Climate Recon 2050:
Dialogues on Pathways and Policy

France
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Sufficiency, behavioural change & social transition

Modelling challenges

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1. Status of sufficiency in scenarios

- In order to be better integrated in policy-making, energy sufficiency needs to be formally more visible in usual decision-making tools, including potential assessments and policy scenarios
- It appears that so far the contribution of sufficiency to sustainability goals has been mostly overlooked and remains a blindspot in most mainstream energy scenarios
  - Most prominent global energy scenario (IEA, Greenpeace…) only take marginal account of the potential for lifestyle changes to reduce energy demand and GHG emissions
  - The vast majority of existing national scenarios, including in Member States, does not specifically address sufficiency potentials, although sufficiency items are punctually included
- However, an increasing number of authors propose that sufficiency strategies (or a greater focus on energy services) are accounted for, garnering more assessments and research
- Existing scenarios, models and studies that have quantified sufficiency potentials one way or another generally concur on the significance of the sufficiency wedge, with cuts on final energy demand ranging from 20 to 40% by 2050 and commensurate to those achievable through efficiency

Source: based on ENOUGH (Toulouse, E.) - 2018

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2. Potential assessment

- Modelling is a crucial tool for assessing the potential that can be mobilised through action
- Regarding sufficiency, this is more true if assumptions are made on the enabling conditions rather than on the behaviour or practice itself
- To develop such an approach, robust assumptions to relate the enabling condition to the realisation of the behaviour are required
- Sufficiency aspects should be possible to address through modelling
- Although many energy models have not been used so far with sufficiency-oriented input, they should be able to do so one way or another by adjusting modelling parameters: identifiying them is a prerequisite
- However, complex organisational and behavioural aspects may not be easy to illustrate through existing modelling, thus requiring the development of more sophisticated tools
- Nevertheless, sufficiency assumptions can to some extent be translated into simplified proxies to be used in existing models (e.g. a reduction or stabilisation in the demand of specific energy services)

Source: based on ENOUGH (Toulouse, E.) - 2018

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3. Ongoing discussions

- The robustness of the assessment of a sufficiency potential depends not only on the quality of the modelling, but also on the robustness of the underlying assumptions about the sufficiency aspect and its diffusion
- Weaknesses in such potential assessments have been spotted though:
  - Due to insufficient backing, they often remain quite normative in that they fail to display and quantify the causal chains to concretise them
  - There are biases in terms of sectors covered: households and personal mobility are preponderant, whereas very scarce research is available on other sectors (e.g. sufficiency in business strategies).
  - Last, sufficiency-based scenarios are still quite divergent in terms of methodology and assumptions
- Discussions emerge on how to overcome these issues, as well as recommendations to increase the quality and credibility of sufficiency potential quantifications

Source: based on ENOUGH (Toulouse, E.) - 2018

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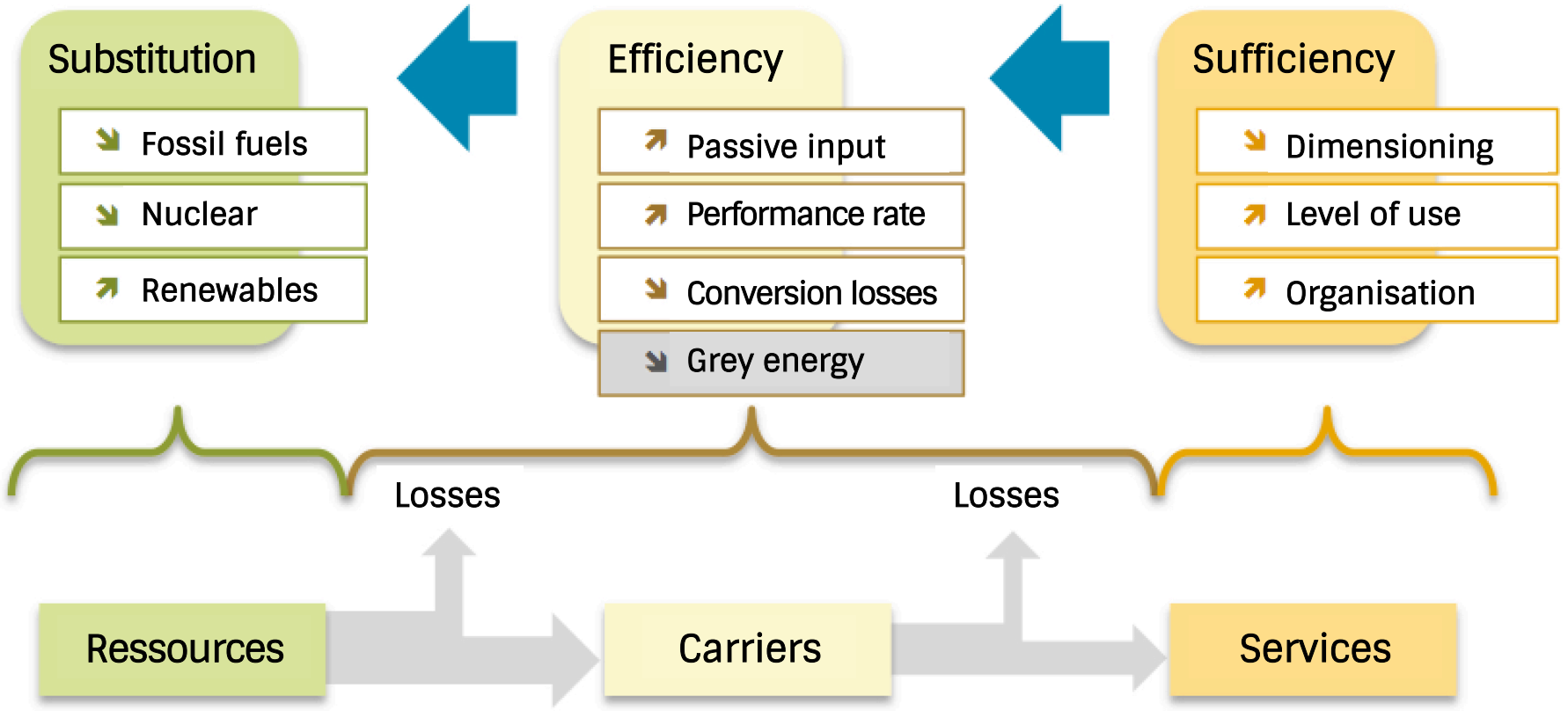
4. Sufficiency as part of a global strategy



Source: Association négaWatt - 2018

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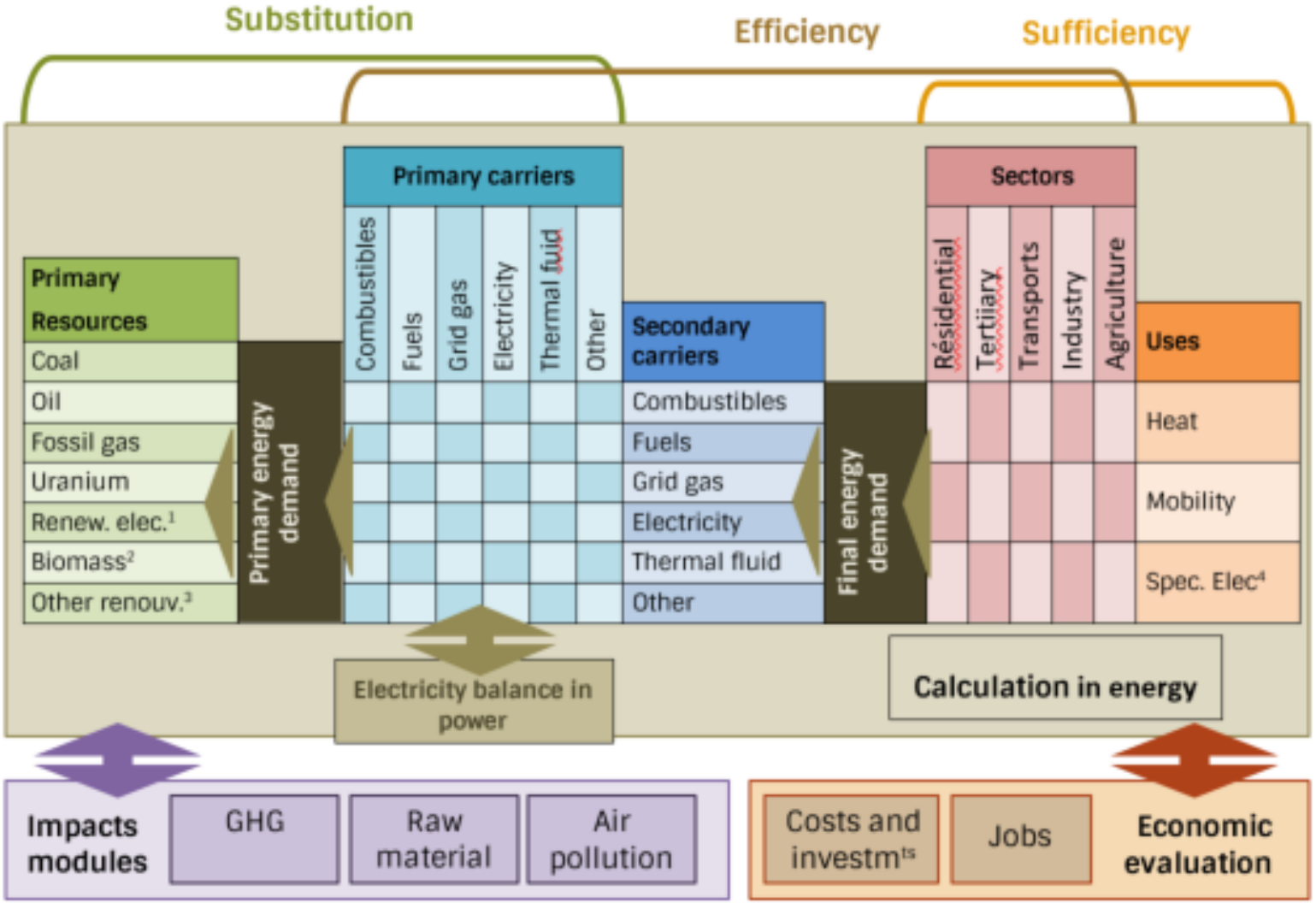

Source: Association négaWatt - 2018

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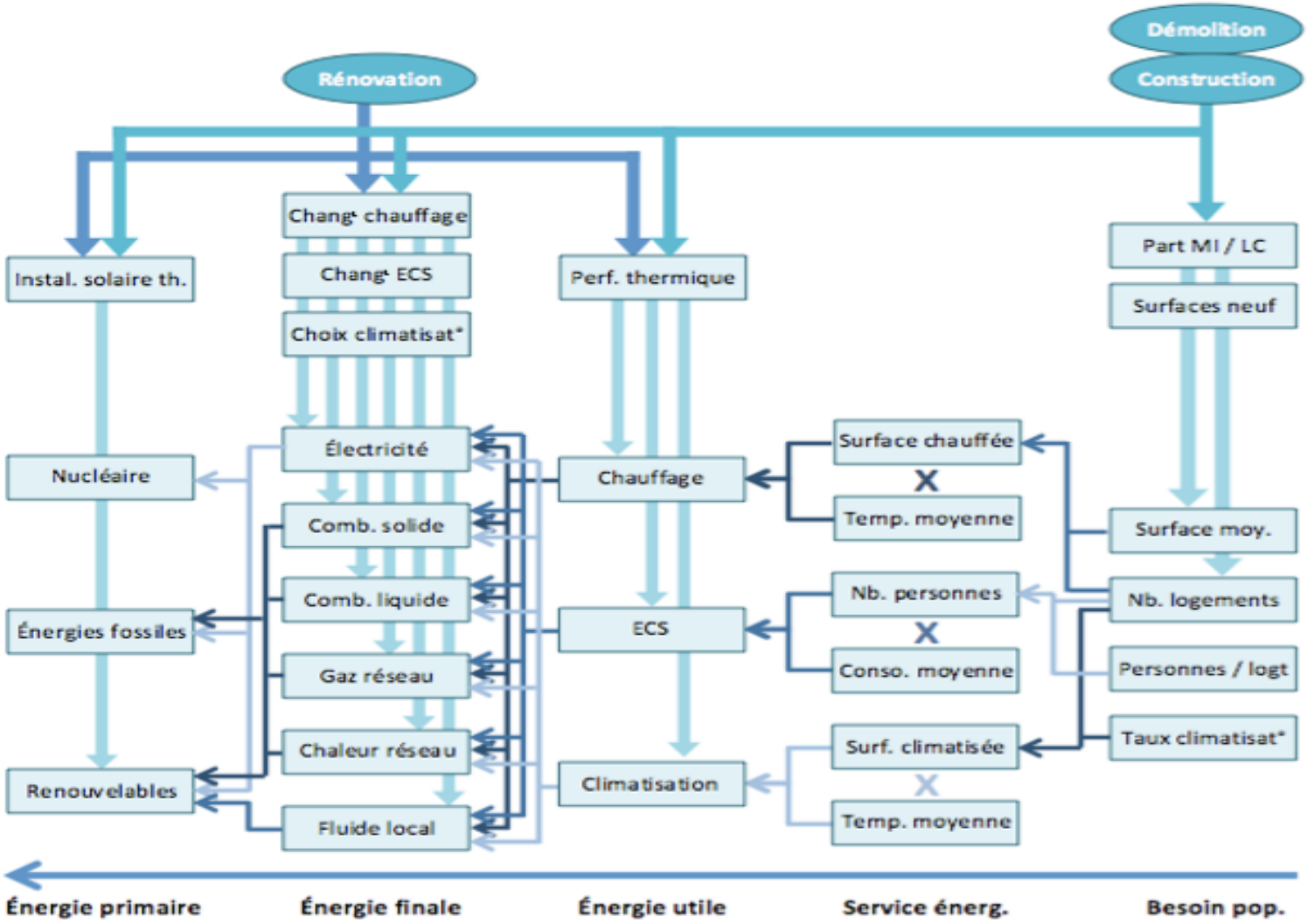

Source: Association négaWatt - 2018

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5. Examples of sufficiency items to be modelled

Sector	Area of need	Parameter	Example of units	Sufficiency measure
Transport	Mobility	Registered cars	Number per year; Number of cars per household	Less demand for individual transportation; More use of public transport
	Mobility	Size of cars	Cubic capacity; Car model	Use of smaller cars
	Mobility	Distance travelled	Kilometres per person	Reduction of kilometres travelled by car (through urban planning, etc.)
	Mobility	Air travel	Number of short/medium/long haul flights per year; number of person kilometres per year	Reduction of private and business air-travel
Buildings	Dwelling & construction	Heating temperature	°C room temperature	Heat rooms less strongly
	Dwelling & construction	Floor space	m^2 per person; m^2 per unit of tertiary activity	Reduction of floor space per person; sharing of space (coworking…)
	Dwelling & construction	Warm water use	Liter per household and year	Reduction of warm water temperature
	Dwelling & construction	Electric appliances	Number per household; Size of appliances; Usage rate per hour / day	Reduction of multiple equipment; sharing of appliances; size reduction of appliances; reduction of usage rate
	Dwelling & construction	Electricity consumption	Kilowatt hours per household and year	Reduction of most consuming activities (e.g. electric drying)
Agriculture	Nutrition	Animal stock	Number of animals per hectare; Kg meat consumption per person and year	Reduction of meat consumption
	Nutrition	Food waste	Kg per household and year	Reduction of food waste; better meal planning and adapted shopping

Source: based on UBA (2018): Mit Suffizienz mehr Klimaschutz modellieren

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5. Various issues to deal with in modelling (1)

- **Scale**
  - the 'climate change' limit is global, and GHG emissions limits are generally set on a national basis
  - action on a more local level can deliver better identified social, economic and environmental benefits
- **Time**
  - 'time of use' is a growing consideration (availability of energy at the required time, esp. power)
  - so is 'use of time': the pace of human activity (e.g. working hours, public holidays, daylight saving…)
- **Demography**
  - the number of people is of couse directly linked to the global need of energy services
  - so are factors such as the average number of people per household, or the age distribution
- **Equity**
  - sufficiency requires that everyone has access to a socially-agreed minimum set of energy services
  - furthermore, access to energy services should be equitable

Source: based on ECEEE paper - 2018

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5. Various issues to deal with in modelling (2)

- **Technological development**
  - technology is very significant in terms of both energy services and ecological impact
  - much new technology is ICT-enabled (in line with increasing concern with system flexibility), which is consuming energy and materials and calls for caution regarding sufficiency
  - moreover, the combination of technological and lifestyle changes need to be optimised on individual and collective levels, and through time
- **Rebound effect**
  - re-spending the cost savings from sufficiency actions leads to indirect rebound effects
  - some secondary rebound effects might occur

    They are generally modest (e.g. <10%) for sufficiency actions affecting electricity use and heating, larger (e.g. 20-40%) for those affecting transport fuels and possibly very large (e.g. 60-100%) for those affecting food products
  - downshifting reduces aggregate consumption and hence its environmental impact, but that might have non proportional effects on the costs of the energy system, and bear complex impacts on macro-economy
  - people engage in sufficiency actions in one area they may consider they have ‘moral licence’ to be less environmentally responsible in other areas (negative spill-over).

Source: based on ECEEE paper - 2018

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6. Recommendations (1)

- The lack of analysis of the potential of sufficiency to contribute to a reduction in energy demand and GHG emissions is a weakness in energy scenario studies which aim to provide advice to policy makers
- The quantitative potential of lifestyle and behavioural changes should be highlighted more prominently in these scenarios and should not be blurred by combining differences in lifestyle assumptions with unrelated differences in energy efficiency and/or energy supply
- Sufficiency and changes in lifestyle should rather be embedded, discussed and quantified independently of technology decisions. Ideally, studies should also discuss and – as far as possible – model the impact on economic activity of energy-sufficient lifestyles
- The integration of sufficiency should be adressed in stringent climate protection scenarios and across all depicted areas. The omission of sufficiency should at least be justified
- When energy scenario studies comprise several diverse scenarios, sufficiency should be integrated in at least one scenario (as an alternative storyline + in terms of a political and societal course of action)

Source: based on Samadi, S. et al., in *Technological Forecasting & Social Change* - 2017
H. Förster, C. Ziegler, D. Eichhorn (submitted to eceee): Energy efficiency first; sufficiency next?

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6. Recommendations (2)

- Formulate and document justification and derivation for sufficiency in all areas considered
- Identify relevant parameters for each sufficiency measure and document why they are relevant and which direction of change is necessary
- Integrate sufficiency measures in the model by either calibration (if the necessary parameters are already present) or by addition of parameters into the models functional relationsh
- Establish and describe impact chains per measure and document the model parameters settings including their temporal development
- When including lifestyle changes in scenarios, describe the triggers for sufficiency
- Discuss the limits of predictability and modelability (as should also be the case for other changes)
- Develop narratives underlying the quantitative assumptions for sufficiency potentials
  They can help to illustrate the plausibility of the envisaged development and clarify what sufficiency-oriented lifestyles mean
  A participative development of these narratives can enhance their acceptance and their strength

Source: based on Samadi, S. et al., in *Technological Forecasting & Social Change* - 2017
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