

Compilation table of characteristics and Interventions				
Site	Cadiz	Vevey	London	Frederikshavn
Type	apartment block	apartment block	students' accommodation	apartment block
Size	5 floors, 28 apartments, 1873m ²	5 floors, 15 apartments, 1095m ²	4 floors, 9-11 bedrooms/floor, 646 m ²	Two, 3-story buildings, 66 apartments, 5631m ²
Period	60s	1900s	70s	40s
Owner	Cadiz City Council	Public Insurance Company	Brunel Estates	Frederikshavn Building Association
Pre-renovation	Unoccupied, No HVAC	Last significant refurbishment in 1979; The envelope is not insulated	Minimal existing insulation level; Windows replaced with double glazed units and insulation to the roof in 2005; Heating and DHW: central gas-fired boiler plant and hydronic circuits; Natural Ventilation	Addition of 50 mm mineral wool insulation in 1991
Global Objectives	(a) demonstrate the performance of the ReCO ₂ ST technologies in operational buildings (b) investigate technical practical, legislative and owner requirements with respect to installation of novel ReCO ₂ ST technologies. (c) reduced heating and/or cooling consumption after renovation. (d) target 60% reduction of energy consumption (e) maintenance and improvement of quality of life after renovation (f) reduced environmental impact of the building after renovation, and all within a framework of economic profitability			
Individual objectives	-reduce/eliminate the building's heating and cooling needs, - guarantee an adequate level of air quality and thermal comfort throughout the year, -produce hot water mainly from a renewable source, -generate renewable electrical energy	-Core intervention: The improvement of the thermal envelope and HVAC installation. - Other improvements: Carried out in order to increase the building attractiveness and value.	Energy-efficiency retrofit with ReCO ₂ ST kit technologies and improvement to heating system.	Energy-efficiency retrofit
Least-cost methodology	The building will not be equipped with heating/cooling system. The cost benefit study was seen as an improvement of interior thermal comfort conditions with envelope interventions with greater demand reduction at lower cost (definition of insulation type and thickness and window U-value)	The selected scenario includes better U-value for the façades, no thermal insulation for the North architecturally protected façade, installation of 95 m ² photovoltaics on the roof and connection to the district heating.	From the cost efficiency perspective, the most interesting intervention are improvement to the heating system, new extraction fans, and air tightening.	Systems improvements have the lowest cost efficiency. The largest spread of cost efficiency is also observed for envelope improvements.
Energy reduction	The proposed solution presents average space heating of 19 kWh/m ² -year	The selected scenario results in approx. 57% heating demand reduction	The proposed renovation scenarios indicate total primary energy saving potential between 34% and 53%.	Renovation Scenarios developed for the DK demo site indicate total primary energy savings in the range of 8% to 52%
ReCO ₂ ST technologies	CEVF, Cool Roof, VIPs, NBS Innovative AHU (IAHU), CPV	Smart windows, NBS, CPV	Cool Roof, VIPs, Smart Windows, NBS, Mechanical ventilator with Phase Change Materials Storage: Cool-phase® ventilator, CPV	VIPs, Smart Windows, NBS
Other interventions	Structural reinforcement, Domestic hot water (DHW), Solar thermal panels (STP), polycrystalline silicon PV modules, 15.84 kWp	Mineral wool insulation; Replacement of windows, exterior doors and shutters; Addition of balconies; Staircase renovation (fire resistant doors, movement detection lights, smoke outlets); Elevator replacement; Heating and DHW: Wood powered (80%) urban heating, single flow mechanical ventilation with humidity-controlled regulation, 20 kWp PV	Central heating renovation; LED lighting; one kitchen full renovation and general air-tightness improvement; Flat Solar Panels, 3.6 kWp	Individual balanced mechanical ventilation units with heat recovery (building 1); Building 1 Extension; New roof covering; New façades and windows; New electric and plumbing (building 1); Simple extraction ventilation system-fresh PAX Calina with extraction from kitchen and toilet. Exhaust through the façade (building 2)
Status of renovation	Pending	Completed	Completed	Pending