Cornell's Goal of Achieving Carbon Neutrality by 2035

Cornell University | Oceanography

CORNELL VOTES! EVERY PERSON EVERY VOICE

Outline

1. History of events leading to Cornell's 2035 Climate Action Plan
   - **The important role of student activism**
   - **The importance of administrative leadership**
2. What will the finished plan look like?
   - Some current accomplishments
   - The timeline from present to 2035
3. Cost
4. Inspiring Leadership
5. **Two vital take-home points**

Section I

History of events leading to Cornell's 2035 Climate Action Plan

The important role of student activism

The importance of administrative leadership

Some Basic History…

Basic History…

2001. The **Kyoto Now! Student Organization** protested in front of Day Hall. After 3 days, **President Hunter Rawlings** relented and agreed to reduce Cornell's carbon emissions consistent with the Kyoto Protocol.

- **Cornell was the first university in the nation to commit to Kyoto Protocol emission reductions!!!**

2007. **President David Skorton** signed the ***American College & University Presidents Climate Commitment*** making Cornell a Charter Signatory

- **This committed Cornell to develop a plan** for becoming climate neutral. **President Skorton set a target date of 2050.**

2013. Recognizing the urgent need for climate action leadership, the **Faculty Senate** overwhelmingly passed a resolution **calling for the target date to be accelerated to 2035.**

2014. **Every other shared governance body* at Cornell** subsequently passed resolutions supporting the request for an accelerated 2035 climate action plan.
* ***Student Assembly : Graduate and Professional Student Assembly : Employee Assembly : University Assembly***

Basic History…

2014. After a year-long **review of cost and feasibility, Outgoing President David Skorton** announced *the new "**Goal**" of becoming carbon neutral by 2035.*

2015. **Provost Michael Kotlikoff and Cornell President Beth Garrett** asked their Senior Leadership Climate Action Group for a **Detailed Acceleration *Plan***.

2016. **Fall Semester, Provost Michael Kotlikoff received the detailed action plan for achieving carbon neutrality by 2035. And so began the effort in earnest to be carbon neutral by 2035.**

2017. President Martha Pollack announces her support for the 2035 climate action plan!

2019. **Sustainable Cornell Council (SCC) Established**

The Sustainable Cornell Council (SCC)

The SCC comprises three steering committees that will prioritize activities in specific areas and will work to engage broad participation from the campus community:

- **The Carbon Neutral Campus Committee** will advance the university's Climate Action Plan toward the goal of carbon neutrality for the Ithaca campus by 2035.
- **The Campus Operations Committee** will advance sustainability across campus operations, including food; land and water; buildings and energy; and materials management.
- **The Education and Engagement Committee** will promote the adoption of sustainable behaviors and advance sustainability and climate literacy opportunities for students, faculty and staff.

https://sustainablecampus.cornell.edu/our-leadership/governance/sustainable-cornell-council

http://news.cornell.edu/stories/2019/09/new-council-guide-campus-sustainability-climate-efforts

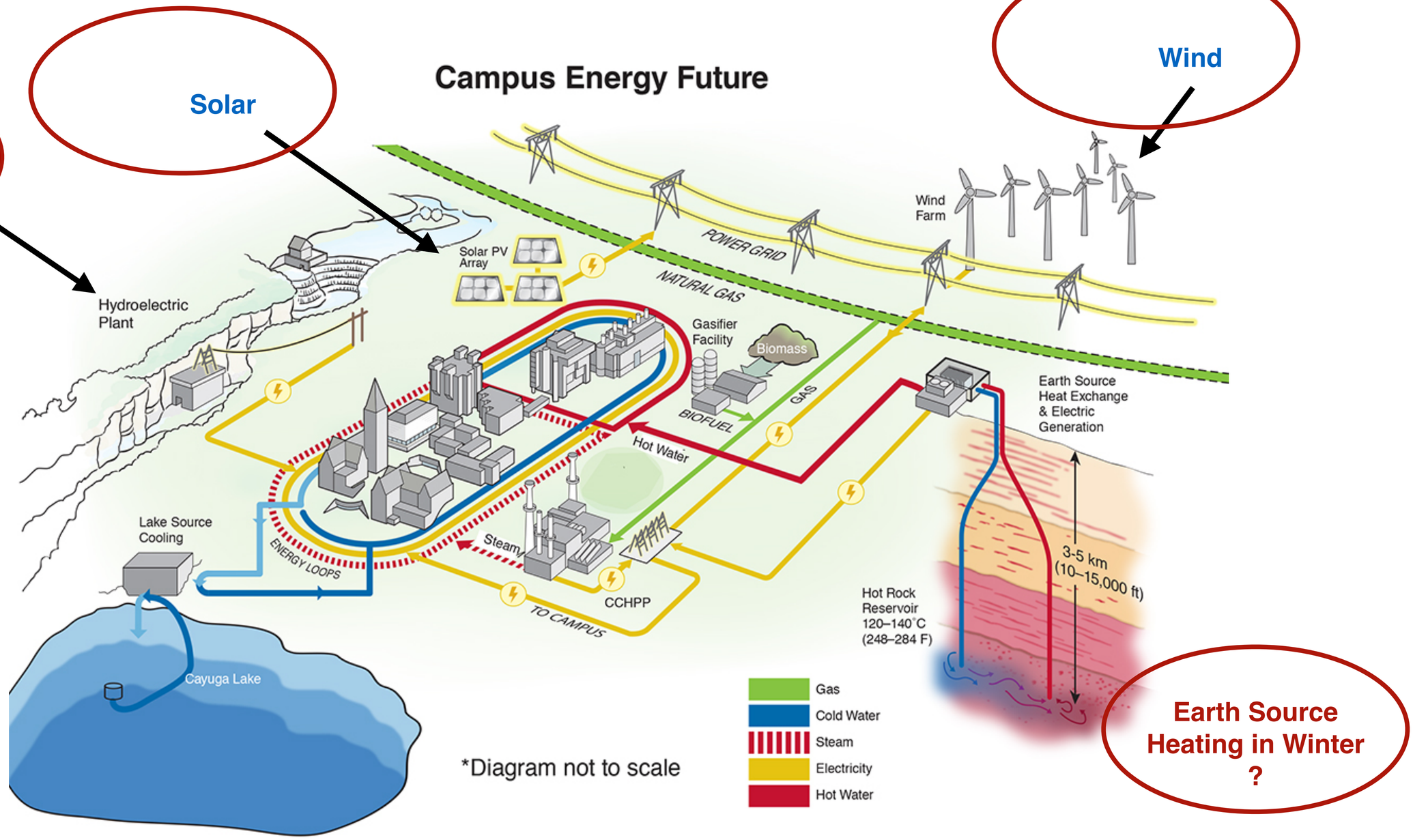
Section II

What Will The Finished Carbon Neutral Campus Look Like?

Water

Solar

Wind



Lake Source Cooling in Summer est. 2000

Earth Source Heating in Winter ?

Options For Heat and Electricity Supply…

Heating

- **Earth-Source Heat** (ESH): uses deep earth source (4-6 km)
- Ground-Source Heat Pump (GSHP): uses shallow ground source (400-500 feet)
- Air Source Heat Pump (ASHP)
- Biomass Combustion: to generate heat during peak loads

Electric

- **Wind, Water, and Solar**

What Has Already Been Done

- **15 solar arrays and a hydropower plant provide** 100% renewable electricity on sunny days, all year
- **Lake Source Cooling** provides 100% fossil-fuel-free renewable cooling to campus from Cayuga Lake
- **28 green buildings**, including 5 LEED Platinum Buildings with green roofing and solar arrays
- Grounds staff use a mobile solar trailer to power **fossil-fuel free landscaping equipment**

https://sustainablecampus.cornell.edu/sites/default/files/2022-07/2022.07 Cornell Sustainability Snapshot.pdf

- **Top Ivy League Institution in STARS* Rating** - with a Platinum rating

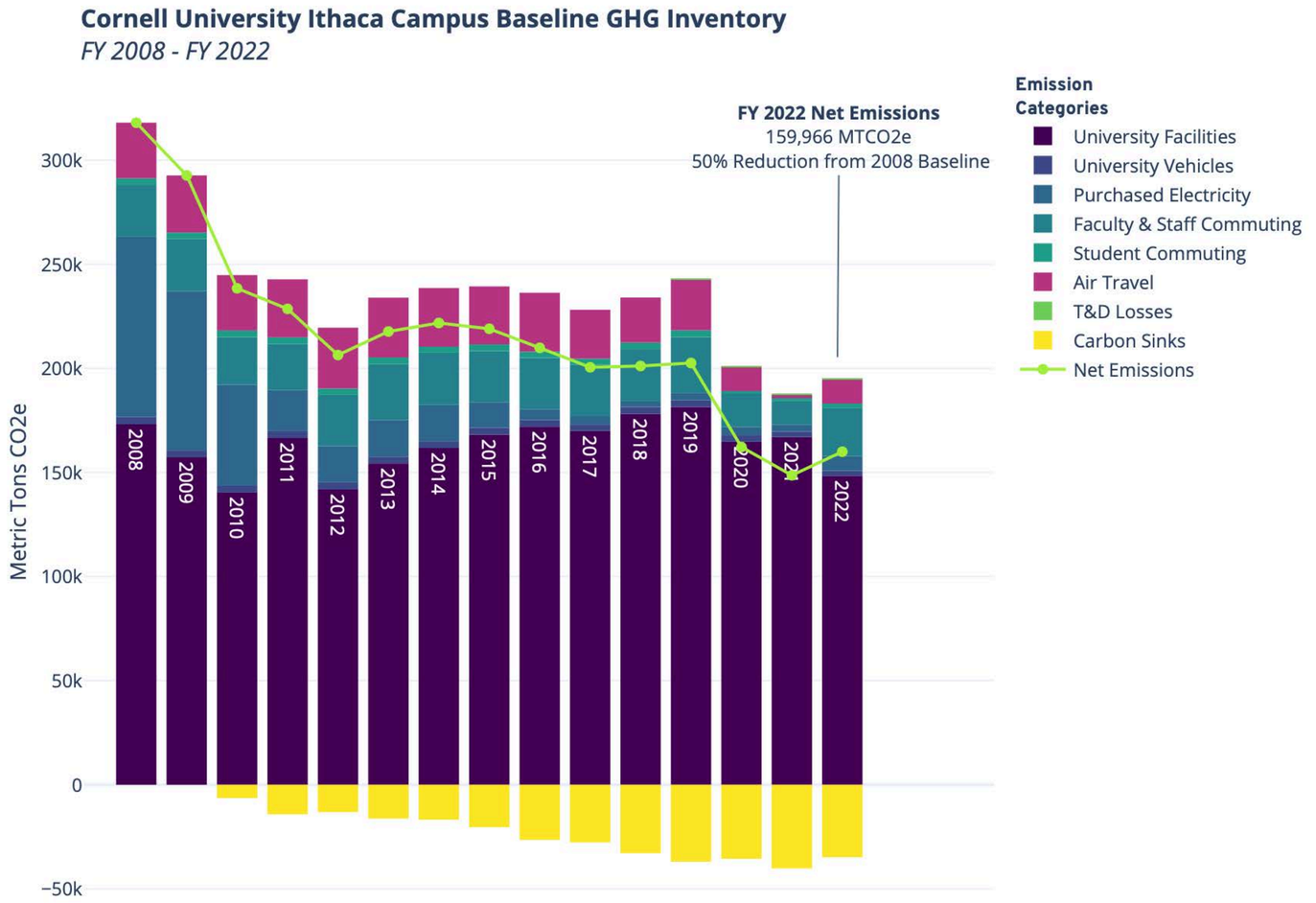
https://sustainablecampus.cornell.edu/our-leadership/annual-sustainability-reporting/sustainability-rankings-and-awards

* Sustainability Tracking, Assessment & Rating System

CO_2 Emissions Reduction Progress

Net onsite CO_2 emissions reduced by

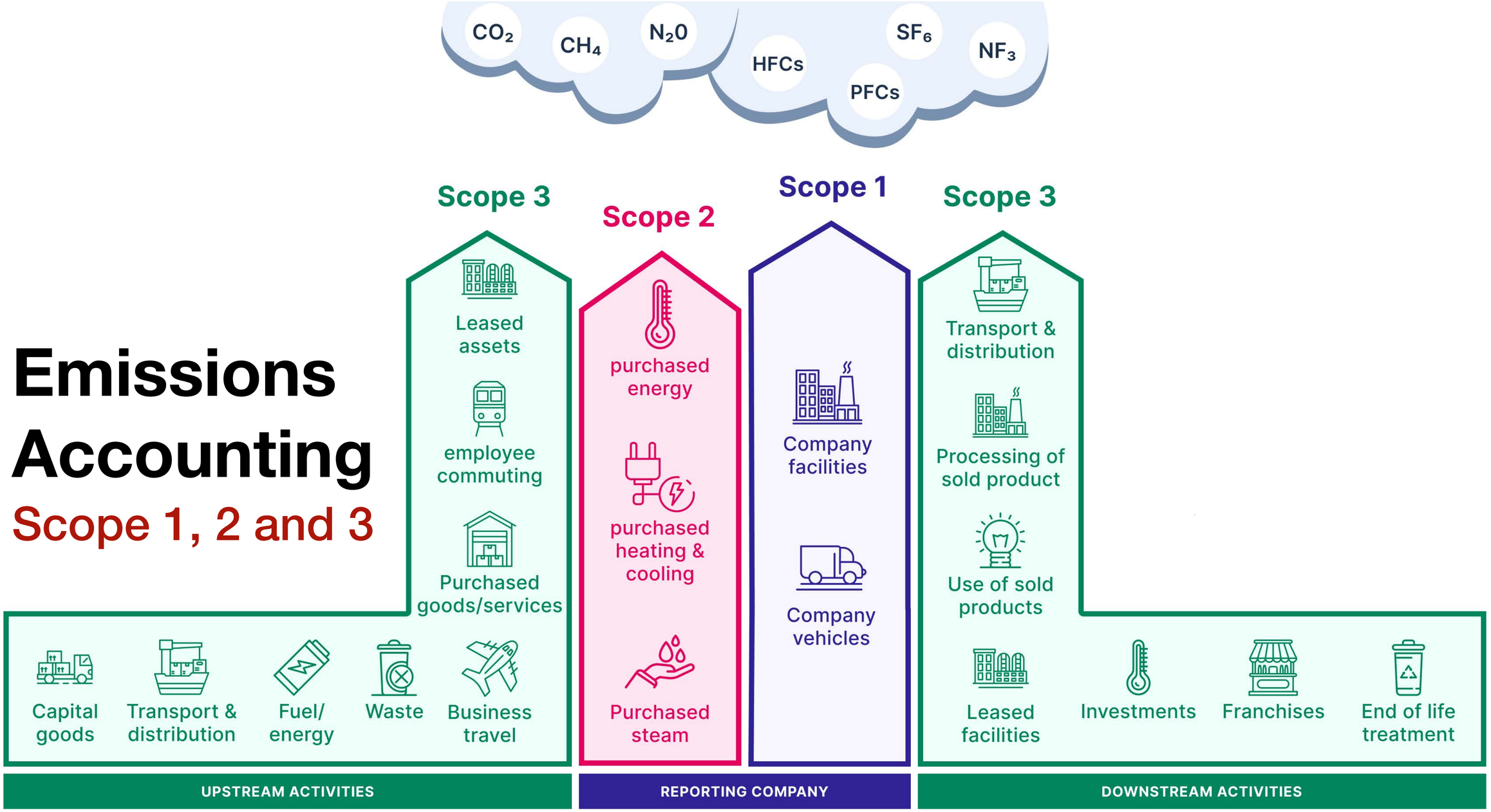
50% since 2008



https://sustainablecampus.cornell.edu/our-leadership/cap/ghg-inventory

Emissions Accounting

Scope 1, 2 and 3



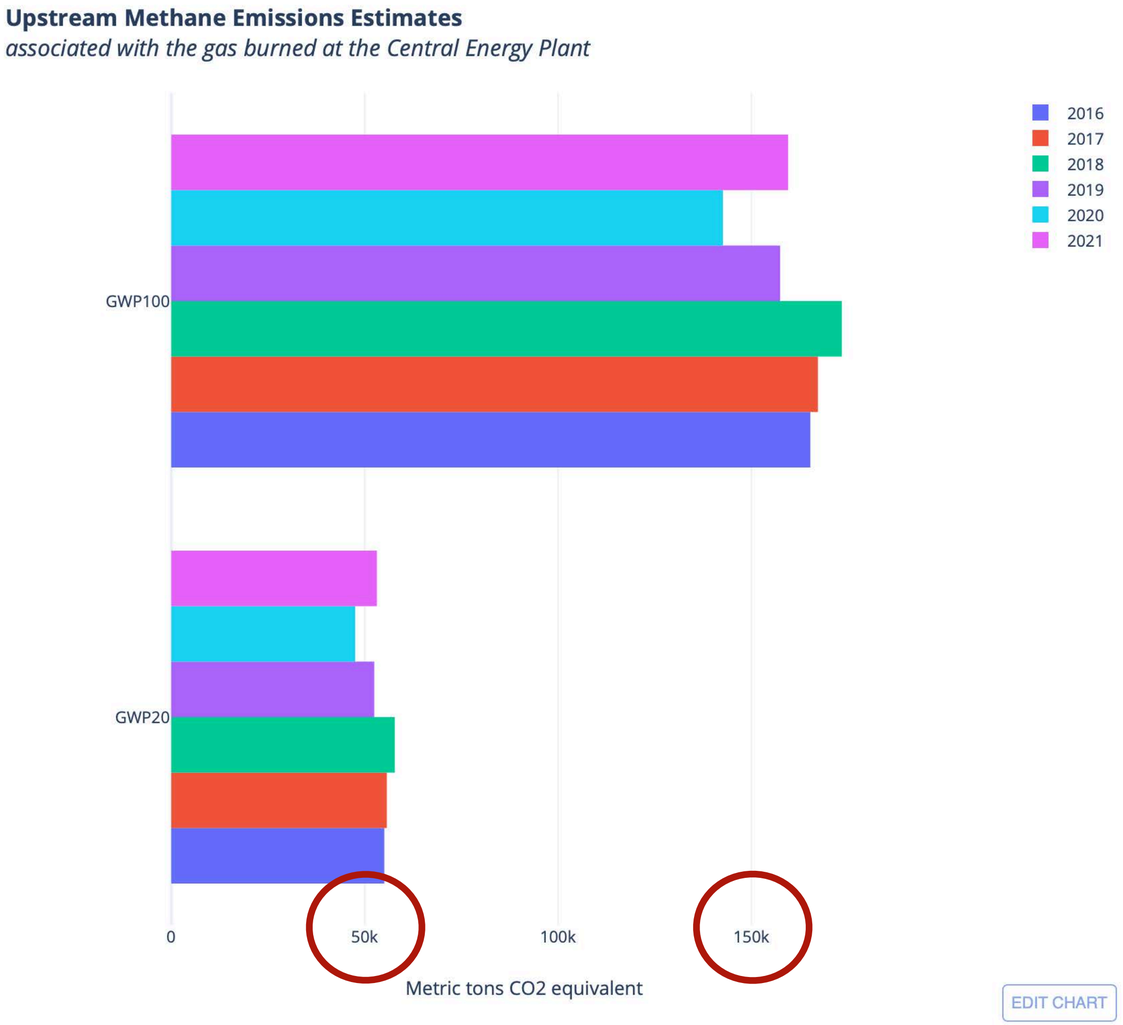
https://www.circularise.com/blogs/scope-1-2-3-emissions-explained

Additional GHG Inventories:
Upstream Fuel Activities (Scope 3)

Cornell has committed to accounting for **upstream additions of greenhouse gasses resulting from methane leaked** into the atmosphere via the fracking process and during transportation of the nature gas from Pensilvania to the Cornell power plant.

Accounting methods are for upstream methane are not well established.

Upstream methane leakage is currently estimated to be **between 50K and 160K Metric Tons of CO_2 equivalents (CO2e)** added to the atmosphere via upstream production and transport.



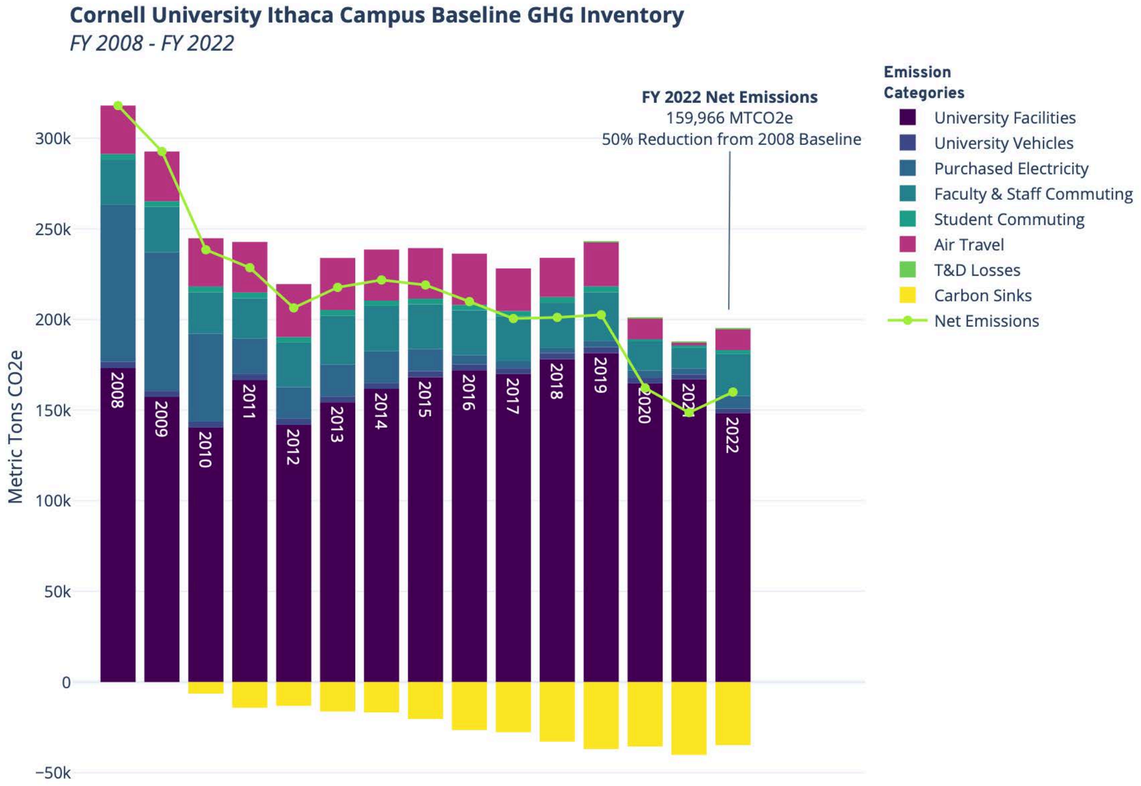
https://sustainablecampus.cornell.edu/additional-ghg-accounting → [Upstream Fuel Activities Link]

Additional GHG Inventories…

160K Metric Tons of CO_2 equivalents from methane leaked upstream would come close to doubling our GHG emissions.

160K

50K



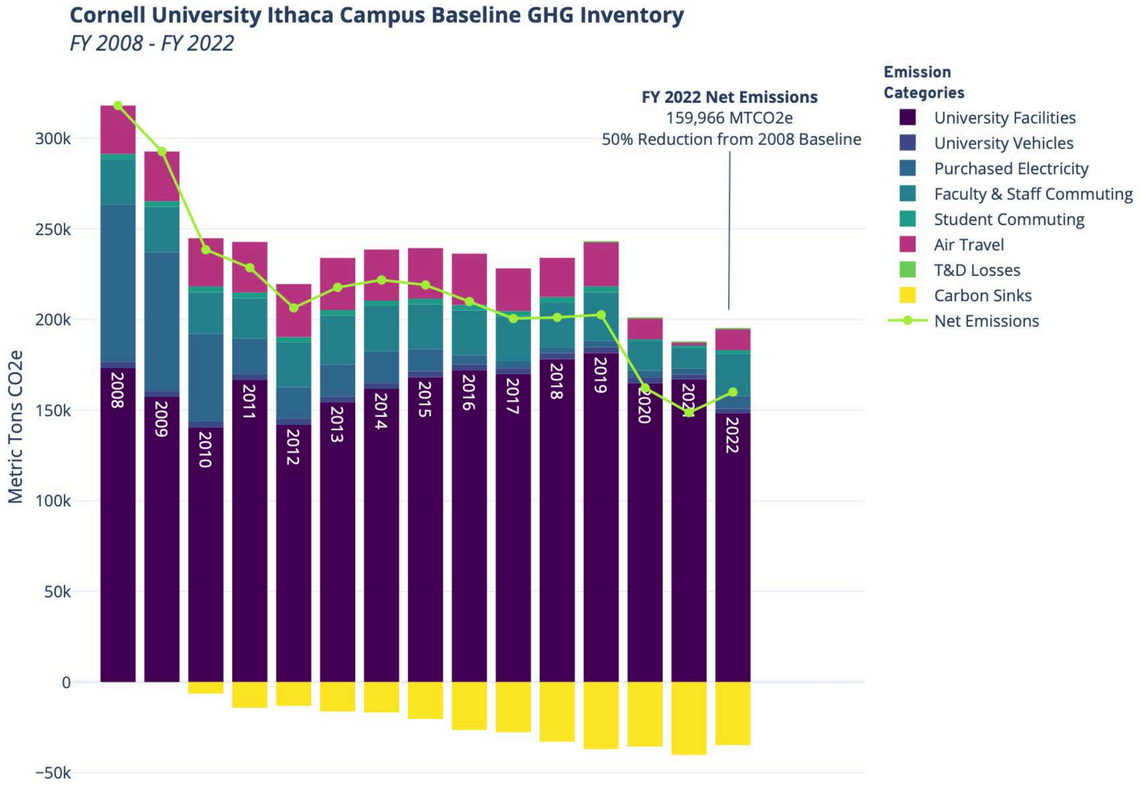
Additional GHG Inventories…

On the positive side, this means whenever onsite emissions are reduced, there is the possibility that a roughly equivalent amount of leaked methane would also be reduced.

On the negative side, Cornell will be stuck with a potentially large shadow upstream methane emission problem, until the natural gas power plant is finally shut down and replaced with a completely renewable source of heat and electricity.

160K

50K



Getting rid of the natural gas power plant, has always been the goal of Cornell's Climate Action Plan.

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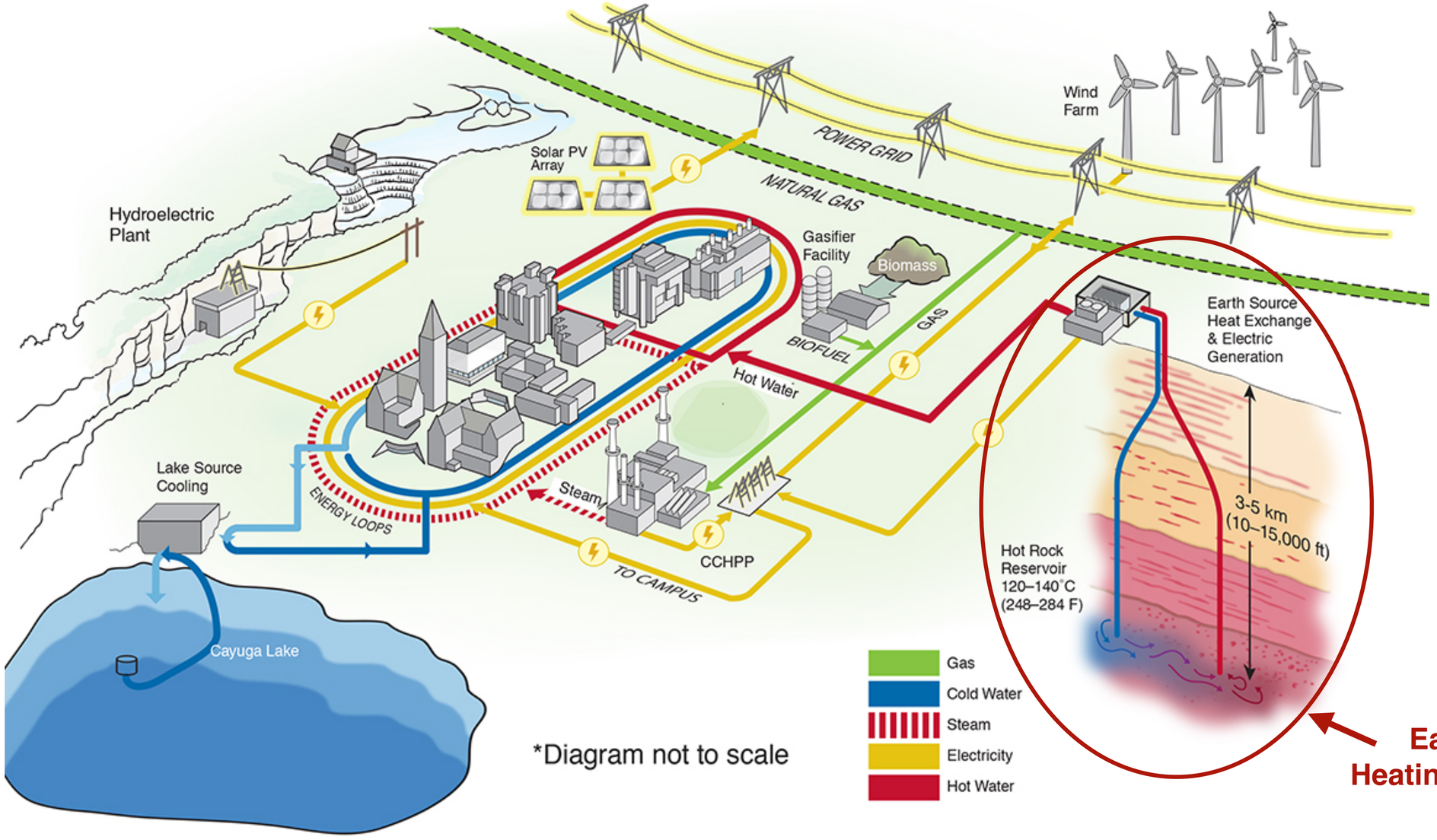
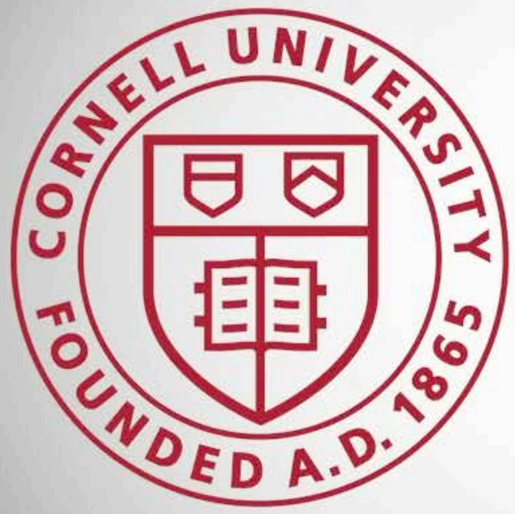
Campus Energy Future



Earth Source Heating in Winter



Cornell
Engineering

Cornell University Borehole Observatory (CUBO)

Completed: **Summer 2022**

Drill Depth: **2 miles (3.2 km)**

Temperature at Depth: **75 ºC to 100 ºC**

Native Rock Permeability at Depth: **Low**

- hydraulic fracturing of the rock will be needed to enhance the existing interconnected pathways through which water can flow and transport heat between a pair of wells.
- Tests conducted elsewhere show that permeability and connectivity of preexisting cracks and fractures in rocks similar to those beneath Cornell can be greatly increased in a safe and responsible manner so that they can act as the water pathways between wells.

CORNELL CHRONICLE

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Jason Koski/Cornell University

The Cornell University Borehole Observatory, located on a Cornell-owned gravel parking lot near Palm Road.

2-mile borehole to reveal viability of campus's geothermal future

https://news.cornell.edu/stories/2022/06/2-mile-borehole-reveal-viability-campuss-geothermal-future

https://news.cornell.edu/stories/2022/10/drilling-ends-and-data-analysis-begins-borehole-observatory

https://cornellsun.com/2022/08/31/the-science-behind-cornells-new-sustainable-energy-initiative-earth-source-heat/

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Timeline for Implementing The Options Discussed in the Accelerated Action Plan Report

2017-2022

- Energy Conservation
- Building Standards
- Campus Engagement
- Climate Literacy
- Fleet Solution
- Ground-Source Heat Evaluations
- Renewable Power Projects (Wind and Solar)

2022

- **Cornell University Borehole Observatory Test Well (CUBO): *Completed Summer 2022!***
  - ***If Viable (5-7 well pairs)***

    else, begin ground source heat pumps (aka., traditional geothermal heat pumps)
- Revise Climate Action Plan to Include New Energy Pathways Forward

2027

- Fully Implement Campus Heating Solution
- Advance Other Carbon Reduction Efforts

2035

Reach Carbon Neutrality!

Section III

1. How Much Will It Cost?

2. Inspiring Leadership

How Much Is This Going To Cost?

Table 7: Financial Details for All Solutions (in millions)

(AEC = Annual Cost + Capital Cost spread over 30 years)

Accounting for Methane Leakage

Solutions for Campus Energy Supply, Financial Details			Up-Front Capital Cost	Annualized Capital Cost	Annual Operating Cost	Annual Offsets Cost	**Annual Equivalent Cost**	Annual Offsets Cost	**Annual Equivalent Cost**
Business as Usual (for comparison, not a solution)					$42				
Heating & Powering Solutions *No offsets needed*	1.	Earth Source Heat, WWS, Biomass	$700	$47	$24	-	$71	-	$71
	2.	Earth Source Heat, WWS	$730	$50	$22	-	$72	-	$72
	3.	Air Heat Pumps, WWS	$930	$62	$28	-	$90	-	$90
	4.	Ground Source Heat Pumps, WWS	$920	$55	$26	-	$81	-	$81
	5.	Nuclear	$700	$42	$34	-	$76	-	$76
All offsets needed	6.	Business as Usual + Carbon Offsets	-	-	$42	$10	$52	$43	$85
Heating Solutions *Offsets for Electricity*	7.	Earth Source Heat, Biomass	$430	$31	$36	$2	$69	$10	$78
	8.	(Only) Earth Source Heat	$470	$36	$34	$2	$72	$10	$80
	9.	(Only) Air Source Heat Pumps	$490	$28	$47	$4	$79	$17	$92
	10.	(Only) Ground Source Heat Pumps	$600	$34	$40	$3	$77	$13	$87

Quadruple Bottom Line Sustainability Decision Making

1. Does it meet the needs of People on campus, in the community and in the world?
   - Can we generate enough renewable energy to operate the campus?
2. Will it enhance overall Prosperity for the campus and our region?
   - Is it affordable?
3. Does it support a sustainable Planet?
   - Will it help with climate change?
4. Does the solution help Cornell fulfill its academic mission and Purpose?
   - The Living Laboratory 

We Need Courageous Leadership to Get Us to Carbon Neutrality

- Given the climate change stakes, and the moonshot-like work that lays ahead for both Cornell (and the whole world) to rapidly decarbonize our energy system, it is fitting I think to provide you with the following example of courageous leadership…

- In the following speech by President Kennedy in 1961, substitute his goal of an **Apollo Mission to the Moon** with Cornell's goal of **Carbon Neutrality by 2035.**

  Note: *In this speech, human history is compressed to **1 year == 1,000 years.***

On July 20th 1969 Apollo 11 Landed Humans on the Moon and Returned Them Safely Back to Earth…

Why Didn’t Cornell Just Buy Off-Sets?

“We choose to go to the moon and do the other things, not because they are easy, but because they are hard,

because that goal will serve to organize and measure the best of our energies and skills,

because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too.”

John F. Kennedy, 1961

Cornell Leadership seems to have committed strongly to the cause of a carbon neutral campus by 2035.

Does this mean current Cornell students can sit back on enjoy the whole process unfold from the sidelines?

The Short Answer: NO!

Some of the Outstanding Issues That Would Benefit From Your Input

1. There is still a big need to reduce upstream methane emissions created by using fracked natural gas to generate electricity and heat on campus.
2. Consider the carbon footprint when selling fracked methane-generated electricity back to the gird in the summer.
3. ~~The portion of Cornell's Endowment that is still invested in fossil carbon energy companies~~
4. Finding additional ways to get students involved with learning from "The Living Laboratory"
5. **Improve climate change literacy among *all* Cornell students**
   https://sustainablecampus.cornell.edu/our-leadership/cap/climate-literacy

I Think Climate Literacy is Essential for All University Students…

Sign in

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Fund independent journalism with $5 per month

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Barcelona students to take mandatory climate crisis module from 2024

Course thought to be world first agreed after university bowed to pressure from seven-day End Fossil protest

The decision came as a political leader in Madrid claimed climate activists' claims were part of a communist plot. Photograph: SOPA Images/LightRocket/Getty Images

Stephen Burgen *in Barcelona*

Sat 12 Nov 2022 03.00 EST

All students at the University of Barcelona will have to take a mandatory course on the climate crisis after the establishment agreed to meet the demands of activists conducting a sit-in occupation.

In a move thought to be a world first, all 14,000 undergraduate and postgraduate students will have to take the course from the 2024 academic year. It will also devise a training programme on climate issues for its 6,000 academic staff.

https://www.theguardian.com/world/2022/nov/12/barcelona-students-to-take-mandatory-climate-crisis-module-from-2024?CMP=Share_iOSApp_Other

Section IV

Two Final Points That Are Vitally Important to Remember

Point #1

The Cornell Climate Action Plan did ***not*** get its start with a Cornell President waking up one morning and deciding that making the campus carbon neutral by 2035 was the right thing to do…

The Cornell 2035 Climate Action Plan got its start by student's raising their voices in 2001 for what was socially just for their generation and for all future generations

The Cornell Daily Sun

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FRONT PAGE » NEWS

Administrators Meet Today on Kyoto Now!

APRIL 15, 2001
BY ARCHIVES

PRINT

DISCUSS

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Kyoto Now! -- students sitting, sleeping and operating daily demonstrations outside of Day Hall since last Wednesday -- are planning a rally to coincide with what some believe will be a major meeting with University administrators today.

The rally, Kyotopalooza, will begin at 4 p.m. to coincide with the discussions taking place inside Day Hall, which are scheduled for 4:30 p.m.

"I believe [today's] negotiations are the crucial ones," said David Unger '02, who has helped Kyoto Now! prepare for the discussions. "We are close, and something has to tip the scales one way or another."

"I believe an agreement will be reached [today]," Unger said last night.

https://alumni.cornell.edu/article/twenty-years-cornellians-at-the-forefront-of-climate-action/

"During my years as president – the first time – the students of Kyoto Now, now known as Climate Justice Cornell, pushed us – so you see this started with students really – pushed us to try harder to reduce greenhouse gas emissions,"

Former President Hunter Rawlings
President's Sustainable Campus Committee Meeting
Nov 10, 2016

CORNELL CHRONICLE

November 12, 2016

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Nov. 10, 2016

Rawlings credits students for driving climate action

By Blaine Friedlander

Interim President Hunter Rawlings gave students credit for propelling the university into action at the President's Sustainable Campus Committee annual summit Nov. 10.

"During my years as president – the first time – the students of Kyoto Now, now known as Climate Justice Cornell, pushed us – so you see this started with students really – pushed us to try harder to reduce greenhouse gas emissions," said Rawlings in his keynote address.

Jason Koski/University Photography

Interim President Hunter Rawlings addresses the President's Sustainable Campus Committee annual summit Nov. 10.

TRENDING

EDITOR'S PICKS | MOST EMAILED | MOST READ

Rawlings credits students for driving climate action

Community breaks bread on heels of presidential election

Provost calls for increased student housing, enrollment

Teaching robots to solve their own problems

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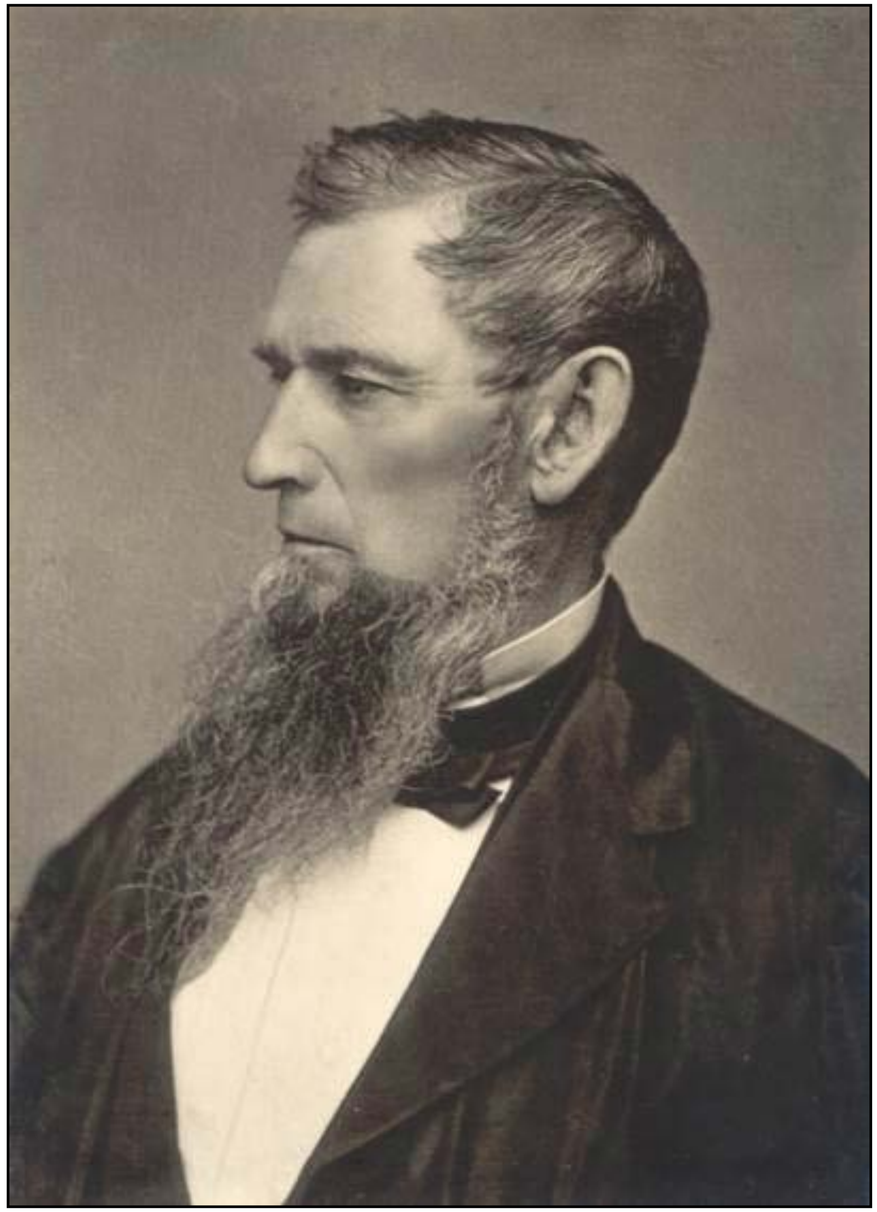
Cornell Sustainability

Sustainability at Cornell (animation)

RELATED STORIES

Point #2

The 2035 Climate Action Plan continues a longstanding Cornell tradition of recognizing the socially just thing to do well before other universities — **and then acting on it!**



*"I would found an institution where **any person** can find instruction in any study."*

Ezra Cornell