

# Welcome to SEAS!

## Admitted Student Visit Day

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Josh Newell

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# Core Faculty



**Michael Craig**  
Assistant Professor



**Benjamin Goldstein**  
Assistant Professor



**Greg Keoleian**  
Professor, CSS  
Co-Director



**Thomas Lyon**  
Professor



**Shelie Miller**  
Professor, CSS  
Co-Director



**Drew Gronewold**  
Associate Professor



**Joshua Newell**  
Professor



**Sara Soderstrom**  
Associate Professor



**Parth Vaishnav**  
Assistant Professor



**Charlene Zietsma**  
Professor



**Tony G. Reames**  
Associate Professor

**01 Specialization Overview**  
program mission, goals, dual degrees

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**02 Our Challenges**  
climate crisis, decarbonizing, food systems, water

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**03 Our Approach**  
systems thinking, program elements, and themes

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**04 Solutions and Impact**  
Work by alumni and students, career outcomes

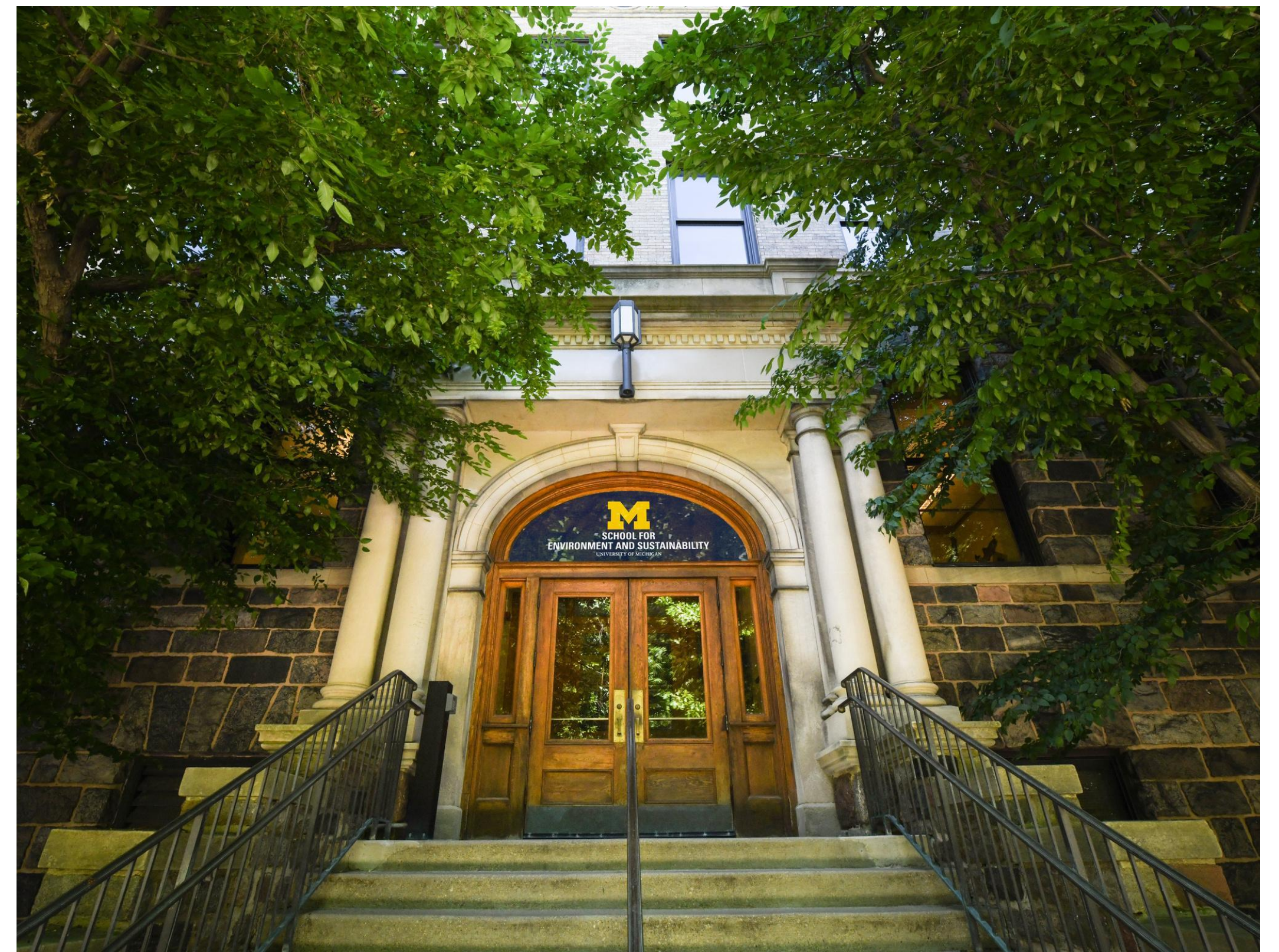
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**05 Resources**  
Opportunities

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**06 Questions**

# Agenda





# Why enroll at U-M SEAS?

- Skills, knowledge, tools, methods to solve complex sustainability challenges
- Interdisciplinary training
- Excellence of programs in SEAS and across UM
- SEAS community
- Alumni network
- Student success

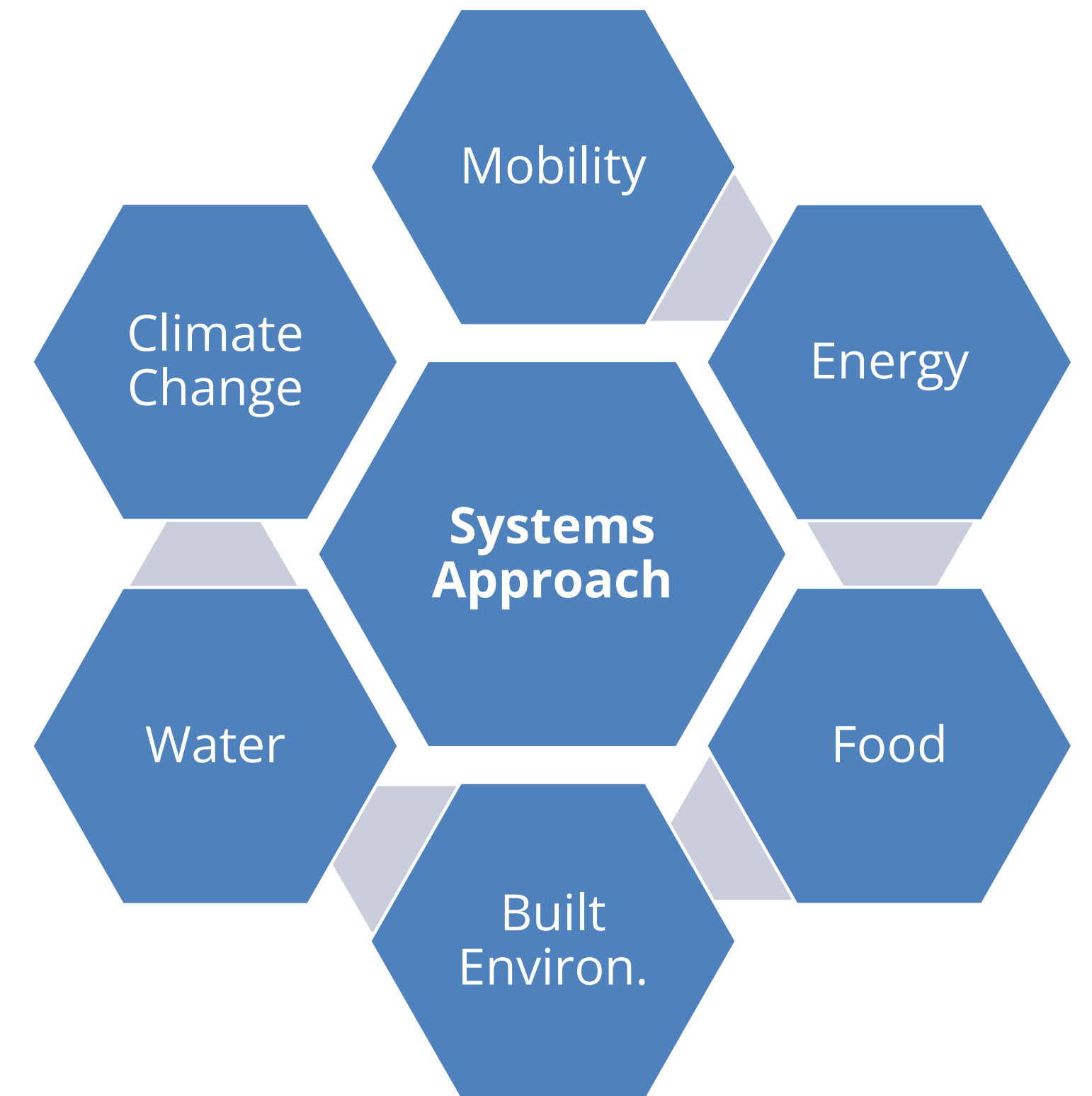
# Sustainable Systems Mission

- To guide and accelerate the development and transformation of technologies, enterprise, and systems for meeting basic human needs in a sustainable manner.
- This curriculum is designed to provide interdisciplinary education and professional development for students in SEAS and those in dual degree programs.

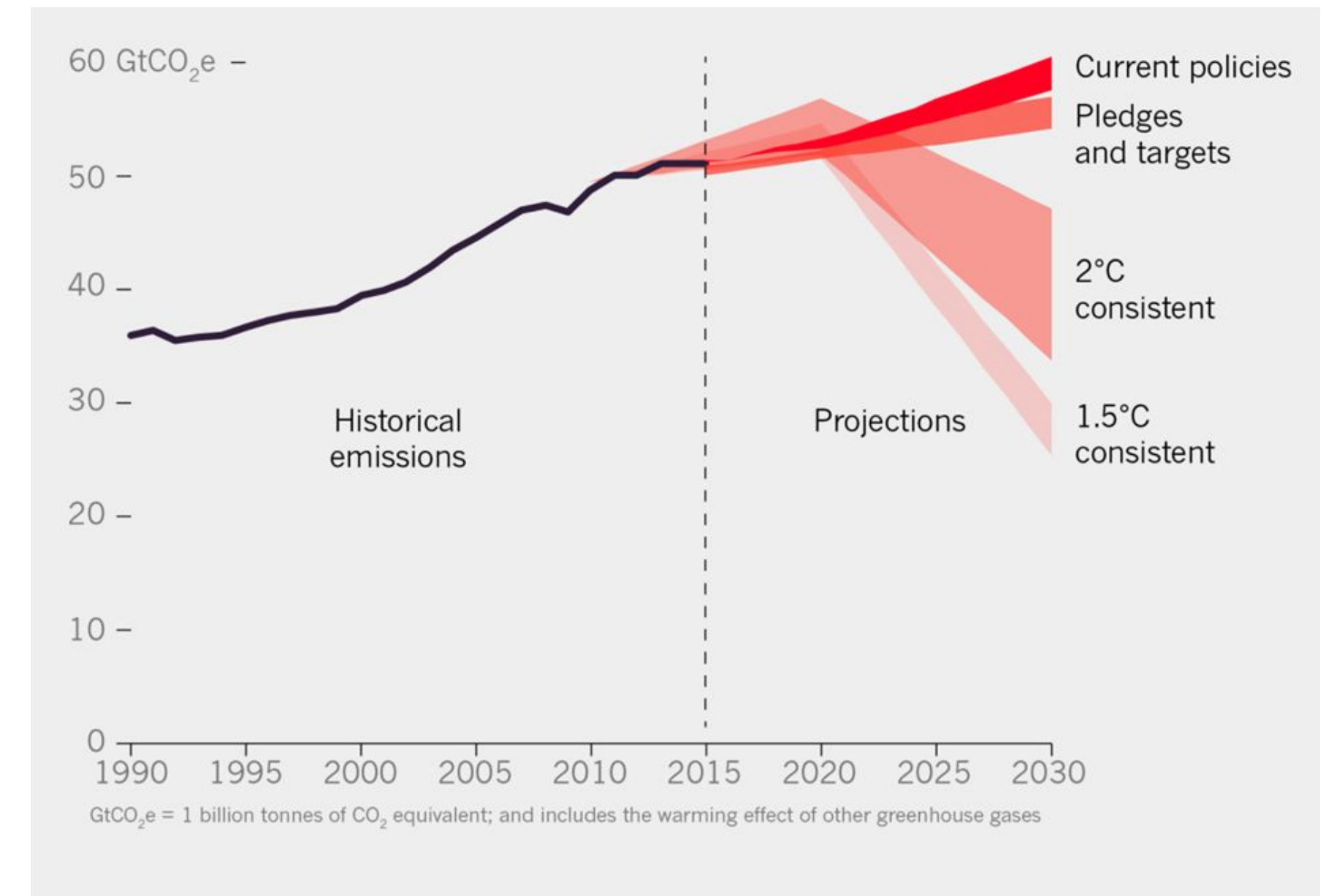
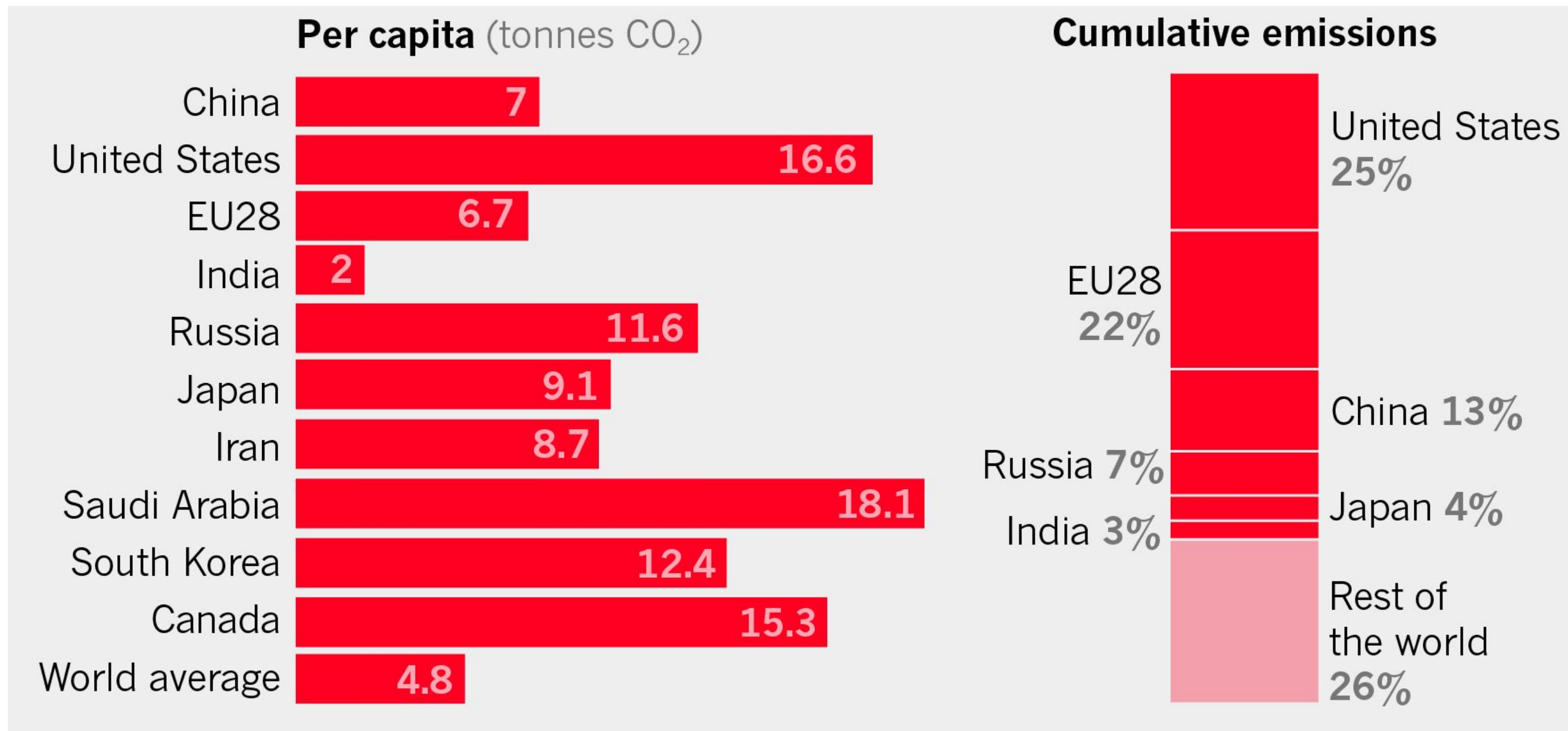
# Our Mission: Themes

## Examples of Research Areas

- Autonomous and electrified vehicles
- Carbon neutrality modeling and strategy
- Circular economy
- Corporate environmental strategy
- Energy efficient technologies
- Energy insecurity and justice
- Environmental impacts of international trade
- Environmental information disclosure
- Greenwashing
- Food, water, energy nexus
- Sustainable diets
- Net-zero buildings
- Renewable energy siting
- Grid integration
- Resource management in developing countries
- Sustainable supply chains
- Transportation climate policy
- Urban agriculture
- Sustainable food systems
- Urban infrastructure systems



# We are facing a Climate Crisis

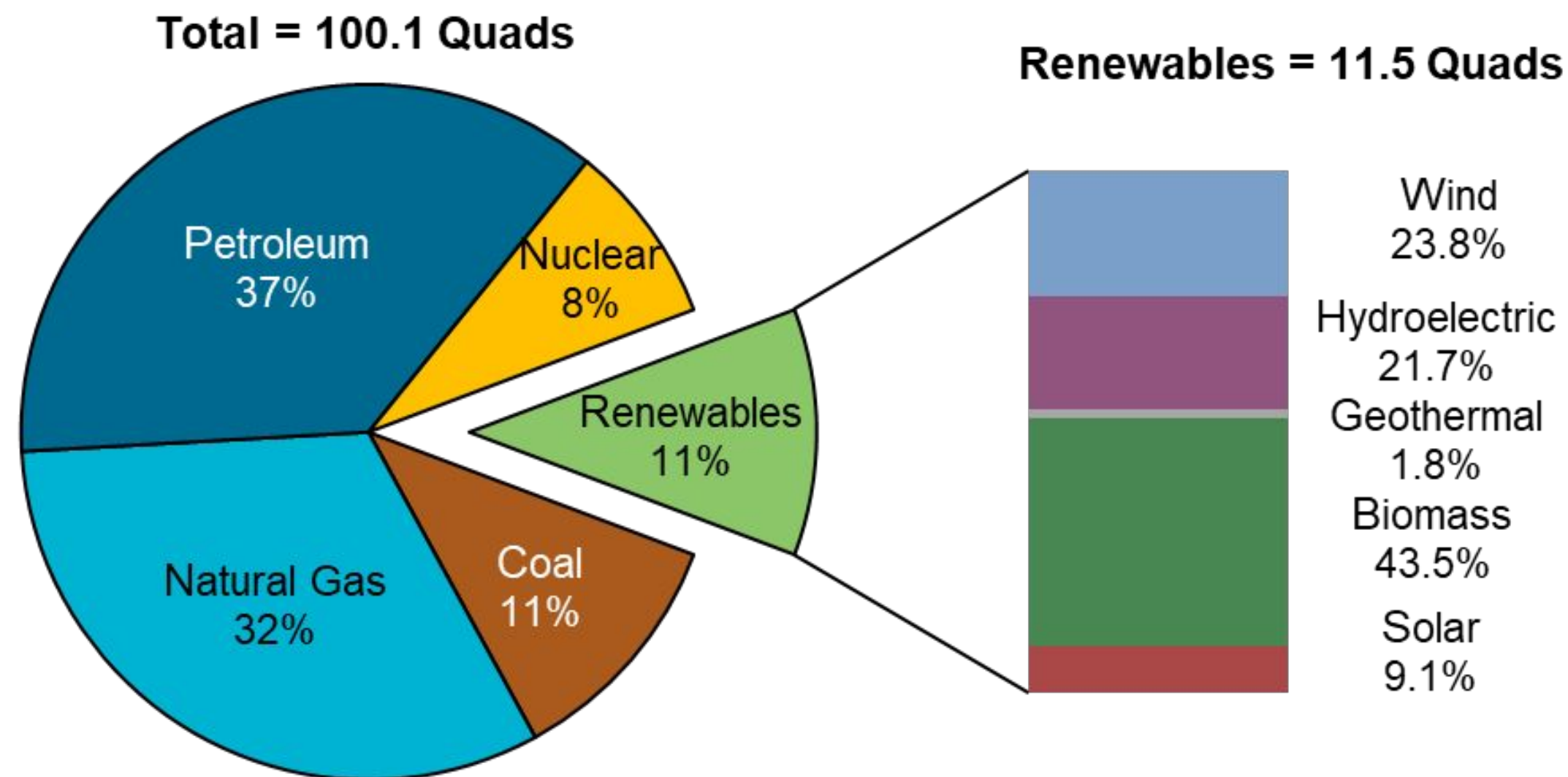


Global average greenhouse emissions 1.5 C target in 2030:  
2.8 t CO<sub>2</sub>e/capita

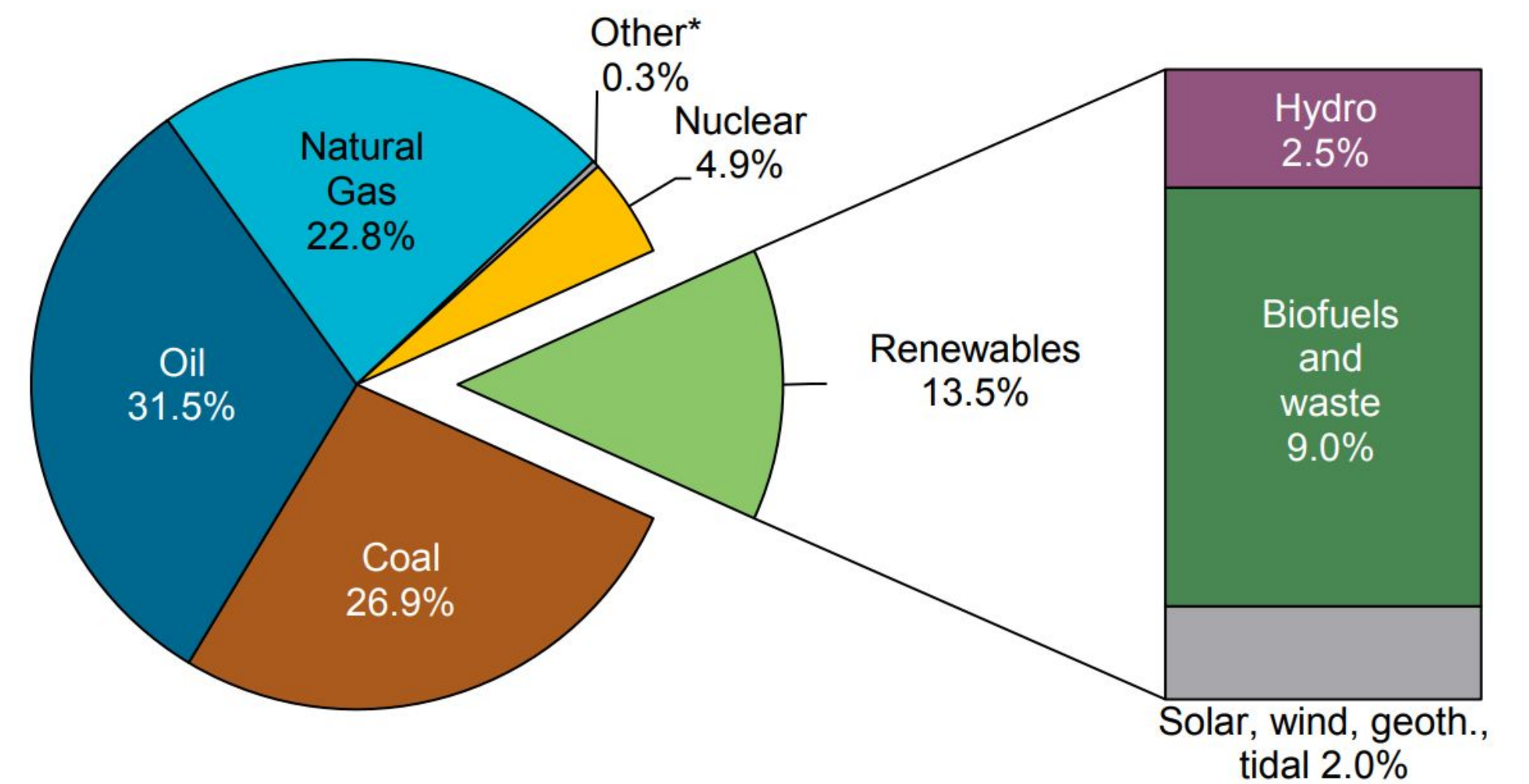
IPCC goals for 1.5°C, global CO<sub>2</sub> emissions:  
~ 45% reduction from 2010 levels by 2030 net  
zero around 2050

# Our Challenge: Decarbonizing Energy Systems

U.S. total and renewable energy consumption by source, 2019



2018 fuel shares in world total energy supply



IEA. All rights reserved.

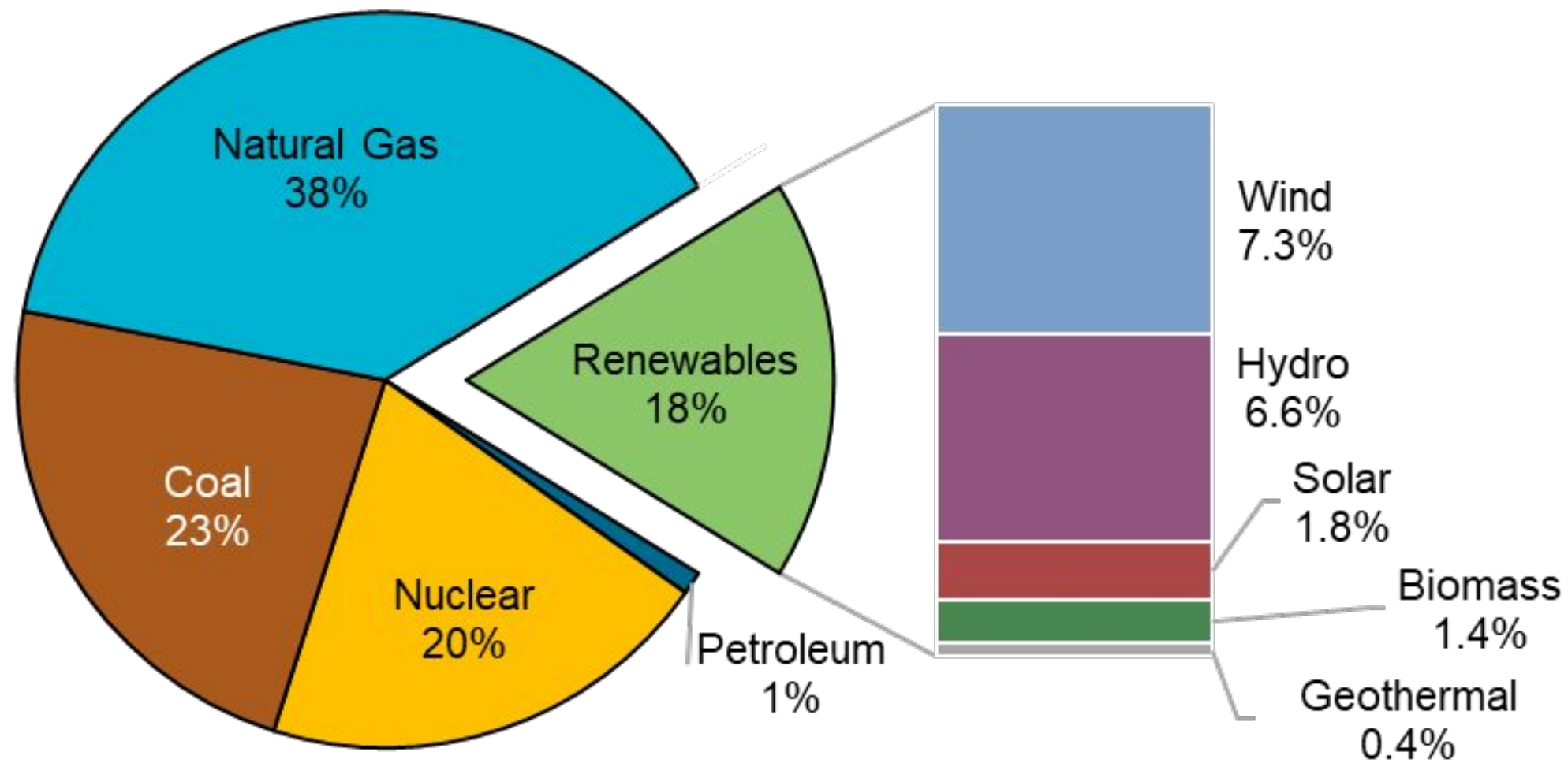
\* Other includes non-renewable wastes and other sources not included elsewhere such as fuel cells.

Note: Totals in graphs might not add up due to rounding.

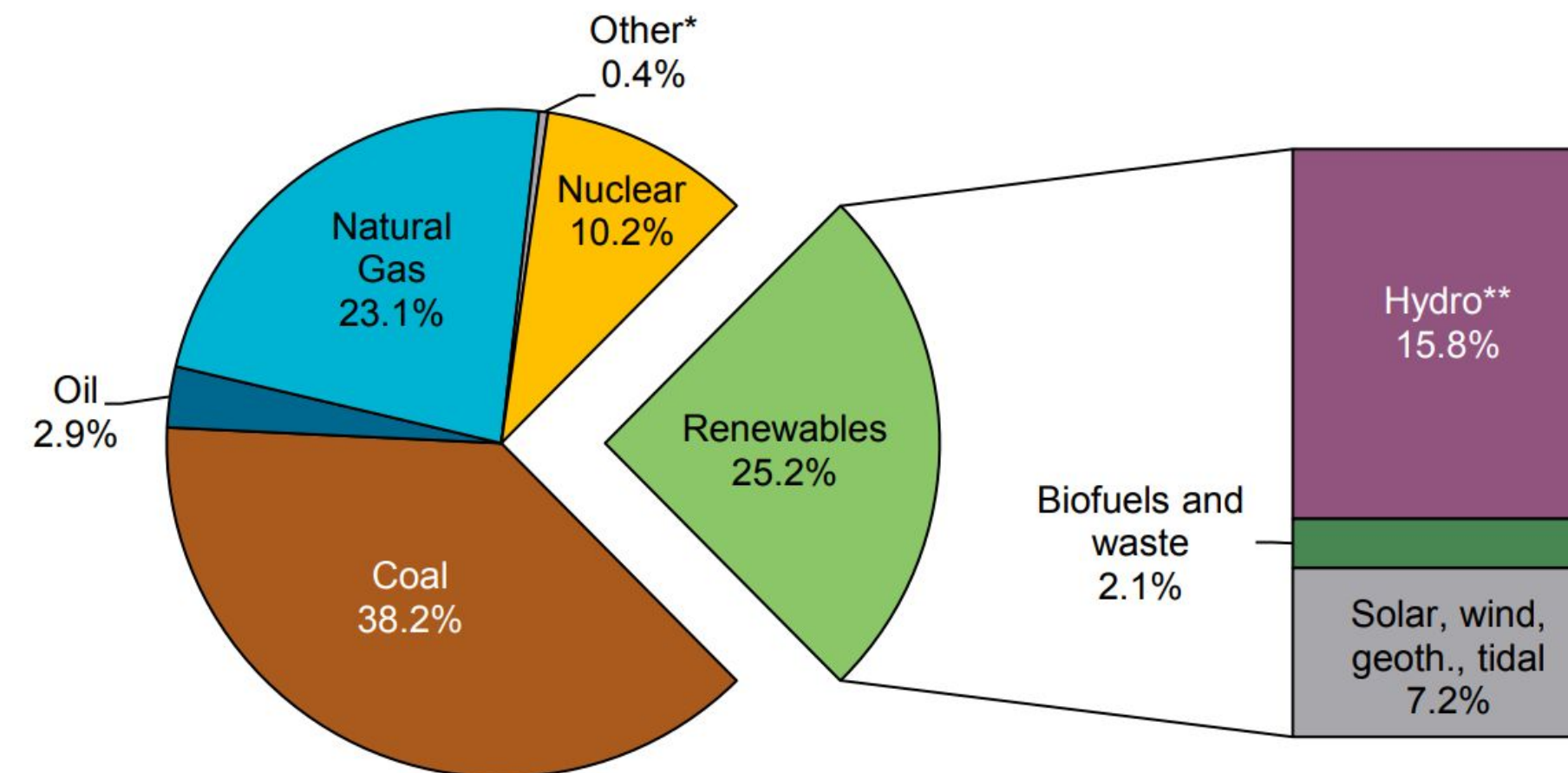
Source: IEA/OECD World Energy Balances.

# Our Challenge: Decarbonizing Energy Systems

Total = 4.12 trillion kilowatthours



2018 fuel shares of world electricity production



IEA. All rights reserved.

\* Other includes electricity from non-renewable wastes and other sources not included elsewhere such as fuel cells and chemical heat, etc.

\*\* Excludes pump storage generation.

Note: Totals in graphs might not add up due to rounding.

Source: IEA/OECD World Energy Balances.

## Sources of U.S. Electricity Generation, 2019

Note: Electricity generation from utility-scale facilities. Sum of percentages may not equal 100% because of independent rounding. Source: U.S. Energy Information Administration, Electric Power Monthly, February 2020, preliminary data

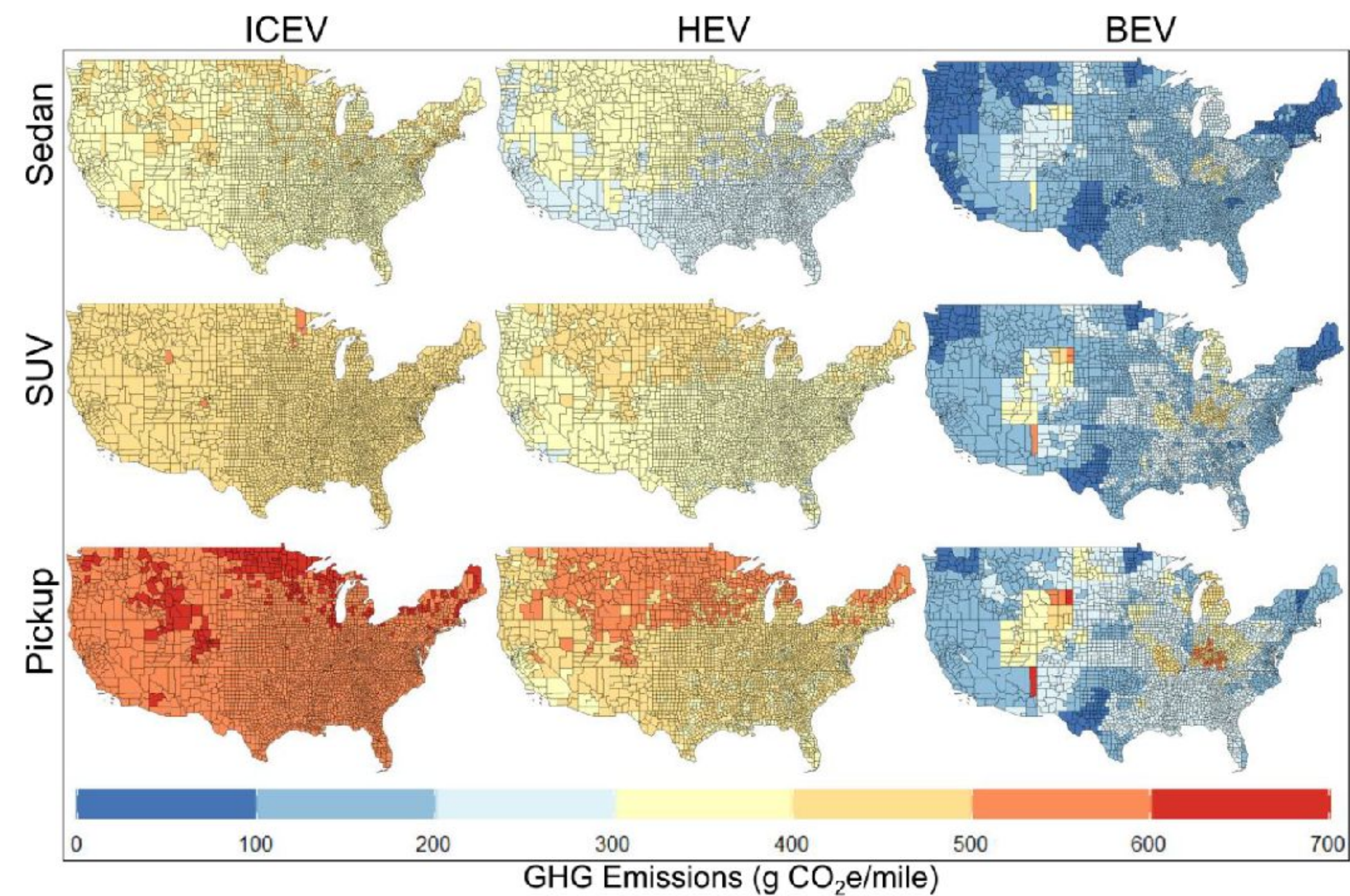
Source: Sustainability Factsheets

# Our Challenge:

## Decarbonizing Mobility/Accessibility

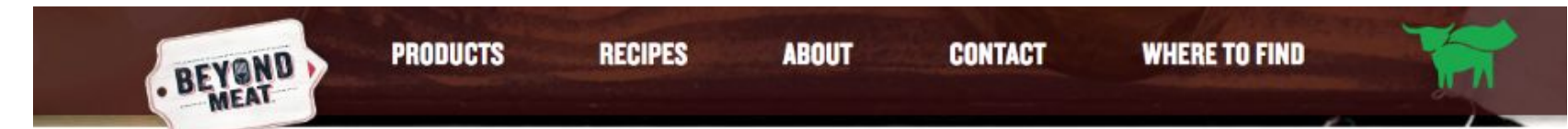
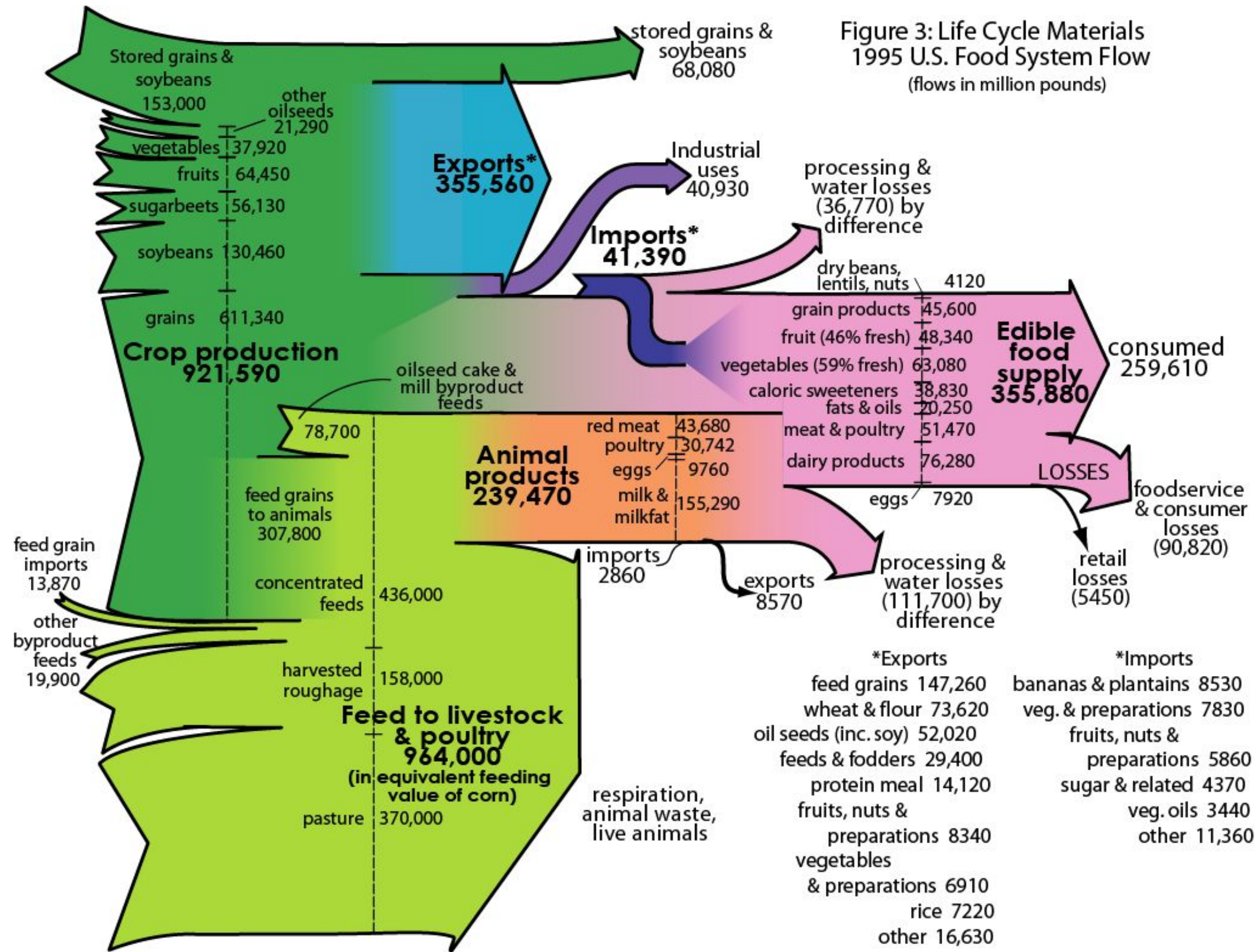
- **Reduce travel**
  - Live closer to work, bundle trips, telework, teleconference
- **Shift modes**
  - Public transit, bike, walk
- **Vehicle electrification**
  - Inform design, vehicle adoption decisions
  - Install charging infrastructure, equity and access
  - Deploy with renewable energy sources
  - Develop circular economy for EV batteries
- **Other technologies**
  - Vehicle lightweighting, powertrain efficiency, automation
- **Policy**
  - Incentives for EV deployment
  - More stringent vehicle GHG standards
  - Tax to address externalities of climate change

# Our Challenge: Decarbonizing Mobility/Accessibility



*Figure 5. Life cycle GHG emissions for each vehicle class and powertrain, accounting for differences in grid emissions for electricity balancing areas and county-level differences in drive cycle and temperature effect on fuel economy.*

# Our Challenge: Food Systems



Report No. CS518-10  
September 14, 2018

### Beyond Meat's Beyond Burger Life Cycle Assessment:

A detailed comparison between a plant-based and an animal-based protein source

Martin C. Heller and Gregory A. Keoleian

**THE BEYOND BURGER®** VS **THE BEEF BURGER**  
1/4 LB US BEEF BURGER

- 99% Less** WATER
- 93% Less** LAND
- 90% Fewer** GHGE
- 46% Less** ENERGY

# Our Challenge: Water Scarcity and Sanitation

**6 CLEAN WATER AND SANITATION**  
**ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL**

**BEFORE COVID-19**

DESPITE PROGRESS,  
**BILLIONS STILL LACK**  
WATER AND SANITATION SERVICES



**TWO IN FIVE**  
HEALTH CARE FACILITIES  
WORLDWIDE HAVE  
**NO**  
SOAP AND WATER OR  
ALCOHOL-BASED  
HAND RUB  
(2016)



**COVID-19 IMPLICATIONS**



**3 BILLION**  
PEOPLE WORLDWIDE  
LACK BASIC HANDWASHING  
FACILITIES AT HOME  
↓ ↓ ↓  
THE MOST EFFECTIVE METHOD FOR  
COVID-19 PREVENTION

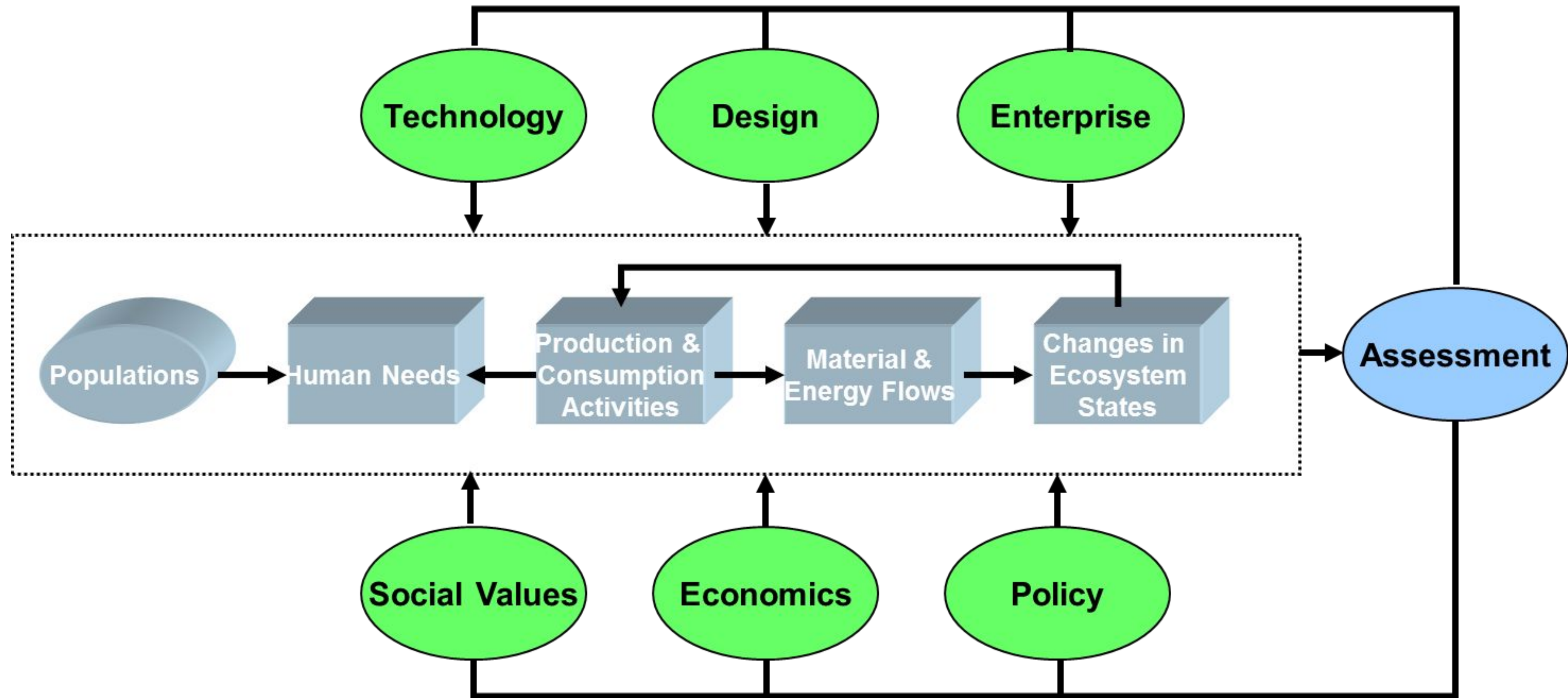


SOME COUNTRIES EXPERIENCE  
**A FUNDING GAP OF 61%** FOR ACHIEVING  
WATER AND SANITATION TARGETS

**WATER SCARCITY  
COULD DISPLACE  
700 MILLION PEOPLE  
BY 2030**

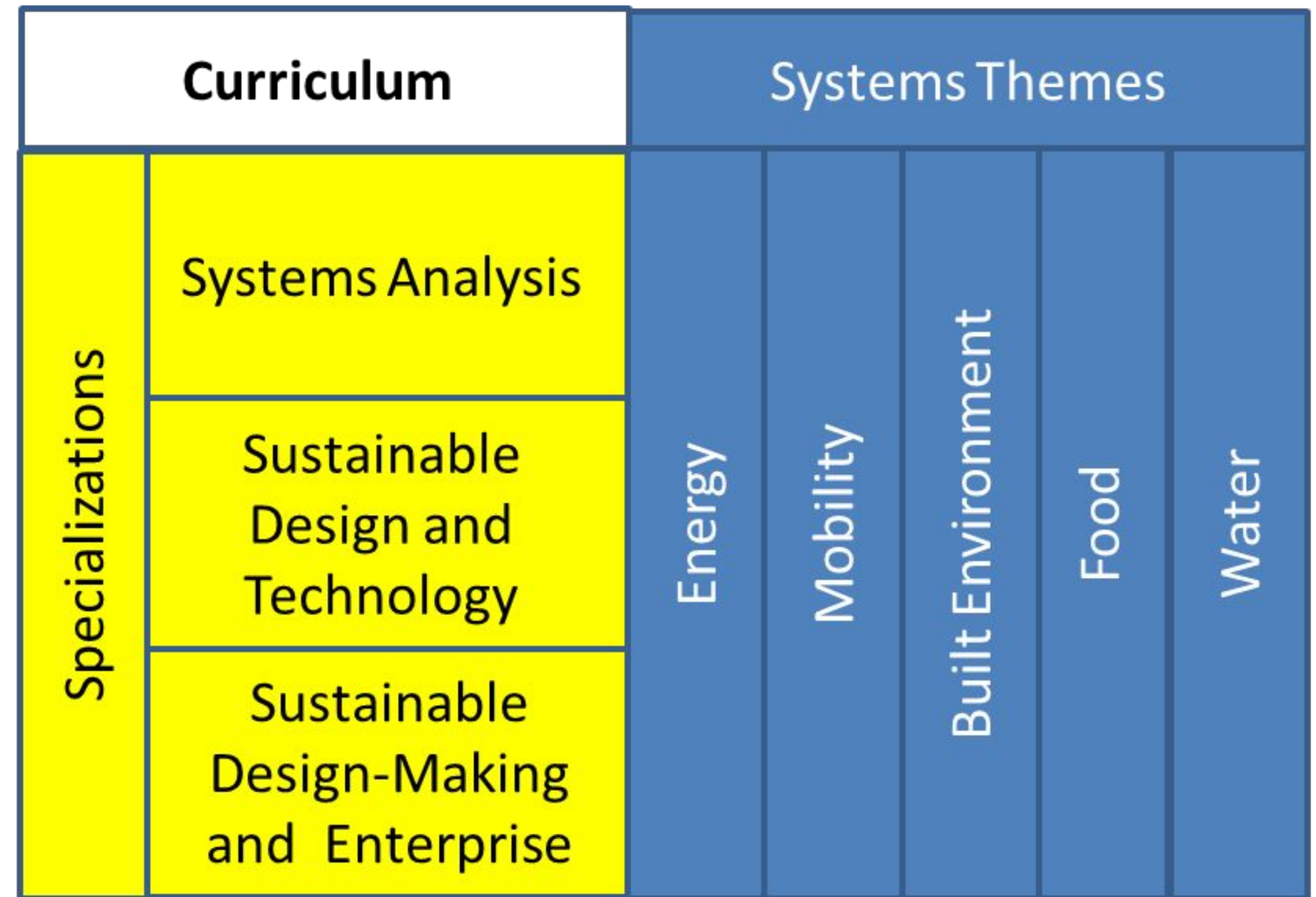


# Systems Approach



# Our Program Elements

- **Systems Analysis**
  - Evaluate sustainability performance
- **Sustainable Design and Technology**
  - Guide design of sustainable products and technology
- **Sustainable Enterprise**
  - Lead public and private sector organizations in the innovation and implementation of sustainable systems



# Our Program Elements

A. Sustainable Systems Core (1-3)

1) Systems Analysis for Sustainability (at least 6CR\*)

EAS 573 (3cr)	Environmental Footprinting and Environmental Input-Output Analysis (W)
EAS 610 (1.5cr)	Advanced LCA Methods & Software Tools (W)
EAS 597 (3cr)	Environmental Systems Analysis (F)
EAS 557/CEE 586 (3cr)	Industrial Ecology (W)
EAS 550/STRAT 566 (3cr)	Systems Thinking for Sustainable Development (W)

\*At least two courses need to be from the courses listed above

EAS 570 (3cr)	Environ Economics: Quantitative Methods & Tools (F)
EAS 501 (1.5cr)	Topics in Env. Economics
EAS 531 (4cr)	Principles of GIS (F&W)

2) Sustainable Design & Technology (3CR)

EAS 537 (3CR)	Urban Sustainability (F)
EAS 501.087 (3CR)	Technology and Community Sustainable Development (F)
EAS 615 (3CR)	Renewable Electricity and the Grid (W)
EAS 574/PUBPOL 519 (3cr)	Sustainable Energy Systems (F)
EAS 605/BA 605 (3cr)	Green Development (W)
EAS 677.023 (2)	Deep Decarbonization
EAS 687 (4cr)	Landscape Planning (F)
ARCH 575 (3cr)	Building Ecology (F)
CEE 480 (3cr)	Design of Environ Engineering Systems (F)
CEE 582 (3cr)	Environmental Microbiology (F)
MECHENG 589 (3cr)	Sustainable Design of Technology Systems (W)

3) Sustainable Enterprise (3CR)

EAS 530 (3cr)	Decision-Making for Sustainability (F)
EAS 525 (3cr)	Energy Justice (F)
EAS 535/BL 536 (2.25cr)	Ethics Corporate Management (TBD)
EAS 512/Strategy 564	Strategies for Sustainable Development I (F)
EAS 513/Strategy 565	Strategies for Sustainable Development II (F)
EAS 527/BE 527 (3cr)	Energy Markets and Energy Politics (F)
EAS 533 (3cr)	Negotiation Skills (F)
EAS 595/TO 560	Sustainable Operations and Supply Chain Management (W)
BE 555 (1.5)	Non-Market Strategy (F)
EAS 560/URP 544 (3cr)	Behavior and Environment (F)
EAS 576/CEE 588/ChE 590 (3cr)	Sustainability Finance: Investment Model for Green Growth (F)
ENGR 521 (3cr)	CleanTech Entrepreneurship (W)
FIN 637 (2.25cr)	Finance and Sustainable Enterprises (F)
FIN 583 (1.5cr)	Energy Project Finance (W)

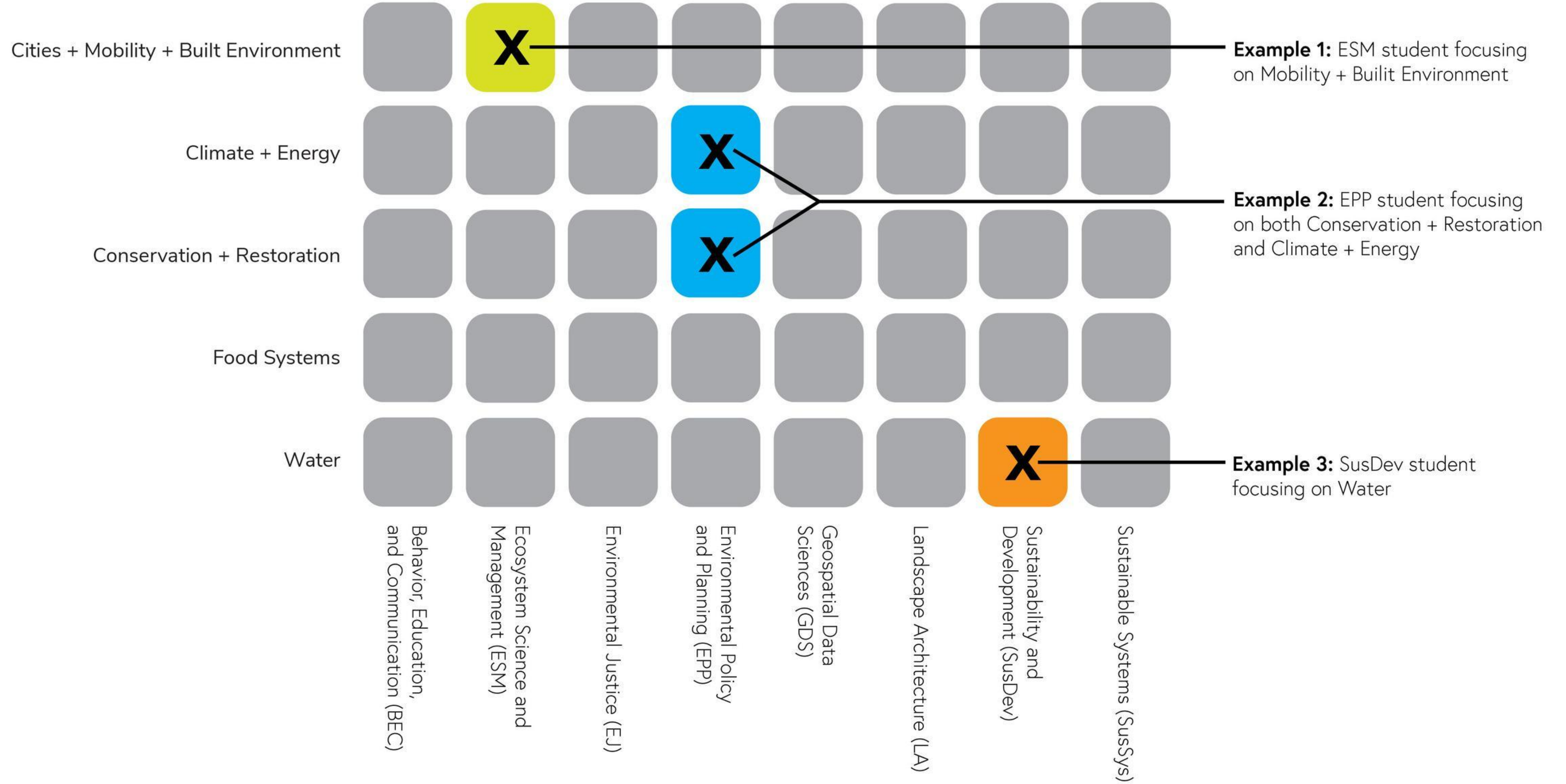
B. Sustainable Systems Electives

B1) Additional SS courses (can count towards Non-Opus option)

EAS 572(2cr)	Environmental Impact Assessment (F)
EAS 523(3cr)	Environmental Risk Assessment (W)
EAS 552 (3cr)	Ecosystem Services (F)
EHS 672 (3cr)	Life Cycle Assessment: Human Health & Environ Impacts (F)
EAS 686/HMP 686/PubPol 563 (3cr)	Environmental Policy (W)
BA 612 (2.25cr)	Strategies for the Base of the Pyramid (F)
ESENG 501 (3cr)	Seminars in Energy Science, Technology, and Policy (F)
Econ 437 (3cr)	Energy Economics & Policy (W)
URP 553	Sustainable Urbanism and Architecture (F)

Courses [here](#).  
Full Curriculum [here](#).

# Themes



# Specializations



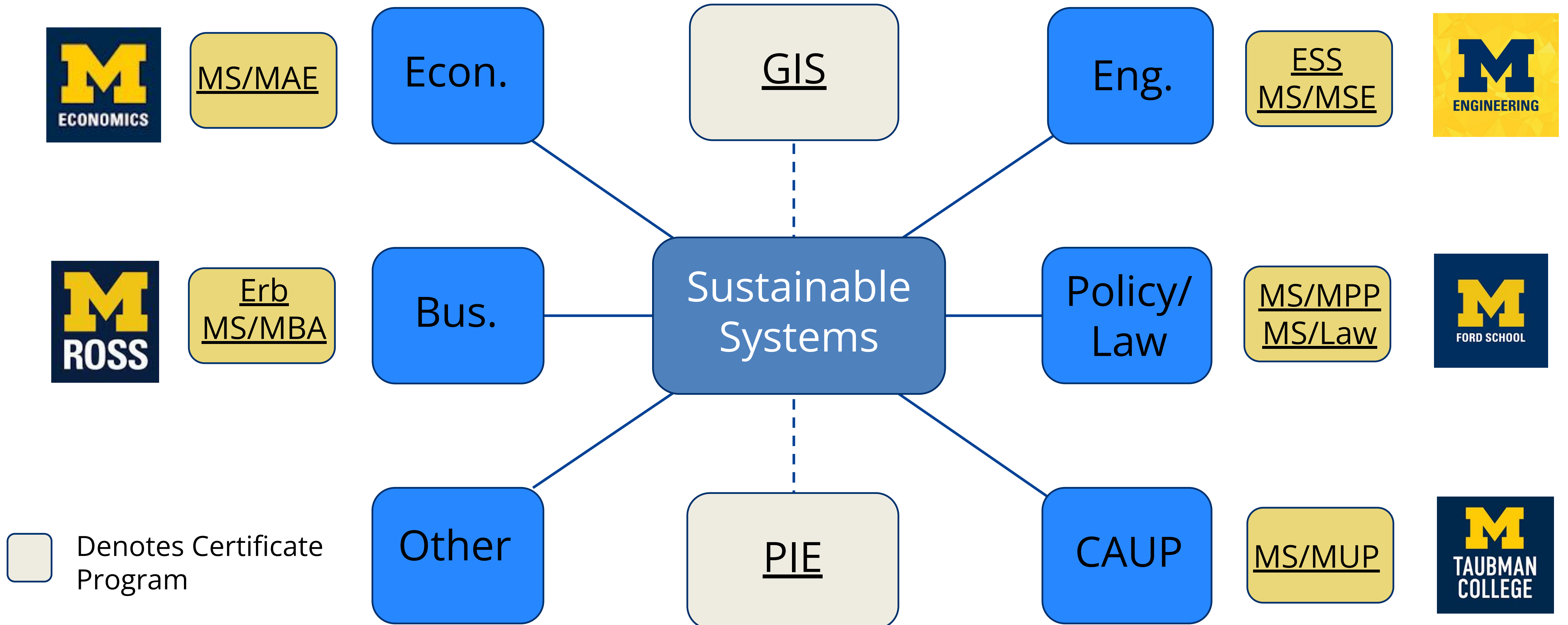
# Tailoring your Degree Beyond your Specialization

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## Certificates

- Environmental Justice
- Industrial Ecology
- Spatial Analysis
- Sustainability
- Climate Change Solutions

# Over 30% dual degree students



# Dual Degree: Erb Institute

## Overview

- 2.5 or 3 year degree (MBA and MS)
- Curriculum includes client-based field projects with companies, government, and nonprofits.
- Two summer internships
- Resources include specialized projects, access to rich network of sustainability leaders, career support and additional funding

## Impact Projects

- Short term, hands-on, field experiences
- Over 100 student projects to date
- About 1/3 have been international
- Locations include: Ecuador, Galapagos Islands, Costa Rica, Nicaragua, Cuba, China, Gabon, Switzerland, Spain, and more!

## Partnership Projects

- Through Partnership Projects, Erb students work collaboratively with companies, associations and nonprofits to tackle pressing business challenges and broader strategy questions.
- Paid opportunities separate from internships and curricular coursework

## Internships

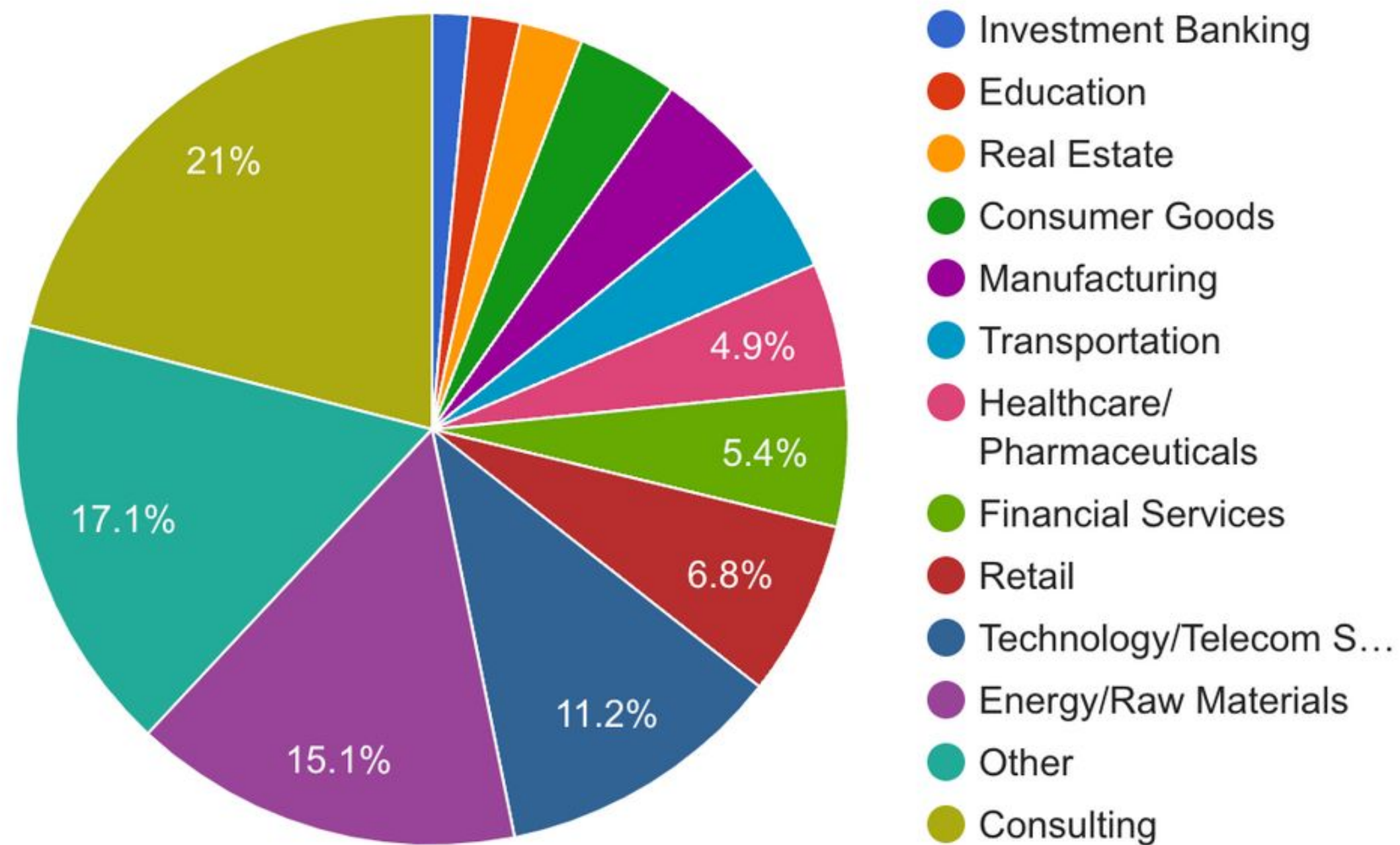
- Students take on 2 internships
- Opportunities for out-of-the-box experiences
- Funding support for students pursuing internships with nonprofits

## Practitioner Engagement

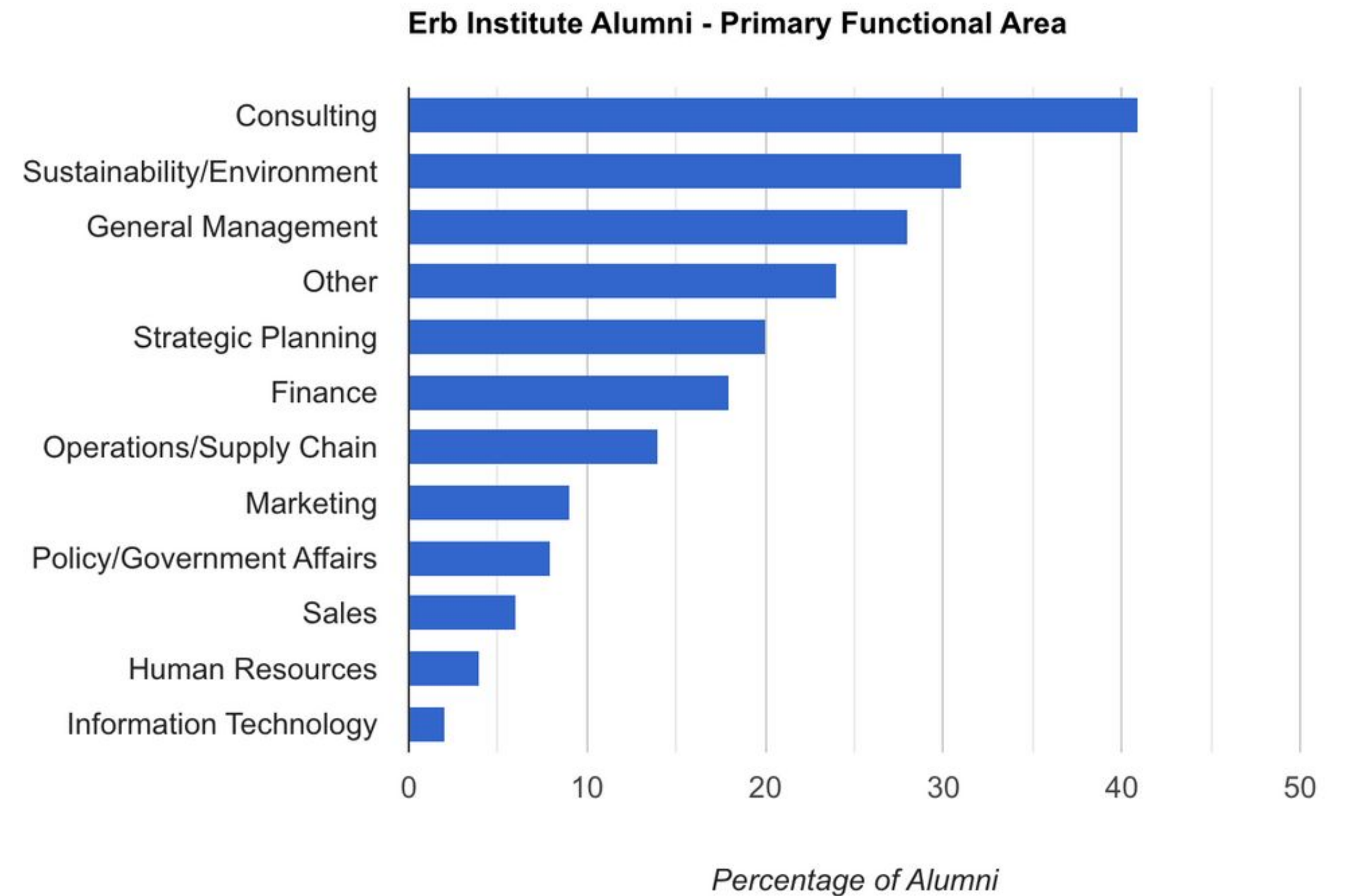
- U-M workshops, career chats, and guest lectures with sustainability leaders, access to multiple boards
- 700+ alumni

# Dual Degree: Erb Institute

## Alumni Employers by Industry



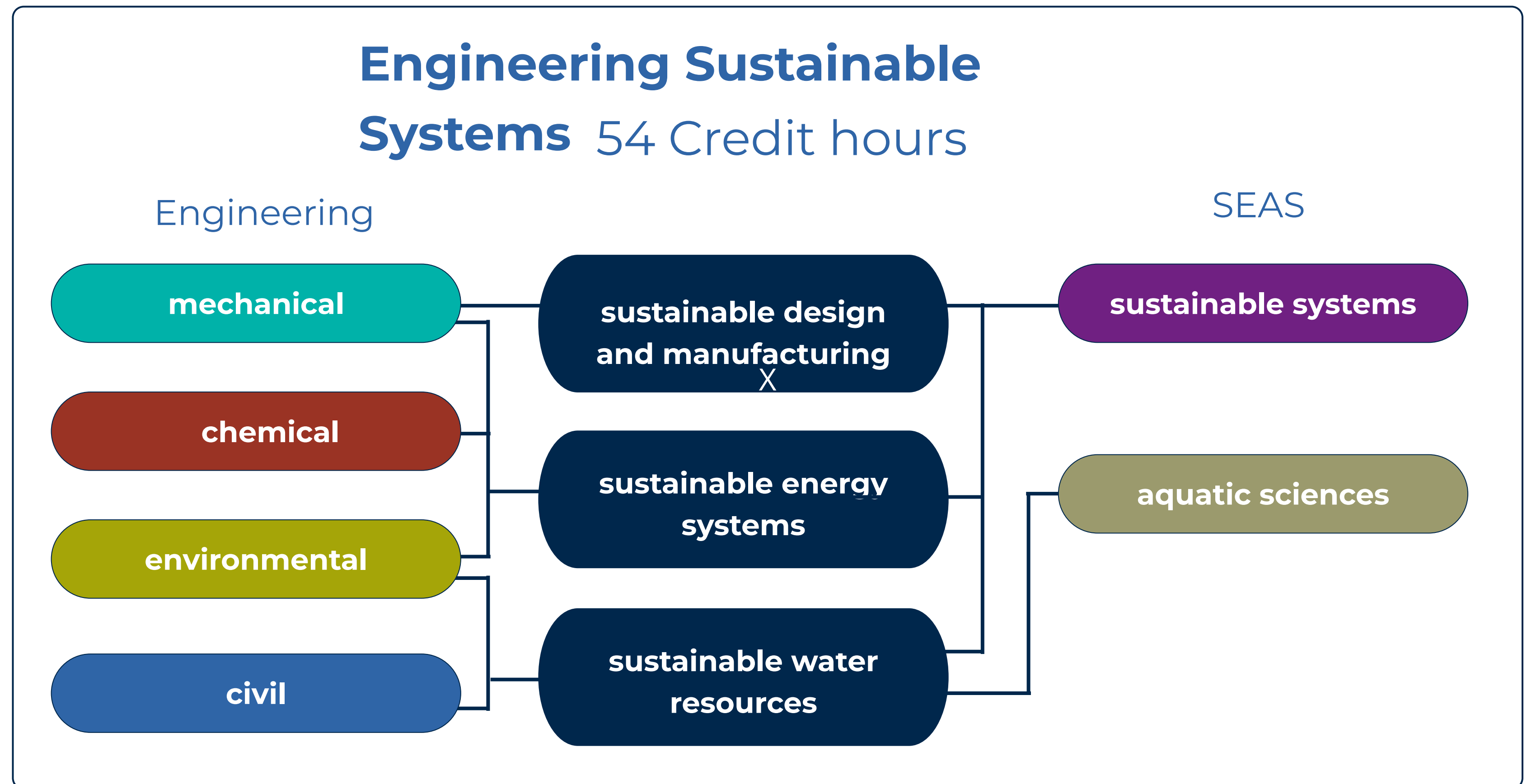
## Alumni Primary Functional Area



# Dual Degree: Engineering

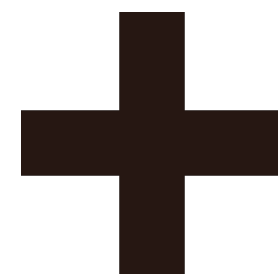
## MS/MSE Program

- MS/MSE Dual Degree Program
- 2- 2.5 years to complete
- First in the nation
- Launched Fall 2007



# More Dual Degrees

**Environment &  
Sustainability  
MS**



**Master of urban and regional planning (MURP)**

**Master of science in public policy (MPP)**

**Juris doctor (JD)**

**Self-initiated dual degrees**



# M.S. Capstone Options

## Project

- Work as interdisciplinary team (3 to 7 students)
- Help client solve a real-world issue
- Report and presentation

## Thesis

- Work primarily individually with Faculty Advisor
- Conduct research to answer a scientific question
- Peer-reviewed publication(s)

## Practicum

- Work primarily individually with Faculty Advisor
- Help client solve a real-world issue
- Report and presentation

## Non-opus

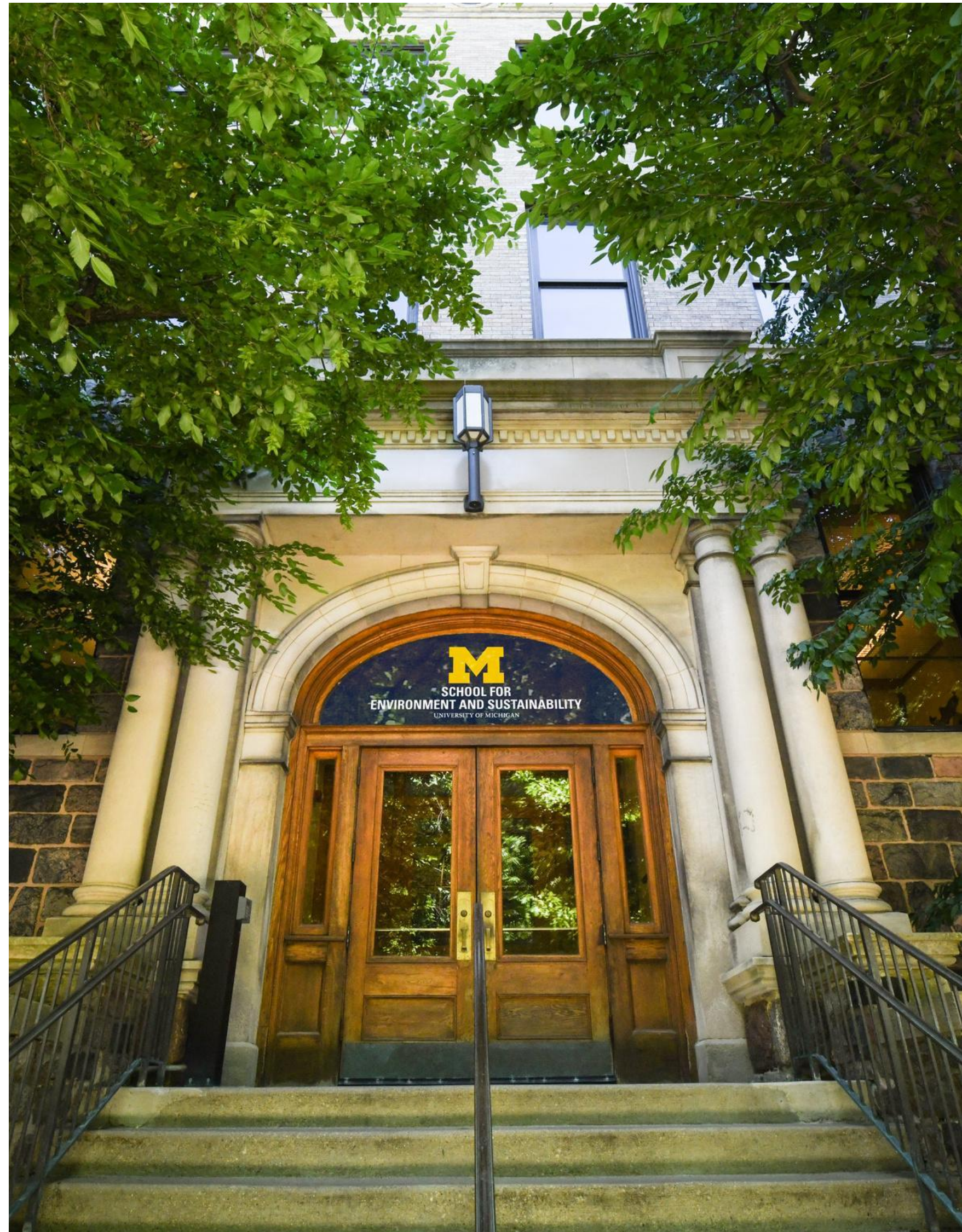
- For students with ample professional experience
- Only coursework, take additional classes
- Work independently

# Master's Projects



EXPLORE MORE ABOUT OUR MASTER'S PROJECTS BELOW





# Alumni Impact

- Sarah Cashman, '09, VP and Director of Life Cycle Services, Eastern Research Group
- Michelle Farhatt, '11, Arc Engineer, PJM Interconnection
- Elizabeth Terry, '03, Program Manager, National Grid?
- Devon Douglas, '09, Director of Sustainability, Etsy
- Shoshannah Lenski, '11, Director of Strategy & Planning at DTE Energy
- Patti Liao, '11, Senior Manager, Recurrent Energy
- Adithya Dahagama, '16, Program Manager, Energy & Infrastructure Strategy
- Rob Frederick, '00, VP and Director, Corporate Responsibility
- Amanda Farthing, '21, Research Engineer II, National Renewable Energy Laboratory
- Michael London, '20, Product Manager, 3D Printing - Metals at HP

# Our Opportunities:

## Center for Sustainable Systems



Research

Education

Outreach

Find out more [here](#).

# Our Opportunities: Forums and Lectures

20TH PETER M. WEGE LECTURE ON SUSTAINABILITY



**EXPANDING THE BASE FOR CLIMATE ACTION AND SOCIAL JUSTICE**  
A CONVERSATION WITH  
**DR. AYANA ELIZABETH JOHNSON**

19TH PETER M. WEGE LECTURE ON SUSTAINABILITY



**A Conversation with Gina McCarthy: Just and Sustainable Climate Solutions**  
White House National Climate Advisor

18TH PETER M. WEGE LECTURE ON SUSTAINABILITY



**NAOMI KLEIN**

23RD ANNUAL PETER M. WEGE LECTURE ON SUSTAINABILITY FEATURING

**JENNIFER M. GRANHOLM**

FORMER U.S. ENERGY SECRETARY, FORMER GOVERNOR OF MICHIGAN

**POWERING TOMORROW, TOGETHER: UNITING FOR A CLEAN ENERGY FUTURE**



24TH ANNUAL PETER M. WEGE LECTURE ON SUSTAINABILITY FEATURING



Business Leader and Author  
**Paul Polman**

**becoming net positive**

how courageous companies thrive by giving more than they take

# Our Opportunities: Clubs

- [SEAS Student Government](#)
- [Consortium on Agriculture, Food, and the Environment](#)
- [BLUElab](#)
- [Ross Net Impact](#)
- [Energy Club @ Ross](#)
- [U-M Chapter of American Society of Landscape Architects](#)
- [Student Sustainability Initiative \(SSI\)](#)
- [Michigan Backpacking Club](#)
- [USGBC \(U.S. Green Buildings Council\) Students at U-M](#)
- [Directory of all U-M Student Groups and Organizations](#)

## CLUB OPPORTUNITIES

The Energy Club provides opportunities throughout the year for students new to the energy industry or with prior experience to grow and develop their skills:



### ROSS RENEWABLE ENERGY CASE COMPETITION

Participate in the country's leading Renewable Energy Case Competition



### HANDS-ON CONSULTING PROJECTS

Consult for leading energy firms and build your resume



### ROSS ENERGY CONFERENCE

Attend the Energy Club's annual conference on the latest themes impacting the market



### SUBSIDIZED TRIPS AND TREKS

Meet with energy-focused companies in San Francisco, Boston, Denver, and more



### REGULAR EDUCATION EVENTS

Attend Lunch 'n' Learns and educational events hosted by the club



### CAREER DEVELOPMENT RESOURCES

Learn how to structure and complete recruitment for on and off-campus jobs in the energy sector



### COMPETE IN CASE COMPETITIONS AROUND THE COUNTRY

Participate in cases at UCLA, Duke, UT Austin, and more



### ACCESS TO COMPILED JOB POSTINGS

Easily find relevant internship and full-time job postings



### NETWORK WITH ALUMNI AND LEADERS

Connect with hundreds of alumni at leading companies

# Our Opportunities: Conferences



A group of students attended and presented on observations from the Global Climate Conference in Paris.

# Alumni Networks

- **University of Michigan | 500,000 alumni**
- **SEAS | 10,388 alumni**
  - represented in all 50 states and 80+ countries).
  - largest alumni network of any environmental degree program.
- **Sustainable Systems | 500 students since 2007**
- **Erb Institute | 500 alumni**
  - [erb.umich.edu](http://erb.umich.edu)
- **Center for Sustainable Systems | 2,000 alumni/partners**
  - [css.umich.edu](http://css.umich.edu)
  - [ess.umich.edu](http://ess.umich.edu)

# Supportive Community

Largest living alumni body of any university

13,700+

**SEAS and PitE alumni, the largest network of any U.S. environmental degree program**

#2

**Best College Town in America**  
(WALLETHUB 2025)

\$28M

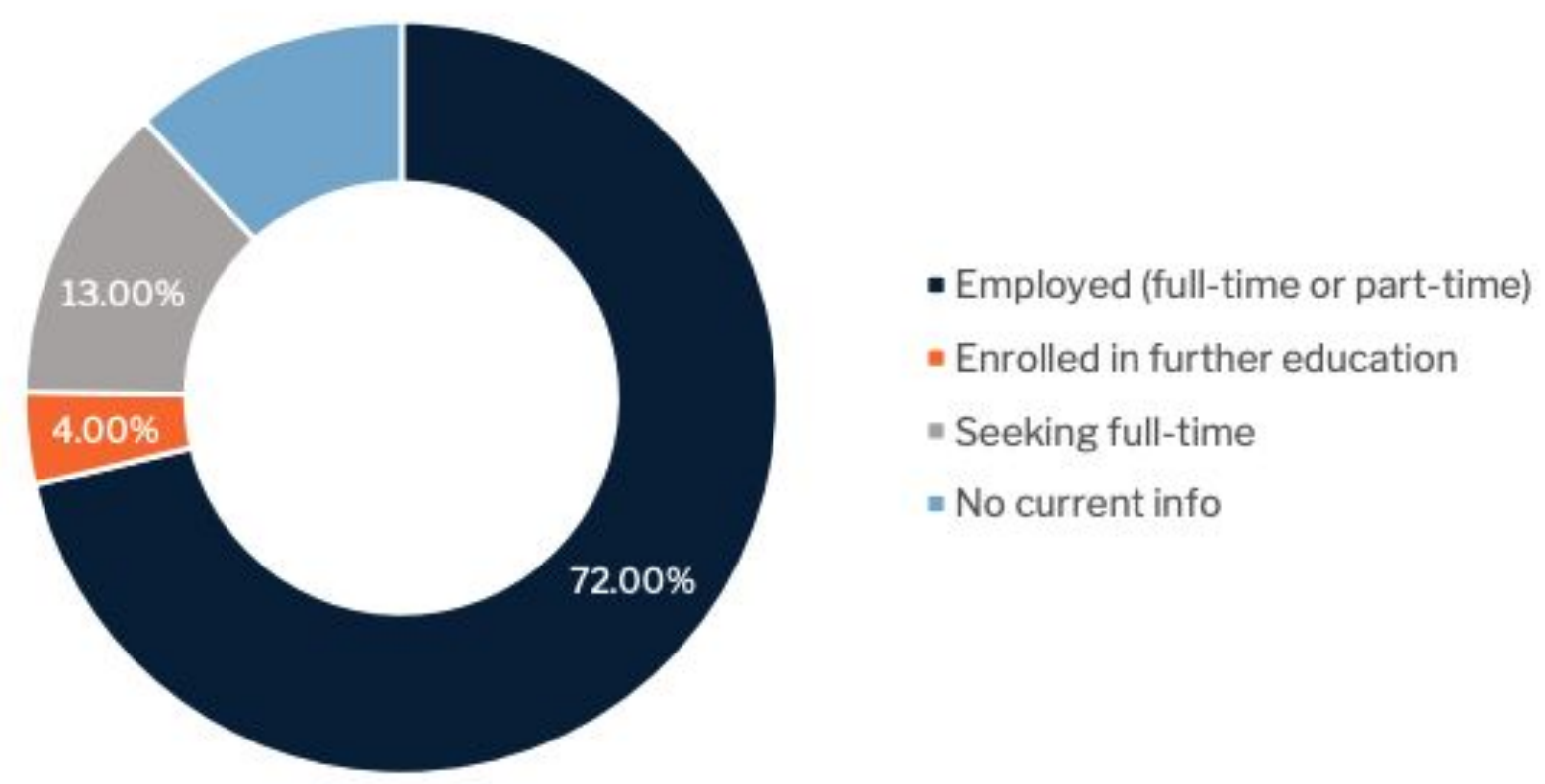
**SEAS had record-breaking research volume in 2025, doubling from five years ago**



See more data [here](#).

# Career Outcomes

2023-24 SEAS Post-Graduate Placements



2023-24 Placement Summary*	%	#
Confirmed post-graduate placement	76%	190
Employed (full-time or part-time)	72%	181
Enrolled in further education	4%	9
Still seeking employment (at time of data collection)	13%	33
No current info	12%	29

\*n=252; Data comes from survey respondents and data entered by SEAS team.

## 2024 Salaries

By Sector		By Specialization		
Specialization	% of reported	Average	Median	Range
Dual Degree*	39.8%	\$94,075	\$92,715	\$50,000 - \$180,000
Behavior, Education & Communication	9.1%	\$70,281	\$58,656	\$24,738 - \$114,000
Environmental Policy & Planning	21.2%	\$71,555	\$70,031	\$45,760 - \$110,000
Ecosystem Science & Management	10.0%	\$53,465	\$55,540	\$31,200 - \$87,400
Environmental Justice	23.0%	\$77,091	\$66,560	\$34,000 - \$192,000
Sustainable Systems	30.5%	\$79,530	\$67,500	\$24,000 - \$190,000
Geospatial Data Sciences	14.3%	\$62,285	\$63,700	\$26,400 - \$192,000
Landscape Architecture	2.0%	\$67,000	\$65,000	\$52,000 - \$70,000
Sustainability and Development	10.0%	\$61,906	\$56,000	\$24,738 - \$114,000
PhD*	N/A	N/A	N/A	N/A

\*Dual degree students pursued degrees in multiple schools + No PhDs reported salary data this cycle



# Our Culture

# Funding

- [Financial Aid website](#) to gain knowledge about internal and external resources to inform you as you develop your plan to finance your graduate degree. These resources include, but are not limited to:
- [Federal and university financial aid](#): This aid takes into account financial need, and the funding sources include grants, loans, and student employment. A completed FAFSA is required.
- [SEAS funding](#): These competitive merit scholarships are awarded by the school, generally at the time of admission.
- [Graduate Student Appointments student employment](#): These limited and competitive positions—Graduate Student Instructor (GSI), Graduate Student Research Assistant (GSRA), and Graduate Student Staff Assistant (GRSA)—often include a full-tuition waiver, health and dental benefits, and a monthly stipend.
- [External funding](#): Fastweb, Pivot, and SPIN are three popular clearinghouses for student-centered grants offered by independent organizations.
- [Rackham funding \(scholarships, fellowships, travel\)](#): Similar to SEAS funding, these selective grants are offered by the Rackham Graduate School.
- [Student Hourly Employment](#): This includes 1) hourly part-time work; 2) work study, which is partially funded by the federal government. To qualify, students must have a work study allocation as part of their funding package. International students are not eligible. Check with SEAS faculty regarding hourly employment.
- [SEAS Funding Database](#): Better understand the specific funding opportunities that are available.



**ENROLLMENT  
DEADLINE  
APRIL 15**

**M | SEAS** SCHOOL FOR ENVIRONMENT  
AND SUSTAINABILITY  
UNIVERSITY OF MICHIGAN



**Come join us!**