

# StromGT: A planning tool for reducing electricity consumption in building automation and control systems

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## Introduction

Electricity consumption by Building Automation and Control Systems (BACS) is often underestimated. Since 2013, the Lucerne University of Applied Sciences and Arts has led SFOE-supported projects to quantify this consumption ([1], [2], [3]) and to develop the planning tool *StromGT*.

## Tool and methodology

StromGT is a free Excel-based tool with embedded VBA macros, available in German, English, and French ([4], [5]). It is preconfigured for the typical building services heating, cooling, ventilation, lighting, and shading. While it focuses on BACS, it can also include non-BACS devices (e.g., light bulbs, heat pumps). Planners can freely define included devices and services — even custom ones like access control.

Key features include:

- Modelling electricity consumption of BACS and other systems.
- Supply loss modelling across the entire power supply tree.
- Minimal input via smart defaults.
- Aggregation by device type, building service, and BACS relevance.
- Interactive tables and graphs for results.

The tool uses a device-level model with active/standby states and multiple power inputs.

## Case study

In Roche Building 1 (Basel) ([6], [7]), a Minergie-certified high-rise using groundwater and waste heat for heating and cooling, BACS electricity use was assessed relative to total building services (heating, cooling, ventilation, lighting, shading):

- Realised system: BACS accounted for 21 % (3.6 kWh/m<sup>2</sup>) of annual services electricity.
- Optimised system: Reduced to 8 % (1.2 kWh/m<sup>2</sup>), resulting in 66 % savings.

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High savings potential was identified in actuators, controllers, lighting components, and power supplies (Figure 1). Heating/cooling valve actuators showed high standby losses, while ventilation and shading motors avoided them via 3-point control.

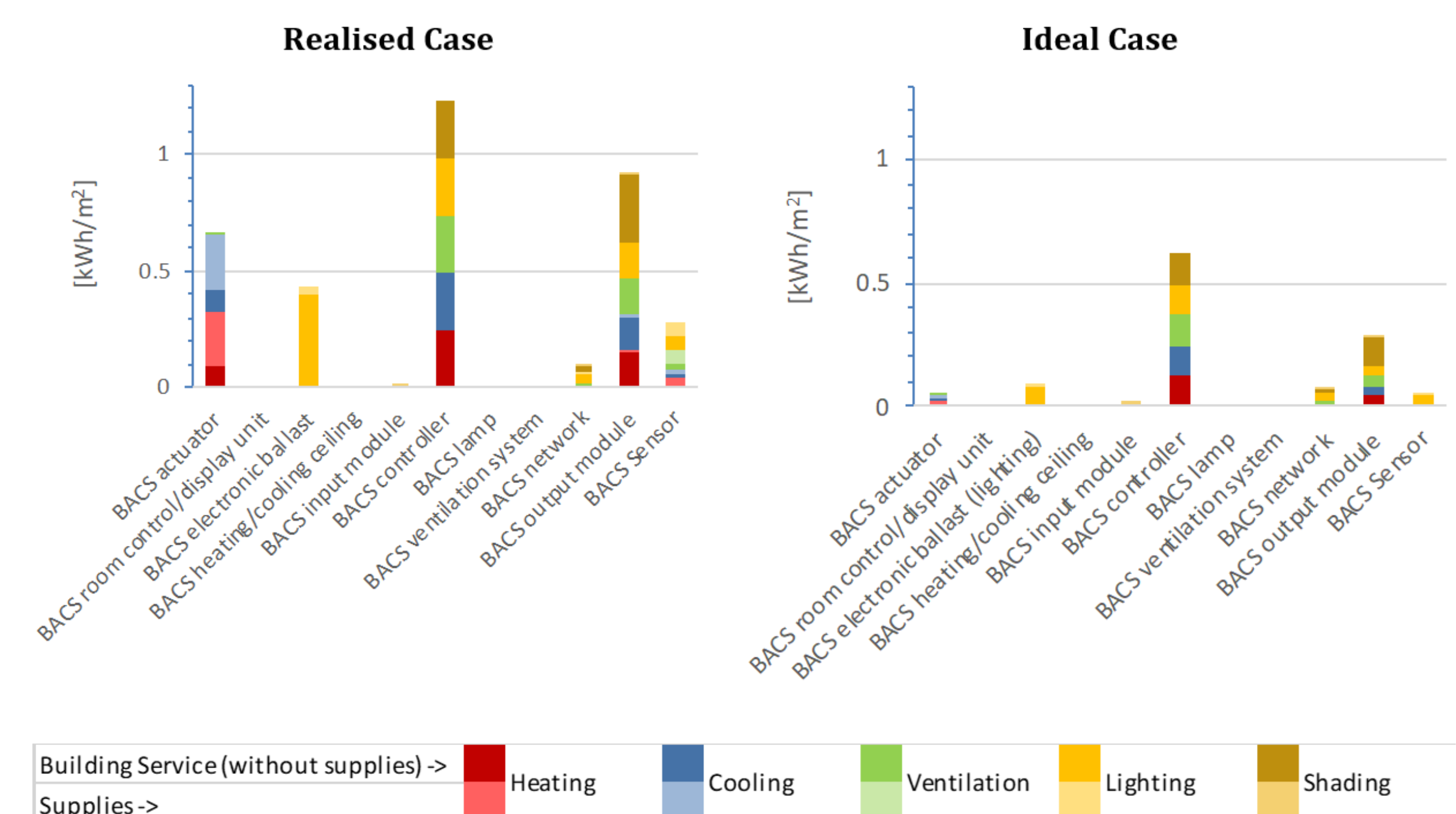


Figure 1: BACS annual electricity consumption by device type and building service.

## Challenges in addressing BACS electricity consumption

- Missing client requirements: Owners rarely define targets or request calculations. Yet, owners could define annual limits (kWh/m<sup>2</sup>) and idle/standby thresholds for systems and devices.
- Regulatory gaps: Few binding standards; SIA 2056 offers reference values but lacks enforcement ([8], [9]).
- Incomplete product data: Typical power consumption values often unavailable; standardisation needed.

The authors recommend incorporating BACS electricity consumption into building labels (e.g., Minergie, SNBS); standardising product datasheets with power consumption values representative of typical usage scenarios; utilising power properties in classification systems (e.g., ETIM, ECLASS); and creating product databases based on these classification systems through automated data integration.

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