Transformation of shopping centers into energy-efficient buildings through deep retrofitting and developing innovative technologies and solutions.

**THE SYSTEMIC RETROFITTING APPROACH (SRA) IS MADE OF INNOVATIVE TECHNOLOGIES AND SOLUTION-SETS AS WELL AS METHODS AND TOOLS:**
- To support their implementation
- To assess their environmental and social impact in a life cycle approach

**THE OVERALL SYSTEMIC RETROFITTING APPROACH INCLUDED:**
- Continuous commissioning of the retrofitted building to ensure the seamless operation of the retrofitting measures, adjusting the solution-set framework, and control strategy to achieve the fixed performance targets (energy, comfort, costs) in the shopping centre operational phase.
- Solutions for reducing energy needs through advanced envelope systems and cooling, and exploiting climate potential for ventilation and daylight harvesting.
- Lean procedure to optimize the construction site timing and cost, reducing failures, the impact on the final users and normal shopping mall functions.
- Energy concept as component of an energy system at neighborhood level (buildings, energy grids, renewable energy production systems in the surroundings - and H2 mobility).
- Solutions for enhancing energy efficiency to be coupled to the building as energy system, marked by on-site HVAC, refrigeration, lighting, RES plants.
- Intelligent Building Energy Management System (iBEMS) able to monitor interactions and to implement comprehensive control strategies.

**WHAT IS COMMONENERGY?**
- Objective: Transform shopping malls into energy efficient buildings, through deep retrofitting and developing innovative technologies and solutions.
- Methodology: The main concept is the shift from single-action refurbishment to a Systemic Retrofitting Approach (SRA).
- Key figures:
  - 3 demo cases (Italy, Spain and Norway) retrofitted
  - 8 reference buildings where simulations are operated
  - An international competition, the Sustainable Building Challenge for shopping centres, launched in 2016 and awarded in 2017.

**IN PRACTICE: THE TRONDHEIM DEMO CASE OF CITY SYD**
CitySyd is a suburban shopping center built on the outskirts of Trondheim, and one of the largest malls in central Norway. The centre opened in 1987 and then covered 38,000 m². The centre was redeveloped in 2000 and it is now 38,000 m². The focus of this retrofit is put on natural ventilation, iBEMS, as well as natural and artificial lighting. This required a certain amount of redesign which was integrated into the architectural redesign of the interior. The shopping center operational phase.

**IMPLEMENTED SOLUTIONS**
- Dome and light tubes in the Jens Hoff shop
- New monitoring systems for air handling unit (AHU) in common areas
- Final testing and commissioning natural ventilation
- Rectangular skylight system
- Artificial lights and meters in the shopping centre gallery and Jens Hoff shop
- Continuous commissioning
- Implementation of KNX network

**DURATION**
October 2013 – September 2017 (48 months)

**PARTNERS**
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