ACE GROUP

AUSTRIAN CONSULTING ENGINEERS GROUP

# The historical building as challenge for European cities

- Sustainable Architecture
- Low-Carbon Engineering
- Research & Development
- Energy Policy Consulting

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# Members of the ACE GROUP

**Managing Director**

Adil Lari, Architect MSc PhD

In all his projects, ecology is a central concern, from planning to completition and scientific evaluation.

**Project Management / Structural Engineering**

DI Christian Bauer, MSc

Mr. Bauer plans the revitalization of historical buildings and conducts research on techniques of environmental protection and structural analysis.

**Structural Engineering**

Stefan Novotny, MSc

In addition to numerous industrial and office buildings, Mr. Novotny conducts research on technological environment protection and developes structural analysis models

**Project Management**

Michael Wagner, Architect MSc

Architect Wagner specializes in project management and construction supervision.

## Strategy

1. Increase Energy Efficiency

2. Use On-Site Renewable Energy Sources

3. Connect to utilities using Renewable Energy

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# OUR SOLUTION

SOS Children‘s Village, Brno


SITE PLAN

- 1. 10 houses & an administration building
  - compact building form
- 2. Full glazing on south façade with shading
  - optimal solar heat gain in winter reduces heat gain in summer
- 3. High quality thermal glazing : U= 1.1 W/(m2.K)
  - prevents heat loss in winter / heat gain in summer
- 4. Insulation of building envelope
  - walls: 25cm porous clay blocks/20cm insulation/wood siding
  - roof: 30cm insulation on concrete roof slab
- 5. Optimal zoning
  - living rooms and children’s rooms face south
  - secondary rooms towards north
- 6. Simple, low-technology solutions
  - effective cross ventilation and air currents
- 7. Solar hot water collectors
  - provide heat and hot water
- 8. High efficiency gas furnace
  - back-up system
- 9. Landscaping and playgrounds
  - integration in micro-ecological climate

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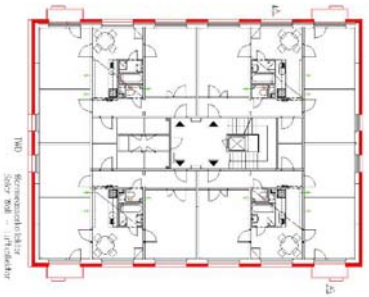
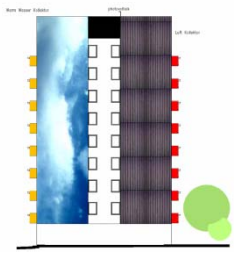
# OUR SOLUTION

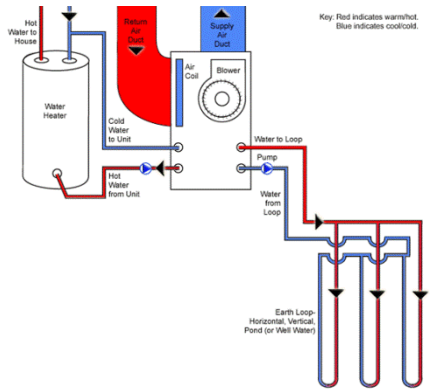
Pre-cast concrete panel apartment building, Brno



- 1 Heat insulation
- 2 New windows
- 3 Sanitary installations
- 4 New balconies
- 5 Air ventilation system
- 6 Solar measures
- 7 Warm water collectors
- 8 Air collector
- Alternatively District heating with individual regulation



## Energy / $CO_2$ - Renewable Energy Sources




- Solar Heating
  - Uses solar thermal gains to generate heating
- Geothermal Heating (Earth Pumps)
  - Uses the temperature of the ground to minimize the additional energy required for cooling

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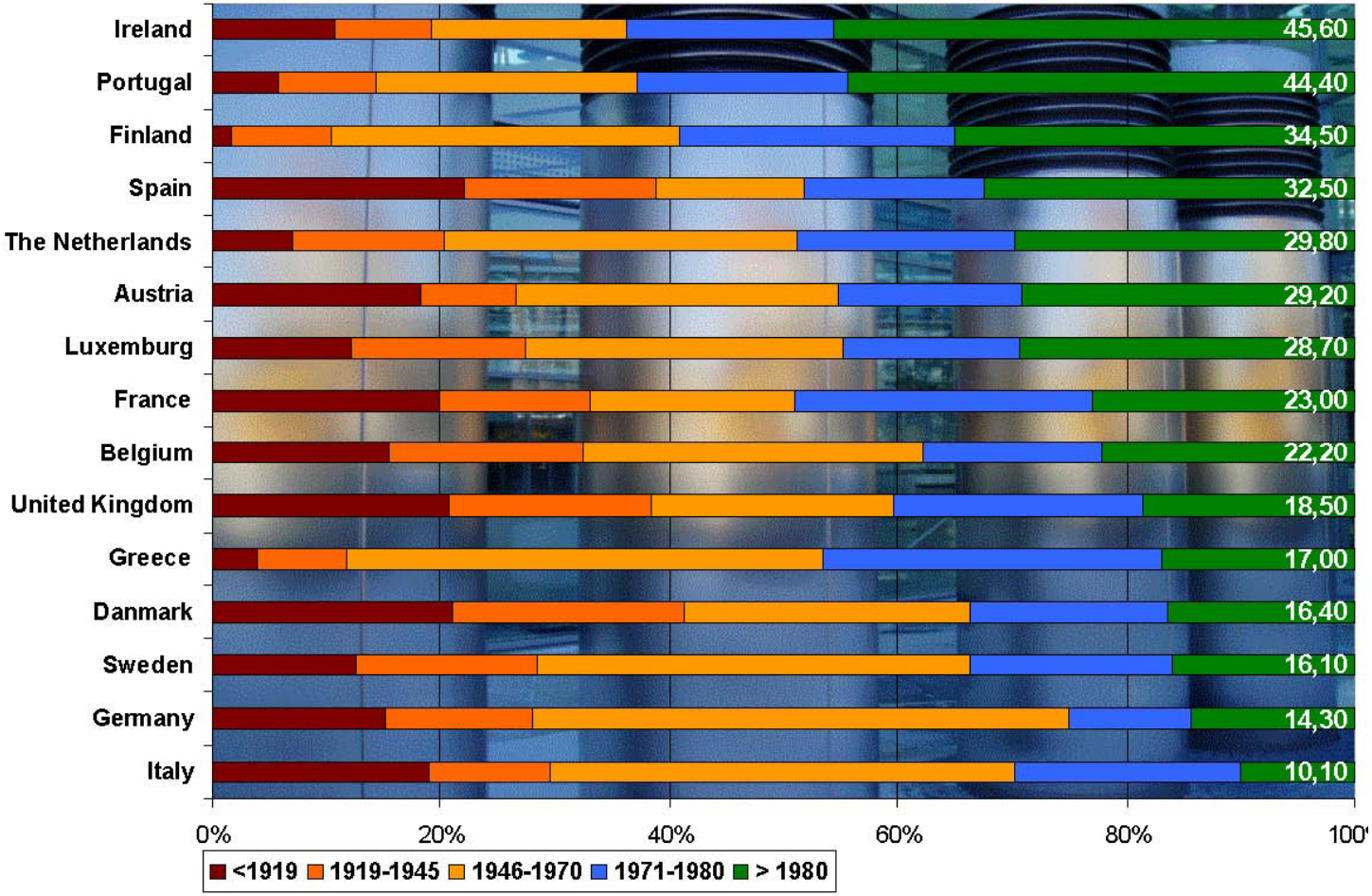
## The European building stock in different groups of age




*Source: National Agency for Enterprise and Housing: Housing Statistics in the European Union 2003. Denmark 2003.*

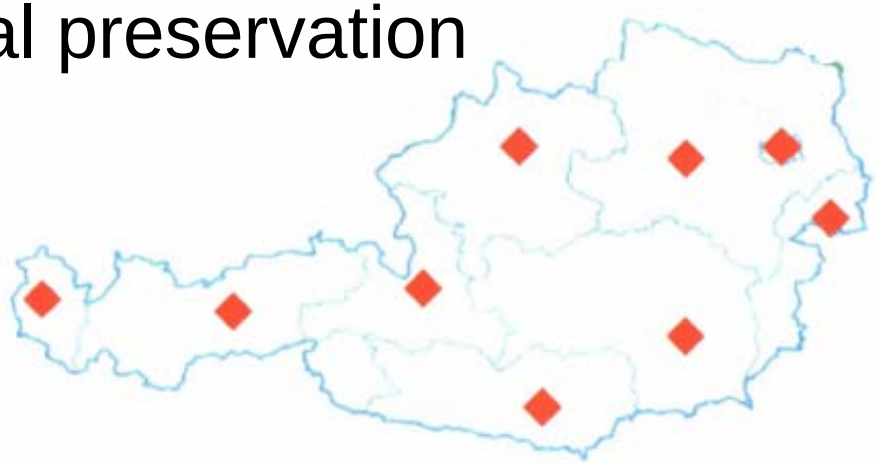
- Austria:

Refurbishment rate of
1,2% (80 years)

Due to:

- Condominium Act
- Return on Capital
- Regulations
- Technical requirements

- National law on historical preservation

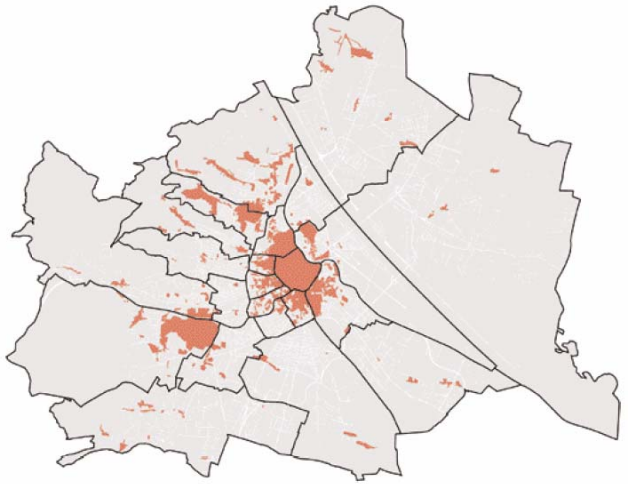


- Building codes:

Competence of
the nine federal
states, therefore:

  - Nine different building codes
  - Nine different regulations concerning new or refurbishing old buildings
  - Nine different conditions in the subsidy schemes for new and existing buildings

# Vienna



- Creation of protected zones
  - Today - 115 protected zones
    - 12,000 individual buildings
    - appr. 8% of total building stock
    - Vienna Inner city World Heritage site: Inner city and Ringstraßen
- Historical City Preservation Fund (1972)
  - Assuming additional costs caused by monument preservation

- CONSERVATION
- RESTORATION

- PLANNING IN HISTORICAL STYLE
- REHABILITATION

# CONSERVATION

Building as witness

– Reflects the period in which it is built

– Subject to national preservation regulations

– Some opportunities for renewable energy technologies (ie ground source heat pumps)

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Franziskanerkloster
Graz

# RESTORATION

- recreation of buildings which have been completely demolished in an earlier period.

- a new building which can be carried out with energy efficiency and renewable energy technologies

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- PLANNING IN HISTORICAL STYLE

  Palais Ofenheim Schwarzenbergplatz

  - creation of new buildings which reflect an earlier period.
  - must be carried out according the new regulations including building energy performance codes

# REHABILITATION
## Contemporary reuse of buildings of historic significance

**One of the Biggest Challenges in Europe**

Before we demolish a building – we should consider whether we will replace it with something better

Target should be a zero emission building

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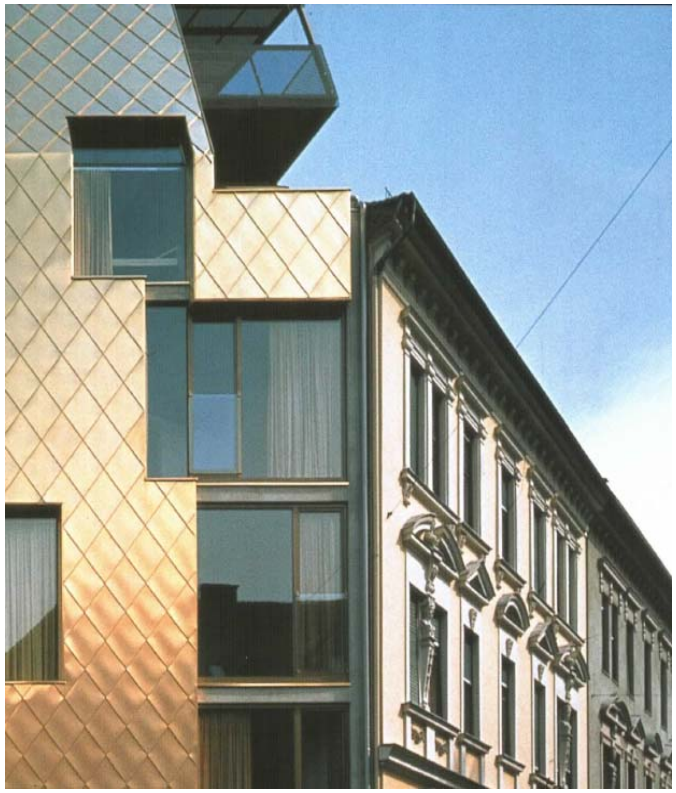
# Energy rehabilitation of buildings of historic significance

1. Definition of energy standard
2. Clarification of status
   with regard to preservation order
3. Definition of historically significant
   parts incl. energy evaluation

   Exterior: - Facades
   - Roof, towers, chimneys
   - Windows & doors

   Interior: - Structure
   - Spatial design
   - Room setup

4. Overall assessment and evaluation



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# Zero Emission Building

## *Step 1:* ***Energy Efficiency***

- Prevention of heat loss through ventilation

  Renovation of windows, sealing exterior shell, controlled ventilation

- Prevention of heat loss through the building substance

  Insulation, prevention of thermal bridges, drying out exterior walls

- Appliances, mechnical systems and lighting

Energy saving potential – up to 30%!

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# Zero Emission Building

*Step 2:* ***Use of solar energy***

- For hot water and space heating
- Use of the building substance as thermal storage (passive solar gains)

Energy saving potential after step 2 – up to 50%!

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# Zero Emission Building

*Step 3:* ***Heat pump***

- ground source, air to air, or solar
- Operating factor > 5
- Requires storage tanks

Energy saving potential after step 3 – up to 92%!

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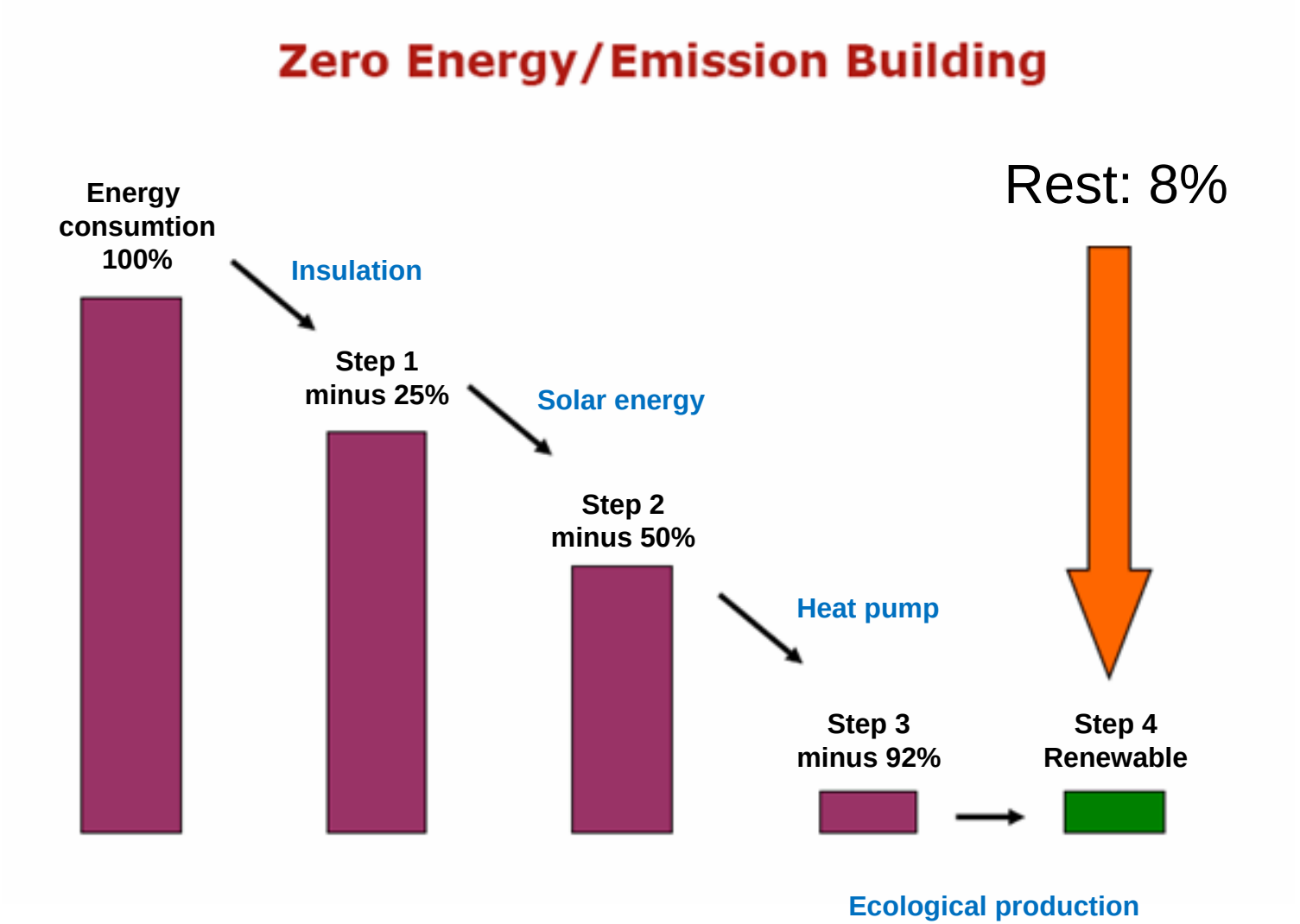
# Zero Emission Building

*Step 4: Green **Electricity***

- Photovoltaic (on buildings)
- purchase of green electricity

Rest: 6 to 8% of the original consumption!


Zero Energy/Emission Building
Energy consumtion 100%
Insulation
Step 1 minus 25%
Solar energy
Step 2 minus 50%
Heat pump
Step 3 minus 92%
Step 4 Renewable
Rest: 8%
Ecological production

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# Example 1

Zanklhof Factory,
Graz, Austria

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Photos: DI Dietmar Koch

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vision becomes reality

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# Example 2:

**GASOMETER**
**Vienna Austria**

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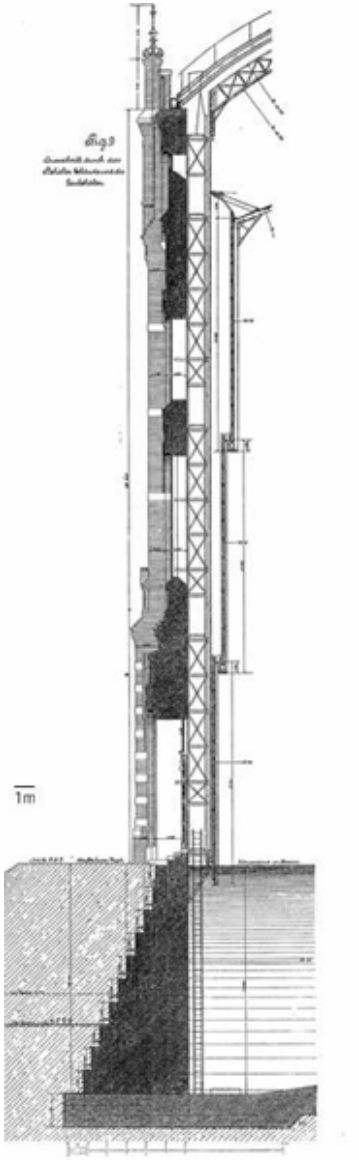
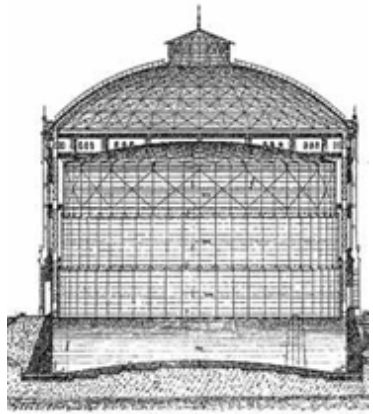
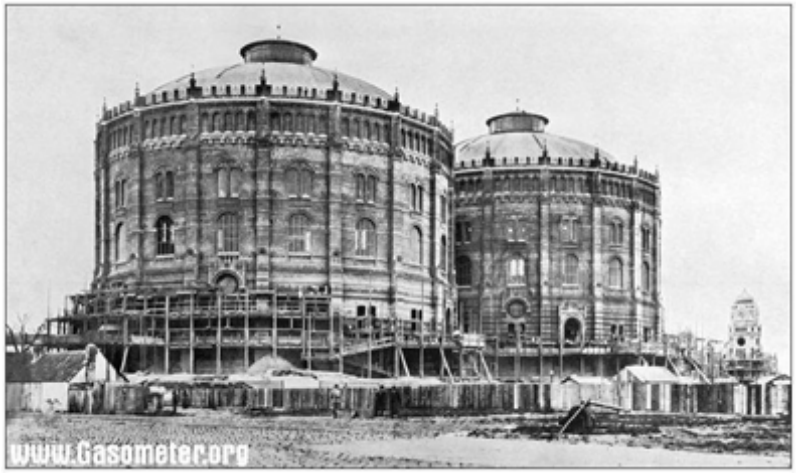
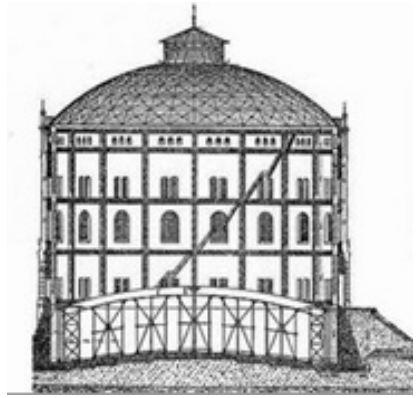


# GASOMETER - Vienna

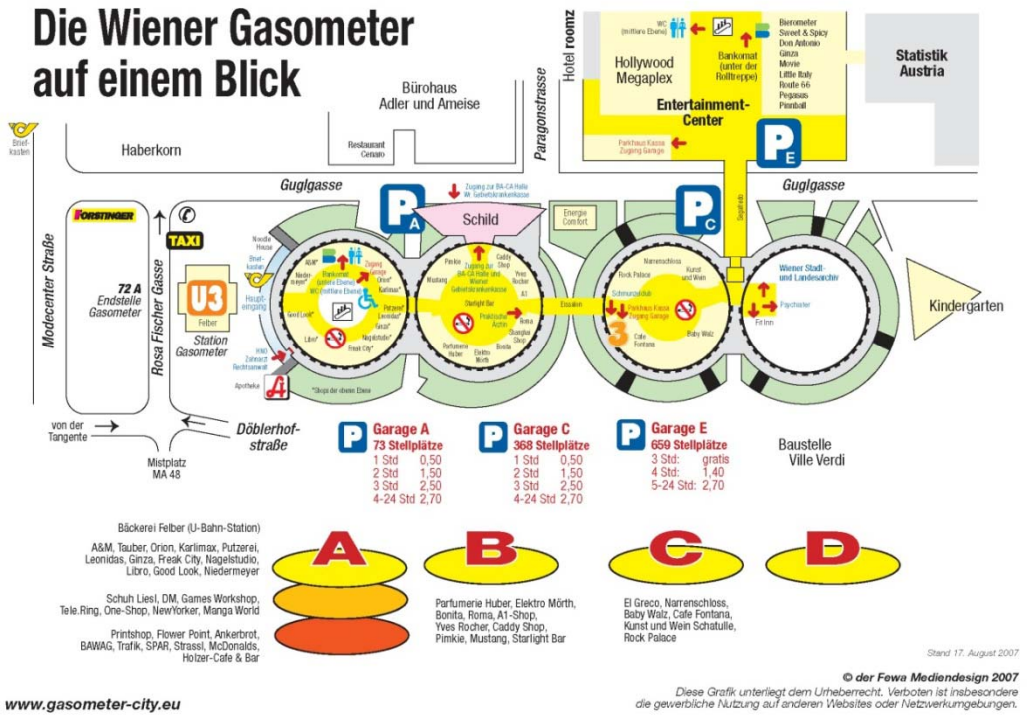


- 4 gas storage tanks:
  capacity of 90.000m³ each
- Built in 1896-1899, in use until 1984
- Protected historic landmarks in 1978



# REHABILITATION




The Gasometer Complex

70 shops, restaurants, bars, cafes
A multiplex cinema with 12 screens.
An events hall with room for 4,200 people.
A daycare center.
The Vienna National Archive.
11,000 square meters of office space.
615 apartments.
A 230-bed student dormitory.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vision becomes reality

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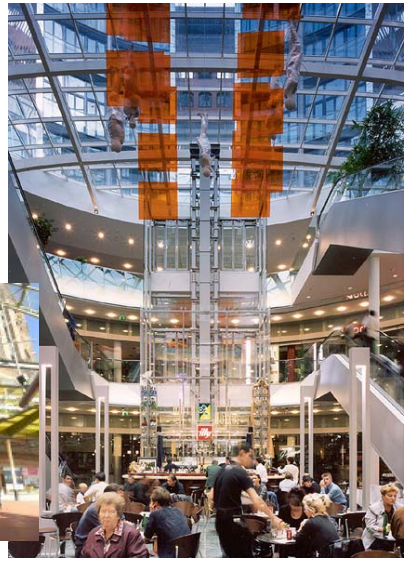
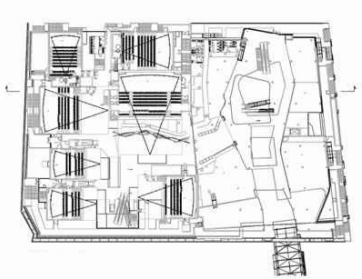


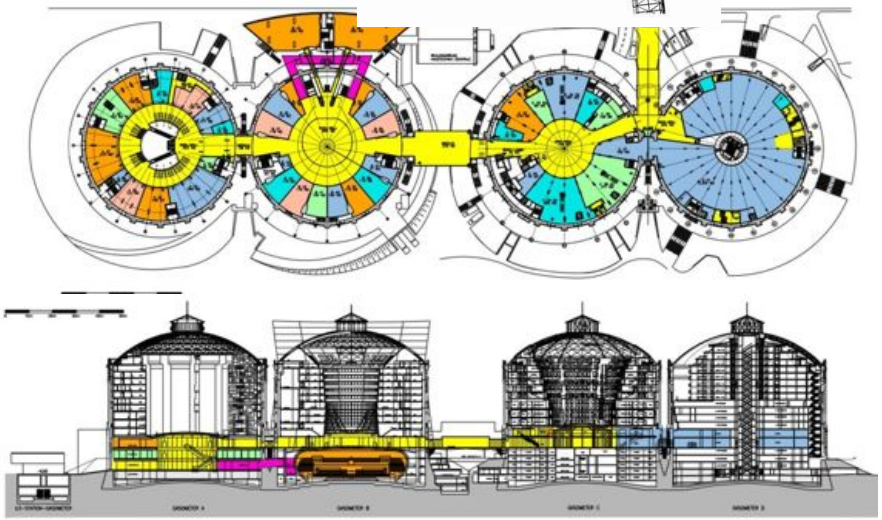
GASOMETER A

GASOMETER B

GASOMETER C

ENTERTAINMENT CENTER





Gasometer Shopping Mall

opened: August 2001
area: 20.232 m²
5 buildings, 3 floors

6.252 m² Mall Gasometer A
2.914 m² Mall Gasometer B
4.450 m² Mall Gasometer C
1.960 m² Mall Gasometer D

4.656 m² Entertainment Center

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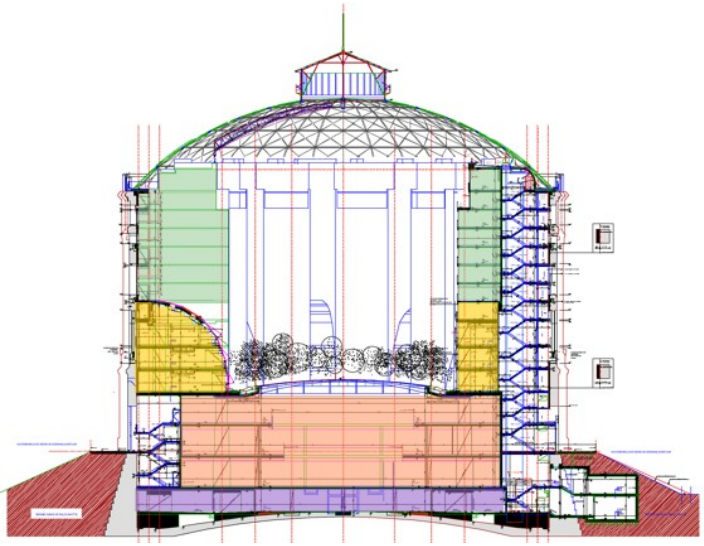
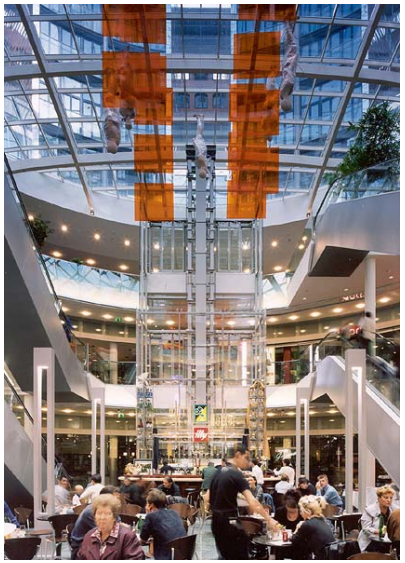
# GASOMETER A





## Facts of Gasometer A

9 floors residential
(128 apartments)
3 floors offices
3 floors shopping mall
1 floor parking garage
(74 parking spaces)

8.016 m² residential
5.100 m² office
6.252 m² retail

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## Gasometer A Mall, Vienna / Austria

In Vienna's 11th district, the "Gasometer" compound - a row of historical container buildings belonging to the former gas works - has been converted into a modern apartment and office complex, complete with infrastructure and cultural facilities. In cooperation with Architectures Jean Nouvel, responsible for the building design of the first container, "Gasometer A", it was our task to develop the three bottom floors of Gasometer A into a shopping mall with a total area of 7,020 m². The quintessence of our design was to use light as a constructive element, within a funnel-shaped structure widening towards the top, to guide the expected 3,000 visitors per day through the mall's three levels. From a conceptual point of view, emphasis was placed on color and airy elements; seemingly weightless structures and variations of light were the basic principles.

Thank you for your attention!

Dr. Adil Lari

**ACE Group**

Austrian Consulting Engineers Group

Waehringer Str. 115

1180 Vienna / Austria

0043 1 408 9405

www.acegroup.at