Copper Alliance

The role of electricity in heating and cooling
INDUSTRY SECTOR

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July 15, 2015

DOES A HIGHLY ELECTRIFIED INDUSTRY MAKE SENSE FOR SOCIETY?

Can industry really be highly powered by electricity?

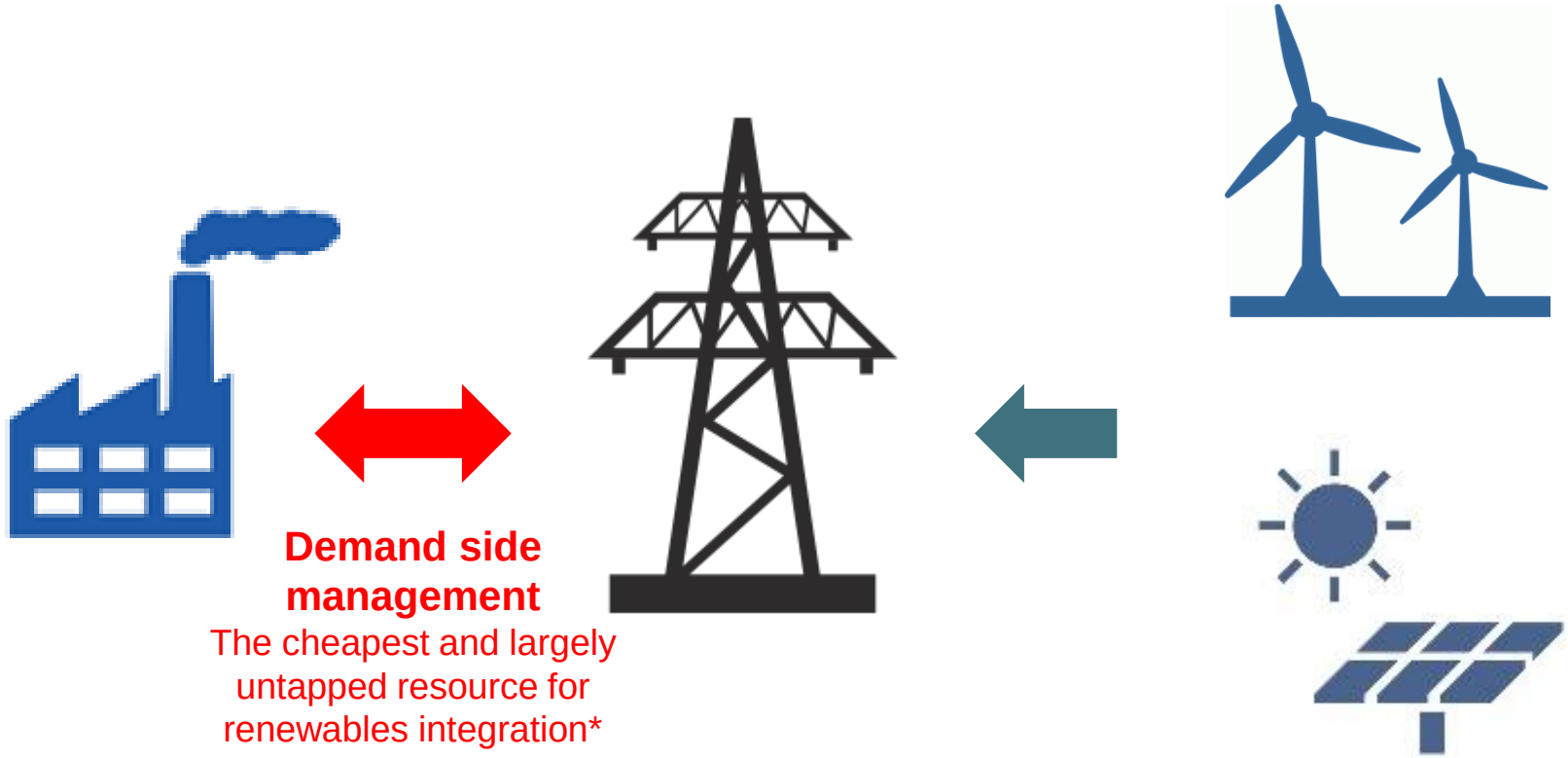
Cu

Main needs of the industry

	Motive power	Thermal processing
		
Fuels		✓
Electricity	✓	**Electro-processing of materials**

Yes, industry can be highly powered by electricity

Can the electricity system cope with a highly electrified industry?



Demand side management

The cheapest and largely untapped resource for renewables integration*

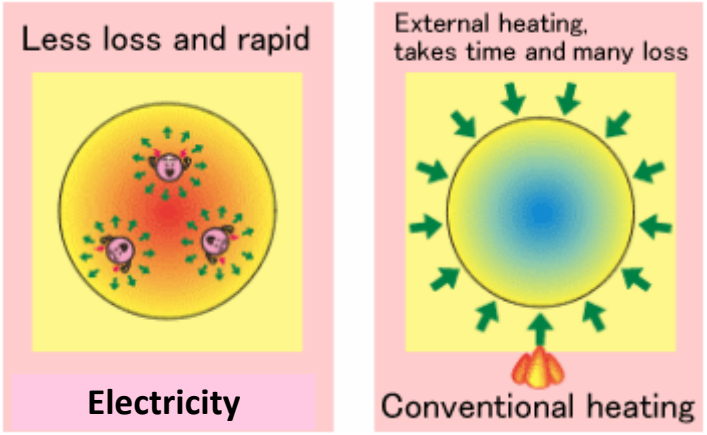
The electricity system can not only cope with a highly electrified industry, but it actually needs industrial flexibility to accommodate renewables

* Integration of Renewable Energy in Europe – 12 June 2014 – Imperial College London, NERA, DNV-GL
https://ec.europa.eu/energy/sites/ener/files/documents/201406_report_renewables_integration_europe.pdf

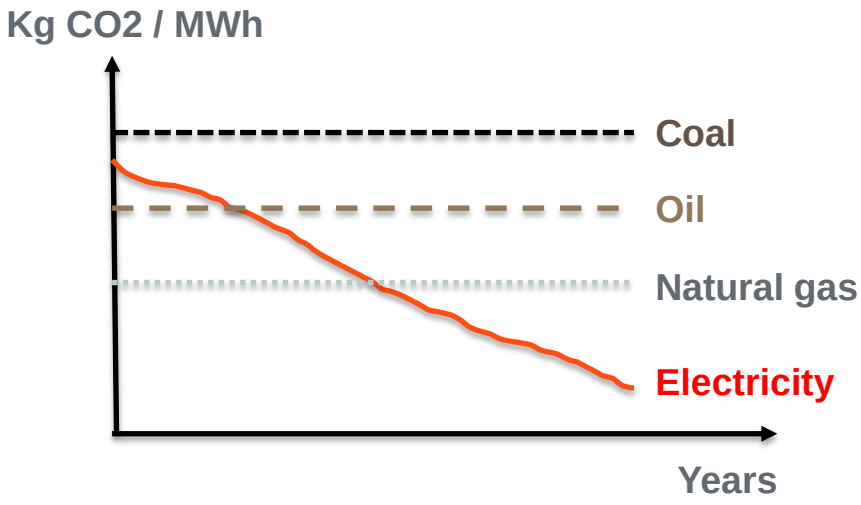
ELECTRO-PROCESSING OF MATERIALS (EPM)

EPM offers significant energy savings and higher environmental performance

Electricity: higher end-use efficiency

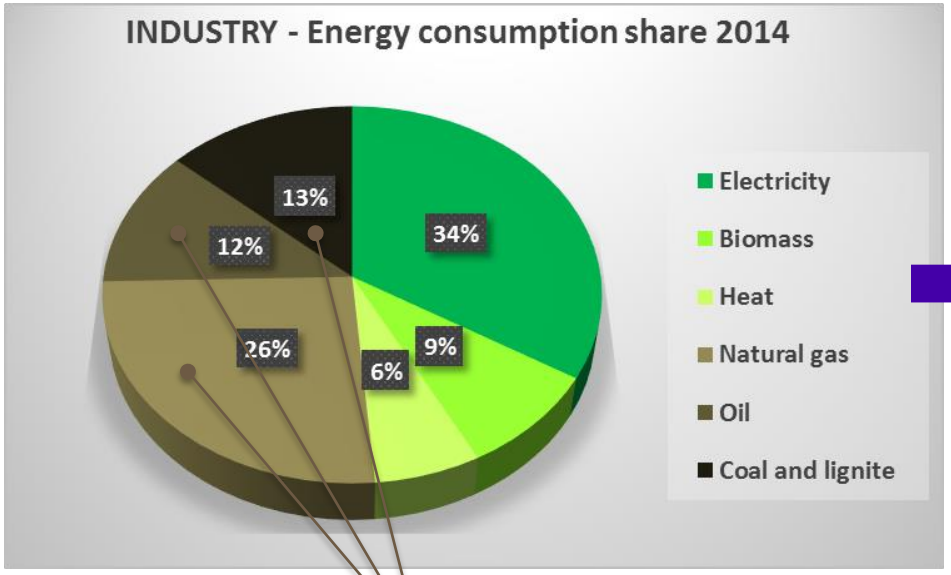


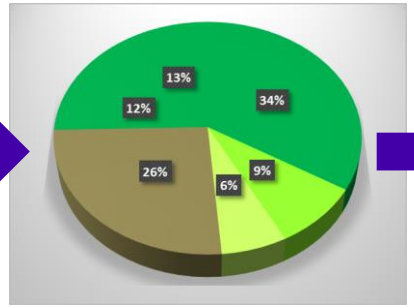
Electricity: increasingly decarbonized

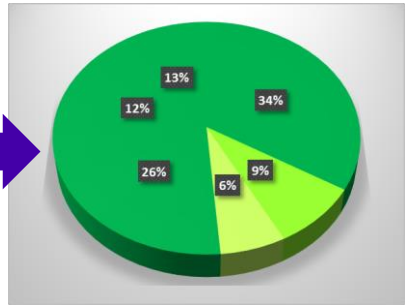


Electricity share could significantly increase in industry

Current EPM penetration rate: 10%
Potential EPM penetration rate: >70%







470 Mtons CO2 / year

Hihgly DECARBONIZED industry

EPM technology is available

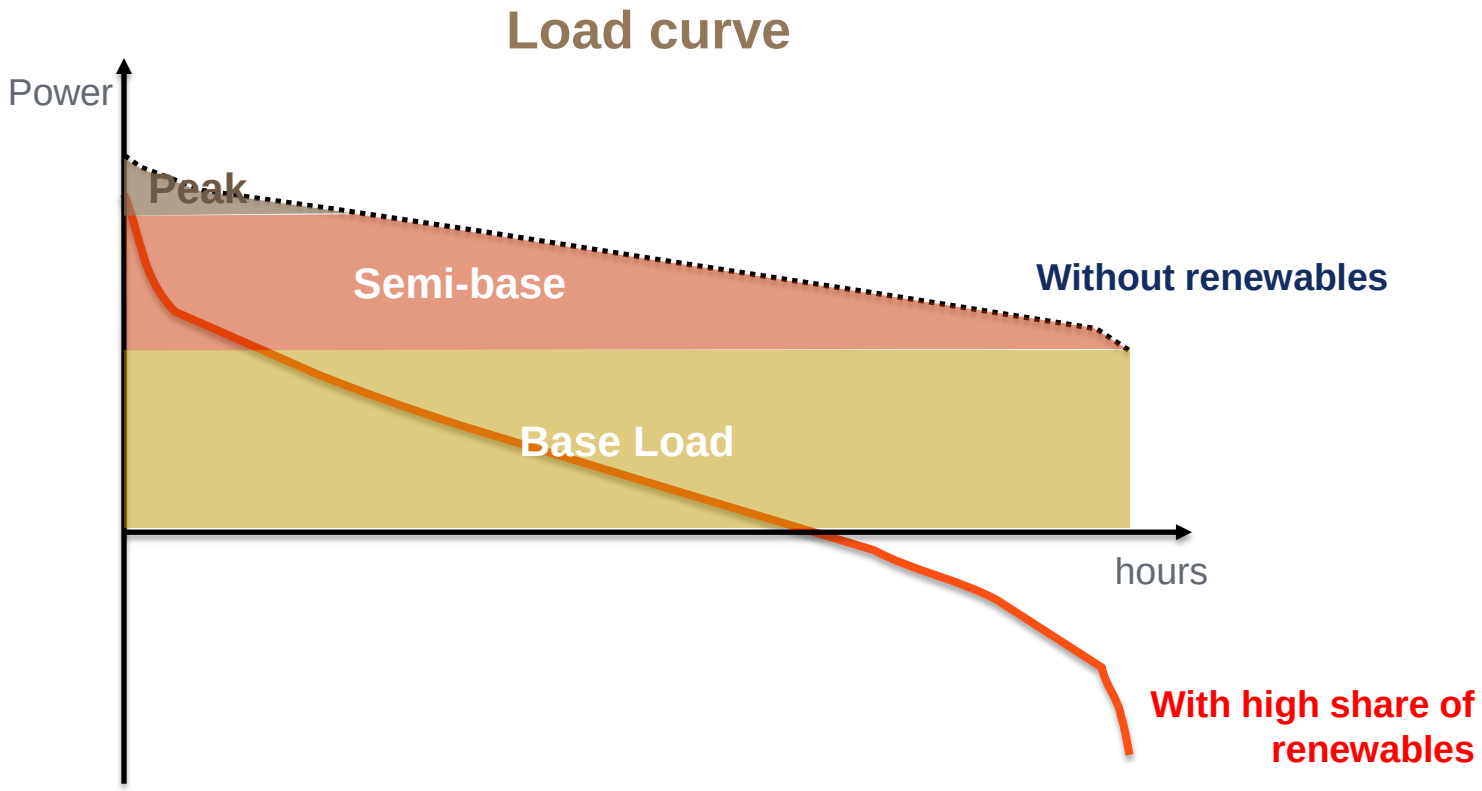
- **Resistance** (Direct, Indirect)
- **Infrared**
- **Induction**
- **Dielectric** (Microwave, Radiofrequency)
- **Electric arc /** Plasma arc
- **Electron beam**
- **High temperature heat pumps** (Residual heat recovery)

EPM economic viability

- **Upfront cost:** no burden for electrical technologies
- **Operational cost:** relative price of electricity vs fuel is the key aspect
- **Collateral benefits:**
  - improved productivity
  - better control, higher quality products
  - easier automation and monitoring

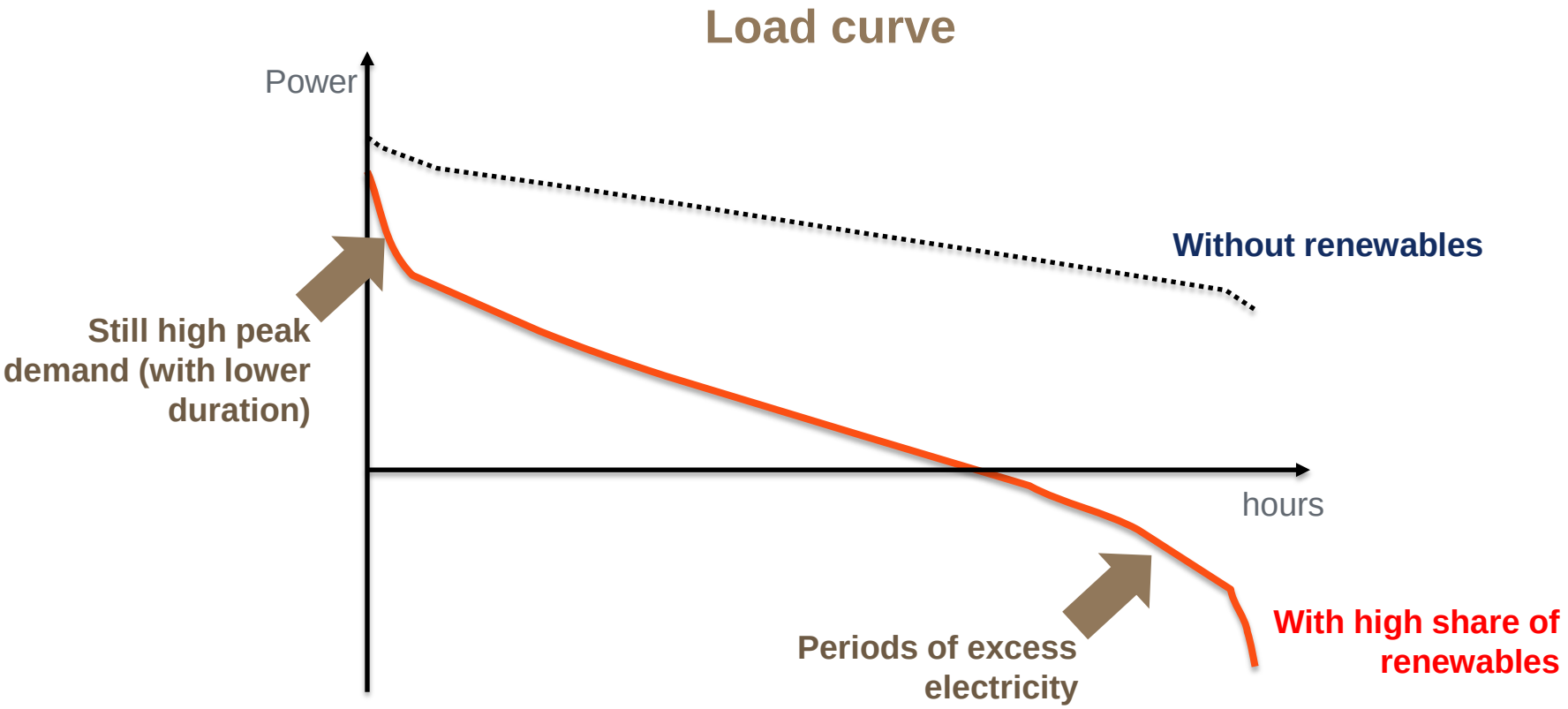
HOW A HIGHLY ELECTRIFIED INDUSTRY CAN SUPPORT THE ELECTRICITY SYSTEM?

Challenges of a high renewable energy mix



http://www.leonardo-energy.org/white-paper/flexibility-options-electricity-systems

Challenges of a high renewable energy mix



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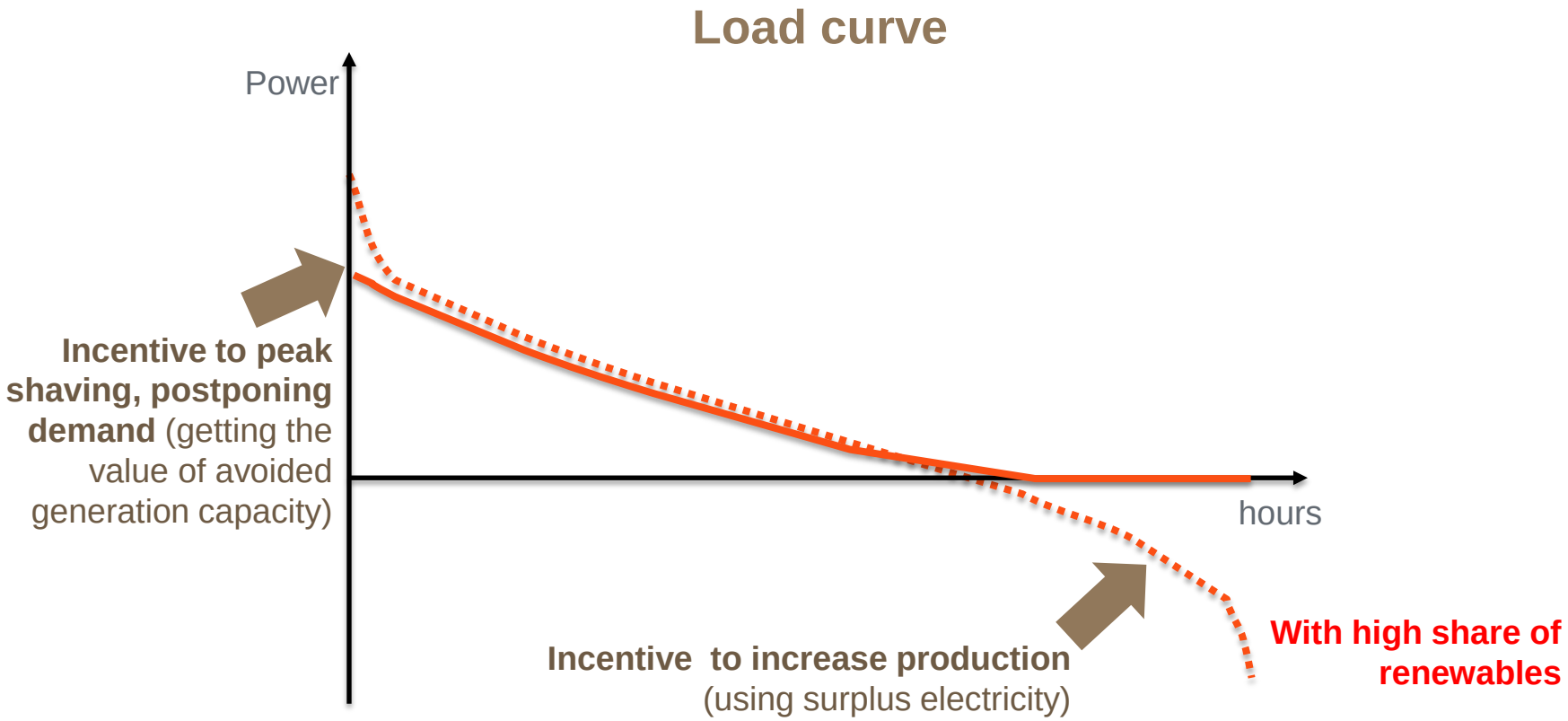
How can industry help and benefit from the new situation?



Exploit Demand Side Management (DSM) under new business models

IndustRE - H2020 Project
Industrial flexibility for renewables integration

- **Present suitable business models and facilitate their adoption**
- **Formulate policy recommendations**
- **Quantify the potential benefits for the power system**
- **Move industry and variable renewable energy plant operators into action**

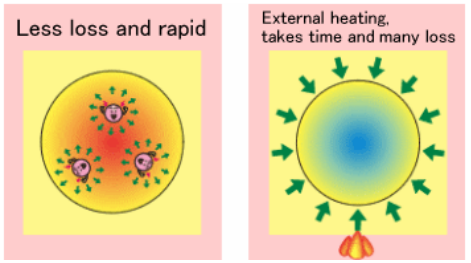
www.industre.eu

2015 - 2018

Conclusion: a highly electrified industry does make sense for society

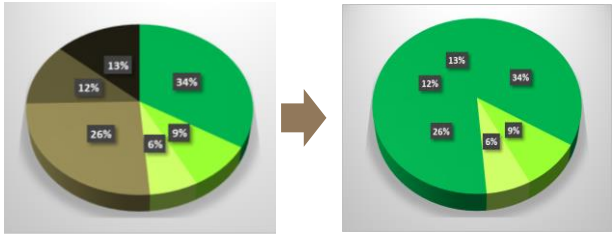
1

Reduces the primary energy demand through the higher end-use efficiency of electricity



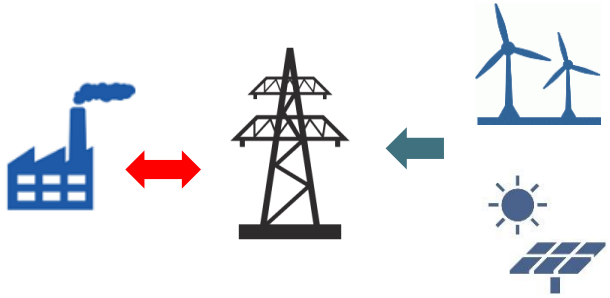
2

Highly reduces the carbon emissions of industry, as the electricity mix goes decarbonized



3

Supports the transition of the electricity system by bringing the flexibility needed for renewables integration



Thank you

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