Universität für Bodenkultur Wien
Department für Bautechnik und Naturgefahren

NaMaP

Sustainability monitoring of passive-houses in Vienna

Architecture - Constructions
Technical Equipment - Monitoring

DDI Roman Grünner

Univ.Prof. Arch. Dipl. Ing. Dr.techn. Martin Treberspurg

DI Roman Smutny

AG Ressourcenorientiertes Bauen

Institut für Konstruktiven Ingenieurbau

BOKU Wien

Current situation *

- 6.5 mil. m² living floor area in passive-house standard in Europe

- 2.5 mil. m² in Austria (about 5000 budov)
- 2.4 mil. m² in Germany

- Density in Austria reaches 300 m² / 1000 residents,
  10 x more than in Germany**

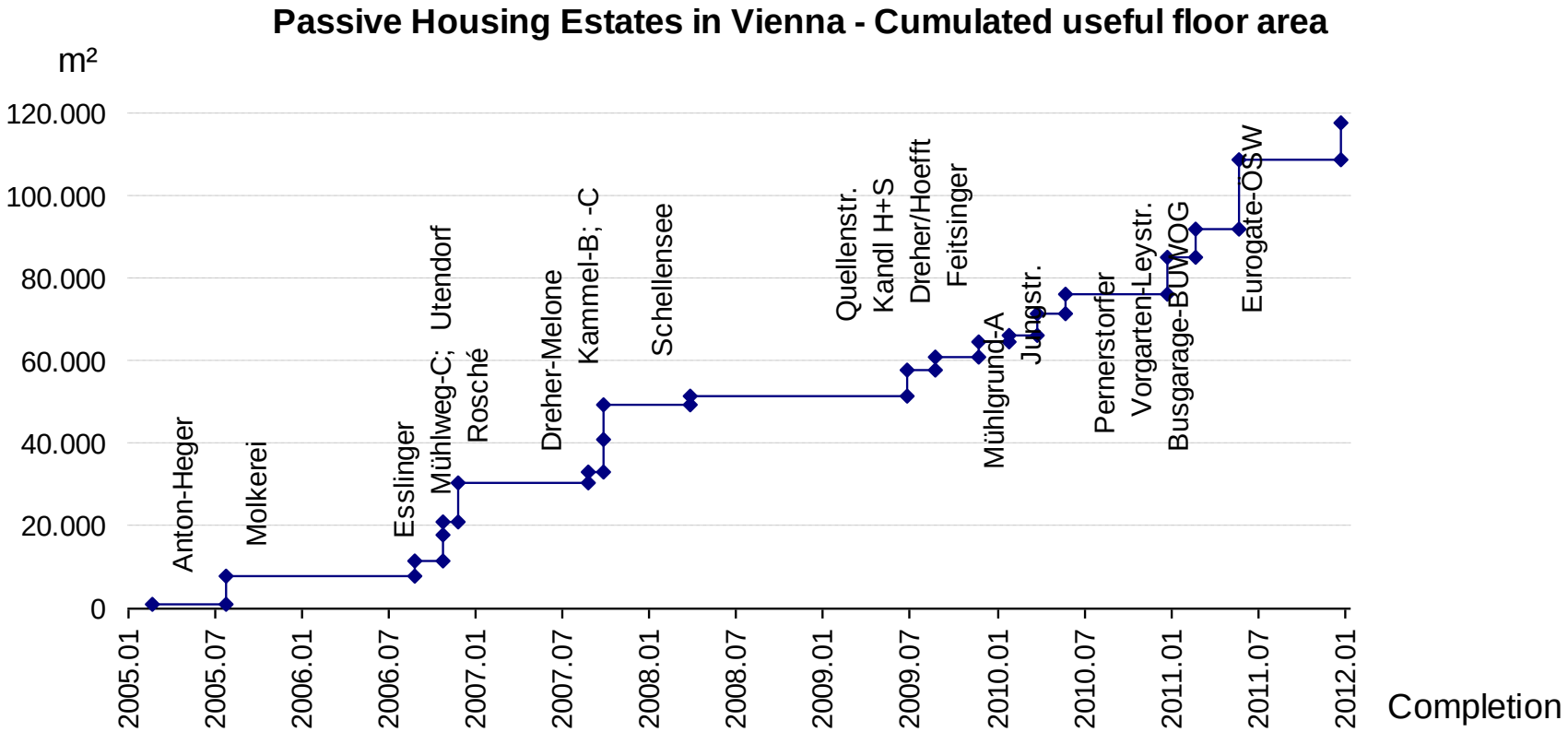
- In 2008, more than 7% of new buildings were constructed in passive-house standard e

- Vienna
  - first student hostel PH-standard - Molkereistrasse (2005)
  - largest PH-building Roschégasse (2006)
  - highest PH density

*July 2009

**Daxböck, Ch. Aktiv Energie sparen mit Passivhäusern, in: Perspektiven – der Aufbau, 2009-03, p.25-31

Development in Vienna



NAMAP

Sustainability monitoring of passive-houses in Vienna

DDI Roman Grünner, AG Ressourcenorientiertes Bauen, Institut für Konstruktiven Ingenieurbau, BOKU Wien

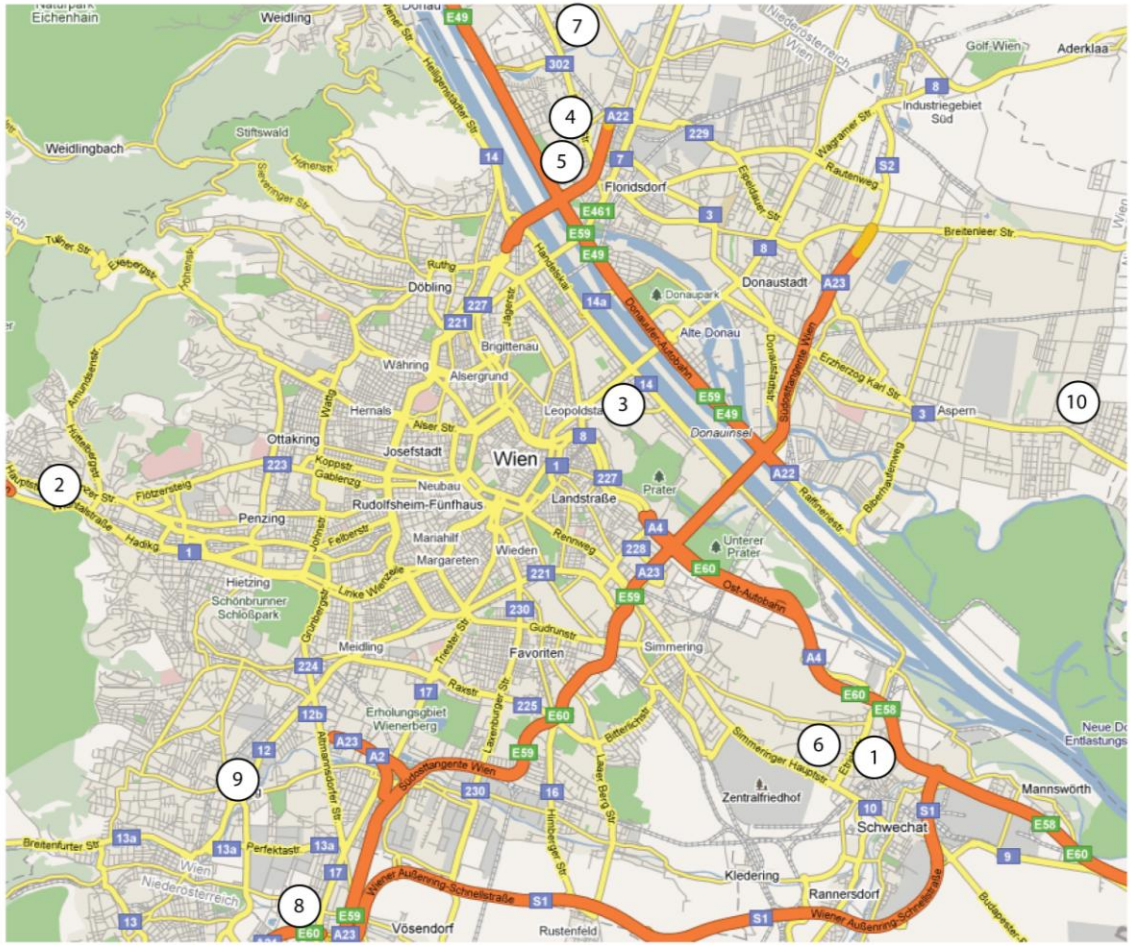
1. Dreherstraße 66
BUWOG
Arch. Lautner

2. Utendorfgasse 7
HEIMAT ÖSTERREICH
Schöberl & Pöll OEG,
Kuzmich

3. Molkereistraße 1
MIGRA
Baumschlager Eberle
Gartenmann Raab Arch.

4. Rudolf Virchow-Straße 12
WE PRO Bauträger
s&s architekten

5. Kammelweg 10
KAMMELWEG BAUTRÄGER
J.+H. Kaufmann Arch.



6. Roschégasse 20
A:H
Treberspurg & Partner
Architekten ZT GmbH

7. Fritz-Kandl-Gasse 1
BAI Bauträger
Dietrich I Untertrifaller Arch.

8. Schellenseegasse 5
GESIBA
Arch. Reinberg

9. Anton-Heger-Platz 4
FAMILIENWOHNBAU
Arch. Hackermüller

10. Esslinger Hauptstraße 17
FAMILIENWOHNBAU
Arch. Hackermüller

NAMAP

	Building	Apartments	Energy	Construction
1	**Dreherstraße 66, 1110 Vienna**	27	District heating	reinforced concrete
2	**Utendorfgasse 7, 1140 Vienna**	39	Gas	reinforced concrete
3	**Molkereistraße 1, 1020 Viedeň**	133	District heating	reinforced concrete
4	**Rudolf Virchow-Straße 12, Bauplatz B, 1210 Vienna**	92	District heating	reinforced concrete
5	**Kammelweg 10, Bauplatz C, 1210 Vienna**	80	District heating	Combined (Wood + concrete)
6	**Roschégasse 20, 1110 Vienna**	114	Geothermal energy, photovoltaic	reinforced concrete
7	**Fritz-Kandl-Gasse 1, 1210 Vienna (Mühlweg)**	70	Gas, photovoltaic	Combined (Wood + concrete)
8	**Schellenseegasse 5, 1230 Vienna**	22	Gas, thermal collectors	reinforced concrete
9	**Anton-Heger-Platz 4, 1230 Vienna**	15	Gas	Wood
10	**Esslinger Hauptstraße 17, 1220 Vienna**	46	5 rôznych zdrojov (electricity, gas, thermal collectors)	Prefabricated wood elements

solarCity

Sustainability Evaluation of Solarcity Linz

[Quelle: Magistrat Linz]

solarCity Linz-Pichling –Sustainable Urban Development

World SB08 Melbourne

[Source: Mag. Stadt Linz, Stadtplanung]

PROJECT DATA

Location:	Pichling, Linz, Austria, Europe
Size:	36 hectares
Construction phase:	2001 – 2005
Apartments:	1,298 apartments
Apartment buildings:	73
Inhabitants:	ca. 2,700
Central infrastructure:	local shops, social and cultural facilities, school center, kindergarten, pastoral center, family center, sports park
Public transport:	tram, bus

PRECONDITIONS FOR STARTING THE PROJECT

- Enormous demand for housing in Linz – 12,000 persons looking for appartments in 1990
- Lack of unspoilt, central urban building area
- City of Linz owned large, connected pieces of real estate in Linz-Pichling

PARTICIPANTS

Masterplan: Roland Rainer (A)

Urban planning 1st construction phase:
READ-Groupe (Foster and Partners (GB), Richard Rogers Partnership (GB), Herzog+Partner (G), Renzo Piano Building Workshop (I), Norbert Kaiser (G))

Urban planning 2nd construction phase:
Martin Treberspurg (A)

Public Buildings:
Architekten Loudon + Habeler (A), arch-schimek.at (A), archsolar (A), Auer + Weber + Architekten (G), Jordan architektur & energie (A), Pointner/Pointner Architekten (A), Reinhard Stummer (A)

Residential Buildings:
Architektur Weismann (A), Future Systems (GB), Herzog + Partner (G), Herbert Karrer (A), Franz Kneidinger (A), Norman Foster and Partners (GB), Richard Rogers Partnership (GB), Heiz Stögmüller (A), Architekturbüro Gellner (A), Kaufmann/Partner (A), Lassy-Architektur + Raumplanung (A), Helmuth Schweiger (A), Reinhard Stummer (A), Treberspurg & Partner Architekten (A)

Landscape planners:
Atelier Dreiseitl (G), Latz + Partner (G)

Sociocultural planning: wohnbund:consult (A)

Housing developers:
BRW, EBS, EIGENHEIM LINZ, FAMILIE, GIWOG, GWB, GWG, LEBENSRÄUME, NEUE HEIMAT, VLW, WAG, WSG

MUNICIPALITY OF LINZ

LINZ AG

BOKU
University of Natural Resources and Applied Life Sciences, Vienna, Austria
Institute for Structural Engineering, Sustainable Constructions
Univ. Prof. Arch. DI Dr. Martin Treberspurg, DI Roman Smutny, DI Ulla Ertl

„Sustainability Evaluation of the solarCity Linz-Pichling" sponsored by
Municipality of Linz, Province of Upper Austria and 12 housing developers of the solarCity.

solarCity Linz-Pichling –Sustainable Urban Development

Original area in Linz-Pichling
[Source: Mag. Stadt Linz, Stadtplanung]

Draft of the first settlement area and further possible developments
[Source: READ-Group]

Model photo of the first settlement area in 1995 with integrated green spaces
[Source: READ-Group]

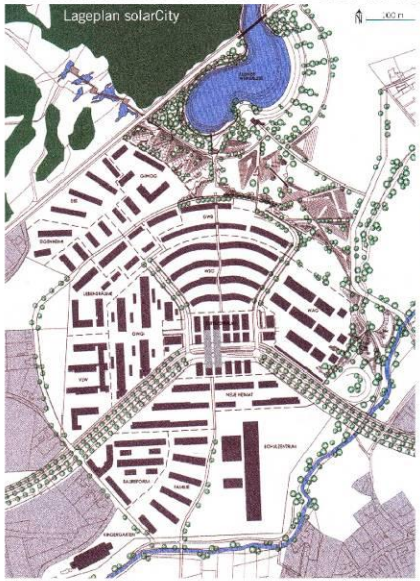
Air photograph of the solarCity in 2008
[Source: Mag. Stadt Linz, Stadtplanung]

PLANNING OBJECTIVES

The City of Linz entered into contracts with Linz's 12 participating housing developers. Main focuses of the planning objectives were:

- Low-energy construction, solar architecture
- Future-oriented approach to energy supply and disposal
- Issues of building biology
- Issues of local recreation and leisure time
- Creation of a modern sociocultural, family-oriented infrastructure
- Sustainable traffic-concept
- Common, group-specific marketing campaign

THE SOLARCITY SHOULD BECOME A EUROPEAN EXAMPLE OF SUSTAINABLE URBAN DEVELOPMENT!!!



Site plan solarCity
[Source: Treberspurg & Partner Architekten]

Center
[Source: Mag. Stadt Linz, Archiv]

Kindergarten
[Source: Mag. Stadt Linz, Archiv]

School center
[Source: Mag. Stadt Linz, Archiv; Bruno Klomfar]

Pastoral center
[Source: Mag. Stadt Linz, Archiv]

URBAN PLANNING

- 1,298 apartments + central infrastructure (local shops, social and cultural facilities, school center, kindergarten, pastoral center, family center, sports park)
- Central tram stop (max. walking-distance 300m to appartments)
- Buildings 2 – 4 stories high, max. floor space index 0.65
- Building orientation to the south, avoidance of shadowing
- Part of green spaces 60%, distance to the nature protection area „Traun-Danube-alluvial meadows" 50-80m

SOLAR ARCHITECTURE

- Low-energy houses, 3 passive houses
- Compact construction and upgraded thermal insulation
- Utilization of solar energy (active and passive)
- Ecological building components

Different housing estates [Source: Mag. Stadt Linz, Archiv]

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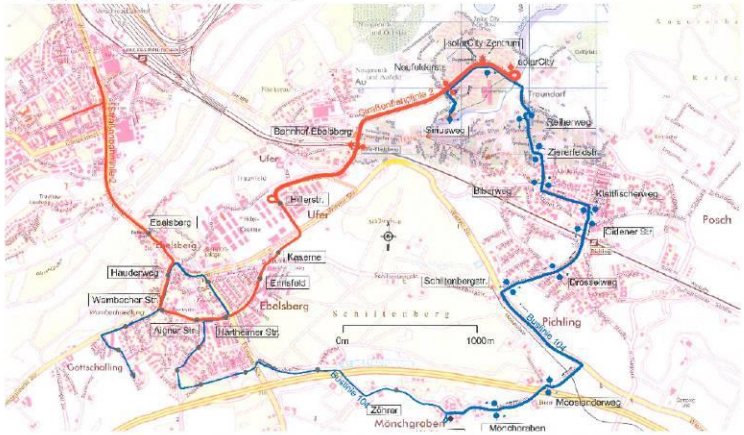
Tram stop in the center of the solarCity [Source: Mag. Stadt Linz, Archiv]

Bus stop near the kindergarten [Source: Mag. Stadt Linz, Archiv]

Advertising theme [Source: Createam - Werbeagentur]

MOBILITY

- Path network for pedestrians and bikers
- Reduction of car traffic: nearly car-free area, underground car-parks
- Local public transports
  - Extending the tram line no. 2 (directly connection to the city center of Linz)
  - Bus line 104 extended
- Railway connection
- Bypass road „Ebelsberg"



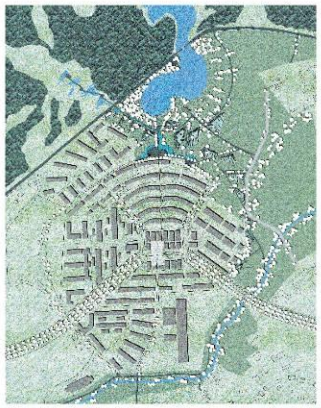
Site plan tram line no. 2 (red line) and bus line 104 (blue line) [Source: LINZ AG]

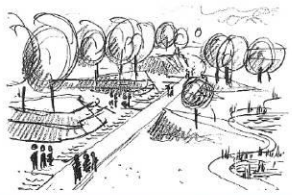
SOCIOCULTURAL PLANNING

- Quality agreements with housing developers
- Concepts for resident participation
- City district management office etc.

MARKETING CONCEPT

- Create a uniform marketing concept with main focus on non-technical aspects such as quality of life and the environment





Site plan for open spaces. Draft and realization of the "hilly park" [Source: Atelier Dreiseitl; Mag. Stadt Linz, Archiv]

LANDSCAPE PLANNING

- Logbook for the design of open spaces (Atelier Dreiseitl)
- "Hilly park" + large recreational facilities (lake with swimming area, bike path, sport area etc.)
- 70% increase of the lake "Kleiner Weikerlsee"
- Hiking trail through the nature protection area
- Revitalization of the stream "Aumühlbach"
- Construction of a sport area

Lake "Kleiner Weikerlsee" with swimming area and area for nature [Source: Mag. Stadt Linz, Archiv]

DRAINAGE AND SANITATION

- Rainwater Concept
- Alternative wastewater concept
- Constructed wetlands for wastewater treatment

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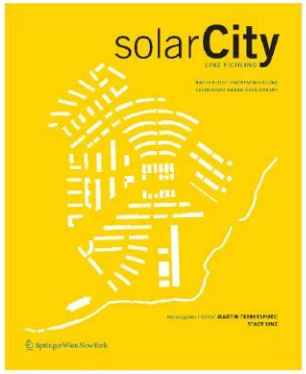
solarCity Linz-Pichling –Sustainable Urban Development

[Source: Mag. Stadt Linz, Archiv]

[Source: Mag. Stadt Linz, Archiv]



!!! NEW BOOK RELEASE !!!
"solarCity Linz-Pichling - Sustainable Urban Development",
Editor Martin Treberspurg and City of Linz published by Springer ViennaNewYork in English and German language

POWER SUPPLY

Solar Energy

- Passive: Low energy houses after principles of solar architecture
- Aktive: Solar panels for mainly hot water

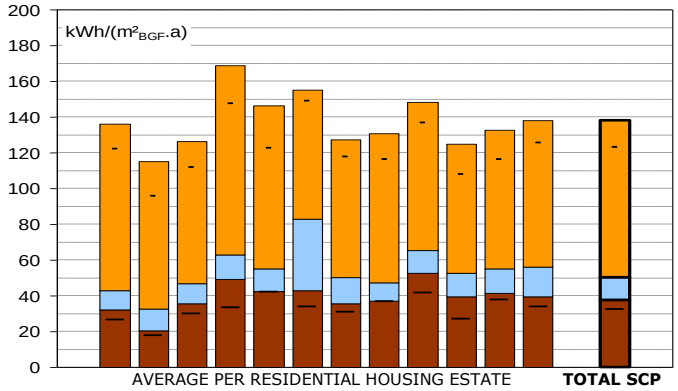
District Heating for all buildings

- CHP with natural gas and biomass

EVALUATION OF THE SOLARCITY Sustainability-Monitoring

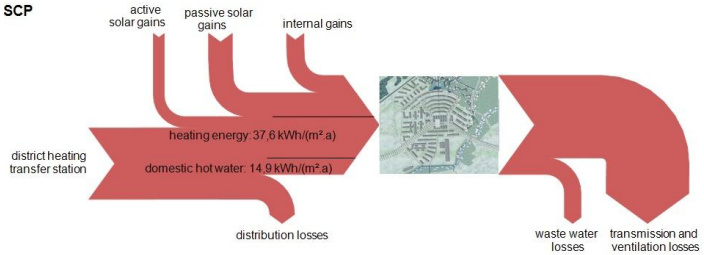
In March of 2007, the University of Natural Resources and Applied Life Sciences in Vienna began conducting a three-year sustainability check. This sustainability monitoring and reporting project, supported by the Province of Upper Austria, the City of Linz and the housing developers, is based on quantitative quality indicators and involves intensive interviewing of the residents. The social analysis is being carried out by Dr. Josef Lins of the Johannes Keppler University of Linz. The goal of the post-occupancy evaluation is to provide factual documentation of the quality of the solarCity and a clear presentation of its sustainability performance, focusing particularly on the areas of urban development, architecture, energy management, climate protection, material management and user satisfaction. An additional part of the project consists in developing an easily applicable orientation and decision-making tool that can be used for future urban development projects and new residential buildings in Upper Austria.

PRIMARY ENERGY CONSUMPTION, not renewable per HOUSING ESTATE, May 2006 – April 2008

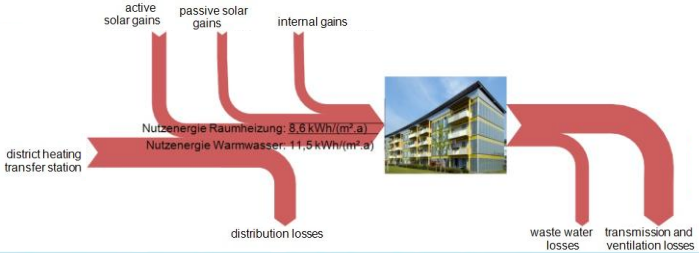


BGF = Gross Floor Area [m²], Factors [kWh/kWh] from GEMIS 4.3: district heating 0.76, electricity 2.65 (EU-Mix), solar gains 0.048

MEAN HEAT FLOW for all residential buildings



HEAT FLOW Passive House (GIWOG-1)



The research project "Sustainability Evaluation of the solarCity Linz-Pichling" runs until Feb. 2010 and is sponsored by Municipality of Linz, Province of Upper Austria and the 12 housing developers of the solarCity.

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