

Synergies in the integration of energy networks for electricity, gas, heating and cooling

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Structure of the EU energy system, 2014

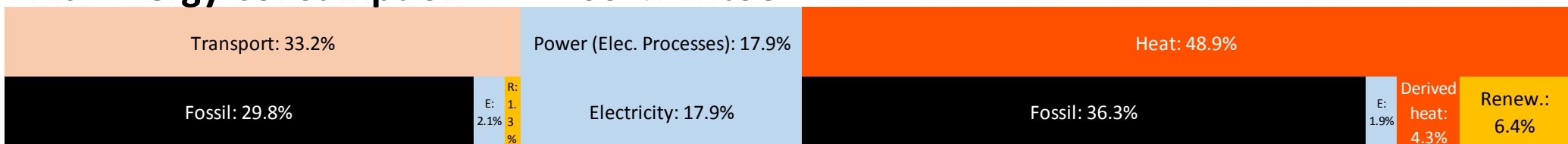
Gross Inland Consumption 1605.9 Mtoe



Final Energy Consumption 1061.7 Mtoe



Final Energy Consumption 1061.7 Mtoe



Source: Eurostat

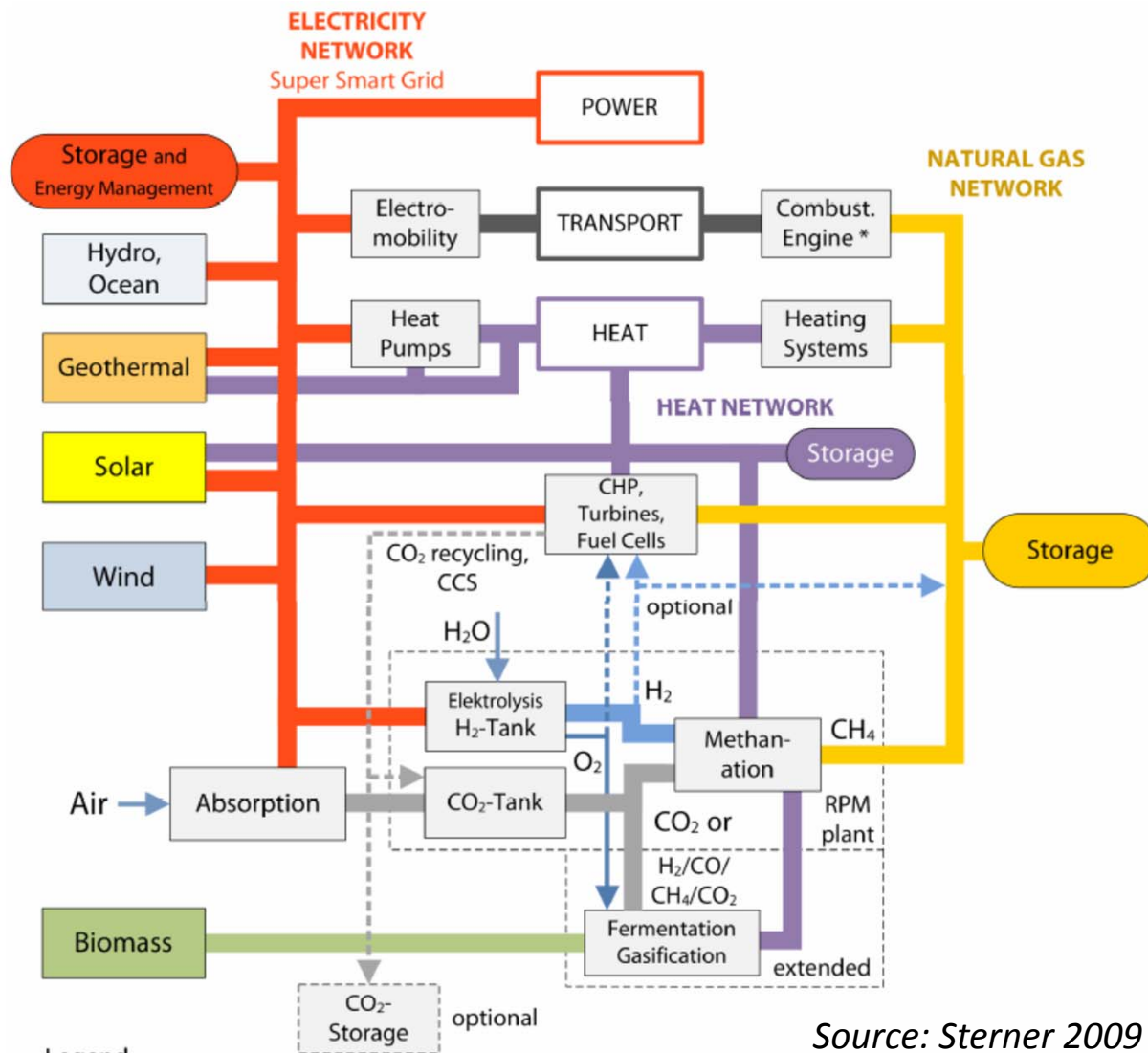
Challenge: Decarbonisation of the energy system

Options: Energy efficiency improvements / Energy savings

CO₂ free energy carriers (Renewables, Nuclear)

Carbon capture and use (CCU), Carbon capture and storage (CCS)

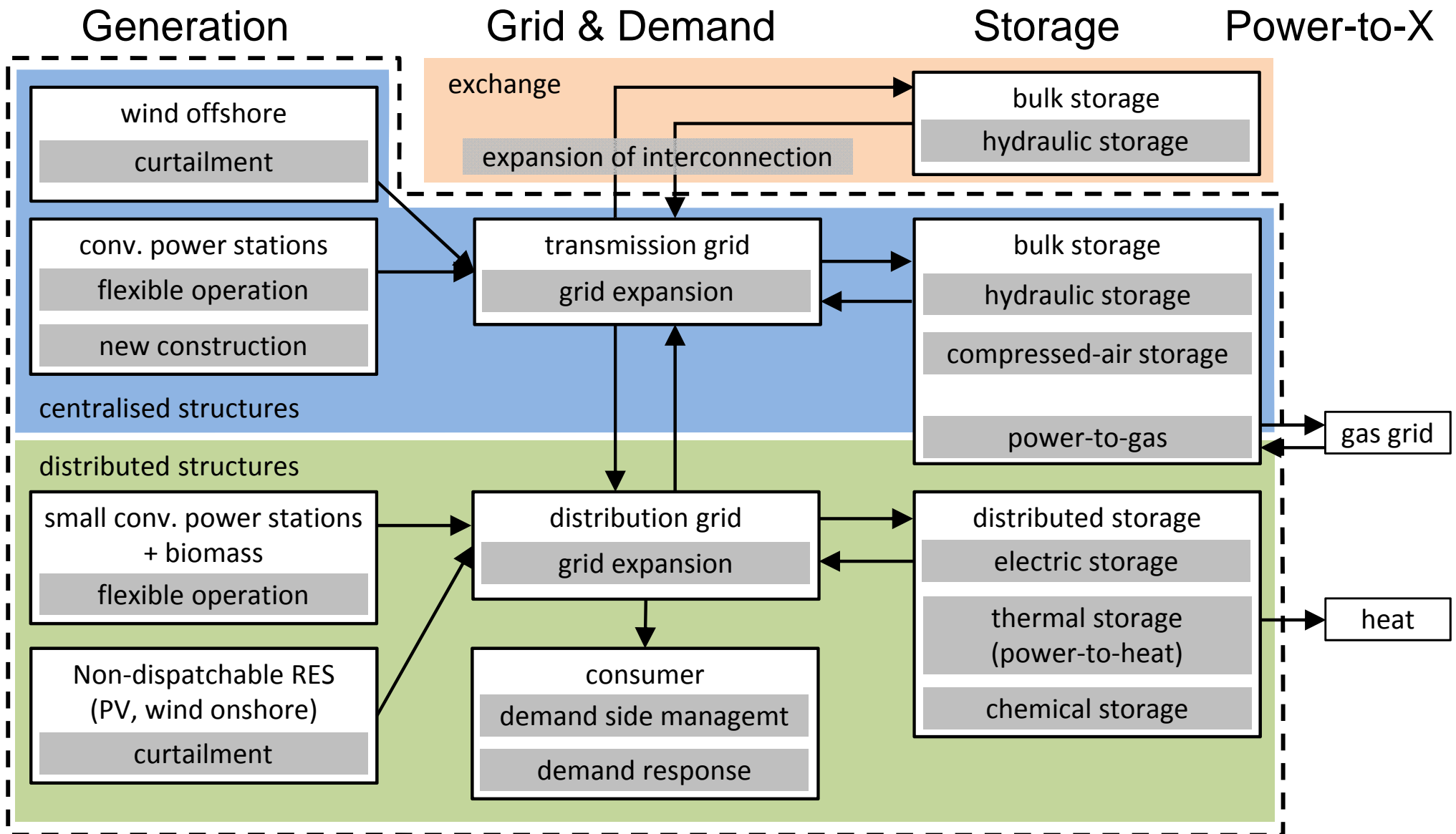
Conceivable design of an integrated energy network system



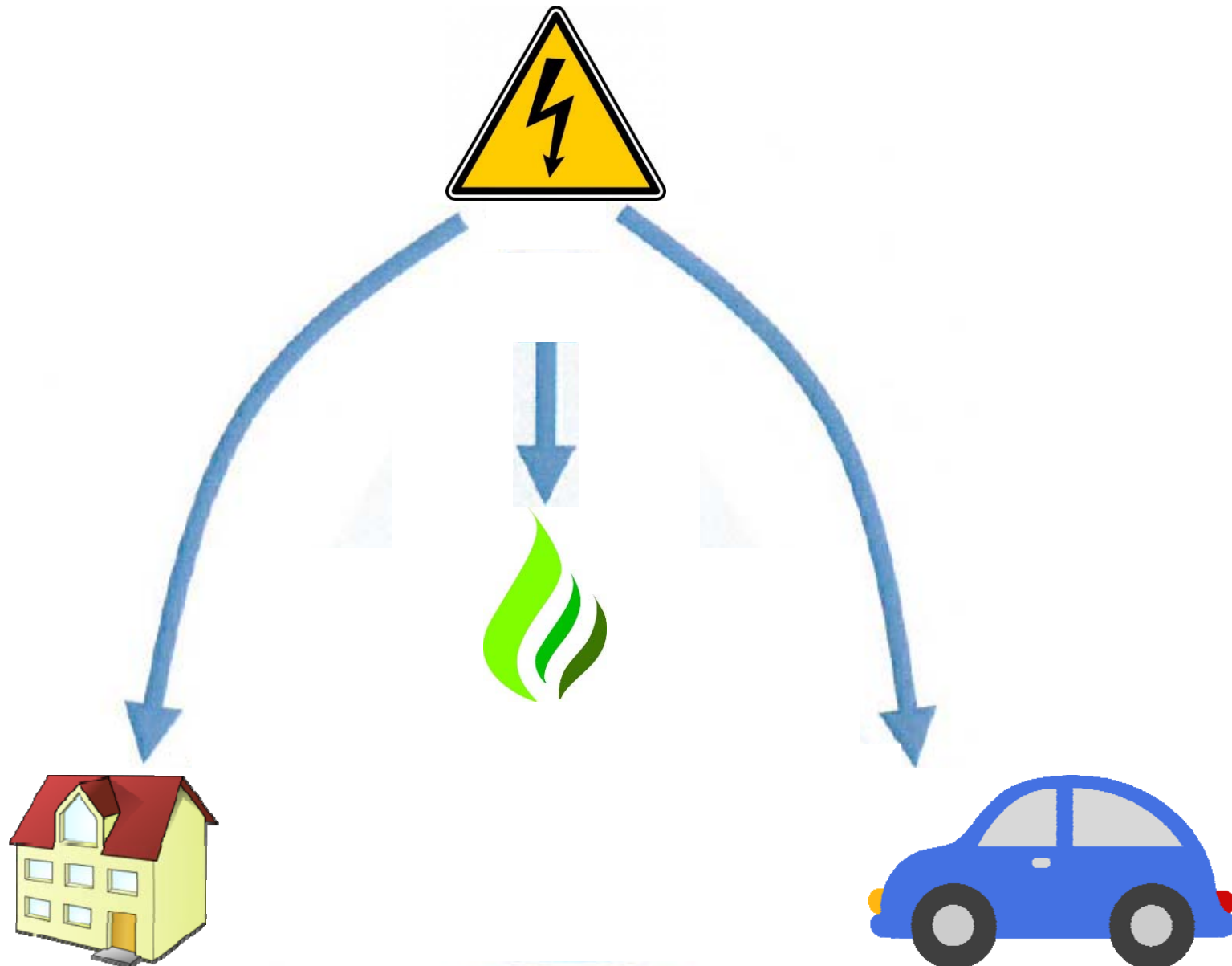
Source: Sterner 2009

- The integration of different networks (electricity, gas, heating, cooling), so called hybrid networks, provide a potential for mitigating climate change.
- Interacting networks describe a multi-functional energy system which utilizes the synergies of different technologies and energy forms by optimizing their interactions in operation and to achieve a secure supply.

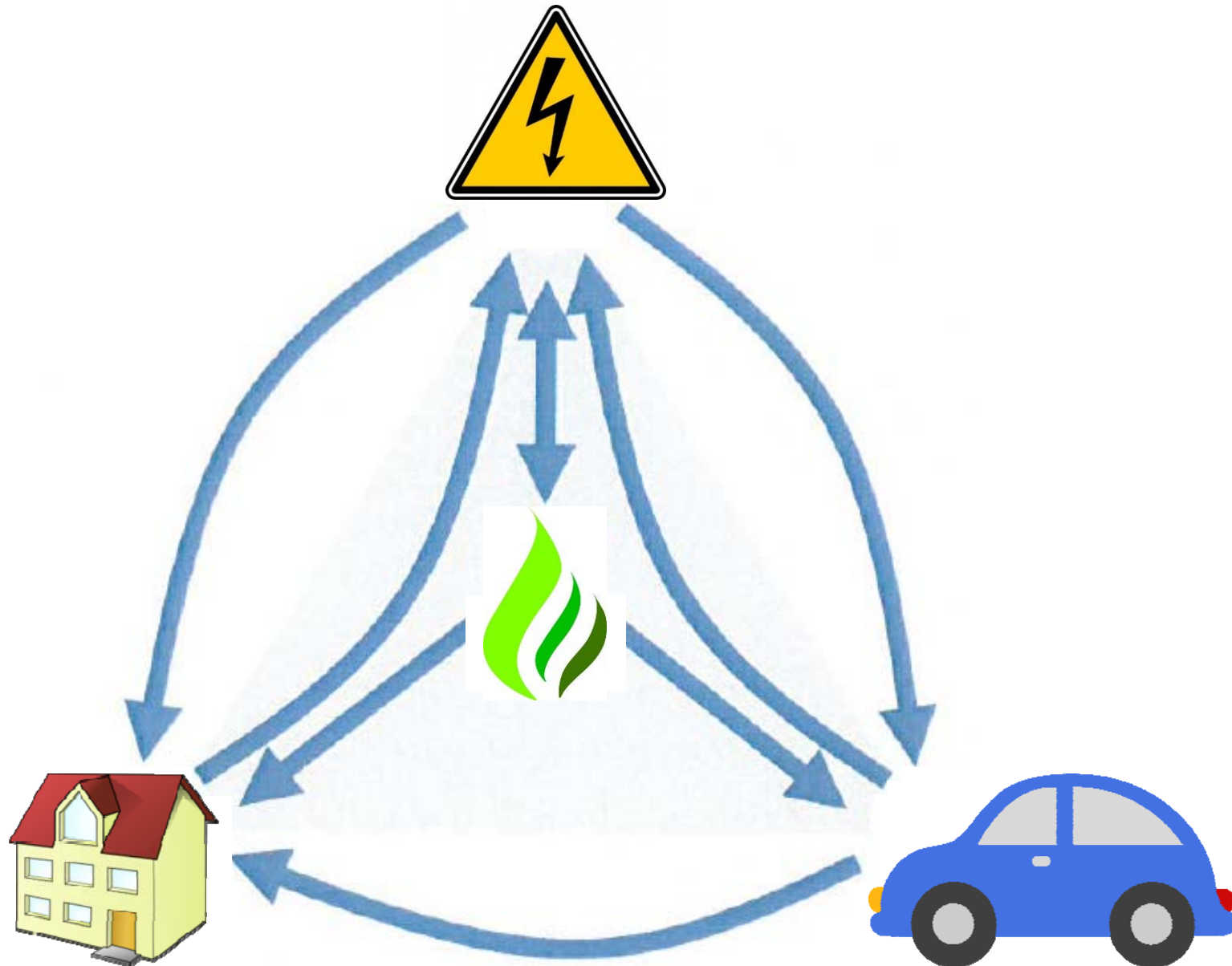
Flexibility options for the electricity system



Power-to-X

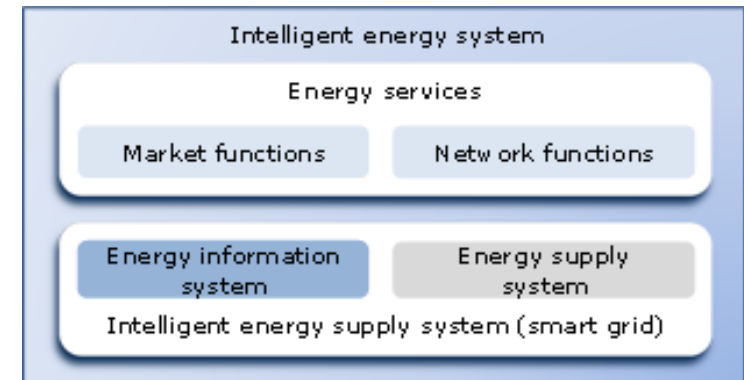


Network of networks



Role of Information and Communication Technologies (ICT)

- ICT will become necessary to support the integration of RES technically and economically into the overall energy system.
- With ICT it will be possible to converge the large and mainly independently operating networks for electricity, heat, gas and mobility into hybrid networks.
- In a modern energy system these must not be optimized separately but simultaneously in order to utilize the synergies by promoting interactions among energy carriers.



The efficient management of the interdependencies between the different networks will be of major importance in the future.

Conclusion

The variety of technologies and their different fields of application illustrate the complexity of an efficient energy system, where various energy forms, generation units and networks interact to promote synergies between each other.

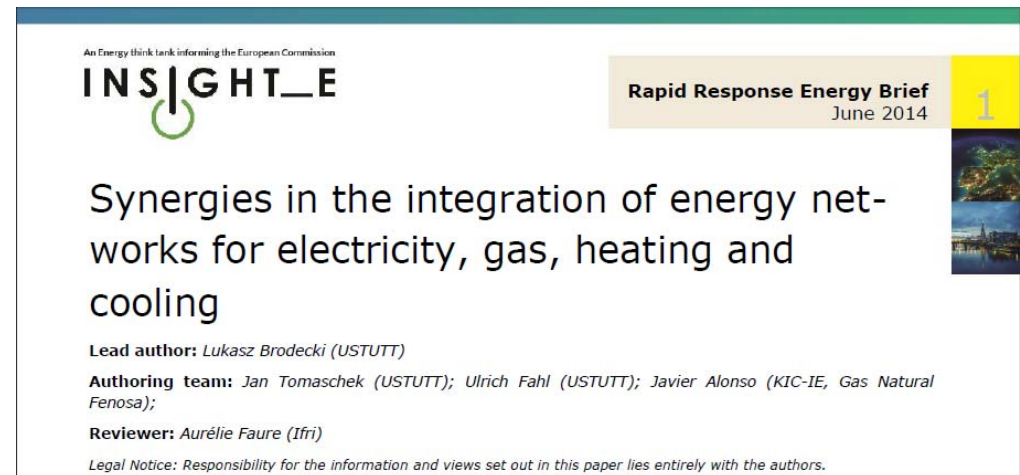
Increased penetration with ICT infrastructure is a prerequisite for coordination processes.

Thank you!

FOR FURTHER INFORMATION:

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