

# Projections and scenario analysis for climate and nitrogen action planning



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# Outline

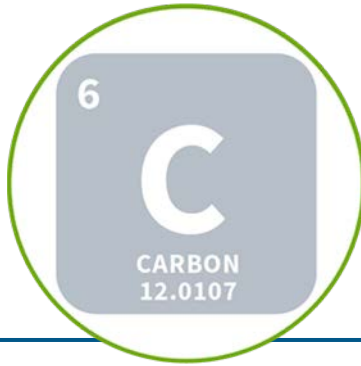
## Part 1: Projections & scenarios

- SIMAP background
- Projection & scenario results
- Excel templates

## Part 2: Integrated planning

- Integrated planning strategies
- Case study 1: University of Virginia and nitrogen
- Case study 2: University of New Hampshire and climate

# SIMAP integrates two tools



 UNH Sustainability Institute

- Developed in 2001 at UNH
- Excel and web version
- Used by **thousands** of institutions





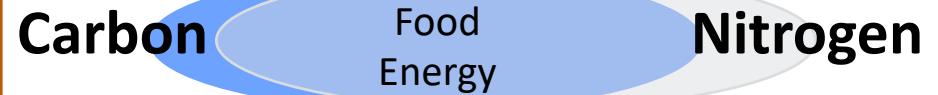
- Developed in 2009 at UVA
- Excel-based
- Used by 20 institutions
- **Completed pilot testing**

# Why a new tool?

1 Broader picture of environmental impacts



2 Single tracking tool



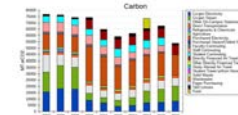
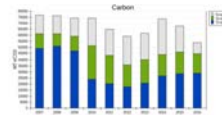
3 Integrate with other reporting platforms



Second Nature

*Others in the future*

4 Research about data trends

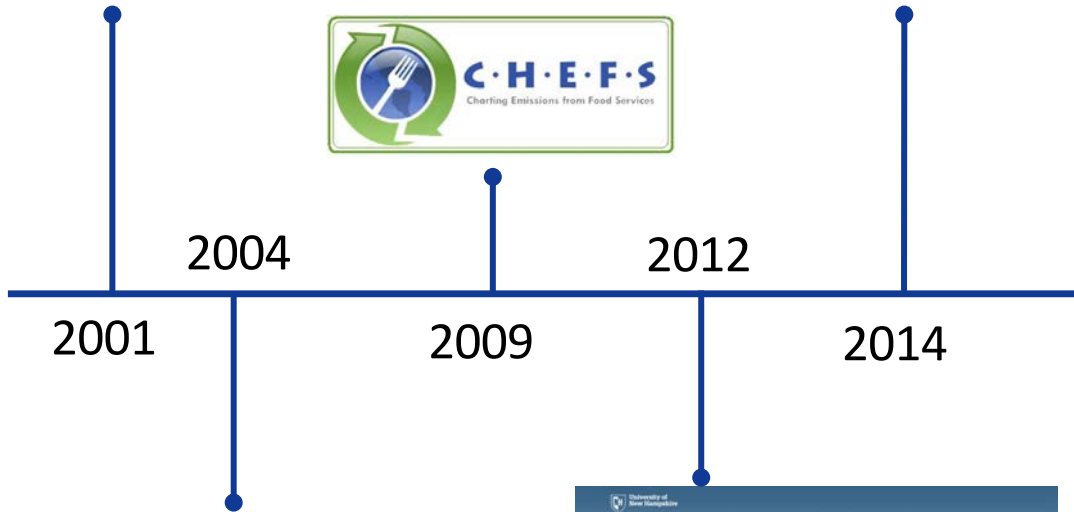


5 UNHSI's ability to support the tool



# How did we get here?

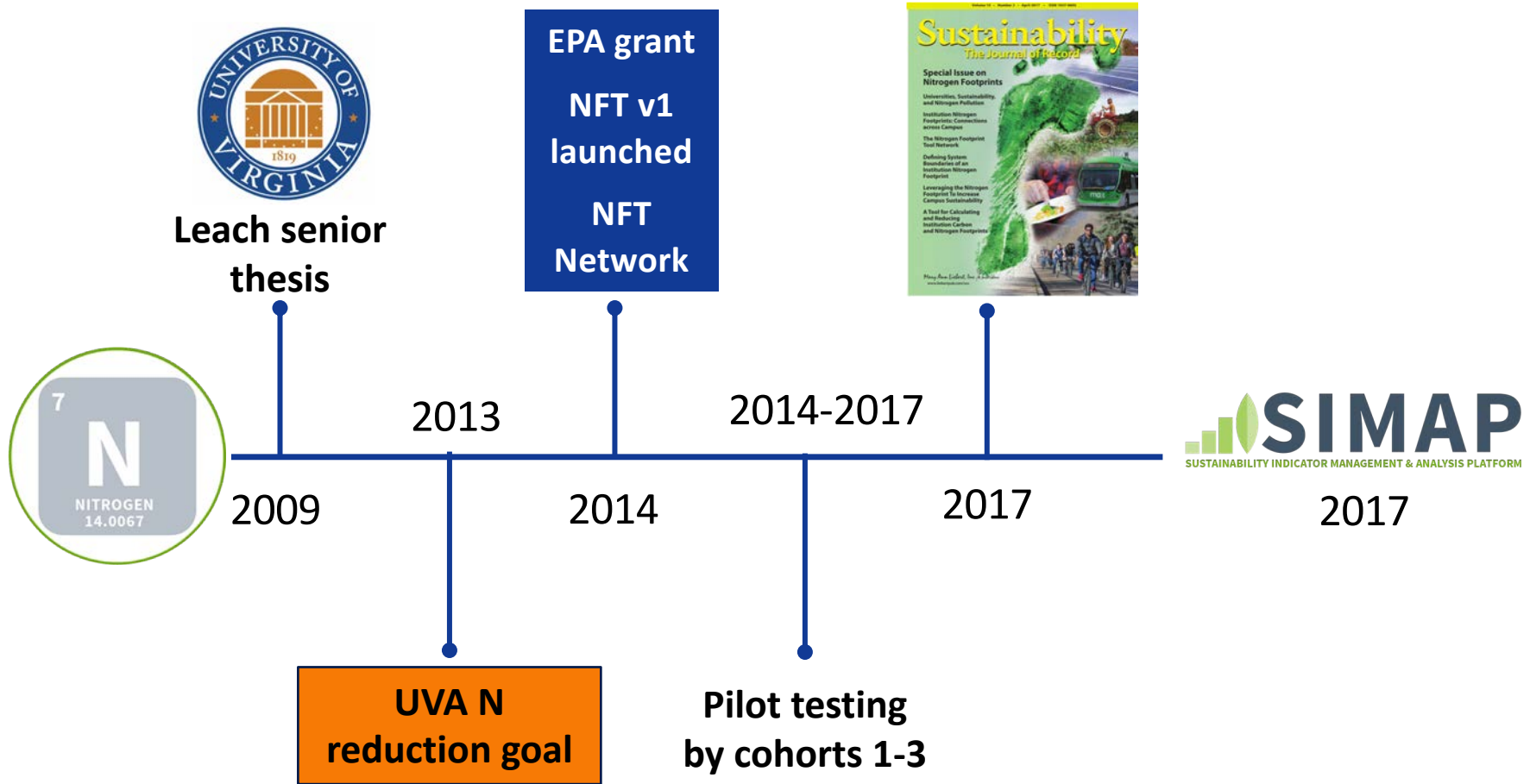
## Carbon



2017

# How did we get here?

## *Nitrogen*



# Why do we care about nitrogen?

## Benefits

Necessary for life  
Synthetic fertilizer provides  
unlimited N supply for food



## Drawbacks

Negative impacts to  
environmental & human health



## Challenge:

Optimize the use of nitrogen,  
while minimizing the negative impacts

# What is a nitrogen footprint?

A **nitrogen footprint** is the amount of reactive nitrogen released to the environment as a result of an entity's resource consumption



## 1 Food\*



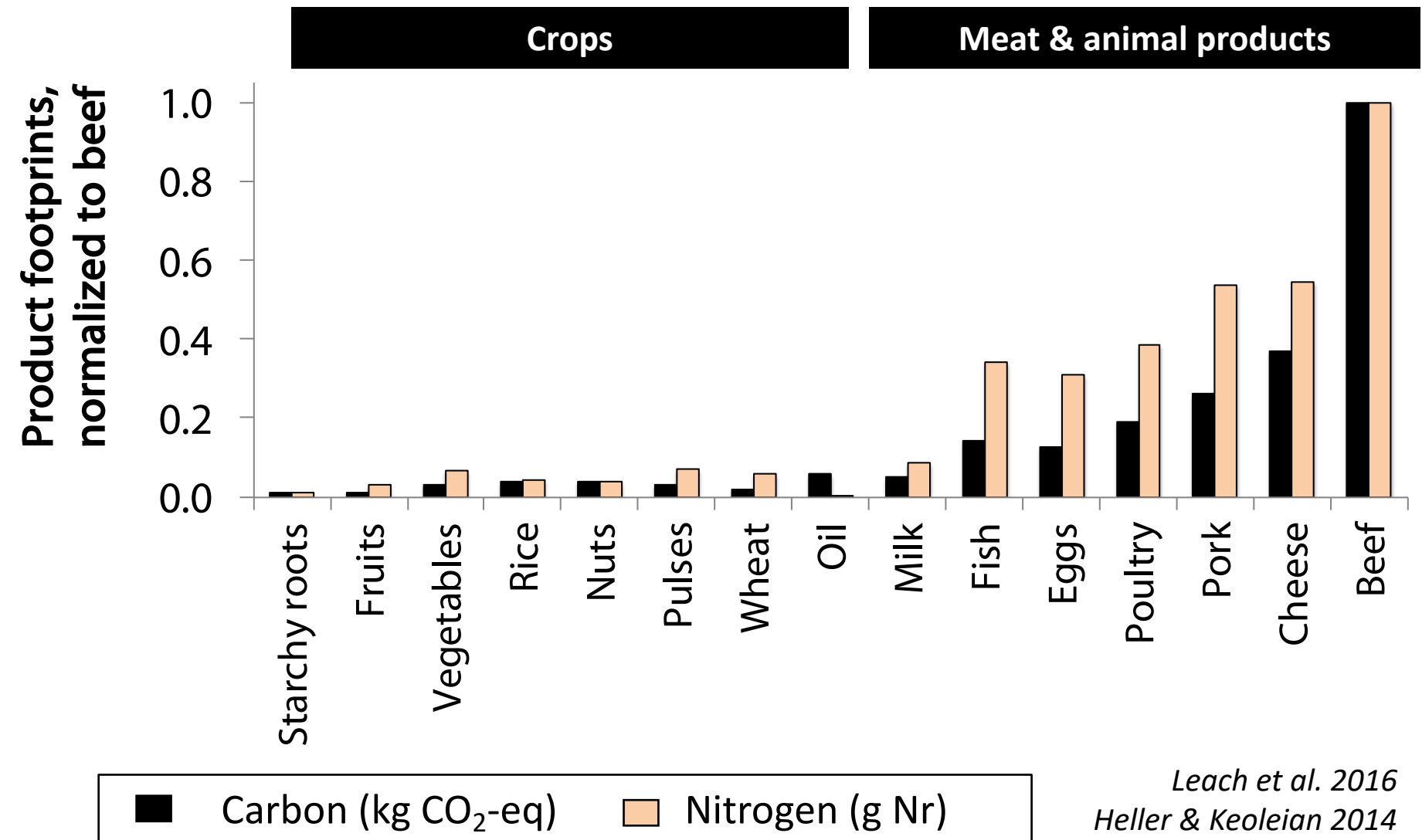
## 2 Energy



*\*Food consumption  
and production*



# Carbon & nitrogen footprint of food



**Consistent trends across C & N footprints**

## SIMPLIFYING SUSTAINABILITY DECISIONS

SIMAP<sup>®</sup> is a carbon and nitrogen-accounting platform that can track, analyze, and improve your campus-wide sustainability. Our proven algorithms, based on nearly two decades of work supporting campus inventories with the Campus Carbon Calculator, CarbonMAP and Nitrogen Footprint Tool, will help you:

- **Create a baseline**
- **Benchmark your performance**
- **Create reports**
- **Set goals**
- **Analyze your progress year over year**

**GET STARTED!**

## YOUR CAMPUS FOOTPRINT



### CARBON

CO<sub>2</sub> emissions from generating power, treating waste, daily commuting, and even the use of paper, contribute to a campus' carbon footprint. Reducing these greenhouse gas emissions will help slow the effects of climate change and global warming.



### NITROGEN

Reactive nitrogen can result from everyday activities like food service, energy use, transportation, and ground fertilizer. Reducing your nitrogen footprint can provide benefits to air and water quality, while helping prevent climate change.

## SUBSCRIPTION TIERS

While SIMAP offers basic functionality at no cost, we also offer two premium subscription levels that provide additional features at a nominal license fee. Our model allows UNH to cover the costs of continuing to offer and support this tool for the good of the entire campus-based sustainability community.

**BASIC (FREE)**

**TIER 1 (\$350):**

**TIER 2 (TBD):**

## NEWSFEED

**Graphs are now interactive!** Check them out on the [results tab](#) and review [the user guidance](#) for how to use them.

SIMAP data review appointment request and data review document are on our [Support page](#).

Thank you for taking the survey and for your feedback about what is working and what could be improved. We are analyzing the results now and will provide communications on what the development priorities will be and the timelines. We really appreciate your feedback!

["The Nitrogen Footprint Tool for Universities"](#) webinar presented on 6/27/18

New and simpler [data collection template](#) now available!

Please read [this new guidance](#) on the updated Scope 2 market-based purchased electricity calculations with residual emissions factors.

Check out the [FAQs](#) and [changes and updates](#).

Training Webinar Accounting for Renewable Energy in SIMAP: Recording posted on the [training page](#).

CarbonMAP users can still request your data [HERE](#).

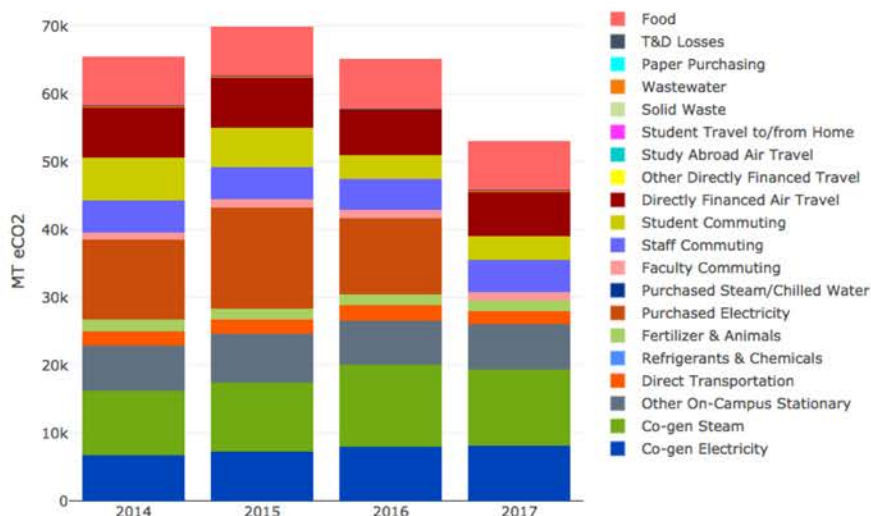
## 3. Results

**Footprints \***  Carbon  Nitrogen  
**Report Type \***  Total footprint  Scopes  Categories  Sources  Gas/pollutant  
**Scope 2 Method 3 \***  Market-Based  Location-Based  Custom Fuel Mix  
**Graph Type \***  Line  Bar

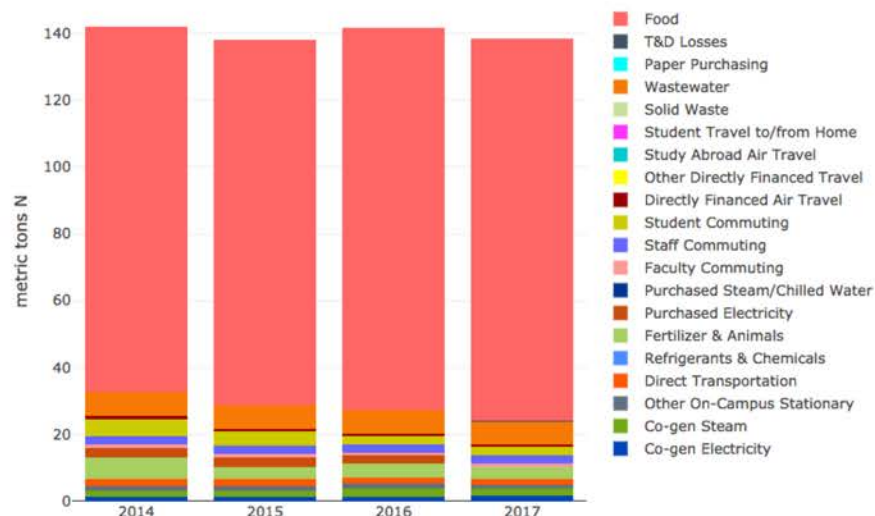
**Fiscal Year Range \*** 2014 - 2017  
**Normalization** None CALCULATE

[Get help with graphs](#)

Carbon



Nitrogen



Carbon

Fiscal Year	Scope	Source	CO2 (kg)	CO2 (MTCDE)	CH4 (kg)	CH4 (MTCDE)	N2O (kg)	N2O (MTCDE)	GHG MTCDE
2014	1	Co-gen Electricity	6,840,038	6,840.04	701	17.52	17	4.98	6,862.53
2014	1	Co-gen Steam	9,377,846	9,377.85	961	24.02	23	6.82	9,408.69

# Carbon and nitrogen footprint projections and scenarios



# What are projections and scenarios?

## Projections

- **Estimate future emissions based on:**
  - Population growth
  - Planned construction
  - More!

## Solutions/scenarios/projects

- **Estimate effects of management strategies on current or projected footprint:**
  - Changes in emissions
  - Cost of scenarios

**Both are important for accurate and informed goal setting!**

# What methods have been used?

## Projections

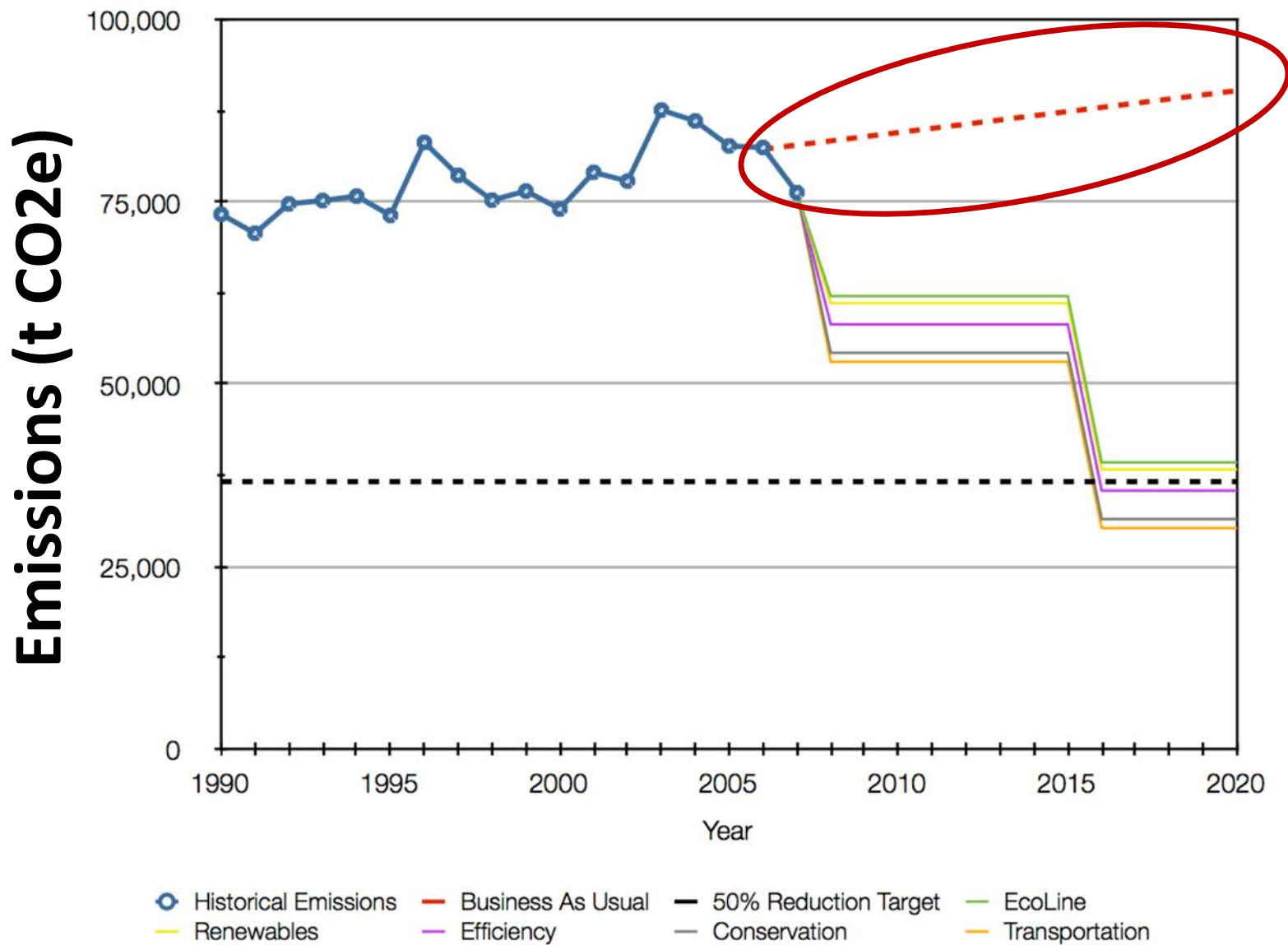
- **Methods for projecting in the CCC:**
  - Linear
  - Normalized by students
  - Normalized by square feet
  - Custom trends
  - Variable trends

## Solutions/scenarios/projects

- **Users entered detailed project\* data in CCC**
  - No “standard scenarios”
- **Metrics to view results in the CCC:**
  - Impact on C footprint
  - Life-cycle cost of project
  - Payback time of the project
  - Net present value (life-cycle cost/savings per ton of C)

CCC = Campus Carbon Calculator

# In the CCC: Projections



Projected Greenhouse Gas Reductions 1990–2020

# In the CCC: Weighing Solutions

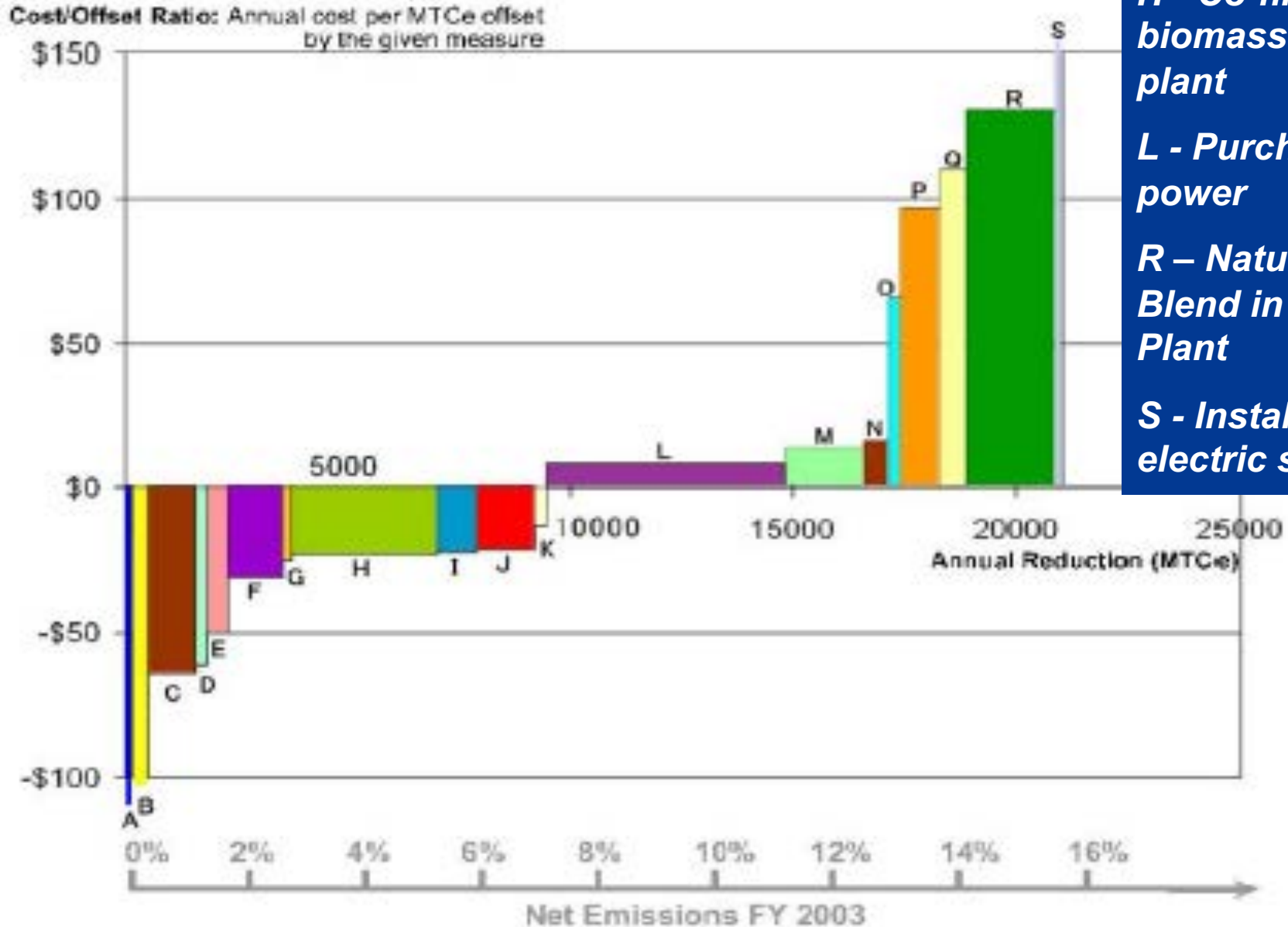
**A - Purchase high capacity buses**

**H - Co-fire biomass in steam plant**

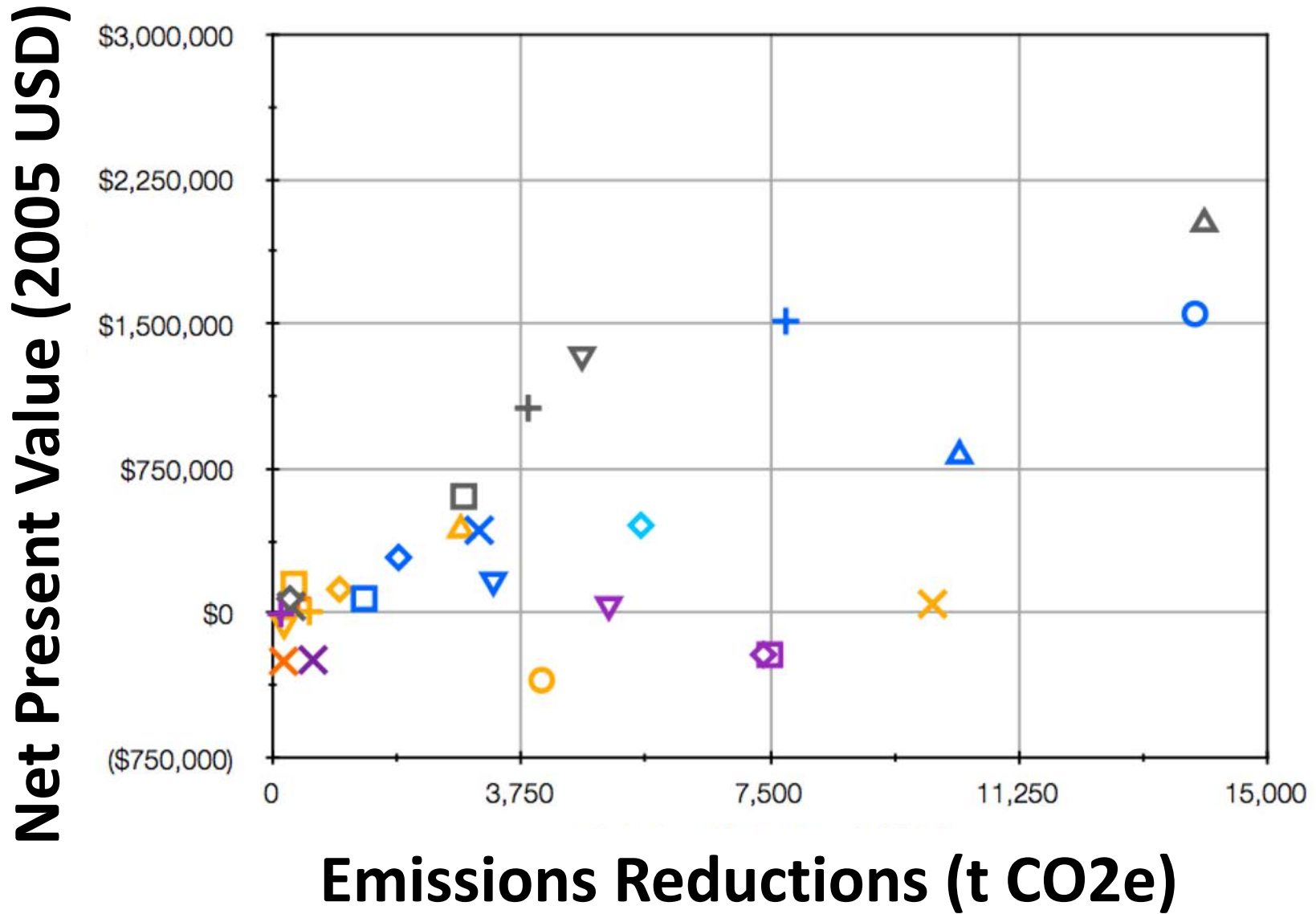
**L - Purchase wind power**

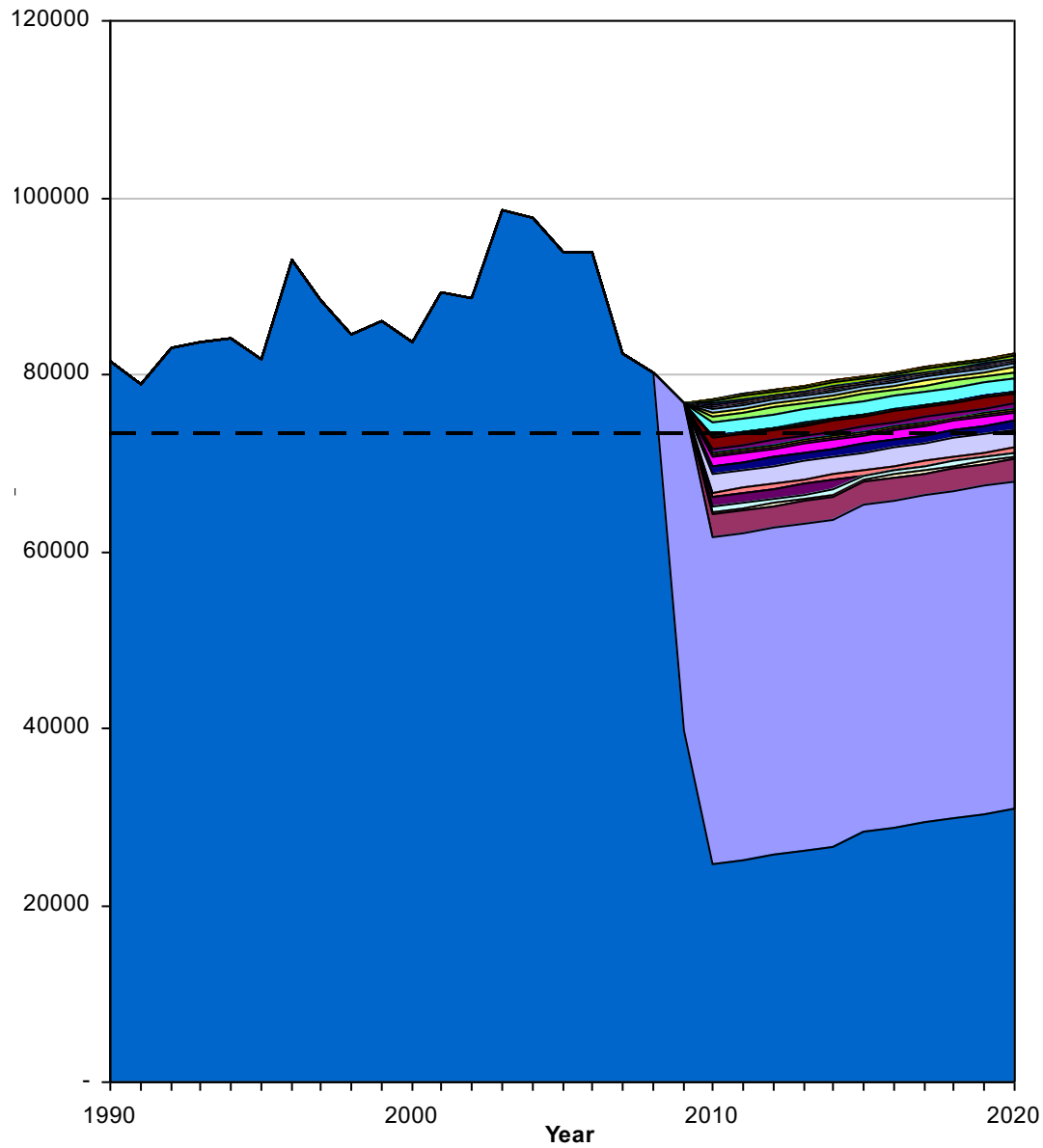
**R - Natural Gas Blend in Steam Plant**

**S - Install solar electric system**



# In the CCC: Weighing Solutions

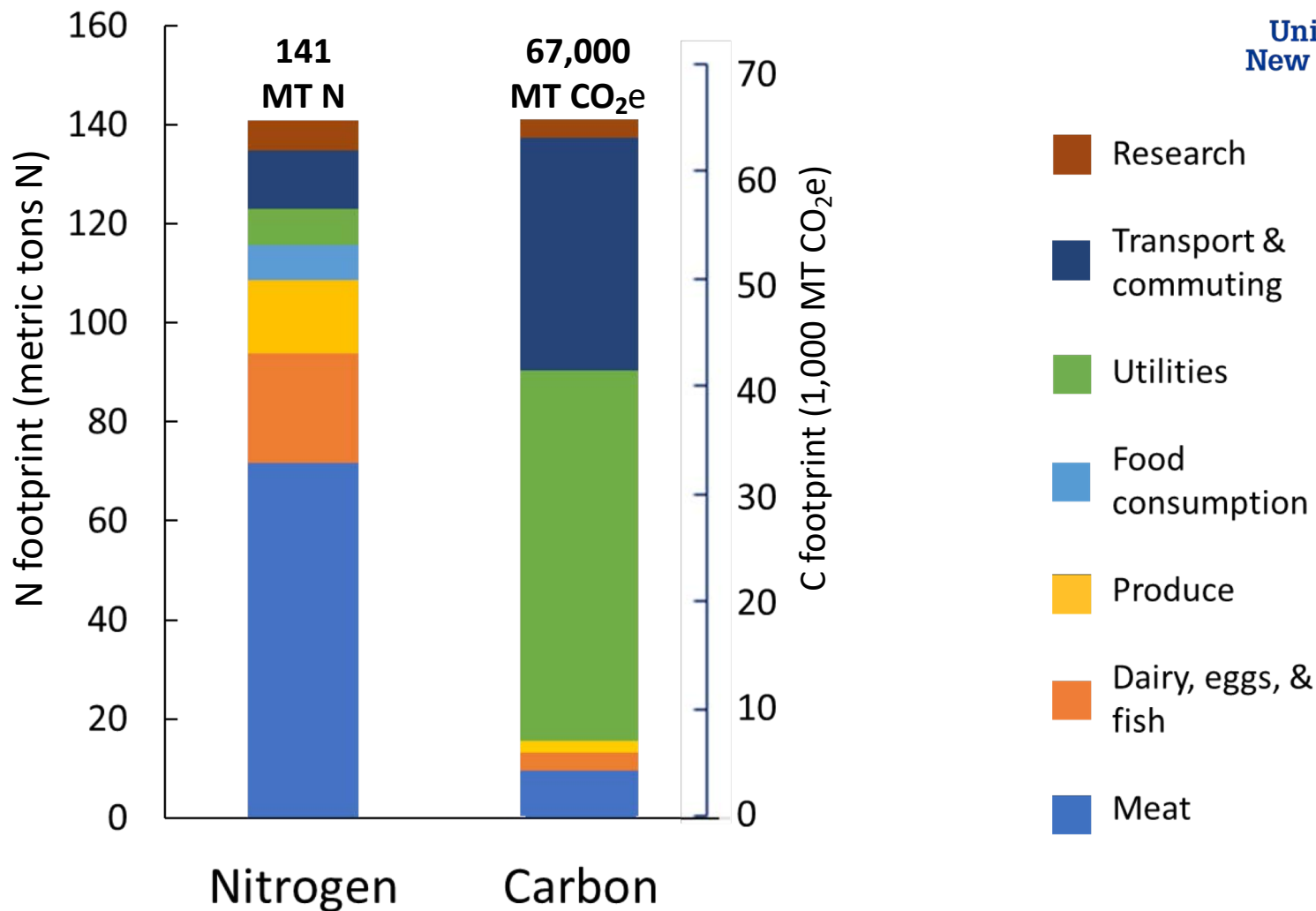




# Example at UNH



University of  
New Hampshire



Food is key sector for  
nitrogen

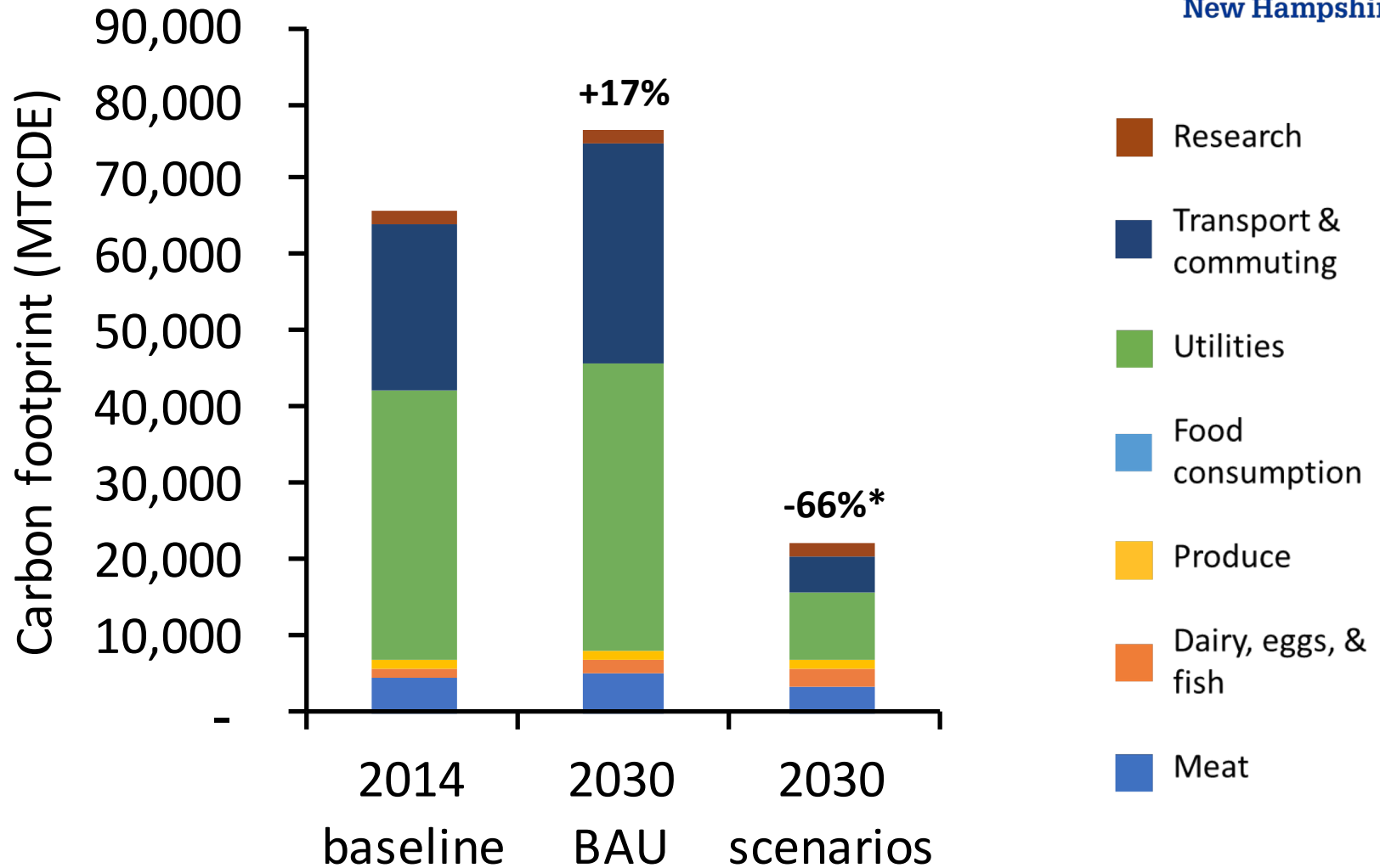
Energy sectors are key sector  
for carbon

# PROJECTIONS: UNH's C footprint in 2030



University of  
New Hampshire

*Assumes 2% growth rate for energy, linear population projection for food (0.7%)*



\*Relative to 2014 footprint

\*When compared to 2001 C baseline, reduction is 71%

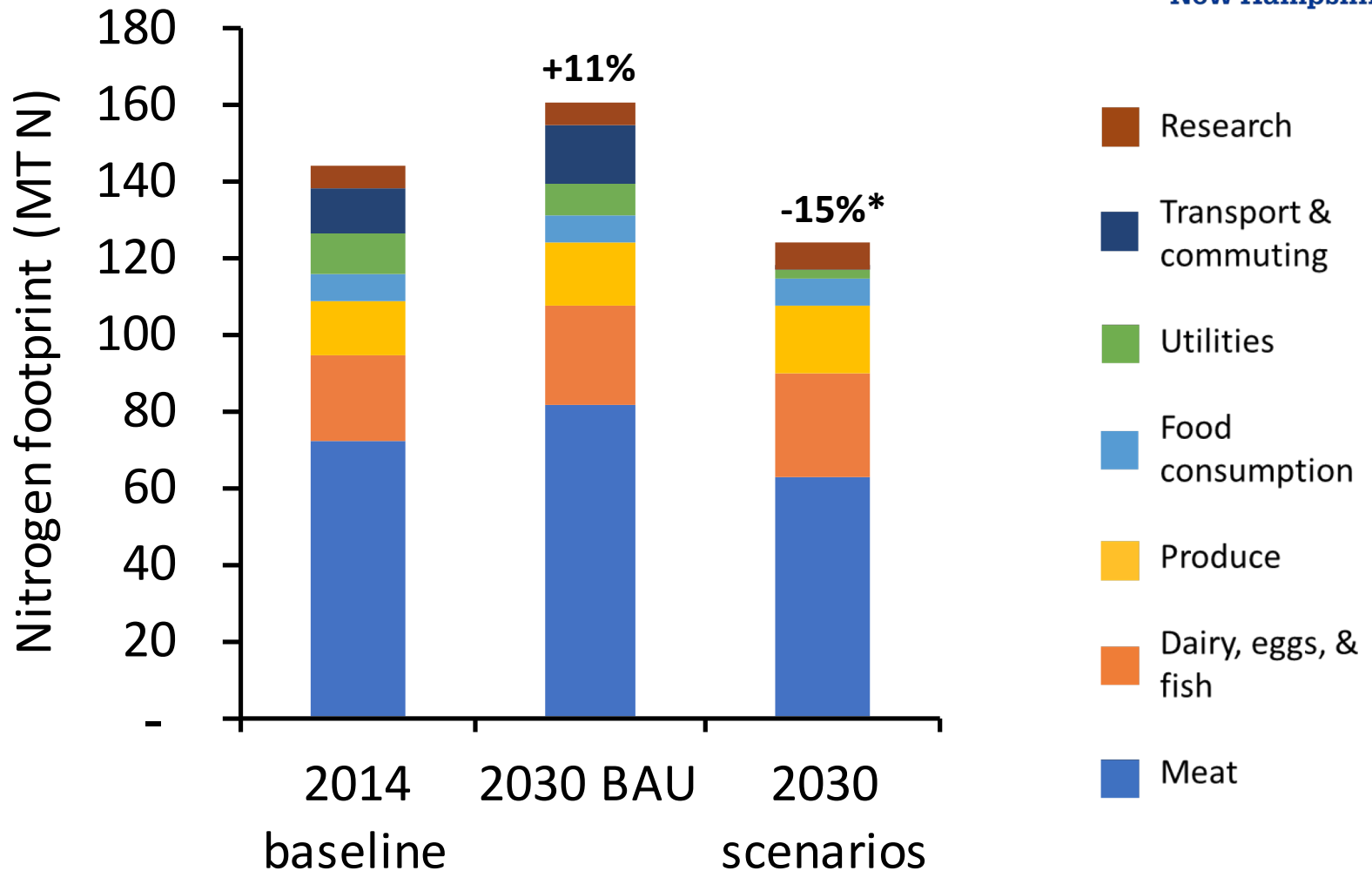
BAU = Business As Usual

# PROJECTIONS: UNH's N footprint in 2030



University of  
New Hampshire

*Assumes 2% growth rate for energy, linear population projection for food (0.7%)*



\*Relative to baseline (2014).

\*C footprint goal + feasible food scenarios shown

BAU = Business As Usual

# Next steps for projections and scenarios in SIMAP:

- Conducted survey in spring/summer
  - *More feedback welcome!*
- Beginning development
- Beta testing in early 2019



**What can you do in the meantime?  
Use our Excel scenario templates!**

# Food scenarios template

## Food Projections & Solutions Template



**Updated: 8 June 2018**

### What this template provides

You can use this template to project your SIMAP carbon and nitrogen footprint results to a projection year. You can then run the following food scenarios: vegetarian meal replacement, up to 4 food category replacements, custom food replacement, and local food replacement, and diverting food waste.

### How to use this template

#### **Enter SIMAP data tab**

Copy-paste your exported data from SIMAP. This will be used for your baseline C and N footprint and food calculations. See the tab for detailed instructions.

#### **Select projections and scenarios tab**

Select how you would like to project your data. There are different selections for non-food data and food data.  
Select your scenario input data (e.g., % vegetarian meals, % replacement of food categories).

#### **View projections and scenarios tab**

# Energy scenarios template



## Energy Projections and Solutions Template



Prepared by:

Andrew Pettit, Libby Milo, Izzy Castner, Allison Leach, Jim Galloway, and the UVA Office for Sustainability  
University of Virginia

### Introduction

This template is intended to help users make decisions on energy reduction strategies to minimize both GHG and N losses to the environment.

#### This template provides:

- 1) Inventory your organization's Utility and Transportation reduction strategies.
- 2) Calculate the Nitrogen co-benefits from these reduction strategies.

### Navigation

This color scheme is used throughout the template to indicate which cells to interact with.

	Do not enter data here
	Enter copy and pasted data here
	Enter customized data here

### Instructions Overview

#### Downloads from SIMAP:

1. Annual Report Carbon: Go to SIMAP "Reports" tab -> Chose "annual report", "carbon"-> Type in baseline year
2. Annual Report Nitrogen: Go to SIMAP "Reports" tab -> Chose "

Questions about  
projections and scenarios?



# Part 2:

## Integrated planning strategies



**Alley Leach**  
University of New Hampshire  
Sustainability Institute

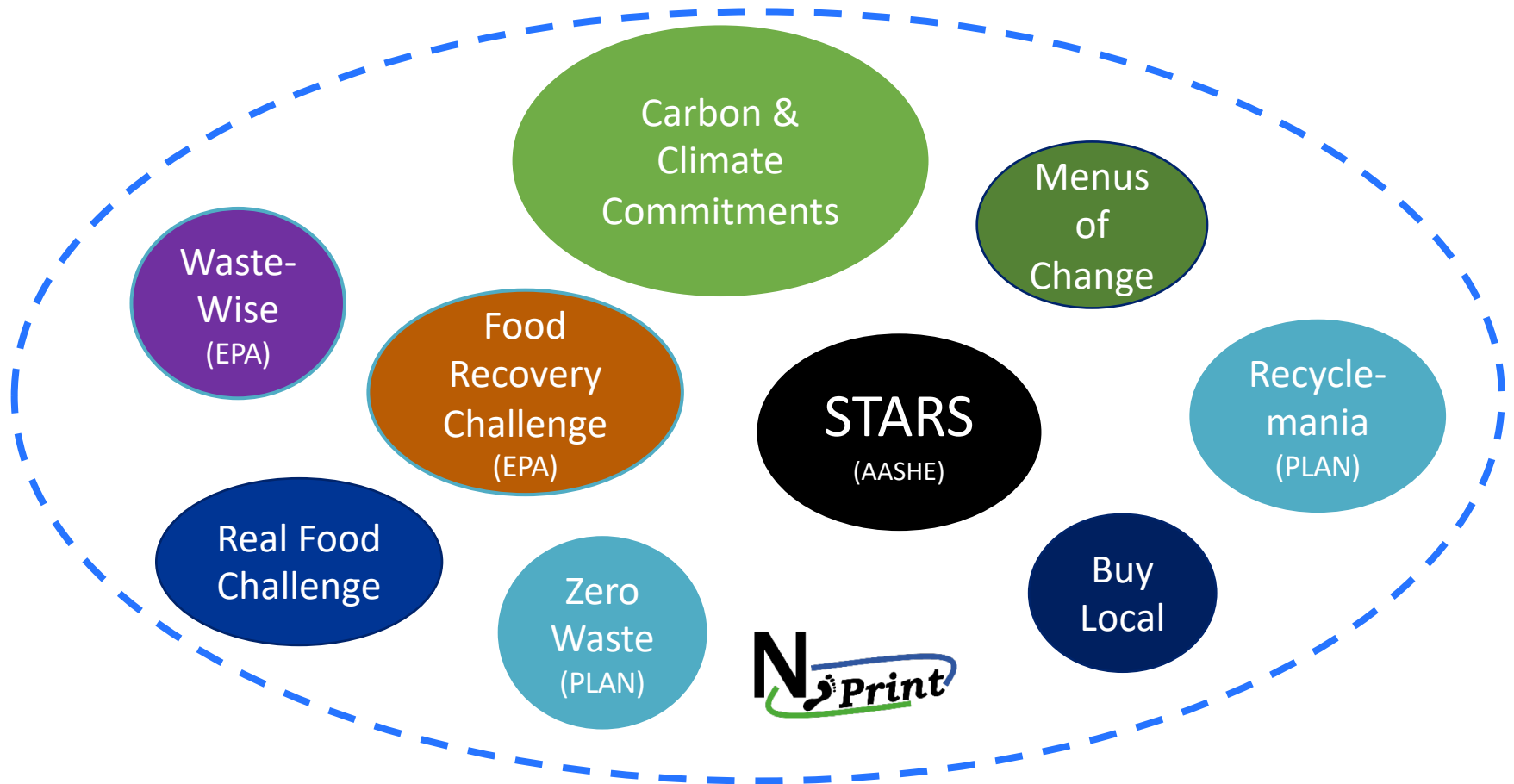


University of  
New Hampshire

# Questions for proposing C+N goal

1. What **other sustainability goals** are in place or planned?
2. At **what level** should the goal be approved (e.g., governing body, university)?
3. How should the goal be **framed** (e.g., overall, scopes)?
4. What should the **goal year** be?
5. What should the **% reduction** goal be?

# 1. What other sustainability goals are in place or planned?



## 2. At what level should the goal be approved?

NO GOAL

1. **Research exercise:** Internal stand-alone N footprint calculations and/or goal
2. **Grassroots action:** No goal, but working with stakeholders to push reduction strategies
3. **N benefits:** No goal, but N benefits mentioned in other plans

GOAL

4. **Goal based on existing plans**
5. **New goal approved by governing body**

*Lower  
commitment*



*Higher  
commitment*

# 3. How should the goal be framed?

- **Overall goal**

- A single reduction goal for the overall N footprint

- **Per capita/normalized goal**

- Reduction goal(s) normalized to campus users

- **Scope goals**

- Separate reduction goals for scope 1+2 (local) and scope 3 (not local)

- **Sector goals**

- Separate goals for energy, transit, food, etc.

## Other questions to consider:

4. What should the **baseline year** and **goal year** be?
5. What should the **% reduction goal** be?



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# The University of Virginia's Nitrogen Action Plan

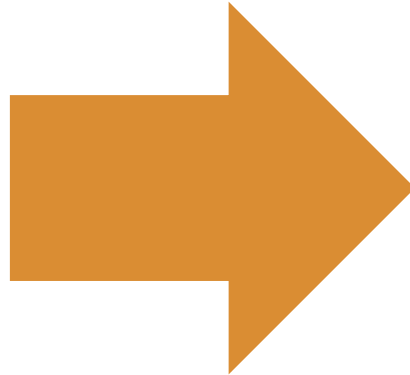
Elizabeth Dukes



# From goal setting to action plans at UVA

## Goal setting

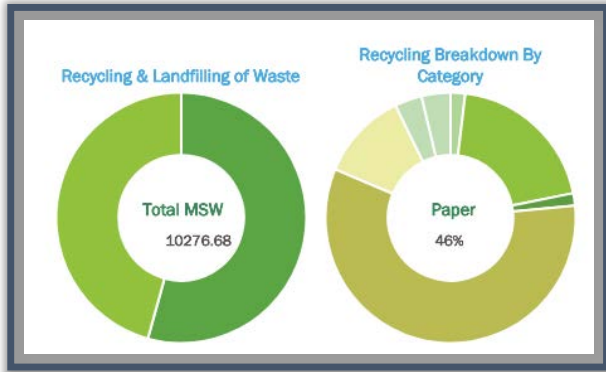
1. Carbon (2009)
2. Nitrogen (2010)
3. Water (2010)
4. Materials (2014)
5. And more!



## Action plans

1. Greenhouse Gas (2017)
2. Nitrogen (2018)
3. Materials (2018)
4. Sustainable food (2018)
5. And more!

# Sustainability Goals and Action Plans at the University of Virginia



**Materials  
Action Plan**

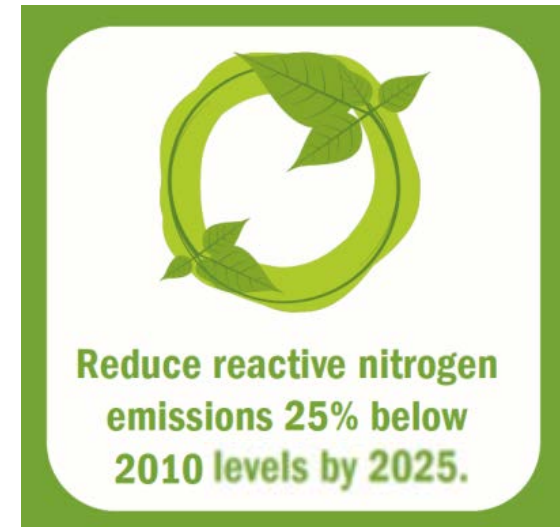


**Greenhouse  
Gas Action Plan**



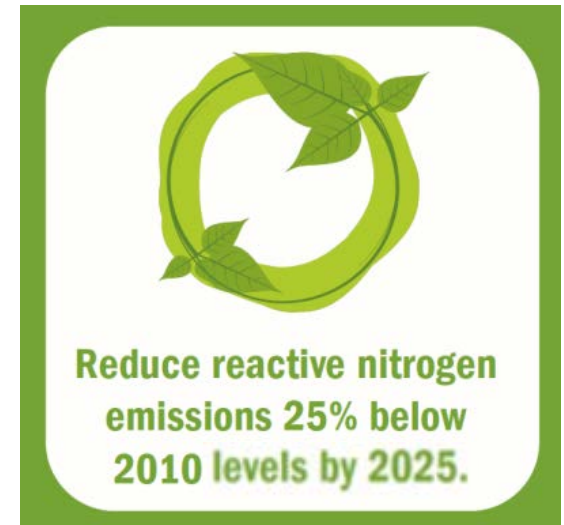
**Sustainable Food  
Action Plan**

**Nitrogen (N) Action Plan**

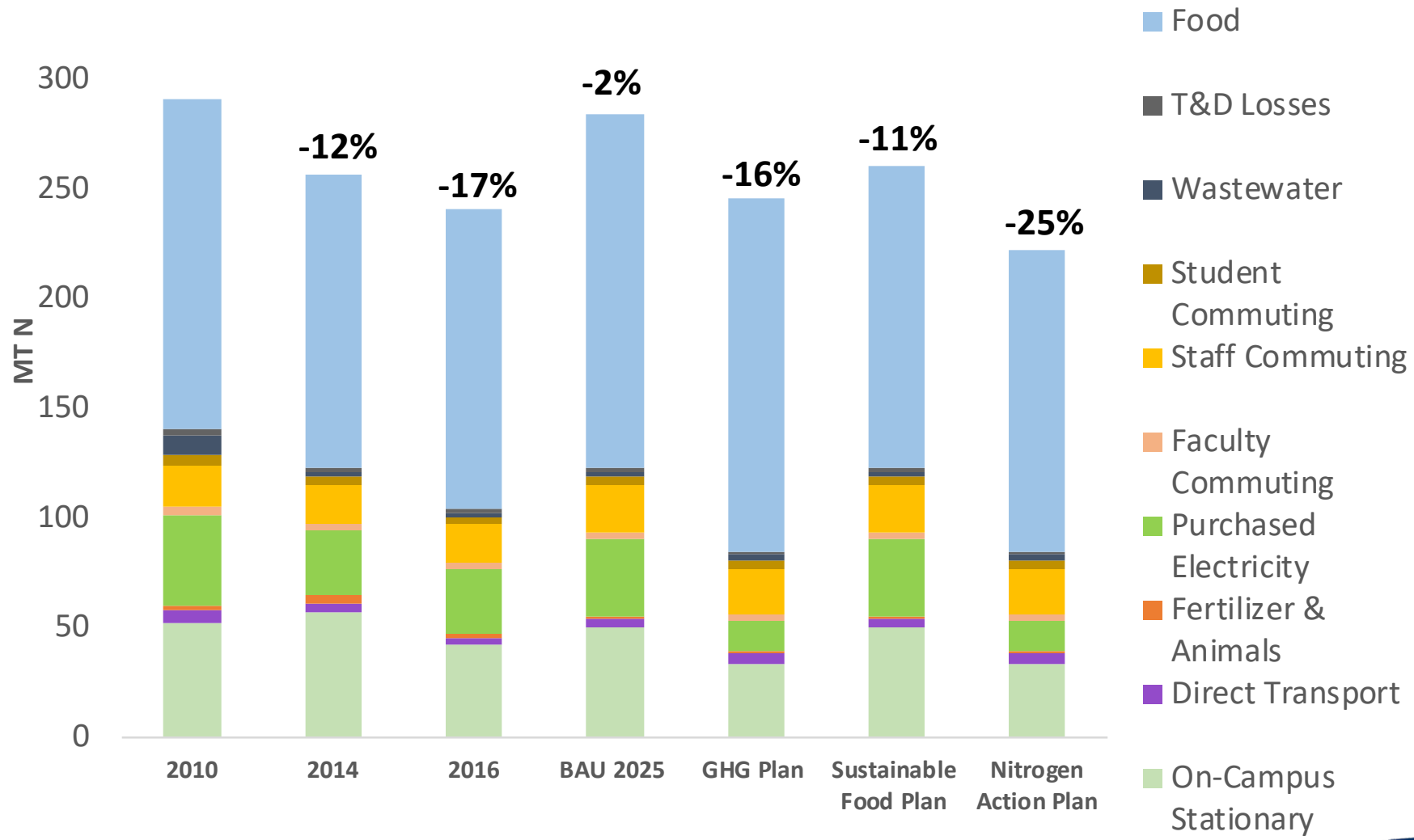


# What's Included in the N Action Plan?

1. Reductions from GHG Action Plan
  - a) Purchased Electricity
  - b) On-site utilities
  - c) Transportation
2. Reductions from Sustainable Food Action Plan
  - a) Increase vegetarian meals
  - b) Increase local purchasing
  - c) Opening plant-based café
3. Reductions from Materials Action Plan
  - a) Composting waste
4. Other specific N scenarios
  - a) Higher reductions in utilities sectors
  - b) More stringent meat reduction strategies in food sectors
  - c) Offsets for N



# UVA's Nitrogen Footprint: Action Plans Combined



# Take-aways for UVA's Nitrogen Action Plan

1. Current action plans strategies will allow UVA to reach 25% reduction goal.
2. Collaboration with multiple sectors at the university (dining, facilities, health system, etc.) will reduce N footprint and meet other goals!



# A climate resilience plan at the University of New Hampshire

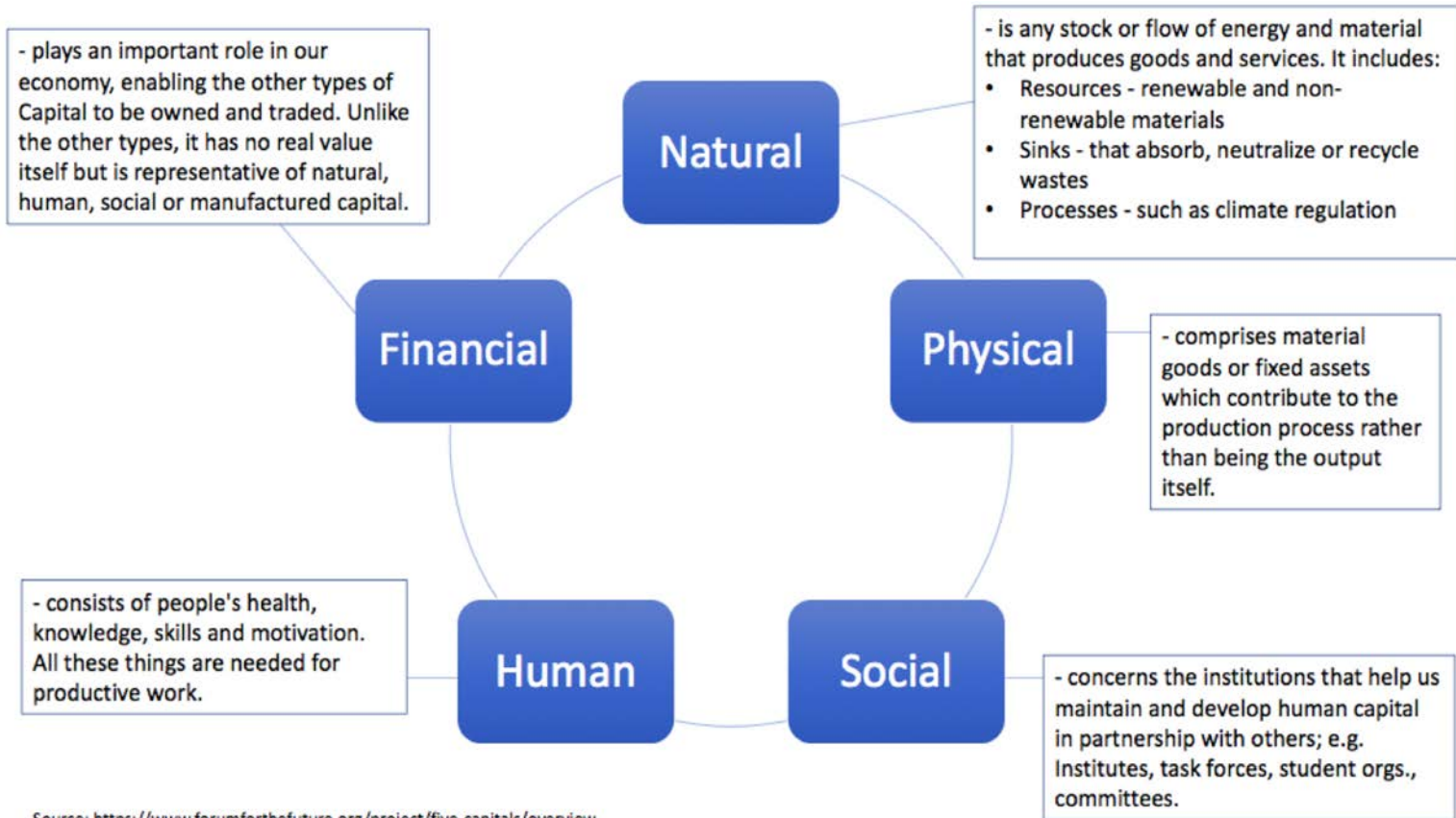


**Jennifer Andrews**  
University of New Hampshire  
Sustainability Institute



University of  
New Hampshire

# Framing Resilience: “Five Capitals” Model



Source: <https://www.forumforthefuture.org/project/five-capitals/overview>



# Findings: Priority Opportunities

- Use improved understanding of needs to improve social capital/systems to drive change in other capitals, primarily by working to break down silos and ensure collaborative, inclusive, transparent and effective processes
- **Better communication and outreach**
- **Continue/enhance student engagement**
- Add community representatives to Task Forces
- Water conservation – demand/summer, \$
- **Promote active transportation**
- **Update WildCAP to meet/exceed GHG reduction goals**
- Land conservation policies in light of development pressure
- **Updated and implement Landscape Master Plan**
- **Accelerate sustainable food initiatives**
- Provide more interpersonal resilience skills training for students, staff, faculty
- Research: groundwater mapping
- **Research: supply chains**
- **Focus on indicator data collection**



# The Five Capitals: Connected to Every Aspect of Sustainability

## Physical

- Energy and GHG planning
- Buildings, deferred maintenance, and codes and zoning;
- Greening of fleets, streets (i.e. storm water) and TDM;
- Supply chains for food, water, waste disposal

## Human

- “Healthy UNH”—including Menus of Change
- Learning outcomes
- Research and engaged scholarship
- “Campus climate”
- Sustainable food systems
- Inclusion and diversity

## Natural/Ecological

- Landscape master plan update
- Nitrogen footprint reduction
- Land policy committee: zoning, land use planning

## Social

- Coordination and planning
- Social justice and racial equity

## Financial

- Move to life-cycle cost accounting in planning
- Housing affordability
- Living wages
- Staffing and employment
- Corporate social responsibility, social innovation
- Sustainable investment



# Summary

## Projections and scenarios

- Important for informed and accurate goal setting
- Excel templates available now
- Beta testing in early 2019

## Goal setting

- Lots of options for integrated carbon and nitrogen goals
- Integrated goal setting is win-win for sustainability initiatives

[unhsimap.org](http://unhsimap.org)

