


Scope Dependent Modelling of Electricity in Life Cycle Assessment

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Agenda

- Problem setting and motivation
- Recommendations regarding electricity mix models
- Relevant French and European electricity mixes
- Decision tree and business cases

Problem setting and motivation

- Many products and services are strongly linked to electricity use and/or production
- Electricity use/production one key parameter regarding LCA results
- Clearly structure and practical guidance still missing

Relevant business cases

- investment planning and realisation
- implementation of measures
- environmental reporting
- product and service declarations
- purchase decisions (e.g. green electricity)
- choice of suppliers

Recommendations regarding electricity mix models

- Geographical aspects
- Market aspects
- Temporal aspects
- **Modelling aspects**
- Further modelling and communication aspects

Modelling aspects

- How to model electricity mix when assessing
 - individual consumers' purchase decisions
 - corporate strategy decisions
 - EU-27 policies (such as the biofuels directive)
 - corporate environmental impacts of 2008
- Are different electricity mixes required?
- Does decision support always imply consequential modelling?

Sitting on the lakefront ...

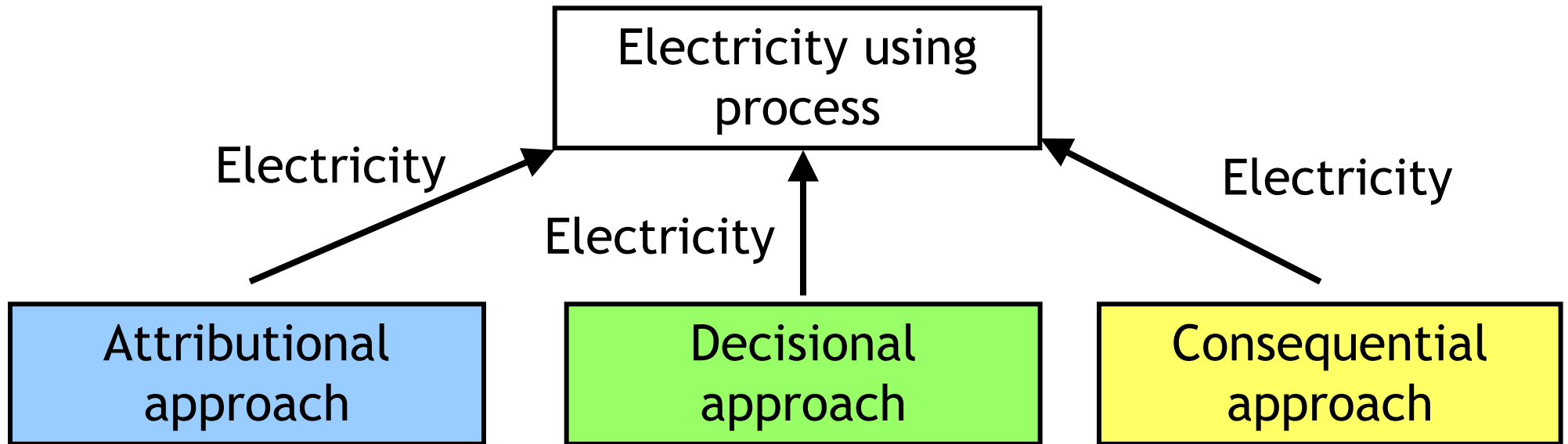


Modelling decision support

- Individual decisions are overlaid by thousands of contemporaneous decisions
- Only few (very large) decisions (or events) lead to observable consequences
- Apply *mutatis mutandis* principle to establish the LCI model consistent with a particular business case (decision)

mutatis mutandis: the necessary changes being made

3 approaches for modelling electricity in LCA



Attributional approach



→ Calculated from the average supply in a given time period (i.e. French electricity supply mix in 2007)

Used for modelling LCA with the purpose of:

- Reporting, product labelling and declaration
- Small scale decision making (e.g. individual consumer)

Decisional approach



→ Technologies identified by financial and contractual relations (existing or planned)
(e.g. purchase of certified hydropower)

Used for modelling LCA with the purpose of:

Medium scale decision making

(e.g. strategic decisions of large companies)

Consequential approach



→ Identifying technologies that will be influenced by a change in demand
(i.e. increase of gas and wind power in Europe)

Used for modelling LCA with the purpose of:

Large scale decision making
(e.g. international policy making)

Classification of LCA objects of investigation

Using the relative economic size:

Size of the object of investigation compared to:

- annual consolidated turnover in a region (e.g. EU-27 or France)
- monetary purchase volume from relevant economic sectors
- physical purchase volume from relevant economic sectors

>1%

<0.1%



<1%




<0.01%

<1%

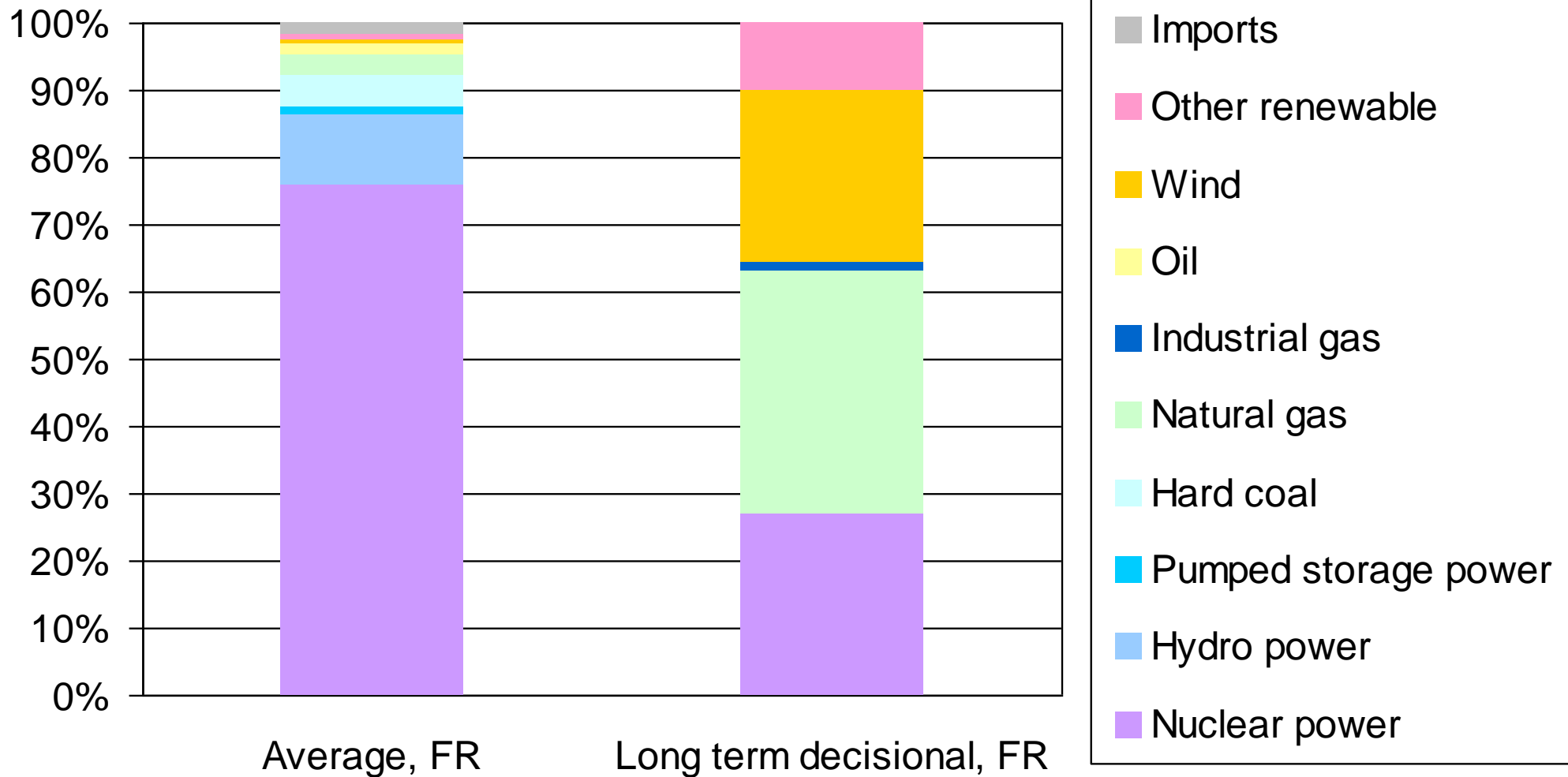
Practical investment and policy examples

examples	volume of object of investigation	reference volume	relative share	class
LCA of the investment in a new residence building	90 Mio. CHF	51'881 Mio. CHF	0.17%	medium
	155' MWh	6'915 GWh	0.00%	small
LCA of the investment in a new waste water treatment plant (size: 670'000 inhabitant equivalents)	7'200 MWh	2'983 GWh	0.24 %	medium
LCA of electricity purchase of Credit Suisse sites in Switzerland (choice of a supplier)	176 GWh	57.4 TWh	0.31 %	medium
Comparative LCA of heating systems in view of a promotion of electric heat pumps in Switzerland	1'000 GWh	57.4 TWh	1.7 %	large
LCA of biofuels to cover a share of 10 % in total fuel sales in the EU by 2020	353 TWh	3'530 TWh	10 %	large

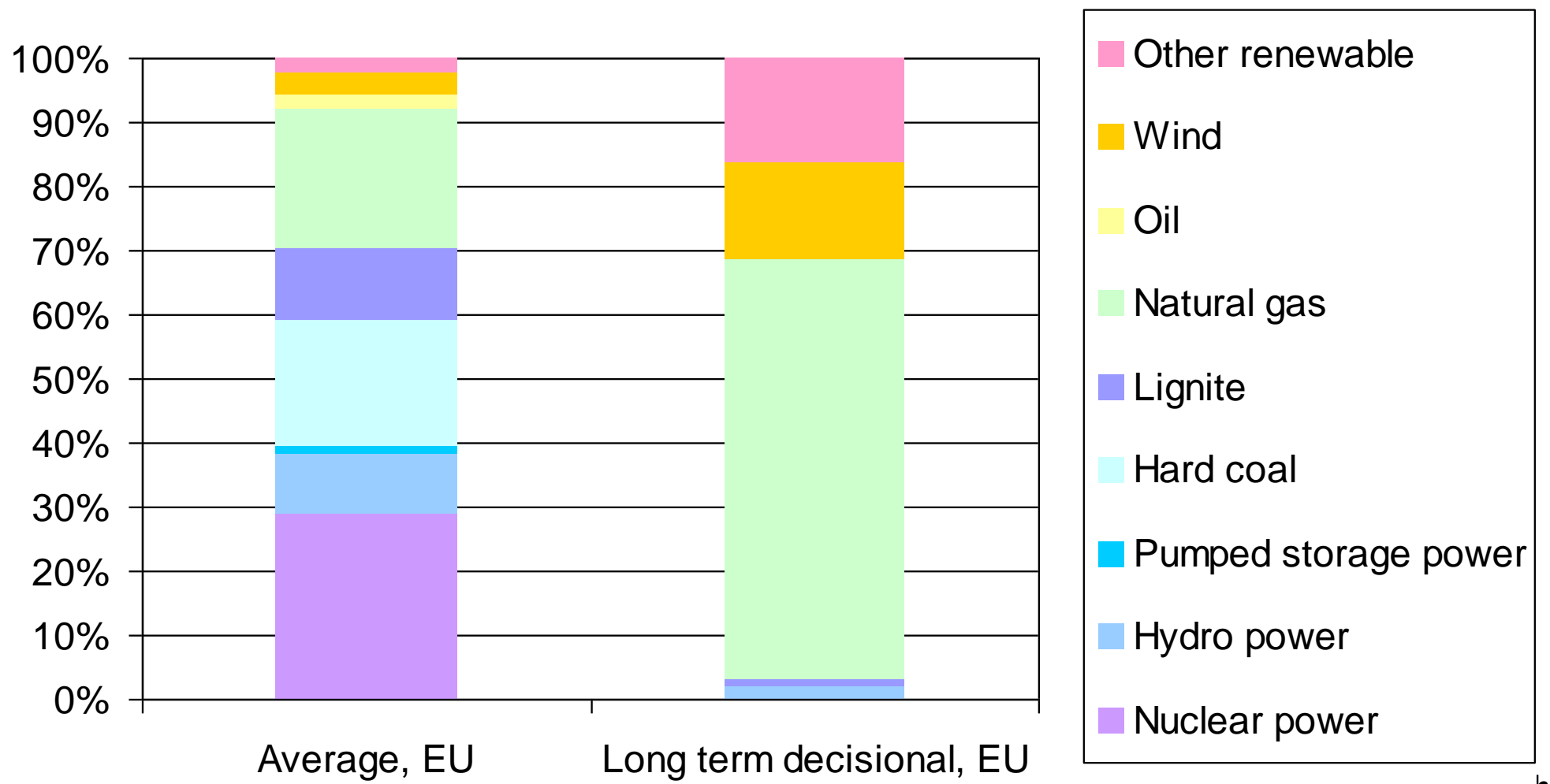
Synthesis

economic size		relative share	recommended LCI model
Small: individual consumer decisions 		< 0.1 %	attributional
Medium: corporate strategic planning 		0.1 % to 1 %	decisional / attributional in a sensitivity analysis
Large: international policy making 		> 1 %	consequential

FR electricity mixes: Average and Long term decisional

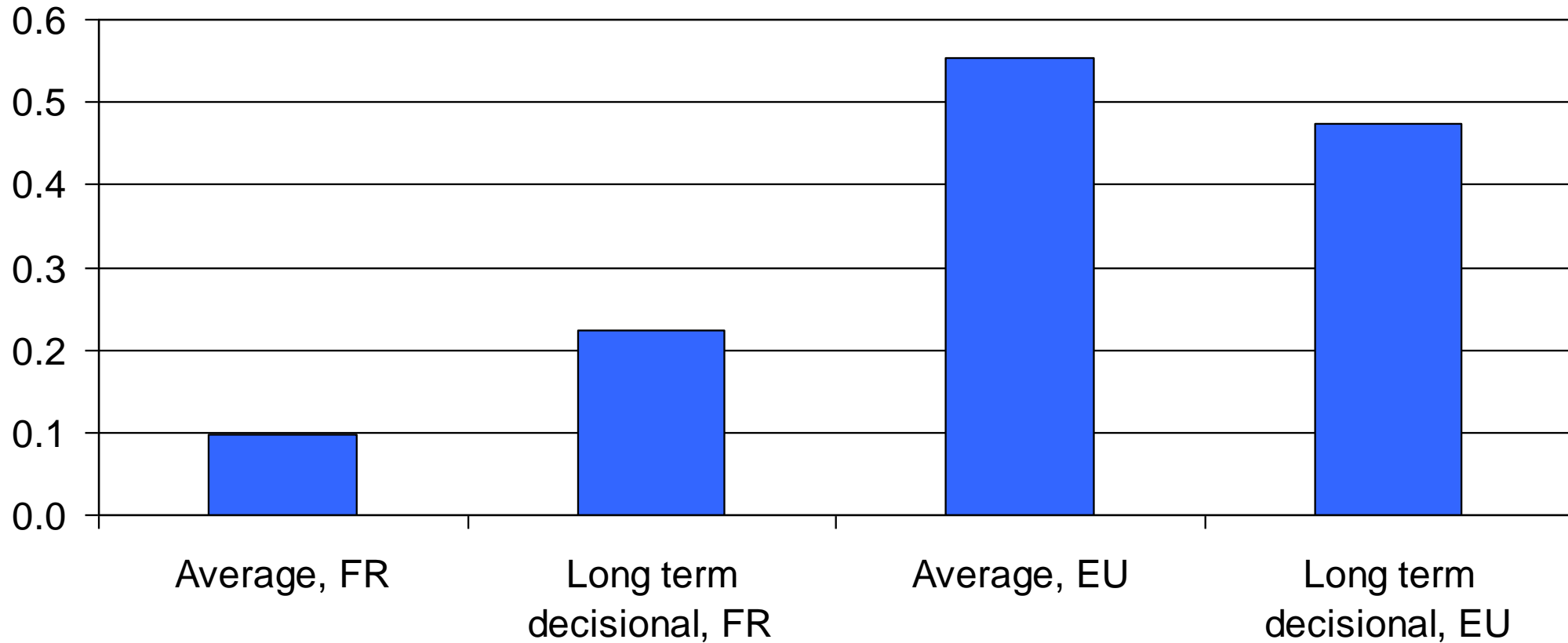


EU electricity mixes: Average and Long term decisional



Greenhouse gas emissions of FR and EU mixes

kg CO₂-equ/kWh



Conclusions

- Different business cases call for different modelling approaches
- **Relative size** of object of investigation suitable to select appropriate modelling approach
- **Decisional modelling** is appropriate for most relevant business cases
- **actual business relations** and actions are key information to establish appropriate LCA models

Thank you very much for your attention!

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