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**Business participation in
Demand Response: a
review of potential barriers**

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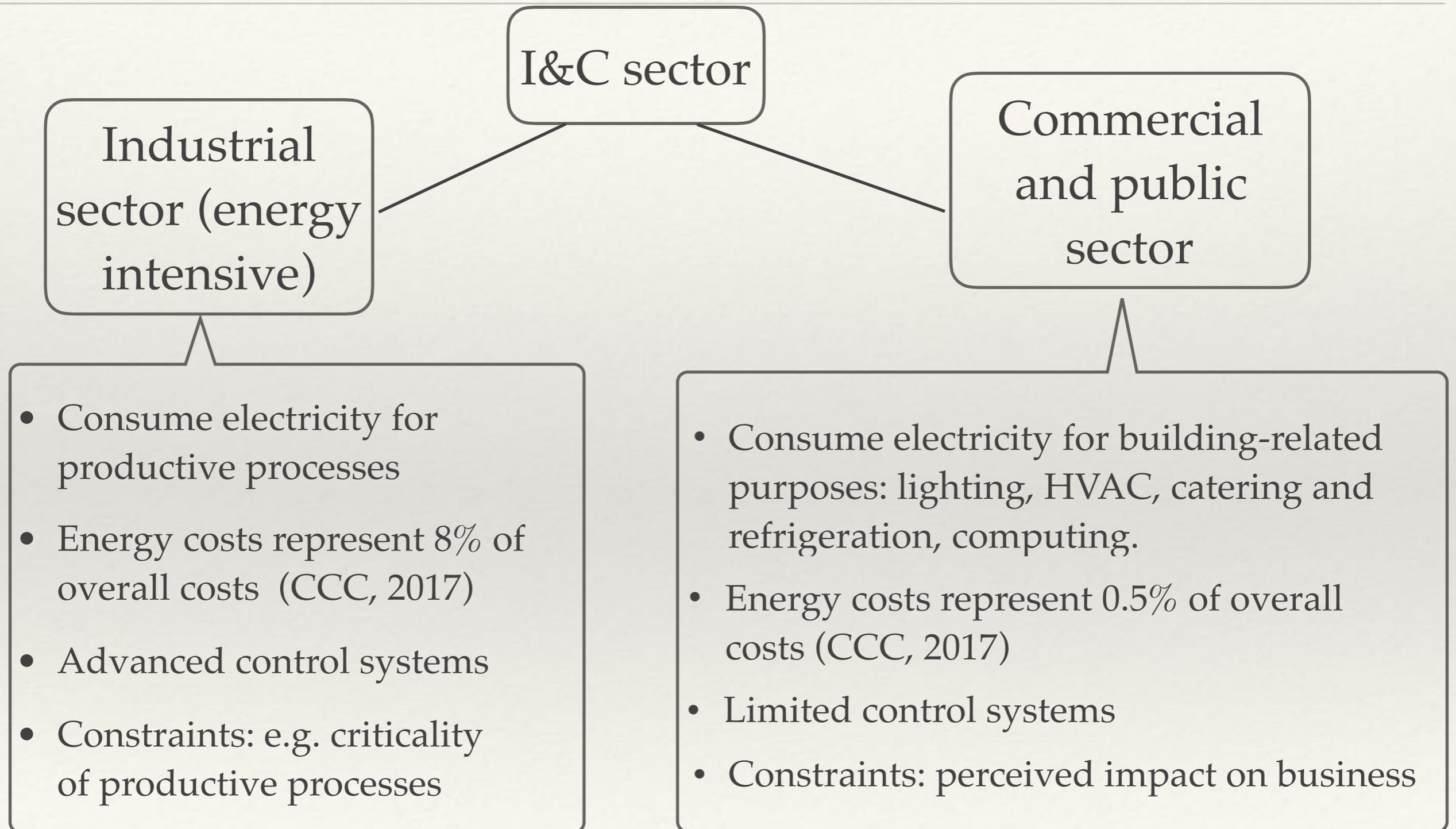
Overview

- ❖ The I&C Sector
- ❖ Neoclassical economics: hidden costs and risk
- ❖ Behavioural economics: bounded rationality and status-quo-bias
- ❖ Social practice insights
- ❖ Conclusion

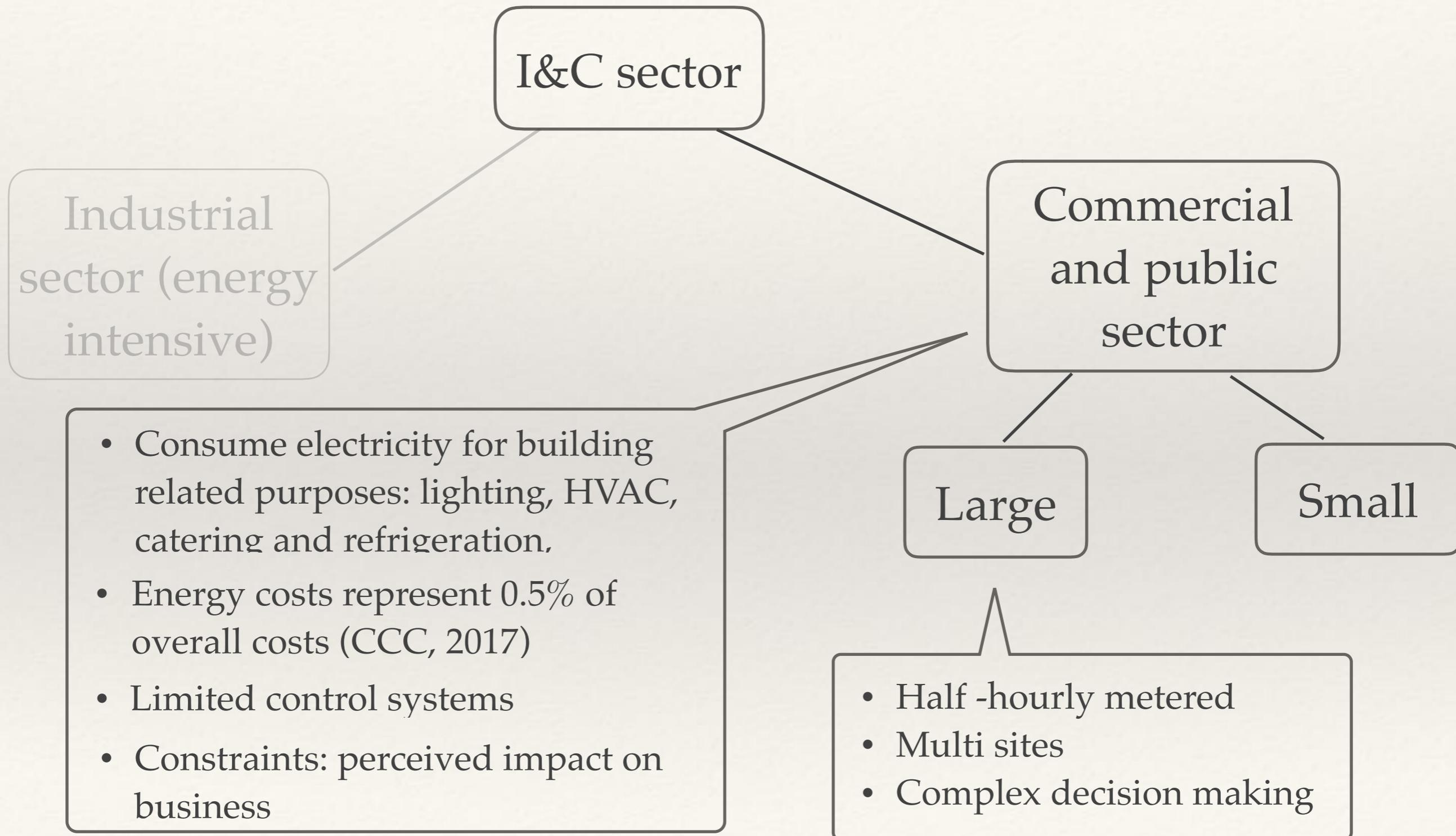
The I & C sector

- ❖ I & C sector provided 2.7 GW of DSR in 2016 (National Grid, 2017a)
- ❖ Potential 9.8 GW by 2020 (ADE, 2016)
- ❖ The industrial sector provided 54% of all demand side flexibility (National Grid, 2017b)
- ❖ The commercial and public sector provided 29% of all demand side flexibility (National Gridb, 2017)
- ❖ Non-domestic buildings account for 30% of peak demand
- ❖ Demand-led DSR potential: between 1.2 and 4.4 GW (Element Energy, 2012)
- ❖ Generation DSR potential: another 1-4 GW

The I & C sector



The commercial and public sector



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DSR costs

- ❖ Initial cost - cost of investing in enabling technology and establishing a response plan
- ❖ Activation costs - costs incurred when responding to a DSR request
- ❖ Initial costs in the commercial sector are high - e.g. capital cost
- ❖ Activation costs in industry £80 - £ 400 per MWh
- ❖ Activation costs in commercial premises - £15 per MWh

Other initial costs: hidden costs

Type of hidden costs	Examples of hidden costs
Hidden production costs	<ul style="list-style-type: none">• Searching for suitable equipment• Overhead costs to allow equipment installation
Market transaction costs	<ul style="list-style-type: none">• Gathering information to allow initial decision• Choosing aggregator• Negotiating and managing contracts• Complying with administrative requirements
Organisational transaction costs	<ul style="list-style-type: none">• Internally championing DSR• Coordinating various departments' contributions

Based on Sorrell et al, 2004

Organisational TCs

“The onsite energy manager thinks DSR looks interesting and could provide revenue. They have to speak to the estates team, who will look at the asset register. Then they have to get in touch with the finance guys to ask whether they can go ahead; ... Then they have to consult with the clinicians, who are acutely concerned about any break in supply...”

Julie Braidwood, Crown Commercial Services Energyst 2016, p. 21

Risk

Risk to core business

- ❖ DSR - an unfamiliar concept
- ❖ Automation

Uncertainty of financial returns

- ❖ Auctions
- ❖ One year contracts
- ❖ Changes in policy context

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Bounded rationality

- ❖ Rational but facing limitations in terms of their attention capacity and knowledge.
- ❖ Resorting to rules of thumb to find satisfactory rather than optimal solutions
- ❖ Most relevant for marginal issues during the initial stages of decision-making process

Energy as a marginal issue

Proportion of large companies with both capacity and ambition to reduce energy consumption is 44% .

Table 3.3: Percentage of energy consumed by organisation size, energy management resource and energy management ambition, 2014–15

Organisation size	Energy management ambition	Energy management resource (%)				Total
		Specialist energy manager	Non-specialist energy manager	No energy management	Don't know	
All	Active	35%	18%	3%	-	56%
	Passive	14%	12%	8%	-	34%
	None	1%	1%	3%	-	6%
	Not asked	0%	-	-	4%	4%
	Total	50%	31%	15%	4%	100%
Large	Active	44%	20%	2%	-	65%
	Passive	13%	7%	3%	-	23%
	None	0%	0%	3%	-	4%
	Not asked	0%	-	-	8%	8%
	Total	57%	27%	8%	8%	100%
SME	Active	25%	16%	4%	-	44%
	Passive	14%	17%	15%	-	46%
	None	3%	2%	4%	-	9%
	Not asked	-	-	-	0%	-
	Total	42%	35%	23%	0%	100%
Not asked	Active	25%	19%	4%	-	48%
	Passive	21%	18%	7%	-	46%
	None	1%	1%	4%	-	6%
	Not asked	-	-	-	-	0%
	Total	46%	38%	15%	-	100%
Don't know	Active	20%	3%	5%	-	28%
	Passive	22%	35%	14%	-	71%
	None	-	-	1%	-	1%
	Not asked	-	-	-	-	0%
	Total	42%	38%	20%	-	100%
<i>Unweighted base</i>		1,292	1,289	1,006	103	3,690

Source: BEIS, Building Energy Survey, 2016

Bounded rationality and DSR

Low Carbon London - interviews

- ❖ Early Adopters - already participating in DSR
- ❖ Majority - interested in DSR but unwilling to take the risk
- ❖ Unaware - did not know about DSR and little interest in finding out more

Study of aggregators' acquisition process - three stages

- ❖ Primary reason for not taking up DSR during the first two stages was lack of interest
- ❖ During the third and last stage more specific reasons were given

Sources: Woolf, Ustinova, Ortega et al, 2014; Curtis, 2017

Loss Aversion



Status-quo-bias and DSR

“you are unlikely to get blamed for doing things in the traditional way, but doing something new may carry a high personal risk of being blamed if it goes wrong”

(Grubb et al, 2014)

Radical departure from how consumers perceive energy use:

- Access to energy on a continuous basis taken as a given
- Deviation from a well-functioning system

Uncertainty enhances attraction of status quo:

- Inherent in Capacity Market design
- Changes in legislation
- Number of DSR events
- Complexity of regulation

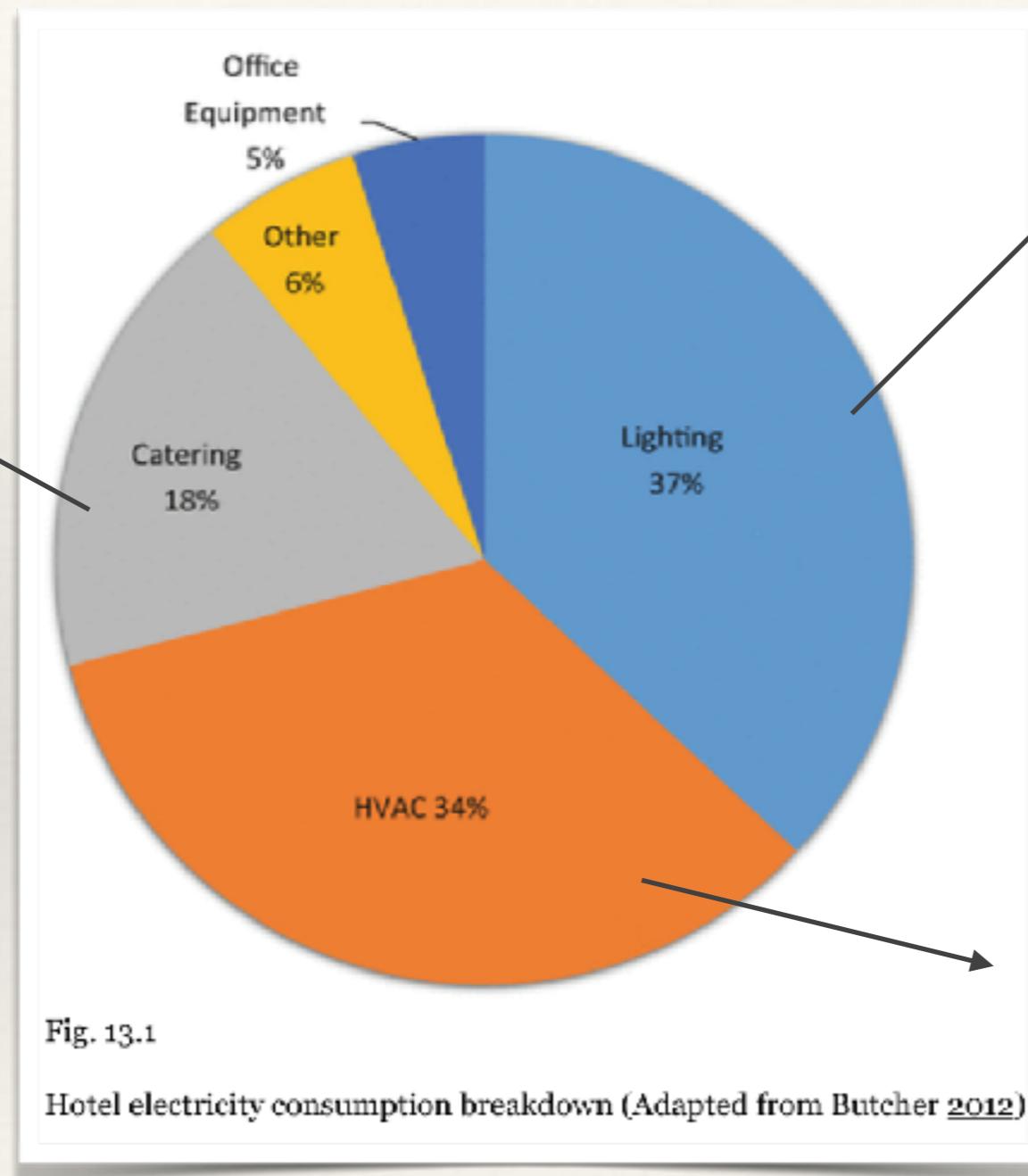
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- ❖ Conclusion

Social Practice Perspectives

- ❖ Energy demand is an outcome of what energy is for
- ❖ Similar buildings may have different constraints in their use of electricity
- ❖ The extent to which a DSR intervention can take place depends not only on individuals' decisions, but also time structure of business activities

Flexibility in a hotel setting



End user impacts

Most flexibility during the summer time; response time and automation

Refrigeration - health and safety rules

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Conclusion

- ❖ Need for research on barriers to the uptake of DSR in the commercial sector
- ❖ Decisions about DSR participation are not always and necessarily taken by careful consideration of pros and cons
- ❖ Non-energy experts also have a say
- ❖ Technical and real flexibility influenced by what energy is used for - which is determined by non-energy factors
- ❖ Need for DSR opportunities that are low risk and easy to understand by non-specialists

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Thanks

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