

# DATA GATHERING AT THE PUBLIC & COMMERCE LEVEL: DETERMINATION OF CONSUMPTION/GENERATION PATTERNS FOR ENERGY, WATER, WASTEWATER AND SOLID WASTE, BASED ON FACILITY TYPES

## Data gathering and analyses

The main objective of this task is to determine energy and water consumption, and the generation of waste water and solid waste in public & commerce facilities. Based on the facility type, the data will be calculated per employee/customer/student/etc. This data is then delivered to other work packages for further integration into system modelling and simulation within RP.

## Approach

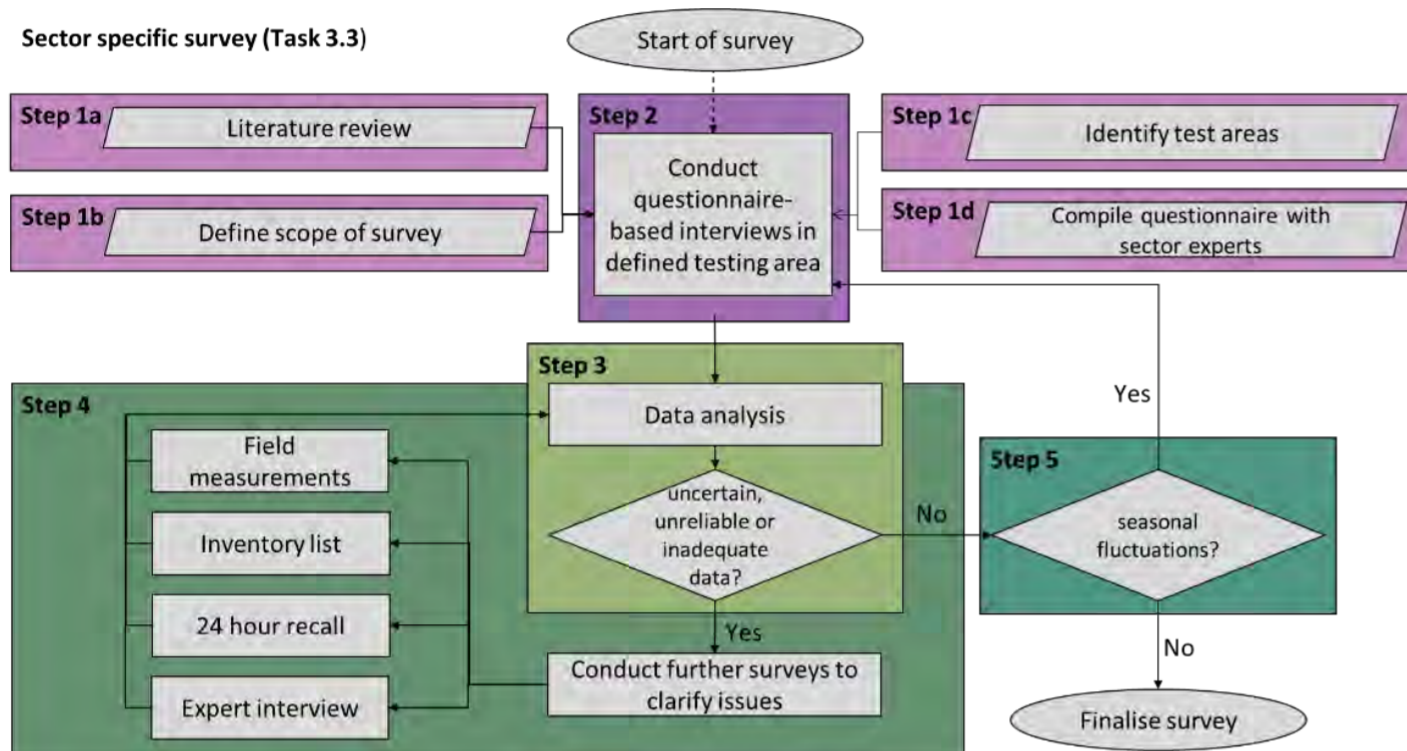
During our first visit in Kigali, a preliminary survey was carried out to determine types of existing facilities in Kigali. As most of the facilities under public & commerce sector do not have a typical building type, the test areas in Task 3.3 were identified based on the occurrence/accumulation of

these facilities, such as Central Business District (CBD) and market areas. Some of the test areas do overlap with the household test areas as facilities such as school and health care centre are located in the residential areas.

Once the test areas and facility types were finalised, together with sector experts, a questionnaire for Kigali was developed and sent to project partners in the case cities for their inputs and suggestions. Depending upon the case city, the questionnaire comprises of 25 - 30 questions and covers four above-mentioned sectors. The finalised questionnaires were translated into the local language and uploaded onto the ODK Collect APP. Lastly, with the help of local assistants, two 'Public & Commerce' surveys were conducted in Kigali. The methodology is presented in the following figure.

## Data gathering methodology at the public & commerce level

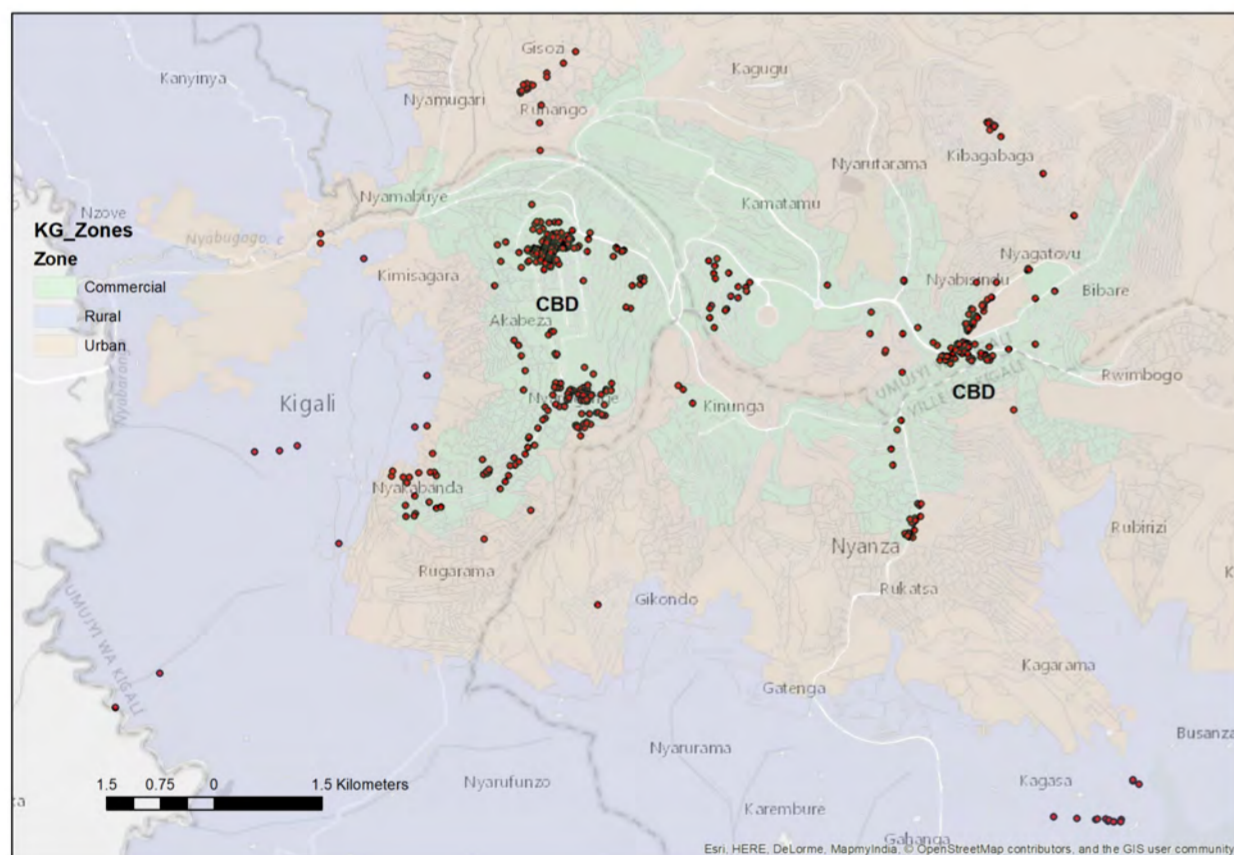
### Sector specific survey (Task 3.3)



## Test areas

The following figure shows the test areas and the location of surveyed facilities in Kigali.

### GPS location of surveyed facilities in Kigali



## Main facilities in Kigali:

(Sample size for each facility is shown in the brackets)

- Bank (8)
- Café (10)
- Restaurant/food shops (67)
- Garage (8)
- Hotel (6)
- Internet Café (17)
- Health centre (10)
- Shops (489)
- Gas Station (3)
- Market (18)
- Religious sites (31)

School (6) Shops is the dominant type of facility in Kigali, followed by restaurants and religious sites. The facilities are analysed per customer/employee/pupils or sq. m [m<sup>2</sup>] based on its type. The following section presents the analysis of 'Restaurants' based on location, size and availability of kitchen on site.

## Exemplary results for restaurants (total sample size: 67)

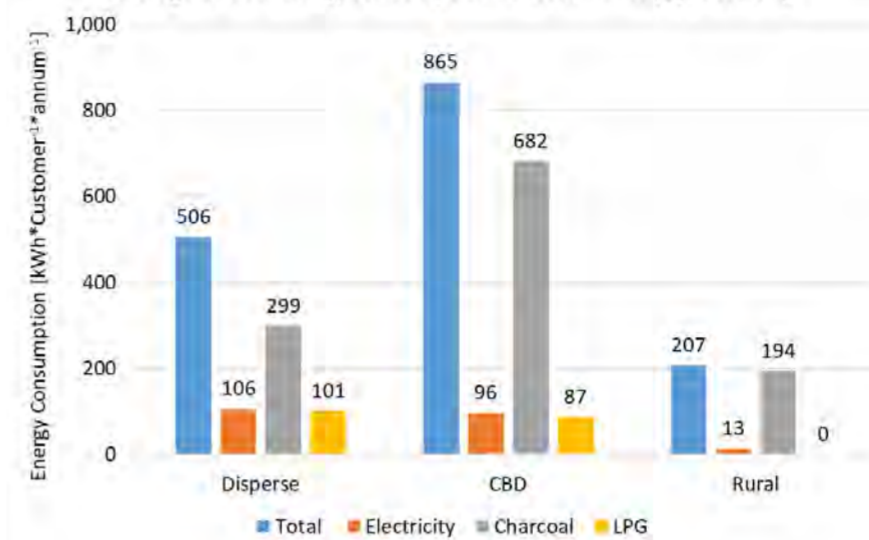
### 1. Restaurants by location

- The restaurants are categorised by their location: disperse, CBD, and rural
- Sample size: Disperse (21), CBD (44), Rural (2)

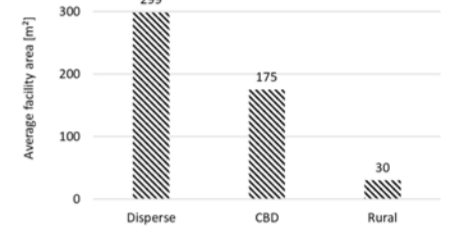
(All consumption values are in kWh per customer & annum)

### CBD: Central Business District

Average annual energy consumption in restaurants (by location)



Average facility area (by location)

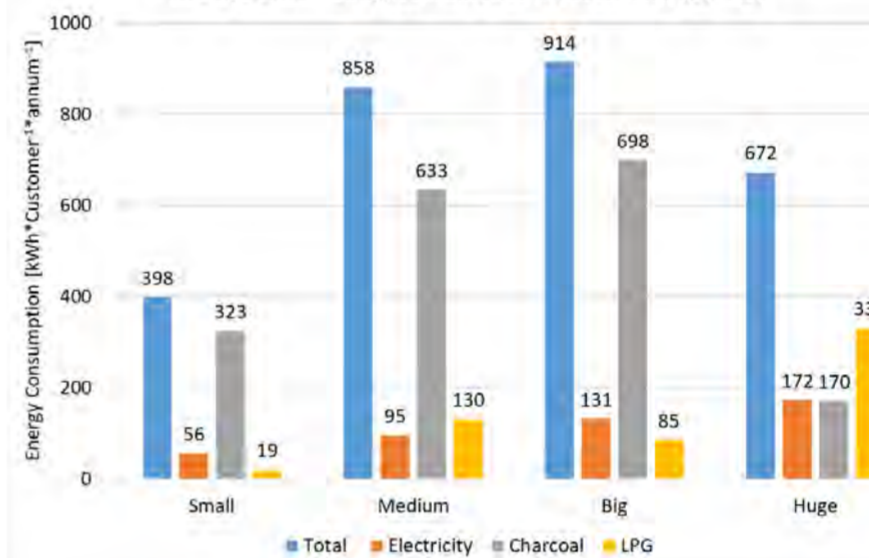


As anticipated, restaurants in the rural areas have the lowest energy consumption and also the smallest facility area. Restaurants in CBD have the highest energy consumption per customer while restaurants in disperse areas have, the largest area.

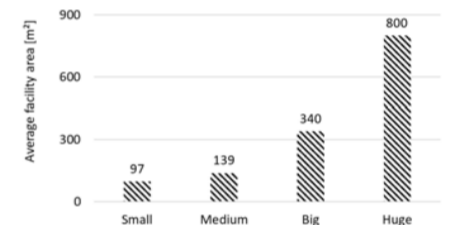
### 2. Restaurants by size

- This categorisation is based on no. of employees: small (1 - 4), medium (5 - 9), big (10 - 24) and huge (> 25)
- Sample size: Small (20), Medium, (24), Big (21), Huge (2)

Average annual energy consumption in restaurants (by size)



Average facility area (by size)

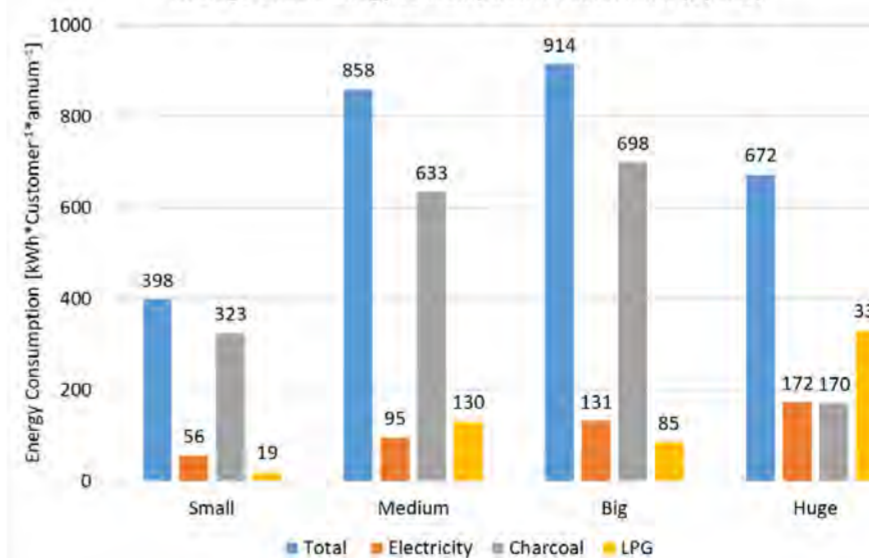


Employee size and area of the facility are directly proportional to each other. Surprisingly, restaurants under category 'Big' have the highest energy consumption per customer, followed by medium and huge-sized restaurants.

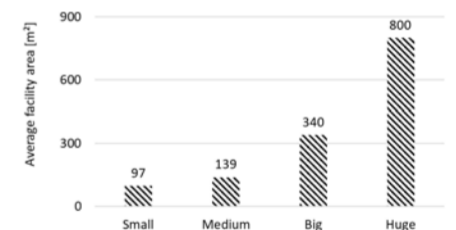
### 3. Restaurants by kitchen on site (yes/no)

- In the last categorisation, restaurants with and without kitchen on site (food shops) are analysed
- Sample size: Cook at the facility?, yes (56), Cook at the facility?, no (11)

Average annual energy consumption in restaurants (by size)



Average facility area (by size)

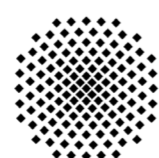


There is a huge difference between energy consumption & area for restaurants with and without a kitchen. As food shops only sell finished products, they require less space and consume less energy, compared to proper restaurants with kitchen

- The analysis shows that location, employee size and availability of kitchen influence no. of customers, energy consumption and area [m<sup>2</sup>] of the facility, e.g. restaurants in rural areas and food shops have the lowest energy consumption per customer and the smallest facility area.
- In the aforementioned analysis, consumption patterns are analysed per customer, as the analysis based on other parameters such as employee does not show great variations.
- Moreover, all restaurants (independent of location or size) spend the highest share of their expenditure on utilities, i.e. energy and water.

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