WORK PACKAGE 4
„Technical Innovations“

Co2olBricks

Main objectives

Why is Co_2olBricks dealing with that kind of theme?

→ Reduction of CO_2 emmissions
→ The energy prices will raise

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Why is Co$_2$olBricks dealing with that kind of theme?

→ Reduction of CO_2 emmissions
→ The energy prices will raise

1. **Improve energy efficiency of historic brick buildings without destroying their cultural value**

2. **Make technologies and results public**

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Main steps

1. Handbook

→ Examples of energy efficiency refurbishment of historic brick buildings

→ Knowledge exchange

COMPLETED

2. Researches

→ Researches concerning energy efficiency

→ Knowledge gain for pilot project implementation

IN PROGRESS

3. Pilot Project

→ Implementation of measures in built reality

→ Knowledge gain for final report

IN PREPARATION

1. HANDBOOK

Handbook

Energy efficient refurbishment of historic buildings in member states in the Baltic Sea Region

A handbook of the “usual way of energy efficiency” improvements

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→ Selection of examples by each project partner, compiled by work package leader

→ Description of examples, common criteria: historic brick buildings

- Examples with internal insulation
- Examples with external insulation
- Examples without insulation on the facade

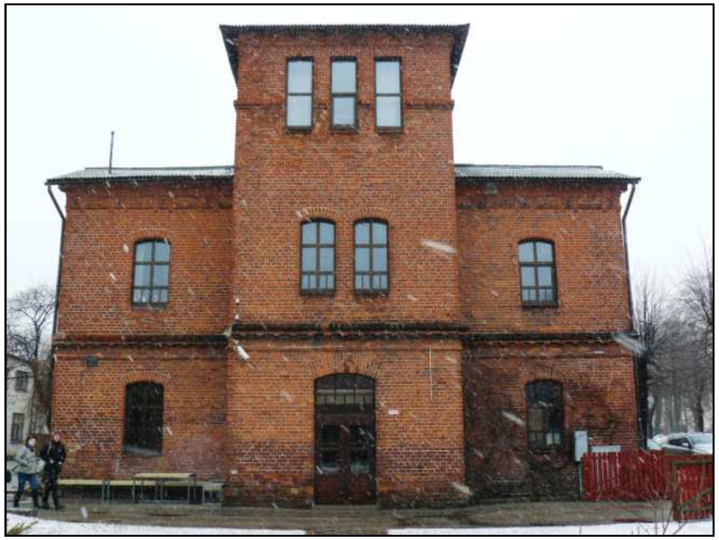
Examples with internal insulation

DK Kopenhagen: Frederiksberg

DK Kopenhagen: Hellerup

Examples with internal insulation

LV Riga: Melnsila Street 7



LV Liepaja: Alejas Street 18

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Examples with internal insulation

LV Riga: Kr. Valdemara Street 1

PL Gdansk: Grunwaldzka Street 186

Examples with internal insulation

DE Hamburg: Sanitasstraße 20-26

DE Hamburg: Wilhelmsburger Straße 80-82

DE Kiel: Hohenrade

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No measures on the facade

DE Hamburg: Koreastraße 1

EE Tallinn: Pagari 1

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No measures on the facade

PL Czeladz: Kosciuszki Street 1

PL Lodz: Ulica Ogrodowa 17

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No measures on the facade

LI Kaunas: Pilies takas 1

SE Kalmar: Valvsgatan 20

SE Kalmar: Larmgatan 13

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Handbook

Results:

→ Countries deal very carefully with historic buildings

→ All measures based on theoretical calculations

→ No analysis before the refurbishment (material, real heat transmission etc.)

→ No evaluation after refurbishment

→ Definition of value of building components before and after refurbishment

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Handbook

Examples internal insulation	Country	Building type	Year of construction	Insulation	New windows	Roof insulation	Basement insulation	New heating system	Energy consumption	Material analysis	Real heat trans-mission	Evaluation after refurbish-ment
Frederiksberg	DK	Apartment building	1889	internal	yes	yes	yes	yes (district heating)	- 30 kWh/m² per year (calculated)	no	no	no
Hellerup	DK	Apartment building	1904	internal	yes	yes	no	yes (district heating)	- 31 kWh/m² per year (calculated)	no	no	no
Alejas Street 18	LV	Apartment building	1870	internal	yes, years ago	yes	no	yes (unknown)	98 kWh/m² per year (calculated)	no	no	no
Melnsila Street 7	LV	Apartment building	1907	internal	yes	yes	yes	yes (gas boilers)	60 kwh/m² per year (calculated)	no	no	no
Kr. Valdemara Street 1	LV	Public building	1879	internal	yes	yes	no	yes (unknown)	101 mWh per month in heating season (real values)	no	no	no
Grunwaldzka Street 186	PL	Military office building	1890	internal	no	yes	no	yes (district heating)	---	no	no	no

Examples external insulation	Country	Building type	Year of construction	Insulation	New windows	Roof insulation	Basement insulation	New heating system	Energy consumption	Material analysis	Real heat transmission	Evaluation after refurbish ment
Wilhelmsburger Str. 80-82	DE	Apartment building	1927	external	yes	yes	yes	yes (gas boiler & solar panels)	60 kWh/m² per year (calculated)	no	no	no
Sanitasstraße 20-26	DE	Apartment building	1925	external	yes	yes	no	yes (gas boiler)	116 kwh/m² per year (calculated)	no	no	no
Hohenrade	DE	Apartment building	1938	external	yes	no	yes	yes (gas boiler & pellet heating)	71 kWh/m² per year (calculated)	no	no	no

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Examples with no insulation	Country	Building type	Year of construction	Insulation	New windows	Roof insulation	Basement insulation	New heating system	Energy consumption	Material analysis	Real heat transmission	Evaluation after refurbishment
Pagari 1	EE	Apartment building	1912	no	no	yes	no	yes (central heating)	282 kWh/m² per year (calculated)	no	no	no
Koreastr. 1	DE	Warehouse	1879	no	no (upgrade)	yes	yes	yes (district heating)	---	yes	no	no
Ulica Ogrodowa 17	PL	Industrial building	1878	no	no (upgrade)	yes	---	Yes (district heating)	---	no	no	no
Kościuszki Street 18	PL	Apartment building	end 19th century	no	yes	yes	yes	yes (natural gas)	205 kWh/m² per year (calculated)	no	no	no
Pilies takas 1	LT	Farming building	1852	no	yes (partly)	yes	no	yes (district heating)	---	no	no	no
Varvsgatan 20	SE	Office building	1865	no	yes	yes	---	yes (district heating)	121 kWh/m² per year (calculated)	no	no	no
Larmgatan 13	SE	Apartment building	1900	no	yes	no	no	yes (district heating)	180 kWh/m² per year (calculated)	no	no	no

2. R E S E A R C H E S

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Researches

→ Individual tasks by each project partner in work package 4

→ Common development of research activities

→ Regular reconciliation between project partners

Aims:

→ Knowledge gain by project partners for Co_2olBricks

→ Development of innovative methods, technologies etc.

→ Realisation within pilot project development

Researches

Research in Denmark

→ Evaluation of implemented refurbishments

Copenhagen, Frederiksholm kanal nr 30

Researches

Research in Estonia I

→ Evaluation of real energy consumption of different brick buildings

→ Energy performance calculations

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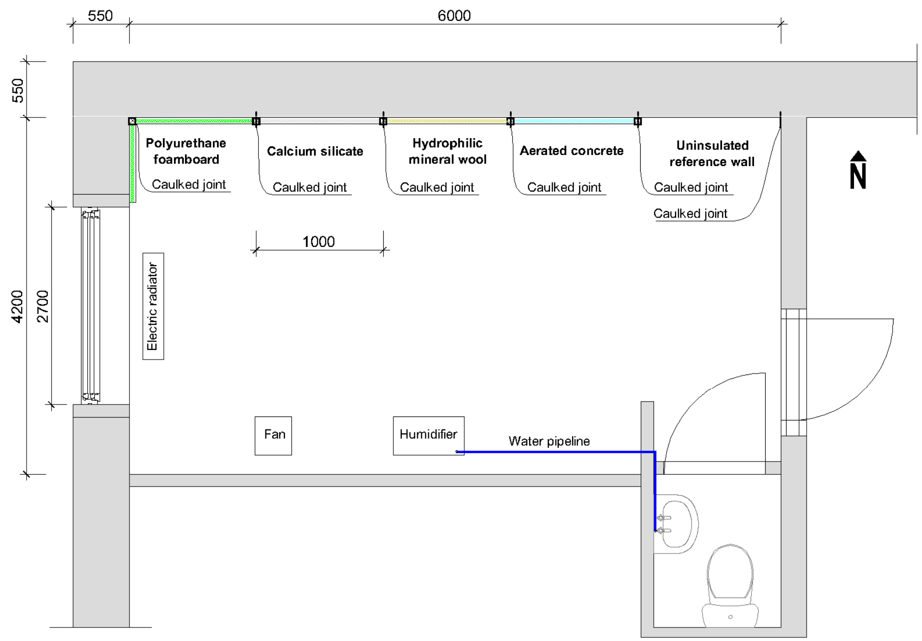
Researches

Research in Estonia II

→ Evaluation of different internal insulation materials in historic school building

→ Dynamic energy performances



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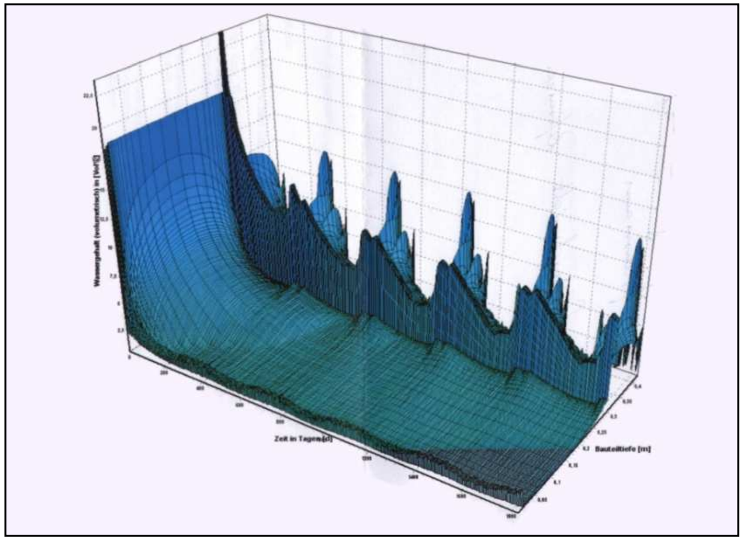
Researches

Research in Germany

→ Analysis of different internal insulation materials in residential building

→ Installation of measuring probes and dynamic simulations



Researches

Research in Belarus

→ Analysis of different material for restoration

Overall linear shrinkage, %	5 – 7
Water absorption, %	9 – 11
Apparent porosity, %	19 – 22
Bending strength, MPa	7 – 11
Compressive strength, MPa	29 – 34
Freeze-thaw durability, cycles	> 100
Firing temperature, C	1100

Researches

Research in Poland

→ Analysis on two buildings concerning the energy performance

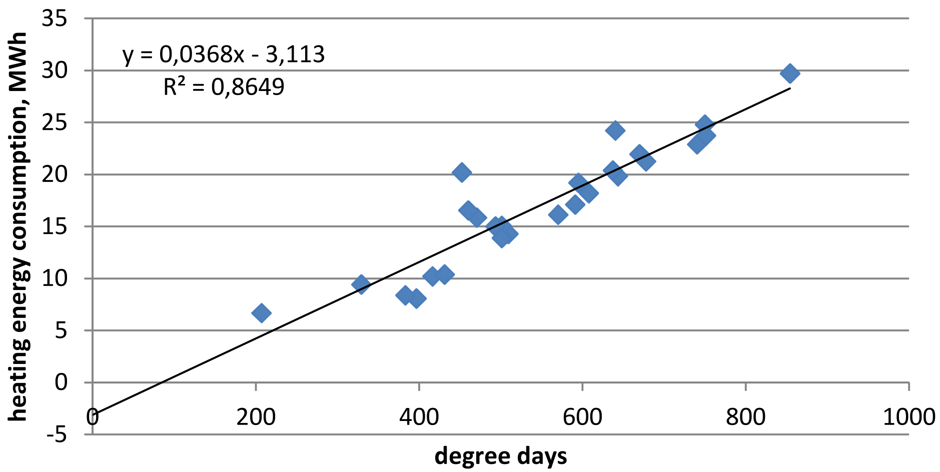
→ Development of energy audits

Researches

Research in Latvia

→ Analysis of heat consumption of 20 different brick buildings

→ Preparation of energy audits, implementation of heat flow and humidity measurements



3. PILOT PROJECTS

Pilot projects

Four $Co_2olBricks$ pilot projects:

- Germany, Hamburg: Residential building
- Estonia, Kothla-Järve: Historic school building
- Sweden, Malmö: Former hospital area
- Latvia, Riga: World heritage site

Aims:

→ Implement innovative methods/ technologies into built reality

→ Knowledge gain for $Co_2olBricks$

→ Examples show results of $Co_2olBricks$ after project end

Pilot projects

Pilot project in Hamburg, Germany: Holstenkamp

→ Ensemble of historic brick buildings will be used for living

→ Implementation of wall tempering system and normal heating system

→ Comparison and evaluation of energy performance

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Pilot projects

Pilot project in Hamburg, Germany: Holstenkamp

Pilot projects

Pilot project in Kothla-Järve, Estonia: Historic school building

→ Development of innovative energy efficiency concept for part of building

→ Researches within the school building

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Pilot projects

Pilot project in Kothla-Järve, Estonia: Historic school building

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Pilot projects

Pilot project in Malmö, Sweden: Former hospital area

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Pilot projects

Pilot project in Malmö, Sweden: Former hospital area

→ Development of energy efficient refurbishment concepts

→ Usage of renewable energies and energy storage

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Pilot projects

Pilot project in Riga, Latvia: World heritage site Spīķeri

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Pilot projects

Pilot project in Riga, Latvia: World heritage site Spīķeri

→ New information centre as an energy efficient building

→ Showroom of different technologies and methods to save energy

→ Usage of renewable energies

THANK YOU FOR ATTENTION

More information: www.co2olbricks.eu

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