



# MPC Boiler Optimization

The McGill Energy Project

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- The McGill Energy Project (MEP) is a collaboration of students, faculty, and staff working towards energy sustainability on campus through applied research.

Find out more by visiting:  
**[mcgillenergyproject.wordpress.com](http://mcgillenergyproject.wordpress.com)**  
or email [energyproject@mcgill.ca](mailto:energyproject@mcgill.ca)

# Background – The Boilers

- McGill's downtown campus has four boilers which supply its steam network.
- This steam is primarily used for heating.
- Together, they burn ~\$5M/yr of natural gas.
- They all have different capacities and efficiencies, and operate best under different conditions.



# Project Objective

- Create a decisional model that will improve the efficiency of the steam generation process.
- This can be done by:
  - A) Recommending when to switch the different boilers on and off. (Dynamic)
  - B) Determining how to optimally distribute the load across the boilers running. (Static)

# Pulse Energy

- Due to the extensive installation of meters around campus, we are able to collect data with a resolution of 15 minutes
- We can get csv files from the website for steam, water, electricity, and weather conditions.

# Project has 3 parts

1. **Build a steam forecast from Pulse data.**
2. Backsolve for “gas to steam” efficiencies for each boiler under various steam loads (from powerhouse data), and solve the static problem.
3. Using 1, 2 and considering other factors such as maintenance and risk of failure, solve the dynamic problem (MPC).

# Forecast

- Data available
- SVM Package (a good resource to learn: [coursera.org](https://www.coursera.org))
- So far:
  - A. Using combinations of 5 variables
  - B. Picking the best and testing weights
  - C. Selecting best from stage B and varying cost

# What we need

- Help in making a good prediction system.  
This will help:
  - Save McGill in the order a hundred thousands dollars a year.
  - Reduce the universities GHG emissions.
  - Prove that the MEP's education model has value.
- Any method apart from SVM such as neural networks are acceptable