



EMCS Consumer Insights Team

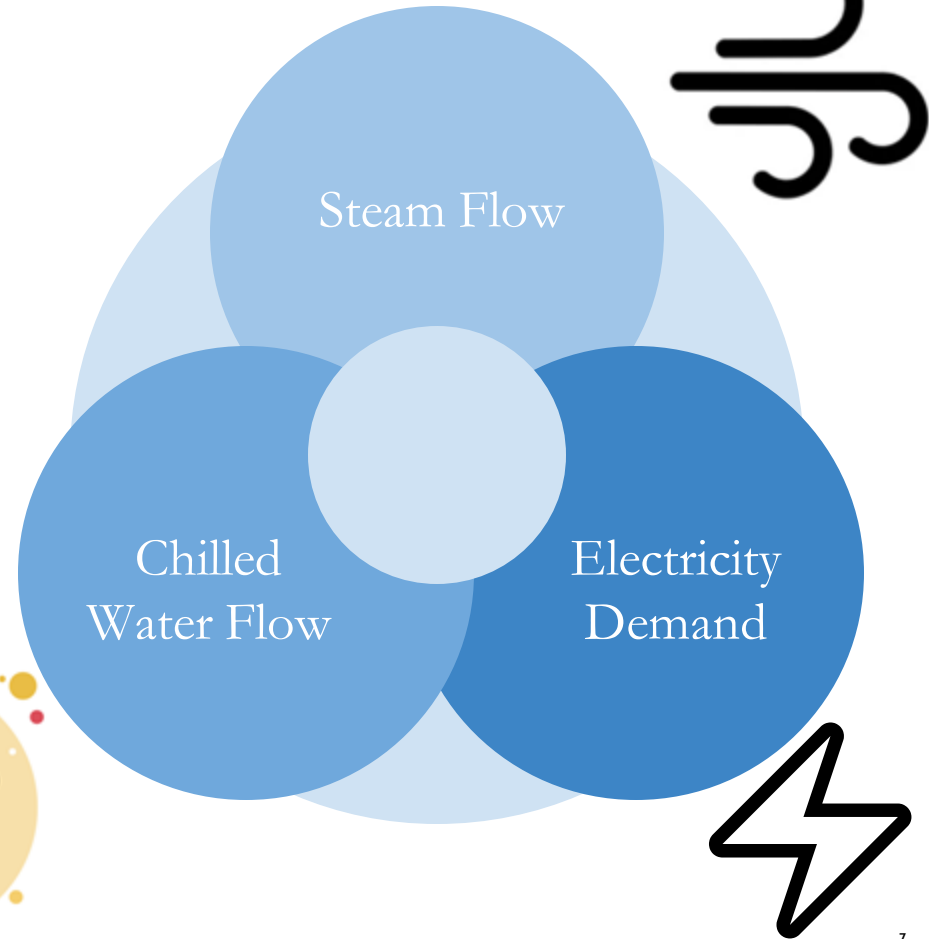
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Sachar, John Lee



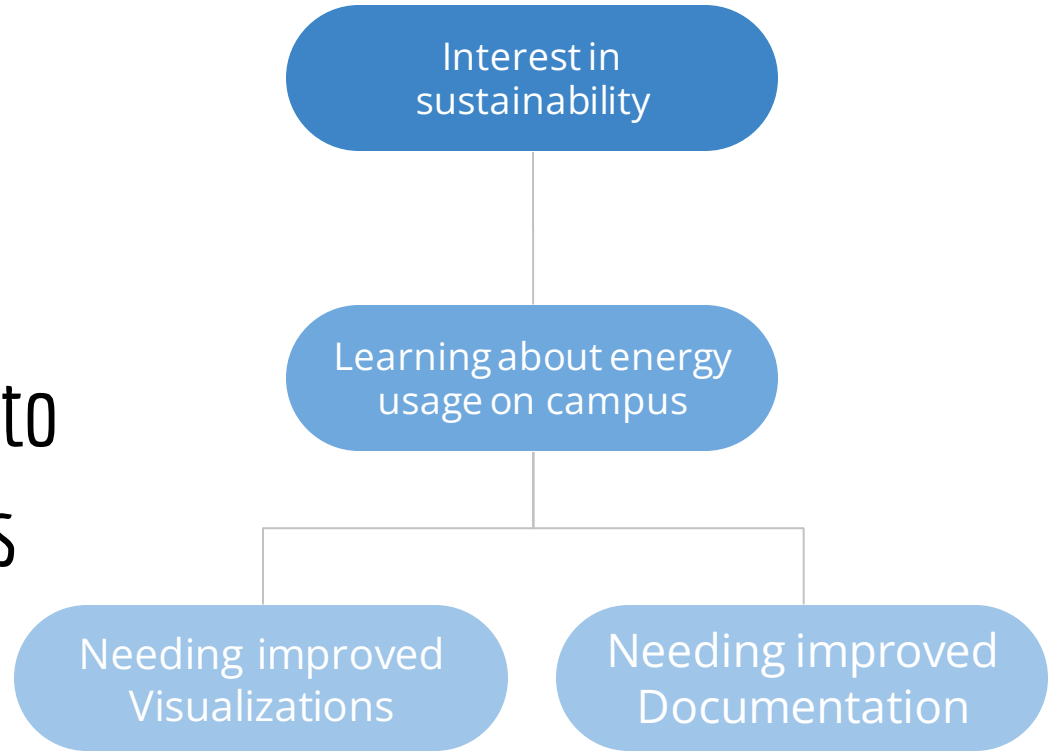
Thank you to Dr. Hutchison, the EMCS team (Steve), and our classmates in assisting us at various stages of this project so we are able to provide an engaging platform for students and the general public to learn about energy use on Cornell campus.

Here is our [EMCS dashboard](#)

The Energy Management and Control System (EMCS) collects energy consumption data on campus in real time.



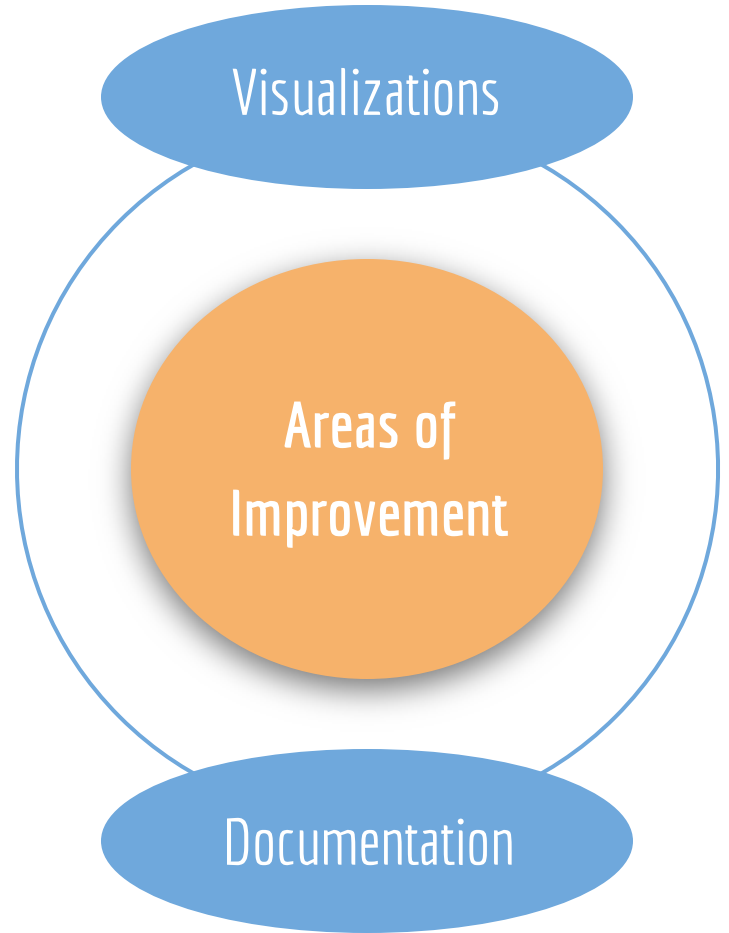
Our team's interest in sustainability leads to a deeper improvement in providing ease of access to energy data to our peers



The previous EMCS Dashboard was not user friendly and hard to navigate

- 1 Difficulty in navigating the layout
- 2 Hard to understand titles and labels
- 3 Trouble finding and understanding documentation
- 4 Visualizations are not intuitive

We wanted to address
two main areas of
improvement





Understand the variety of dashboard users and their user needs



Implement improvements to data visualizations



Develop user document



Conduct usability testing and revise accordingly

We addressed improvement areas using four tasks

1. Understanding dashboard users

Analysis

We analyzed previously collected feedback from users of the dashboard

User Groups

We identified user groups based on the different types of people who may use the dashboard

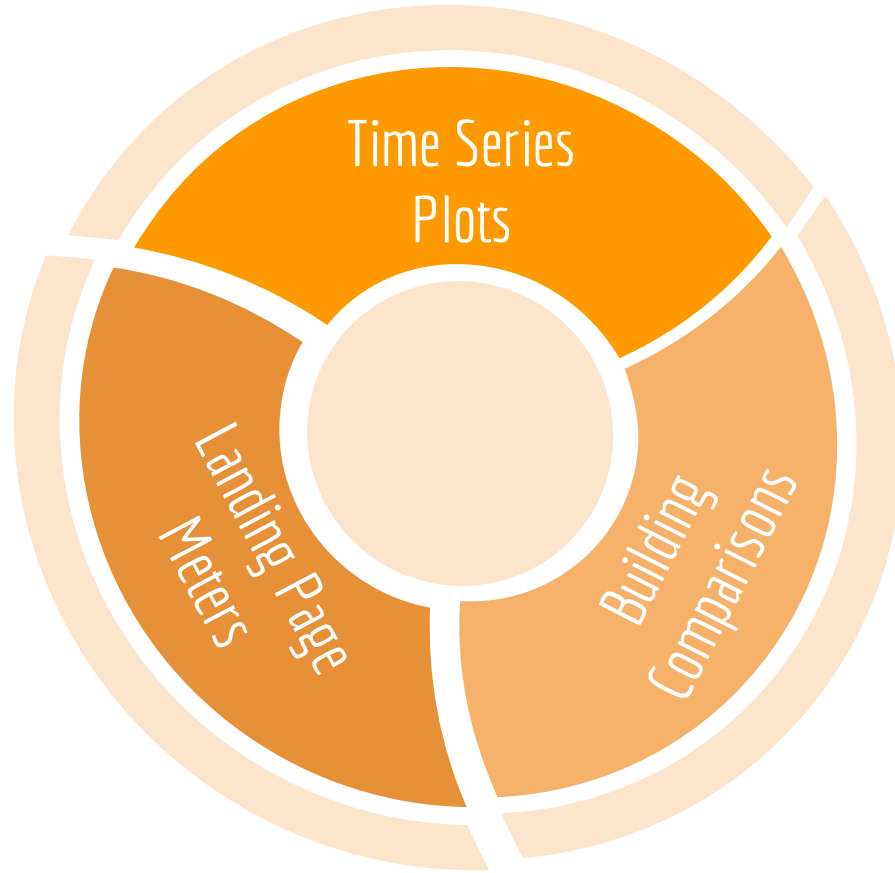
Level of Knowledge

We estimated the level of knowledge each user group would likely have

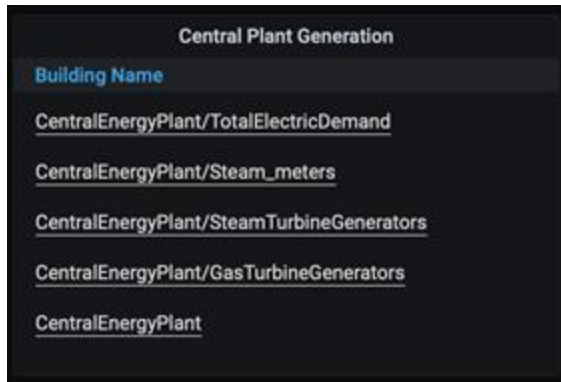
Use Cases

We established specific use cases for each user group, identifying which dashboard features would be most relevant

2. Implementing improvements to visualizations



3. We developed user documentation by writing the general portal help page and dashboard-specific help panels.

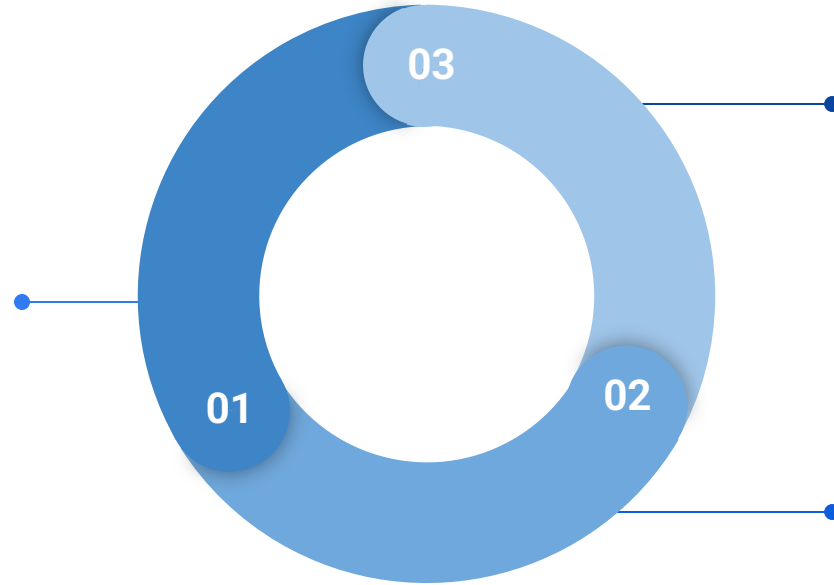


← Specific dashboards →



4. Conducting usability testing

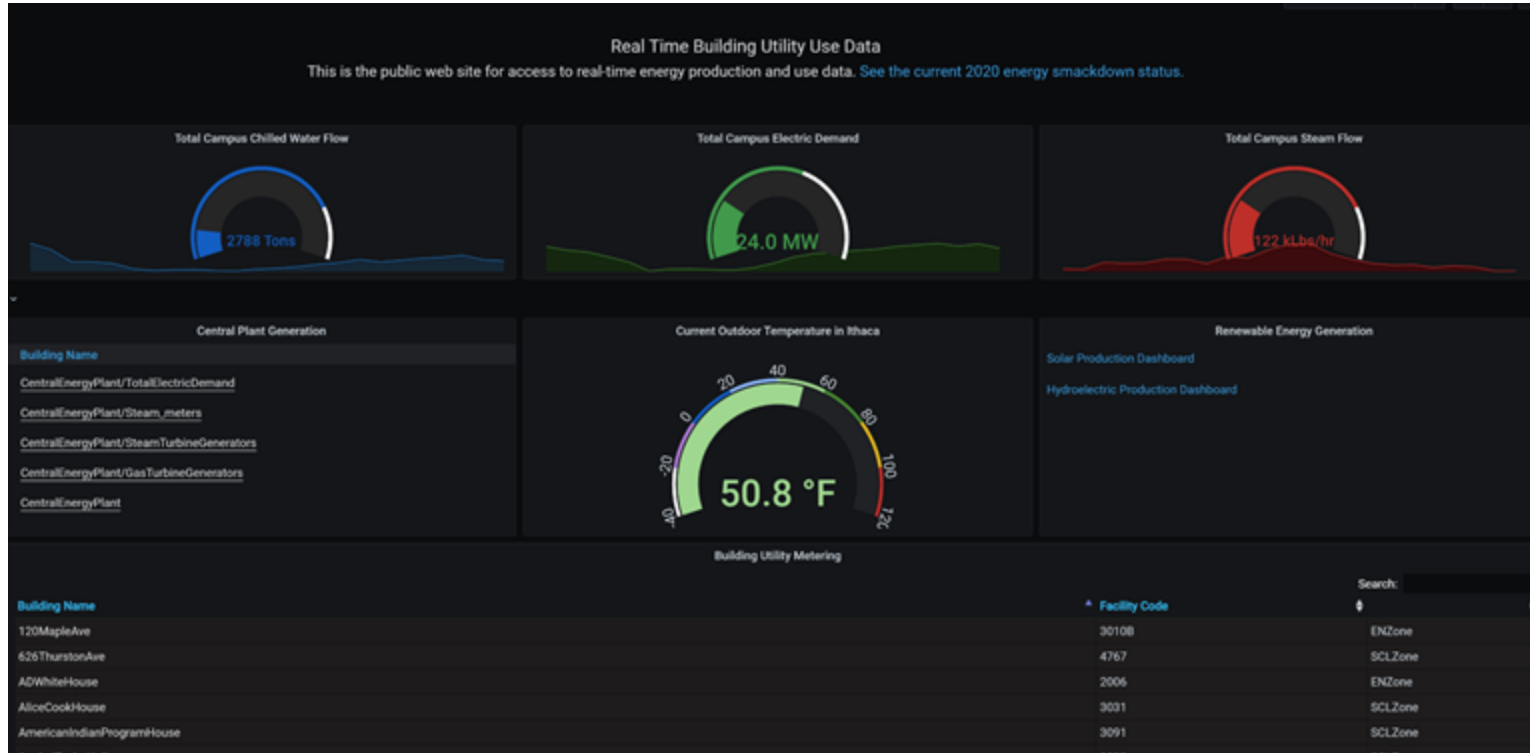
We drafted the usability testing memo



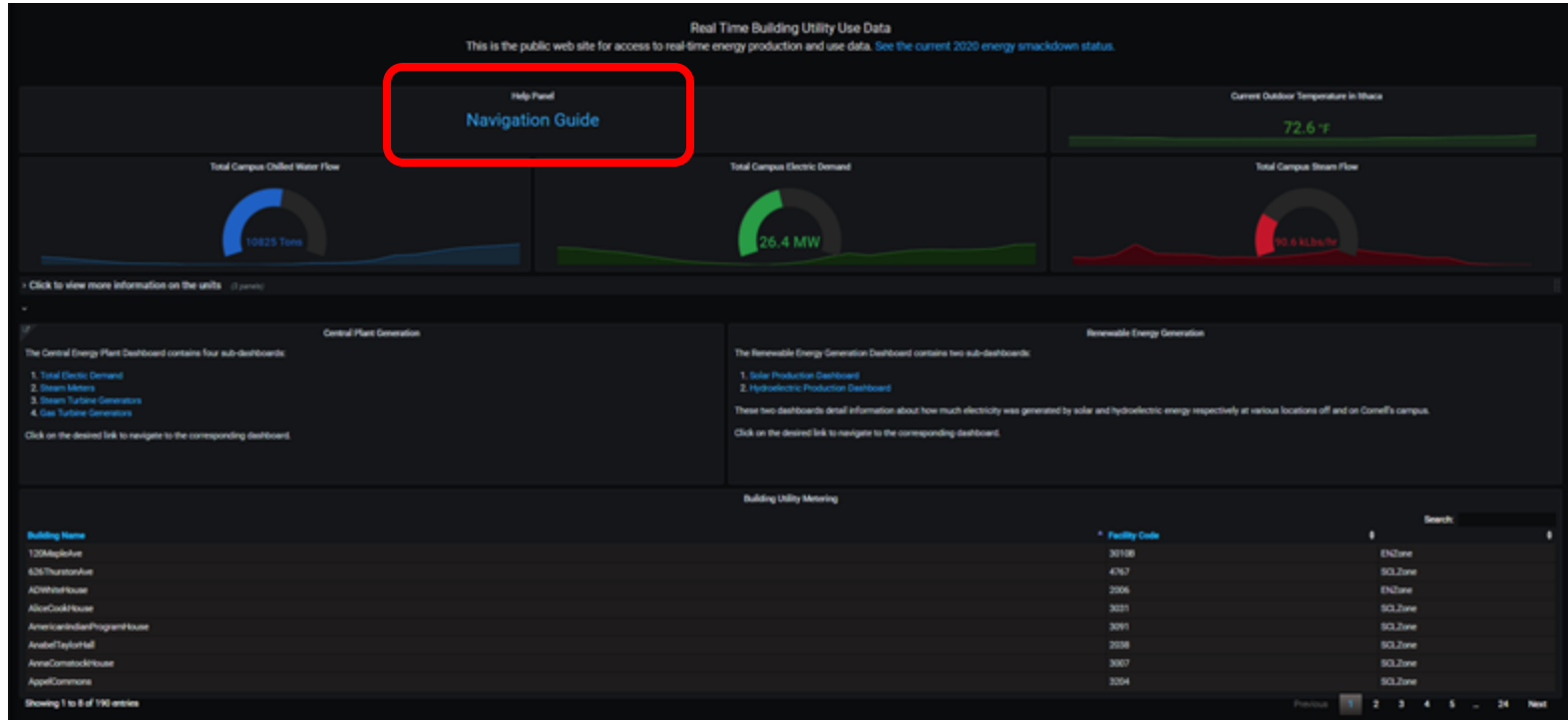
We analyzed the feedback and implemented changes

We gathered user feedback through Flipgrid

The original EMCS homepage lacked navigation guidance



A link to the navigation guide was added

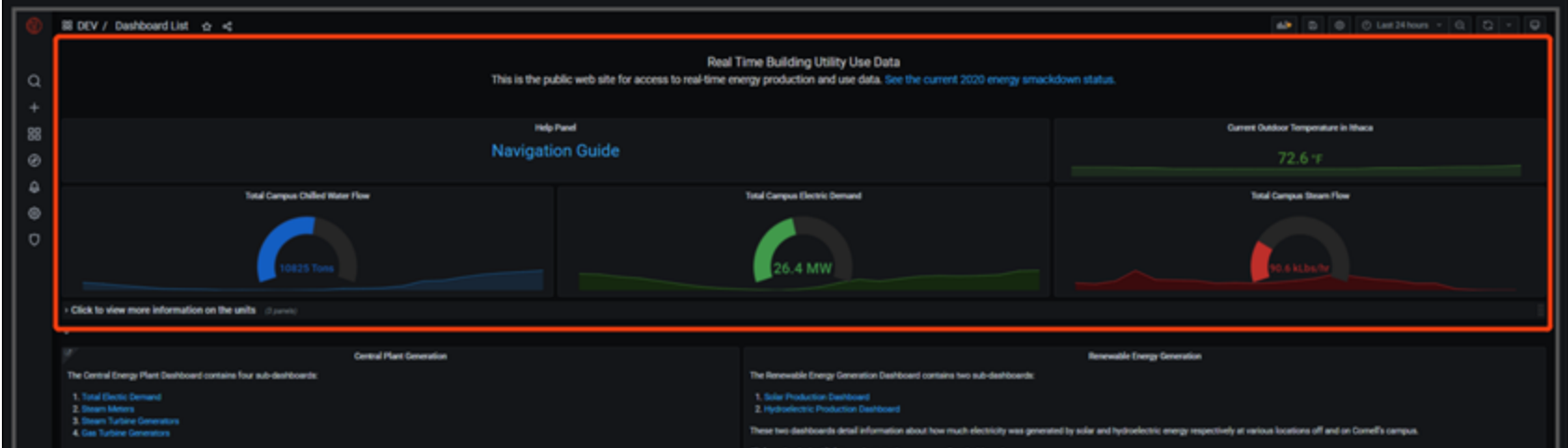


We added screenshots for homepage navigation

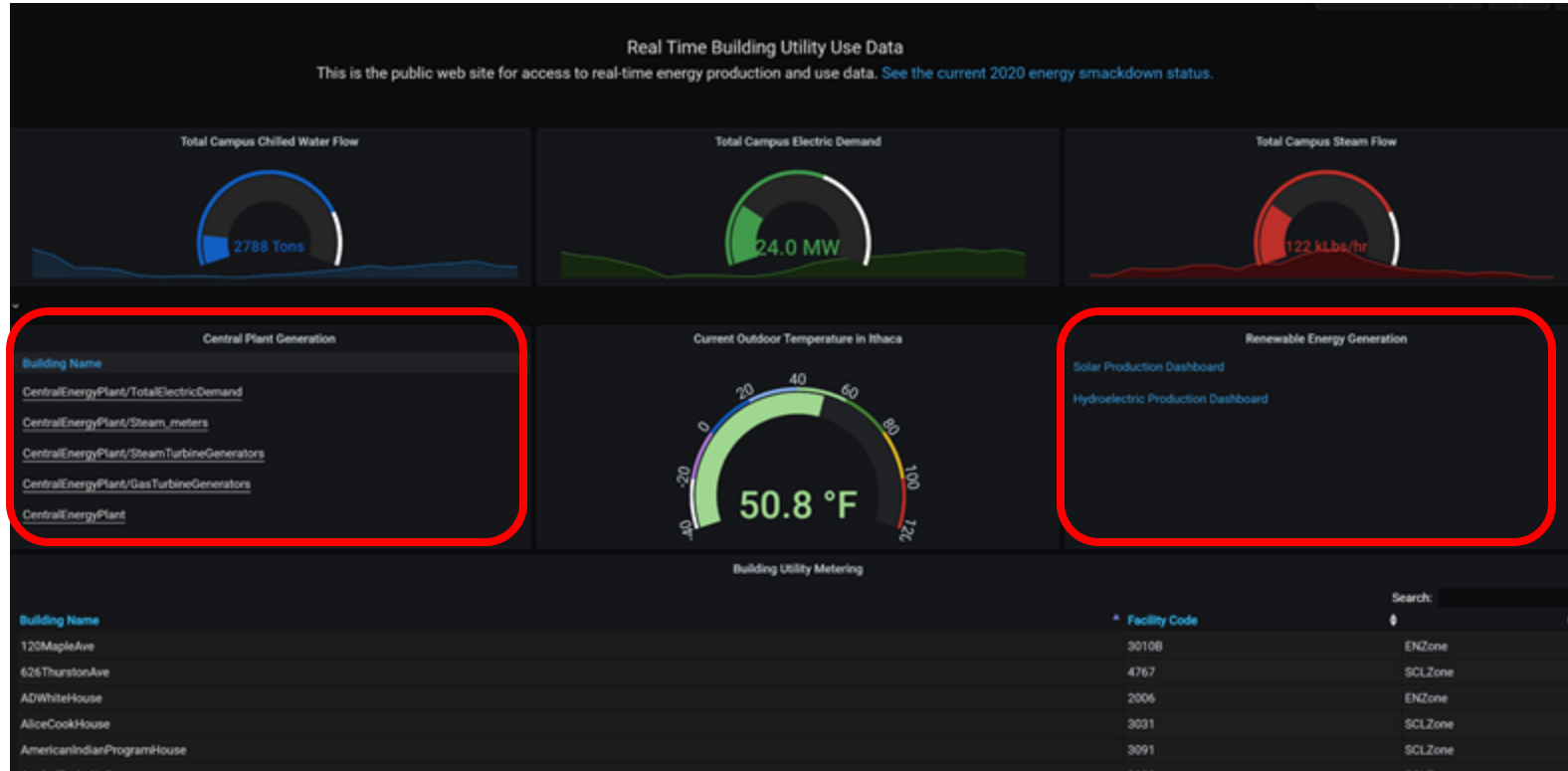
The homepage contains a holistic view of several energy consumption data, and it provides the entry for several other dashboards. Within the **red rectangle** below, you can find

- Entry to the energy smackdown status
- Entry to the navigation guide (this guide)
- Current temperature in Ithaca with trends in the past week
- Total campus chilled water flow compared to historical maximum
- Total campus electric demand compared to historical maximum
- Total campus steam flow compared to historical maximum

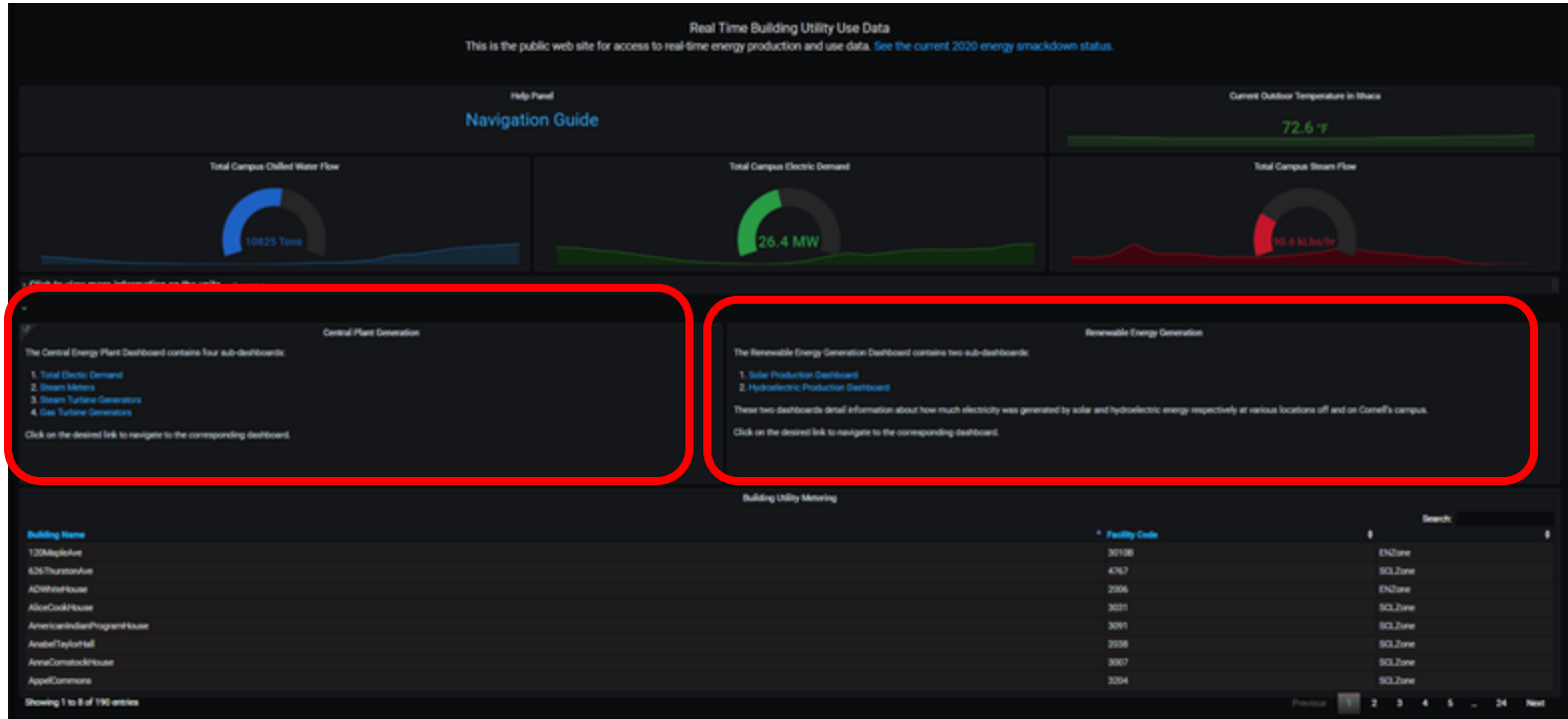
You can look and the trend of temperature variation and see if that correlates to the change in energy consumption.



The original EMCS homepage lacked panel explanations



We added explanations to help navigating into specific panels



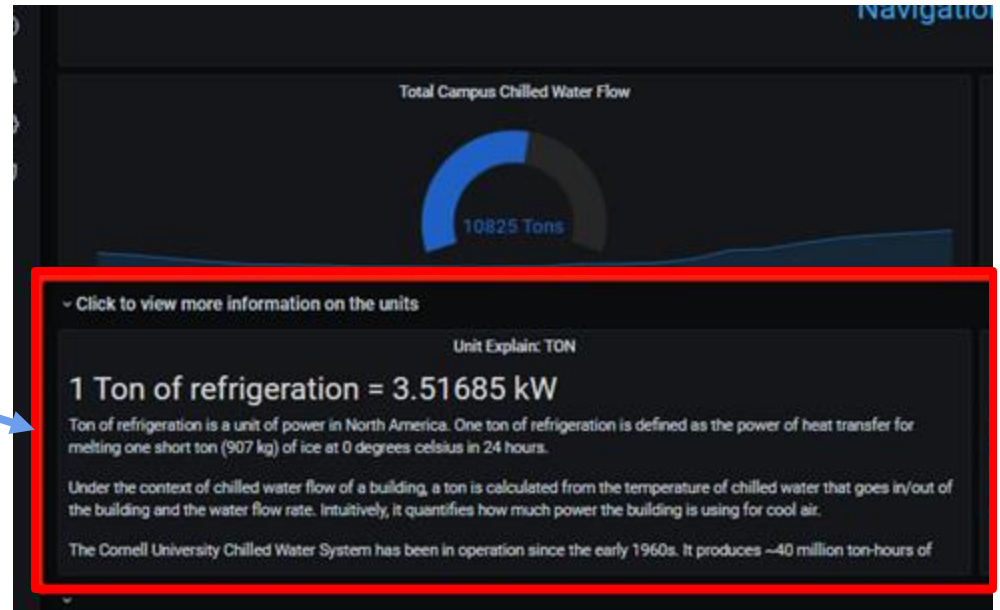
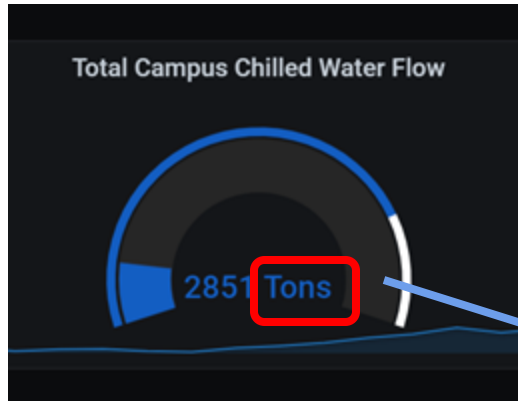
Plot legends were changed to be user-friendly



MusgraveEastSolarSystem.GWC_V2/Grid.Export.kW.Production
MusgraveWestSolarSystem.GWC_V2/Grid.Export.kW.Production
SnyderRoadSolarSystem.GWC_V2/Grid.Export.kW.Production
HarfordSolarSystem.GWC_V2/Grid.Export.kW.Production
GenevaSolarSystem.GWC_V2/Grid.Export.kW.Production
CascadillaCommunitySolarFarmNorth
CascadillaCommunitySolarFarmSouth

Musgrave East Solar System
Musgrave West Solar System
Snyder Road Solar System
Harford Solar System
Geneva Solar System
Cascadilla Community Solar Farm North
Cascadilla Community Solar Farm South

Original panels lacked explanations for units



Specialized plots lack in-dashboard documentation



We conducted usability testing to gather feedback

1

First Step

Familiarize the units for chilled water flow, steam flow, and electricity consumption

2

Second Step

Navigate to the Solar Production Dashboard.
Play around with changing the time range and visualizing the data

3

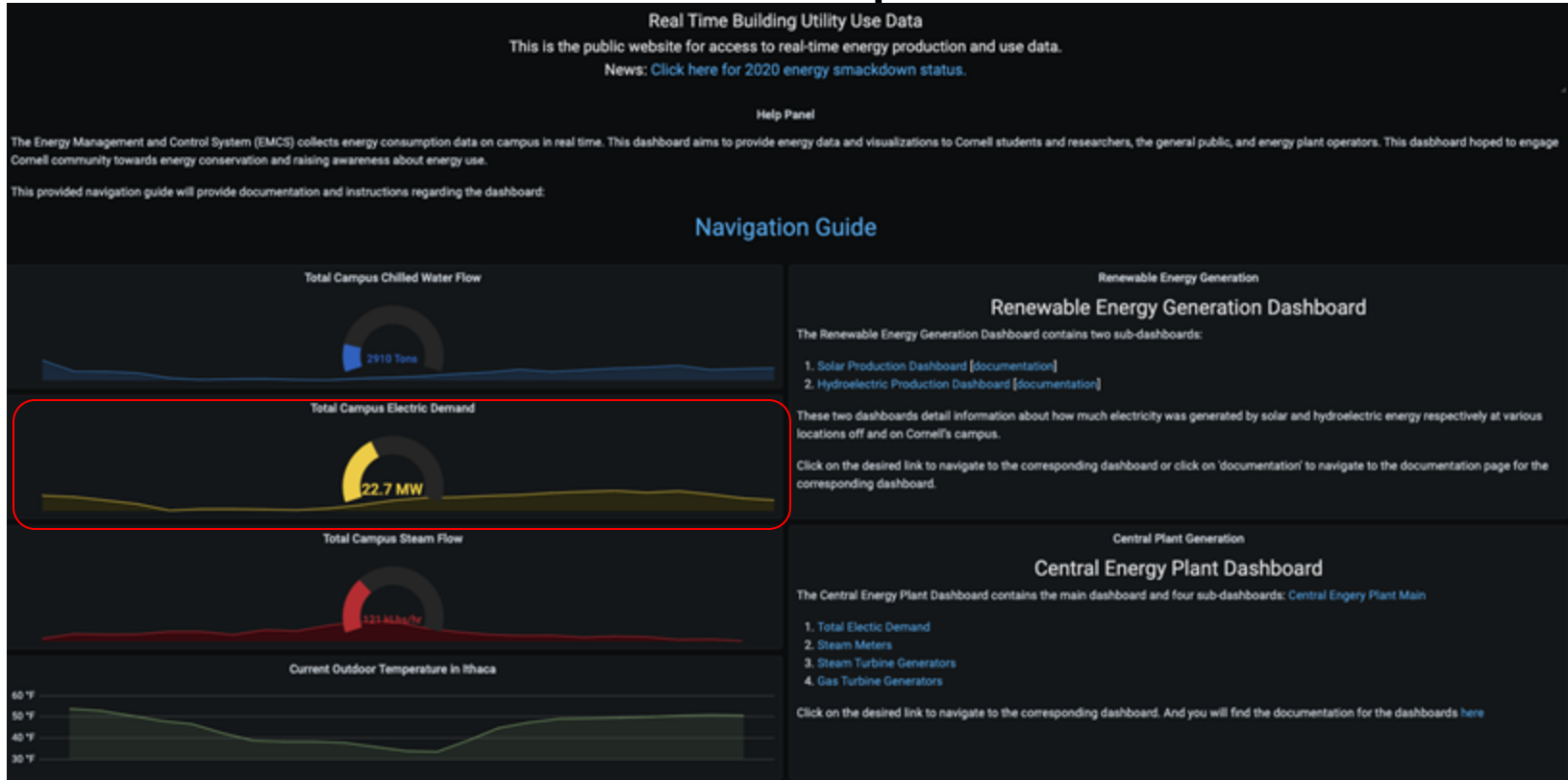
Third Step

Download the electricity consumption data of Upson Hall

We revised the homepage according to suggestions

01	Marlaina	<ul style="list-style-type: none">• Suggested splitting up the portal help page & comparison between solar power generation and electricity consumption
02	Kevin	<ul style="list-style-type: none">• Navigation of the graphs and timeline was confusing. Ex. zooming out• Resizing issues
03	Jack	<ul style="list-style-type: none">• Suggested larger dashboard title headings• Make fonts for renewable energy and CEP larger
04	Samuel	<ul style="list-style-type: none">• Font size issues and resizing issues

This is our current version of the dashboard



Thank you!

References

- [1] G. Sedrakyan, E. Mannens, and K. Verbert, "Guiding the choice of learning dashboard visualizations: Linking dashboard design and data visualization concepts," *Journal of Computer Languages*, vol. 50, pp. 19–38, Feb. 2019, doi: 10.1016/j.jvlc.2018.11.002.
- [2] F. Nakazawa et al., "Smart power strip network and visualization server to motivate energy conservation in office," *2011 9th IEEE International Conference on Industrial Informatics*, Lisbon, Portugal, 2011, pp. 352–357, doi: 10.1109/INDIN.2011.6034901.
- [3] L. K. Murugesan, R. Hoda, and Z. Salcic, "Design criteria for visualization of energy consumption: A systematic literature review," *Sustainable Cities and Society*, vol. 18, pp. 1–12, Nov. 2015, doi: 10.1016/j.scs.2015.04.009.
- [4] MIT, "MIT Shares Energy Data with New Website: Energy Dashboard Will Provide Access to Campus Building Data." *Buildings*, no. 6, 2017, p. 12. EBSCOhost, search.ebscohost.com/login.aspx?direct=true&db=edsge&AN=edsgecl.498485228&site=eds-live&scope=site.
- [5] Harvard University, "Harvard's 2019 Sustainability Report," Mar. 05, 2015. <https://report.green.harvard.edu/> (accessed Mar. 28, 2021).
- [6] University of California, Berkeley, "UC Berkeley Energy Dashboard." <https://engagementdashboard.com/ucb/ucb> (accessed Mar. 28, 2021).