COORDINATED PRODUCTION
FOR BETTER RESOURCE EFFICIENCY

Project Overview

www.spire2030.eu/copro

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COORDINATED PRODUCTION FOR BETTER RESOURCE EFFICIENCY

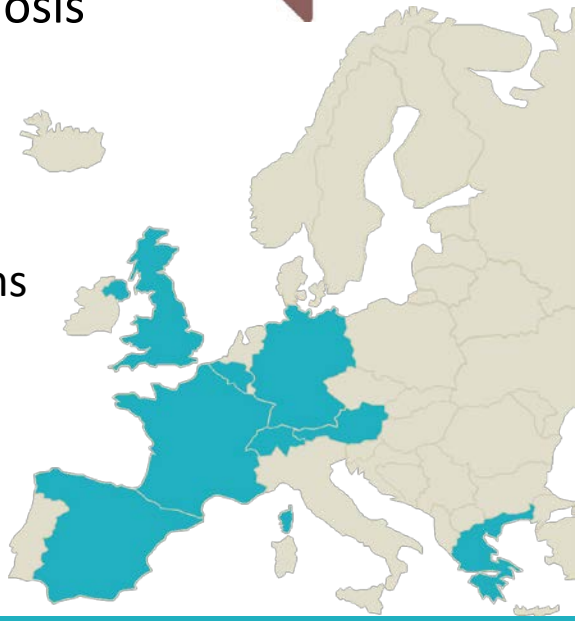
Individual units often are already automated and operated efficiently

Inefficiencies result from **lack of coordination**

Better coordination of production means improved energy and resource efficiency

CoPro: Short fact sheet

- Full title: **Improvement of Energy and Resource Efficiency by Better Coordination of Production in the Process Industries**
- Contributing to circular economy and industrial symbiosis
- Builds on the results of FP7 projects
  - MORE Real-Time Monitoring and Optimization of Resource Efficiency in Integrated Processing Plants
  - DYMASOS Dynamic Management of Systems of Systems
- 17 partners from 8 countries
- Duration: 42 months
- EC contribution: 6 M€



Consortium

Industry with 5 applications covering the complete value chain

covestro

P&G

Frinsa

Lenzing
Innovative by nature

INEOS
THE WORD FOR CHEMICALS

Technology providing SMEs

LeiKon

PSE

sabisu

asm

divis
intelligent solutions

ORSOFT
Advanced Production Scheduling

Universities

technische universität dortmund

Universidad de Valladolid

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Dissemination and exploitation support

inno

Research institutes

CERTH
CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

Mission

Improved coordination is key to better energy and resource efficiency of the existing assets

CoPro addresses coordination in three dimensions:

- Cross-layer process integration, from basic process controls to the coordination of the complete supply chain
- Cross-unit and cross-plant coordination: Integrated management and control of heterogeneous units coupled by flows of energy and materials
- Cross-functional coordination: Coordination between different functions related to production, e.g. between maintenance and operations and between operations and the procurement of electricity

Goals

Provide and demonstrate tools for process monitoring, dynamic planning, and scheduling and control of plants, sites and industrial clusters under dynamic market conditions

- Improved energy and resource efficiency by coordinated optimization of production units
- Buffering the effects of fluctuating renewable energy production and distribution by integrating demand-side response with plant-wide scheduling and control
- Efficient plant and resource utilisation by integrated plant-wide scheduling and control
- Optimization of maintenance

Innovations

Plant and site operation efficiency largely determined by discrete events and decisions	→	CoPro includes discrete decisions in plant-wide control and optimisation schemes
Plant managers and operators have a crucial role in the operation of processing plants	→	CoPro develops intuitive forms of human-machine interaction and optimisation-based advanced decision support
Suitable mathematical models in most cases are only available for some important plant or units	→	CoPro develops techniques for coordination of production units that can employ models of different types
Operation of plants of different companies in industrial parks that are connected by energy & material streams are not coordinated	→	CoPro develops technology for balancing and optimising networks, and for distributing the joint benefit in industrial parks

Industrial use cases

Optimal site and cracker planning and scheduling including optimisation of plants operations and DSR

Alexander Gammersbach
Team Leader of
Site Optimisation
INEOS Köln GmbH

"We operate a petrochemical complex with interacting plants and produce a large number of base chemicals. We need to plan this production for at least the year ahead. With optimal planning of the site and optimisation of some of our units we can react quickly to changes in the market and save resources and energy."

Industrial use cases

Cross-company coordination in chemical parks under confidentiality constraints

Lukas Maxeiner
Research Assistant
TU Dortmund

"In Chemical Parks and Industrial Clusters, chemicals and carriers of energy are exchanged across the boundaries of companies, usually based on long-term contracts. We want to coordinate the exchange of energy and materials in an agile and optimal manner while preserving confidentiality of business information. This will lead to better overall energy and resource efficiency and to a win-win situation for all parties involved."

Industrial use cases

Coordination of production & distribution of gases in a chemical complex

Christine Maul
Team Lead of
Advanced Process Control
Covestro Deutschland AG

"We strive to optimize the production and distribution of basic chemical gases required in the synthesis of our polymers. By means of advanced modelling, monitoring and optimization methods, we want to improve the energetic efficiency in the production of gases while respecting environmental and safety regulations."

Industrial use cases

Lenzing
Innovative by nature

Optimal process coordination for the recovery section of EU's largest viscose fiber production plant

Christian Jasch
Process Engineer
Recovery & Spinbath
Lenzing AG

"The recovery of the spinbath is the key process step in the viscose fiber production with the highest energy demand. Especially the spinbath reconcentration by evaporation requires a huge amount of heat. In CoPro our goal is to improve our multi-unit evaporation process by focusing on load allocation, cleaning cycles, cooling water distribution and the heat recovery."

Industrial use cases

Plant-wide control of the sterilisation and packaging of food

Jose Manuel García Lampón
FRINSA Production Manager
Frinsa del Noroeste, S.A.

"At FRINSA, we produce over 400 different products on shared production equipment. Our main challenge is to optimally plan, schedule and operate the equipment to minimize queues, idle times and consumption of energy.
CoPro technology will replace manual scheduling methods and will improve the energy efficiency and reduce total costs."

Industrial use cases

Optimisation of production and packing of consumer goods products

Francesc Corominas
Principal Engineer
Procter & Gamble

"We produce a large number of similar products in the same plant and with the same equipment. The process of fitting all products in the daily schedule and the change from one product to the other makes it all quite complex and often not optimal. The main objective in this project is to increase the plant productivity by means of optimal planning and optimal and efficient utilization of assets, resources and energy. "

Outcomes: Technologies and tools

- Plant-wide and site-wide optimisation of operating points and discrete decisions including demand side response
- Distributed optimization using market-like algorithms to coordinate with minimum exchange of information
- Technology for optimising changeovers, reducing waste, rework and energy consumption and increasing throughput
- Reactive scheduling to maximize utilisation of the equipment and to minimize energy consumption

Outcomes: Technologies and tools

- Online data analytics for the detection of quality and equipment problems from available sensor information
- New modelling techniques to build models for advanced control and plant-wide optimisation efficiently
- Novel forms of information presentation to managers and operators that lead to a symbiosis of operators and computer-based optimization algorithms
- Software platform that connects to different IT systems and to visualization systems and facilitates the engineering and maintenance of integrated control and optimisation solutions

Expected impact

- 10% improvement of energy and resource efficiency if implemented fully and along the value chains across all applications and sectors
- Contribution to circular economy and industrial symbiosis
- Strategic partnership between the CoPro SMEs and large industrial companies
- High impact on the competitiveness of all individual partners by being first to the technology market; fast followers expected after dissemination and interaction with stakeholders
- Long term growth in employment (40 jobs 5 years after project end) at technology providing partner SMEs
- Economic leverage in the time of 3 years after the project end at least by a factor of 5
- Academic training and education via R&D and courses

Key expected sustainability impacts

Estimated impacts for broad deployment by 2030 (relative to 2015)

Indicator	Expected Impact
Reduction in greenhouse gas (GHG) emissions	4%
Reduction of the use of energy from non-renewable sources	2-10%
Waste minimization (in specific cases)	25%
Reduction of fresh water consumption (where applicable)	10%

Exploitation and Outreach

- **Valorisation**
  - Definition of commercialization strategies
  - Contribution to standards
  - Support of start-ups
  - Analysis of alliances
- **Outreach**
  - Publications
  - Feasibility studies
  - Exchange with industrial stakeholders
  - Seminars, workshops, trade-fairs

Contacts

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  https://www.researchgate.net/project/CoPro-Coordinated-Production-for-Better-Resource-Efficiency