Declarative Knowledge
(know why)

Procedural Knowledge
(know how)

Attitudes

Labile → Stable
Behavior Change

- Norms
- Values
- Character Strengths
- World View
- Intrinsic Motives
- Sense of Responsibility
- Declarative Knowledge
- Procedural Knowledge
- Attitudes

Labile ➔ Stable
Sense of Responsibility

Intrinsic Motives

Declarative Knowledge (know why)

Norms

Attitudes

Procedural Knowledge (know how)

Intrinsic Motives

World View

Character Strengths

Values

Norms

Behavior Change

Labile ➔ Stable
Attitude change

- Attitudes
- Norms
- Values
- Declarative Knowledge (know why)
- Sense of Responsibility
- Character Strengths
- Procedural Knowledge (know how)
- Intrinsic Motives
- World View

Behavior Change
Changing social norms

- Attitudes
- Norms
- Values
- Declarative Knowledge
  (know why)
- Sense of Responsibility
- Character Strengths
- Procedural Knowledge
  (know how)
- Intrinsic Motives
- World View

Behavior Change
Deepest cognitive structures resist change

- Attitudes
- Norms
- Values
- Character Strengths
- World View
- Behavior Change

- Declarative Knowledge (know why)
- Sense of Responsibility
- Intrinsic Motives
- Procedural Knowledge (know how)
World View
Sense of Responsibility
Intrinsic Motives
Character Strengths
World View
Labile
Stable
Weaker relationships
Moderate
Stronger relationships

Attitudes
Norms
Values

Declarative Knowledge (know why)
Sense of Responsibility
Character Strengths

Procedural Knowledge (know how)
Intrinsic Motives

Enduring Behavior

Stronger relationships
HOW EXPERTS CAN facilitate BEHAVIOR CHANGE THAT STICKS

Different approaches result in different levels of stability
Common behavior change approaches

- Education
- Information
- Media campaigns
- Rules, regulations
Less common approaches

- Education
- Information
- Media campaigns
- Rules, regulations
- Social marketing
- Norm marketing

### Intrinsic Motives

- Character Strengths
- Values

### Norms

- Sense of Responsibility

### Declarative Knowledge (know why)

- Attitudes
- World View

### Procedural Knowledge (know how)

- Norms
- Intrinsic Motives

### Labile ➔ Stable

- Less common approaches
- Education
- Information
- Media campaigns
- Rules, regulations
- Social marketing
- Norm marketing
Ideas for promoting stable behavior change?

- Education
- Information
- Media campaigns
- Rules, regulations
- Social marketing
- Norm marketing
- __________________
- __________________
- __________________

Labile ← __________________ → Stable

- Attitudes
- Norms
- Values
- Declarative Knowledge (know why)
- Sense of Responsibility
- Character Strengths
- Procedural Knowledge (know how)
- Intrinsic Motives
- World View
Examples of **un-common** approaches

1. California community-based water conservation

1. Berlin neighborhood source reduction
Some un-common approaches

- **Lifelong education**
- Information
- Media campaigns
- Rules, regulations
- Social marketing
- Norm marketing
- **Participatory behavior change**
  - Community-based
  - Eco-teams
- Envisioning

![Diagram](attachment:diagram.png)

- Attitudes
- Norms
- Values
- Declarative Knowledge
  - (know why)
- Sense of Responsibility
- Character Strengths
- Procedural Knowledge
  - (know how)
- Intrinsic Motives
- World View

Labile → Stable
If goal is durable behavior then:

• **Use un-common strategies:**
  - Patiently alter social norms
  - Leverage values, character strengths, world-views

• Anticipate behavioral continuity

• **Reframe our role as experts. Stable change requires:**
  - Facilitators of participatory problem solving
  - Developing our own character strengths of:
    - Courage to be **patient**
    - Wisdom to be **steadfast**
“It’s an entire Web site of things you can buy to consume less.”

Raymond De Young
Associate Professor of Environmental Psychology and Planning
School of Natural Resources and Environment
University of Michigan, Ann Arbor, MI, USA
rdeyoung@umich.edu
www-personal.umich.edu/~rdeyoung
4 October 2012
Get Involved

http://sustainability.umich.edu/involved

• Student groups: SSI, Kill-A-Watt, EnAct, Michigan Sustainable Foods Initiative, SNRE Student Government, RecycleManiacs and many more!
• Planet Blue Ambassador Program
• Submit proposal for Plant Blue Student Innovation Fund
• Certify your lab, workplace or room
• Faculty and Staff can sponsor/support student efforts
• Attend events and join discussions