Student Sustainability Advisory Council

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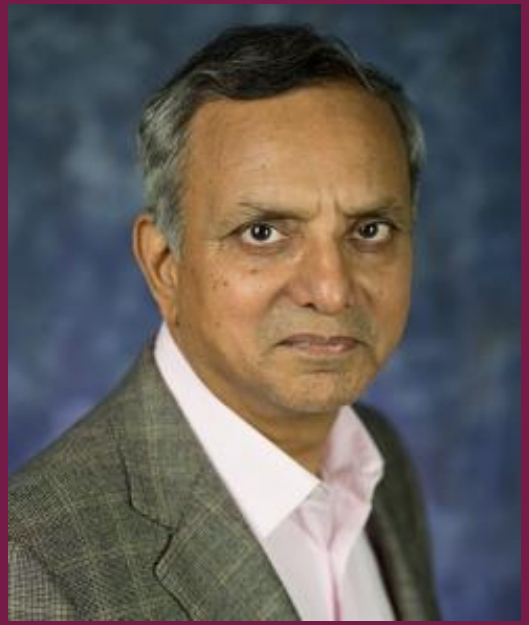
Spring 2018 Recommendations

PennState

Robert Pangborn
Vice President for Undergraduate Education

Damon Sims
Vice President for Student Affairs



Paul Shrivastava
Chief Sustainability Officer for PSU

Sustainability at Penn State

*"Penn State will be a **leader** in research, learning, and engagement that facilitates innovation, embraces **diversity and sustainability**, and inspires achievements that will affect the world in positive and enduring ways."*

- Penn State 2016-2020 Strategic Plan

Energy: Mission

"To support Penn State policy that enables on-site energy production and demand side energy reduction, and develops a culture of energy awareness of the populous and leadership through commitment to greenhouse gas reduction goals."

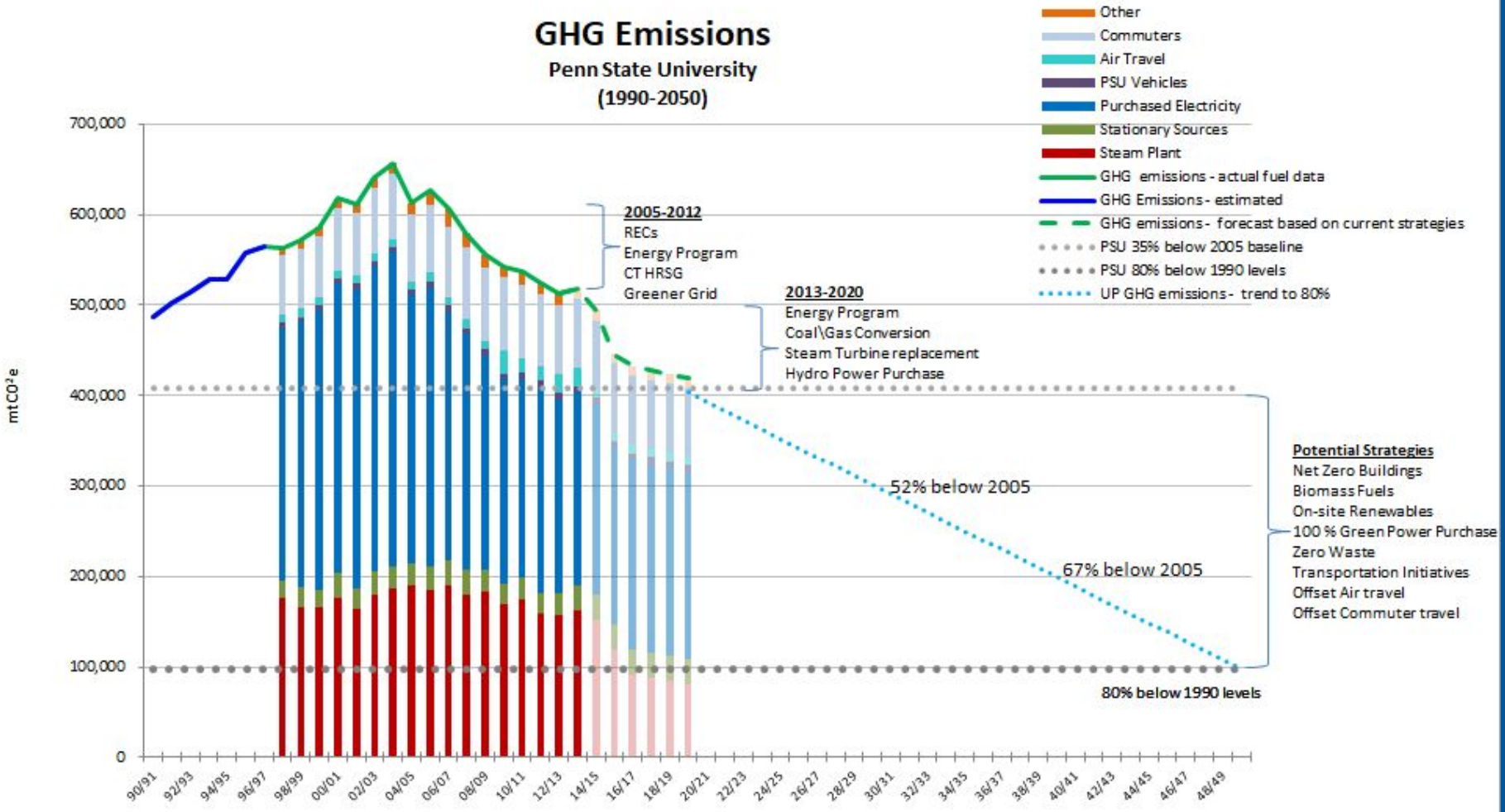
Spring 2018 Recommendations

- Carbon Incentive Program
- Biomass Power Generation
- Steam to Hot Water District Heat
- Green Roof Retrofit

GHG Emissions

Penn State University

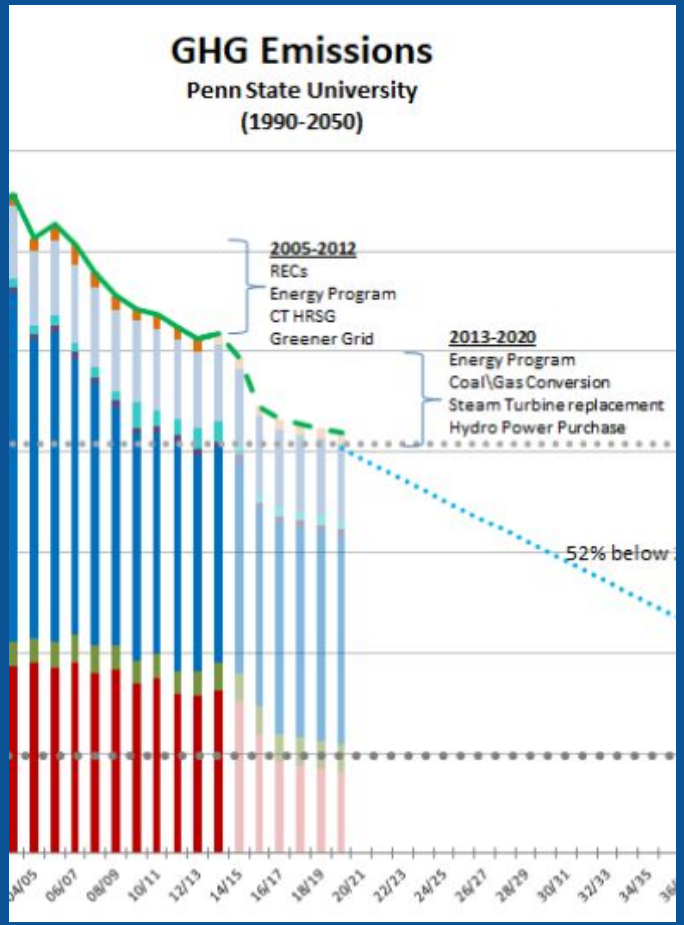
(1990-2050)



Penn State GHG Emissions include stationary sources, purchased electricity, OPP & Fleet vehicles and estimated commuter miles, air travel, waste, refrigerants and animal management.

Carbon Incentive Program

- **There have been significant** improvements from the Energy Savings Program recently
  - Tackled many “low hanging fruit” projects
- Funding from the next capital plan is increasing; however, framework may constrain further energy saving progress at necessary rate
- **Achieve** existing sustainability targets by encouraging energy conservation and efficiency



Carbon Incentive Program: Solutions

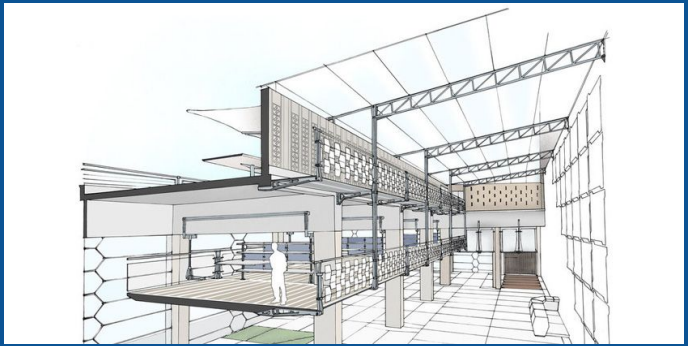
- Restructure the Energy Savings Program to include projects with longer-payback periods
  - Maximize utilization of pre-allocated funds
  - Larger diversity of projects for improving energy efficiency

- Place an internal cost on carbon to decrease payback period of projects
  - **$40/ton** allows 10% larger budget on projects due to inclusion of carbon "savings" - Matt Leah (OPP)
  - Several models of carbon incentives exist (Yale, Swarthmore, Vassar, etc)

Carbon Incentive Program: Recommendation

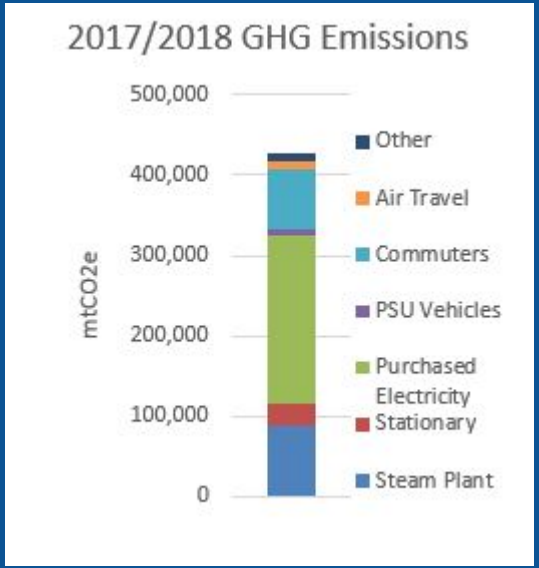
- **Devise** an actionable plan for the possible implementation of a carbon incentive program at Penn State
  - Team of faculty, staff, students, OPP
- **Re-evaluate** payback period for future OPP projects

- Help meet existing sustainability targets
- Make Penn State a leading university in sustainability and set an example for other universities to follow



Biomass Power Plant

- Professional feasibility study 50% complete
  - $70-80 million for 6 MW biomass facility
  - All PA grown biomass feedstock within 75 miles of PSU
  - 20-25% steam plant carbon emission reduction



- Why PSU should fund a biomass project in the 2024-2028 Capital Plan:
  - Actionable strategy to help meet carbon reduction goals
  - On-site thermal energy cannot be sourced remotely (unlike electricity)
  - Storage of biomass can provide emergency energy storage capacity
  - PSU needs to add steam capacity by 2026

Biomass Power Plant: Recommendation

- Fund a biomass project in the 2024-2028 capital plan
  - Shows Administration's commitment to carbon goals
  - Provides a living laboratory

- Assemble Biomass 'Project Team'
  - Students, Faculty and Staff
  - Collaborate with OPP engineers and establish relationship of feasibility to sustainability

District Steam to Hot Water Conversion

- Professional feasibility study currently underway
  - Analysis by same firm that designed and implemented Stanford conversion
  - Conversion will take about 10 years with 5-7 phases

- Why PSU should convert from steam to hot water:
  - Conversion yields 30% increase of district heating efficiency, which also adds system capacity
  - Increased electricity production capacity from existing cogen plants
  - Lower maintenance costs and lower cost to connect new buildings
  - Potential for low temperature heat sources: solar thermal, geothermal

District Steam to Hot Water Conversion: Recommendation

- Fund initial phases of a steam to hot water conversion project in the 2024-2028 Capital Plan
  - Shows Administration's commitment to carbon goals
  - Provides a living laboratory

Green Roof Retrofit

- A green roof includes:
  - High quality waterproofing
  - Root repellent system
  - Drainage system
  - Growing medium and plants
    - Sedum & additional flowering plants
- Purpose:
  - Stormwater management
  - Solar radiation management/Energy saver
  - Increases life of roof (30-40 years)
  - Environmental aid
  - Campus life
    - Aesthetically pleasing, “Campus Arboretum”

- Additional savings: cooling/heating
- LEED Certificate
  - (41 points)

Green Roofs: PSU

- Eight Green Roofs
  - 6 at University Park
  - Additional study buildings at Rock Springs
    - 3 acres
- Mostly installed on new construction
  - Penn State Green Roof Summary Sheet

- Center for Green Roof Research
  - Dr. Robert Berghage

Green Roof Retrofit: Recommendations

- Initiate feasibility study for green roof retrofit
  - Cost/Savings, Solar Energy, Climate, and Biodiversity Studies

- Introduce policy which mandates consideration of green roof installation prior to roof replacement
  - Cooperation with Center for Green Roof Research and OPP
  - Living laboratory
  - University Park & Commonwealth campuses
  - Commitment to sustainable architecture

Spring 2018 Recommendations

- Carbon Incentive Program
- Biomass Power Generation
- Steam to Hot Water District Heat
- Green Roof Retrofit

Key Stakeholders Contacted

- **Jeremy Bean,** Associate Director of Planning and Partnerships, SI
- **Steve Oskin**, Continuous Commissioning Engineer, OPP
- **Matt Leah**, Energy Engineer, OPP
- **Mike Prinkey**, Senior Energy Program Engineer, OPP
- **Laura Miller**, Operations Engineer, OPP
- **Ron Pristash**, Utility Systems Engineer, Steam, OPP
- **Mark Stewart**, Senior Project Manager, Office of Sust., University of MD
- **Dr. Erica Smithwick,** Director of Ecology Institute, Penn State
- **Dr. Robert Berghage,** Director of Center of Green Roof Research, Penn State

Food & Waste: Mission

"To make sustainable food and waste management more relevant and easily accessible to the student body through policy and physical changes at Penn State."

Spring 2018 Recommendations

- Reduce waste through expanded peer leadership programs
  - Environmental Ambassadors Sustainability Program

- Investments in personnel and infrastructure to minimize impacts of waste
  - Curriculum focus on life cycle assessments
  - Health Food Service staff member
  - Food waste to energy initiatives

- Course offerings to address Hydroponics
  - Hydroponics Strategic Plan SEED Grant

Engaging Students on Waste

Through accountability in peer leadership programs supported by fundamental institutional investments, we can more effectively reduce waste on campus.

Environmental Ambassadors Summer Sustainability Program

- Sustainability Institute sponsors a week long summer program for high school juniors/seniors intended to educate participants on sustainability at PSU.
  - Students meet with participating faculty in various colleges and work in groups on addressing a sustainability issue
  - Credit/internship opportunities for undergraduate and graduate students who lead the program
  - Serve as a recruiting tool for Penn State
  - Further Penn State's sustainability mission

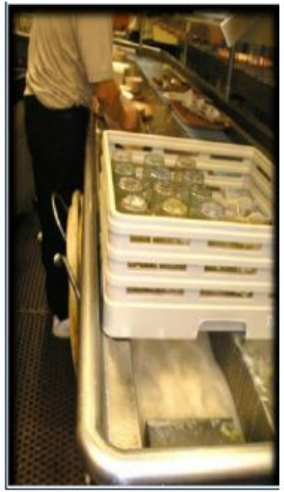
Investing in Waste

Create a closed loop cycle in which total waste production at Penn State is addressed and appropriate actions are taken to minimize our effects

- **Student level**
  - Curriculum amendment across colleges in which Life Cycle Assessments of products, animal waste, and food are deeply analyzed and applied to coursework
- **Faculty and Staff level**
  - Collection of staff/faculty to target complete analysis of food products and areas in which Penn State can improve in mitigating waste
- **Institutional level**
  - Food waste taken to generate energy needed to power the wastewater treatment facility

Institutional Investments

- Case study: Purdue University and The West Lafayette Wastewater Treatment Utility Plant



Food waste is scraped from plates at the kitchen cafeteria.

Water conveys food waste to an industrial grinder.

A classifier deposits ground food waste into a toter.

During the school year, Purdue delivers 15-20 toters to the WRRF each day.

At the West Lafayette WRRF, an operator stands by as the cart tipper empties a toter into the hopper.

Hydroponics Course Implementation

<u>What is the problem?</u>

- Percentage of food wasted can be large at the farm and PSU level
  - *What quality controls does food face after being transported long distances?*
- Lack of cross-discipline student engagement and education with agricultural production
  - *Do our non-Agriculture students know where their food comes from?*

Hydroponics Course Implementation

The Solution: Hydroponics

Hydroponics Course Implementation

<u>What do these systems do? What is the basic design?</u>

- Closed-loop circulating water system with added nutrient solutions
- Designed to grow vegetables and herbs of interest
- Can be designed for multiple crop heights
- Portable and secure- design will be on wheels
- Visually stimulating “high tech” LED lighting and design
- Electronic screen to monitor system and educate students

PSU's Current Hydroponics System

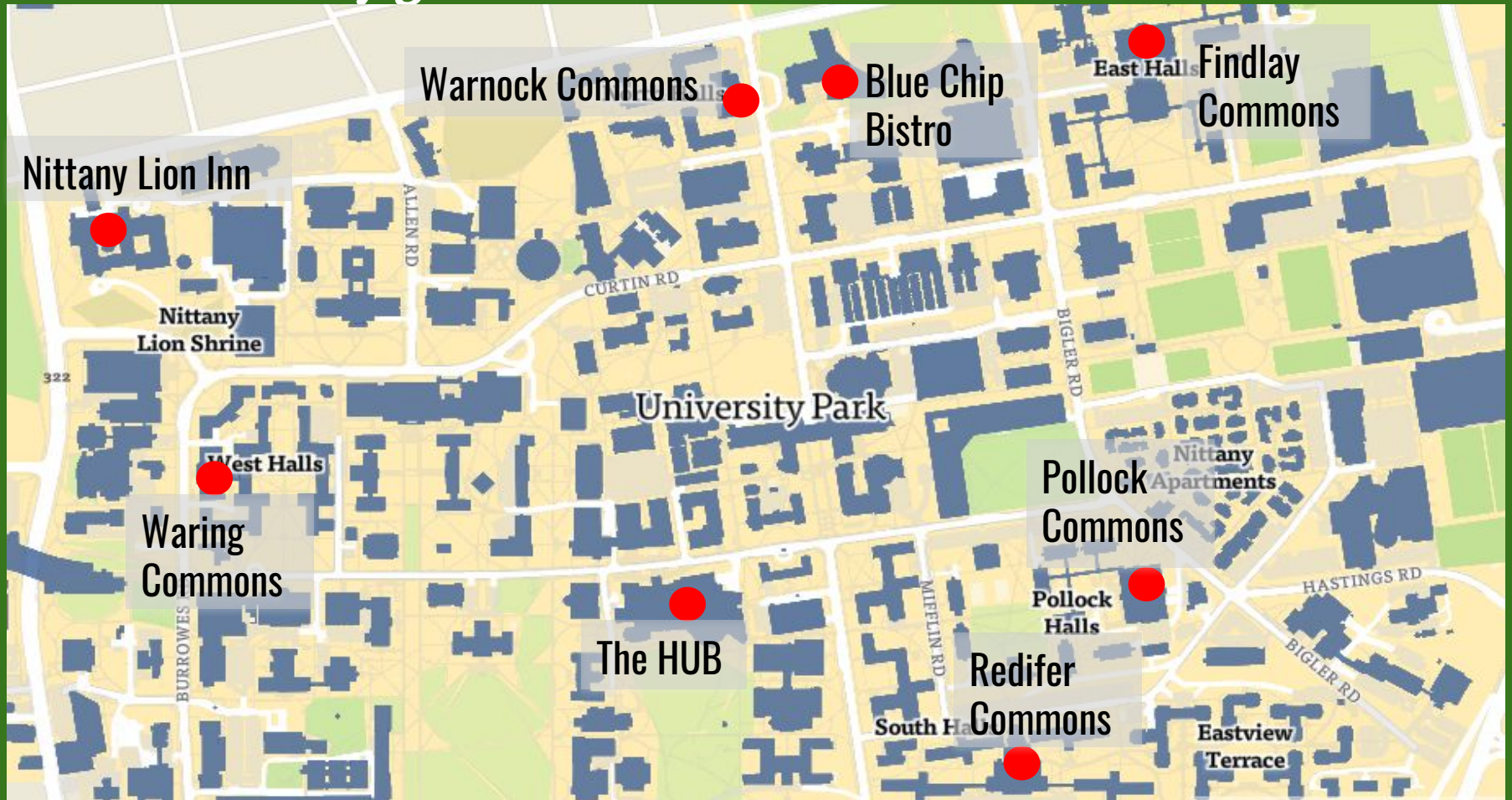
Hydroponics Course Implementation

How are we to implement this?

- 3-stage hydroponics design course
- Special topics classes taught by Dr. Berghage
- Funded by **Strategic Plan seed grant** (submitting Sept. 2018)

Spring 2019	Initial design/logistics course (5 seats-"group leaders")
Fall 2019	Official system design/construction (30 seats- 5 teams)
Spring 2020	Data logging and analysis (seats TBD)

Where will they go?



Hydroponics Course Implementation

<u>Why do these systems matter?</u>

- For Our Students
  - Engagement
  - Education
  - Leadership
  - Health Promotion
- Food Availability-Locally Produced
- Offset Food Waste Due to Transportation

Hydroponics Course Implementation

Schools that have funded hydroponic related classes/systems:

Spring 2018 Recommendations

- Reduce waste through expanded peer leadership programs
  - Environmental Ambassadors Sustainability Program

- Investments in personnel and infrastructure to minimize impacts of waste
  - Curriculum focus on life cycle assessments
  - Housing and Food Services staff member
  - Food waste to energy initiatives

- Course offerings to address student engagement and food waste reduction
  - Hydroponics Strategic Plan SEED Grant

Key Stakeholders Contacted

Michelle Amateau, Emerita of Visual Arts and Women's Studies as well as founder of the Women for Environmental Justice Group

Denice Wardrop and Peter Buckland, Created “Plastic Entanglements” Symposium for Spring 2018 at the Palmer Art Museum

Lydia Vandenbergh, Associate Director of Employee Engagement and Education

Doug Goodstein, Associate Director for Student Engagement

John Papazaglou, Vice president for Auxiliary and Business Services

David Rose, Assistant Vice President for Auxiliary & Business Services

Izaiah Bokunewicz, Involved Student Leader, Student Farm Club Co-Chair

Leslie Pillen, Associate Director, Farm and Food Systems

Dr. Robert Berghage, Associate Professor of Horticulture

Bill Laychur, Corporate Executive Chef

Jim Meinecke, Associate Director of Residential Dining

Jaime Robinson, Senior Assistant Director of Residential Dining

Community Development: Mission

*"To determine areas of **improvement within the campus community**, to further **develop sustainability** by providing suggestions to refine daily routines and practices, and to promote wellness and health in our campus, both at the individual and collective scale."*

Spring 2018 Recommendations

Updated:

- NSO Sustainability Component

New:

- Expansion of Seminar Education
- Environmental Justice RFP

Context:
NSO Sustainability Component

Goal:
Introduce new students and parents to Penn State's sustainable culture.

Student Working Group:
Met multiple times this semester to discuss & develop current and new ideas.

Recommendation Update:
NSO Sustainability Component

<u>NSO 2018: Sustainability Lives Here</u>

1. Improved Signage
2. O-team Behavior Modeling
3. Sustainability Pamphlet
4. Inclusivity of Sustainability

Recommendation:

Make NSO a **zero waste** event by utilizing the App GuideBook to electronically share event handouts

Continued Support of Initiatives

Context:
First-year seminar program

Currently, freshman who take seminar programs are not exposed to sustainability-related practices and organizations on campus

- Current research shows that practices are easiest developed when in new environments

Recommendation: Expansion of Seminar Education Component

Discussed with major advisors to determine whether Seminar Education would be wanted with overwhelmingly positive response

- Hosted by the SI
  - Would recruit students in a pilot program
- Credits hosted by Higher Ed department
- Doug Goodstein would teach course
  - Focus on peer-to-peer learning techniques
  - Could be utilized to fulfill general education requirements

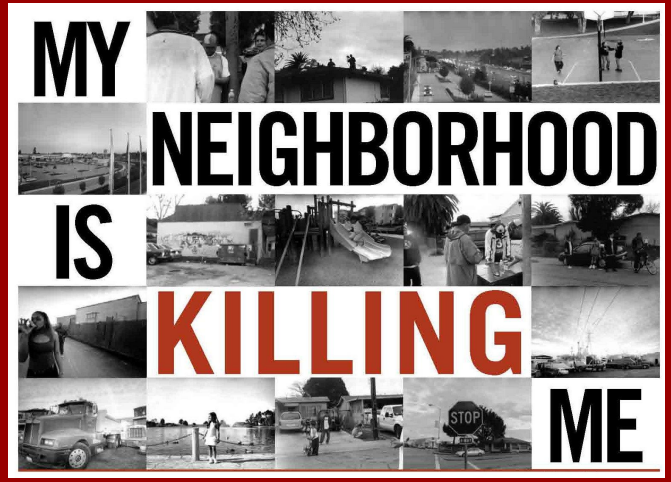
Recommendation:

To provide monetary and structural support for this program

Context: Environmental Justice

For decades, many low-income communities of color have been fighting for their basic human rights to breathe clean air, drink clean water, eat nutritious food and live a safe, healthy life.

Many of our fellow students and faculty have lived, worked, and played in this type of environment before and have dealt with the negative side effects first hand.



Past Recommendations

PENNSTATE 1855 HESE Humanitarian Engineering & Social Entrepreneurship

<u>Evaluate Penn State Students on Involvement and Knowledge</u>

- Assessment on cultural competency, sustainability, and diversity and inclusion to find where students have transformative experiences
- Collaborative Effort between department and offices

<u>Increase Environmental Justice Events</u>

- Provide consistent speakers to educate students on past and current environmental justice news
- Implement reliable resources that will engage with students outside of events to continue the support of these issues

New Recommendation: Environmental Justice Request for Proposal (RFP)

1. Educating students, faculty, and the community
2. Long-term institutional support for the underrepresented groups on campus
3. Establishing connections between multicultural and sustainability organizations

Curriculum ↔ Outreach ↔ Research ↔ Resources

Curriculum ↓ Environmental and Social Justice Minor

Outreach ↓ Community Partnerships

Research ↓ Fellowships for students to research and implement results

Resources ↓ Online website to provide information and resources

Our Vision for Environmental Justice at Penn State

To increase multicultural unity, awareness, and improve available resources through sustainability initiatives to ensure every student feels more welcome at Penn State

- Give students the tools to advocate for and empower their community
- Enhance the understanding of environmental and health-related issues in the community
- Accessible and culturally appropriate opportunities for low-income, minority and linguistically isolated stakeholders to meaningfully participate in decision-making processes

Community Development

NSO Sustainability Component

Seminar Education

Environmental Justice RFP

Key Stakeholders Contacted

Mary Edgington Senior Director of Union and Student Activities

Dan Murphy Director of Student Orientation and Transition Programs

Katie Motycki New Student Orientation Associate Director

Dr. Peter Buckland, Academic Program Fellows (The Sustainability Institute)

Dr. Erica Smithwick, Director of Ecology Institute,Professor in Geography Department

Carlos Wiley, Director (PRCC)

Nakita Dolet, Diversity Advocate for Students (MRC)

Maddy Nyblade, President (Eco-Action)

National Society of Black Engineers

Multicultural Engineering Program

Lydia Vandenbergh Associate Director of Employee Engagement and Education, SI

Dr. Robert Pangborn Ph. D, Vice President of Undergraduate Education

Questions?

Sustainability at Penn State

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