

CTECH Living Lab --Transportation Innovations for Carbon-Neutral Cornell

2017 Sustainability Leadership
Summit

H. Oliver Gao





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Vision—Multimodal Easy Electric Transit (ME² Transit)

Shared use of on-demand
mobility service by smart electric
fleet of flex size and dynamic
routing

Approach

- ❖ Alternative vehicle options for transition: alternative fuel/energy sources and technologies for transportation
- ❖ Multimodal Mobility-on-Demand Service and EVs
- ❖ Information for better-informed decisions: users as well as service providers

Data and Model?

Demand, Network, Operations

Cornell

❖ Ithaca

❖ Tompkins

Action Items, Plan, Partners

- ❖ Behavior and Demand Analysis
- ❖ Technical Design (Software and Apps)
- ❖ Network Design and Operations Management
- ❖ Mechanism Design (Incentives, etc.)
- ❖ Infrastructure, finance
- ❖ Other

CTECH Living Lab Student Teams/Projects

- ▶ **Why Target Transportation?**

Jared Hibshman, CTECH Living Laboratory Student Project Coordinator

- ▶ **Biodiesel Engine Feasibility Project**

Gregory Brumberg and Manisha Kunala of Engineers for a Sustainable World: Biofuels

- ▶ **Electric Vehicle Charging Stations**

Srajal Raizada, Apurti Marodia, Srajan Shetty, Bakulesh Singh, and Simon Yu

- ▶ **Electrifying Cornell Fleet**

Nilesh Deshpande, Ye Lin Kim, JD Paff, and Daniel Sachs

- ▶ **Optimization of Cornell EV Rental**

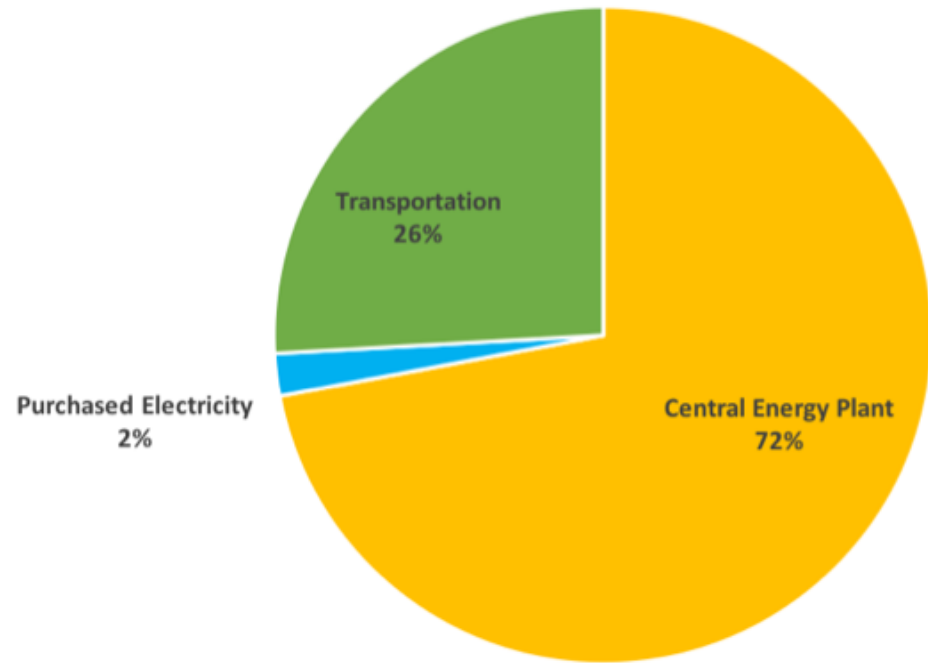
Yue Wang

- ▶ **Mini Electric Shuttle System**

Zelin Linghu, Yingqing Chen, Ran Gao, Siran Jia, and Chenxi Yang

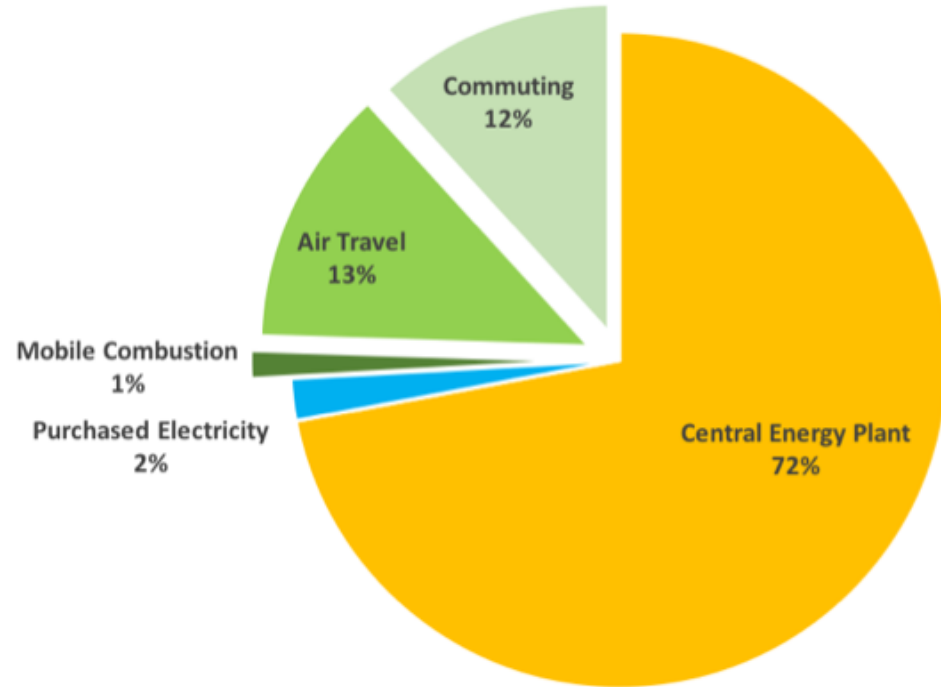
- ▶ **Simulation, Modeling, and Optimization Tools for Transit Network Design**

Robert Gurnee



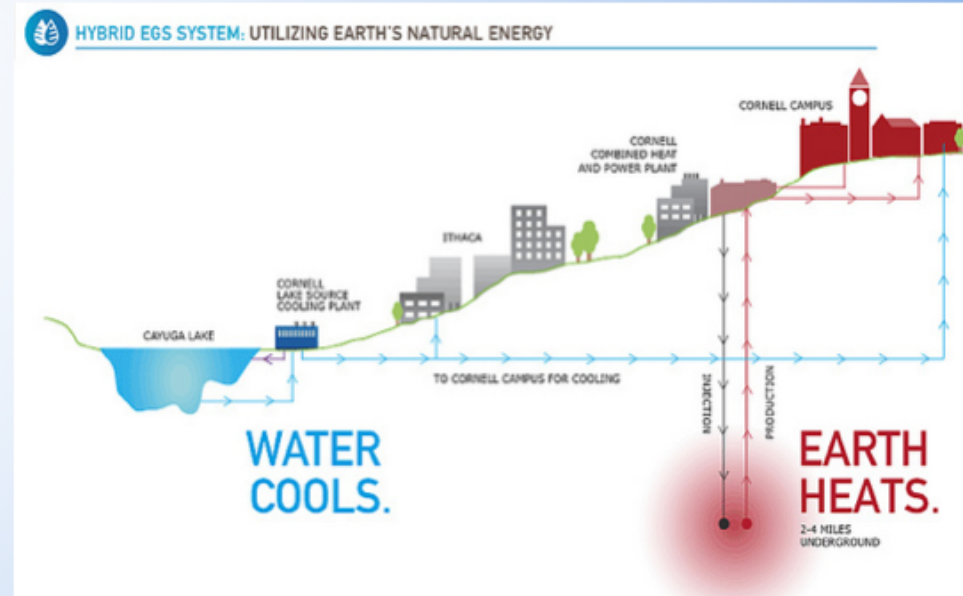
2016 Cornell Ithaca Campus GHG Emissions

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Comparing Investments

- **Earth Source Heat with Biomass Peaking and Wind/Water/Solar**
 - Estimated Capital Costs:
 - \$250M with outside investment
 - **1500 \$/ton GHG reduced**
 - \$700M with no outside help
 - **4000 \$/ton GHG reduced**



Comparing Investments

Emissions Category	Allowed Capital for 1500 \$/GHG (Million \$)	Allowed Capital for 4000 \$/GHG (Million \$)
Mobile Combustion	5	13
Commuting	42	110
Air Travel	46	120
Total Transportation	93	250