

MP GHG Inventory Training

Homework for Session 2

Energy: Grid electricity

1. **How much electricity do you use a month in your house (units/kWh). How many households are there in your municipality? Using this information, estimate how much electricity might be used in the residential (domestic) sector in your municipality, assuming all households use a similar amount?**

My household, based in Steve Tshwete municipality, uses around 450 units per month.

According to the municipality's annual financial report, which can be found at <https://stlm.gov.za/wp-content/uploads/2025/04/FINAL-Annual-Report-2023-2024.pdf>, there are 80,052 households in the municipality. This gives around 36 million kWh, or 36 gigawatt hours (GWh) per month, or around 432 GWh per year.

2. **Now let's try a more rigorous exercise to estimate grid electricity for your jurisdiction and see how it compares.**
 - a. **Start with the data for SA for residential from the 2019 energy balance (see the workshop slides for the link).**

The energy balance in 2019 indicates that 48,523,000 MWh was consumed by the residential sector in that year.

- b. **This data now needs to be scaled down to the provincial or municipal level. Go to <https://www.nersa.org.za/files/files/2020/09/Electricity-Supply-Statistics-2012.pdf>**
- c. **On page 47 you will find the distribution of electricity by category by province and the total, while on page 55 you will find the distribution by category per municipality in Mpumalanga**

MP used $1,187,675 / 42,671,581 = 2.78\%$ of the national residential demand.

Steve Tshwete used $213,890 / 1,187,675 = 18\%$ of the residential demand in MP

- d. **This data is for 2012 but the ratios for the distribution by category and municipality can be used to disaggregate the national data (if you assume the split has not changed since 2012). You can use the "downscaling tool" provided for this purpose.**

e. Estimate the energy consumption for residential in 2019 for your jurisdiction

Steve Tshwete consumption = $18\% * 2,78\% * 48,523,000 \text{ MWh} = 242,809 \text{ MWh}$, or 242 GWh.

Note: This is about double of what was estimated using my own consumption, which makes sense as I used a middle class household's consumption data whereas average consumption could well be lower than my own consumption.

3. Prepare a document or slide for presentation at the next workshop to explain your thinking process.

Additional optional exercise

1. One more source of data is https://www.eskom.co.za/wp-content/uploads/2023/10/Eskom_integrated_report_2023.pdf. What data can you use from this report to give another estimate? How does this compare to the other approaches? Which do you think is the most accurate?

The report indicates 5% of total national electricity sales to be to the residential sector, and total sales in 2023 to be 188.4TWh or 188,410 GWh. So total national sales to the residential sector is $5\% * 188,410 \text{ GWh} = 9,420.5 \text{ GWh}$.

We now have to allocate this to Steve Tshwete, which we can do either based on population or number of households.

Population:

According to the 2022 census, https://census.statssa.gov.za/assets/documents/2022/Census_2022_Municipal_factsheet-Web.pdf?utm_source=chatgpt.com, the Steve Tshwete share of population was $242,031/62,027,502 = 0.39\%$.

Applying this to the total residential sales = $0.39\% * 9,420.5 \text{ GWh} = 36 \text{ GWh}$. This figure is significantly lower than the other estimates.

Number of households:

The census data at <https://census.statssa.gov.za/#/province/8/2> indicates 80,052 households in the municipality, out of a total of 17,828,778 in 2022, or 0.449% of households. Applying this to residential demand = $0.449\% * 9,420.5 = 42.29 \text{ GWh}$.

Which do you think is the most accurate number, of all those you calculated?