Energy Efficient Building Renovation in South East Europe

A Regional Workshop on the Implementation of EU Directives in the Buildings Sector – Slovenia
8th May 2019
Welcome Address

Barbara Hafner
Marketing and PR Director
Knauf Insulation
Opening of the Workshop

Jernej Vernik
Head of EU Representative Office
VELUX
Today’s Aim

**What:** Facilitate Energy Efficient Building Renovation in South-East Europe

**How:** By addressing 3 key questions together

→ What are the key drivers local jobs, better environment, cleaner air and more comfortable homes?

→ How can national long-term renovation strategies best plan ahead and maximise impact?

→ How do we best finance the ambition of a highly energy-efficient building stock by 2050?
Current State of Play

EPBD
2018

Guidance Document on EPBD Implementation
2018

Guidance document on EPBD Implementation
Adoption mid-2019
# Achieving our Aim: 3 Phases

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Session 1

Energy Efficient Buildings in South-East Europe

**What are the key drivers local jobs, better environment, cleaner air and more comfortable homes?**

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Keynote Speech

Sasa Galonja
Head of Construction Division, Ministry of Environment & Spatial Planning
Slovenia
NEARLY ZERO ENERGY AND SUSTAINABLE BUILDINGS IN SLOVENIA

EuroACE Conference

Saša Galonja, Škofja Loka, 8 May 2019
TRENDS IN PUBLIC SECTOR (I)

- Revision of existing Rules on energy performance of buildings:
  - New tougher requirement for envelope, systems in the building and use of renewables,
  - Use of new set of EN standards for calculation of energy use,
  - Reference building approach,
  - New set of climate data will be used and hourly method will be introduced,
  - No decision yet on mandatory use of calculation tool.
New „greener“ requirements for public procurement of buildings
– use of wood,
– or one of established certificate systems can be used (LEVEL(S) DGNB; BREEAM…),

Guidance document on sustainable (public/administrative) buildings is being developed, uses LEVEL(S) as basis,

Subsidies and loans for reconstruction and refurbishment of existing buildings owned by municipalities and government
TRENDS IN PRIVATE SECTOR

- Efficient use of energy has become common practise, especially for new homes,
- Use of wooden structures and wooden façade is becoming increasingly popular,
- Energy efficiency of multi-storey dwellings is being improved, less so in private one-family houses,
- Deep renovations are less common or they are divided into many phases, in between indoor climate is not optimal,
- Eko sklad (Eco-fund) gives subsidies and loans to private persons for efforts in reaching over minimum state requirements on building elements, systems and new houses
SOME DOUBTS

- Energy use is only a fraction of sustainable construction, but it seems that many people (including politicians) think both are synonyms,
- Fear of sick-buildings-syndrome,
- With „high-end“ demands robustness is gone,
- Smart buildings concepts and solutions will need several iterations to become fully functional and will work seamlessly in the background,
- Introducing recharging infrastructure for electro-mobility is no problem for new buildings, but would be a nightmare for existing multi-family residential buildings – ownership problems,
- Buildings are so complicated we will need „user manual“,
IMPACT ON INDUSTRY

- Shift from new to reconstruction and reuse of existing building stock,
- More opportunities for micro and small construction businesses,
- Industry of thermal insulation materials, machinery for buildings and building automation…, they all must like the development of new energy policies and regulations as they will sell more,
- Producers and distributors of energy sources other than electricity are probably getting worried.
DEEPER AND DEEPER RENOVATIONS

- It is not part of the scope of EPBD, but it only make sense that before or at the same time building is assessed and renovated as „deeply“ as necessary. This possibly includes:
  - Improving mechanical stability (earthquakes),
  - Fire resistance,
  - Other safety requirements,
  - Functional improvements,
  - Access for all…
Thank you for your attention!

Saša Galonja
Sektor za graditev
Direktorat za prostor, graditev in stanovanja,
Ministrstvo za okolje in prostor
Dunajska cesta 48, 1000 Ljubljana, SI – Slovenia
(sasa.galonja@gov.si)
Setting the Scene

What are the benefits for SEE of good implementation of EU legislation for energy efficiency in buildings

Adrian Joyce
Secretary General
EuroACE
More than…
• ...286,000 employees
• ...1,200 production facilities & office locations in Europe
Policy Context

Paris Agreement 2015
   Keep well below 2°C increase over pre-industrial temperature
   Make efforts to stay below 1.5°C

Clean Energy for All European Package 2030
   Energy Efficiency Directive (amended)
   Renewable Energy Directive (recast)
   Governance Regulation (new)

Long-Term Climate Neutral Strategy 2050
   Eight scenarios modelled – none fully account for the potential in buildings
Benefits for South-East Europe

Become Front-Runners
Early implementation; Innovative approaches; Exchange of experiences and practices

New Direct Local Jobs
Local, Permanent Jobs in Construction; Attract Workers Back from Other EU Countries

Comfort and Health
We Spend 90% of our Time Indoors; Efficient Buildings are Comfortable and Boost our Health

Boost to GDP
Estimate Increase in Construction Output in the EU is in a range from €200 to €670bn per year (from 2020)
A strong EPBD transposed and implemented at national level

Contents:

12 High-Level Recommendations

6 Chapters Covering Key Issues
Recommendations:

• Resources and Technical Capacity
• The Crucial Role of Buildings
• Existing EPBD Implementation Efforts Must Continue
• Embedding Milestones and Measurable Progress Indicators into LTRS
• Fulfilling Consumer Needs
• Building the Knowledge Base Together
• It’s All About the Money
• Continuous Communication
• You can’t Maintain What You Don’t Measure
• Integration Counts
• Calculate Energy Demand First
• Keep Everyone onside
Long-Term Renovation Strategies

- Transform Building Stock by 2050
- Have Milestones
- Have Measurable Progress Indicators
- Address Worst-Performing Segments
- Consultation of Stakeholders
Building Renovation Passports

- New Option for Member States
- Feasibility Study by Commission
- Comprehensive, Prepared with Owners
- Tailored, Independent, Motivating Advice
- Catalyst to Drive Action
Financing Energy Renovations

• Link to Targeted or Achieved Energy performance
• Support Mobilisation of Investments
• Commission to Collect and Disseminate Best Practices
Smart and Technology Equipped Buildings

- Inspection Regimes Amended
- Definitions Extended
- Building Automation and Control Systems Mandatory
- Smart Readiness Indicator to be Rolled Out
- Increased Transparency and Compliance
Annex I – Measuring Energy Performance

- Put Energy Efficiency First
- Increase Comparability Across the EU
- Describe the Energy Needs
- Account for Additional Passive Factors
- Treat RES on a Non-Discriminatory Basis
Final Thoughts

Start of New Cycle
Transposition and implementation
Incorporation of new issues

Changes at EU Level
Elections in 2019 – new MEPs
New Commission at end of 2019

Member State Actions
Engage with stakeholders; Transpose and implement amended EU directives; Share

Ljubljana Declaration
Statement of intent; A rallying call to bring actors together for progress
Thank You!

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View from the European Commission

Getting the EPBD to national level

Dimitrios Athanasiou
Policy Officer
DG Energy
Clean Energy for All Europeans: THE RIGHT REGULATORY FRAMEWORK FOR POST – 2020

Energy Efficiency Directive
- Binding 30% energy efficiency target for 2030;

Ecodesign Working Plan 2016-2019
- List of new product groups;
- Contribution to circular economy objectives;

Energy Performance of Buildings
- Supportive of renovation;
- Smarter – ICT, smart buildings;
- Simpler;

Energy Union Governance

Energy Efficiency

Renewables
(Revised Renewable Energy Directive)

New Electricity Market Design
(including Risk Preparedness)

Energy prices and costs report

Clean Energy for All Europeans: 8 different legislative proposals

Political negotiations on the Clean Energy for All Europeans package have been concluded

- Energy Performance of Buildings
- Energy Efficiency \( \rightarrow 32.5\% \)
- Renewable Energy \( \rightarrow 32\% \)
- Governance Regulation
- Electricity Market Design
  - Electricity Regulation,
  - Electricity Directive,
  - Risk-Preparedness Regulation
- Rules for the regulator ACER

A major step towards completing the Energy Union and combatting climate change

- **Keeping the momentum**: We need approximately the same energy efficiency effort from 2020 to 2030 as from 2010 to 2020
- **Union’s commitment** towards its international climate and energy goals in 2030 and beyond
- Endorse the Union’s commitment under the Energy Union Framework to put ‘energy efficiency first’
- Give investors the security that it is worth investing in energy efficiency, with positive impact on the technology costs and payback periods

Energy consumption is **rising since 2014**, following an extended period of declining or flat consumption. The distance to the **EU 2020 energy efficiency target** has been increasing.

Source: DG ENER based on Eurostat data

Relative change in primary energy consumption, primary energy intensity and GDP, 2014-2017

Source: Eurostat
CLEAN ENERGY FOR ALL EUROPEANS

EU 32.5% Primary Energy Consumption Target

The energy efficiency challenge for 2030
Some interesting facts for the building sector

Buildings responsible for **40% of energy consumption and 36% of GHG emissions** in EU

Buildings to contribute significantly to **GHG emission reductions** of around 90% compared to 1990 by 2050

**75% of the housing stock is energy inefficient**

**Construction rates / worse economic conditions**

- low demolition rates (0.1-0.2% per year)
- limited new construction activities (0.4-1.1% per year)
- very low refurbishment rates (0.4-1.2% per year)

**Problems and drivers**

- structural
- market failures
- regulatory failures
EPBD is effective (will deliver the 60-80 Mtoe energy savings by 2020)

The overall architecture is working (especially for new buildings)

The NZEB sets a 'future-proof' vision for the sector and mobilise stakeholders accordingly

Cost-optimality is an efficient approach to set energy performance requirements

EPCs is a useful demand-driven market tool

Relatively limited regulatory failures

Opportunities for simplification

Decarbonisation of buildings in the long-term strategy

Modernisation in terms of technological progress towards ‘smarter’ buildings

Better linking them with financial support systems

Databases can be a key instrument for reinforced compliance

Evaluation of the EPBD
EPBD review: the process

From EC proposal to publication


Transposition deadline:
10 March 2020

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2018.156.01.0075.01.ENG
Main outcomes of the revision

A strengthened Directive

- Stronger **long term renovation strategies** for Member States, aiming at decarbonisation by 2050 and with a solid financial component
- An optional **Smart Readiness Indicator** for buildings
- Targeted support to **electromobility** infrastructure deployment in buildings' car parks
- Enhanced transparency of national building **energy performance calculation methodologies**
- Reinforcement of **building automation**: additional requirements on room temperature level controls, building automation and controls and enhanced consideration of typical operating conditions
Requirement for Member States to establish comprehensive strategies aiming at a highly efficient and decarbonised building stock by 2050 and at a cost-effective transformation of existing buildings into nearly zero-energy buildings.

More elements to be considered: energy poverty, market failures and barriers, split incentives, necessary skills, health and safety issues, wider benefits.

Set up a roadmap with measures, measurable progress indicators and indicative milestones for 2030, 2040 and 2050.

Carry out a public consultation.

Financial component: facilitate access to appropriate mechanisms (effective use of public funding; aggregation; de-risking).

By **2025**, Member States will set **requirements** for a **minimum number of charging points** in all non-residential buildings with more than 20 parking spaces

**Simplification** of the deployment of recharging points (including with permitting procedure)

Requirement on the deployment of **ducting infrastructure** in new and major renovations of buildings of with more than 10 parking spaces
- 1 in every 5 parking spaces for non-residential buildings
- Every parking space in residential buildings

**1 charging point** per building for new and major renovation of non-residential buildings with more than 10 parking spaces

**Targeted exemptions** (e.g. for SMEs)
New article advocates the introduction of an optional common Union scheme for rating the smart readiness of buildings

- Will characterize the ability of a building to manage itself,
- To interact with its occupants,
- And to take part in demand response and contribute to smooth, safe and optimal operation of connected energy assets

The SRI will be established through two legal acts: delegated act for the definition and calculation methodology; implementing act for the technical modalities of implementation. By 31 Dec. 2019

Motivation: recognition of progress towards smart building systems and their added value for building users, energy consumers and energy grids

https://smartreadinessindicator.eu/
Inspections & building automation (Articles 14&15, Article 8)

**Thresholds** for inspections are set up at **70 kW** for both heating and air-conditioning systems

**Alternative measures** to mandatory inspections based on advice are kept, with ex-ante reporting to the Commission

Additional requirements on the installation of **building automation and control systems** by **2025** in large non-residential buildings

Additional requirements on the installation of **self-regulating devices** for room temperature level control in new buildings and when heat generators are replaced
Towards better data (Article 10(6) and Article 8(9))

- Requirement for EPC databases to allow gathering data for the (measured or calculated) energy consumption of buildings
  - This data shall be made available to building owners and for statistical and research purposes
- Requirement to assess and document the performance of technical building systems when they are installed, replaced or upgraded

Complementary with the EU Building Stock Observatory: https://ec.europa.eu/energy/en/eubuildings
Towards more transparency (Annex I)

New obligation to describe national calculation methodology following the national annexes of the **overarching standards** (ISO 52000-1, 52003-1, 52010-1, 52016-1, and 52018-1 developed under mandate M/480) https://epb.center/

Considerations for the **calculations of Primary Energy Factors (PEFs)**

National calculation methodologies must reflect the energy needs of a building in order to provide the **optimal comfort, indoor air quality and health conditions inside the building**

Pursuing the **optimal energy performance of the building envelope**

Treatment of **on-site and off-site RES** on a non-discriminatory basis
EPBD implementation (studies and contracts)

- **Feasibility study (Article 19a of the revised EPBD)**
  - Standalone ventilation systems
  - Optional building renovation passports

- **Smart Readiness Indicator** [https://smartreadinessindicator.eu/](https://smartreadinessindicator.eu/)
  - Phase 1 Final report available (including summary version)
  - Phase 2 starting in December 2018

- Support to use of CEN EPB Standards [https://epb.center/](https://epb.center/)

- Comprehensive study on *renovation rates and NZEB uptake* in the EU

- **Energy Performance Certificates**
  - Quality, Visibility, Usability

- **Finance measures on energy renovations**
The "Smart Finance for Smart building" Initiative

Smart Finance for Smart Building Initiative aims at unlocking investments and private financing through:

- Technical Assistance and Aggregation of projects
- De-risking
- Effective use of public funding

Financing Initiatives

- **European Local Energy Assistance** (ELENA) - Technical assistance to develop large-scale projects
- **De-risking Energy Platform (DEEP)** - database aiming at de-risking energy efficiency investments
- **EFFIG Underwriting toolkit** - guide which aims to assist financial institutions to scale up their deployment of capital into energy efficiency
- **Sustainable Energy Investment Forums**
- Facilitate the use of **Energy Performance Contracting** for the public sector

Main lessons learnt for the energy performance of buildings

- The building sector needs to use more innovative design and construction methods to build for high energy performance.
- Large-scale building renovation requires holistic and attractive packages to be developed.
- Collaboration of all players and stakeholders from the construction, energy and education sectors.
- Training is necessary tailored to the needs of construction companies, workers and homeowners.
- Support from national authorities will now be key in the long-term roll out of existing and new energy efficiency training schemes in the construction sector.

Barriers to boost energy efficiency solutions

- The appropriate regulatory framework
- A proper understanding of the market
- Energy poverty and low incomes
- Financial risks
- Lack of skilled workforce
- Split incentives and common decision-making

Sources of funding

- European Regional Development Fund (ERDF)
- European Social Fund (ESF)
- Horizon 2020
- Project development Assistance Facilities

The ESCO model and use of EPC

A basic financial instrument model for SEE

Challenges
• Make investing in demand-side infrastructure a strategic priority
• Overcome the lack of project proposals for demand-side projects
• Remove silos that are hindering effective governance of funding streams
• Reduce uncertainty to spur private investments

Solutions
• Strategic measures
• Increase technical assistance
• Better governance
• Implement cross-cutting measures

Source: Energy Poverty Observatory

https://www.energypoverty.eu/
Going beyond energy savings

Wider benefits of NZEB and highly energy performance buildings

- Health
- Comfort
- Indoor air quality
- Lower bills
- Increased property value
- More demand
- Increased productive (for offices)
- ......

https://www.velux.com/health/healthy-homes-barometer-2018
Thank you!

Dimitrios ATHANASIOU

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European Commission - DG Energy
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Views from the Business Sector

Vojko Golmajer
General Manager
VELUX

Darko Bevk
Commercial Director
Knauf Insulation
BRING / LIGHT TO LIFE
THE VELUX VISION

To lead the development of better living environments with daylight and fresh air through the roof, and to be rated as the best in the eyes of our customers.

VELUX Slovenija, VELUX Croatia
Vojko Golmajer
BRING / LIGHT TO

What we make
BRING / LIGHT TO LIFE

What our customers buy
STRIVE ⁄ FOR THE BEST

A decade of full-scale experiments

01 Torzhkovskaya Street
St Petersburg, Russia

02 Soltag
Copenhagen, Denmark

03 Átika
Bilbao, Spain

04 VELUXlab
Milan, Italy

05 VELUX House, COP15
La Rochelle, France

06 Home for Life
Aarhus, Denmark

07 Green Lighthouse
Copenhagen, Denmark

08 Sunlighthouse
Vienna, Austria

09 LichtAktiv Haus
Hamburg, Germany

10 Maison Air et Lumiére
Paris, France

11 CarbonLight Homes
Kettering, UK

12 Osram Culture Centre
Copenhagen, Denmark

13 Guldberg School
Copenhagen, Denmark

14 Albertslund Solar Prism
Albertslund, Denmark

15 Russian Active House
Moscow, Russia

16 Solhuset
Høersholm, Denmark

17 ISOBO Aktiv
Stavanger, Norway

18 Future Active House
Trondheim, Norway

19 Smith Residence
St. Louis, USA

20 De Poorters
Montfoort, the Netherlands

21 Healthy Home townhouses
Stjoerdal, Norway

22 Great Gulf Active House
Toronto, Canada

23 Langebjerg School
Fredensborg, Denmark

24 Green Solutions House
Røenne, Denmark

25 Active House
Rome, Italy

26 RenowActive House
Brussels, Belgium
BUILD / RESPONSIBILITY

Sustainable Living in Buildings

**Planet**
Sustainable Living in Buildings is our commitment to people and planet.

**Buildings**
We engage with key stakeholders

**Products**
...and deliver products and solutions

**People**
...made to optimise human health and well-being and minimise environmental impact.

Healthy Home
RENOVATION IS KEY TO ACHIEVE THE PARIS AGREEMENT

40% of the total energy consumption in Europe is used in buildings.

36% of Europe’s total CO₂ emissions are emitted by homes and buildings.

9/10 existing buildings in Europe will still be in use in 2050.
3 out of 4 European buildings are not energy efficient

And current renovation rate is only 1-2% across Europe
The Healthy Homes Barometer 2017 reminds us that buildings are intended to create a healthy home for citizens. But it is alarming to read that one out of six Europeans reports living in an unhealthy building.

Maroš Šefčovič, Vice-President, Energy Union European Commission
of our time is spent indoor
EPBD 2018: HEALTH MUST BE CONSIDERED

- **Opportunity to integrate Indoor Environmental Quality (IEQ) and energy performance**

- **Amended Energy Performance of Buildings Directive (EPBD, 2018/844)** mentions that energy performance requirements defined by governments in all EU countries should optimise health, indoor air quality and comfort levels.

**Article 13 – health guidelines from WHO:**
The 2009 WHO guidelines provide that, concerning indoor air quality, better performing buildings provide *higher comfort levels and wellbeing* for their occupants and *improve health.*

**Article 14 – the upgrades of the existing buildings:**
Member States should support energy performance upgrades of existing buildings that contribute to *achieving a healthy indoor environment*...

**Article 15 – measures to improve energy performance of a building:**
It is important to ensure that measures to improve the energy performance of buildings do not focus only on the building envelope, but include all relevant elements and technical systems in a building, such as passive elements that participate to passive techniques aiming to reduce the energy needs for heating or cooling, the energy use for lighting, *ventilation* and hence improve *thermal and visual comfort.*

**Article 19 – the national renovation strategies focusing on all elements off a building envelope:**
For new buildings and buildings undergoing major renovations, Member States should encourage high-efficiency alternative systems, if technically, functionally and economically feasible, while also *addressing healthy indoor climate conditions* as well as fire and seismic safety, in accordance with domestic safety regulations.
EXPLORATORY FACTS

- Our productivity at work can rise by up to 15% if the indoor environment has adequate **daylight, temperature** and **air quality**.*

- Also learning abilities at schools are effected by indoor climate. It is estimated that learning abilities for school children can increase up to 15% in good indoor climate.

- As societies, we should include healthy buildings in policy-making.

*DAYLIGHT, ENERGY AND INDOOR CLIMATE BASIC BOOK (2014).
EXPLORATORY FACTS

- Around 80 millions of Europeans currently live in damp or mouldy dwellings, and this poses a major challenge for the health, economy and well-being of society*.

- Unhealthy buildings contribute to these problems. Mould and damp dwellings nearly double the risk of developing asthma and allergy.

LIVING IN DAMP AND MOULDY HOMES INCREASES THE RISK OF ASTHMA BY 40%

**EUROSTAT, 2009-2013.
Renovating to save energy is important. But so is renovating to improve well-being at home and good health*.

It is therefore a key that indoor comfort requirements are emphasized in the implementation of the amended EPBD and in LTRS to stimulate homeowners’ private investments in energy renovation.

*HEALTHY HOMES BAROMETER 2016
ACTION IS NEEDED

- **Energy efficiency & Healthy buildings** To integrate wider benefits such as health, comfort, wellbeing into the design of national law.

- **Revise building codes**
  Should ensure adequate levels of daylight, acoustics, ventilation, thermal comfort and indoor air quality.

- **Subsidies for renovation** should include Indoor comfort parameters as well as energy savings to promote projects that also aim to improve health and wellbeing.
SOME CONCRETE SUGGESTIONS...

WHAT?

- To ensure **good daylight provision across the space**
  - to enable people to perform visual tasks efficiently and accurately

- To ensure **good indoor air quality**

- ... and much more

HOW?

- Transposition of **new daylight standard EN 17037** as a common methodology for the evaluation of daylighting conditions in buildings throughout Europe
  - Revision of regulation **Efficient use of Energy**
  - Better requirements for daylight conditions

- The **benefits of natural ventilation and natural ventilative cooling** should be included in EU regulation as in national legislation and compliance tools.
  - Revision of regulation **Efficient use of Energy**
KEY NOTE

We do not build to save energy, no matter how noble and important that also is.

We build to shelter, and provide good conditions to live, study, work, enjoy and heal.

Pawel Wargocki
Technical University of Denmark
Views from the Business Sector

Vojko Golmajer
General Manager
VELUX

Darko Bevk
Commercial Director
Knauf Insulation
EuroACE Workshop
Slovenia – Energy efficiency & renovations of buildings

Škofja Loka, 08/05 2019

Darko Bevk, Knauf Insulation
Slovenia – Economic Situation and Market Expectations

GENERAL ECONOMIC INDICATORS

GDP forecast for 2019: +3.4%
Industrial production index 2018 vs 2017: +4.6%
Industrial production index YTD: +5.2%
Manufacturing confidence indicator y-o-y: -8.0%

Building construction NEW / RENO
Slovenia 2000-2018 & FC 2019

Population: 2,076,595
Gross earnings: 1,729.15 €
Unemployment: 4.4%
GDP growth: 4.5%
Inflation: 1.2%
Construction: 19.9%
CONSTRUCTION INDICATORS
Value of construction works y-o-y: +18.7%

In April 2019 the construction confidence indicator was lower at the monthly level by 3 p.p. and compared to April 2018 by 13 p.p. It remained above the long-term average (by 26 p.p.).

Forecasts

NEW
- EECFA trend:
  - RES: +6.6%
  - NON RES: +11.3%
- Building permits (m²) 2018 vs 2017
  - RES: +18.0%
  - NON RES: -4.0%
- Building permits (m²) 2019 vs 2018 YTD
  - RES: +25.9%
  - NON RES: -16.3%

RENO
- EECFA trend:
  - RES: +7.5%
  - NON RES: +5.6%
Slovenia – Building Stock Potentials and rate of renovations

80 mio m² – Residential building stock

36 mio m² – Non-residential building stock

65-70% of building stock needs to be renovated

2.5% - yearly rate of renovations for Single Family Houses

3.6% - yearly rate of renovations for Multi apartment houses

3.0% - yearly rate of renovations for Public buildings (Central government)
Slovenia – Current Subsidy programs for renovations

ECO FUND Slovenia (Eko sklad)

Eco Fund Tenders: Renovation co-financing tender, constant, long term

- **Source:** Big energy distributors on the basis of EED (36.5 Mio EUR)
  Climate change fund (47.5 Mio EUR)

- **Amount in €:** Loans - 50 Mio
  Subsidies – 83 Mio (out of this 21.5 Mio allocated for sustainable mobility)

- **To whom:**
  - Single family houses
  - Multi family houses
  - Public buildings - New demonstration projects
  - Private non residential buildings

- **How:** Co-financing of EE measures (subsidies: 20 – 50%)

- **Measures:** All EE Measures (EE of envelope, heating, solar…)

Slovenia – Current Subsidy programs for renovations

EC Cohesion Fund

Cohesion Fund – Financial Perspective 2014 – 2020

- Source: EU Money from financial perspective 2014 – 2020

- To whom:
  - Public Buildings

- How:
  - Private-public partnership (ESCO Model – up to 40% co-financed from cohesion funds)
  - Standard public procurement

- What:
  - All measures

- Expected Results:
  - The renovation of 3% of public buildings owned or occupied by central government each year
  - The renovation of 1.8 million m² of the floor area of buildings in the wider public sector between 2014 and 2023
  - Improvement in the ratio between public funds invested and investment incentives in the public sector to 1:3
## Positive facts
- Creation of construction and renovation culture
- Constant availability of subsidies (Eko Fund)
- Creation of general EnEf awareness

## Issues
- Balanced distribution of funds for specific EnEf measurement (envelope first)
- Balanced level / share of incentives for specific measurements (20-50%)
- ESCO renovations: limited number of capable companies
- ESCO renovations: main focus profitability of ESCO companies
- Pilot public projects – mainly wooden based construction as the only acceptable sustainable approach
Thank you
Q&A Session and Open Discussion
### Session 2

**Energy Efficient Buildings in South-East Europe**

#### National Long-Term Renovation Strategies: Planning Ahead, Making Impact

<table>
<thead>
<tr>
<th>Topic</th>
<th>Speaker</th>
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<tr>
<td>Involving stakeholders in Long-Term Renovation Strategies (Croatia)</td>
<td>Ms. Diana HORVAT, Ministry of Construction and Physical Planning, Croatia</td>
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<tr>
<td>Alleviating energy poverty thanks to Building Renovation (Romania)</td>
<td>Mr. Mihai MOIA, Executive Director, ROENEF</td>
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<tr>
<td>Moving towards smart and technology-equipped buildings (Slovenia)</td>
<td>Mr. Damijan ČIŽIČ, Branch Manager, Signify Slovenia</td>
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<td>Mr. Andrej KASTELIC, Danfoss</td>
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<td>Q&amp;A + Open Discussion</td>
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**Implementation Workshop in South East Europe**

8th May 2019

**With support from:**

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**Sponsored by:**

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Involving Stakeholders
In long-term renovation strategies (Croatia)

Diana Horvat
Ministry of Construction and Physical Planning
Croatia
Involving stakeholders in implementation of the Long-Term Renovation Strategy in Croatia

STAKEHOLDER DIALOGUES
First Croatian Stakeholder dialogue for the implementation of nZEB standard and the Long-term renovation strategy was held on 27 September 2018 as a side event of „Energy Efficiency in Buildings - for a Better Tomorrow“ conference under MCPP’s initiative.

Stakeholder dialogue is set up as broad-based expert dialogue, an all-round process involving relevant authorities, academic community, architecture, engineering and skilled crafts sector, construction industry.

All stakeholders who will join the dialogue will sign The Charter on co-operation towards decarbonised building stock by 2050.
A strong desire for more effective communication and cooperation between the state administration and the real sector

Continuous cooperation is underway in the preparation of the Long-term renovation strategy for the Reconstruction of the National Fund of Buildings and the transition to the standard of building nearly zero energy buildings (nZEB)

The signatories promote decarbonisation of buildings in their further activities

So far, **32 signatories of the Charter!**
✓ The Charter on co-operation towards decarbonised building stock by 2050 was signed by first group of partners:
  o Ministry of Construction and Physical Planning
  o Environmental Protection and Energy Efficiency Fund
  o Croatian Association of Heat-Facade Systems Manufacturers
  o Croatia Green Building Council
  o nZEB Cluster
THE FIRST STAKEHOLDER DIALOGUE

Workshop with the topics:

✓ Decarbonisation of building stock by 2050
✓ Smart Finance for Smart Buildings
✓ Electromobility
✓ One Stop Shop
✓ Automation and control systems in buildings
✓ Addressing fire safety and risks related to earthquakes (intense seismic activity)
THE SECOND STAKEHOLDER DIALOGUE

✓ Workshop - The aim was to select criteria for determining vulnerable groups of citizens/Households affected by energy poverty
THE SECOND STAKEHOLDER DIALOGUE

SELECTED CRITERIA ON THE WORKSHOP:

✓ Low household income / income per household
✓ Energy class of a building (QHnd i.e. heating needs)
✓ Guaranteed minimum fee
✓ Personal disability benefits
✓ Real consumption of particular energy product proven by invoices (in m2)
✓ Energy basket share in household’s income (energy for heat, warm water, lighting and electricity included)
✓ Total household energy costs in comparison to total household income
✓ Retired people with retirement less than ...
✓ Single-parent families
✓ Recipients of a child benefit
✓ Total heat costs in comparison to total household income
✓ Index rate of territory development
THE SECOND STAKEHOLDER DIALOGUE
THE THIRD STAKEHOLDER DIALOGUE

✓ The focus was placed on the application of modern solutions and rules in the field of **protection against fire and seismic activity risks during energy building renovation**
✓ Presentations and panel discussion
THE THIRD STAKEHOLDER DIALOGUE
Croatia has given great attention to the section Other benefits of the implementation of the Long-term renovation strategy for Mobilizing Investment in Renovation of the National Building Stocks where is considered:

- the real estate value and esthetic external effects
- reducing health risks
- poverty and energy supply
LONG-TERM RENOVATION STRATEGY

Direct effects

- Stabilization and increase of economic activity
- Increased real estate value
- Reduction of energy poverty
- Improved human health
- Employment
- Increased budget revenue

Direct effects lead to:
- Increased real estate value
- Stabilization and increase of economic activity
- Improved human health
- Employment
- Increased budget revenue
- Reduction of energy poverty
LONG–TERM RENOVATION STRATEGY

- Reducing poverty due to employment
- Reduced gray economy
- Complex connections
- Reducing costs for better human health
- Wealth impacts: high value for real estate growth
- Increasing fiscal stability
LONG–TERM RENOVATION STRATEGY

- Tourism development
- Quality of life
- Energy security

Indirect effects
LONG-TERM RENOVATION STRATEGY

Ministry has recognized the importance of communication and therefore initiated Stakeholder Dialogues.
Thank you for your attention!

Diana Horvat, M.Arch.

Head of Department
Directorate for construction, real estate assessment and energy efficiency in the building sector
Ministry of Construction and Physical Planning
Zagreb, Croatia
Web: www.mgipu.hr
Email: diana.horvat@mgipu.hr
Alleviating Energy Poverty
Thanks to building renovation (Romania)

Mihai Moia
Executive Director
ROENEF
ENERGY EFFICIENT BUILDING RENOVATION IN ROMANIA AND THE CHALLENGE OF ALLEVIATING ENERGY POVERTY

Energy Efficient Building Renovation in South East Europe,
Knauf Insulation Experience Centre, Škofja Loka, Slovenia,
8th May 2019
Principles

Technological Neutrality

Using proved arguments in the communication activity

Full transparency in cooperation with public authorities

ROENEF Objectives

Promote a favourable regulatory and economic framework for energy efficient construction and renovation of buildings in Romania

Create a predictable and stable business environment

BOARD MEMBERS

ALUKONIGSTAHL  European Climate Foundation  ROCKWOOL  Signify

ENGINEERING TOMORROW  Danfoss  KNAUF INSULATION  SAINT-GOBAIN  VELUX
National Renovation Strategies

Triple goal

- increasing the rate and depth of renovation
- achieving energy savings targets
- improving the living conditions of millions of vulnerable citizens

Member States to establish specific measures and financing instruments in their renovation strategies to decrease energy demand and contribute to the alleviation of energy poverty

Reducing Energy Poverty with National Renovation Strategies

National programmes renovating low income and energy poor homes can be highly cost-effective considering the wider health, societal and economic benefits of renovation

Deep renovation has far-reaching benefits for society and public spending, since increasing indoor comfort and air quality avoids illnesses and premature deaths
## Population unable to keep home adequately warm by poverty status - % of population

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Source: EUROSTAT, 2019
Current status: Romanian housing stock

- 8.1 million homes in Romania, distributed in 5.1 million buildings, SFH representing 61%.
- In the urban area, 72% of the dwellings are in city blocks, while in the rural area 94.5% of the dwellings are single-family houses.
- 37% of the homes in Romania are concentrated in just 2% of the residential buildings.
- The total living area has increased in Romania from 270 million m² in 2000 to 425 million m² in 2016.
- Most of the residential buildings were built between 1961 and 1980, in the absence of efficiency standards for the building envelope.
- About 53% of the residential buildings were built before 1970.
- In Romania, one out of seven families face serious housing problems, most often regarding poor quality of walls, floors, and window frames.

Source: National Institute of Statistics, 2018
Achievements

Outcomes:

- 3 new sources of funding identified along with concrete project plans developed for financing.
- Calafat and Petrosani municipalities have approved action plans to address energy efficiency and fuel poverty.
- Policy analysis, policy formulation and draft amendments in order to address EE needs in low-income communities.
- 8 inter-organizational working group meetings.

Outcome 1: Romanian energy policy integrates fuel poverty issues and addresses EE needs in low income communities.
Achievements

826 building engineers, architects and energy auditors trained and certified for the application of EE measures

46% households interviewed plan to implement EE measures due to the project

2 building materials and construction companies which are producing and selling locally produced, sustainable EE materials

17 additional counties have expressed interest in replicating project activities due to the information campaign activities

2 additional countries (Armenia and Moldova) expressed interest in replicating project activities

Outcome 2: Supply of trained architects, building engineers, builders and auditors with EE experience expanded; municipalities in low-income regions have a better understanding of EE issues
Achievements

Outcome 3: Energy efficient buildings reconstructed with reduced fuel costs or using improved sustainable energy technologies in low-income communities

Best practices:
UNDP/GEF Project: Improving Energy Efficiency in Low Income Housing and Communities in Romania (2011-2016)

- 1606 residential buildings thermal rehabilitated through the NTRP (2011-2016)
- 21 energy efficient central heating units have been installed in public buildings
- Technical documentation for thermal rehabilitation of 50 types of blocks delivered available at National level
- 71 social buildings have benefitted from the project's financial support in 6 municipalities
Best practices:
UNDP/GEF Project: Improving Energy Efficiency in Low Income Housing and Communities in Romania (2011-2016)

Achievements

- Development of a methodology for fuel poverty assessment
- Report on the costs and benefits of implementing EE measures to address fuel poverty
- Creation, operation and maintenance of the National Buildings Registry

Outcome 4: Data and information available for decisionmakers for designing programmes to address fuel poverty
## Project Period (2011-2016) vs 10 year post-project (2016-2025)

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<tr>
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<th>Project Period (2011-2016)</th>
<th>10 year post-project (2016-2025)</th>
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<tbody>
<tr>
<td></td>
<td>MWh savings per year</td>
<td>Lifetime direct emission reductions (tonnes of CO(_2)/yr)</td>
</tr>
<tr>
<td><strong>Outcome 1: Legislative amendments:</strong> expansion of the scope of energy efficient measures that would be financed by the National Thermal Rehabilitation Program, to empower municipalities on the selection of buildings for rehabilitation and EE measures to implement.</td>
<td>74,994</td>
<td>683,000</td>
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<tr>
<td><strong>Activity 3.1.1: Technical Documentation for 50 building types</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Activity 3.1.2: Boiler Replacements in 21 public buildings</strong></td>
<td>427</td>
<td>11,440</td>
</tr>
<tr>
<td><strong>Activity 3.2.1: Insulation Programme for 43 public buildings</strong></td>
<td>6,243</td>
<td>48,700</td>
</tr>
<tr>
<td><strong>Activity 3.3.1: Renovation of windows and doors of 7 Public Buildings</strong></td>
<td>645</td>
<td>4,000</td>
</tr>
<tr>
<td><strong>Outcome 4: National Buildings Registry database</strong></td>
<td>0</td>
<td>0</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>82,309</td>
<td>747,140</td>
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</table>
Energy savings of the thermal insulated buildings in Dolj and Hunedoara counties (MWh/year)

- Calafat; 574
- Calan; 38
- Petrița; 106
- Craiova Metropolitan Area; 1314
- Petrosani; 1758
- Vulcan; 1459

Dolj county

Hunedoara county
Main obstacles for carrying out building renovation programs:

<table>
<thead>
<tr>
<th>Legislative</th>
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<tbody>
<tr>
<td>➢ The existence of multiple authorities with responsibilities in the field and without a clear regulation framework;</td>
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<tr>
<td>➢ Lack of coordination of local development strategies with national strategies (sustainable development, renovation strategy, etc);</td>
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<tr>
<td>➢ Lack of regulatory framework for ESCOs and Energy Performance Contracts;</td>
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<table>
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<tr>
<th>Economic</th>
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<tr>
<td>➢ Insufficient public funds and private investments in building renovation – a high level of dependency on public grants;</td>
</tr>
<tr>
<td>➢ The execution of low-quality renovation works;</td>
</tr>
<tr>
<td>➢ Low demand of innovative technologies for building renovation;</td>
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<tr>
<td>➢ Improper assessment of the energy savings: extended benefits such as health, security and quality of air should be assessed over the lifetime of the investment;</td>
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<table>
<thead>
<tr>
<th>Lack of skills and training</th>
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<tr>
<td>➢ Shortage of skilled workers using energy efficiency technologies and systems, as well as RES integration;</td>
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<tr>
<td>➢ Lack of knowledge about energy efficiency measures and technologies at the level of the local administration;</td>
</tr>
<tr>
<td>➢ Lack of knowledge concerning the procurement rules for buildings renovation;</td>
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</tbody>
</table>
Proposed priority actions:

**Actions**
- **Focus on deep renovation** and introduction of quality standards into the criteria for funding EE in buildings measures;
- Operating National Buildings Registry at national level and **focusing on worst performing buildings**;
- establishing a **support scheme for the renovation of SFH**;
- developing the regulatory framework for ESCOs and the energy performance contracts;

**Context**
- Mainly shallow renovation projects;
- Launching procurement process using "lowest price criteria";
- Lack of knowledge concerning the use of innovative technologies and solutions;
- Lack of data concerning the actual energy performance of buildings;
- Lack of responsibilities at local level to report energy performance of buildings in NBR;
- Lack of real data analysis for the decision makers;
- Out of the 8,1 million homes in Romania, SFH represent 61%;
- Casa Verde Plus Programme is not active and requires a revision of the Guide for Applicants;
- High potential in stimulating investments for increasing EE mainly in public buildings and public lighting;
- The statistic treatment of the EnPC and impact on public debt and public deficit;

**Benefits**
- Increase of comfort and air quality leading to preventing diseases and premature death;
- Increasing employment in the construction sector;
- Increasing efficiency of public spending;
- Increase of the energy efficiency of the building and energy savings;
- Energy managers reporting energy consumption in the NBR;
- Data and information available for decisionmakers in the process of elaborating new programmes and strategies;
- Reducing energy poverty;
- Low energy bills;
- Using EnPC guarantees the energy savings;
- Mobilizing private investment for increasing energy efficiency in buildings;
- Implementing deep renovation;
- Implementing modern and efficient technical solutions that contribute to the increase of energy efficiency;
Thank you!

Mihai MOIA
Executive Director

The Association for Promoting Energy Efficiency in Buildings – ROENEF

Email: mihai.moia@roenef.ro
www.roenef.ro
Moving Towards
Smart and Technology-Equipped Buildings (Slovenia)

Damian Cizic
Branch Manager
Signify Slovenia

Andrej Kastelic
Product Manager
Danfoss Trata, Slovenia
Moving towards smart and technology-equipped buildings
Building intelligence with light

Damijan Čižič, Škofja Loka 8th May 2019
Challenge

We all spend over 90% of our time inside buildings and 40% of this time in office.

This sector consumes around 40% of all primary energy produced in the EU.

As a result, emits about 36% of energy-related CO₂ into the atmosphere.

Part of the answer can be smart lighting.
Solutions perceived as being part of a smart building

Q1. In general, what kind of solutions do you perceive to be part of a smart building?

<table>
<thead>
<tr>
<th>Solution</th>
<th>UK (%)</th>
<th>DE (%)</th>
<th>FR (%)</th>
<th>PL (%)</th>
<th>NL (%)</th>
<th>BE (%)</th>
<th>ES (%)</th>
<th>Average number of products mentioned</th>
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<td>Lighting</td>
<td>85%</td>
<td>79%</td>
<td>45%</td>
<td>74%</td>
<td>47%</td>
<td>74%</td>
<td>73%</td>
<td>8</td>
</tr>
<tr>
<td>Central heating/cooling control/ smart thermostats</td>
<td>77%</td>
<td>75%</td>
<td>42%</td>
<td>76%</td>
<td>39%</td>
<td>61%</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Security access control / entry solutions (doors, lock, etc.)</td>
<td>66%</td>
<td>68%</td>
<td>32%</td>
<td>68%</td>
<td>34%</td>
<td>64%</td>
<td>63%</td>
<td></td>
</tr>
<tr>
<td>Video surveillance / cameras</td>
<td>68%</td>
<td>54%</td>
<td>36%</td>
<td>68%</td>
<td>47%</td>
<td>57%</td>
<td>66%</td>
<td></td>
</tr>
<tr>
<td>Movement/ Presence detectors</td>
<td>64%</td>
<td>56%</td>
<td>13%</td>
<td>62%</td>
<td>30%</td>
<td>67%</td>
<td>54%</td>
<td></td>
</tr>
<tr>
<td>Zoned heating/cooling</td>
<td>65%</td>
<td>30%</td>
<td>37%</td>
<td>66%</td>
<td>25%</td>
<td>52%</td>
<td>58%</td>
<td></td>
</tr>
<tr>
<td>CO2, smoke, humidity sensors</td>
<td>43%</td>
<td>54%</td>
<td>2%</td>
<td>69%</td>
<td>15%</td>
<td>50%</td>
<td>56%</td>
<td></td>
</tr>
<tr>
<td>Sun shading and sun blinds</td>
<td>38%</td>
<td>40%</td>
<td>1%</td>
<td>60%</td>
<td>21%</td>
<td>48%</td>
<td>58%</td>
<td></td>
</tr>
<tr>
<td>Solar panels</td>
<td>44%</td>
<td>33%</td>
<td>4%</td>
<td>62%</td>
<td>26%</td>
<td>55%</td>
<td>48%</td>
<td></td>
</tr>
<tr>
<td>Heat pumps</td>
<td>45%</td>
<td>33%</td>
<td>8%</td>
<td>56%</td>
<td>20%</td>
<td>53%</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td>Electricity storage</td>
<td>39%</td>
<td>28%</td>
<td>6%</td>
<td>49%</td>
<td>16%</td>
<td>56%</td>
<td>41%</td>
<td></td>
</tr>
<tr>
<td>Boilers</td>
<td>56%</td>
<td>11%</td>
<td>7%</td>
<td>50%</td>
<td>13%</td>
<td>38%</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td>Entertainment (Music/Video/Multroom)</td>
<td>50%</td>
<td>10%</td>
<td>1%</td>
<td>54%</td>
<td>16%</td>
<td>36%</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td>Streaming of music &amp; video</td>
<td>52%</td>
<td>16%</td>
<td>2%</td>
<td>49%</td>
<td>13%</td>
<td>36%</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td>Demand-response regulation</td>
<td>29%</td>
<td>6%</td>
<td>2%</td>
<td>52%</td>
<td>9%</td>
<td>31%</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>6%</td>
<td>8%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Don't know</td>
<td>3%</td>
<td>1%</td>
<td>0%</td>
<td>3%</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>200</td>
<td>201</td>
<td>200</td>
<td>200</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

Source: Installation Monitor European Electrical Installation Monitor – Q4 2017 (Theme: Smart buildings), March 2018
The evolution of the lighting industry

**Conventional lighting**
Analog lighting with on and off options

**LED lighting**
Greater efficiency and quality of illumination

**Lighting systems and services**
Greater control and performance and the start of lighting-based business models

**The Internet of Things**
The era of integrations and connected smart devices that enable data collection and create new data enabled services
Delivering value beyond illumination
We are leading the ongoing development of connected lighting systems and services. By leveraging the Internet of Things, we are transforming buildings, urban places, and homes. We increase energy efficiency and manage working environments in a more environmentally friendly way.

We make cities safer and more responsive. We offer rich lighting experiences that make people feel safe, comfortable, focused, energized, and entertained. That’s how we take light beyond illumination, and help improve the way the world works and people live.
A connected lighting grid is a perfect foundation to make the world a better place to live. In cities, for instance, connected LED lighting can become an integral and future-proof smart city building block. In addition to energy efficiency, cost savings, and reduced carbon emissions, connected LED lighting can:

Connected lighting solutions for every application area
• Enhance safety
• Create more productive offices and workplaces
• Make public places and cities more enjoyable
• Lighting can be a foundation stone for smart/IoT applications
Can you imagine lighting ....

Guiding shoppers in retail stores right to the items they are looking for?
Facilitating a free flow of spectators to concession stands in a stadium to increase crowd safety and maximize refreshment sales?
Tracking and locating high-value machinery and equipment in hospitals?
Optimizing space usage in offices and reducing real estate costs?
Understanding the workplace evolution

- **Fixed desks**
  - Task-oriented
  - Strict hierarchies
  - No worker empowerment

- **Computer technology introduced**
  - Democratization of workplace
  - Collaborative working
    - Portable communications
    - Flextime
    - Hot desking

- **Early 20th century**
  - Open plan offices
  - Increased communications
  - Early electronics

- **Mid 20th century**
  - More efficient working methods
  - Task-oriented autonomous working

- **Late 20th century**
  - Energy-efficient workplaces
  - Focus on productivity and performance
  - Employee empowerment
    - Digital connectivity and collaboration

- **Early 21st century**
  - Promotion of health and wellbeing
  - Environmental awareness
Recognized people-centric innovations in the new Skanska office

A recognized and certified human centric approach, which enabled the Spark office to become the first WELL certified building in the CEE region.

The lighting is fully integrated with the Building Management System (BMS) of the building providing new opportunities to enhance comfort as well as increase operational efficiency.

High level of employee comfort achieved through the option of customization of light settings.

LED technology reduces maintenance costs and electricity consumption further increasing the sustainability credentials of the building.
Controls make the difference

The combination of:

• LED technology
• task turning
• occupancy dimming
• and daylight dimming

can lead up to 80% reduction in energy costs compared to the linear fluorescent lamps previously in place
1: Optimize operations

- Comfortable, compliant office lighting
- Flexibility to fit different building and ceiling types
- Upgradeable* with IoT sensors
- Reconfigurable and upgradeable* lighting system to meet occupants’ changing needs
- Open interfaces to ensure compatibility with other Interact offers and non-Philips luminaire brands

Tenants and building owners want comfortable, yet efficient, lighting which complies with regulations. They know that luminaire choice can have a significant impact on their operations.

These days, offices frequently make minor changes over time, so implementing them needs to be easy. They also need to be prepared for the future, anticipating changes in staff, new ways of working, growth technology innovations.
2: Enhance performance

- Different luminaire form factors to suit different spaces
- A luminaire range that offers adaptable light intensity, warmth and distribution to suit different activities
- Light scenes to allow personal recipes
- Smart device apps to help employees find the space that best supports their activity
- Applications that offers insight into space usage
- Predictive analytics* to optimize space usage in the office

Identity
Comfort and wellbeing

Activity-based working
Space efficiency
Flexible capacity
Return on investment
Sustainability

The nature of the workspace is changing. Employers are adapting to suit the tasks and activities of a more mobile and diverse workforce.

They want the workspace to be more effective and perform better, often with less available space per employee. They are looking into new technologies and ways of working to achieve this.
3: Enhanced engagement and well-being

- Well-being enhanced by light, without compromising comfort
- Natural light distribution for a healthy and inspiring working environment
- Self-learning system* to provide the right light at the right time to supports the circadian rhythm
- Integrated environmental sensors to report on climate conditions in real time
- Open API to provide data to optimize the indoor climate
- Possible integration as part of an intelligent building eco-system

Companies want to create inspiring environments that help to attract and retain talent and allow employees to identify with the organization's culture. Creating a ‘great place to work’ can partially be achieved by optimizing the indoor climate (natural light, HVAC, temperature, etc) as recognized by the WELL Standard. This supports employee comfort, well-being and happiness, which influences performance. Current lighting solutions cannot deliver the benefits of natural light. What's more, building management systems lack the data to operate optimally and create a great place to work.
Interact Office
What is it?

Interact Office is software that – when combined with LED lighting and sensors from Philips and the Interact Office connected lighting system – can transform any office into a smart and sustainable workplace, making your building more efficient and supporting improved employee performance.

Insights from data collected allow you to understand how your office is used and make the most of its space. Use different light settings that facilitate collaboration, improve concentration and energize employees.
Moving Towards
Smart and Technology-Equipped Buildings (Slovenia)

Damian Cizic
Branch Manager
Signify Slovenia

Andrej Kastelic
Product Manager
Danfoss Trata, Slovenia
Active energy and comfort management in commercial buildings

HVAC 4.0

EuroACE Event 2019

Andrej Kastelic
8.5.2019
Mega trends

URBANIZATION
ENERGY EFFICIENCY
DIGITALIZATION
Europäische Union - Umwelt- und Energieziele bis 2030:
- 40% weniger GHG
- 32% erneuerbare Energien
- +1,3%/a erneuerbare Energien in H&C
- 32,5% Energieeffizienz
- Effiziente + digitale Gebäude
- Zerstückelter Stromnetz + flexibles Markt

Unsere Vision: Klimaneutral Europa bis 2050
EPBD: Energy efficiency of buildings

1. Temperature control in the room

2. Efficient transfer of the energy from the source to the end user
   • Partial load (average working condition)
   • Hydronic balancing

3. BACS

19 Dec 2017
EPBD agreed

19 June 2018
EPBD published in EU Official Journal

By end 2018
EU Commission guidelines

2018 - 2020
Conversion of EPBD into national laws

10 March 2020
National EPBD laws apply
HVAC

- Comfort
- Passive energy management
- Investment costs
- Room control, BMS optional

HVAC 4.0

- Individual comfort (micro climate)
- Active energy management
- Overall costs
- BMS control
- Measured energy consumption
- Remote access and control
- Continuous commissioning
- Predictive maintenance
HVAC

HVAC 4.0
For smart buildings
HVAC 4.0 Applications

- AHU
- Terminal units
- Chillers
Active energy management in commercial buildings

1. AB-QM 4.0 – Pressure independent control valve
   - Pressure independent control performance
   - Full authority at any condition
   - More comfort less energy consumption

2. NovoCon S – digital smart actuator
   - BacNET and Modbus communication protocols
   - Remote functions, energy allocation
   - SW configuration tool

3. Connectivity and data
   - Plug and play BMS integration
   - Multiple field devices on BUS (I/O)
   - Energy management

4. Danfoss energy Dashboard
   - Energy allocation and energy usage per unit
1. AB-QM 4.0 – Pressure independent control valve

Before AB-QM
• Complex designing
• Complex balancing
• Pressure and flow oscillation in the system
• Unstable room temperature

Advantages of PICV
• Pressure independent control performance at any condition
• Easy selection, less commissioning, less components
• Improved comfort and less energy consumption
2. NovoCon S – Digital actuator

Before NovoCon
- Analog control signal
- No remote functions

Advantages of NovoCon
- Modbus in BACnet communication protocol
- Remote functions
- Energy allocation
- Continuous commissioning
3. Connectivity and data

Energy allocation
- Terminal unit, AHU, chiller
- BREEM points for energy efficient building
- Energy consumption comparison between units/room/floors

Active energy management
- dT control - higher COP
- Continuous commissioning
4. Danfoss energy dashboard
4. Danfoss energy dashboard
AB-QM 4.0 and NovoCon, energy efficiency through lifetime of the building
Q&A Session and Open Discussion
Lunch Break

Guided tours of experience centre will take place during lunch
### Session 3
Energy Efficient Buildings in South-East Europe

<table>
<thead>
<tr>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing the Ambition of a Highly Energy Efficient Building Stock by 2050</td>
<td></td>
</tr>
<tr>
<td>Financing at regional level and the experience of ELENA Funding</td>
<td>Ms. Ines AHMIĆ, Project Manager, KSSENA – Institute Energy Agency of Savinjska, Šaleška and Carinthia, Slovenia</td>
</tr>
<tr>
<td>Financing building renovation through Energy Performance Contracting</td>
<td>Mr. Ivan SERIC, CEO, Institute for Energy Efficiency</td>
</tr>
<tr>
<td>Practical experience of Energy Performance Contracting</td>
<td>Mr. Danijel BENČIĆ, President of the Board, Rudan, Croatia</td>
</tr>
<tr>
<td>Q&amp;A + Open Discussion</td>
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</table>
Financing at Regional Level
And the experience of ELENA funding

Ines Ahmic
Institute Energy Agency of Savinjska, Saleska and Koroska
Slovenia
EE RENOVATION OF PUBLIC BUILDINGS & THE EXPERIENCE OF EPC (Municipality of Celje - ELENA)

Ines Ahmić, Project Manager, KSSENA

8th May 2019
Škofja Loka, Slovenia
WHAT IS KSSENA?

• Expert organisation specialized in the field of energetics, with the emphasis on RES, RUE and project management

• Professional bridge between potential users (emphasis on the public sector) and suppliers of specialized energetic services/products

• Established in 2006 within the framework of Intelligent Energy Europe (IEE)

• Founders:
  Municipality of Velenje (MOV),
  Municipality of Celje (MOC),
  Municipality of Slovenj Gradec (MOSG)
  and Public utilities company (KPV)
WORKING FIELDS OF KSSENA

- Strategic Energetic Planning
- Dissemination and Education
- (Inter)National Cooperation with Partners’ Institutions
- Energy Management for Local Communities
- Project Work and National and EU Funds
- Private Sector Supporting Services
- (Inter)National Cooperation with Partners’ Institutions
Long-Term Strategy for Mobilising Investments in the ENERGY RENOVATION OF BUILDINGS:

Goals

• 2.9 million m² of Residential Building Stock to be renovated by 2020

• 9 million m² of Residential Building Stock to be renovated by 2030

• 1.8 million m² of Public Sector Building Stock to be renovated in 2014–2023 (180,000 m² of Government Sector included)
Financial Framework for Government & Public Sector:

415 million EUR

PUBLIC PART

EU cohesion

ESCO

Financial Instruments

20 mil. EUR
Government Participation;
30 mil. EUR
Building owners
(municipalities, ministries..etc).

115 million EUR
Non-Reimbursable Funds.

At least 125 million EUR
Equity.

Up to 125 mil. EUR,
Leverage = 2.5;
- 50 million EUR Non-Reimbursable;
- Up to 75 million EUR from Financial Intermediaries.
  • Financial Instrument: - Loans to Public & ESCO’s.
Tender policies:

**PUBLIC SECTOR**

**NON-GOVERNMENT PUBLIC SECTOR**
- Direct Approval
- List of priority buildings

**GOVERNMENT SECTOR**
- Project Selection through Direct Approval;
  Supported by Evaluation & Priority List.

**MUNICIPALITIES**
- Public Tender
FINANCIAL INCENTIVES FOR EE RENOVATIONS (Slovenia)

- Ministry of infrastructure
- Slovenian ECO found (EKO Sklad)
- Slovenian Investment Bank - SID bank
- EIB European Local Energy Assistance (ELENA,
CALLS AND TENDERS BY
Ministry of infrastructure

Central government projects:
14.07.2016 - 4.555.882 EUR
31.03.2017
23.02.2018 - 7.647.059 EUR
27.02.2019

Pilot projects
2016

Wider Government Sector
20.07.2016 - 9.935.294,12
31.03.2017
23.02.2018 - 14.117.647 EUR
27.02.2019

Municipalities:
01.09.2016 - 10.588.235 EUR
24.03.2017 - 17.647.059 EUR
16.02.2018 - 26.470.588 EUR

Cultural heritage:
30.11.2016 - 2.000.000 EUR
ELENA –

supporting investments in energy efficiency and sustainable transport

ELENA is a joint initiative by the EIB and the European Commission under the Horizon 2020 programme. ELENA provides grants for technical assistance focused on the implementation of energy efficiency, distributed renewable energy and urban transport programmes.

Established in 2009, the ELENA facility has awarded more than EUR 130 million of EU support triggering an estimated investment of around EUR 5 billion on the ground.
ELENA may co-finance the preparation of investment programmes in the following fields:

- energy efficiency and building integrated renewable energy
- public and private buildings (including social housing), commercial and logistic properties and sites, and street and traffic lighting to support increased energy efficiency
- integration of renewable energy sources (RES) into the built environment – e.g. solar photovoltaic (PV) on roof tops, solar thermal collectors and biomass
- investments into renovating, extending or building new district heating/cooling networks, including networks based on combined heat and power (CHP), decentralised CHP systems
- local infrastructure including smart grids, information and communication technology
- infrastructure for energy efficiency, energy-efficient urban equipment and link with transport
ELENA – overview (Project Development Services)

- Refine Feasibility studies
  - Business Plans
- Technical studies (energy audits)
- Procurement/tendering/contracting
  - Additional technical staff
  - Financial structuring
ELENA EoMO PROJECT –
Energy efficient renovation of Municipality Novo mesto, Kranj and Celje / Energy retrofit programme of public buildings in City Municipalities of Novo mesto, Kranj and Celje

191.295,42 EUR cofinancing from ELENA for Municipality of Celje

226.293,73 EUR total costs for Municipality of Celje
# ELENA EoMO PROJECT – Municipality of Celje

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Net value in EUR</th>
<th>GROSS value in EUR</th>
<th>Co - Financing - ELENA (EUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>BUILDINGS Detail energy audit and investment plan (23 buildings)</td>
<td>73,800,00</td>
<td>90,036,00</td>
<td>81,032,40</td>
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<tr>
<td>2017, 2018</td>
<td>PUBLIC LIGHTNING: Cadastre and plan of public lightning + investment documentation</td>
<td>52,984,00</td>
<td>64,640,48</td>
<td>47,685,60</td>
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</tbody>
</table>
# ELENA EoMO PROJECT – Municipality of Celje

<table>
<thead>
<tr>
<th></th>
<th>Net value in EUR</th>
<th>GROSS value in EUR</th>
<th>Co - Financing - ELENA (EUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment documentation</td>
<td>126.784,00</td>
<td>226.293,73</td>
<td>191.295,42</td>
</tr>
<tr>
<td>Administrative and legal costs</td>
<td>58.702,66</td>
<td>71.617,25</td>
<td>62.577,42</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>185.486,66</strong></td>
<td><strong>226.293,73</strong></td>
<td><strong>191.295,42</strong></td>
</tr>
</tbody>
</table>
Highlights of Energy renovation project of buildings:

23 Extended energy audits
2 sets of buildings (after economic and technical review)

• The first set of public buildings that will be deeply renovated with investment and organizational measures. The project will be implemented through EPC and co-financed by the Cohesion fund (40% EU co-financing).

• The second set of public buildings that will also have deep renovation and project will be implemented through public partner and co-financed by the Cohesion fund (40% EU co-financing).
First set of Buildings:

<table>
<thead>
<tr>
<th>FIRST SET OF BUILDINGS</th>
<th>Area [m^2]</th>
<th>Energy source</th>
<th>Energy use intensity [\text{MW}_h]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Before measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HE</td>
</tr>
<tr>
<td>1 Coljski dom</td>
<td>4,062</td>
<td>Natural gas</td>
<td>379.51</td>
</tr>
<tr>
<td>2 Osnovna šola Hudinja</td>
<td>4,241</td>
<td>Natural gas</td>
<td>505.28</td>
</tr>
<tr>
<td>3 Vrtec Žarja, enota Živ Žav</td>
<td>998</td>
<td>District heating</td>
<td>191.22</td>
</tr>
<tr>
<td>4 Vrtec Žarja, enota Iskrica</td>
<td>888</td>
<td>District heating</td>
<td>124.79</td>
</tr>
<tr>
<td>5 Vrtec Anico Černejevo, enota Mavrica</td>
<td>1,092</td>
<td>District heating</td>
<td>182.48</td>
</tr>
<tr>
<td>6 IV. osnovna šola Celje</td>
<td>5,082</td>
<td>Natural gas</td>
<td>426.63</td>
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<tr>
<td>7 Vrtec Tončke Čečeve, enota Center</td>
<td>932</td>
<td>Natural gas</td>
<td>197.23</td>
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<tr>
<td>8 I. osnovna šola Celje, dislocirana enota</td>
<td>1,878</td>
<td>Natural gas</td>
<td>227.45</td>
</tr>
<tr>
<td>9 Osnovna šola Glazija</td>
<td>4,702</td>
<td>Natural gas</td>
<td>618.60</td>
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<tr>
<td>10 II. osnovna šola Celje</td>
<td>4,087</td>
<td>Extra-light heating oil</td>
<td>295.23</td>
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</table>
Summary energy and financial data for the first set of buildings:

<table>
<thead>
<tr>
<th>Investment id:</th>
<th>Deep energy renovation of public buildings owned by the Municipality of Celje</th>
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</thead>
<tbody>
<tr>
<td>Investment costs - constant prices (in EUR)</td>
<td>2,843,581</td>
</tr>
<tr>
<td>Investment costs - current prices (in EUR)</td>
<td>2,880,548</td>
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<tr>
<td>EnPC period (years)</td>
<td>15</td>
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<tr>
<td>EU co-financing (in EUR)</td>
<td>932,322</td>
</tr>
<tr>
<td>Public co-financing (in EUR)</td>
<td>209,772</td>
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<tr>
<td>VAT</td>
<td>512,777</td>
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<tr>
<td>Private co-financing (in EUR)</td>
<td>1,188,710</td>
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<tr>
<td>Reduction of CO2 emissions (in kg/a)</td>
<td>386,235</td>
</tr>
<tr>
<td>Estimated heat savings per year (in kWh and %)</td>
<td>1,434,726, 21.29 %</td>
</tr>
<tr>
<td>Estimated electricity savings per year (in kWh and %)</td>
<td>128,625, 3.74%</td>
</tr>
<tr>
<td>Estimated heat savings per year (in EUR)</td>
<td>105,710</td>
</tr>
<tr>
<td>Estimated electricity savings per year (in EUR)</td>
<td>22,506</td>
</tr>
<tr>
<td>Participation of the public partner in savings (in %)</td>
<td>1%</td>
</tr>
<tr>
<td>Return on Investment (ROI) (in years)</td>
<td>&gt;35</td>
</tr>
<tr>
<td>eIRR/C (in %)</td>
<td>0.85%</td>
</tr>
<tr>
<td>Return on investment (ROI) of private capital (in years)</td>
<td>15</td>
</tr>
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ELENA EoMO PROJECT – Municipality of Celje

Second set of buildings (1/2):

<table>
<thead>
<tr>
<th>SECOND SET OF BUILDINGS</th>
<th>Area $[m^2]$</th>
<th>Energy source</th>
<th>Energy use intensity $[MW\cdot h]$</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Before measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HE</td>
</tr>
<tr>
<td>1 Vrteč Tonšček</td>
<td>1,190</td>
<td>Natural gas</td>
<td>70.66</td>
</tr>
<tr>
<td>Geseve, enota Vila Gaberje</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 PP Kocenova ulica 4 - 6</td>
<td>1,523</td>
<td>Natural gas and extra-light heating oil</td>
<td>53.63</td>
</tr>
<tr>
<td>3 Vrteč Zarja, enota Ringa raja</td>
<td>608</td>
<td>Natural gas</td>
<td>28.07</td>
</tr>
<tr>
<td>4 PP Kidričeva ulica 3</td>
<td>1,572</td>
<td>Natural gas</td>
<td>33.50</td>
</tr>
<tr>
<td>5 PP Matiborska cesta 7</td>
<td>7,073</td>
<td>Natural gas</td>
<td>256.69</td>
</tr>
<tr>
<td>6 Glasbeno šola Celje</td>
<td>2,232</td>
<td>Natural gas</td>
<td>152.90</td>
</tr>
<tr>
<td>7 Slovensko ljudsko gledališče Celje</td>
<td>3,556</td>
<td>Natural gas</td>
<td>118.26</td>
</tr>
<tr>
<td>8 Zavod CMLC</td>
<td>2,081</td>
<td>Natural gas</td>
<td>112.79</td>
</tr>
</tbody>
</table>


**ELENA EoMO PROJECT – Municipality of Celje**

Second set of buildings (2/2):

<table>
<thead>
<tr>
<th>SECOND SET OF BUILDINGS</th>
<th>Area [m²]</th>
<th>Energy source</th>
<th>Energy use intensity [MWh]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Before measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HE</td>
</tr>
<tr>
<td>9 Muzej novejše zgodovine Celje</td>
<td>2,311</td>
<td>Natural gas and extra-light heating oil</td>
<td>120.46</td>
</tr>
<tr>
<td>10 I. osnovna šola Celje, glavna enota</td>
<td>3,252</td>
<td>Natural gas</td>
<td>317.50</td>
</tr>
<tr>
<td>11 Osnovna šola Frana Rotaša Celje</td>
<td>4,058</td>
<td>District heating</td>
<td>278.33</td>
</tr>
<tr>
<td>12 Nogometni stadion Arena Petrol</td>
<td>3,437</td>
<td>District heating</td>
<td>182.10</td>
</tr>
<tr>
<td>13 Dvorana Zlatorog Celje</td>
<td>9,972</td>
<td>District heating</td>
<td>607.20</td>
</tr>
<tr>
<td>14 Drežnišče Celje</td>
<td>4,702</td>
<td>Natural gas</td>
<td>201.49</td>
</tr>
<tr>
<td>15 Zdравstveni dom Celje</td>
<td>10,633</td>
<td>Natural gas</td>
<td>1,250.62</td>
</tr>
</tbody>
</table>
Summary energy and financial data for the second set of buildings:

<table>
<thead>
<tr>
<th>Investment id:</th>
<th>Deep energy renovation of public buildings (15) owned by the Municipality of Celje</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment costs - constant prices (in EUR)</td>
<td>5,959,096</td>
</tr>
<tr>
<td>Investment costs - current prices (in EUR)</td>
<td>6,036,564</td>
</tr>
<tr>
<td>EnPC period (years)</td>
<td>-</td>
</tr>
<tr>
<td>EU co-financing (in EUR)</td>
<td>1,905,822</td>
</tr>
<tr>
<td>Public co-financing (in EUR)</td>
<td>3,000,951</td>
</tr>
<tr>
<td>VAT</td>
<td>1,048,202</td>
</tr>
<tr>
<td>Private co-financing (in EUR)</td>
<td>-</td>
</tr>
<tr>
<td>Reduction of CO2 emissions (in kg/a)</td>
<td>598,425</td>
</tr>
<tr>
<td>Estimated heat savings per year (in kWh and %)</td>
<td>2,287,527; 33.95%</td>
</tr>
<tr>
<td>Estimated electricity savings per year (in kWh and %)</td>
<td>238,556; 6.93%</td>
</tr>
<tr>
<td>Estimated heat savings per year (in EUR)</td>
<td>171,626</td>
</tr>
<tr>
<td>Estimated electricity savings per year (in EUR)</td>
<td>27,142</td>
</tr>
<tr>
<td>IRR/C (in %)</td>
<td>-6.96%</td>
</tr>
<tr>
<td>Return on investment (ROI) (in years)</td>
<td>&gt;35</td>
</tr>
<tr>
<td>Return on investment (ROI) of private capital (in years)</td>
<td>-</td>
</tr>
</tbody>
</table>
ELENA EoMO PROJECT – Municipality of Celje

Summary:

- Different types of buildings:
  - schools,
  - kindergartens,
  - administrative-office buildings and
  - buildings of wider social significance.

The entire set of buildings represents 3,976,635 kWh/a of annual reduction potential in energy use or 729,6 t/a of CO₂ emission reduction. This way electricity and heat energy use would be reduced by 32 % according to the considered baseline situation.
ELENA EoMO PROJECT – Municipality of Celje

Summary:

• The total amount of considered investments is 8.802.678 EUR
  (This amount includes VAT and eligible costs for the preparation of documentation, realization and supervision of project implementation.)

• Total amount of eligible costs suitable for the tender of the Ministry of Infrastructure of the Republic of Slovenia is 7.095.360 EUR excluding VAT.

• Involvement of the contractor (EPC), where investment will be covered by the savings and partly by the municipality through a tender of the Ministry of Infrastructure.
Financing Building Renovation
Through Energy Performance Contracting

Ivan Seric
CEO, Institute for Energy Efficiency
Croatia
Financing building renovation through Energy Performance Contracting

Ljubljana, 8. may 2019.
Energy service vs renovation

In case of deep renovation energy service can include:

- Investment in building envelope
- Installment of equipment
- Replacement of renovated parts during the contract
- Maintenance
- Operating heating, cooling, ventilation and airconditioning system
- Energy management
- Change of fuel
- Education of staff
- Investment in renewable energy sources

Energy service can make benefit from interplay of different measures – removable and non removable

Output of energy service are energy savings – not increase of value of the building
WHY EnPC

A business based on future savings – „perpetum mobile” for economy

Does not reach significant volume without regulatory and policy development!
Energy service and Energy Performance Contract (EnPC)

Energy Service Provider delivers efficiency improvement measures in a final customer’s facility or premises.

Energy performance contracting:
- Energy service provider delivers energy savings to beneficiary on his facility or premises.
- Verified and monitored during the whole term of the contract.
- Energy service provider is paid for achieved savings.

In an Energy performance contract (EPC) energy service provider (ESCO) is an investor on final beneficiary’s premises, and beneficiary “buys” savings achieved, not asset – significantly different from traditional investment process!

The asset issue is currently a challenge posing a danger to fundamentals of EPC market!
ESCO assumes risks and benefits from the investment – economic owner of asset even if beneficiary remains a legal owner!

A regulatory framework is essential to define specifics of EPC!
### Development of relevant framework in Croatia

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>EE Law, Ordinance on measurement and verification of savings</td>
</tr>
<tr>
<td>2015</td>
<td>Secondary legislation</td>
</tr>
<tr>
<td>2015</td>
<td>Grant programme from EPEEF</td>
</tr>
<tr>
<td>2015</td>
<td>First large project (hospital Križine Split) show success</td>
</tr>
<tr>
<td>2016</td>
<td>33 projects negotiated</td>
</tr>
<tr>
<td>2016</td>
<td>Model contract for EnPC - proposal</td>
</tr>
<tr>
<td>2017</td>
<td>Public buildings refurbishment programme 2016-2020 adopted</td>
</tr>
<tr>
<td>2017</td>
<td>Discussion about the model of support from EU funds – beneficiary?</td>
</tr>
</tbody>
</table>

The question on beneficiary stopped further implementation of EnPC contracts!
What was the problem?


- E(n)PC is imputed government debt by default, "given the high likelihood that capital expenditure incurred in the context of EPCs would have to be recorded in government accounts anyway"
- Public administrations hesitate to contract EPC - constrains in budget, EDP, public procurement issues
- Rules in contrast with ESA 2010 provisions for economic ownership – if a majority of the risks and are transferred to the partner

Energy Efficiency Directive 2012/27/EU

- EED 18.1.d) Member States shall promote the energy services market... supporting the public sector in taking up energy service offers
- EED 5.7.c) "use, where appropriate, energy service companies, and energy performance contracting to finance renovations and implement plans to maintain or improve energy efficiency in the long term."
- EED 5.1. 3% of the total floor area ... occupied by its central government is renovated each year to meet at least the minimum energy performance requirements set in Article 4 of EPBD.

2015. EUROSTAT guidance note made it practically impossible to renovate public buildings via energy performance contracts – implementation of EED
19. September 2017. new guidance was issued – providing rules in which energy performance contracts can be used by government in line with ESA 2010
May 2019. a detailed Guide published by EUROSTAT and EIB
EUROSTAT guidance 2017.

<table>
<thead>
<tr>
<th>E(n)PC is recorded off government balance sheet if:</th>
<th>ESCO is the economic owner of this asset – bearing most of risks and rewards of the investment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ESCO carries out an initial capital expenditure to improve the energy efficiency of an existing facility</td>
</tr>
<tr>
<td></td>
<td>The remuneration of the ESCO is determined by the energy savings achieved</td>
</tr>
<tr>
<td></td>
<td>ESCO is responsible for the proper operation of the installed equipment – it bears the maintenance and refurbishment risks</td>
</tr>
<tr>
<td></td>
<td>ESCO decides which asset is installed and when it should be replaced or changed</td>
</tr>
<tr>
<td></td>
<td>no cash payment occurs at the time of return of the assets</td>
</tr>
</tbody>
</table>

If an EPC is combined with a factoring without recourse agreement, the government is deemed to be the economic owner of the EPC asset – government debt is imputed.
Implementation of EnPC

**Investment in non-removable assets**
- Investment in „deep” refurbishment – building envelope
- Highest level of savings, available for default approach
- Creating economic activity (jobs) with no costs to government
- ESCO economic but not legal owner of assets
- Long payback periods
- Bankability problems
- Tax and accounting problems

**Investment in removable assets**
- Investment mostly in equipment
- Can include change of fuels
- A thin line between EPC and operating lease or imputed loan
- Procurement rules to define energy efficiency
- Measurement and verification as an ongoing process
- Security of supply for beneficiary

**Investment in intangible assets**
- No significant investment – consultancy, awareness raising, operating etc.
- Very short payback period
- ESCO’s benefit from changes in behaviour or operating
- Determining savings requires complex measurement and verification - EMIS
- Split incentives between ESCO and beneficiary
- Procurement based on ESCO’s references – obstacle to market supply development

Measurement and verification systems tailored for different implementation options
Measurement and verification

**EMIS – energy management information system**
- Data on actual energy consumption
- Data on baseline energy consumption
- Normalization of baseline consumption
- Metered savings = Baseline consumption (normalized) – actual energy consumption
- Can deliver evidence on metered energy savings

**MVP – measurement and verification protocol**
- Methodology for calculating scaled savings
- Simple & efficient resource for settlement of disputes in energy service
- Can deliver evidence and verification for scaled energy savings

Investment in removable and intangible assets

Investment in non-removable assets
Verification of energy savings

- Verification of savings can provide:
  - Basis for invoice for energy savings in EnPC
  - Settlement of disputes
  - Evidence for subsidy providers

If a strong verification process is developed in legislation, it can unlock potential for energy services in multiapartment buildings – verification to provide security for apartment owners allow for energy service to be contracted with majority of co-owners!
Options for subsidies

- **Competitive process**
  - Easily applicable
  - Low administration burden
  - Tailored for individual buildings
  - No experience available

- **Subsidies for individual measures**
  - Easily applicable
  - Does not include interplay of measures
  - Does not reflect individual conditions of a building

- **Subsidies for „deep renovation“**
  - Can include tailored solutions for deep renovation
  - High administrative burden
  - Not compliant to tendering process

- **Flat rate for „deep renovation“**
  - Easily applicable
  - Subsidies too high or too low

*With ESCo as the investor, energy service can be applied and subsidised for multi apartment buildings, unlocking enormous renovation potential!*
Subsidies for energy performance of buildings in Croatia

<table>
<thead>
<tr>
<th>Public buildings</th>
<th>Multiapartment buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidies 40% from EPEEF defined in RFP</td>
<td>Subsidies 60% from ESIF in a call for MA buildings</td>
</tr>
<tr>
<td>ESCO paid in construction phase</td>
<td>Awarded up to available funds</td>
</tr>
<tr>
<td>Subsidies contracted from EPEEF to public authority</td>
<td>Subsidies contracted with MA building owners (50%)</td>
</tr>
</tbody>
</table>

Proposal for changes in funding scheme – funding up to 100% in competitive process for ESCOs for both public and multiapartment buildings up to available amounts!

Criteria will be depending on total savings and investment/savings guaranteed
Multi apartment buildings

Ownership

- Co-ownership of common parts of a building
- Co-owners can make contracts "obviously profitable" for all co-owners by majority
- Energy savings > payments? Co-owners must be protected

Subsidies

- Insure lowest rate of subsidy needed to achieve objectives
- Counterfactual scenario
- Competition rules

How can energy efficiency be subsidized for multiapartment buildings?
How can co-owners be safe from non-performance of renovation?
Can EnPC be a tool for renovation of multi apartment buildings?
Grants and financial instruments

Grants
– If aimed at individual measures, not taking into account interaction of measures for „deep renovation”
– If level for „deep renovation” is pre-defined, either too high or too low

Financial instruments
– Can deal with risks typical for EnPC – guarantee schemes

State aid issues – GBER (art.39 §4.) allowes supporting only for building owners – not ESCO’s, but ESCO assumes risks and rewards!

Solution?

Competitive process of awarding EnPC, in line with Guidelines on State aid for environmental protection and energy 2014-2020 – ESCO’s bid for the level of support!
Competitive process – proposal for multi apartment buildings

Co-owners apply for subsidy for EnPC → Request for proposals – tendering process → ESCo’s bid for renovation – 100% of savings + grant

EnPC in line with EUROSTAT rules for government debt and deficit → Grants paid after completed renovation → Termination of contract in case of non performance

Basic rules for competitive process:

- ESCo’s apply for grants
- ESCo’s can ask for grants above savings guaranteed
- Grants considered to be a price in a tendering process
- Standardised contracts used to protect co-owners
- Full application of EUROSTAT rules – ESCo an economic owner of investment!
Development of energy service market

Energy service market must be developed to apply competitive process
Stringent rules and processes for government buildings can provide framework for
renovation of multi apartment buildings – unlocking potential
Not possible if ESO’s are not economical owners of investment – EUROSTAT rules!
Ensuring consistency will bring to full scale implementation/roll-out

*Due to clear definitions* provided by EUROSTAT on *what is ESCO* market, *EU market for ESCO’s can be created*, as it made clear distinction of Energy Performance Contract and other arrangements.

To make EU market *one market* it is necessary to:

- **Develop accounting standards:** national accounting standard related to international accounting standards – defining taxing in the same way across EU
- **Regulation of energy service:** creating same terms and definitions for ESCO market
- **Grants and Innovative financial instruments:** defintion of investor, assets, liabilities, time of transaction and procurement rules are necessary for development of market based subsidies for ESCO’s and dealing with state aid rules
- **Enlarging the market:** ESCO’s can renovate multitennant buildings in line with property laws
Thank you for your attention!

Ivan Šerić
ivanseric75@gmail.com
# Expert’s background – Ivan Šerić

<table>
<thead>
<tr>
<th>Name</th>
<th>Expert’s Profile</th>
<th>Indicative Project Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Drafted Energy efficiency law (in force)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drafted Ordinance on measurement and verification of savings (in force)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drafted Ordinance on energy efficiency in public procurement (in force)</td>
</tr>
<tr>
<td></td>
<td>Owner/founder in Investicijski inženjering d.o.o.</td>
<td>Drafted Ordinance on Energy audits for large enterprises (in force)</td>
</tr>
<tr>
<td></td>
<td>Undergraduate degree in Economy from the University of Josip Juraj Strossmeyer</td>
<td>Drafted Ordinance on Energy savings obligations (draft)</td>
</tr>
<tr>
<td></td>
<td>Leading expert in energy efficiency regulation and energy service due to key involvement in energy efficiency law regulation in Croatia, and design and implementation of Programme of energy renovation of public buildings in Croatia – the most successful application of energy service through private investment in public buildings</td>
<td>Drafted Ordinance on Energy management system (in force)</td>
</tr>
<tr>
<td></td>
<td>Provided solutions for EUROSTAT for debt and deficit issues related to energy performance contracts for public buildings – removing a crucial barrier in implementation of energy efficiency policies on EU level</td>
<td>Drafted Bill on Contracting and budgetary treatment of energy performance contracts for public buildings (in force)</td>
</tr>
<tr>
<td></td>
<td>Continuously advising public bodies in Croatia in implementation of energy efficiency policies, in particularly in energy service for buildings, where Croatia created more than 3000 jobs from savings, without public sector expenditure</td>
<td>Drafted and implemented Programme of Energy refurbishment of public buildings (2012-2014, 2014-2016, 2016-2020)</td>
</tr>
<tr>
<td></td>
<td>Defined all laws and bylaws for transposition of EED in Croatia</td>
<td>Drafted Methodology for ex-ante technical analysis of retrofitting potential of a building (in force)</td>
</tr>
<tr>
<td></td>
<td>Developed and implemented Measurement and Verification System in use in Croatia, providing efficient solution to many different energy efficiency issues</td>
<td>Involved in development of subsidy schemes for energy efficiency of buildings under OPCC 2014-2020</td>
</tr>
<tr>
<td></td>
<td>Represented Croatia in DG Energy</td>
<td>Involved in Eurostat Task Force on Energy Performance Contracting resulting in new guidance note on energy performance contracts based mostly on his proposal</td>
</tr>
<tr>
<td></td>
<td>Designed and implemented workshops for SEE countries (Serbia, Montenegro, Kosovo, Albania, Kosovo and Macedonia) on development of regulatory framework for energy efficiency in compliance of EED under organisation of European Energy Union</td>
<td>In development of subsidy schemes for energy efficiency of buildings under OPCC 2014-2020</td>
</tr>
<tr>
<td></td>
<td>Represented Croatia in DG Energy</td>
<td>Represented Croatia in DG Energy</td>
</tr>
</tbody>
</table>
Practical Experience of Energy Performance Contracting

In Croatia

Danijel Bencic
Board Member and EE Project Manager
Rudan
ENERGY PERFORMANCE CONTRACTS
EXPERIENCE FROM CROATIA

Danijel Benčić,
Rudan d.o.o.
Market leader in water & energy saving projects in Croatia
First to use ESCO model in Croatia and still using..

- Company founded
- Headquarters-1st passive commercial building in Croatia
- End of energy efficiency renovation project, Hospital Karlovac
- Two in a row.. Hospital Šibenik and swimming pools sports centre Poljud
- First ESCO project in Croatia
- End of 1st energy efficiency renovation project, Hospital Križine, Split
- End of biggest E.E. renovation project, Hospital Firule, Split
- Latest E.E renovation project of Pulmatory department, Split
How did it all start for us..?
<table>
<thead>
<tr>
<th>ordinal number</th>
<th>EPC project</th>
<th>total investment (EUR)</th>
<th>subsidies (EUR)</th>
<th>justified cost for national fund (%)</th>
<th>energy consumption before (kWh/annual)</th>
<th>energy consumption after (kWh/annual)</th>
<th>energy savings (kWh/annual)</th>
<th>savings (%)</th>
<th>CO2 before (t/annual)</th>
<th>CO2 after (t/annual)</th>
<th>CO2 savings (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>KBC Split - Križine</td>
<td>8.248.729,63</td>
<td>2.976.791,34</td>
<td>36%</td>
<td>14.002.906,30</td>
<td>7.902.074,30</td>
<td>6.100.832,00</td>
<td>7.902.074,30</td>
<td>4.839,96</td>
<td>2.059,95</td>
<td>57%</td>
</tr>
<tr>
<td>5.</td>
<td>Bazeni Poljud</td>
<td>6.716.070,31</td>
<td>2.564.102,56</td>
<td>38%</td>
<td>7.307.750,72</td>
<td>2.112.750,72</td>
<td>5.195.000,00</td>
<td>2.112.750,72</td>
<td>2.127,65</td>
<td>706,63</td>
<td>67%</td>
</tr>
<tr>
<td>6.</td>
<td>KBC Split- Pulmonary</td>
<td>2.195.994,70</td>
<td>739.541,16</td>
<td>34%</td>
<td>935.581,00</td>
<td>684.481,00</td>
<td>251.100,00</td>
<td>684.481,00</td>
<td>262,35</td>
<td>59,72</td>
<td>77%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>48.872.142,03</td>
<td>17.356.051,27</td>
<td>36%</td>
<td>77.539.808,62</td>
<td>43.413.685,58</td>
<td>34.126.123,04</td>
<td>43.413.685,58</td>
<td>23.481,51</td>
<td>9.016,45</td>
<td>64%</td>
</tr>
</tbody>
</table>
Opportunities:

- Never better (programs, directives...)
- Knowledge and experience on our side
- Successfully conducted projects
- Financial market – cheap money
Conclusion – ESCO!

- Motivated to finish the project in shortest timeframe
- Takes all the risk
- Brings experience and knowledge
- Proven good results
- Dedicated to contribute to sustainability for future generations
Thank you for your attention!

Danijel Benčić
danijel.bencic@rudan.com
Rudan d.o.o.
www.rudan.com
Q&A Session and Open Discussion
Conclusions
And signing of the Ljubljana Declaration

Adrian Joyce
Secretary General
EuroACE

Jernej Vernik
Head of EU Representative Office
VELUX
Thank You!

Keep up the good work!