La reconfiguration des solidarités électriques.
Pour une négociation ontologique des cadrages disciplinaires

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_LES COÉVOLUTIONS DES USAGES ET DES SYSTÈMES SOCIOTECHNIQUES DE L'ÉNERGIE_
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Outline

✧ Combine theoretical perspectives on the electrical grid with empirical observations
✧ Electrical grid: the biggest “machine”; central in the energy transition(s)
✧ Five solidarities: territorial, technical, economic, ecological, sociological
  ✧ The object « electrical grid » is made of heterogeneous knowledge/community of practices
  ✧ Enlarging the analysis beyond technology and market
  ✧ How are these solidarities interlinked?
✧ Solidarities offer new perspectives on electrical configurations
  ✧ Rebound as effects of infrastructures and markets
  ✧ Co-evolution of usages and grids
  ✧ Energy communities: at which scale?
How to think the object « electrical grid »?

Made of heterogeneous knowledge/community of practices

Need to add new entities/knowledge
Energy transition or transformation?

“The pathways assessment builds upon the AR5 with a greater emphasis on sustainable development in mitigation pathways. All pathways begin now, and involve rapid and unprecedented societal transformation.”

“Pathways limiting global warming to 1.5°C with no or limited overshoot would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems (high confidence). These systems transitions are unprecedented in terms of scale, but not necessarily in terms of speed, and imply deep emissions reductions in all sectors, a wide portfolio of mitigation options and a significant upscaling of investments in those options (medium confidence).”

“Most literature related to CRDPs invokes the concept of transformation, underscoring the need for urgent and far-reaching changes in practices, institutions, and social relations in society. Transformations toward a 1.5°C warmer world would need to address considerations for equity and well-being, including in trade-off decisions.”

IPCC, October 2018
Realities and promises of the electrical configurations

✧ Electrical grid: central in the energy transformation(s)
✧ Towards (almost) 100% renewables: long and fast collective learning (1 generation)
  ✧ Variable power
  ✧ Demand logics → supply logics
  ✧ Issue of storage
✧ Smart grids ? Economics of techno-scientific promises
  ✧ New usages : electrical vehicles, heat pumps,…
  ✧ Co-evolution of usages and grids
✧ Value is increasingly produced in a diffuse way
✧ Many questions, e.g.
  ✧ What is flexibility?
  ✧ Electricity communities: at which scale?
Searching for a concept of “electrical solidarity”

✧ Several coherent points of view on the grid
  ✧ Selection of relevant entities (specific properties)
  ✧ Ontology: relationships between entities
  ✧ Informed by scientific disciplines or communities of practice (geography, engineering, economics, ecology, sociology)
  ✧ Struggle between ontologies

✧ Solidarity as a plan of consistency
  ✧ Matter of fact: how entities are held together
  ✧ Unity of action in a given ontology
  ✧ The way a given set of entities are acting together to perform actual relationships
  ✧ Without moral dimension
  ✧ Possibility to sum up electrical activities into figures (indicators)
5 types of electrical solidarity
Territorial solidarity

✧ Territory: area of land under the jurisdiction of a ruler
  ✧ Many possible scales
  ✧ Human and nonhuman activities
  ✧ Specific infrastructures and productions
  ✧ Regional and historical features
  ✧ Energy as a political issue

✧ Electrical solidarity: equal access to modernity
  ✧ After WWII in Europe, grid built as a national solidarity (with many regional discrepancies)
  ✧ Development of the grid = modernisation front
  ✧ Challenged by microgrids
  ✧ Indicator of solidarity: km of network
Technical solidarity

✧ Engineer’s world: machines, cables, infrastructures (incl. their maintenance).
✧ Achieving balance between production and consumption at all times
  ✧ Automation (capacity reserves)
  ✧ Flexibility: industry integrated
  ✧ TSO coordinates the balance (with BRP)
✧ Centralised and vertical grid
  ✧ Transport: meshed network
  ✧ Distribution: tree-like network
✧ Demand is apprehended through forecasts
✧ Indicator of solidarity: 50Hz
Economic solidarity

✧ Neo-classical ontology:
   ✧ buyers and sellers
   ✧ Maximisation of functions of utility (products) and of production (labour, capital)
   ✧ Relationships: equilibrium on markets, temporary contracts

✧ Electrical solidarity:
   ✧ Unity of action: market
   ✧ Money flows from consumers to providers
   ✧ Liberalisation performs this solidarity

✧ Active consumer: change of provider

✧ Instruments for flexibility
   ✧ Feedback
   ✧ Time of Use
   ✧ Dynamic tariffs (real time pricing)

✧ Indicator of solidarity: volumes on markets at a given time.
Adding up new entities.

Make existing other ontologies
Ecological solidarity

✧ Ontology:
  ❧ Ecosystems
  ❧ Reproduction of living species
  ❧ Multiple solidarities: ontology of relationships and processes (energy and material flows)

✧ Electrical solidarity:
  ❧ Objective: fast transformation towards 100% renewables
  ❧ Need to decrease the absolute level of energy consumption (in developed countries)
  ❧ Adapt demand to available energy (weather forecast)
  ❧ Renewable has priority on the grid (transform generation market)
  ❧ Cooperatives? Energy communities?

✧ Issues:
  ❧ Embedded energy of the “transition” + other mineral resources (e.g. rare earths)
  ❧ Landscape transformation

✧ Indicators of solidarity: CO2, other material flows
Sociological solidarity

✧ Relations between multiple practices through the grid
  ✧ Billions of interconnected objects
  ✧ Rhythms and synchronisation (peaks and valleys)
  ✧ Usage and power associated

✧ Usage solidarity revealed through provision threat (blackout)
  ✧ Existence of the grid in daily practices
  ✧ Reactions: blackout party, “we are in Africa”

✧ Prosumer solidarity revealed in local congestions

✧ Material participation (Marres 2012)
  ✧ Make emerging new publics
  ✧ Reactions to rare and meaningful signals (CPP, Tempo)
  ✧ Greater flexibility (?)
  ✧ Desynchronisation of practices

✧ Indicators of solidarity: instantaneous power (choreography of power)
Politisation
A solidarity is a unity of action within an ontology:
- Set of entities to be taken into account
- Relationships and hierarchies
  → Political dimensions of the energy transformation
- Political power // control on energy flows
  → Reconfigurations = conflicts (vested interests, incumbent actors)
- How to articulate the 5 solidarities?
- Dominant ontologies are performative
  → How to make ecological and sociological ontologies more performative?
- Other solidarities?
Quels réseaux énergétiques pour la Wallonie aux horizons 2030 et 2050 ? Rapport IWEPS, 2018
Reconfiguring the collective grid and its solidarities

Infrastructures and practices are co-designed

How to reverse the co-evolution?
Benefits from energy efficiency?

✧ Efficiency ≠ efficacy. Efficiency is a ratio!

\[ \text{efficiency} = \frac{\text{résultat}}{\text{moyens}} = \frac{\text{activité}}{\text{ressource utilisée}} = \frac{\text{output}}{\text{input}} = \text{productivité} \]

✧ Two possible interpretation:
  ✧ Improving energy efficiency: same activity with less energy
  ✧ Improving energy productivity: more activities with the same energy quantity

✧ Energy policies rely much on energy efficiency to reduce energy consumption
Rebound effects

✧ Saved energy (following EE improvement) is used at another time, in the same activity or in another.

✧ Rebounds are accelerated when infrastructures and markets can redistribute quickly the saved energy.

→ Reduction of energy consumption = reducing infrastructures and markets
From stock to flux

Electricity grids have been conceived to provide energy anywhere at anytime
→ energy is considered as a stock, not really a flux.

Renewables are variable
→ Inverse the perspective: how to adapt our activities to available energy?
→ Integrate environmental limits within practices
Blackout threats are good

• Reveal dependence on infrastructures
• Question the grid development and technological lock-in → deconstruction of the energy transition
• Planned blackouts: improve resilience?
Disrupting routines

- Routines are stabilised through invisible infrastructures → disruptions make visible infrastructures and maintainers, and can give new meanings to practices
- How far are we dependent on electricity?
- Disruptions problematize the composition of the world:
  - How is it usually maintained?
  - Which entities belong to the collective?
  - How is power distributed?
  - Who is entitled to recompose the world?
Disruption of social experience

- Problems with blackouts: security, people trapped (elevators, subway), hospitals, frozen food, etc.
- Contagion of joy; feeling of adventure; “unexpected moment of spontaneous cohesion”; but also riots and thefts (Nye, 2010)
- Breakdowns: reveal actors who make the grid and society functioning. Blackouts reveal also other people and the state of society
- Experimenting new ways of producing comfort (Kilpinen 2012)
- Not only blackouts: embargo; strikes; etc.
Solidarity: at which scale?

✧ Territorial solidarity: European, national, regional, municipal or communal?
✧ Technological solidarity: all scales are good (is there an upper limit?)
✧ Economic solidarity: all scales are possible (e.g. complementary or local currencies)
✧ Sociological solidarity: depends on the creation of a public → small scales are preferable
✧ Ecological solidarity: short circuits are preferable; diversity for resilience

→ Redefinition of territorial solidarities
  ✧ Various legal frameworks of energy communities
  ✧ Adapting productive activities >> labour law
Project « Voisins d’Énergie »

Neighbours assemble and self-organise to produce and consume energy together around a transformation cabin.
Open questions

✧ Which models of local governance?
✧ Which links between local and regional/national solidarities?
✧ Who has time and interest to develop communities?
✧ How to recruit low income households?
✧ What share of energy production can communities produce?
✧ How could practices evolve in a new energy framework?
✧ Can flexibility be developed through social innovation?
Thank you for your attention!