



ENERGY EFFICIENCY:

THE FIRST FUEL FOR EU ENERGY TRANSITION

Energy management solutions: successful projects
in Europe



*European Federation of Intelligent
Energy Efficiency Services*

EFIEES

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EFIEES is the European Federation of Intelligent Energy Efficiency Services.

We represent Energy Service Companies (ESCOs) and their national associations across the EU.

Together, they represent over 100 000 professionals committed to designing and implementing energy efficiency measures in public and private buildings and industrial facilities.

Several EFIEES' members are also engaged in the efficient operation of district heating and cooling (DHC) networks.

Energy management solutions provided by EFIEES' members contribute to deliver on EU climate and energy targets through CO₂ and energy savings.



Energy Management Solutions

Energy management solutions are actions and technologies designed to optimise energy consumption, minimise energy loss, and enhance overall efficiency across the whole value chain of both buildings and industry sectors.

They include monitoring energy consumption, operating energy systems and maintaining them, but also energy coaching to educate consumers. From building automation systems regulating heating & cooling to advanced metering infrastructure providing real-time energy data, energy management solutions offer a comprehensive approach to sustainability and cost reduction.

Energy Performance Contracts (EnPCs) are contractual agreements increasingly used to implement energy management solutions. They involve outsourcing of energy efficiency projects to an ESCO (Energy Services Company), with guaranteed energy and, for some projects, also CO2 performance over the whole term of the contract.

The works and services provided by the ESCO are paid for in relation with the agreed performance objectives and savings. EnPCs may include in the same contractual instrument all the project-related features: investments, operation and energy management, financing arrangement, all needed measures, and contractually guaranteed actual energy performance over time.

District heating and cooling (DHC) is a centralised system that distributes heat/cool through a network to multiple buildings or sites. Efficient by design, it also leverages various local sources of heat, including waste heat from industrial processes, or renewable sources like geothermal energy or biomass. Furthermore, DHC provides flexibility and storage solutions.



FLORENCE, ITALY

Public buildings



PUBLIC BUILDINGS RENOVATION AND RENEWABLES INTEGRATION

ENGIE



PROJECT SPECIFICATIONS

Contract type: Global public procurement contract

Object of the contract: 433 buildings owned by the municipality of Florence

Duration of the contract: 9 years

Objective of the contract: Reduction of heat loss and the resulting consumption, integration of energy from renewable sources

Investment: 20M EUR



ACTIONS UNDERTAKEN

- Renovation of **buildings and heating systems**
- Installation of **photovoltaic panels**
- Installation of **LED lamps**



RESULTS

Thermal energy savings: 30%

Electricity savings: 23%

Emissions savings: 50 000 tonnes CO2

SAINT-CHRISTOL, FRANCE

Public buildings



REDUCTION OF ENERGY CONSUMPTION AND EMISSIONS OF A MILITARY BASE

I dex



PROJECT SPECIFICATIONS

Contract type: Energy Performance Contract – multi-EnPC public-procurement

Object of the contract: Military base (housing & offices) – 86 700 m²

Duration of the contract: 11 years (2016–2027)

Objective of the contract: 21% final energy savings and 20% reduction in greenhouse gas emissions

Investment: 1.3M EUR



ACTIONS UNDERTAKEN

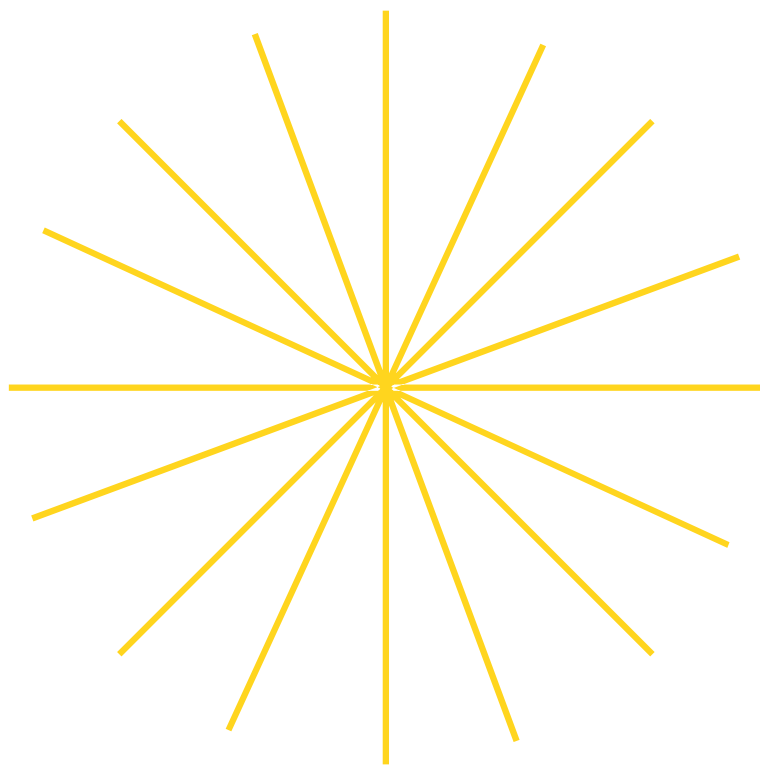
- Installation of a 10 MW **biomass/oil boiler plant**
- Installation of a **solar thermal panels** (550 MWh/year)
- Implementation of a **Centralised Technical Management**
- Creation of a **customer portal** (Web)
- Raising **users' awareness**
- Optimised **management of the energy supply**



RESULTS

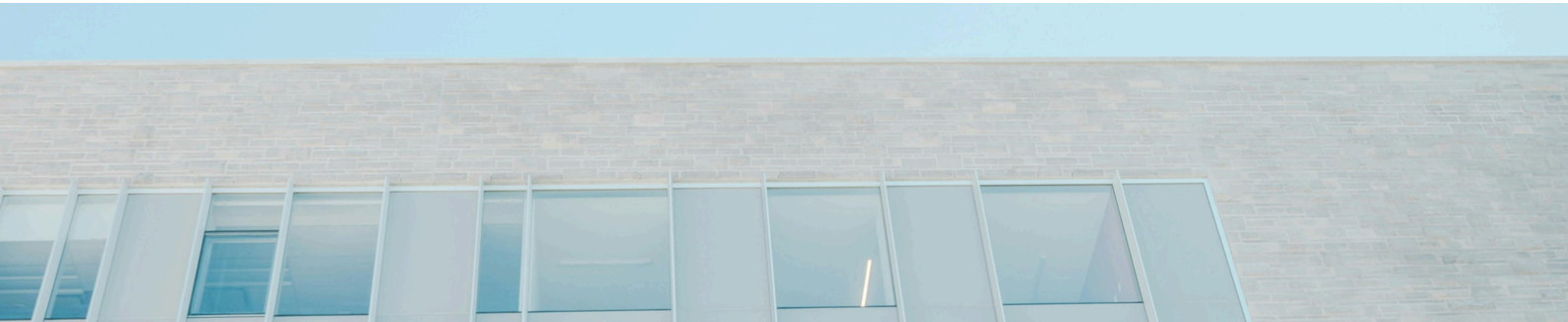
Final energy savings: 21%

Energy costs savings: 38%



CENTRE-VAL DE LOIRE, FRANCE

Schools



HIGH SCHOOLS AND CULTURAL CENTRE RETROFITTING AND OPERATION

ENGIE Solutions



PROJECT SPECIFICATIONS

Contract type: Public Procurement

Object of the contract: 62 high schools and 1 cultural centre - 1.1M m²

Duration of the contract: 17 years

Objective of the contract: Reduction of the energy consumption and the GHG emissions

Investment: 27M EUR (not financed by ENGIE Solutions)



ACTIONS UNDERTAKEN

- **Works:** thermal insulation of buildings, renovation of boiler rooms and controlled mechanical ventilation (CMV) systems, installation of thermostatic valves, and installation of rooftop photovoltaic panels)
- Multi-technical **operation and maintenance**
- **Raising users' awareness** on energy and environmental issues (45 000 students, 5 000 teachers and administrative staff)



RESULTS

Energy savings: 30% in 17 years

Emissions savings: 35% in 17 years

ROMANIA

Schools



ROMÂNIA EFICIENTĂ - DEEP RENOVATION OF PUBLIC SCHOOLS

OMV Petrom



PROJECT SPECIFICATIONS

Contract type: Public procurement

Object of the contract: Information, education, and public awareness, and renovation works at nZEB requirements in public schools from different regions of Romania

Duration of the contract: 6 years (2020-2026)

Objective of the contract: Transform public schools into Near Zero Emission Buildings and foster a culture of energy efficiency in Romania



ACTIONS UNDERTAKEN

- **Information, education and awareness campaigns** for households, pupils and students
- **Training modules** for the public administration on energy efficiency in buildings
- Creation of an **online platform**, repository of information and knowledge about energy efficiency in buildings
- **Deep renovation** of schools to turn them into nearly zero energy buildings - 3 school renovations completed so far



RESULTS

Energy savings: approximately 30%

BRATISLAVA, SLOVAKIA

Schools



UNIVERSITY OF ECONOMICS / STUDENT DORMITORY

Veolia Slovakia



PROJECT SPECIFICATIONS

Contract type: Energy Performance Contracting - public

Object of the contract: Student housing

Duration of the contract: 15 years (2022-2037)

Objective of the contract: Reduction of energy consumption (heating, hot water, cold water and electricity)

Investment: 504 475 EUR

Assumed payback: 13 years



ACTIONS UNDERTAKEN

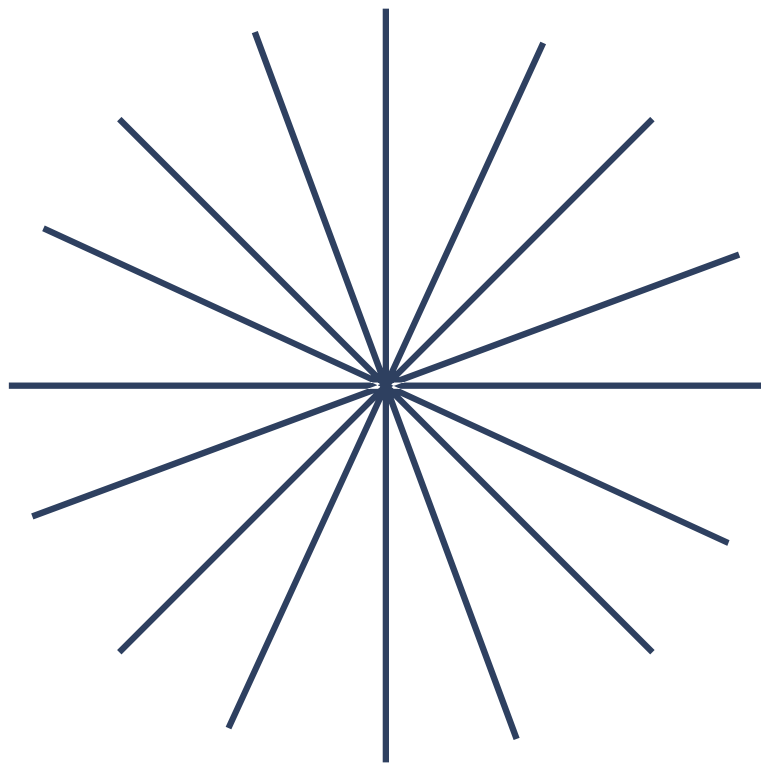
Facade and roof **insulation**, **windows replacement**, refurbishment of the **heating system**, installation of **heat recovery ventilation (HRV)** and **thermostatisation**, **heat pumps** installation



RESULTS

Annual savings in 2022: 44 462 EUR excl. VAT

Annual savings in 2023: 40 942 EUR excl. VAT



SAINT-ÉTIENNE, FRANCE

Hospitals



REDUCTION OF ENERGY CONSUMPTION OF A HOSPITAL

Dalkia



PROJECT SPECIFICATIONS

Contract type: Energy Performance Contract – public procurement

Object of the contract: Hospital – 38 building units – 80 700 m²

Duration of the contract: 15 years (2018-2033)

Objective of the contract: 28% final energy savings

Investment: 1M EUR



ACTIONS UNDERTAKEN

- Installation of a **cogeneration** unit adapted to the thermal and electrical consumption profile
- Installation of a **condensing boiler** combined with improvement of the network
- Deployment of **monitoring and traceability tools** for customers, **management of heating & cooling**, development of an **appropriate metering plan, and remote management** via DESC (Dalkia Energy Savings Center)
- Rigorous **control and monitoring of installations**



RESULTS

Final energy savings: 28%

SIENA, ITALY

Hospitals



AZIENDA OSPEDALIERO-UNIVERSITARIA SENESE RENOVATION & ENERGY MANAGEMENT

Renovit



PROJECT SPECIFICATIONS

Contract type: Public-Private Partnership & Energy Performance Contract

Object of the contract: University Hospital - 700 beds - 3 000 employees

Duration of the contract: 16 years (2023-2039, including 15 years of facility energy management)

Objective of the contract: Renovation & energy management of the university hospital

Investment: 20M EUR



ACTIONS UNDERTAKEN

- Renovation of the **heating and ventilation systems**
- Upgrading of the **hot water production system** (pathogens prevention)
- Installation of a new 1.5 MWe **trigeneration system**
- Installation of photovoltaic panels **on roofs** (total peak power of 265 kWp)
- New **BMS (Building Management System)** systems for the remote monitoring and management (24 hours/day)
- Replacement of approx. **4 000 lighting points** with LED lighting fixtures



RESULTS

Energy consumption reduction: 30%

CO2 emissions reduction: around 4 600 t/year

Gains in comfort, air and water quality

GHENT, BELGIUM

Hospitals



UZ GENT HOSPITAL ENERGY INSTALLATION MANAGEMENT AND MAINTENANCE

Veolia Belgium & Luxembourg



PROJECT SPECIFICATIONS

Contract type: Energy Performance Contract

Object of the contract: UZ Ghent (2nd largest hospital in the country) - 40 buildings - 352 089 m² - 42 hectares

Duration of the contract: 10 years (2024-2034)

Objective of the contract: Technical management and maintenance with optimisation of energy management



ACTIONS UNDERTAKEN

Veolia has taken charge of the **energy management** and has entered into a commitment in relation to gas, steam, electricity and water. Savings are achieved through rapid improvements in **day-to-day administration and in the building management system**.

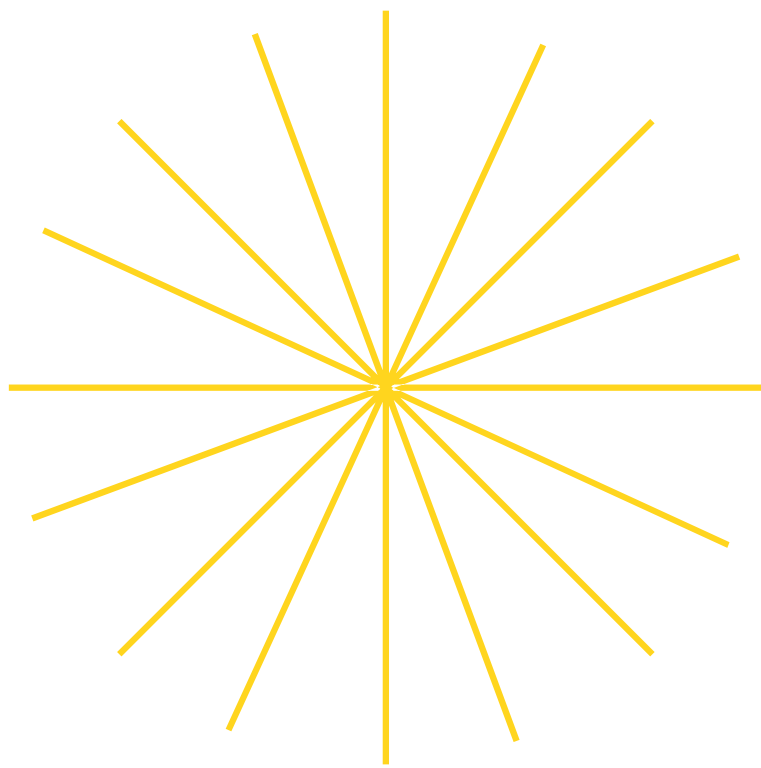
- Management and supervision of installations
- Maintenance and repairs
- Total warranty for part of the installations
- Energy management



RESULTS

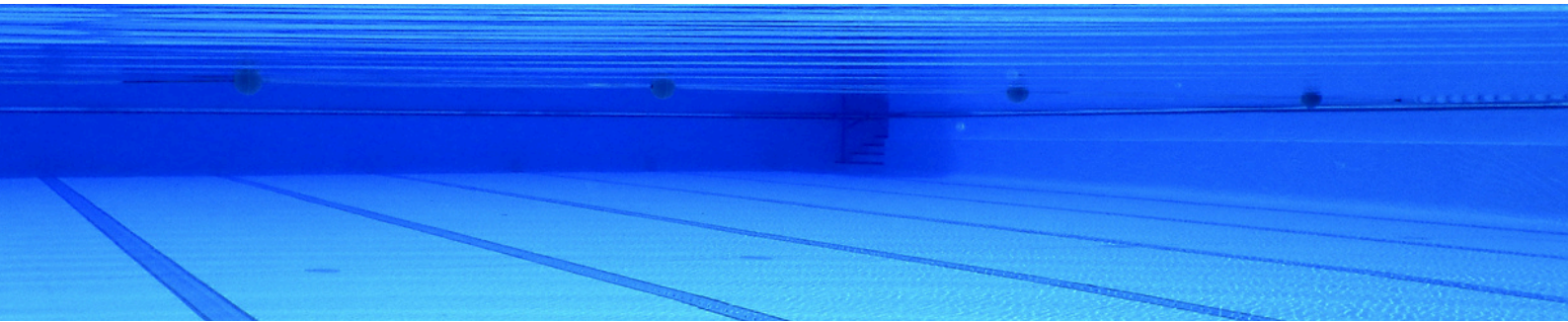
Energy savings

Comfort of patients, visitors and personnel through reliable energy supply



PAYS DE L'OR, FRANCE

Sport facilities



ENERGY PERFORMANCE OF SWIMMING POOLS

Dalkia



PROJECT SPECIFICATIONS

Contract type: Energy Performance Contract – public
Object of the contract: 4 swimming pools – 16 000 m²
Duration of the contract: 8 years (2019-2027)
Objective of the contract: 30% final energy savings
Investment: 1.5M EUR



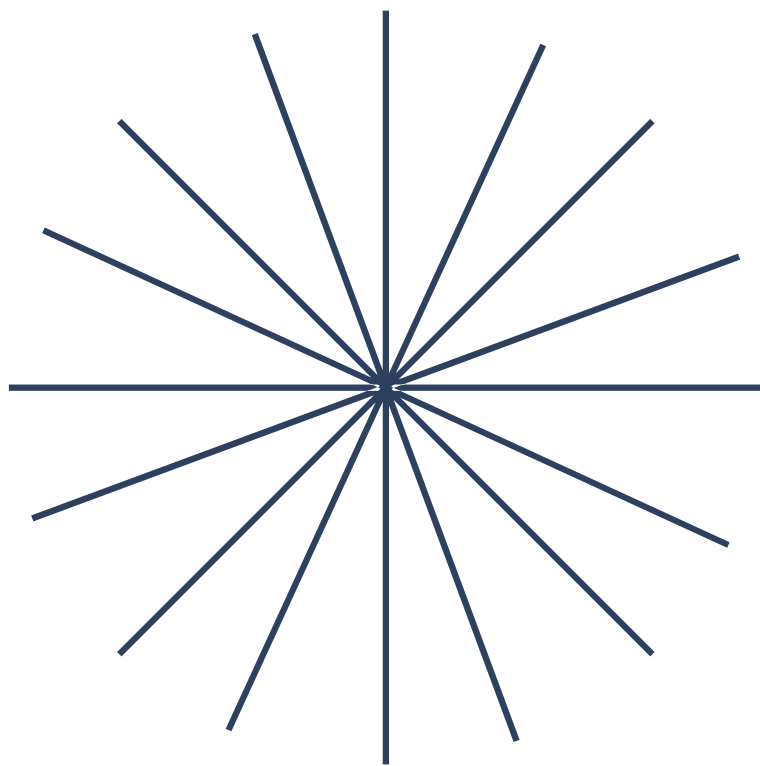
ACTIONS UNDERTAKEN

- Work on **heating, cooling, air treatment, water treatment**
- Installation of a **centralised technical management system & remote management**
- **Internal bulletin**, screen in reception area (to raise user awareness)
- Use of **geothermal and photovoltaic solar energy**
- Optimised **management of the energy supply**



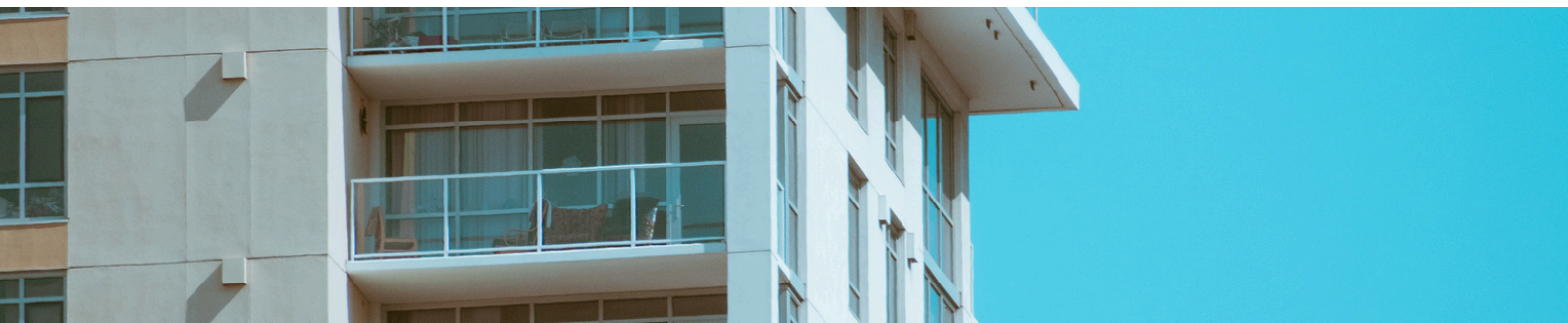
RESULTS

Final energy savings: 32% in 8 years
Energy savings in heating, domestic hot water, ventilation, cooling, water, lighting



MIRIBEL, FRANCE

Housing



REDUCTION OF ENERGY CONSUMPTION OF A CONDOMINIUM

Hervé Thermique



PROJECT SPECIFICATIONS

Contract type: Energy Performance Contract – private

Object of the contract: Multi-apartment buildings – 100 flats – 8 350 m²

Duration of the contract: 8 years (2015-2023)

Objective of the contract: 36% final energy savings

Investment: 600 000 EUR



ACTIONS UNDERTAKEN

- Replacement of **carpentry**
- **Building's envelope** (external insulation)
- Installation of **ventilation** systems
- Works on **heating** systems
- Rigorous **monitoring and control** of installations
- **Users' awareness** campaigns
- Optimised **management of the energy supply**



RESULTS

Final energy savings: 43% in 8 years

Emissions savings: 56% in 8 years



ENERGY AND CARBON PERFORMANCE CONTRACT IN SOCIAL HOUSING

Dalkia



PROJECT SPECIFICATIONS

Contract type: Energy and Carbon Performance Contract – public

Object of the contract: Social housing – 29 000 housing units

Duration of the contract: 8 years (2024–2032)

Objective of the contract: 10% of additional energy savings

Investment: 14.3M EUR (12.5M EUR for decarbonisation and 1.8M EUR for energy efficiency)



ACTIONS UNDERTAKEN

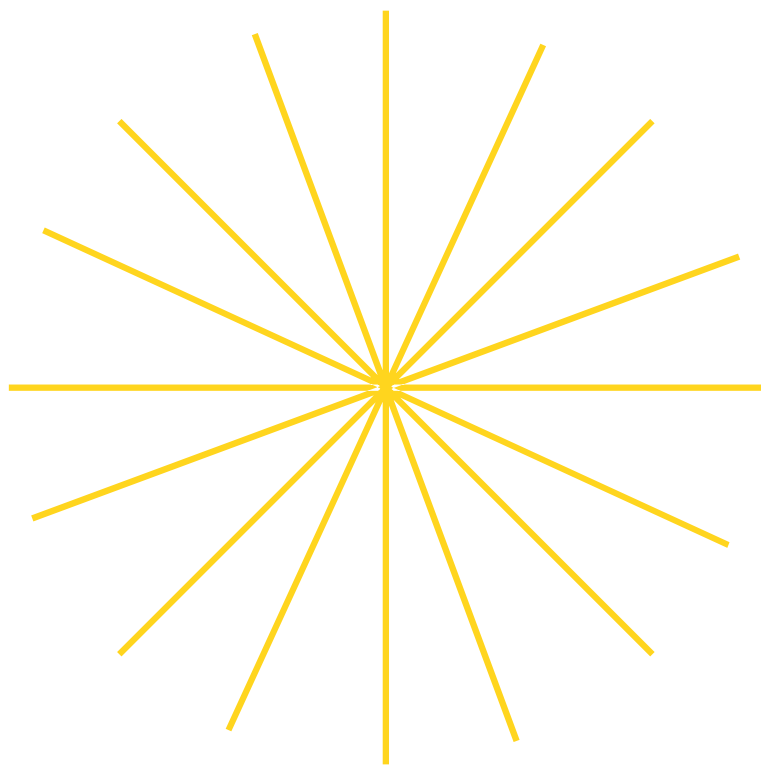
- **Construction of two district heating networks (DHN)** using 85% local renewable energy (wood energy), 22 biomass boilers, 8 heat pumps and 100 m² of solar panels. 130 GWh of heat for heating and 47 GWh for domestic hot water
- **280 housing units connected to the DHN**, +500 residences supplied in heating and domestic hot water
- **2 500 connected sensors and widespread remote management** enabling real-time monitoring of consumption
- Implementation of an **Energy Manager**



RESULTS

CO₂ avoided per year: 4 300 tonnes

Savings for a typical household connected to the DHN: up to 450 EUR



CASSINO, ITALY

District heating



CREATION OF A SMART COMMUNITY BETWEEN AN INDUSTRIAL PLANT AND THE UNIVERSITY OF CASSINO

Renovit



PROJECT SPECIFICATIONS

Contract type: Energy Performance Contract

Object of the contract: High-efficiency trigeneration plant combined with a district heating and cooling network

Duration of the contract: 10 years (2021-2031)

Objective of the contract: Creation of a “smart community”. Efficiency intervention on an industrial site (a paper factory), with the installation of a new CHP plant. The energy hereby produced is used to heat and cool the University campus located nearby, via a new DHC network (University of Cassino)



ACTIONS UNDERTAKEN

- Installation of a new 7 MW **trigeneration system** (electricity, steam & hot water)
- Building of a **new DHC network**, linking the paper factory to the University campus situated nearby



RESULTS

Entire coverage of **the steam and electricity needs of the factory**, with high energy efficiency gains

University's GHG emission reduction: around 10%

CHIUSA, ITALY

District heating



DISTRICT HEATING POWER PLANT'S OPTIMISATION AND THERMAL LOAD FORECASTING

Alperia



PROJECT SPECIFICATIONS

Contract type: Energy Performance Contract

Object of the contract: District heating network - 13 km - approx. 8 000 housings connected

Duration of the contract: 10 years

Objective of the contract: Thermal load forecast and optimisation of a district heating power plant



ACTIONS UNDERTAKEN

- Development of a **control algorithm** based on model predictive control technology that has been installed on a Supervisory Control and Data Acquisition (SCADA) located on site, **boosting automation**
- **Improvement of power** provided by biomass
- **Improvement of economic revenues** by bidding electrical energy produced from CHP plant into electricity market



RESULTS

Annual savings: 22 500 EUR

Annual emissions savings: 3 160 tonnes CO2

POZNAŃ, POLAND

District heating



CONSTRUCTION OF THE HEAT STORAGE INSTALLATION ON VEOLIA'S CHP FACILITIES

Veolia Poland



PROJECT SPECIFICATIONS

Contract type: Energy Performance Contract with a consortium – private

Object of the contract: District heating network – heat storage system

Objective of the contract: Improved efficiency and reliability of the heating system



ACTIONS UNDERTAKEN

Construction of a water-filled tank with atmospheric pressure inside, that can cover 1/3 of Poznań's district heating system. **It distributes surplus heat** when the residents' demand for the heat increases and optimises system performance through AI (specialised software and control system)



RESULTS

Annual reduction in CO2 emissions: 24 000 tonnes

Reduction of coal and oil consumption, heat losses and malfunction effects

Adjustment of the production to the demand on electricity market due to higher flexibility of the system

OROSZLÁNY, HUNGARY

District heating



BIOMASS-BASED COGENERATION UNIT

Veolia Hungary



PROJECT SPECIFICATIONS

Contract type: Private project

Object of the project: Modernisation of the power plant of a DHC

Timeline of the project: Project under development that should start in 2024

Objective of the project: Transformation of a power plant based on local brown coal into a biomass-based cogeneration unit



ACTIONS UNDERTAKEN

Modernisation of the power plant to produce electricity and district heating from renewable energy (biomass), with a 2 x 50 MWe capacity



RESULTS

Annual reduction in CO2 emissions: 536 kT

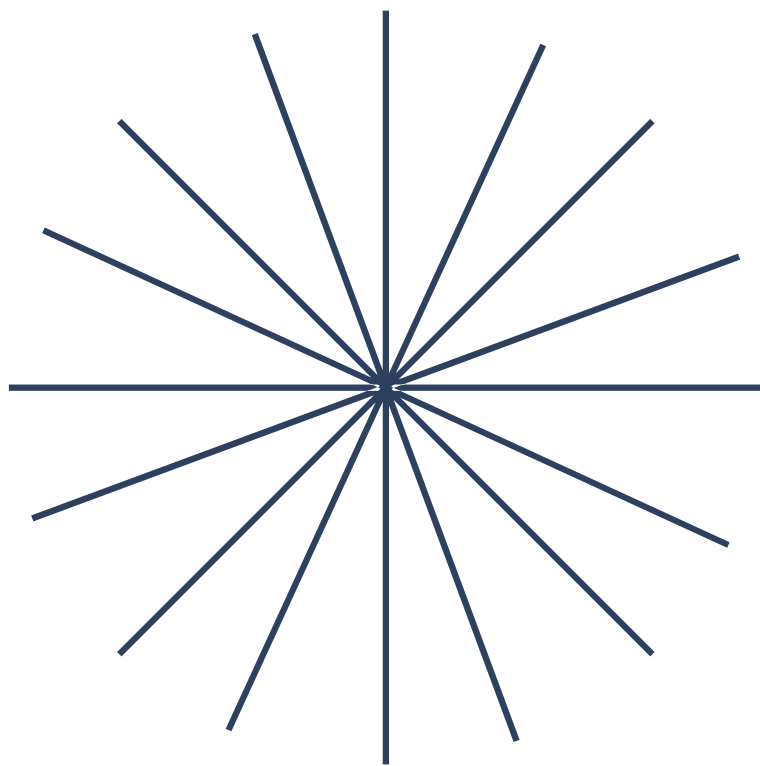
Electricity production: 2 x 50 MWe

Annual heat production: 345 TJ

Direct jobs created: 200

Supply chain jobs created: 300

Flats supplied with district heating: 4 300 (46 MWth peak demand)



ROVERETO, ITALY

Energy Efficiency in Industry



PHARMACEUTICAL PLANT – GLYCOL NET AND COLD DISTRIBUTION OPTIMISATION

Alperia



PROJECT SPECIFICATIONS

Contract type: Energy Performance Contract – private

Object of the contract: Industrial plant – pharmaceutical sector

Duration of the contract: 5 years (2023-2028)

Objective of the contract: Maximisation of the coefficient of performance of chillers



ACTIONS UNDERTAKEN

- **Development of Advanced Process Control (Sybil)** based on Model Predictive Control technology: automatic and optimised management of 3 chillers and 8 pumps
- **Cooling energy consumption forecast**, useful for chiller control, and smart alarms



RESULTS

+15% of the coefficient of performance compared to manual control

GHENT, BELGIUM

Energy Efficiency in Industry



STEELANOL PROJECT - GAS FERMENTATION PLANT USING STEEL FACTORY GASSES

Veolia Belgium & Luxembourg



PROJECT SPECIFICATIONS

Contract type: Private energy and CO2 contract

Object of the contract: New Gas Fermentation Plant that uses the metallurgical gasses from a steel factory for ethanol production, which is the largest CO2 emitter in Belgium (8% of the emissions)

Duration of the contract: 10 years (2022-2032)

Objective of the contract: Construction of a pilot plant "Steelanol" that converts 10% of the flue gasses of the steel furnaces to produce Bioethanol in a bioreactor



ACTIONS UNDERTAKEN

- Conversion of the flue gasses of the steel furnaces to **produce bioethanol in a bioreactor**
- Conversion of sludge digested in order to **produce biogas which is in turn used to produce green electricity** (about 20 000 MWh per year) **and green heat by means of a CHP**



RESULTS

Emissions saved: 150 000 tons/yr of CO2 (or the equivalent of removing 60 000 cars from the road)

Reduction of **60% of GHG emissions versus fossil fuel**

EINDHOVEN, NETHERLANDS

Energy Efficiency in Industry



BRAINPORT INDUSTRIES CAMPUS - HIGH-TECH CAMPUS POWERED BY 100% CARBON-FREE ENERGY

EQUANS Nederland



PROJECT SPECIFICATIONS

Contract type: Utility Supply Contract - Equans is shareholder of BIC Utility BV

Object of the contract: Design, build, finance, maintain, operate and exploit all utilities needed for this high-tech manufacturing campus

Duration of the contract: 15 years

Objective of the contract: Security of supply of the utilities, carbon neutral utilities, congestion management



ACTIONS UNDERTAKEN

- **DBFMO** (Designing, Building, Financing, Maintaining and Operating) **and exploiting utilities:** heat and cold, process cooling, vacuum compressed air, demineralised water and electricity)
- **Installation of assets:** solar panels (2.7 MW), battery storage (1 MWh), aquifer thermal energy storage, heat pumps, compressed air units, vacuum pumps, demineralised water system and chillers



RESULTS

100% carbon neutral utilities

SZLACHĘCIN, POLAND

Energy Efficiency in Industry



HEAT RECOVERY FROM A SEWAGE TREATMENT PLANT WITH EFFICIENT COGENERATION

Veolia Poland



PROJECT SPECIFICATIONS

Contract type: Private

Object of the contract: Waste heat recovery from a sewage treatment plant with efficient cogeneration

Objective of the contract: Create synergies between heat generation and water treatment to save resources and limit emissions



ACTIONS UNDERTAKEN

- Veolia has created a system which enables the **use of heat coming from sewage**, supported by the installation of **high-efficiency cogeneration**, producing electricity and heat simultaneously
- **Waste heat is recovered from two sources:** from waste water thanks to a heat pump and from the electricity production needed to power the device
- The heat is fed into the **district heating network**



RESULTS

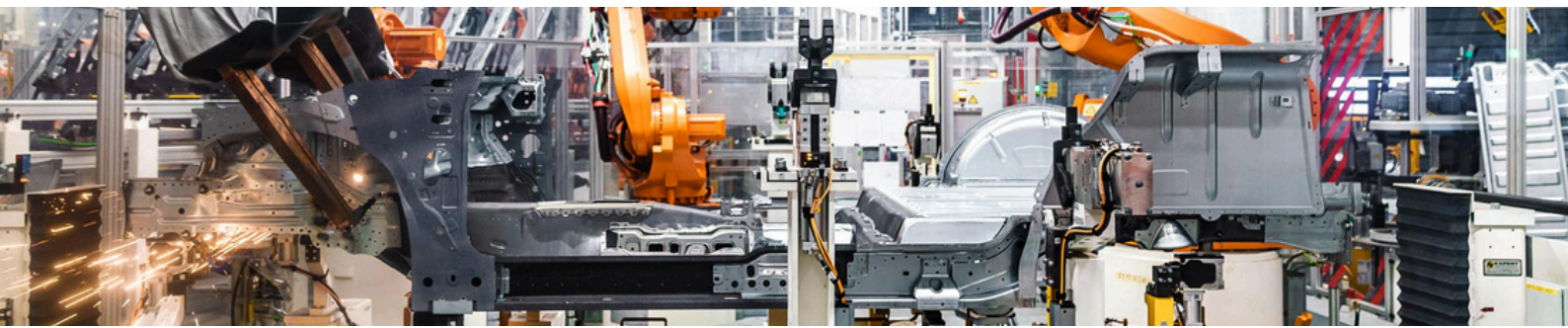
Annual CO2 reduction: 8 600 tons

Annual coal usage reduction: 4 600 tons

Inhabitants supplied with recovered heat: 5 000 inhabitants

POZNAŃ, POLAND

Energy Efficiency in Industry



INDUSTRIAL WASTE HEAT RECOVERY FROM A VOLKSWAGEN FOUNDRY

Veolia Poland



PROJECT SPECIFICATIONS

Contract type: Private

Object of the contract: Waste heat recovery from a foundry's compressor unit

Objective of the contract: Find alternative sources of heat to save natural resources



ACTIONS UNDERTAKEN

- Veolia has built **a system for the recovery of waste heat**, which is generated during work of compressor unit located in the foundry of the Volkswagen plant in Poznań
- The investment in a system for the recovery of heat into the district heating system is **one of the first of such projects in Central and Eastern Europe**

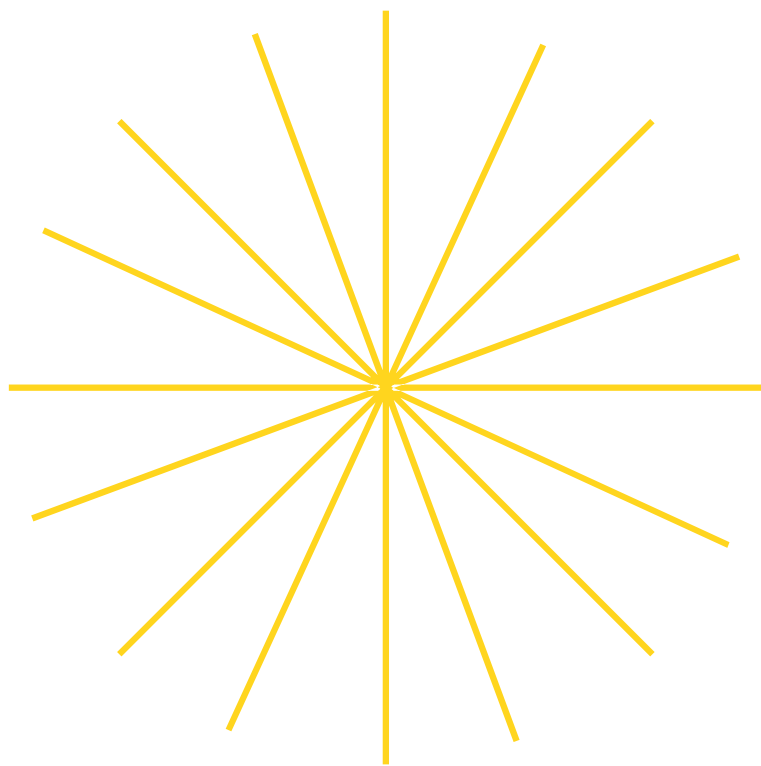


RESULTS

Annual CO2 reduction: 3 500 tons

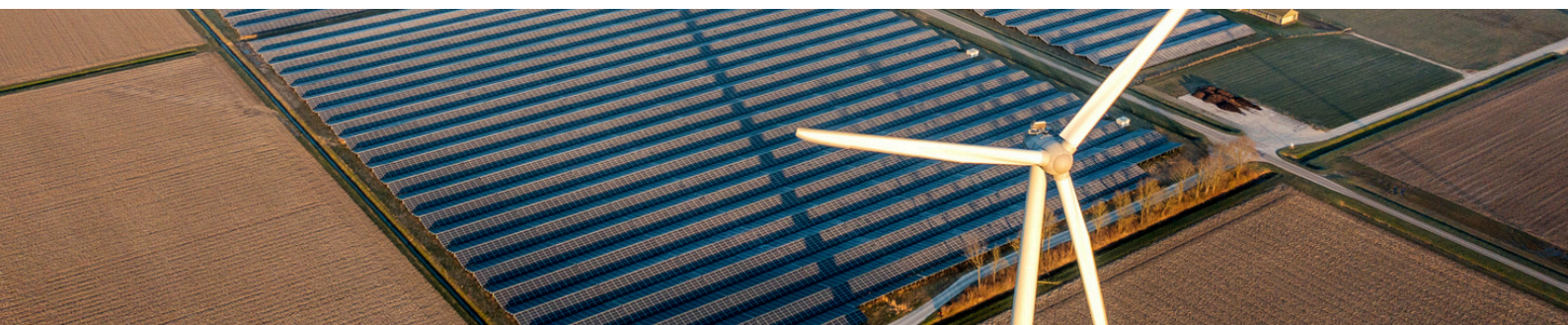
Annual water consumption reduction: 17 000 m³

Apartments supplied with recovered heat: 6 500 apartments



FLEVOLAND, NETHERLANDS

Grids



SMART GRID FLEVOLAND - BRINGING DEMAND AND SUPPLY OF ELECTRICITY TOGETHER

EQUANS Nederland



PROJECT SPECIFICATIONS

Contract type: Ownership and operation of a grid

Object of the contract: Designing, building and operating a closed distribution network for real estate developers who wish to invest in solar PV, wind, or battery storage

Duration of the contract: 15 to 20 years

Objective of the contract: Provide a solution for grid congestion and increase sustainable generation in areas with less grid capacity



ACTIONS UNDERTAKEN

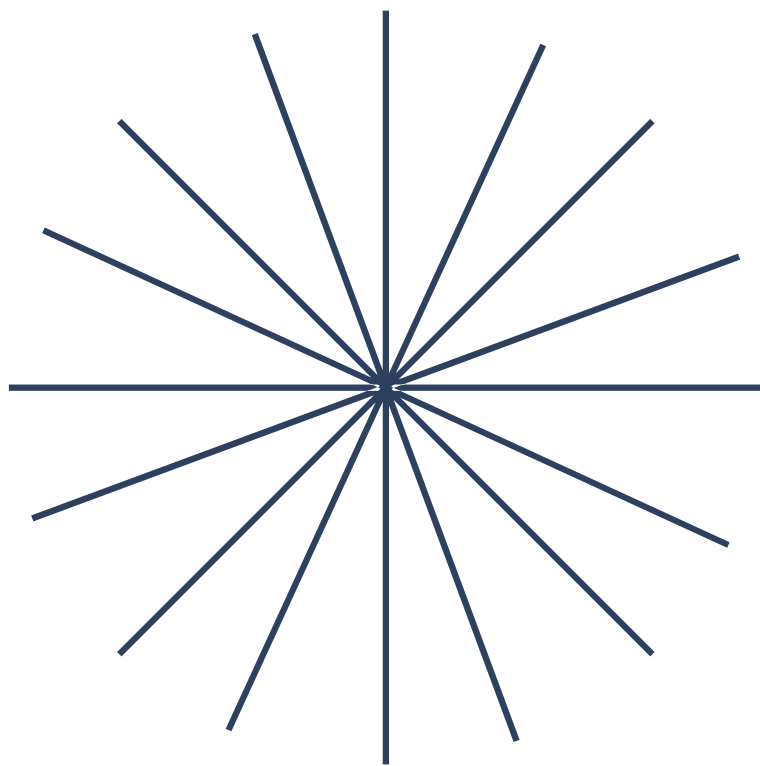
- **Installation of 300MW of production units:** 6 solar parks with approx. 500 000 solar panels with a total capacity of 163MW, 37 windmills with a total capacity of 137MW
- **36MVA of battery storage** on a 155MVA grid connection
- **Smart energy management** (Energy Management System)
- **Future actions:** development of a **hydrogen plant** connected to the Smart Grid to ensure that the solar and wind farms can produce more energy and supply sustainable energy to consumers in the area



RESULTS

Annual energy production: 600 GWh with smart metering and adjusting per second (approx. 0.6% of Dutch electricity production)

With similar solutions the **congestion in the Netherlands can be reduced by 15%**





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