The Nitrogen Working Group *of SIMAP*

SIMAP
SUSTAINABILITY INDICATOR MANAGEMENT & ANALYSIS PLATFORM

July 17th, 2023 Webinar

Co-facilitated by the University of Virginia and the University of New Hampshire

UNIVERSITY of VIRGINIA

University of New Hampshire
Sustainability Institute

Agenda

- Introductions
- Nitrogen overview
- Benefits of tracking N at an institution
- How to track N in SIMAP
- Institution case studies:
  - Brown University
  - University at Albany
  - Colorado State University
  - University of Virginia
- General Q&A

SIMAP
SUSTAINABILITY INDICATOR MANAGEMENT & ANALYSIS PLATFORM

Presenters

Libby Dukes

Jim Galloway

Alley Leach

Stacey Baumgarn

Mary Ellen Malia

Derek Wiestma

Andrew DiSanto

Using SIMAP to Determine Nitrogen Footprint of your Institution

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Why Care About Nitrogen

- Tracking and reducing the carbon footprint is now standard
- The nitrogen footprint is relatively new, but it captures **different environmental impacts**: Smog, acid rain, dead zones, climate change, stratospheric ozone depletion, and more.
- <u>The nitrogen footprint may also soon be a standard credit in **AASHE STARS**</u>

stars®
a program of aashe

What is a Nitrogen Footprint?

- When energy and food resources are consumed, nitrogen compounds are released to the environment.
  - **Fossil fuel combustion** releases nitrogen oxides (contributing to smog and air pollution).
  - **Food consumption (and associated food production)** release ammonia (contributing to dead zones) , nitrous oxide (contributing to climate change and stratospheric ozone loss), and a variety of other N compounds.
- The N footprint is an estimate of how much N pollution is generated by an entity's (person, institution, community) use of energy and food resources.

How is it calculated?

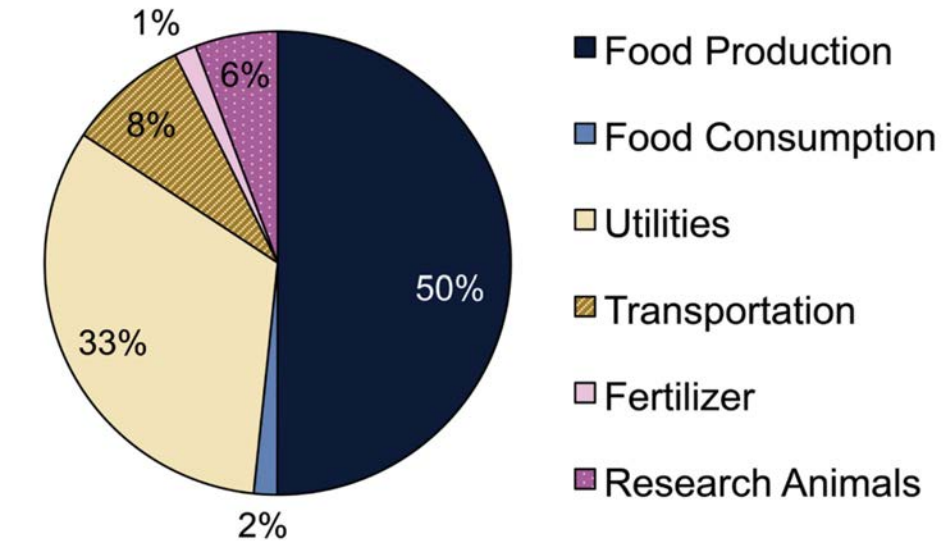
- There are two key components to tracking the N footprint—energy use, and food consumption.
- **The energy component** is easy as it is the same input data as for the carbon footprint.
  - Nitrogen emission factors are used instead of carbon factors.
- **The food component** is more challenging but very doable.
  - It just requires information on the annual amount of different food products (e.g., vegetables, fruits, meats, dairy) purchased.
- Existing SIMAP calculators do the rest!

Benefits of Tracking your Nitrogen Footprint

1. Additional indicator of environmental sustainability
2. Research, sustainability, and education focused goals
3. Overlaps with other initiatives, especially with food
4. Much of the data is already included with GHG footprint tracking

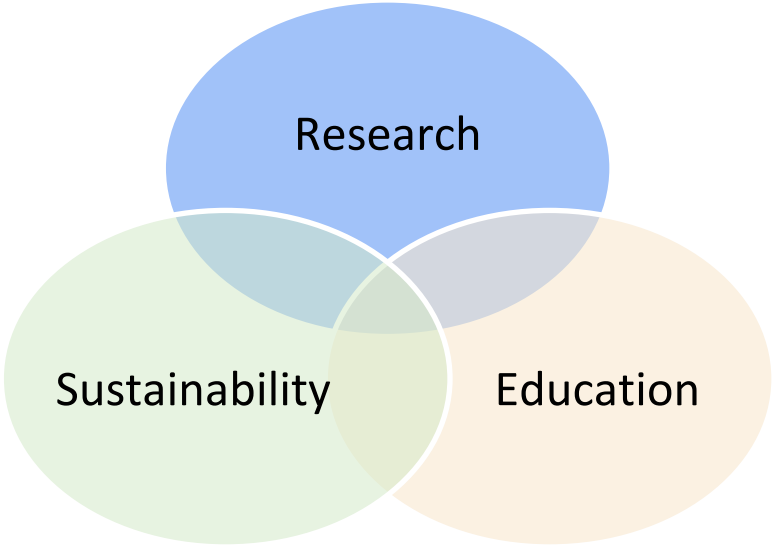
1. Additional Indicator of Environmental Sustainability

- Food is 50% or more of an institution's nitrogen footprint, highlighting the importance of food
- Accounts for NOx emissions which is an air pollutant directly connected to local human health
- Local water and air quality are affected by NOx, ammonium, and organic N
- Nitrogen has both local and global impacts vs. carbon being primarily global
- Ability to connect human health impacts and other environmental justice initiatives



Castner et al., 2017

2. Research, sustainability, and education focused goals



Why colleges and universities?

- Institution-scale impacts
- Learning labs
- Overlap with existing sustainability initiatives
- Capacity for research

N Print

SIMAP
SUSTAINABILITY INDICATOR MANAGEMENT & ANALYSIS PLATFORM

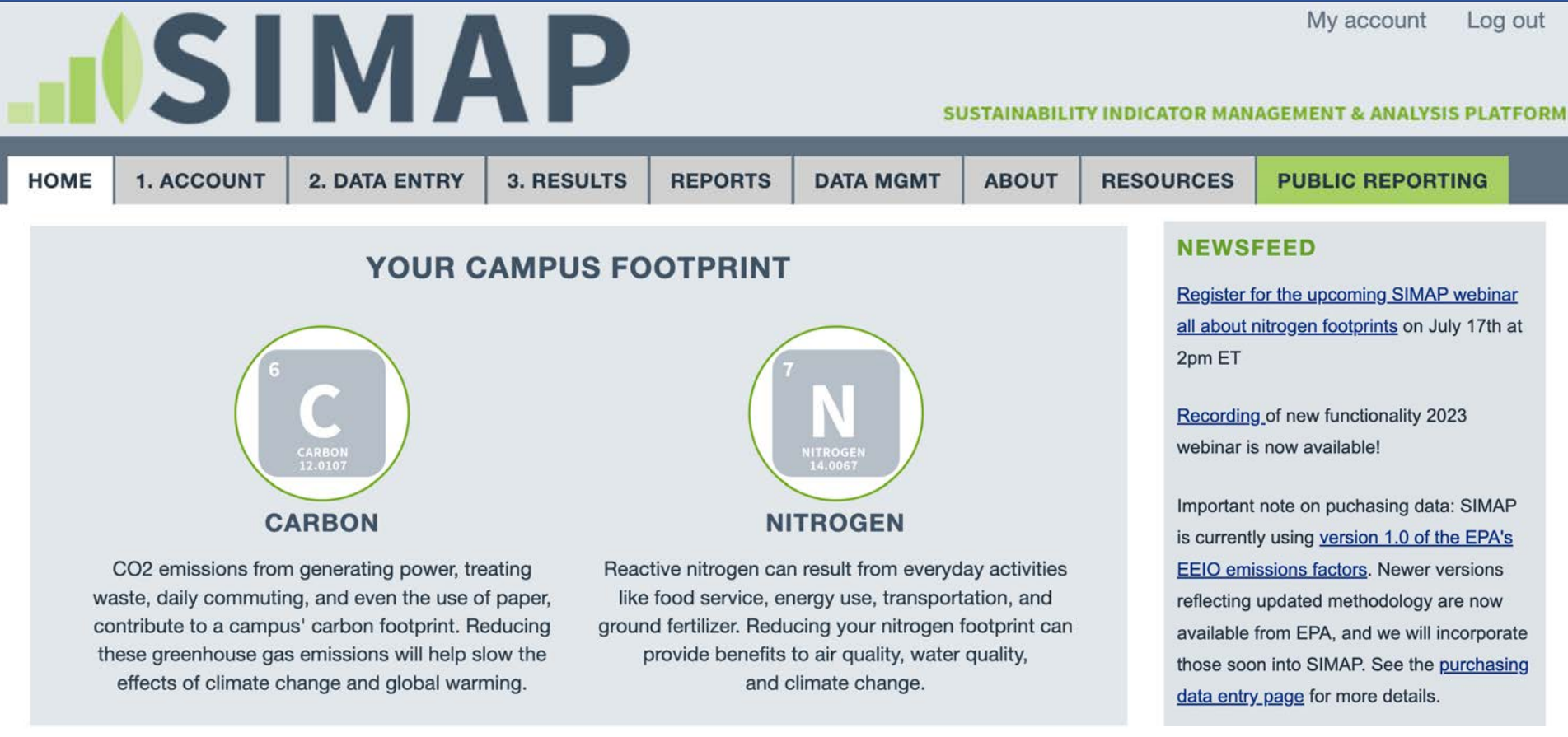
3. Overlap with other sustainability initiatives

- Carbon and Climate Commitments
- AASHE STARs Credit
- Buy Local
- Race to Zero Waste
- Real Food Challenge
- Menus of Change
- Food Recovery Challenge
- Broader N-Print community

4. Overlap of data collection with GHG footprint

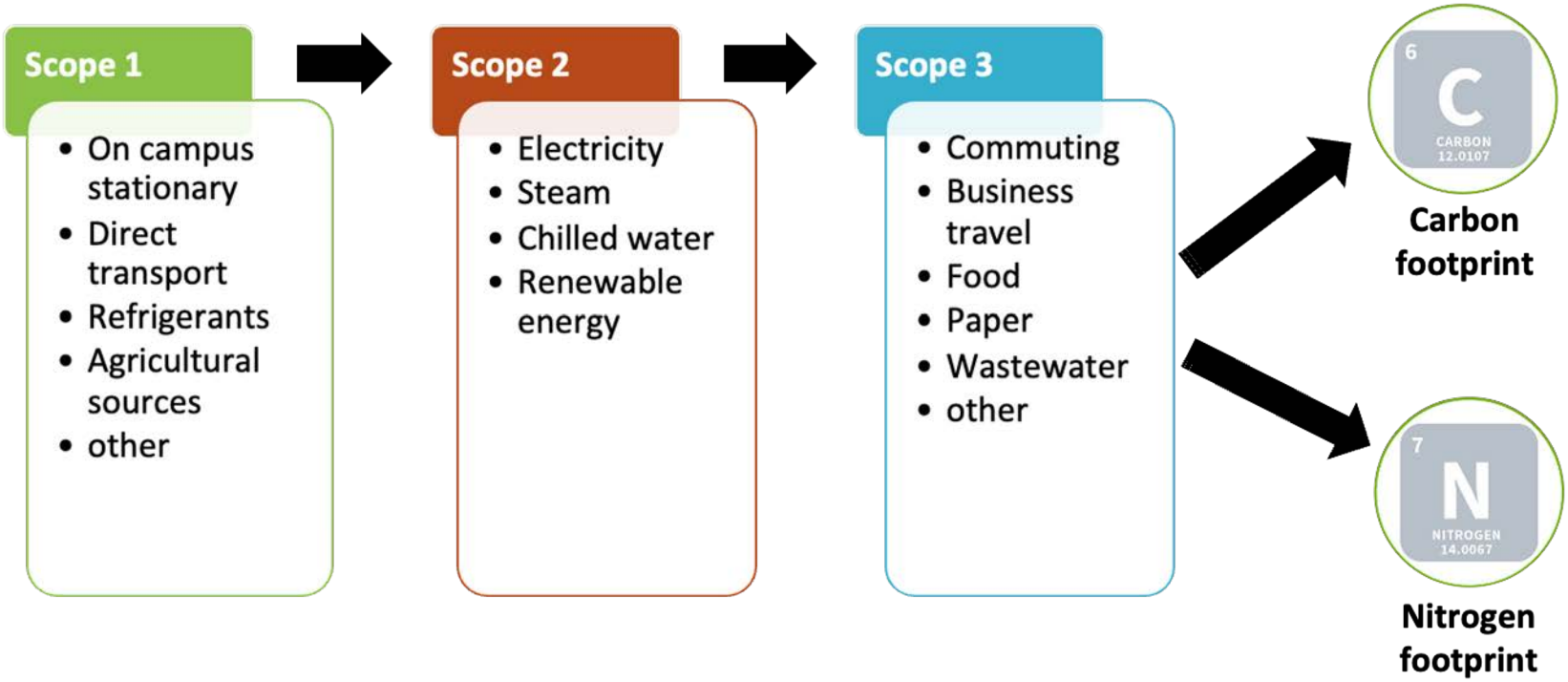
1. Much of the data collected for a **GHG footprint** is used in the N footprint calculation
2. **Food** data is the largest new piece of information needed
3. **Wastewater and fertilizer** play larger roles in the N footprint than the C footprint
4. **Energy consumption** is a larger factor for the C footprint but is not insignificant in the N footprint calculations

How to track nitrogen in SIMAP



How to track nitrogen in SIMAP

Enter your activity data:

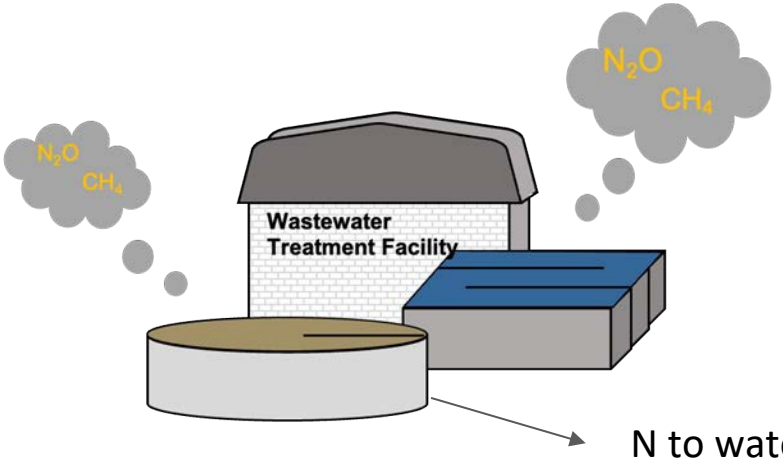


Key categories to include

All relevant scope 1 and scope 2 sources PLUS:

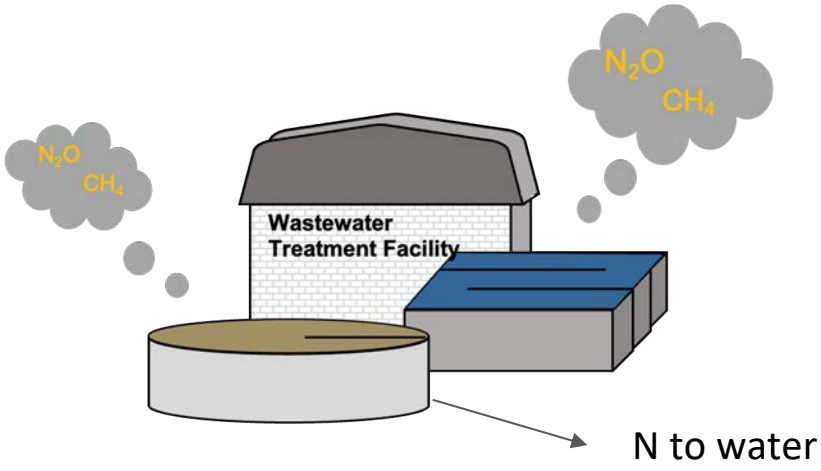
Food

Wastewater



Tracking your wastewater footprint

- **Volume of wastewater** (e.g., gallons)
- **Method of wastewater treatment** (e.g., central: aerobic)



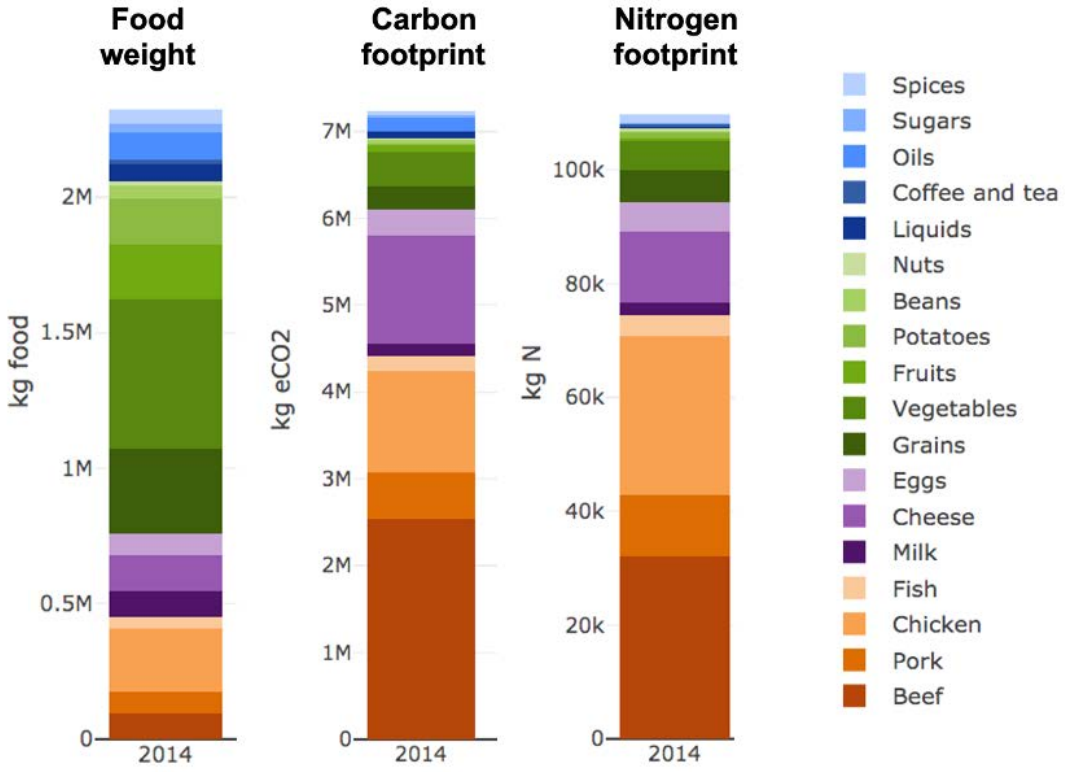
SIMAP has wastewater N footprint emissions factors built in

Tracking your food footprint

- **Weight of food by category**
- Usually from purchase records
- Automated food categorization tool

SIMAP has food N footprint emissions factors built in

Results: SIMAP Food Report



Consistent trends across C & N footprints

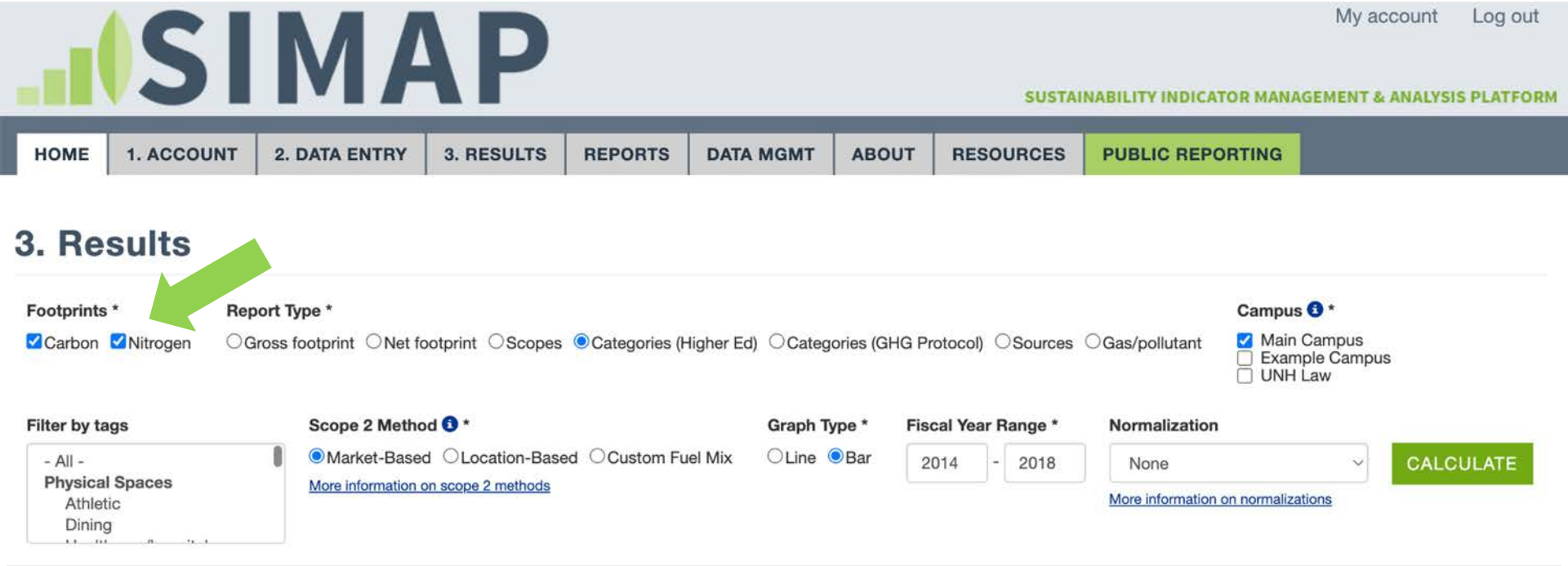
This is a win-win for food footprint reduction scenarios

The trend holds for other environmental footprints (phosphorus, water)

5-15% of carbon footprints

>50% of nitrogen footprints

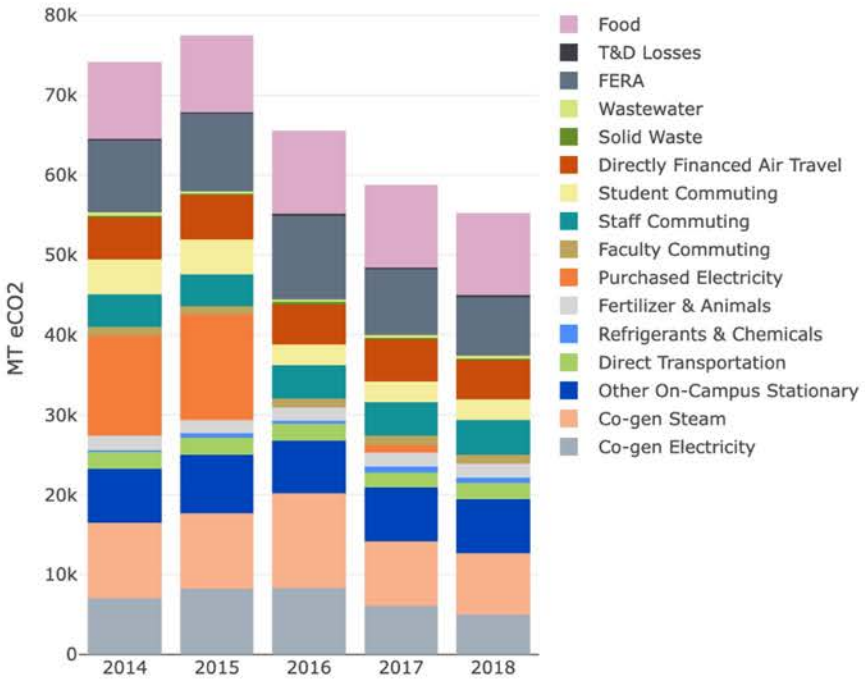
Results: SIMAP Results Tab



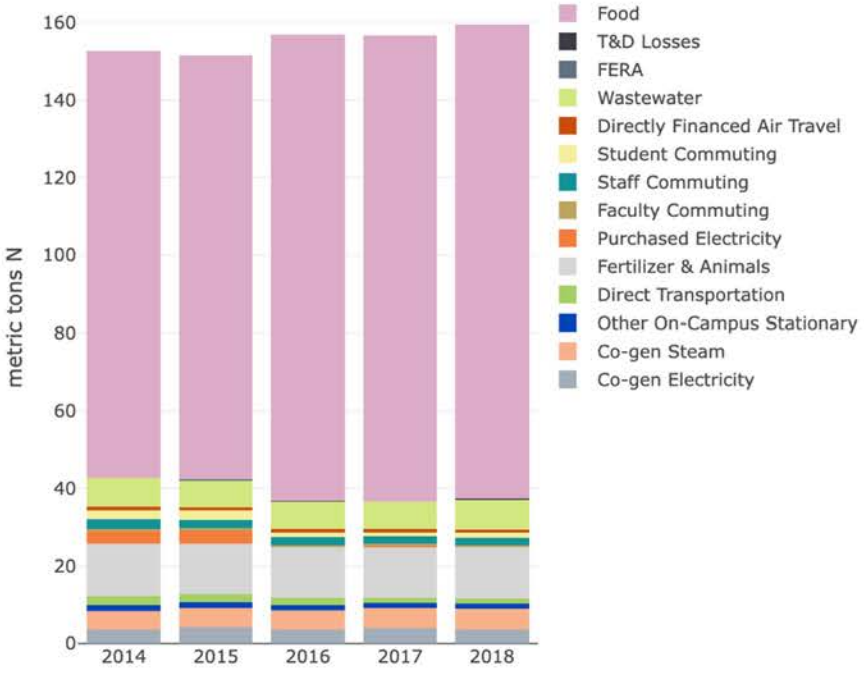
All SIMAP reports have nitrogen footprint option

Carbon and nitrogen footprint

Carbon Footprint (MTCDE)



Nitrogen footprint (MT N)



Categories (Higher Ed) graph view

Case Studies

- Brown University (Derek Wietsma)
- Univ. Albany (Mary Ellen Mallia)
- CSU (Stacey Baumgarn)
- UVA (Andrew DiSanto)

Reducing Nutrient Pollution @ Brown

Brown's Sustainability Approach

BROWN UNIVERSITY

Strategic Sustainability Plan

Areas of Focus

- Reduce Greenhouse Gas Emissions
- Reduce Nutrient Pollution
- Safeguard Human Health
- Reduce Water Use and Impacts
- Curb Biodiversity Loss

A Focus on Nutrient Pollution Reduction

BROWN

BROWN UNIVERSITY

Strategic Sustainability Plan

Areas of Focus

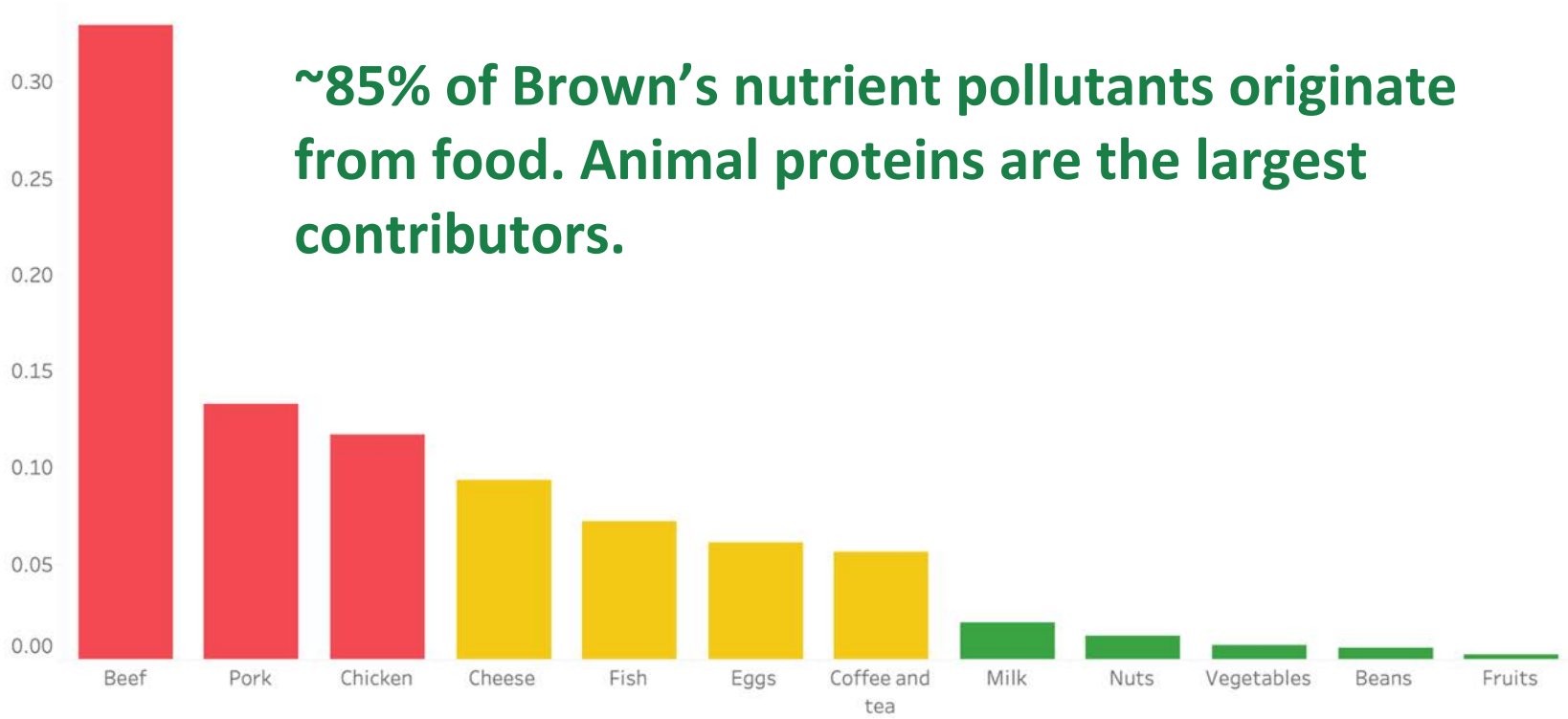
- Reduce Greenhouse Gas Emissions
- Reduce Nutrient Pollution
- Safeguard Human Health
- Reduce Water Use and Impacts
- Curb Biodiversity Loss


Brown committed to reducing nitrogen and phosphorus pollution
25% by 2025, and 50% by 2030

Animal Protein Reduction is Key

BROWN

~85% of Brown's nutrient pollutants originate from food. Animal proteins are the largest contributors.



Lbs of Nitrogen per lb of food produced (source: SIMAP)

Brown's Reduction Strategy

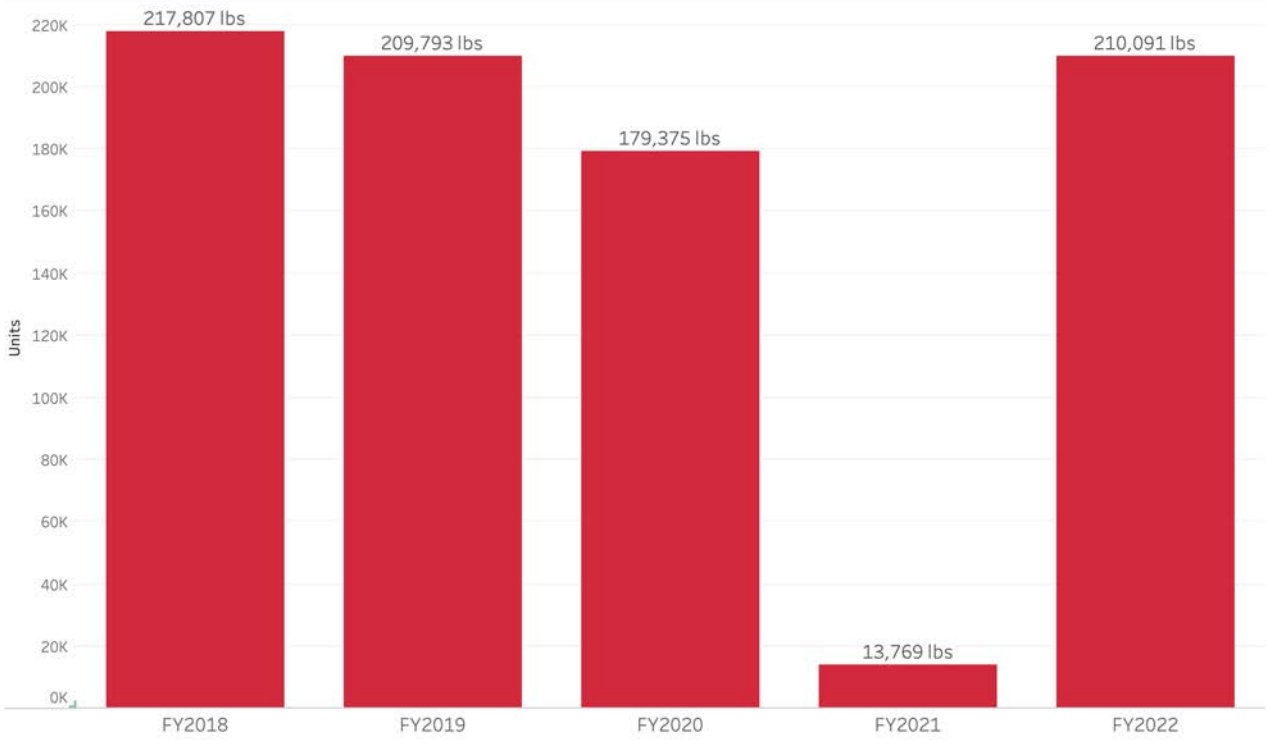
BROWN

Focus on animal protein. Purchase 25% less red meat by 2025 and 50% less by 2030*

- Track Data
- Communicate
- Modify Dining

* Relative to 2018 baseline

Brown tracks Red Meat Purchases



Pounds of Red Meat Purchased by Brown

Dining Communications Campaign

BROWN

Your dining choices can have a big effect on your carbon footprint.

Consider eating plant-forward.

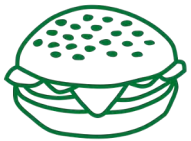
Three Ways To Lower Your Footprint
(without going vegetarian or vegan)

- ✓ **Start Small:** Substitute one weekly beef-based meal with chicken.
- ✓ **Go 50/50:** Make half of your weekly meals plant based, and stick with chicken or fish for the other half of the week.
- ✓ **Bump Up the Plants:** Build your plate with plants, and use meat (chicken/fish) only as a garnish.

Beef produces **10x** more greenhouse gas than poultry and **50x** more than beans or tofu.

Dining Learning and Experimenting | BROWN

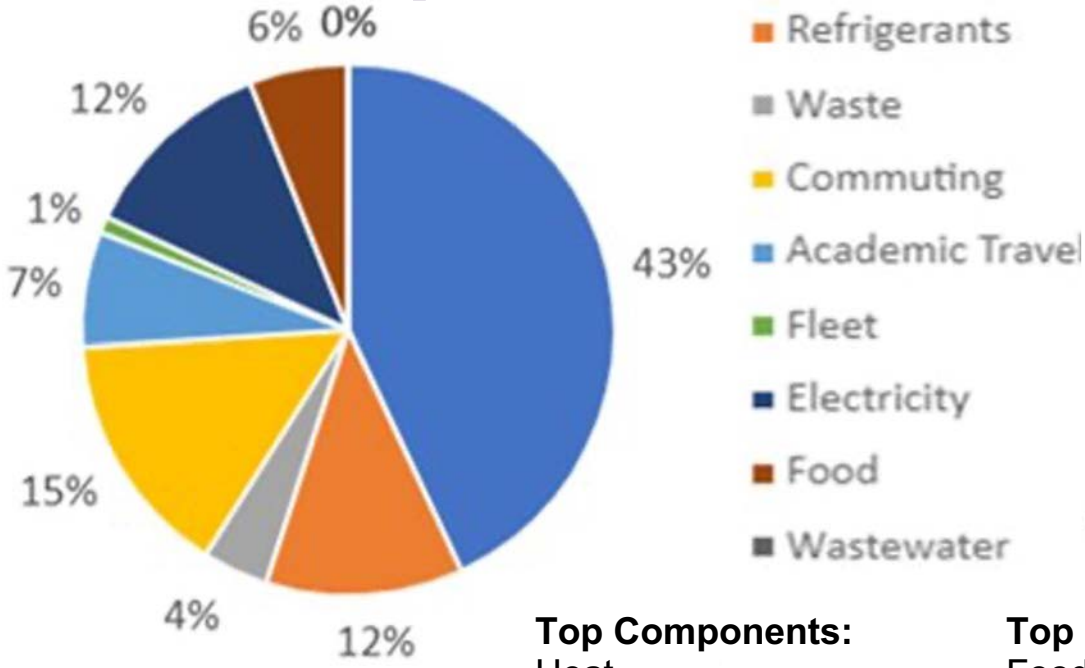
BDS and Bon Appetit working towards nutrient pollution reduction goals

About:

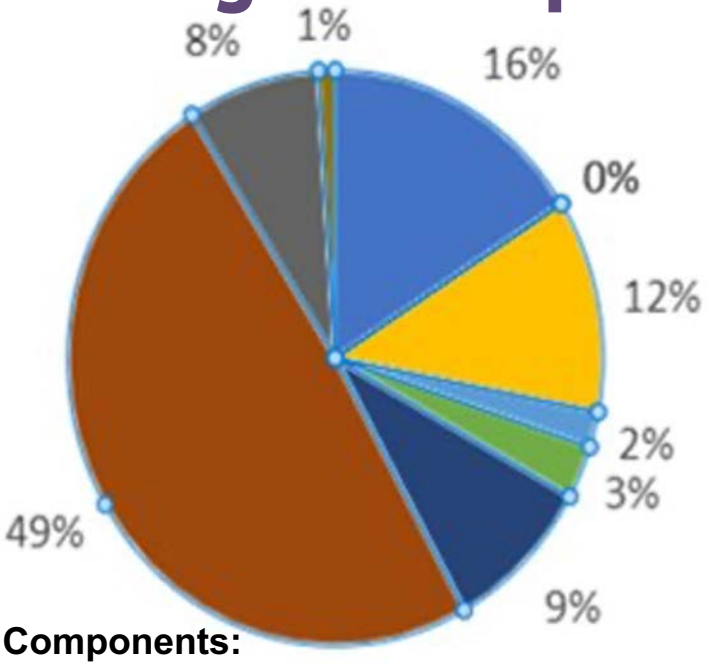
- Location: Albany, NY
- Part of the State of NY(SUNY) 64 campus system
- UAlbany is one of the four university research centers
- Size: 17,075 students (4,421 graduate, 12,654 undergraduate, 7,500 resident students)
- Footprint: Two university owned and operated campuses, over 500 acres, 2 dining halls, campus center food court and retail dining

Carbon Footprint



Top Components:
Heat
Commuting
Electricity

Nitrogen Footprint



Top Components:
Food
Heat
Commuting

Wastewater more prominent

UAlbany green scene

UAlbany actions

Completed:

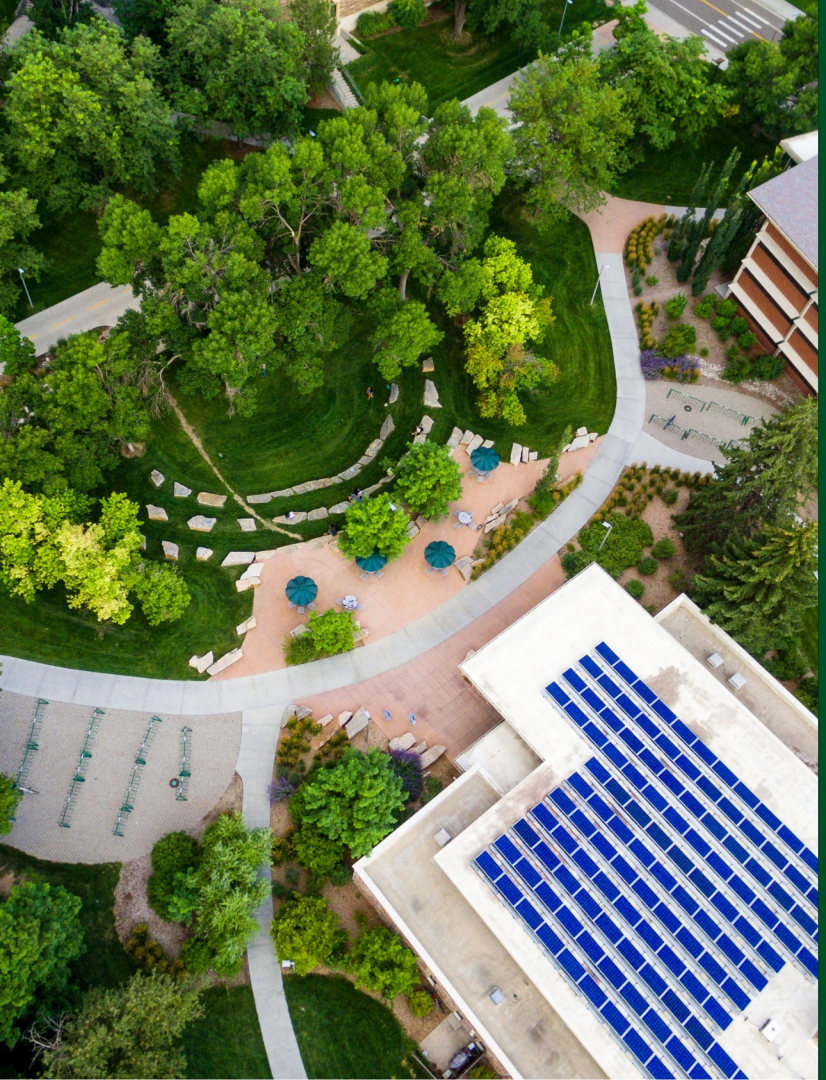
Calculated "average" nitrogen footprint

Created an ecosystem intern position who assists in nitrogen footprint outreach

Incorporated info on nitrogen footprint to accompany any on carbon footprint

To do:

- ❑ Begin tracking food purchases annually
- ❑ Conduct outreach to classes and student groups
- ❑ Establish reduction goals
- ❑ Have campus members calculate their N-footprint



COLORADO STATE UNIVERSITY

33,413 TOTAL STUDENTS

28,446 on-campus students

- 23,943 undergraduate
- 4,503 graduate

7,491 FACULTY AND STAFF

- 33% administrative professionals
- 4% temporary faculty
- 15% tenure-track faculty
- 7% senior teaching and special faculty
- 5% other salaried employees
- 14% research associates
- 23% state classified

Land Grant

Over **13 M** GSF

3 Campuses in Fort Collins, CO

Research Campuses across the state

NUMBERS & GOALS

Carbon Neutral by 2040

100% Renewable Electricity by 2030

44 LEED Certified Bldgs.

43 Solar Arrays

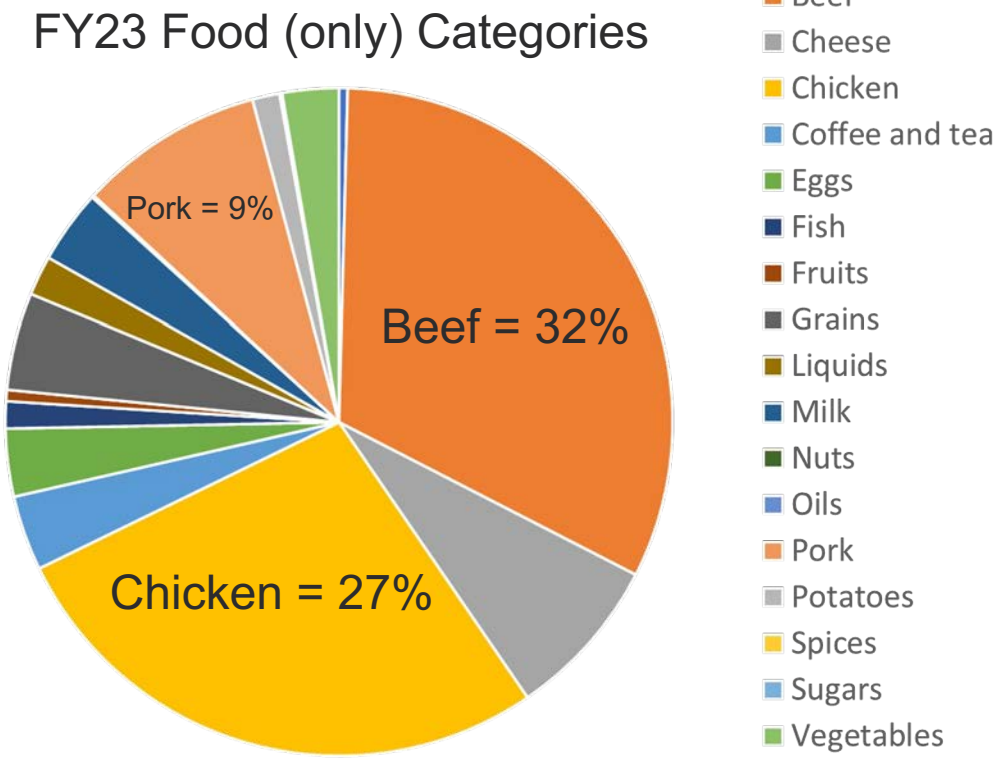
4x STARS Platinum

CSU and the Nitrogen Footprint

- 2014 – CSU joins the Nitrogen Footprint Network
- 2014-15 – first Nitrogen inventory (FY14)
  - Led by Student Sustainability Center
  - Advised by Dr. Jill Baron
  - Using an Excel spreadsheet
- 2019-22 – N inventories (FY18-FY21)
  - Led by students in an ESS 440 senior seminar
  - Advised by Dr. Jill Baron
  - Using SIMAP
- 2022-23 – N inventory for FY23
  - Completed by Stacey Baumgarn

A Focus on Food Procurement

- CSU Dining Services utilizes the N-print summary data
  - CSU Dining Services is actively engaged to help reduce N impacts
- Total: 172 MT N
  - Food: 82 MT N
  - 48% of total footprint is food
  - 68% of food total is Beef, Chicken, Pork



Nitrogen at the University of Virginia

UVA Background

- Location: Charlottesville, Virginia
- Size: 26,000 students (8,500 graduate, 17,500 undergraduate)
- Footprint: All university activities (excluding athletics), 3 dining halls, retail dining, medical center (and cafeteria)

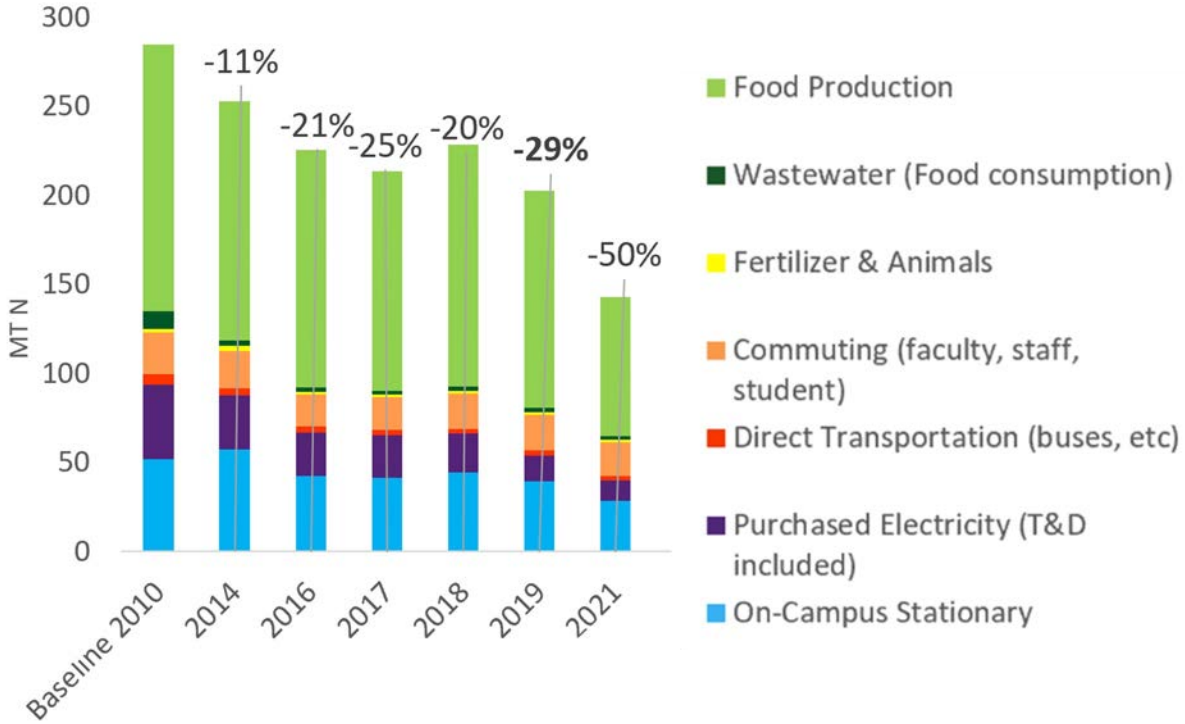
- Goals set by the Board of Visitors
- Funding from the Office of Sustainability (OfS) for running the Nitrogen Working Group each year
  - NWG - group of paid student interns, faculty, and OfS staff in charge of calculating UVA's annual N footprint

UVA N Goals

- 25% Goal
  - Established in 2013, aim to reduce UVA's N footprint **25%** from 2010 levels by **2025**
  - Met in 2019
- 30% Goal
  - In 2019, goal updated to **30%** reduction by **2030**

Current Progress

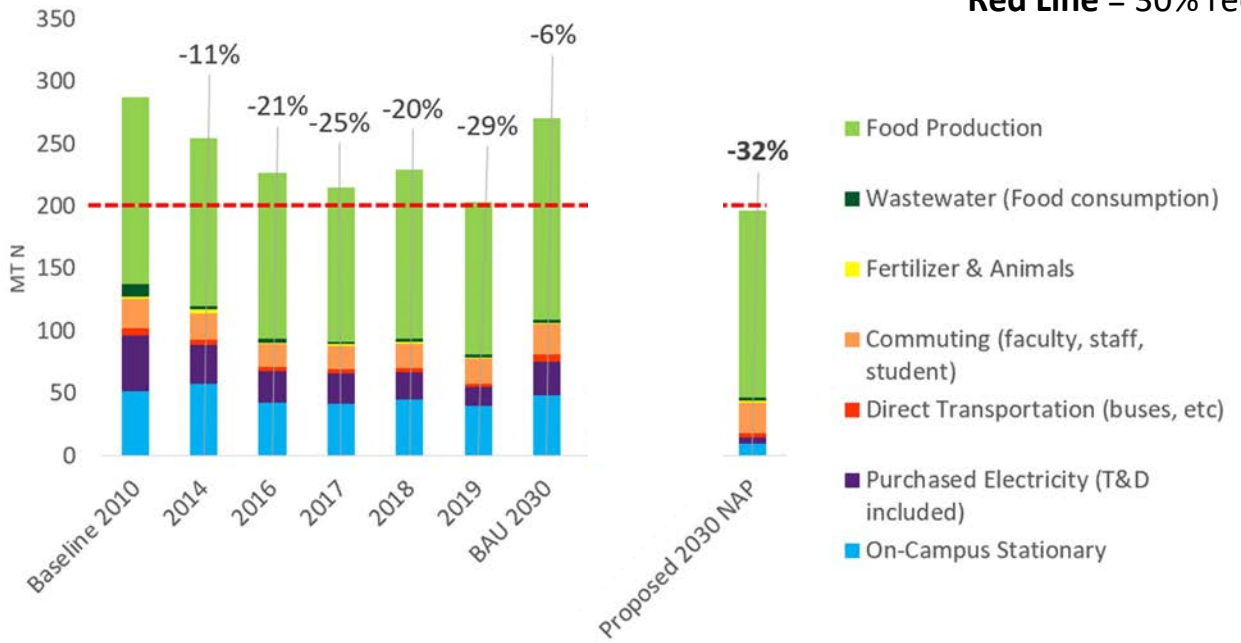
MT N = metric tons of nitrogen



- Footprints completed through 2021
- COVID impact: much lower food and energy use in 2020 and 2021

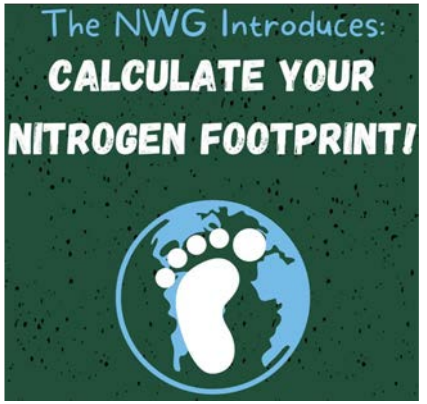
Future Plans

BAU = Business as usual, projection if no changes are made
NAP = Nitrogen Action Plan, proposal for meeting reduction goal
MT N = metric tons of nitrogen
Red Line = 30% reduction goal



- Footprint to increase with university growth
- Need food and energy changes to reach goal

Other Projects



Outreach

- Logo
- Instagram (@uvanitrogen)
- Collaboration with other UVA departments (housing, Sustainability Office)
- Laundry Project

IEFT

- Integrated Environmental Footprint Tool
- Calculates nitrogen, carbon, phosphorus, and water footprints
- Useful for determining co-benefits of N reduction


BE THE CHANGE YOU WANT TO SEE IN THE
65%
green
HAPPY
AND WIN A U


VIRGI