ECO-FRIENDLY SUSTAINABLE CAMPUS

MONITORING CLEAN ENERGY IN THE EULIST CAMPUSES

GROUP C

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AN ECO-FRIENDLY SUSTAINABLE CAMPUS:

- PAves the way for a greener future
- Empowers individuals to make positive changes that extend beyond the campus boundaries
- Ultimately contributes to a sustainable planet for generations to come

PROJECT FOR AN ECO-FRIENDLY SUSTAINABLE CAMPUS FOCUSES ON A NEW PROTOTYPE BUILDING MODEL:

- Nearly Zero Energy Building
- Possibility of alternating masonry and glazing
- Easy switching of thermal and electrical energy production systems
- Monitoring and controlling of building's passive and active operational systems

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STEP 1: DATA COLLECTION

- Configuration of weather data and construction materials
- Insulation levels, glazing characteristics for different building elements (walls, roof, windows)
- Simulation settings - the simulation period, time step, and output variables, input of the occupancy schedule, lighting loads, and otherinternal gains

STEP 2: APPROACH

- Division of the building to smaller spaces of multiple rooms with similar thermal properties
- Thermal properties considered: o*rientation of the space, occupancy profile of the space, internal loads of the space, desired temperature setpoint*

STEP 3: ANALYSIS AND OPTIMIZATION OF THE ENERGY DESIGN

- ENERGYPLUS simulation tool allowing assessment of the energy performance of buildings
- Exporting informed decisions to improve their energy efficiency

SIMULATING THE OPTIMAL BUILDING PROPERTIES IN DIFFERENT CONDITIONS:

- Two different climatic zones:

ATHENS, GREECE

STOCKHOLM, SWEDEN

SIMULATING THE OPTIMAL BUILDING PROPERTIES IN DIFFERENT CONDITIONS:

- Distinctive function: RESIDENTIAL BUILDING for a family

FAMILY OF FOUR:

- CONSITS OF TWO PARENTS AND TWO CHILDREN
- Parents - in office 8.00 - 18.00 (mon - fri)
- Children - in school 8.00 - 16.00 (mon - fri)
- Weekend outtings - 12.00 - 17.00
- Vacation - in July

LOCATION NO.1: ATHENS, GREECE

LOCATION

- South-eastern Europe, beyond Balkan countries, on the Peloponnese peninsula and more than 1.400 adjacent islands

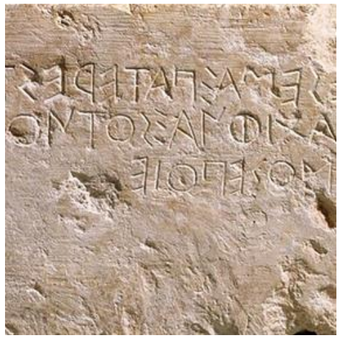
CLIMATE

- Typical Mediterranean climate: mostly cloudless skies in summer, temperature around 36°C (in thesouth around 40°C), clear weather from April to November, rainy weather in winter

MOST USED MATERIALS

WOOD AND CLAY

LIMESTONE



PENTELIKON MARBLE

PINK EPIROS MARBLE

LOCATION NO.2: STOCKHOLM, SWEDEN

LOCATION

- Northern Europe

CLIMATE

- Primarily mild climate (thanks to Gulf Stream), withdeciduous trees in south and pines and birchesin north, the subarctic climate dominates mountains in the north

MOST USED MATERIALS & CONSTRUCTION

WOOD INFILL WALLS

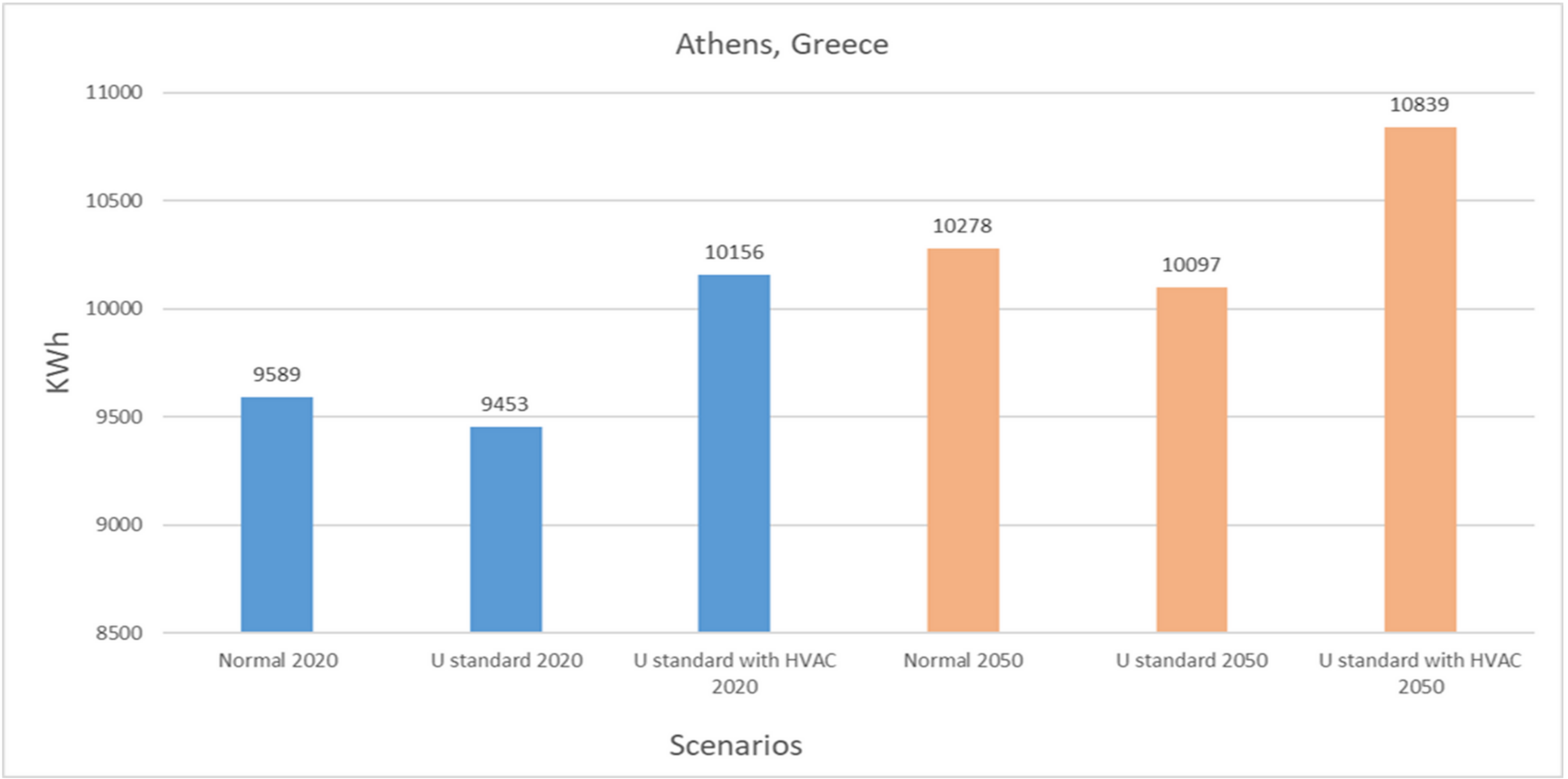
LIGHTWEIGHT CONCRETE WALLS

SANDWICH WALLS

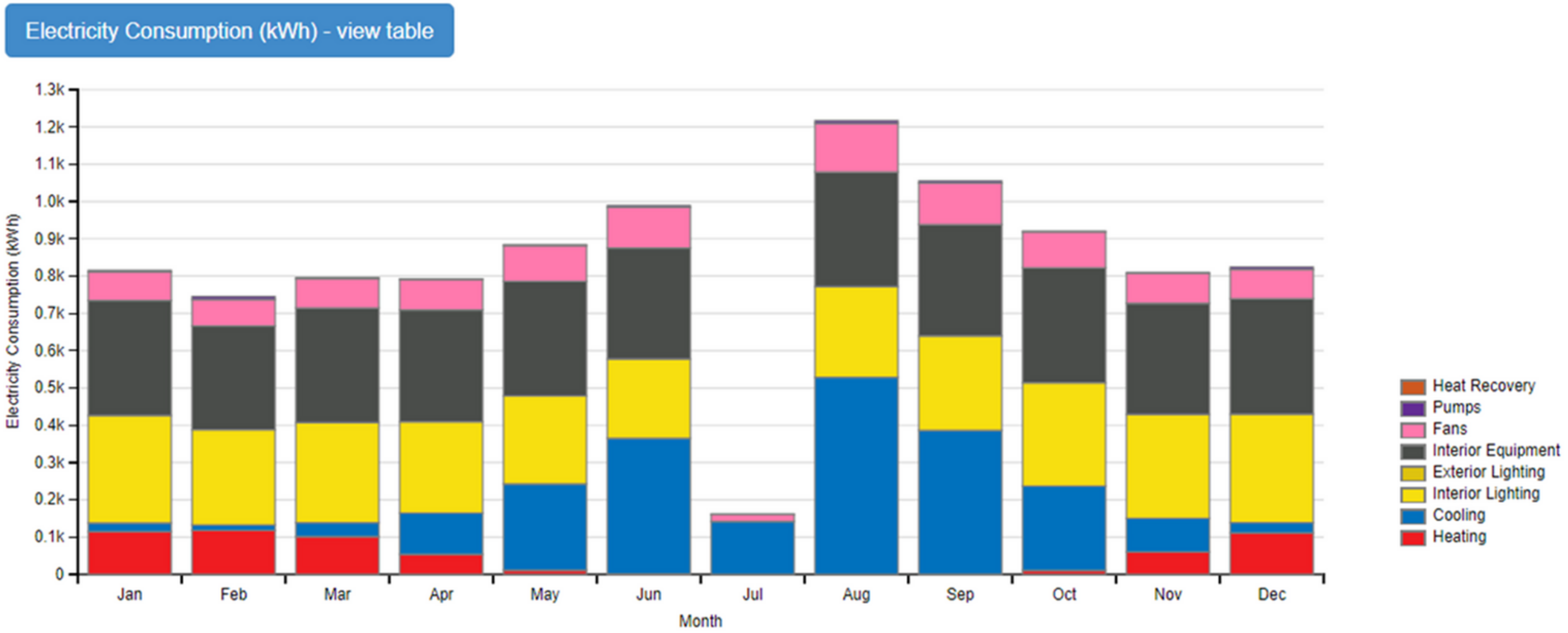
BIOBASED MATERIALS:

BARRIER FILMS
CHEMICALS
CARBON FIBRES
TEXTILE FIBRES

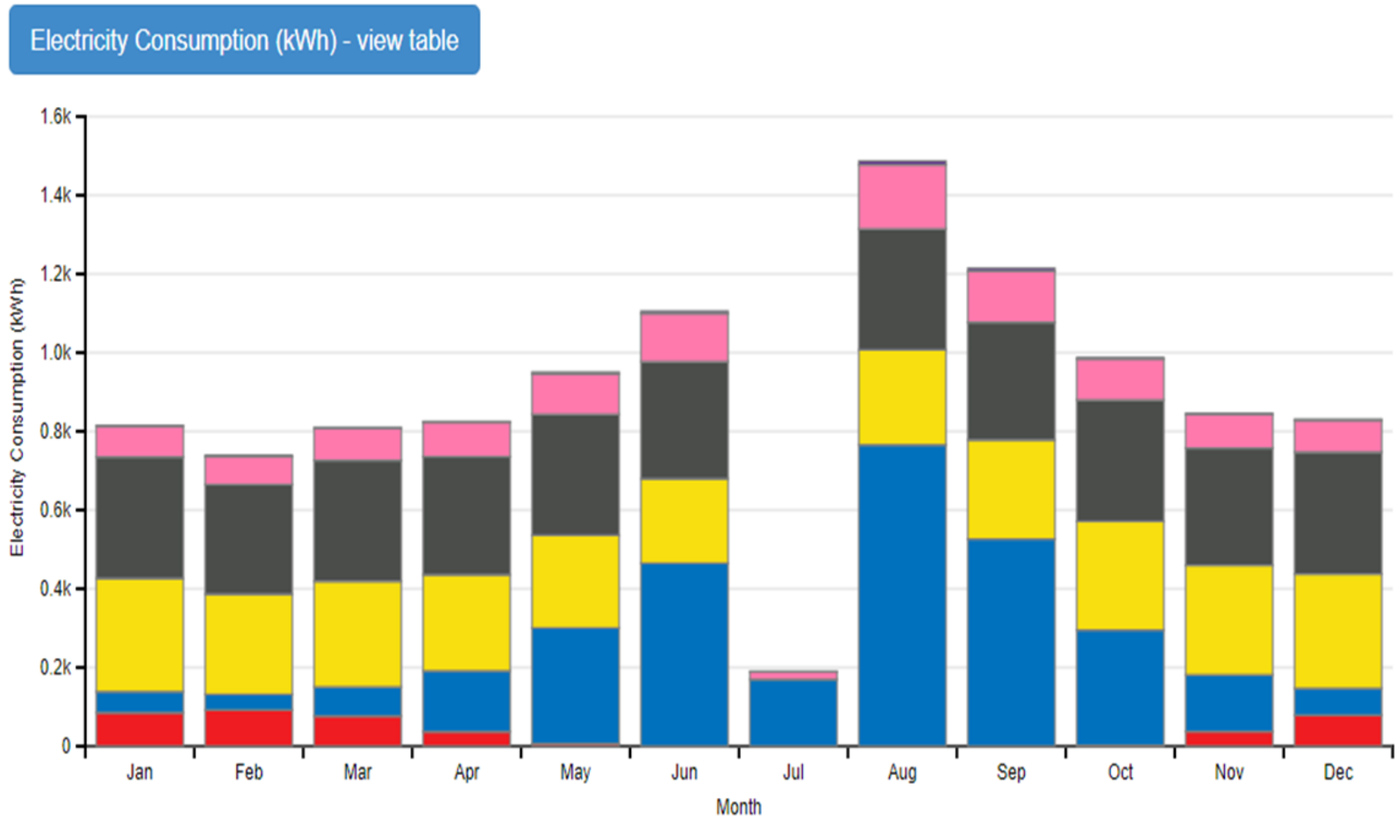
SIMULATING THE OPTIMAL BUILDING PROPERTIES - RESULTS FOR ATHENS:



SIMULATING THE OPTIMAL BUILDING PROPERTIES - RESULTS: ATHENS 2020 HVAC



SIMULATING THE OPTIMAL BUILDING PROPERTIES - RESULTS: ATHENS 2050 HVAC



COMPARED TO 2020:
→ heating decreases
→ cooling increases
REASON:
rise in global temperature by 1.5°C

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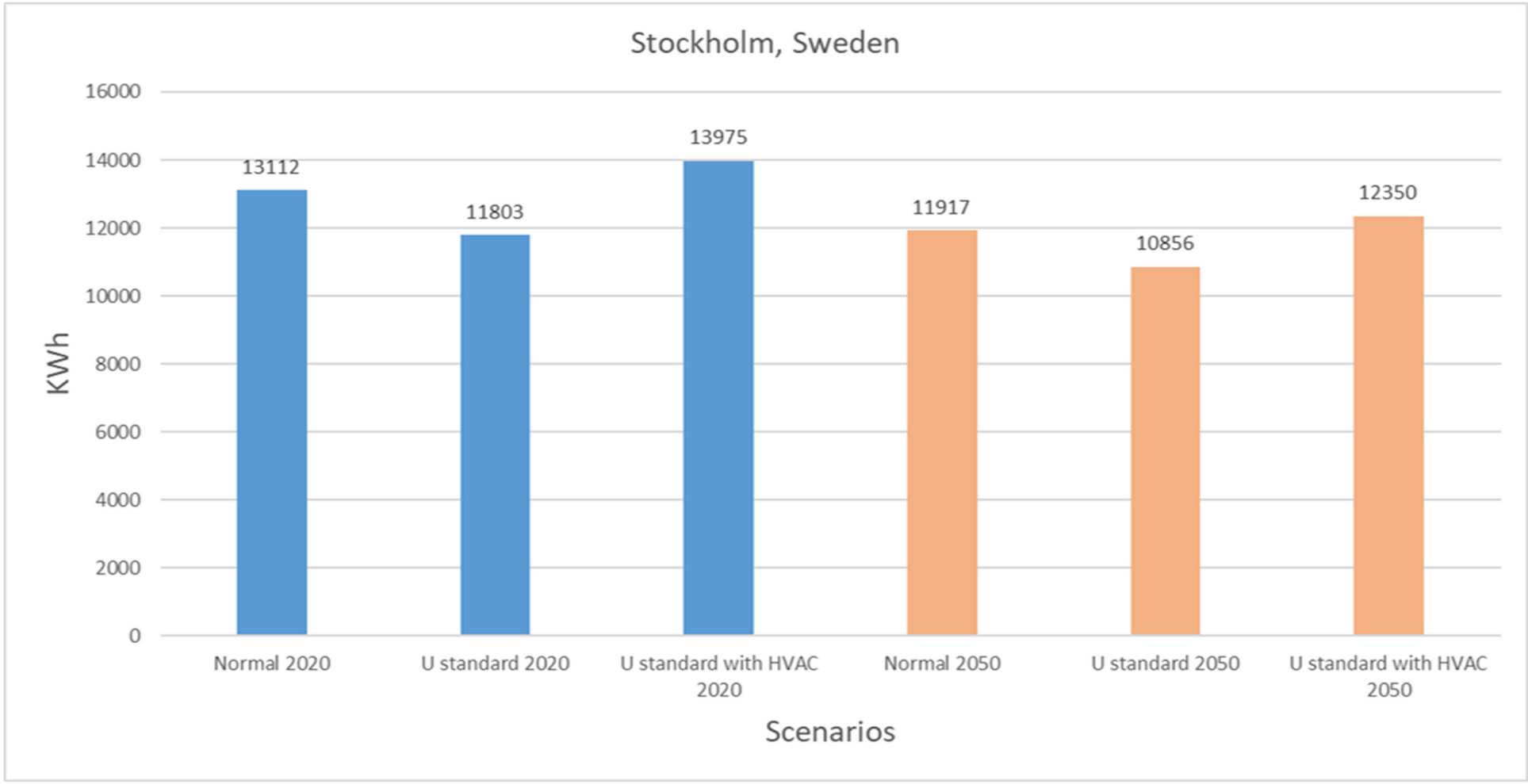
SIMULATING THE OPTIMAL BUILDING PROPERTIES - RESULTS FOR STOCKHOLM:



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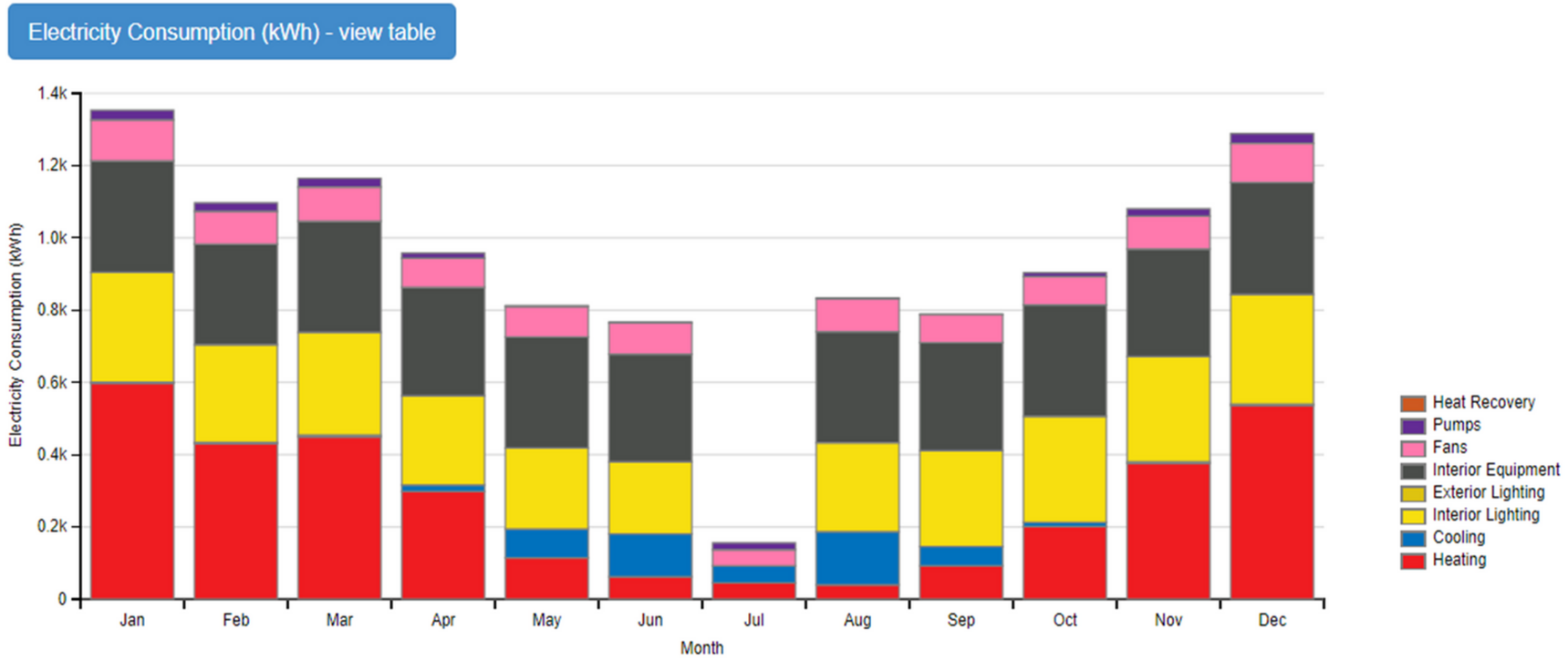
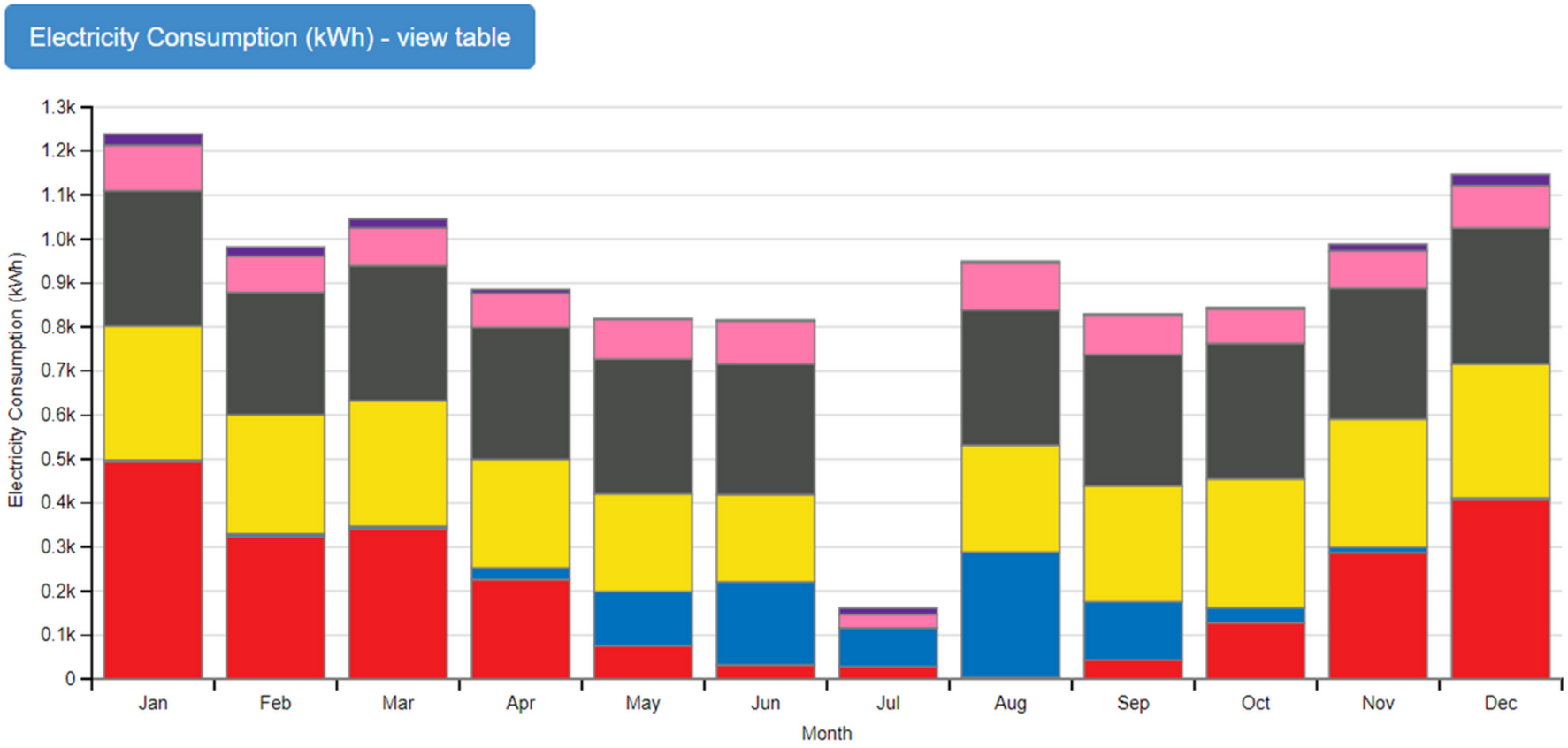
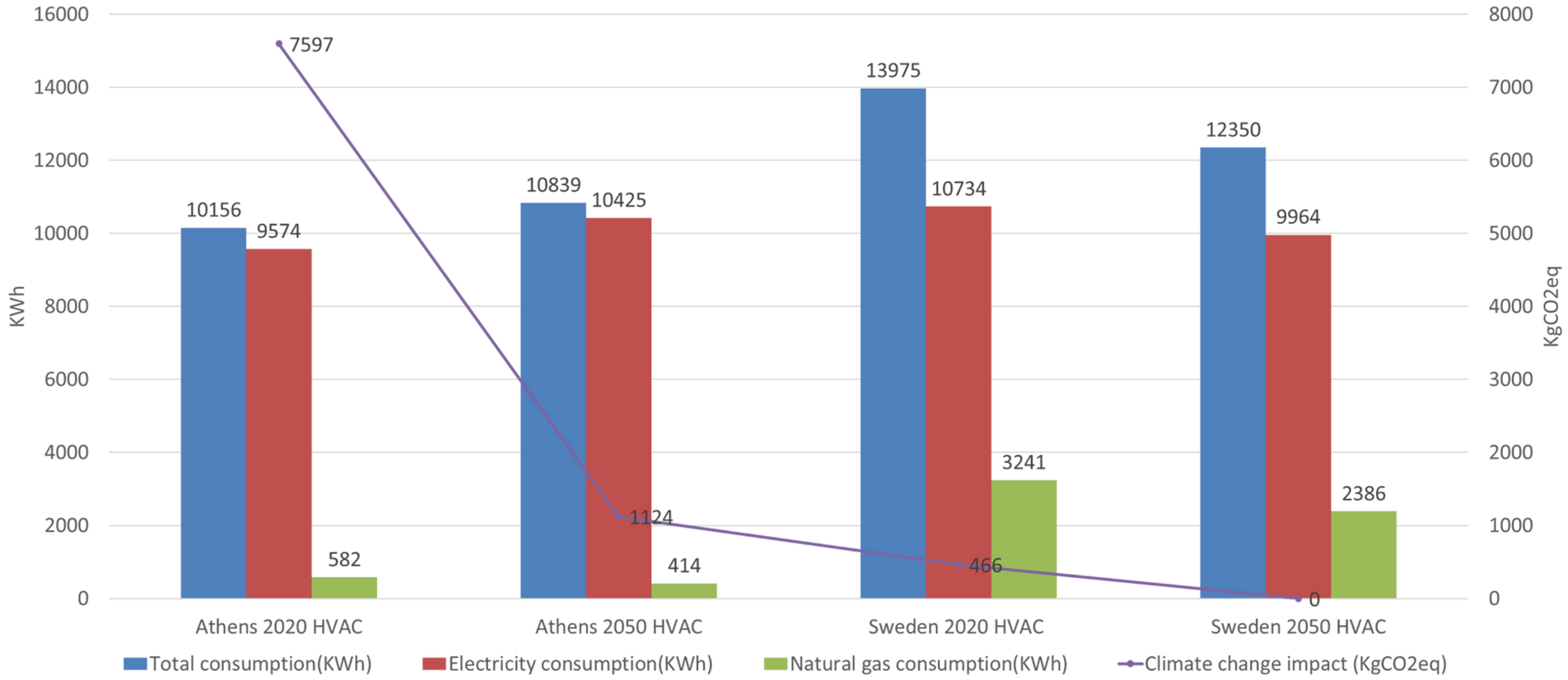
SIMULATING THE OPTIMAL BUILDING PROPERTIES - RESULTS: STOCKHOLM 2020 HVAC



SIMULATING THE OPTIMAL BUILDING PROPERTIES - RESULTS: STOCKHOLM 2050 HVAC



SIMULATING THE OPTIMAL BUILDING PROPERTIES - RESULTS: LIFE CYCLE ASSESSMENT OF ENERGY CONSUMPTION



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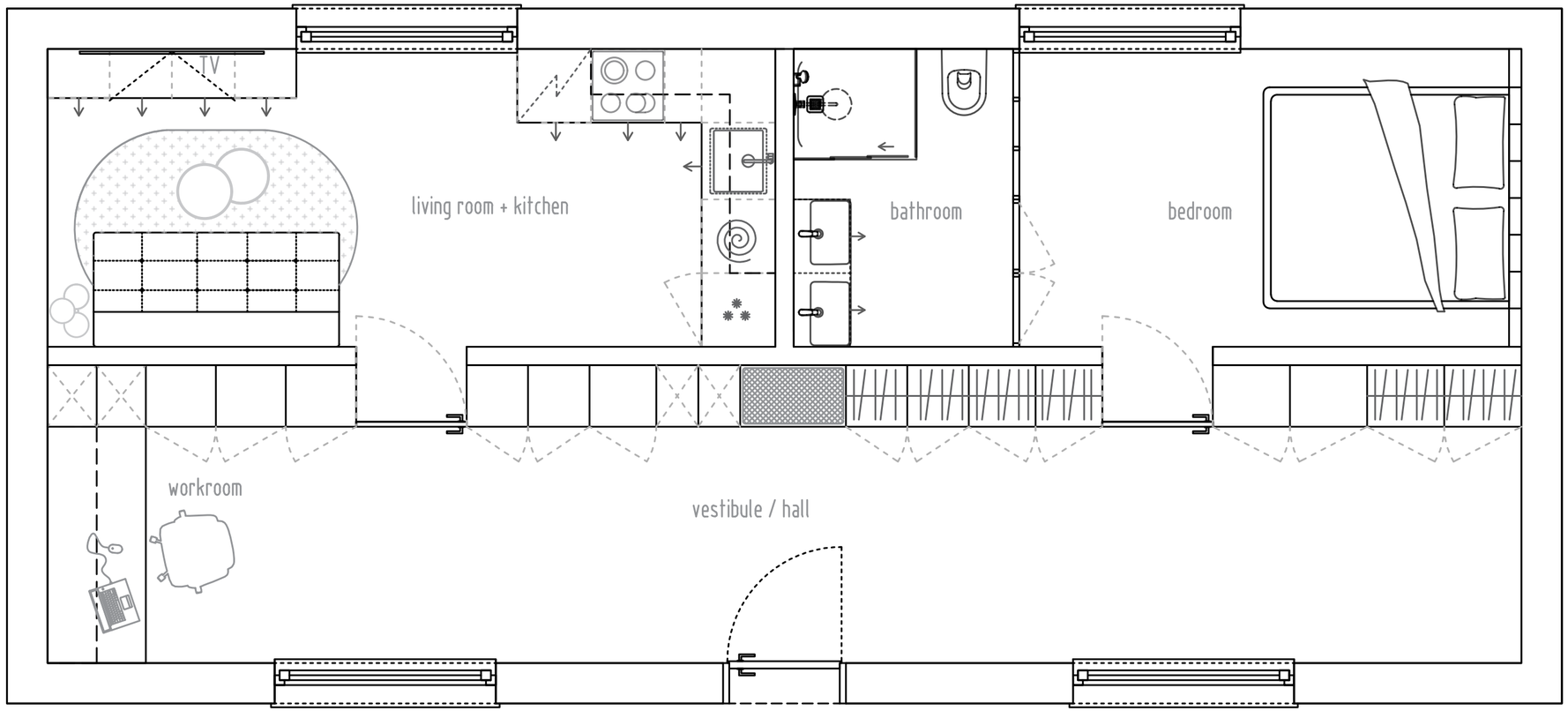
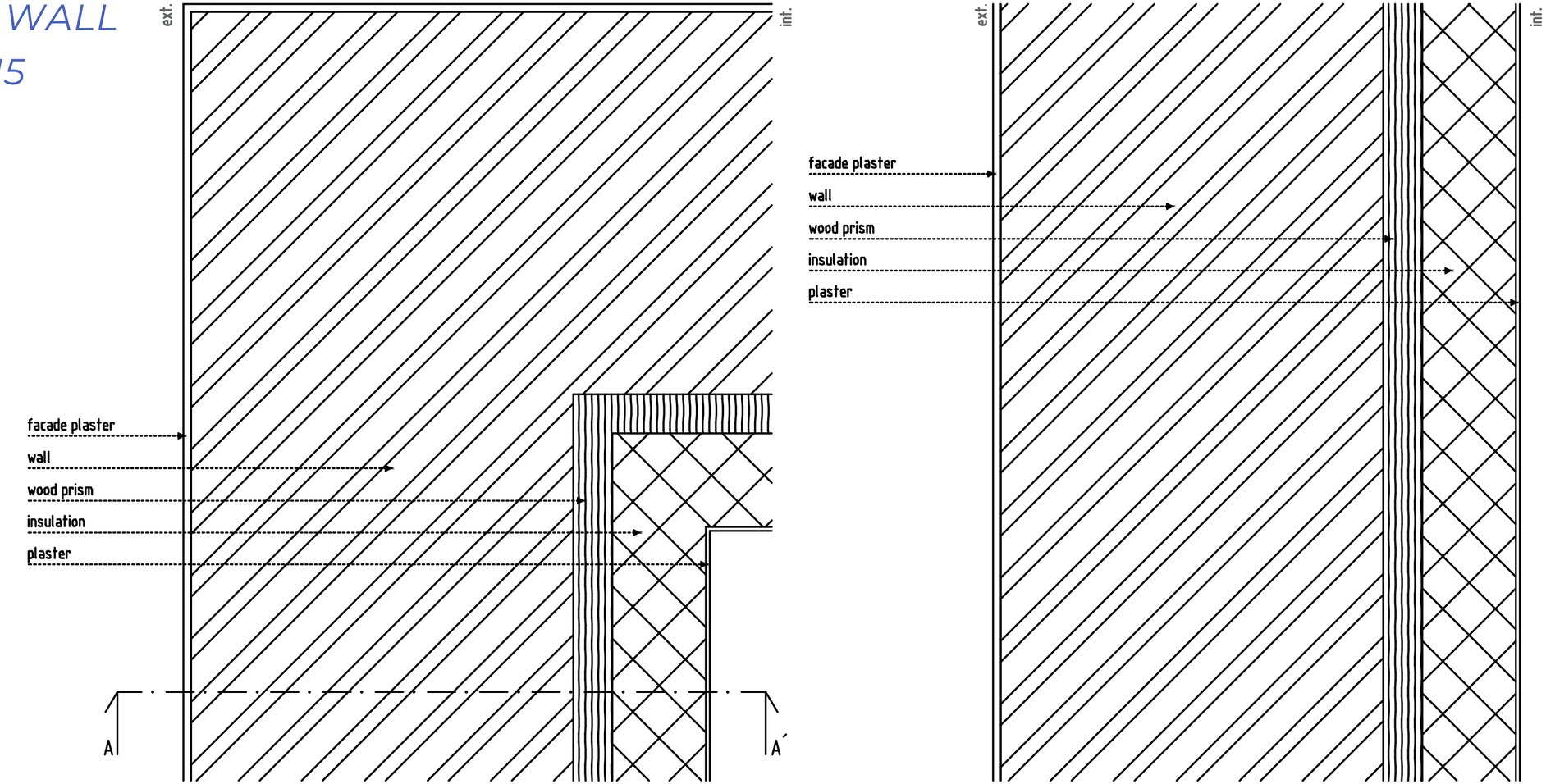
LOCATION NO.1: ATHENS, GREECE



RESIDENTIAL BULDING
FLOORPLAN M1:30

LOCATION NO.1: ATHENS, GREECE

DETAILS OF THE WALL
FLOORPLAN M1:15



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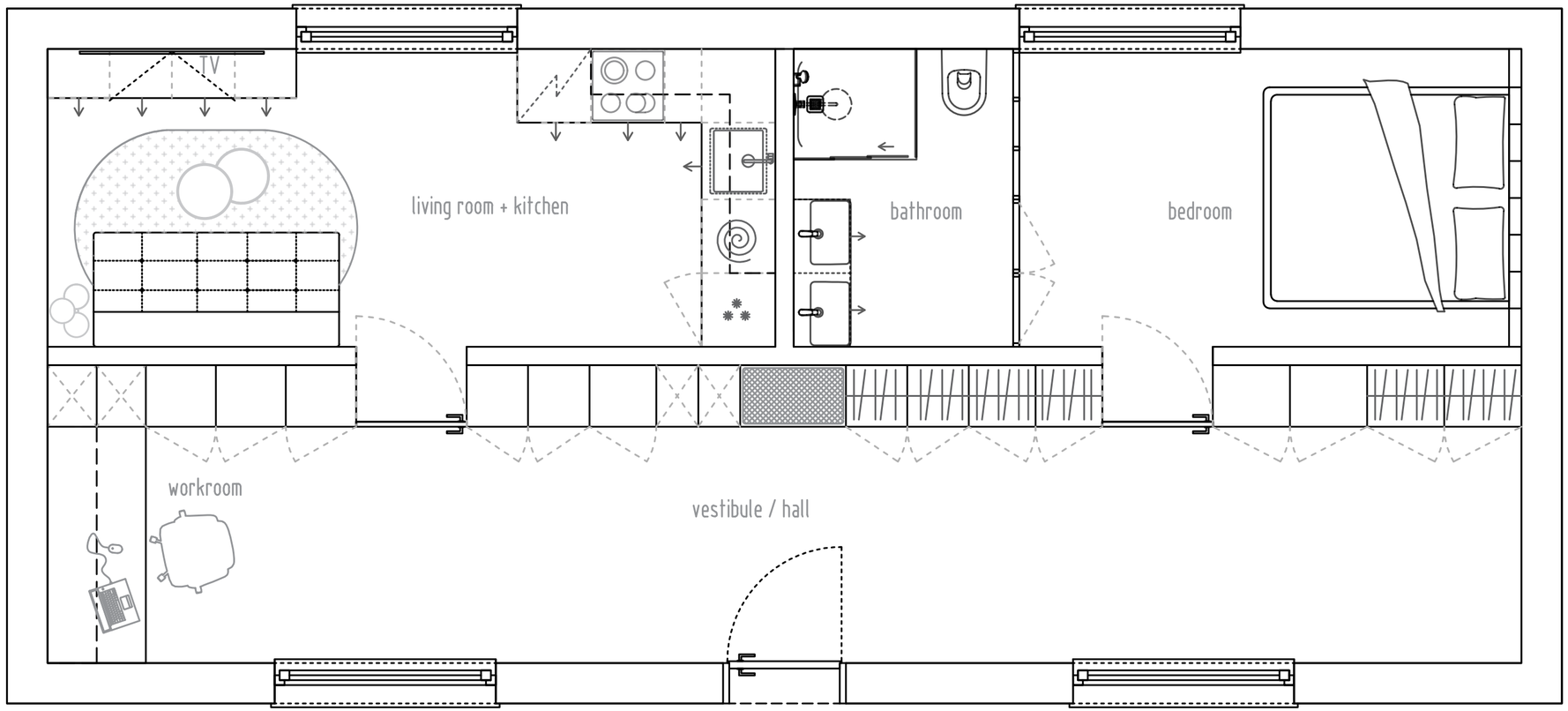
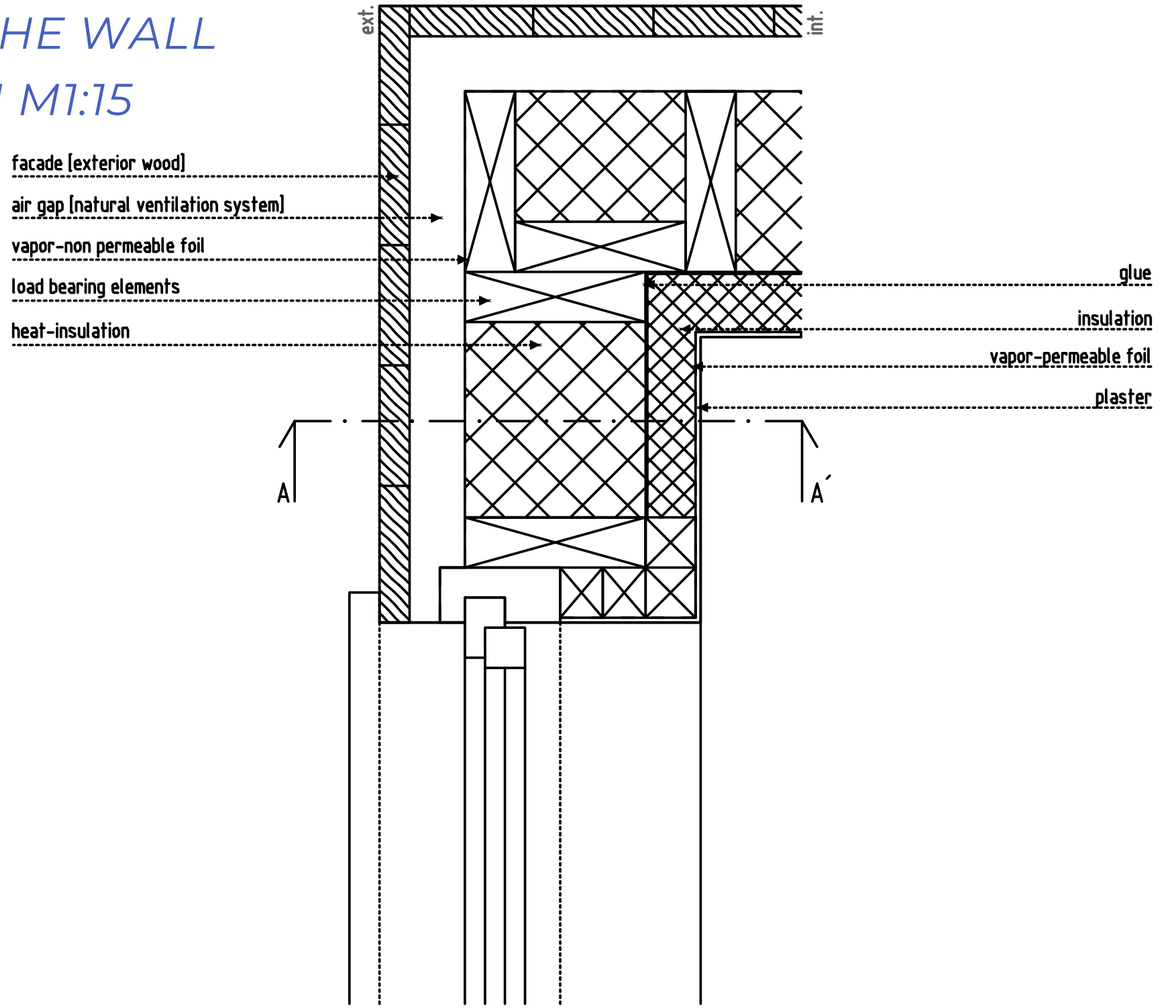
LOCATION NO.2: STOCKHOLM, SWEDEN

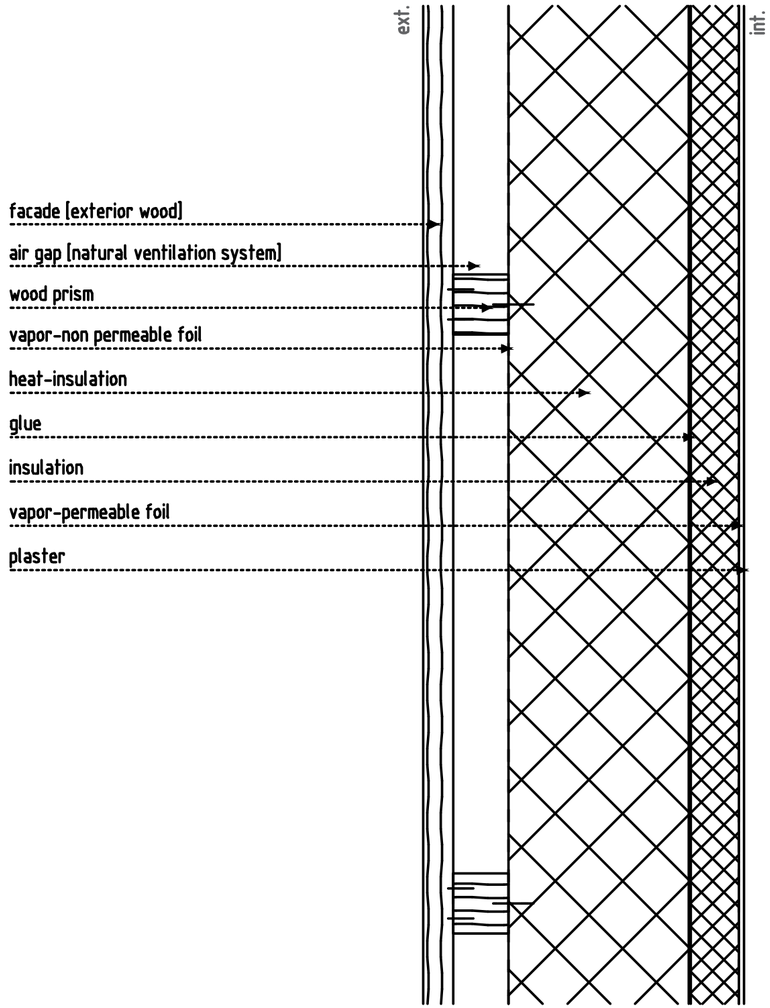


RESIDENTIAL BULDING
FLOORPLAN M1:30

LOCATION NO.2: STOCKHOLM, SWEDEN

DETAIL OF THE WALL FLOORPLAN M1:15





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