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# **Higher Education Institutions as Laboratories**<sup>4</sup>

Higher education institutions have the capital, intellect, and opportunity to implement sustainability and climate mitigation initiatives.



The United States produces ~ 25% of the world's greenhouse gas emissions.<sup>5</sup> Higher education institutions produce ~ 2% of the United States' greenhouse gas emissions.<sup>2</sup>



Higher education institutions are at the forefront of sustainability science. Professionals and students studying the environmental, economic, and societal aspects of sustainability are located within a centralized area.



Higher education institutions have the purchasing power to support sustainability-driven markets. Each year, higher education institutions spend ~ \$14 billion on energy.<sup>1</sup> Higher education institutions have an annual operational budget of ~ \$350 billion which is ~ 2.5% of the United States' gross domestic product.

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As semi-autonomous communities, higher education institutions have opportunities to experiment with and implement different sustainability practices.<sup>3</sup>

Successful sustainability practices and policies can be scaled up to other communities.

#### **Sustainability at UNH** Since the creation of its Sustainability Institute in 1997, the University of New Hampshire has been a leader in higher education sustainability within the United States. In 2017, UNH achieved its interim climate action goal of reducing its greenhouse gas emissions 50% below its 2001 baseline. In light of the Intergovernmental Panel on Climate Change (IPCC) 2018 Report, UNH is setting new goals of reducing its greenhouse gas emissions 45% below its 2010 baseline and achieving carbon neutrality by 2050. In the winter of 2019-2020, UNH will be releasing its third climate action plan "WildCAP" which will detail how the university will work towards these goals. 120,000 (CDE) 100,000 (MT Scope 3 Scope ] 80,000 Su Emissio 60,000 Gas 40,000 Greenhouse 45% below 2010 baseline\* 20,000 03 04 05 06 07 08 09 14 15 16 17 12 13 01 02 **Fiscal Year (2001-2017)** Source 1 – direct emissions from UNH facilities WildCAP 2009 WildCAP 2014 Source 2 – emissions from purchased electricity Source 3 – selected indirect emissions (i.e. commuting, business travel)



# WildCAP Areas of Focus

### I am researching the following topics for inclusion into UNH's third climate action plan "WildCAP 2019."



Updating planning, design, and construction guidelines for new construction and major building renovations to improve campus energy efficiency and reduce greenhouse gas emissions



Incorporating the cost of carbon into planning, budgeting, and operations to frame resource allocation decisions, incent emissions reductions, raise revenue for sustainability work, and prepare for an external price on carbon



Researching carbon capture and utilization technologies to offset greenhouse gas emissions from, ideally, source three emissions



Improving outreach and engagement efforts to integrate students into campus climate planning and foster sustainable behaviors and attitudes among faculty, staff, and students

# Challenges

Grid Energy – the energy source and carbon intensity of electricity generation within the New England Grid

Energy Economics and Policy – the implementation of an external carbon tax, the improvement of state building codes, the price of different energy sources and/or installations

Technology Changes – the creation and viability of carbon capture and energy efficient technologies

**Growth** – the number new buildings (especially air-conditioned spaces)

Climate Impacts – the number of heating and cooling degree days, the frequency and severity of storms, and the degree of sea level rise

Time Span – the long turnover time of building infrastructure, but short time span of analyzed capital investments



# Findings on Sustainable Building Standards

Based on an inventory of 18 universities and colleges within the United States, there are four sustainable planning, design, and construction approaches that higher education institutions typically follow for high performance "green" buildings.



Augmented Leadership in Energy and Environmental Design Certification Standards – achieve LEED Silver or Gold certification

Stretch Standards - exceed ASHRAE 90.1 Standard, outperform state or city building code



**ENERGY STAF** 

Prescriptive Standards - install Energy Star appliances, equipment, products, and/or furnishings, achieve a specific energy-use intensity (EUI) or score on the Environmental Protection Agency's Portfolio Manager, evaluate the feasbility of utilizing renewable energy

State-Wide High Performance or Energy Conservation Standards – comply with or exceed pre-determined state/city high performance standards



# **Next Steps**

Interview architects commonly contracted by UNH for new building constructions and major building renovations.

Research internal carbon pricing, carbon capture and utilization technologies, and sustainability engagement and outreach.

# References

- **1** Environmental Protection Agency. 2002. "Community Culture and the Environment: A Guide to Understanding a Sense of Place. 2 National Wildlife Foundation. 2008. "Higher Education in a Warming World: The Business Case for Climate Leadership on Campus."
- 3 Second Nature. 2013. "Higher Education: Leading the Nation to a Safe and Secure Energy Future." 4 Strauss, B. H. 1996. "The Class of 2000 Report: Environmental Education, Practices and Activism on Campus."
- 5 United Nations Framework Convention on Climate Change. Annex 1: Greenhouse Gas Inventory Database





