

# Energy Flexibility

A solution for the European Energy Transition



# *SynEnergie*

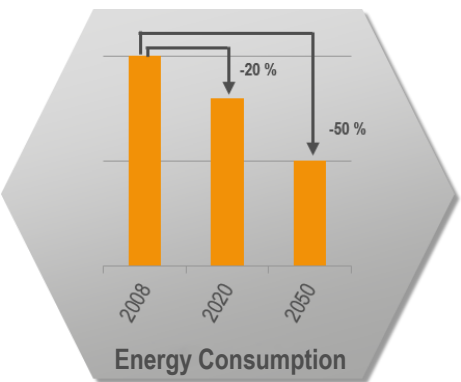
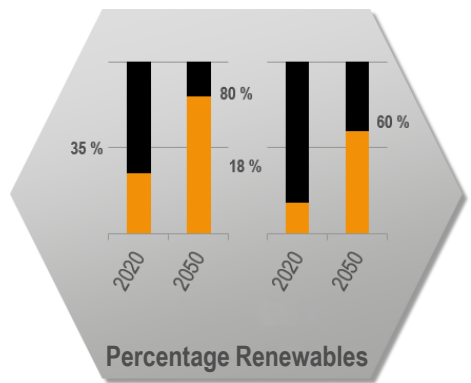
*Synchronized and energy-adaptive  
Production Technology for the flexible  
Adjustment of Manufacturing Processes  
to a volatile Energy Supply.*

- 1** The German Energy Transition
- 2** The Four Kopernikus Projects
- 3** The SynErgie Project - Overview
- 4** The SynErgie Project - Flexibility Measures and their Implementation
- 5** Vision

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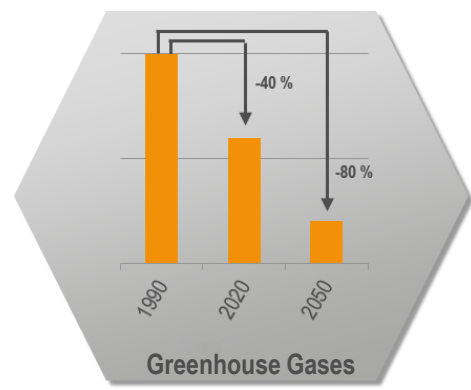
# Goals of the Energy Transition by 2050

Increase in **renewable energies** to **80%** of gross electric power consumption and to **60%** of gross final energy consumption (2020: 35% and 18%).

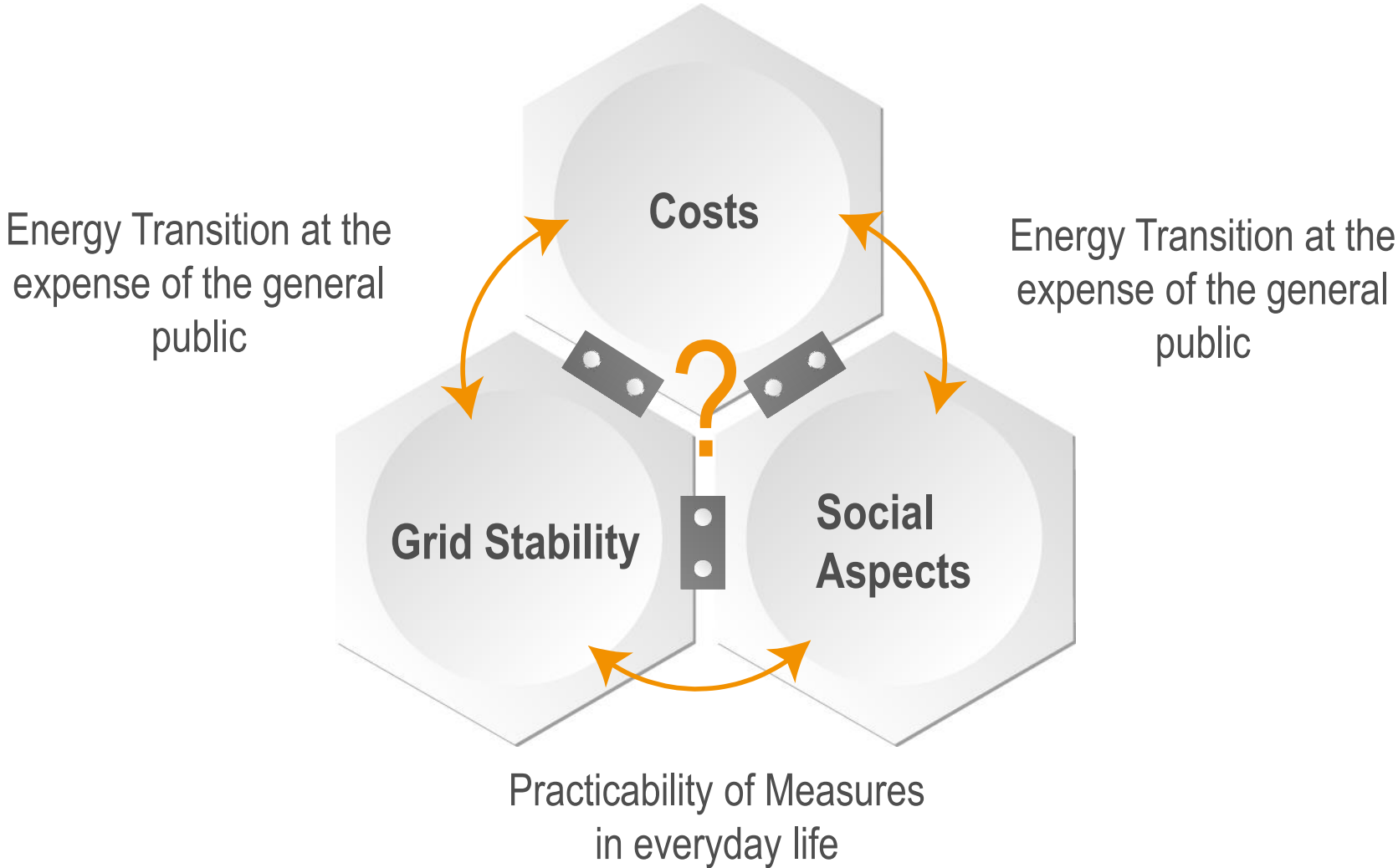


**Reduction of primary energy consumption by 50%** referring to 2008 (2020: 20 %)

Reduction of **emissions** of greenhouse gases by min. **80%** referring to 1990 (2020: 40 %)



# Challenges of the Energy Transition



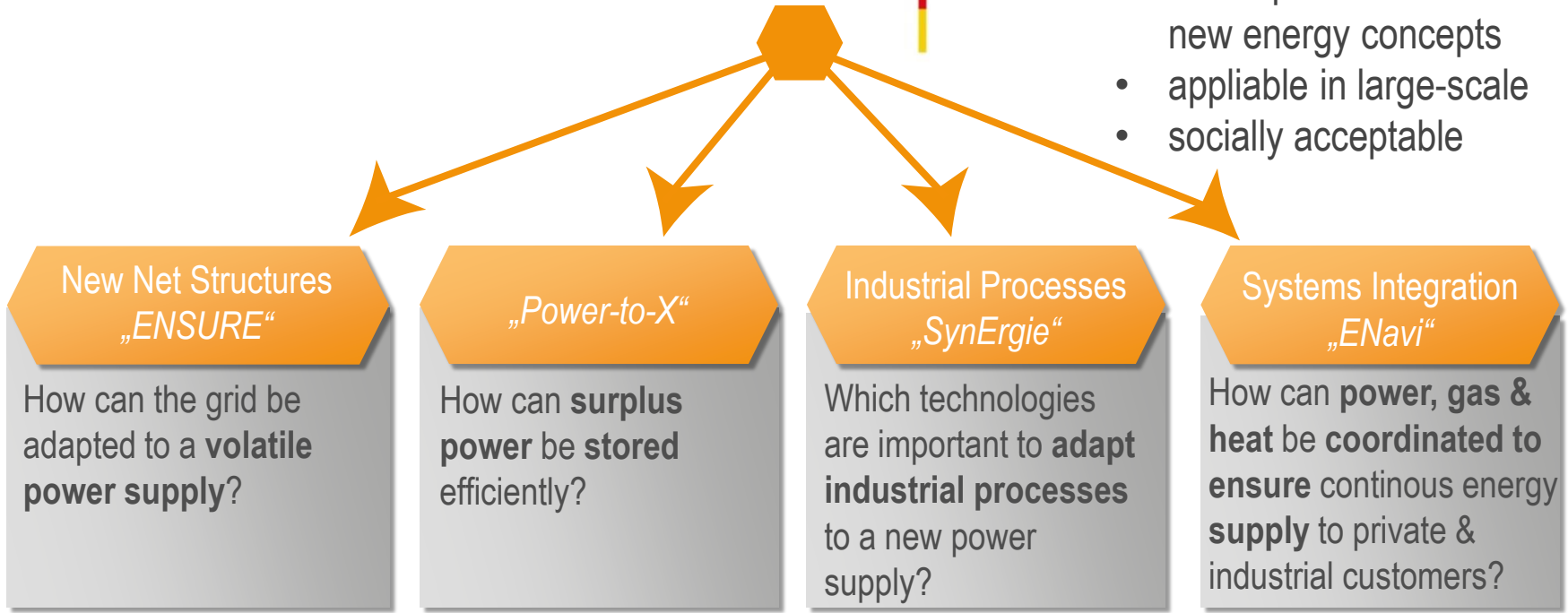
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# 4 Kopernikus-Projects for the Energy Transition in Germany



Federal Ministry of Education and Research

- 400 million Euros in 10 years
- development & launch of 4 new energy concepts
- applicable in large-scale
- socially acceptable



**New Net Structures**  
„ENSURE“

How can the grid be adapted to a **volatile power supply**?

„Power-to-X“

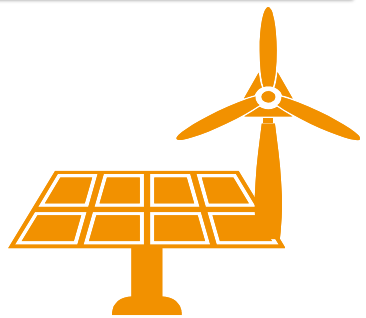
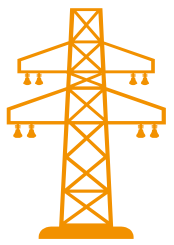
How can **surplus power** be stored efficiently?

**Industrial Processes**  
„SynErgie“

Which technologies are important to **adapt industrial processes** to a new power supply?

**Systems Integration**  
„ENavi“

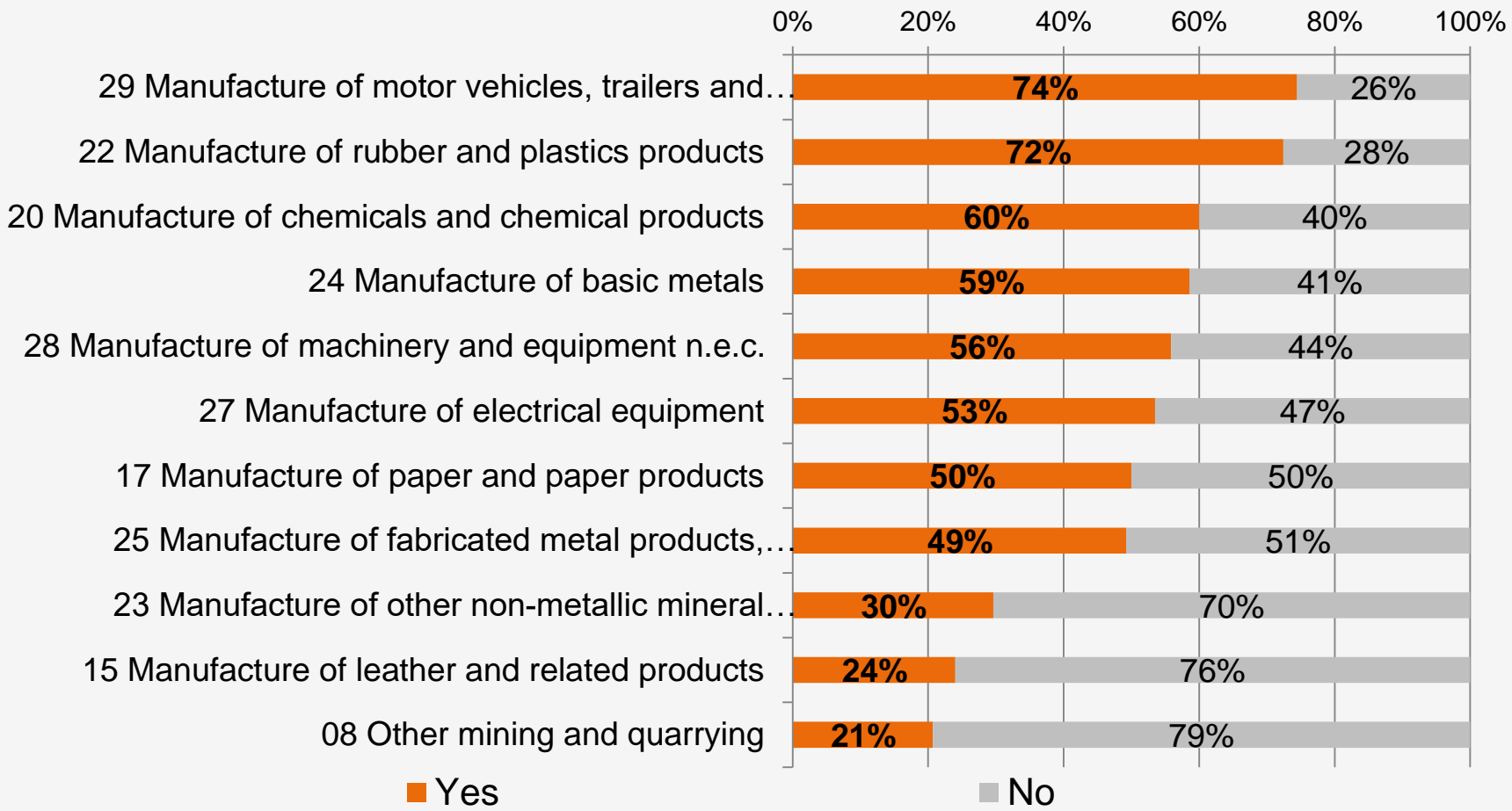
How can **power, gas & heat** be coordinated to **ensure** continuous energy supply to private & industrial customers?



Source: The SynErgie Project

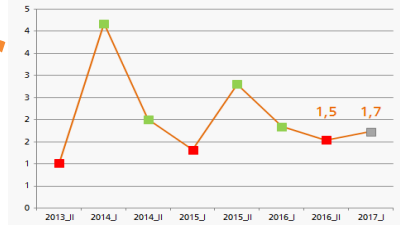
# The Energy Efficiency Barometer of Industry (#EEBarometer)

**Do you believe that making the energy demand flexible in your company will become relevant in the future? ? (n=599, n'=451)**





# The Energy Efficiency Barometer of Industry (#EEBarometer)



Open until 31 December: [www.eep.uni-stuttgart.de/eeei](http://www.eep.uni-stuttgart.de/eeei)



- Reduce **unknowns, risks and uncertainties**
- informs **decision makers** about actual situation and **needs of the economy**
- analyses the impact and effectivity of **pilot and development schemes**
- informs **finance sector** and **service providers** about **investment** mechanisms
- shows where **companies** stand
- delivers evidence on where and how to act to increase energy productivity
- allows, in the medium-term, cross-country, sector-specific analyses -> TOP-Runner

Launching #EEBarometer for Russian speaking countries

The #EEBarometer is covering 88 countries in their 10 native languages

**United Kingdom:**



**Germany:**



**Canada:**



**Sweden:**



**United States:**



**Mexico:**



**Poland:**



■ Barometer established

■ Country partners

■ Language partners

■ Partnership under investigation

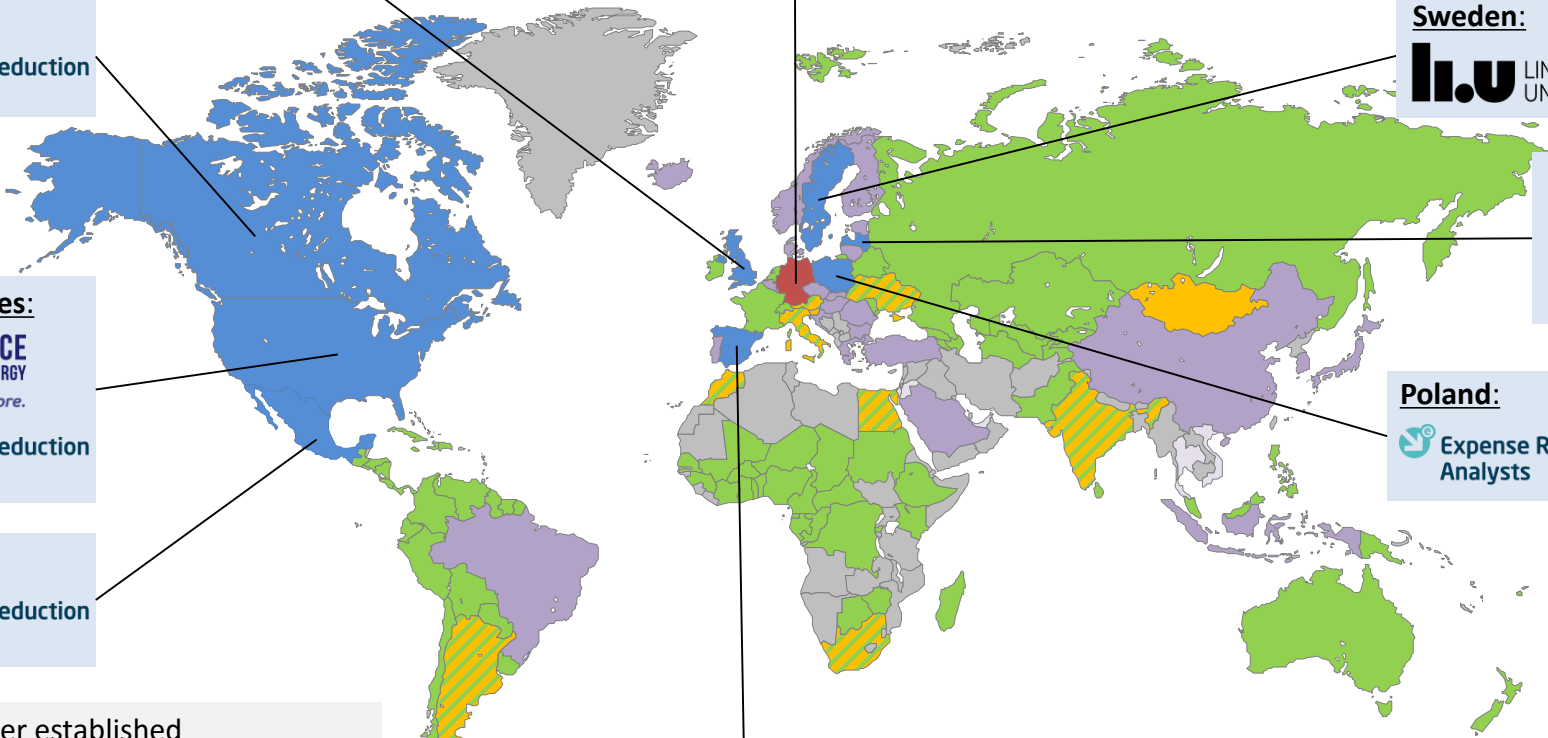
■ Target country group A (G20+EEA)

■ Target country group B

**Spain:**



**World:**



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# SynErgie

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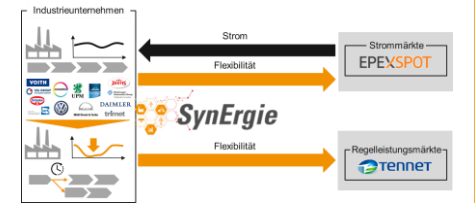
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# Vision of the consortium: Supply of full flexibility of industrial companies

## Vision

In return for an incentive compatible remuneration, Industrial companies supply **maximal flexibility**



Companies are proactive on the energy market „selling flexibility“

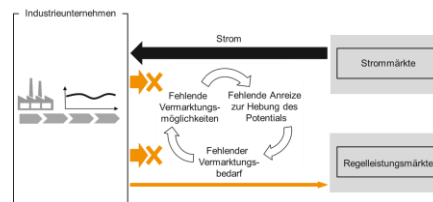
New / adjusted technologies enable energy flexibility

Cross cutting technologies are adjusted to energy flexible operations

Energy data management from market estimation, via PPCS\* to MT\*

state of today

Industrial companies hardly only act as consumers






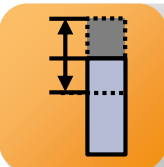




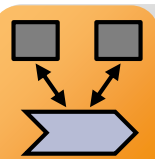
MT = machine tool  
PPCS = Production planning and control system

Source: The SynErgie Project

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  - 4.2** Focus: Industry - Best Practice C&C Bark
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# Categories of flexibility arrangement

-  Change source of energy
-  Storage energy
-  Pause process
-  Adapt process parameter
-  Reorder production sequence
-  Adapt time of shifts
-  Reschedule production start
-  Shift idle times
-  Reorder machine loading

[Graßl 2014]



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## Overall Overview

**Since more than 30 years TRIMET is a independent family business:**

- Founded 1985
- Locations 8
- Employees 3000
- Apprentices 150
- Sales volume 1,7 bn. € \*)
- Investments 104 mn. € \*)
- Equity 60 % \*)

\*) fiscal year 2016/2017

## Core Competence:

**Production: 770 kt/a**

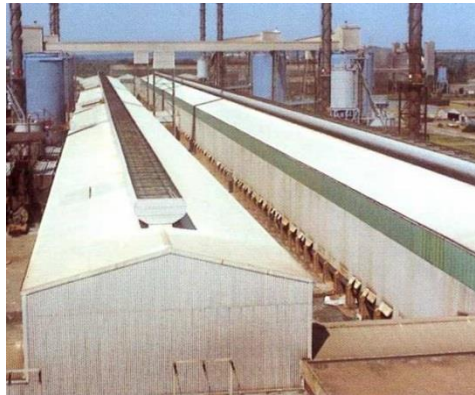
- Aluminium for the production of:
  - e.g. slabs, extrusion billets, foundry alloys, wire rod ...
- Material for a variety of applications:
  - e.g. automobile, package, electronics, engineering,...

Basic principle: Electro-intensive industry processes as a buffer between

## Renewable Energy



## Virtual battery



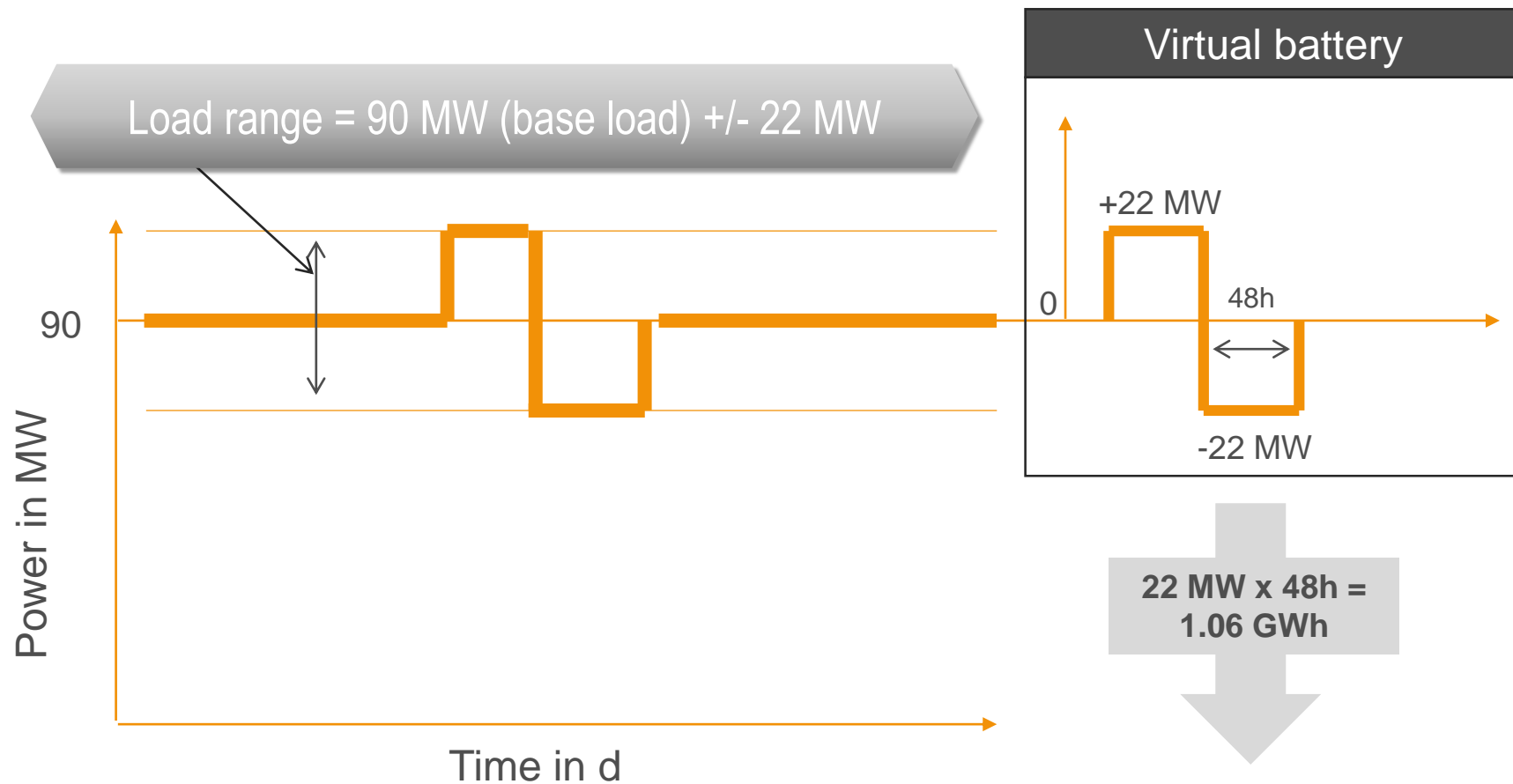
## Demand side



The use of a virtual battery to balance between volatile power production and demand oriented consumption

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This capacity is comparable to an average size pump storage hydro power station

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## Overall Overview

### C&C Bark is a typical SME

- Employees < 100
- Sales volume < 15 Mio. €
- Family enterprise in third generation with proprietor-director

## Core Competence:

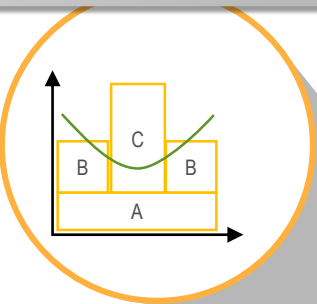
### C&C Bark is quality leader in the field of magnesium pressure die casting

- Mold and tool design and construction
- Magnesium pressure die casting mold in hot and cold chamber procedure; part weights between 1g – 5.000g
- CNC-processing
- Coating
- Assembling fabrication

# Energy-Flexible magnesium casting machine

## Determination of potentials of different arrangement for the dual fuel casting machine

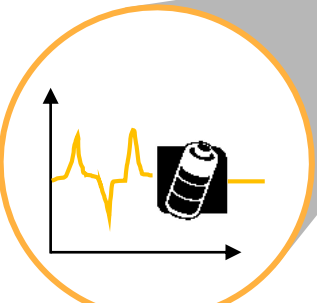
flexible planning of production



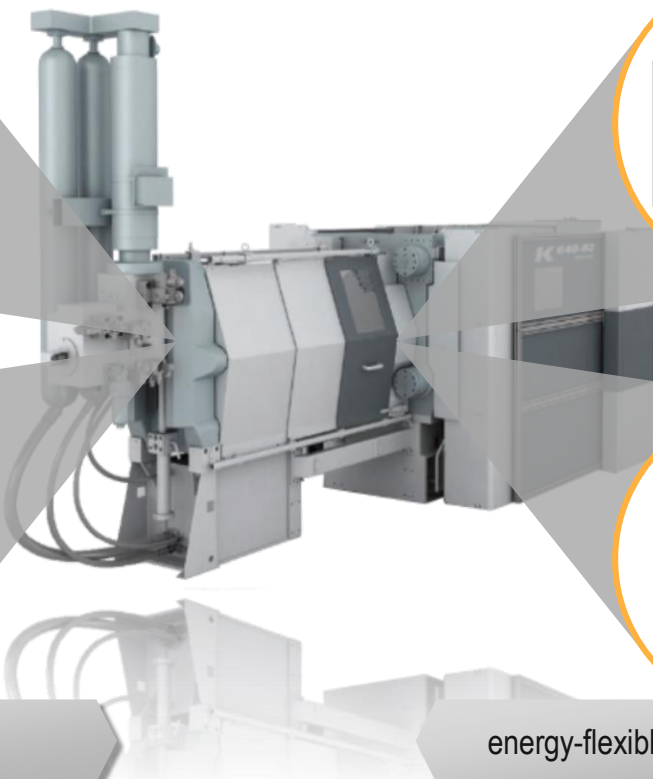
flexible magnesium melt



peak load grading



energy-flexible power supply



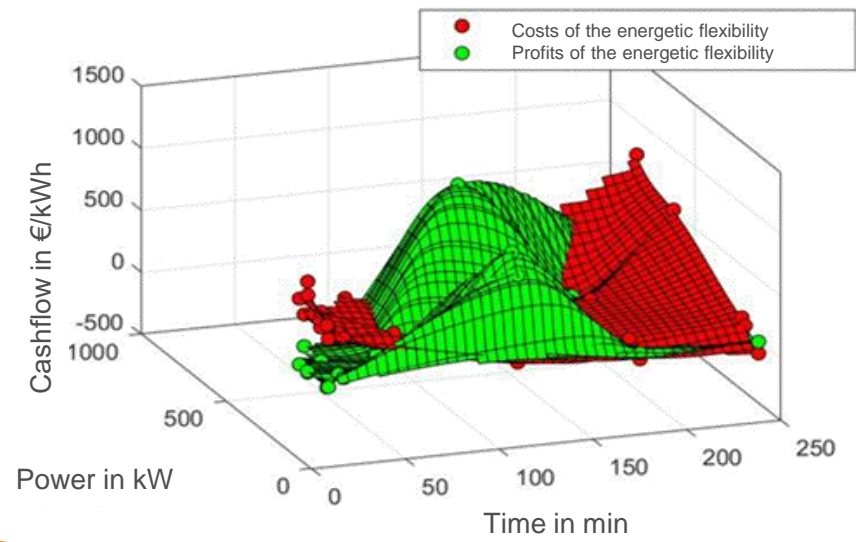
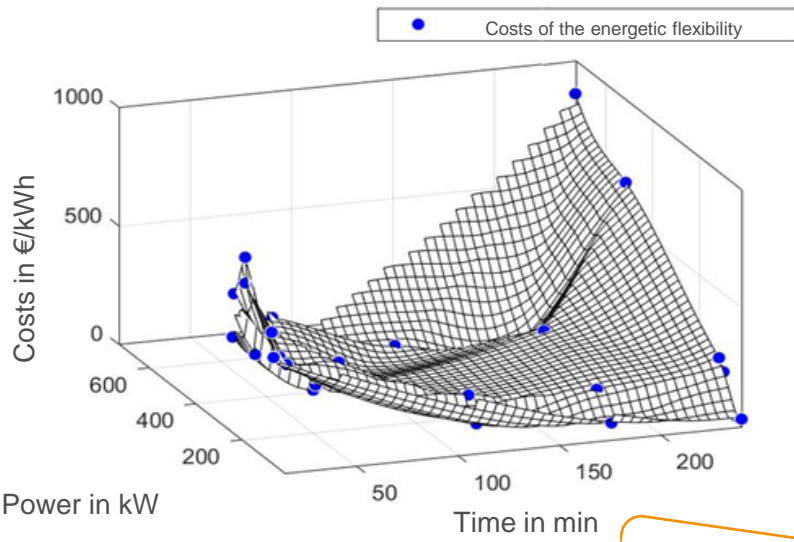
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# Identification of economic benefits

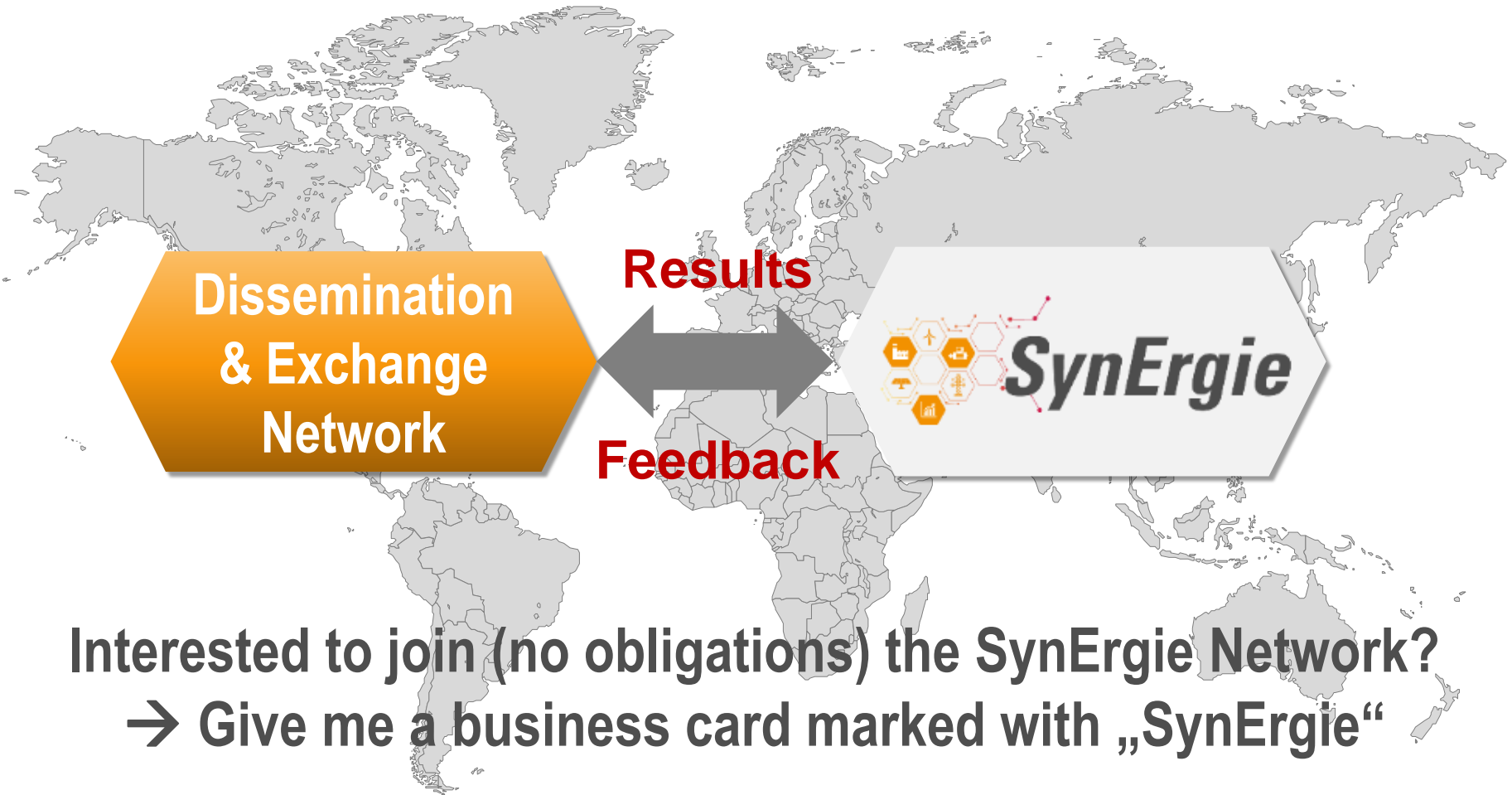
Potential surface  $f(\Delta P, \Delta t, \Delta K)$   
 technical potential

Visualizing of economic potential through  
 combining of cost and proceed surfaces



Exemplary data

# Establishing a Network on Energy Flexibility



Interested to join (no obligations) the SynErgie Network?  
→ Give me a business card marked with „SynErgie“



We are grateful for the outstanding support by the



**Federal Ministry of Education and Research**



and the project management organization



**Projektträger Jülich (PtJ)**

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**Thank you!**

We are happy to respond to your questions.



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