

Challenge: LCBA – Waste Heat Recovery

Challenge Statement/Synopsis:

Bell is committed to making its operations carbon neutral by 2025 and to achieve a science-based emissions reduction (SBT) target by 2030 in accordance with the 1.5°C warming scenario.

Bell seeks adapted technological solutions in order to achieve its ambitious targets, while meeting objectives of growth and sustainability for its network. Bell wants to adopt a strategy of deployment and integration of new technologies and combining reliability and efficiency, for some or all of the 4,600 buildings and shelters.

Bell has a strong interest in innovations and technologies in the following area:

(a) Waste heat recovery

- Rationale: Waste heat from telecom / IT equipment is discharged to the atmosphere; it could be used to heat the building or to produce electricity (e.g. Organic Rankine Cycle)
- Constraints: Output temperature from cooling systems is typically 35°C (95°F), with some systems such as heat pumps having an output temperature of 60°C (140°F).
- Challenge: Where electricity is produced from waste heat, how to use the electricity produced to power telecom / IT equipment or other building loads.

Context for challenge

Bell and its subsidiaries own and lease buildings across Canada, with most sites located in Ontario and Quebec and a large number of sites in Manitoba and the Atlantic provinces.

Electrical load varies greatly from site to site. Approximately 600 to 700 sites are in the 100 kW to 1 MW range, while 1600 to 2000 sites are in the 30 kW to 100 kW range. Sites typically have ~60% of the total building load on 48 Volts DC power for the network equipment, with the rest on AC power (347/600V, 120/208V, 120/240V).

A significant portion of the electrical load is due to HVAC power consumption, mainly cooling. Historically, the cooling for the equipment rooms was designed to maintain the network equipment cold, with supply air temperatures (SAT) ranging from 10°C to 13°C (50°F to 55°F) and the return air temperature set to 24°C (75°F). This was done regardless of the network equipment's operating temperature range. The cooling systems vary from site to site and may include chillers, cooling towers, computer room air handlers (CRAH), computer room air conditioners (CRAC) and other appliances. Most sites rely on direct expansion (DX) cooling systems, while larger sites typically have chillers and a chilled water loop.



Telecom / IT equipment is air-cooled. No liquid-cooled equipment is installed in Bell facilities.

In most sites, heating load is non-negligible, albeit significantly smaller than the cooling load. Most sites use electrical baseboards and / or gas or oil-fired boilers. Although most sites do not reuse waste heat from network equipment to heat the building, a few sites are better optimized and use heat pumps (which heat the building while producing chilled water for cooling).

It should also be noted that, to support its activities, Bell uses energy storage systems (48 Volts DC power plants and UPS systems). These systems are composed mainly of batteries that can support the load for a duration varying from 10 min to 8 hours, depending on the application.

The power usage effectiveness (PUE) represents the ratio between a building's total power consumption (including HVAC, among others) and the power used by the network / IT equipment. At Bell, the average PUE ratio for buildings is 1.8, whereas the most efficient data centers from key players such as LinkedIn, Microsoft and Facebook are able to achieve a PUE below 1.1.

Bell is therefore looking for solutions to improve energy management in its buildings housing server rooms and other related equipment used to support its network and thus minimize energy consumption and carbon footprint. Bell would like to implement a more integrated approach between network / IT equipment and the buildings hosting it, in order to reduce the corresponding energy needs while ensuring the reliability of the systems.

The proposed solutions will have to take into account the current and future legislative context (in particular, at the level of refrigerants, abolition of halocarbons, alternative energy sources (natural gas, renewable, etc.). The latter must also have a favorable impact on reducing energy consumption, including fossil fuel consumption.

Response criteria

The cost of the solutions should be subject to a break-even point based on an investment-benefit analysis including, but not limited to, the following aspects:

- Impact on climatic conditions
 - Total CO₂ reduction
 - Cost per ton of CO₂ reduction
- Total cost of acquisition and maintenance

Bell is interested in solutions at the research and development / pre-commercial / already commercial stage. While it would be preferable to aim to integrate solutions that have already



been proven in the short term, Bell is open to supporting the development and testing of new technology as long as it is in line with the objectives and timelines of this project.

The Opportunity

As part of the LCBA Canada Project you may have the opportunity to:

- Pilot or deploy your solution with Bell, if your solution is selected and deemed suitable.
- Meet new customers and explore new markets for your solution.

About Bell

Leading the way in broadband and media innovation

Leveraging the power of our world-class wireless and fibre networks, BCE delivers a wide range of service innovations to consumers, businesses and government customers across Canada including 4G LTE, 5G, and 5G+, Fibe Internet and TV, Wireless Home Internet, cloud and data hosting, IP voice and collaboration and Internet of Things.

Bell Media operates the country's top media brands, such as CTV, Noovo, TSN, RDS, Crave, and iHeartRadio, is a leading investor in Canadian content creation, including local television and radio news, sports and entertainment programming, and other original TV and film productions, and partners with advertisers to help connect brands to consumers through video, audio, out-of-home and digital platforms, as well as our advanced advertising technology products.

With its extensive network, BCE is also one of Canada's biggest retailers, with more than 6,000 retail points of distribution across Canada, including approximately 1,100 Bell, Virgin Plus, Lucky Mobile and The Source locations, as well as Glentel-operated locations.

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