

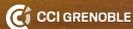
# ON THE VIABILITY OF LOCAL ENERGY COMMUNITIES

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# This talk is based on previous ENGIE consulting and research work

- ASSET study for the European Commission.
- Scientific publications:
  - Abada, I., Ehrenmann, A., & Lambin, X. (2020). On the viability of energy communities. *The Energy Journal*, 41(1).
  - Abada, I., Ehrenmann, A., & Lambin, X. (2020). Unintended consequences: The snowball effect of energy communities. *Energy Policy*, 143, 111597.



# The value creation of LEC

- Local energy communities create some value (sometimes as side benefits):
  - A decrease of emissions motivated by environmental concerns,
  - A financial gain in the form of reduced electricity bills,
  - Willingness to become energetically independent, to gather into a community,
  - etc.
- Such a value could be measured (economically) especially when it materializes in the form of reduced bills:
  - Reduced fixed costs, economies of scale,
  - Aggregation benefits,
  - Feed-in tariffs,
  - Etc.



# But there could be an issue of value sharing among members

- Heterogeneity of members increases the value and hence the incentive to participate
  - Various consumption/production profiles (prosumers, producers, etc.) increase the potential of the use of storages and consequently reduce the investment cost.
  - A higher aggregation benefit.
  - Etc.
- However, this comes with the risk of badly allocating the value among members
  - If the allocation rule is not judiciously set, a member or a group of members (coalition) could be unsatisfied and would have an incentive to leave.
  - As an example: a member that consumes around noon in accordance with the solar irradiation creates more value than those who consume around 8PM. Consequently, he should receive a higher share.
- This problem comes on top of the physical one of sharing electricity and flows among members of the LEC.



# Possible solutions

- Economic theory and cooperative games could help find proper allocation rules
  - Computationally heavy One needs to calculate the value created by possible coalitions (sub-groups) of the LEC.
- Our findings:
  - **Simple allocation rules (equal allocation, pro-rata of consumption or capacity) fail to stabilize LEC when they are heterogeneous.**
  - **Some solutions exist:** the Shapley value, Minimum inequality of treatment, Marginal allocation, etc.
  - However, they are more complicated to implement and they require some educational effort.
  - One has to arbitrage between efficiency and simplicity.
  - **This remains to be tested on the field with real LEC.**

