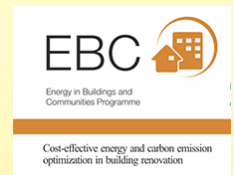
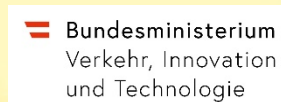




IEA EBC Annex75: Kosteneffiziente Strategien in der Gebäudesanierung auf Stadtteilebene

Karl Höfler, David Venus

AEE – Institut für Nachhaltige Technologien (AEE INTEC)
A-8200 Gleisdorf, Feldgasse 19
AUSTRIA

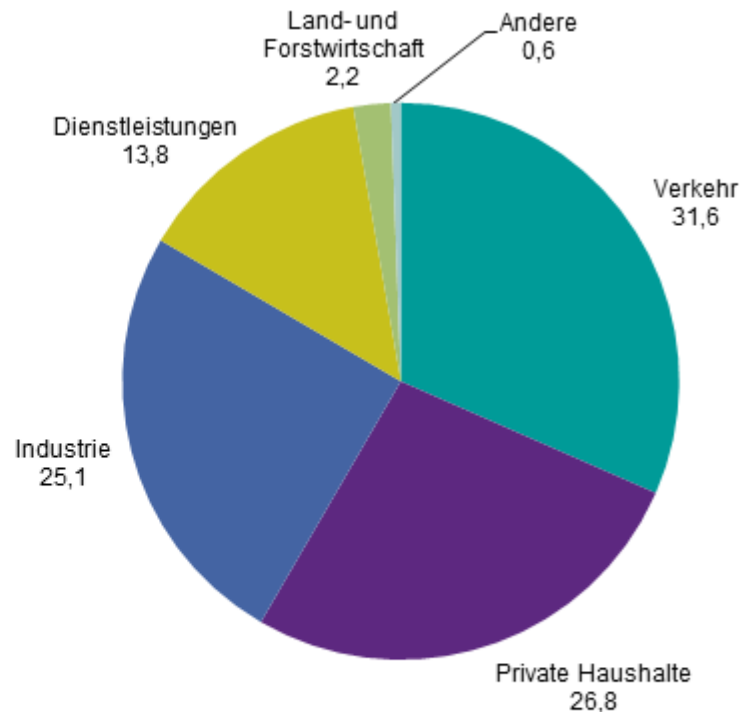


Inhalt

- Hintergrund
- Forschungsprojekt IEA EBC Annex 75
- Berechnungsmethodik
- Case Studies und Best Practice
- Erwartete Ergebnisse

Hintergrund

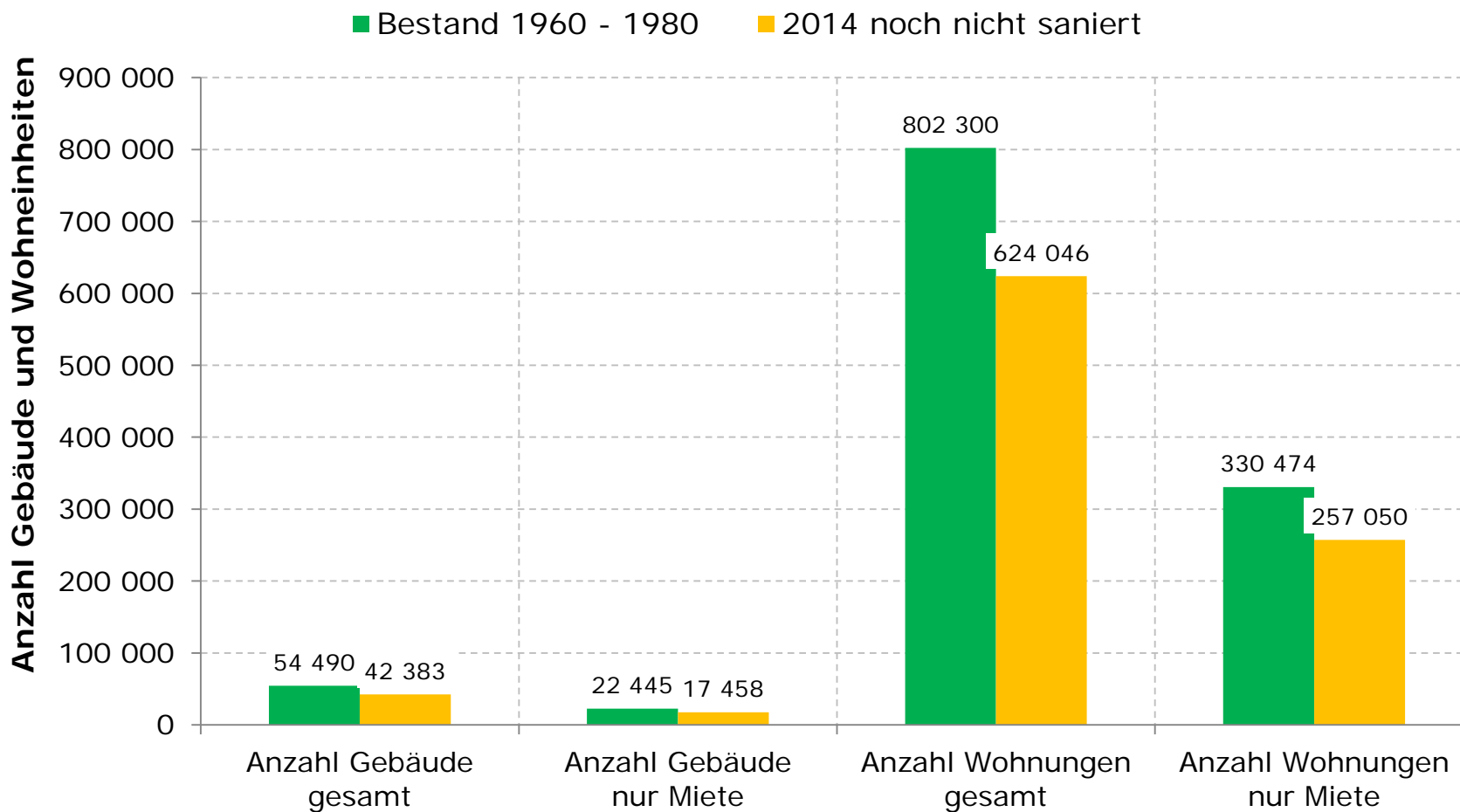
Final energy consumption, EU-28, 2013



(¹) Rundungsbedingt ergibt die Summe nicht genau 100 %.
Quelle: Eurostat (Online-Datencode: nrg_100a)

Hintergrund - Sanierungspotential

Großvolumige Wohngebäude in Österreich



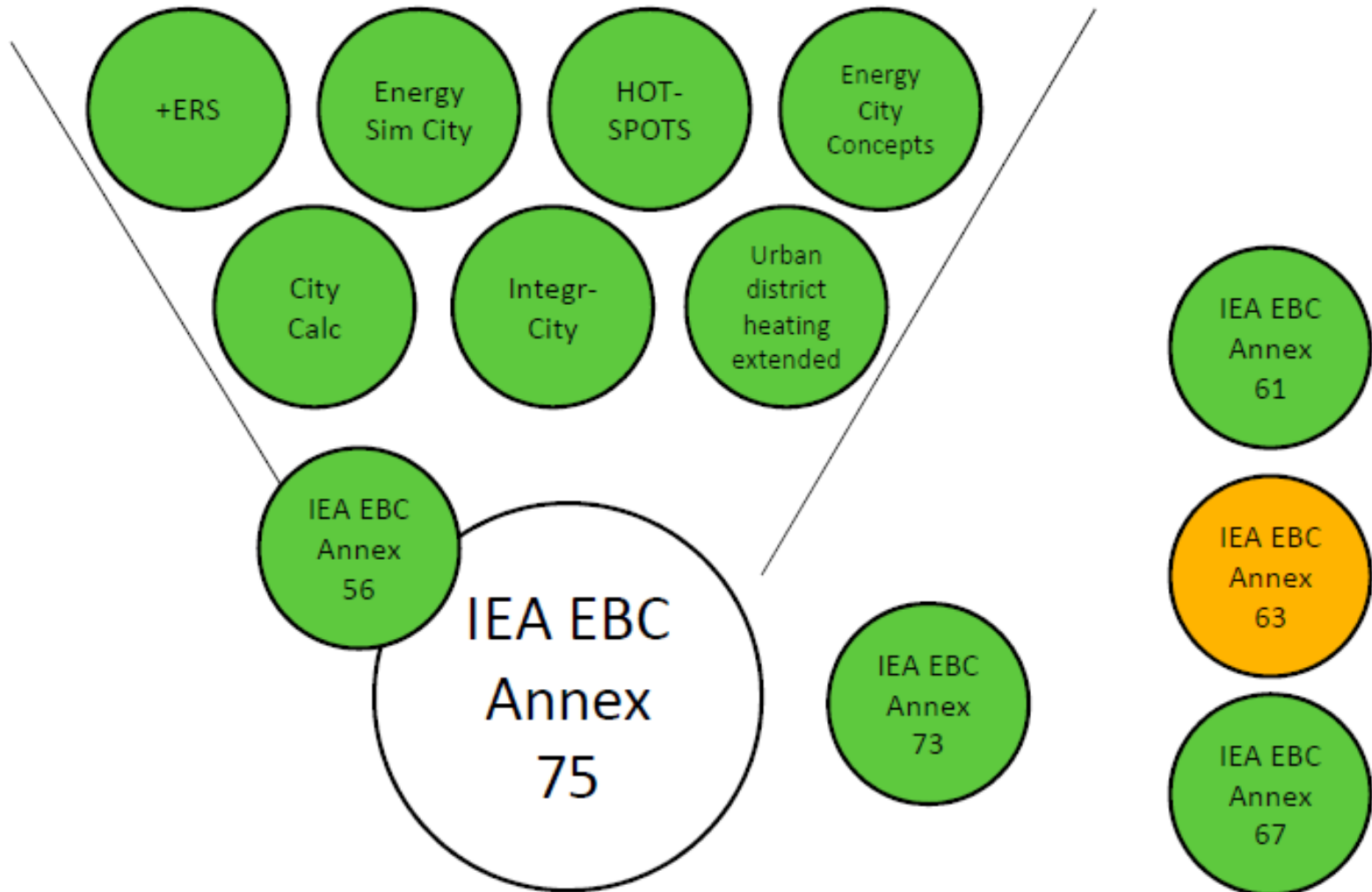
Quelle: Basisdaten von Tabula - Episcopo

Hintergrund - Fragen

Fragen?

1. Was ist die beste Gebäude-Performance einer kosteneffizienten Sanierung auf **Stadtteilebene** in Bezug auf:
 - geringen Energieverbrauch
 - geringe Treibhausgasemissionen
 - Erreichung von zusätzlichem Nutzen
 - Kosteneffizienz
2. Durch welche thermische und gebäudetechnische Maßnahmen kann diese erreicht werden??

Hintergrund – FO-Projekte



Hintergrund – Annex 56

Cost-effective energy and carbon emission
optimization in building renovation

The screenshot shows the homepage of the IEA Annex 56 website. The browser address bar displays <http://www.iea-annex56.org/>. The page features a navigation menu on the left with links for HOME PAGE, PROJECT, PARTICIPANTS, NEWS, and RESULTS. A newsletter subscription form is located in the top right, with fields for email, username, and password, and a 'Subscribe' button. Below the navigation menu, there are three news items under the heading 'RECENT NEWS':

- IEA Annex56 ASCOT tool is now available**
2015-11-09 by admin
It is now available for download, the **IEA Annex 56 ASCOT tool**. Find [here](#) the direct link to the spreadsheet, or visit the page "tools" under the results menu.
- Newsletter 6 is now available**
2015-09-03 by admin
It is now available for download the newsletter 6, of the Annex 56 project. Find [here](#) the direct link to the document, or visit the page "newsletters" under the results menu.
- Annex 56 International Workshop – Portugal, September 17**
2015-08-13 by admin
The final workshop of the project, will take place in Porto, Portugal, next 17th September.
This event will be an opportunity to receive an update about findings and conclusions of the project, as well as look at some policy-makers perspective towards building renovation.

On the right side, there is a section titled 'Case Studies of Building Renovation'. It includes a grid of images showing various buildings and a text block stating: 'Within this project, the gathering of case studies is one of the activities undertaken to reach the overall project objectives, because it is a recognized fact that the process of decision-making has to be strongly supported by success stories from real life and experiences and lessons learned from practice.' Below this, it mentions 'Shining Examples' and provides a link to a selection of successful demonstration projects.

Website (<http://www.iea-annex56.org/>)

Hintergrund - Idee

IEA ANNEX 75

einzelne
Technologien



Methodik



Wärmepumpe
Fernwärme
Abwärme
Solarthermie
Photovoltaik
...

LCC
LCA
Co-Benefits
...



Dissemination

IEA EBC Annex 75

IEA EBC Annex Proposal

Cost-effective strategies to combine energy efficiency measures and renewable energy use in building renovation at district level

Presentation to **EBC Executive Committee**

Organizations from the following countries have expressed interest for participation (8):
AT, CH, CZ, DK, ES, IT, PT, SE

Proposed Operating Agent:
Manuela Almeida
University of Minho
Portugal

ExCo Meeting
Sydney, 18 November 2016

IEA EBC Annex 75

The Goal: reach cost-effective energy and carbon emission optimization in building renovation in urban districts

Key question: Where is the balance point between energy efficiency measures and measures that promote the use of renewable energy?

- Annex 56: At the building level
- Annex 75: At the level of groups of buildings / urban districts

IEA EBC Annex 75

- Subtask A: Technology Overview
- Subtask B: Optimization Methodology and Strategy Development
- Subtask C: Case Studies
- Subtask D: Policy Instruments, Stakeholder Dialogue and Dissemination

Berechnungsmethodik

Kosteneffiziente Gebäudesanierung auf Stadtteilebene
unter Berücksichtigung von
Lebenszykluskosten, Primärenergie und Treibhausgasemissionen

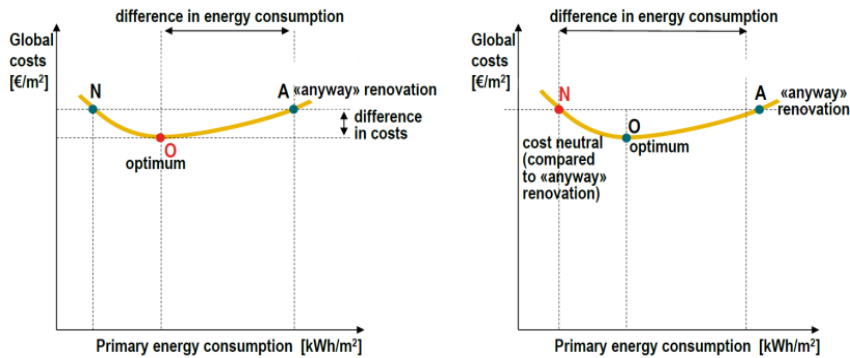
Life Cycle Costs
(LCC)

Life Cycle Assessment
(LCA)

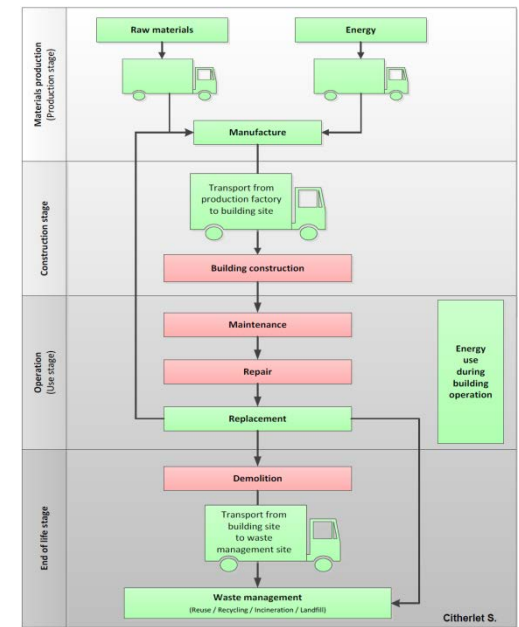
Co-benefits

Berechnungsmethodik

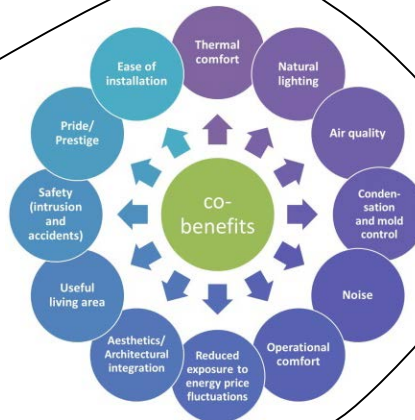
Life Cycle Costs (LCC)



Life Cycle Assessment (LCA)



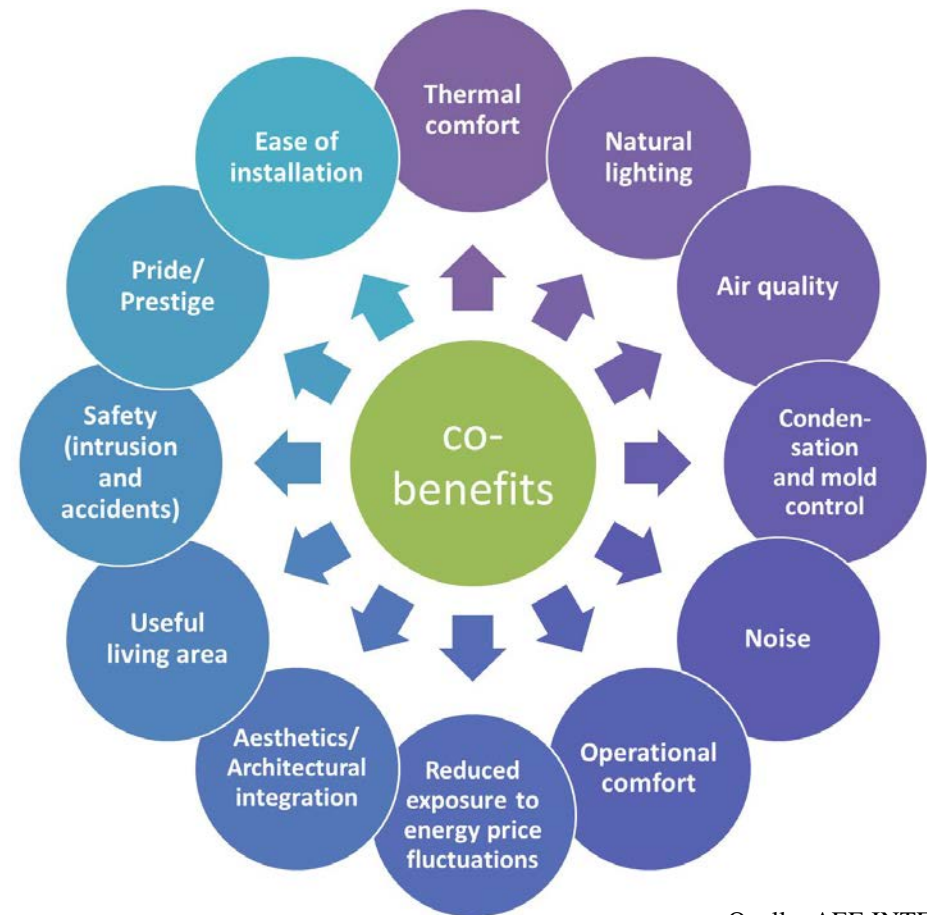
Co-benefits



Quelle: IEA EBC Annex 56

Co-benefits

- Nebeneffekte der Gebäudesanierung
- Nutzen abseits von Energie-, Emissions- und Kosteneinsparung
- Können positiv aber auch negativ sein
- Spielen eine wichtige Rolle im Entscheidungsprozess



Quelle: AEE INTEC

Sanierungsmaßnahmen

Gebäudehülle

Maßnahmen zur Verbesserung der thermischen Qualität der Gebäudehülle, wie z.B. Wärmedämmung der Fassade, des Daches, des Fußbodens und/oder Fenstertausch

Haustechnik / Netzverbund

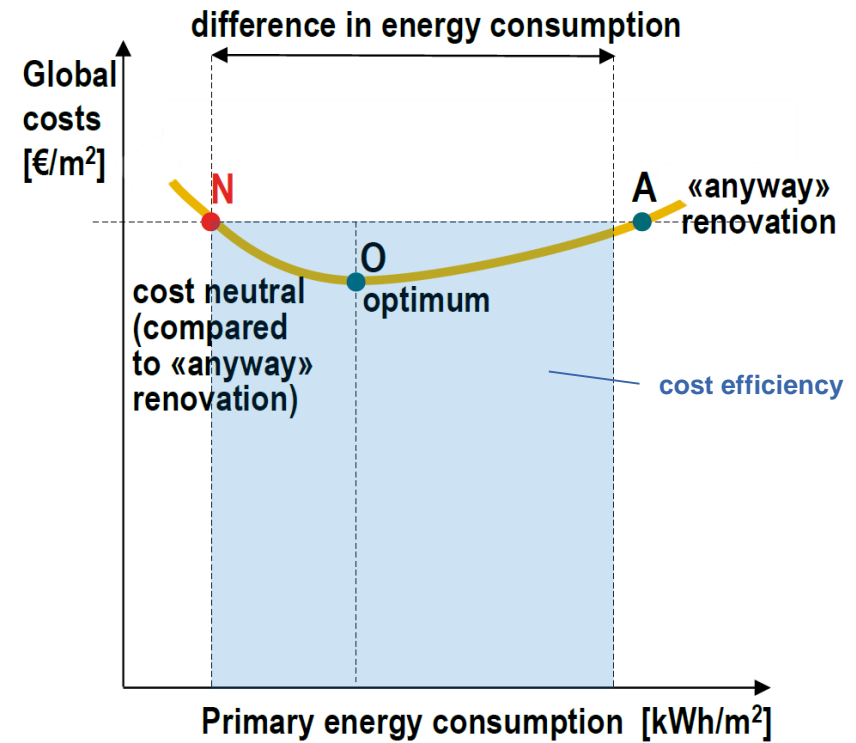
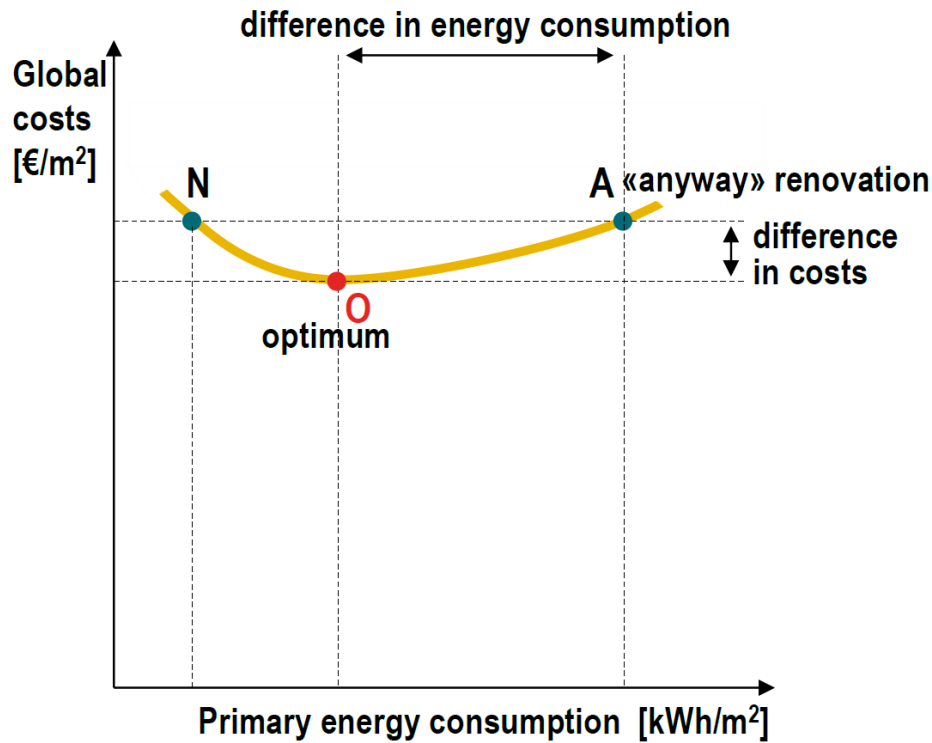
Modernisierung bzw. Erneuerung von Heizungsanlagen, Brauchwarmwasserbereitung, Kühlung, Lüftung sowie Allgemein- und Haushaltsstrom (z.B. Beleuchtung)

Variation von **Energieträgern** für Heizung, Kühlung und Brauchwarmwasser

Erneuerbare Energieerzeugung, wie z.B. Solarthermie oder Photovoltaik

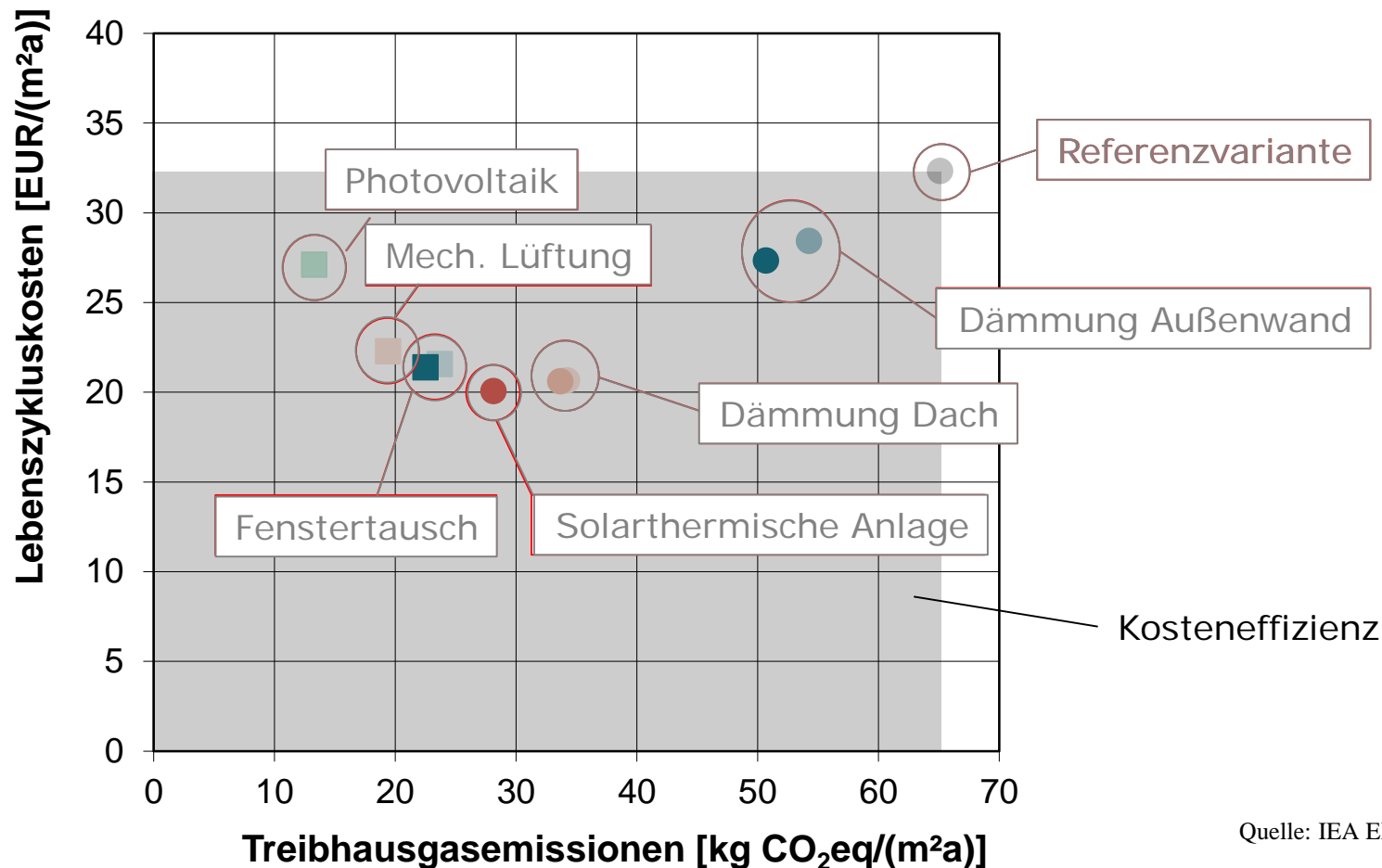
Kosteneffizienz

Cost-effective energy and carbon emission optimization in building renovation



Quelle: IEA EBC Annex 56

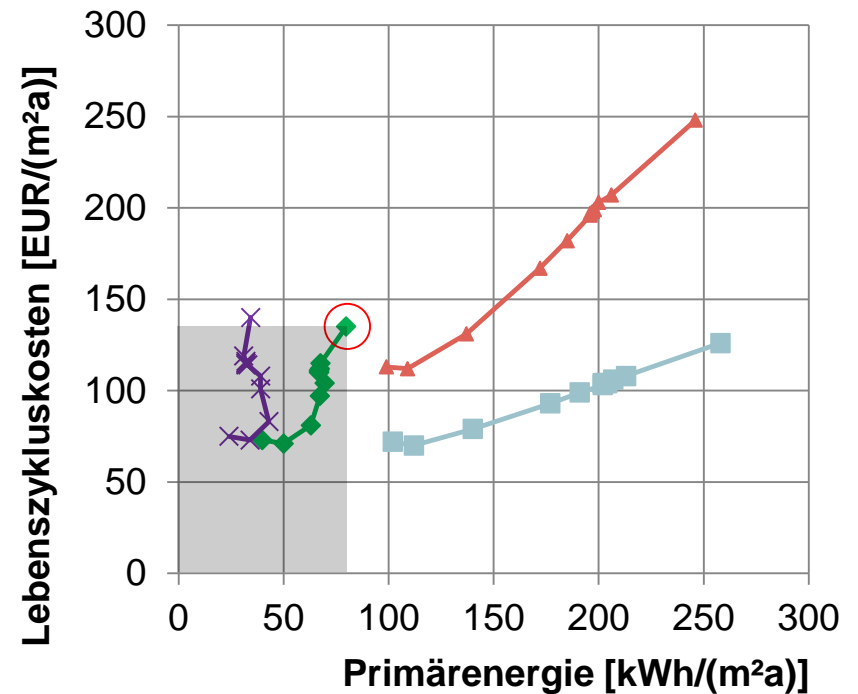
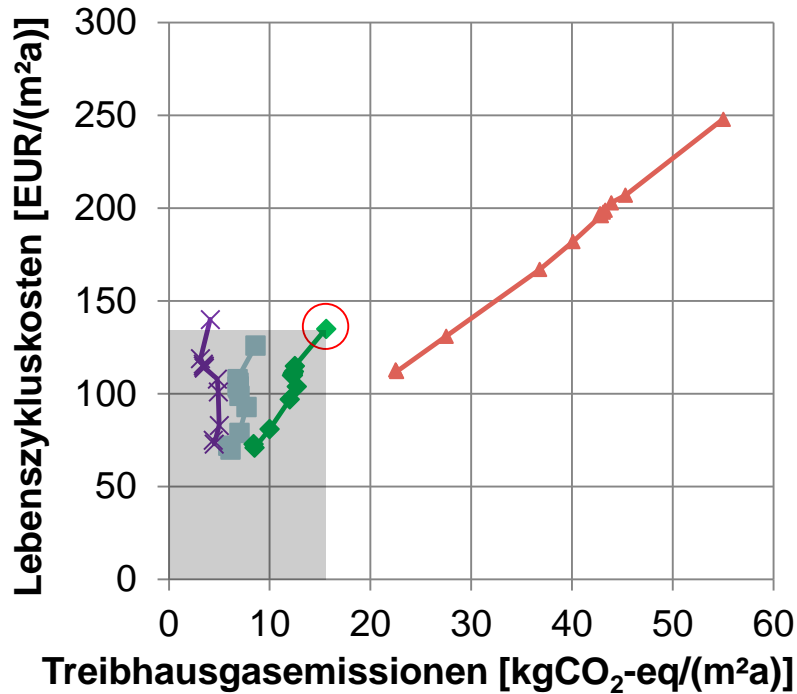
Berechnungsergebnisse



Quelle: IEA EBC Annex 56

Berechnungsergebnisse

Case Study „Backa röd“, Schweden



▲ Öl
 ■ Biomasse
 ◆ Fernwärme
 × Fernwärme EE

Quelle: IEA EBC Annex 56

Success stories and case studies

success stories

country	number of buildings	heated floor area
Austria	26	42,000
Denmark	1,228	120,000
Italy	570000 inh.	54 millions of m ³
Italy	4	4,013
Italy	3	3,661
Portugal	28	80,000
Portugal	109	126,000
Portugal	25	5,000
Sweden	6	276 apartments
Sweden	14	11,956
min	3	3,661
average	160	49,079
max	1,228	126,000

case studies

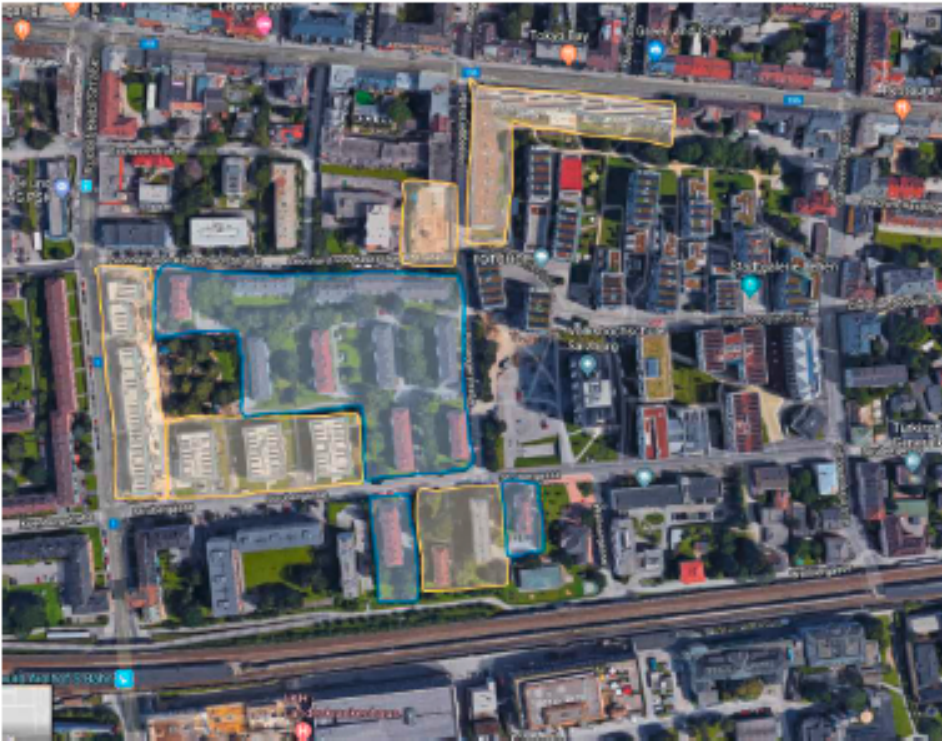
country	number of buildings	heated floor area
Austria	38	13,017
Norway	?	260,000
Portugal	8	3,925
Portugal	7	2,300
Spain	249	286,094
Spain	133	178,388
Spain	114	220,320
min	7	2,300
average	92	137,721
max	249	286,094

Success stories

Cost-effective energy and carbon emission optimization in building renovation

Case study (country)	Number of buildings	Heated floor area (m ²)	Type of intervention	Year
ALER-Varese, Sangallo (IT)	48 Apt. renovated (3 build.) 235 Apt. DH (24 build.)	3,661	Building renovation + DH (condensing gas-boilers)	2015
Quartiere Giardino, Modena (IT)	2,586 Apt. (77%) + schools & offices (33%)	~147,000	District Heating - trigeneration plant (natural gas)	1970-now.
District Heating, Turin (IT)	62,643 (90% schools surface)	?	DH (Combined cycle thermoel. group - n. gas)	1982-now.
Valdastico district, Vicenza (IT)	1 School, 2 nursing home, 1 office building	4,013	District Heating - biomass	2014
Santa Marta Campus, Univ. of Venice (IT)	5 (university + caretaker's house)	17,500	District Heating - trigeneration plant (natural gas)	2017
Kildeparken, Aalborg (DK)	942 apt.; 1,228 after renovation	96,446 m ² ; 119,886 m ² after renov.	Building renovation + DH	2014-2020
Lourdes Neighborhood, Tudela (ES)	146 renovated apart. (from 768 in DH)	11,520 m ² renovated / 63,008 m ² DH	Building renovation + DH (biomass+gas)	2010-2012

Success stories - Salzburg

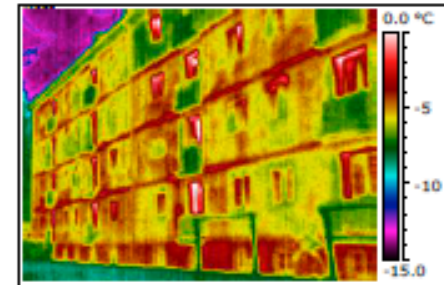
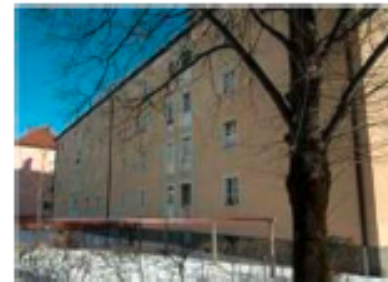


building typology:

- 95% social housing (common room, hair dresser)

years of construction:

- Old houses built 1948 - 1960



- no. of buildings: 14 renovation (286 flats)
- and 12 destroyed and rebuilt (before 337 – after 350)
- total heated floor area: about 42.000 m² (gross)

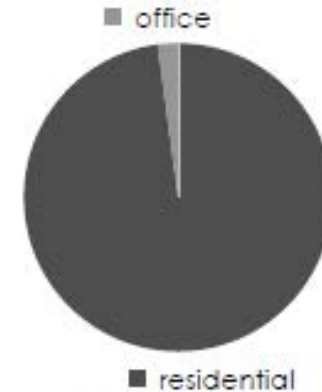
- realisation measures already carried out: yes
- renovation period: 2012- 2012
- New built house after house: start demolition 2013, new built finished September 2015 – End 2018

Case Studies - Liezen

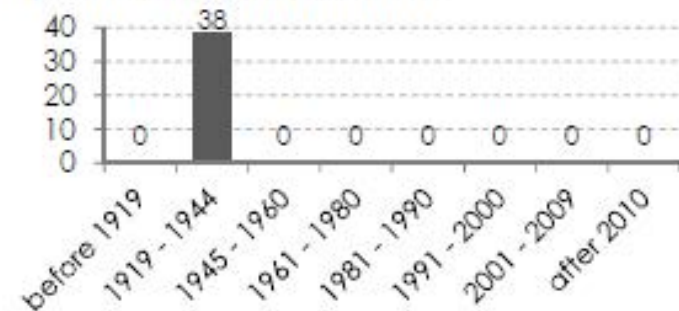


- no. of buildings: 38
- total heated floor area: 13.017 m²

- building typology:



- years of construction:



- renovation measures already carried out: yes
- implementation period: 1989-1993

Case Studies - Liezen

Dr. Karl Renner Ring, Liezen

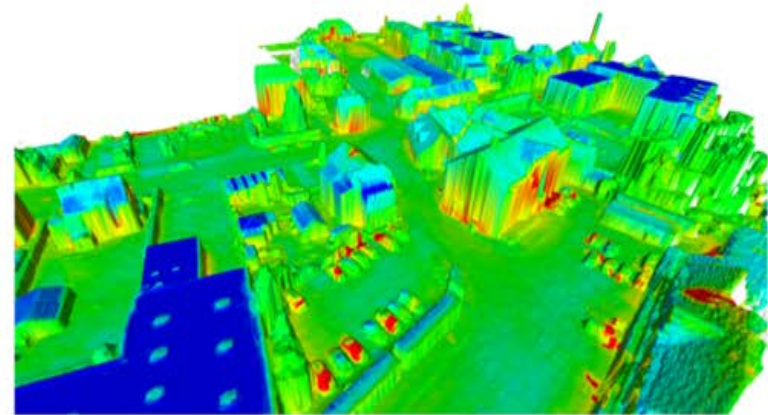
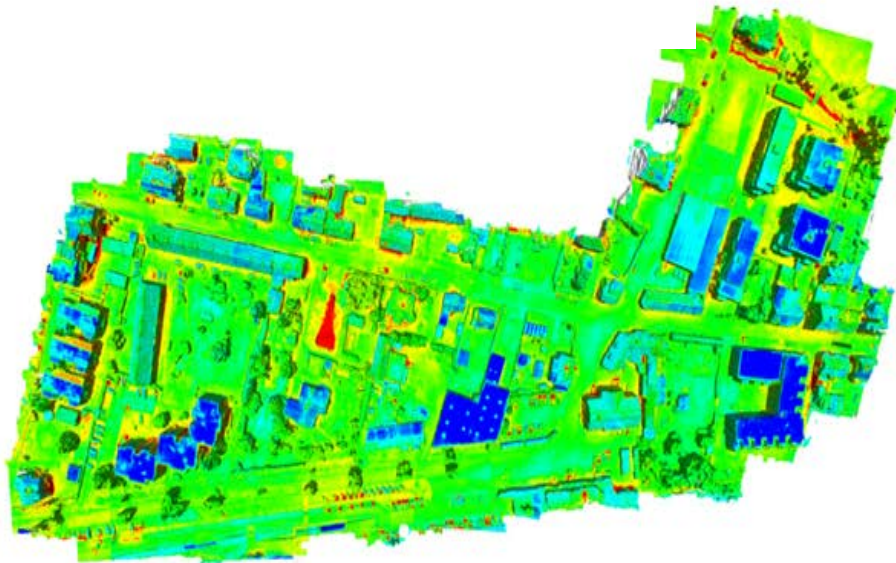
- **current heating demand:**
2.653 MWh/a
- **condition of thermal envelope:**
 - good
 - to be renovated
 -
- **condition of energy supply system:**
 - good
 - to be renovated
 - ...
- **what measures are planned:**
 - a plan has not yet been defined
 - renovation of thermal envelope
 - substitution of energy supply systems. Type:.....
 - integration of renewable energy sources. Type:.....
 - other measures. Type:.....

- **existing energy supply system(s):**
 - heat pump
 - natural gas
 - oil
 - biomass
 - district heating
 - renewables
 - fossil
 - mix
 - other....
- **existing renewable energy generation:**
 - none
 - PV
 - solar thermal
 - other....

- **local renewable energy sources and potentials existing?**
 - solar (thermic and electric)
 - yes
 - no
 - not known
 - geothermal
 - yes
 - no
 - not known
 - biomass
 - yes (district heating)
 - no
 - not known
 - waste heat
 - yes
 - no
 - not known

Case Studies - Hotspots

Cost-effective energy and carbon emission
optimization in building renovation

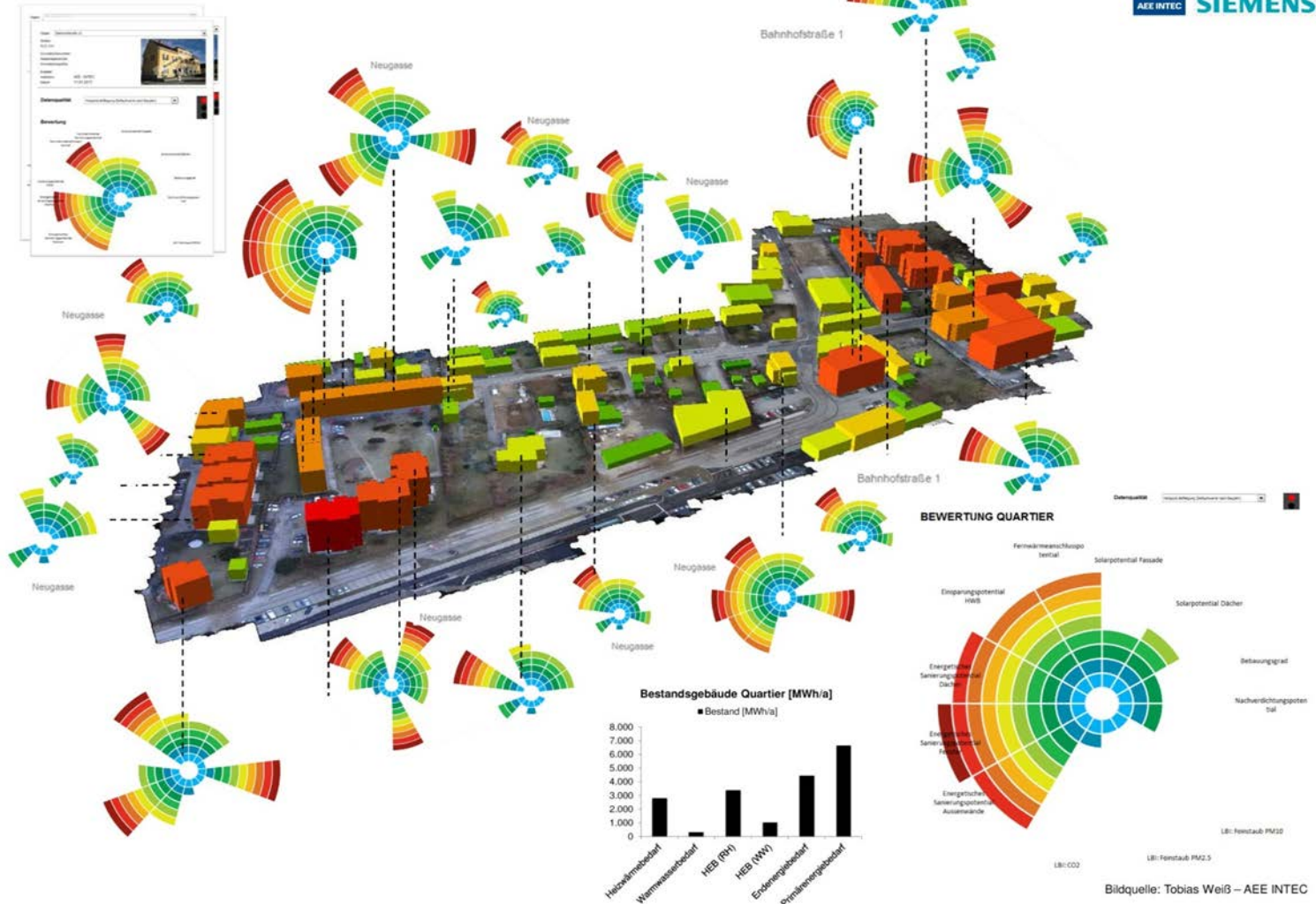




Case Studies - Potenzialerfassung

Cost-effective energy and carbon emission optimization in building renovation

Hotspots Übersicht Kriterienkatalog - Potenzialerfassung:

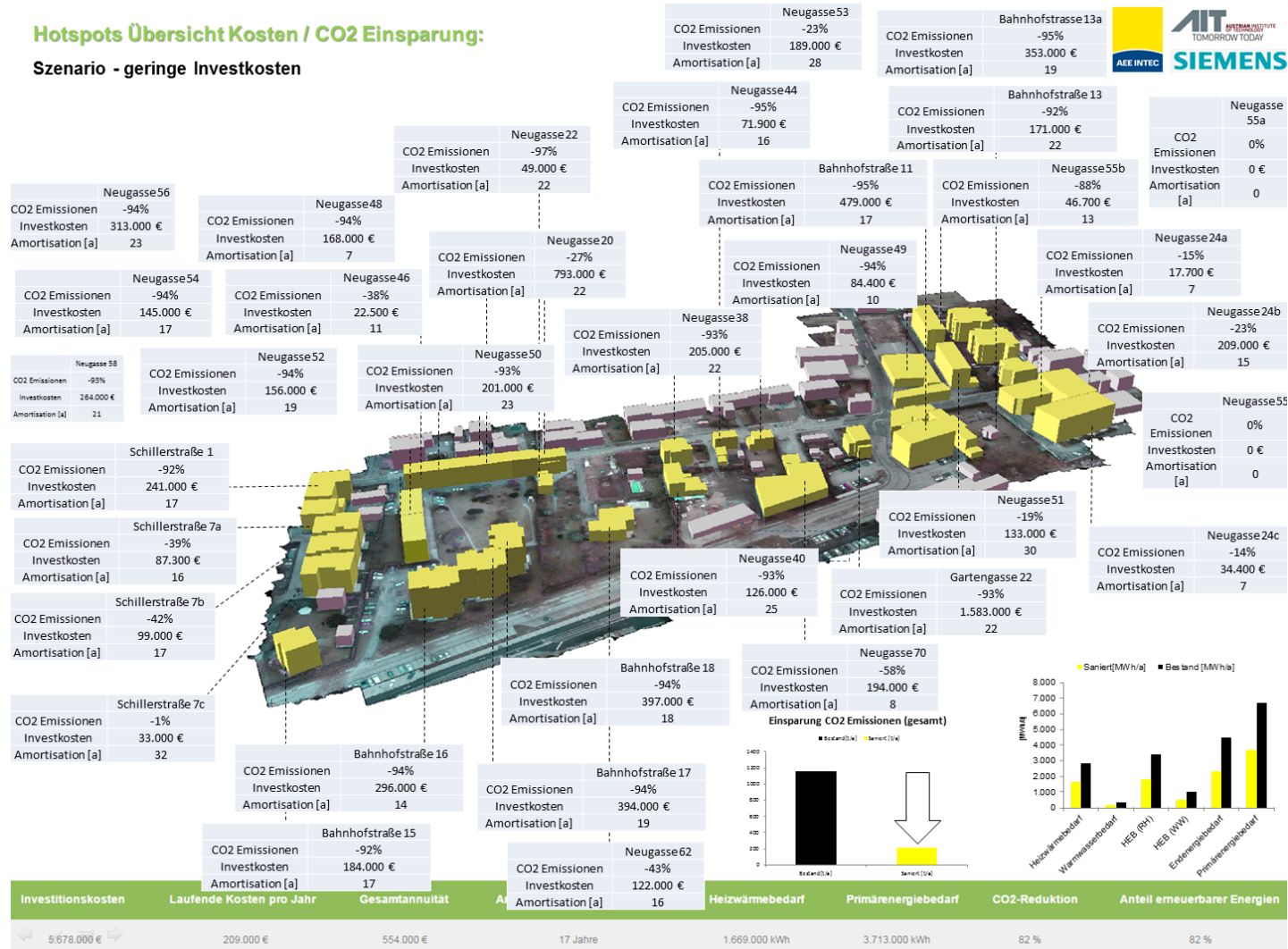


Case Studies – CO₂-Einsparung

Cost-effective energy and carbon emission optimization in building renovation

Hotspots Übersicht Kosten / CO₂ Einsparung:

Szenario - geringe Investkosten



Erwartete Ergebnisse

- Ein Wechsel zu **Erneuerbaren Energieträgern auf Stadtteilebene** reduziert die **Treibhausgas-emissionen** deutlicher als alleinige thermische Sanierungsmaßnahmen an der Gebäudehülle.
- Umgekehrt haben Maßnahmen an der Gebäudehülle einen großen Einfluss auf den **Primärenergiebedarf** und sind daher erforderlich.
- Die Darstellung von **kosteneffizienten „Gesamt“-Sanierungen** sollen Eigentümer und Stakeholder überzeugen, in größeren Dimensionen zu denken.

An aerial photograph of a modern building complex. The building features a prominent facade of large, blue solar panels mounted on a white frame. The building has a mix of white and yellow walls. In the foreground, there is a paved area and a small green lawn. The background shows a residential area with trees and a clear blue sky.

AEE INTEC

IDEA TO ACTION

**Danke für Ihre
Aufmerksamkeit**