List of Figures

List of Tables

Introduction

General Background

[#TODO]

- Global background
- National background Switzerland

Energy policy in the Canton of Basel-Landschaft

In 2021, the cantonal government of Basel-Landschaft signed the Climate Charter of the Northwestern Intergovernmental Conference together with the governments of the cantons of Aargau, Basel-Stadt, Jura and Solothurn. In the Charter, the five cantons agree on the net zero target by 2050[1]. Thus, the energy supply of the participating cantons should be switched to 100% renewable energy sources by no later than 2050 (Nordwestschweizer Regierungskonferenz, 2021).

The current legally valid version of the cantonal energy law defines in § 2 (1-4) the following goals (Landrat des Kantons Basel-Landschaft, n.d.):

1. The end energy consumption (german: Endenergieverbrauch) in the canton, excluding mobility, should be reduced by 40% by 2050 compared to 2000 (6,500 GWh).
2. The share of renewable energies in total energy consumption (excluding mobility) should be increased to at least 40% by 2030.
3. In the building sector, the heating demand for **new buildings** should be reduced to an average of 20 kilowatt hours (kWh) per square meter of energy reference area per year by 2030.
4. In the building sector, the non-renewable heating demand for **existing buildings** should be reduced to an average of 40 kWh per square meter of energy reference area per year by 2050.

[1] As defined by ("2050 indicative target," n.d.), the net zero target means that "*from 2050 Switzerland aims to emit no more greenhouse gases into the atmosphere than can be captured and stored in natural and technological sinks ('net zero emissions').*"

In 2022, the cantonal council published a new version of the energy planning report, in which the above targets were reviewed for compatibility with the net zero target. The report states that goal 1 and 3 are not compatible with the net zero target (Regierungsrat des Kantons Basel-Landschaft, 2022). As a result of this finding, the cantonal government submitted a proposal on behalf of the Landrat in which the two goals are changed as follows (Regierungsrat des Kantons Basel-Landschaft, n.d.):

1. The end energy consumption in the canton, excluding mobility, should be reduced by **70%** by 2050 compared to 2000 (6,500 GWh).
2. In the building sector, the non-renewable heating demand for **existing buildings** should be reduced to an average of 40 kWh per square meter of energy reference area per year by 2050.

Cantonal energy law

Cantonal energy planning

With the total revision of the cantonal energy law in 2016, the new § 3 on energy planning of the canton was introduced. This § 3 obliges the cantonal government to create an energy plan on the basis of the federal requirements and frameworks and to report the results to the cantonal council. Furthermore, according to § 2 (6) of the cantonal energy law, the government council must also report periodically on the effectiveness of the (previous) measures.

As integral part of the energy planning, the canton delivers a energy statistics since 1990. Until 2010, the statistics was mainly based on a top-down approach. Since 2010, a bottom-up approach has been introduced.

Cantonal energy system

In 2020, the gross energy consumption of the canton was about 7600 gigawatt hours, which corresponds to a reduction of 4.4% compared to 2018 (Statistisches Amt des Kantons Basel-Landschaft, 2022). The following figure @ref(fig:energieflussdiagramm) provides an overview of the cantonal energy system.

```
#> knitr::include_graphics(path = "figure/energieflussdiagramm_2020.png")
```

Problem definition

As mentioned in (**cantonal-energy-planning?**), the Canton of Basel-Landschaft conducts a cantonal energy statistics already since 1990[2]. Ever since, the energy consumption had to be estimated at least in parts - namely for energy sources where no measerued data has been available. In particular, this is the case for domestic hot water (DHW) and heat energy consumption (HEC) of residential buildings that are using non-grid connected energy sources such as heating oil, wood-based energy systems or heat pumps. In the latest version of the cantonal energy statistics for the year 2020, about 40% of the total annual energy consumption was based on estimations .

Since 2010, the estimation is based on a new method that has been developed together with the canton of Basel-Stadt Statistisches Amt des Kantons Basel-Stadt (2022) . The method uses a bottom-up approach and is based on the register of buildings and dwellings (RBD) . The RBD provides information about every building in the canton, such as the building area, building category or the construction year. The building data from the RBD is then enriched with measured energy consumption data for gas-heated buidlings and further information from other data sources (e.g. the number of inhabitants or characteristics of the installed combustion plant).

Shortcomings of the current method:

- Influence of retrofitting is unknown and can not be quantified
- Socio-economic factors and behaviour of inhabitants is not considered explicitly
-

Research questions & goals

On the basis of the considerations in Chapter Background and Chapter , we will here formulate the research questions and also define the goals of the project from a practical perspective.

2050 indicative target. (n.d.). Retrieved from https://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/emission-reduction/reduction-targets/2050-target.html

Landrat des Kantons Basel-Landschaft. (n.d.). Energiegesetz (EnG BL). Retrieved from https://bl.clex.ch/app/de/texts_of_law/490/art/2

Nordwestschweizer Regierungskonferenz. (2021). *Klima-Charta der Nordwestschweizer Regierungskonferenz* (p. 5). Retrieved from https://www.baselland.ch/politik-und-behorden/direktionen/bau-und-umweltschutzdirektion/umweltschutz-energie/klima-1/klima-charta-der-nordwestschweizer-regierungskonferenz

[2]The tables and illustrations of the cantonal energy statistics are available at: https://www.statistik.bl.ch/web_portal/8.

Regierungsrat des Kantons Basel-Landschaft. (n.d.). *Vorlage an den Landrat: Änderung des kantonalen Energiegesetzes und des zugehörigen Dekrets aufgrund des Energieplanungsberichts 2022* (p. 47). Retrieved from https://baselland.talus.ch/de/dokumente/geschaeft/0c4e9a4dc0c84cf783377aa2b4e46bcc-332

Regierungsrat des Kantons Basel-Landschaft. (2022). *Bericht zum Stand der Energiepolitik des Kantons Basel-Landschaft im Jahr 2022* (p. 49).

Statistisches Amt des Kantons Basel-Landschaft. (2022, June 29). Webartikel: Energiestatistik 2020. Retrieved from https://www.baselland.ch/politik-und-behorden/direktionen/finanz-und-kirchendirektion/statistisches-amt/publikationen/energie/webartikel_vom_29-06-2022_energiestatistik_2020

Statistisches Amt des Kantons Basel-Stadt. (2022). *Methodenbericht - Energiestatistik Basel-Stadt.* (p. 12). Basel. Retrieved from https://www.statistik.bs.ch/dam/jcr:51d6273d-0c4c-40f9-9941-beb834331e45/Methodikbericht-Energiestatistik.pdf