TOWARDS FUTURE SOLUTIONS

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Taking Action: A Conversation on Climate Change and Architecture in Canada
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What Our Future Should Be: Nur Akšamija’s artwork (16 years old)

Nur, a 10th grader from Hadley, is a Cool Science 2020 Runner-Up. Congratulations Nur!

Renewable energy is more beautiful than storms.
How Do We Get There?

Integration of building performance analysis during design

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Impact of design decisions on building performance

Performance-based design

Impact of Climate Change on Building Envelope Performance: Current Climate, 2050 and 2080

Impact of Climate Change on Building Envelope Performance: Current Climate, 2050 and 2080

Results of energy modeling


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Smart Facade Systems for Heating, Cooling and Electricity Generation


Modeling prototypes

Results


Taking Action: A Conversation of Climate Action and Architecture in Canada: Towards Future Solutions

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Existing Buildings: Methods for Reaching Net-Zero Energy through Regenerative Design

Case study/ regenerative design strategies


Existing Buildings: Methods for Reaching Net-Zero Energy Design/Cost Optimization

Process

- Environmental & Physical Building Data
  - Building Characteristics
  - Climate
  - On-Site Energy Sources
- Economic Data
  - Life Cycle Cost (LCC)
  - Cost of Equipment
  - Cost of Materials
  - Cost of Renewable Energy Sources
  - Installed Rates
  - Manufacturer Market Data
  - RS Means

IDA ICE Energy Simulation Tool
- MOBO Computational Tool
- Pareto Front Solution Ranking Tool
- Ranked Solutions
- Selected Solutions
- Optimum Solution
- Eliminated Solutions

Results

Preliminary Results for a Heating Dominated Climate Zone

Net-zero

Net Energy (kWh in thousands)

Deep retrofits

Net Energy (kBtu in thousands)

Low-impact retrofits

Total cost ($ in thousands)
UMass Architectural Research Collaborative

New research entity at UMass

Integration of Research and Practice
THANK YOU!

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