STRATEGIES TO TRANSITION TO INDUCTION COOKING IN RESTAURANTS: A BUSINESS CASE FOR INDUCTION COOKING IN VANCOUVER

Executive Summary

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Executive summary

1. Overview of the study

The City of Vancouver, in 2011, committed to reducing its carbon footprint by 33% below the 2007 levels by 2020, through the adoption of the Greenest City Action Plan (GCAP). The 2018 review of the plan showed that 12% of the city's emissions reduction target had been achieved. In 2015, Vancouver demonstrated a greater commitment toward this goal by adopting a policy objective of reaching 100% renewable energy use for all socioeconomic activities by 2050. If Vancouver is to achieve these climate mitigation goals, then some policy measures ought to be in place to reduce the restaurant industry's heavy reliance on natural gas, which contributes to carbon emissions significantly. The study found that restaurants in Vancouver emit about 134,322 tCO2e per year by using natural gas. Out of this, cooking activities contribute a greater proportion (67%), while space and water heating account for 33%.

This project aims to develop a business case to transition the restaurant industry in Vancouver to induction cooking, using induction ranges and griddles as the case model. It primarily focuses on an analysis of the transition cost, the operational and financial benefits of an induction kitchen, and makes policy recommendations to incentivize restaurant owners to transition.

2. Study methodology

The project adopted both quantitative and qualitative research techniques, using primary and secondary sources of data. The primary data included interviews of restaurant owners, chefs, and a restaurant consultant. The secondary data included a desktop literature review of the energy consumption distribution and prices of restaurant operations in BC. Information from these sources was used for the cost-benefit analysis and the assessment of emission reduction impacts of induction cooking.

3. Overview and benefits of an induction kitchen

Induction equipment for commercial cooking is currently available for the ranges, griddles, woks, and deep fryers. Typically, an induction range would have 3 to 5 cooking burners and a conventional oven. However, some restaurants prefer to use 3 to 4 high amperage single unit induction cookers. All other restaurant cooking appliances such as ovens, broilers, and steamers

are available in higher energy-efficient electric versions with Energy-Star certification. Some of the documented benefits of induction cookers include:

- **Energy-saving leads to cost-savings**: An induction range can save about 50% of natural gas wasted in unused heat and leakages resulting from using a gas range. Induction ranges are also 85% to 95% energy efficient compared to standard gas ranges which operate at 25% to 35% energy-efficiency. This implies that an induction range can be 3 times as efficient in terms of energy use to cook the same amount of food. In addition, induction cooking reduces the need for ventilation and air conditioning (HVAC) by about 23%, resulting in cost-savings. Although restaurants may see an incremental increase in electricity costs, these costs may be offset by the lower energy requirements of their induction appliances.
- **Reduces the carbon footprint of restaurant kitchens:** BC Hydro produces about 93% of its electricity from renewable sources. Transition to a full-induction/electric cooking has the potential to reduce a restaurant kitchen's carbon impact by 96%.
- **Cooks faster than a gas range:** Various experimental studies have confirmed that induction cooktops transfer heat to food faster than gas ranges with an average of 2-3 minutes less time required to boil water than gas. This has the potential to reduce customers waiting time in restaurants.
- **Improves kitchen ambiance and outdoor air quality**: Cooking with natural gas produces dangerous pollutants such as carbon monoxide (CO), nitrogen dioxide (NO2), and nitrogen oxide (NO). Studies have established that the efficiency of hood vents to remove these pollution ranges from 25-70%. Continuous inhalation of these over a long period is harmful to human health. Induction cooking, however, eliminates these dangerous pollutants from these gas-specific pollutants.
- **Reduces the risk of fire:** With induction cooking, naked flames are avoided, reducing the risk of fire. Chefs also avoid getting burnt from naked flames and hot burners--induction surfaces do not produce extra heat other than the heat of the cookware.
- **Easier with cleaning:** The ceramic-glass surface of an induction range can be cleaned with ease with a wipe, and less time-consuming than a gas burner.

4. Constraints and barriers expressed by participants

Stakeholders expressed various concerns perceived as constraints and barriers to transition to induction cooking. The key ones include: i) difficulty raising capital to meet the cost of transitioning to an induction kitchen; ii) limited electricity amperage; iii) future increases in electricity rates could

lower business profit; iv) induction cooking might not support the preparation of Asian cuisines; v) slight learning curve as chefs adapt to induction cooking methods and determining temperature without sensory indicators; vi) limited availability of induction cooking appliances and maintenance services in Vancouver.

5. Best practice studies and lessons

Government initiatives toward low carbon kitchens

Ecuador's nationwide induction cooking program is one of the few examples of a government led program to transition to induction cooking. The program aims to replace about 3.5 million domestic gas cookers with induction cooktops. The main policy tools used include providing financial incentives such as low-interest loans to purchase induction cooking equipment, subsidizing electricity prices, and embarking on public education on benefits induction cooking.

The State of California also provides incentives for low-carbon kitchen transitions through encouraging Energy Star certified cooking equipment use through financial rebates, and stakeholder training and orientation.

Private initiative to transition to induction cooking

The French Laundry Restaurant in California provides one of the best cases. Its recent renovation included a state-of-the-art induction kitchen, which serves the 62-seat restaurant with 2 to 3 months of advanced booking. The French Laundry Restaurant demonstrates that an induction kitchen can meet the high cooking demand of big restaurants.

Marlow & Sons Restaurant in New York City serves American-Japanese menus and has operated with induction cookers since 2010. Marlow & Sons' case highlights how induction cooking is compatible with Asian cuisines.

Farmers Apprentice Restaurant located in Vancouver, provides a local example of an induction restaurant kitchen. According to the Farmers Apprentice Restaurant, some of the benefits of cooking with induction include lower energy bills, safety and less heat in the kitchen, fewer burns for chefs, and no equipment breakdown since the last five years of operating with induction cookers.

6. Financial cost-benefit analysis

The main cost component to transition to an induction kitchen involves an upgrade of the electrical system of the restaurant kitchen and installing new commercial induction equipment such as a range and griddle. The total cost is estimated at $20,000 to $30,000, but is highly dependent on the size of the restaurant, the electrical upgrades required, and the types of equipment being purchased. The financial returns based on the business case analysis were analysed for 5 different restaurant archetypes: a Full-service restaurant, a quick-service restaurant, a Pizza-dine-in/take-out-, an Asian (wok-based) restaurant and a Banquet/institution/cafeteria. The variation in the financial benefits depends on the energy consumption variable of the various types of restaurants. The estimated payback time ranges from 11 to 20 years without financial incentives. It should be noted that due to the high cost of equipment upgrades and higher electrical costs, any cost savings are better achieved through a complete low-carbon kitchen design rather than the one-off replacement of a single piece of equipment.

7. Policy recommendations

The policy recommendation based on the business case analysis and the best practices case include the following:

- explore incentives to reduce the cost of operating for those implementing induction cooking, for example a rebate on the annual business permit renewal fee
- in partnership with a utility (BC Hydro) provide rebates for restaurants to purchase induction cooking equipment
- partner with a popular restaurant in the city to establish a model kitchen as a demonstration.