



The future of the district heating system at the University of Bridgeport

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1. Introduction

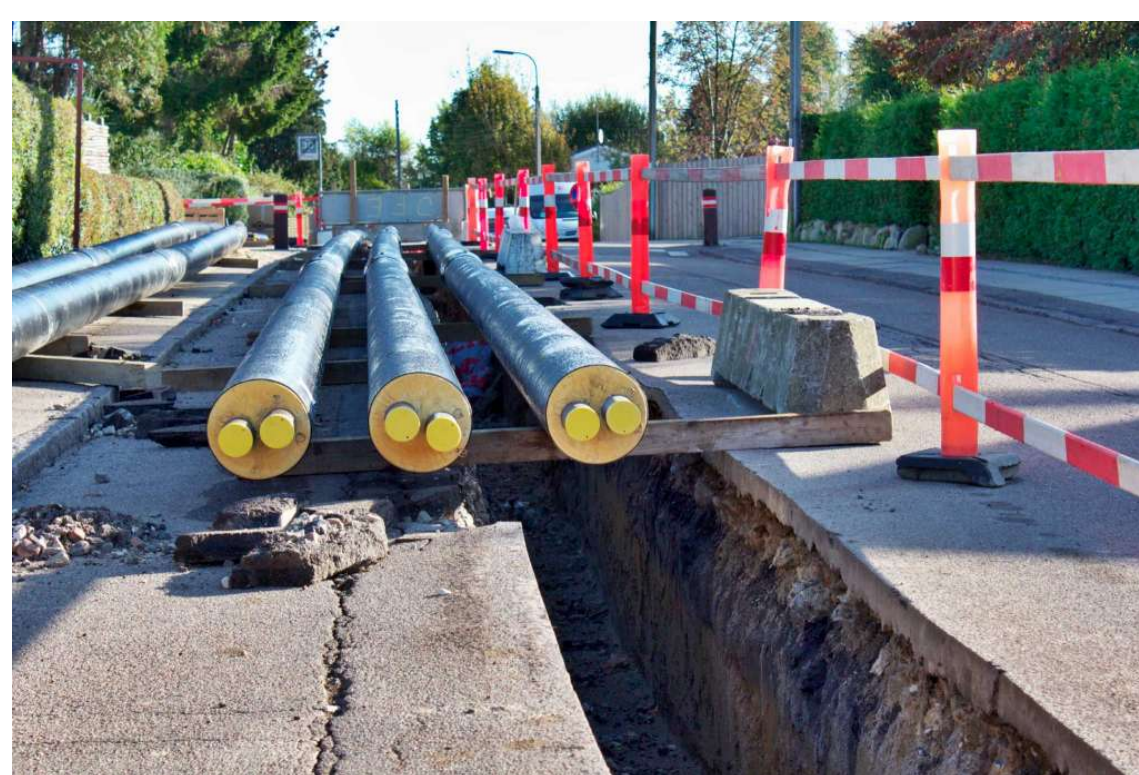
The existing steam heating in the United States is hard to be controlled due to its significant lag times and its efficiency is low. This kind of heating may also bring a safety hazard in maintenance.

District heating system is cost effective and helps to reduce green house gases. It uses the waste heat from existing power plants to provide low temperature heat to the commercial and residential buildings [1]. It includes three main components:

- Thermal piping
- Heat exchangers at the thermal sources and the thermal customer sites
- Backup boiler installation to cover peaking and standby needs



Power plant



Heating pipes

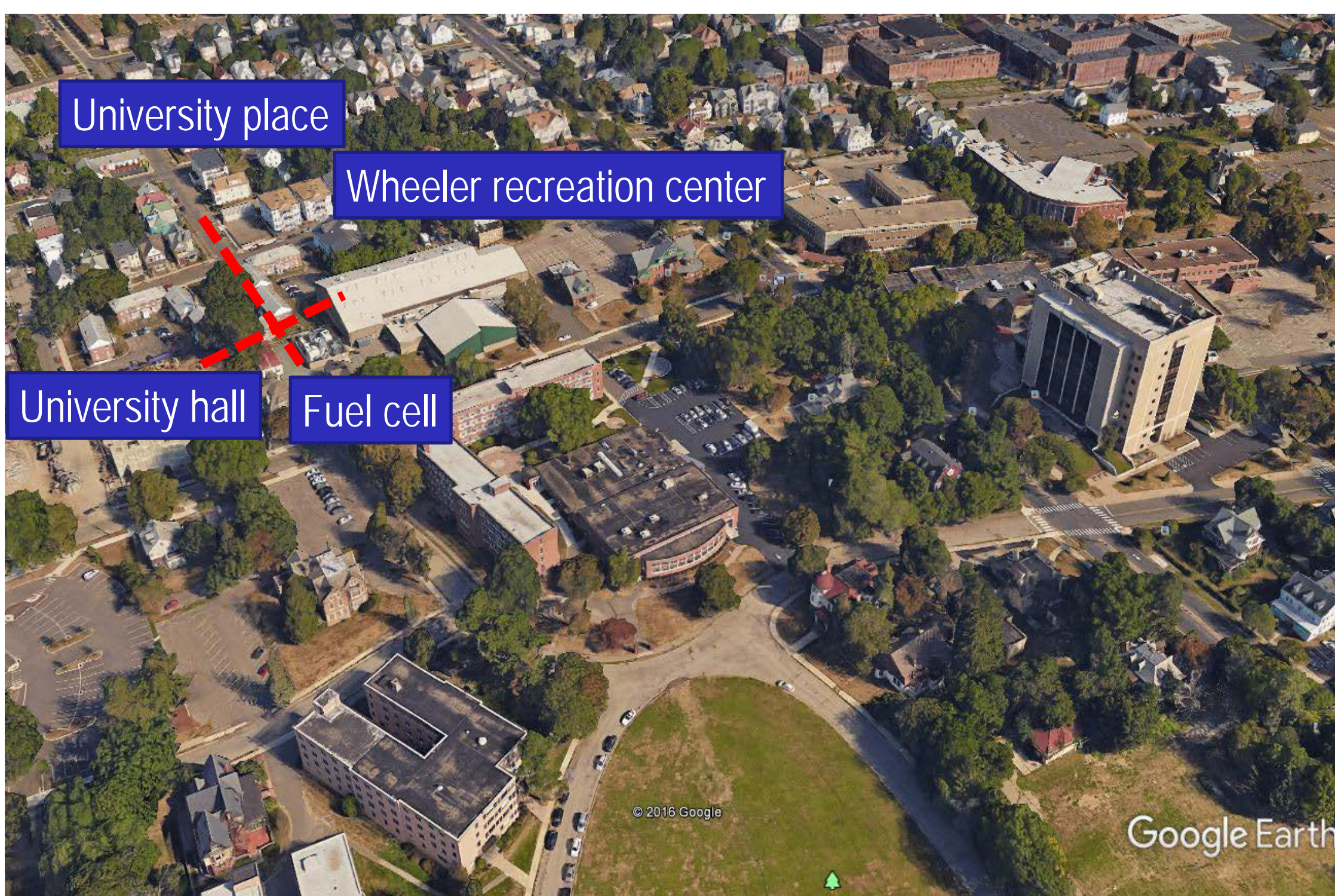


Heat exchanger



Boiler

2. Heating loop at UB



Aerial view of the campus

Existing heating loop to serve three buildings:

- Wheeler Recreation Center
- The University Place apartments
- The University Hall

Heat source: 1.4MW fuel cell station

Wheeler Recreation Center and the University Place Apartments are heated by the fuel cell station, but they also rely on boilers to provide additional heating.

The University Hall currently is only heated by boilers due to the lack of an appropriate expansion tank.

All of the other buildings on the campus have hot water boilers except of Arnold Bernhard Center which has a steam boiler.

3. Factors to be considered for the feasibility study

- Heat demand: Data will be collected for each building in each season.
- Heat supply: The power output from the fuel cell station is close to 1.4MW and it runs very stable. Although the theoretical output heat is more than the power output, it still need to be measured.
- Boilers: There are 29 boilers for the 18 buildings in the campus. These boilers have different efficiency, capacity, and conditions. In order to improve the heating system reliability, some of them will be kept or replaced, especially for the critical building.
- Cost to join the city's heating network: There are multiple heat sources: Seaside Park Fuel Cell Station from United Illuminating, Bridgeport Fuel Cell Park. The cost will be negotiated with the city. In addition, federal and state's grants and incentives for such energy efficient project will be requested.
- Optimization of the setup and operating conditions: The existing heating pipes, hot water flow rates, and heat exchanges will be optimized.
- Loss: The heat loss in the heating pipe network will be estimated especially in winter.
- Smart control: A centralized control system will be developed with different types of temperature sensors, motion sensors, and electronic valves.