



DryFiciency - Waste Heat Recovery in Industrial Drying Processes



Grant Agreement No 723576 - Energy Efficiency
Innovation Action H2020-EE-2016-2017

www.dry-f.eu



The DryFiciency Partners



Austrian Institute of Technology,
Project Coordinator, Austria



Bitzer Kühlmaschinenbau
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EPCON Evaporation
Technology AS, Norway



European Heat Pump
Association, Belgium



ROTREX AS, Denmark



SINTEF ENERGI AS,
Norway



Viking Heat Engines AS,
Norway



AGRANA STÄRKE GmbH,
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Chemours Deutschland
GmbH, Germany



Fuchs Europe Schmierstoffe
GmbH, Germany



Mars GmbH, Germany



RTDS Association,
Austria



Wienerberger AG,
Austria



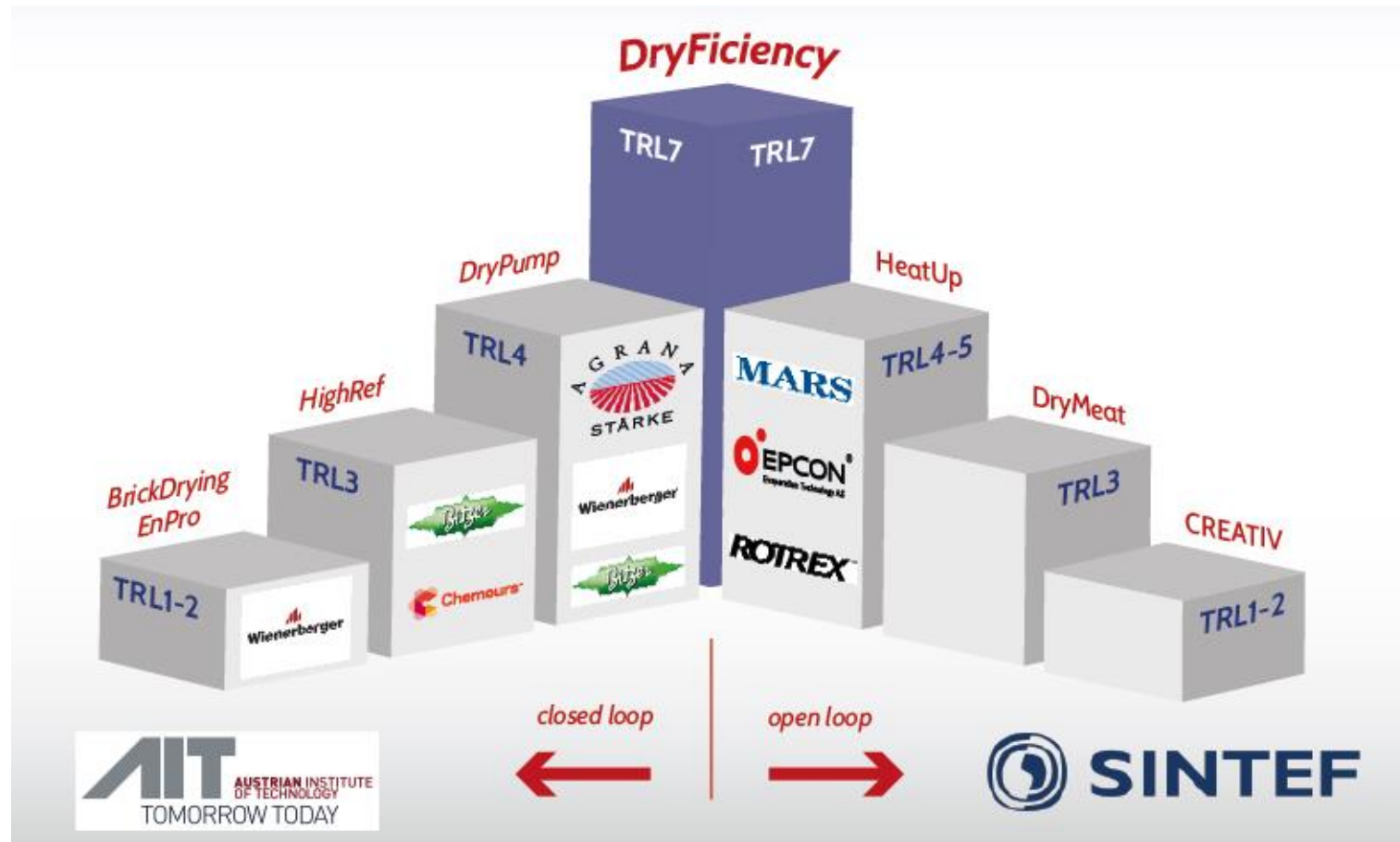
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Motivation of DryFiciency

- to lead the European energy intensive industry to **high energy efficiency** and a **reduction of fossil carbon emissions**
- to **foster competitiveness**, improve security of energy supply and **promote sustainable production** in Europe.
- By **making use of waste heat potentials** of industrial drying and dehydration processes, the most energy intensive and wide-spread processes in a number of industrial sectors

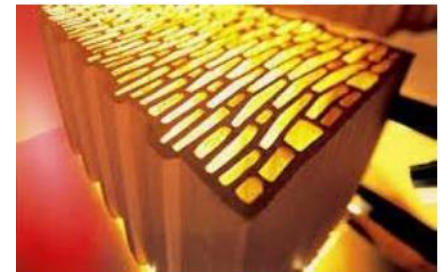


TRL7 – Background R&D



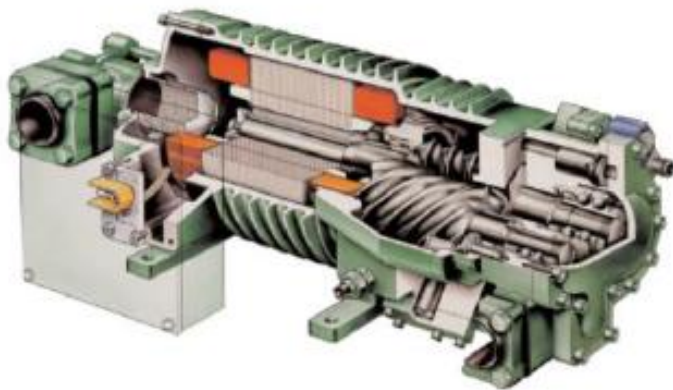
Key goals of DryFiciency

- **Reduction of specific energy consumption** by 60-80 % for drying/dehydration/evaporation processes, by recovering of waste heat
- Phase-in of renewable energy sources into thermal processes ideally resulting in **CO₂-free production**
- Development of **cost-efficient high temperature industrial heat pumps** for industrial thermal processes with minimum global warming potential (GWP) & minimum negative environmental impact
- **Increasing competitiveness** of the European industry
- Become the **leading pioneers** by being the first to deliver to market



Technical objective of DryFiciency

- To elaborate technically and economically **viable solutions for upgrading idle waste heat streams to process heat streams** at higher temperature levels up to 180°C
- Key elements of the solution are **three advanced high temperature vapour compression heat pumps**
 - => a closed loop heat pump for air drying processes and
 - => an open loop heat pump for steam driven drying processes



Research Approach of DryFiciency

Research Approach of DryFiciency

WP1:
Boundaries
WP2:
Components

Component Scale: Key Components

- Determination of boundary conditions
- Definition of performance indicators
- Development and adaption of key components (compressor, bearings, lubricant, etc)

Phase 1
(M1 - M20)

WP3:
Heatpumps

Unit Scale: Heat Pump Packages

- Development and design
- Ordering and assembling
- Function and quality test

Phase 2
(M1 - M28)

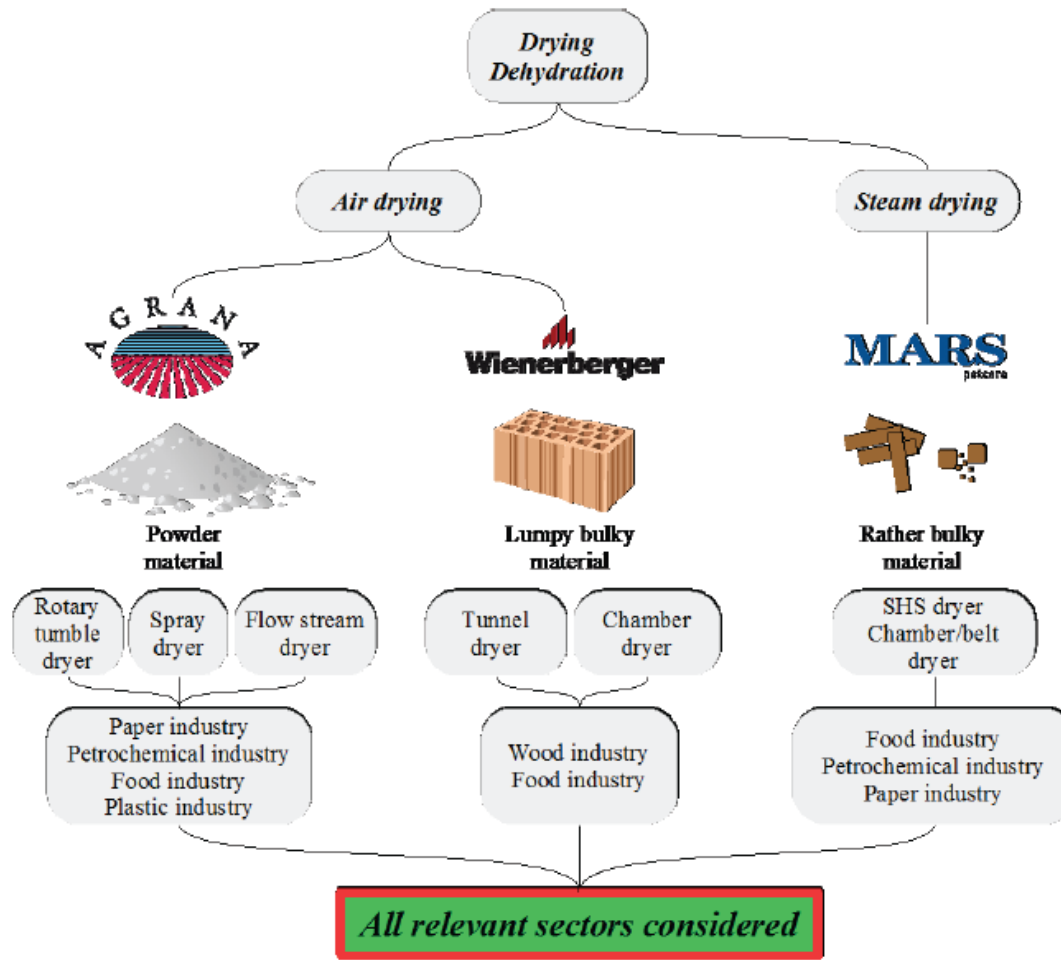
WP4:
System
Integration
WP5:
Demonstrations

Plant Scale: Demonstration Plants

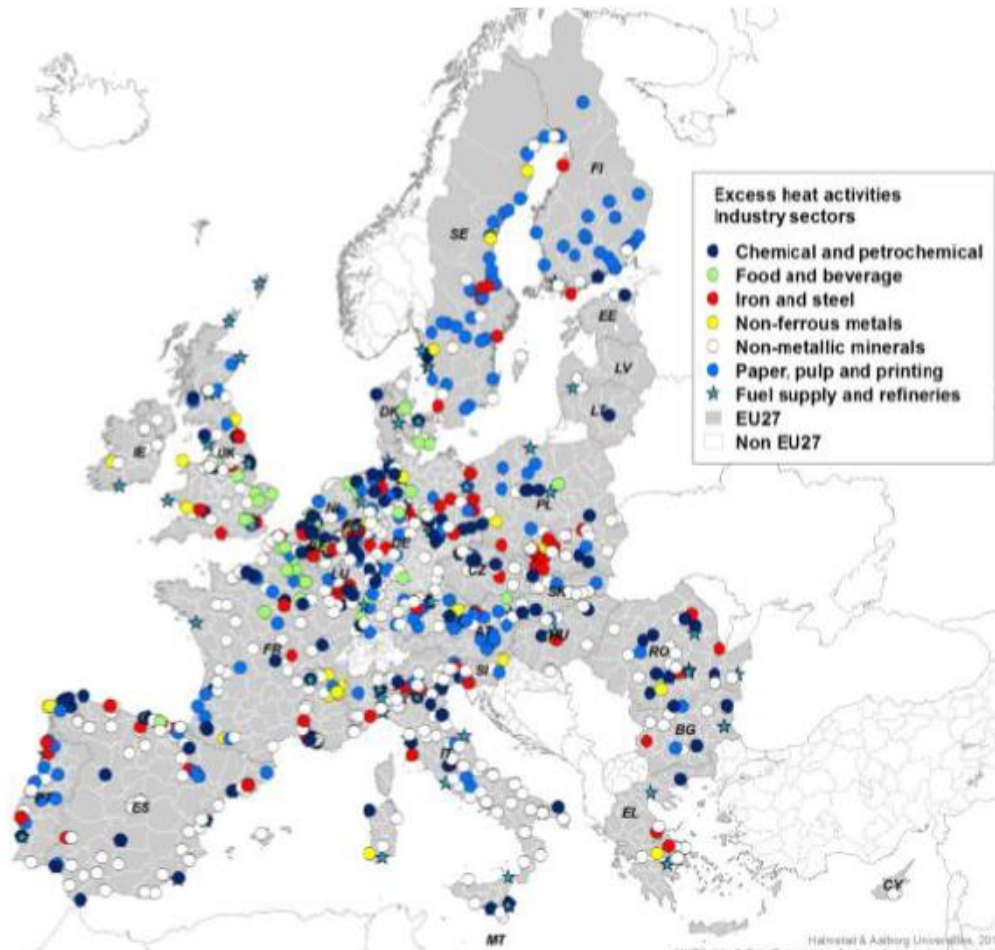
- Planning and layouting
- Design and construction
- Commissioning and test run
- Operation of demonstrators
- Validation of energy savings

Phase 3
(M30 - M48)

Industrial sectors of DryFiciency



DryFiciency – vast market potential





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