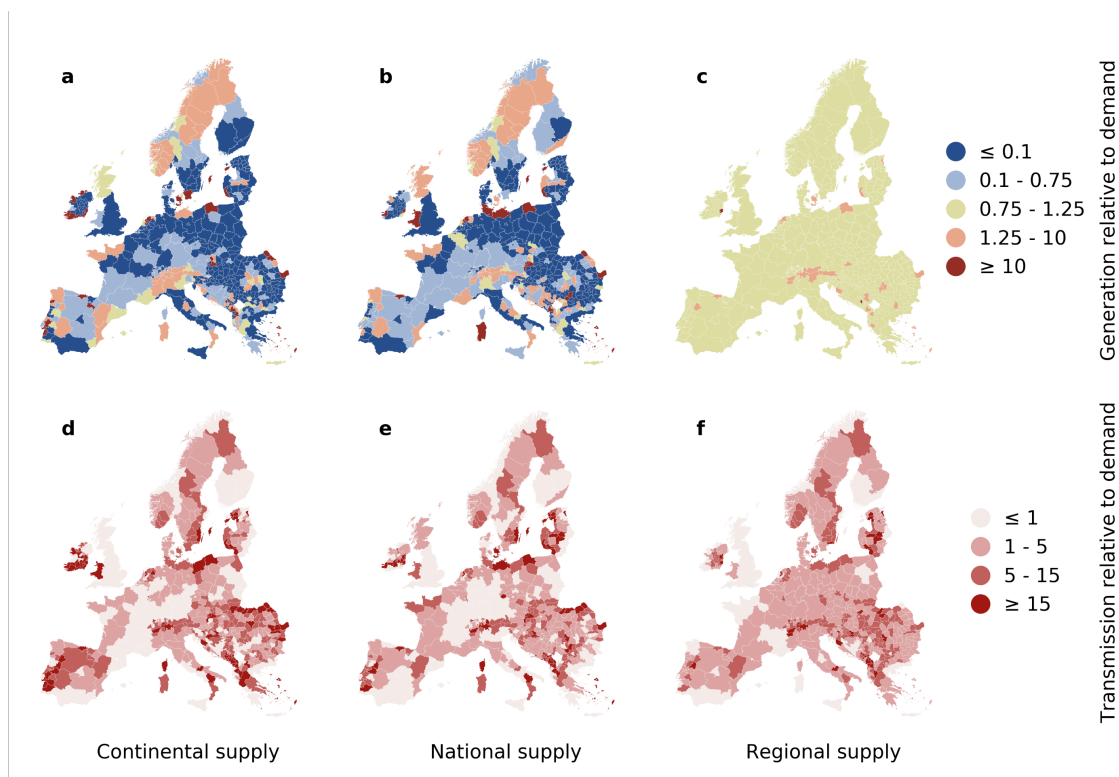


Calliope

Type: Open-source research software

Status: Ongoing

Team: Calliope Development Group (led by CP)



Tröndle, T., Lilliestam, J., Marelli, S., Pfenninger, S., in review. Trade-offs between geographic scale, cost, and system design for fully renewable electricity in Europe. *Joule*.

- Calliope is a free and open-source (Apache 2.0 licensed) tool that makes it easy to build energy system models at scales ranging from urban districts to entire continents.
- Recent results include: “Fully renewable electricity supply in Europe is technically possible and economically viable on the regional scale, as long as a continental transmission grid of today’s total capacity is available to balance fluctuations.” (see above figure), “Resilience to demand uncertainty in district energy systems is best achieved with building level technologies; district level systems only increase volatility and cost.” (Pickering, B., Choudhary, R., 2019. District energy system optimisation under uncertain demand: Handling data-driven stochastic profiles. *Applied Energy* 236, 1138–1157. <https://doi.org/10.1016/j.apenergy.2018.12.037>)
- See www.callio.pe for more details.