

AmBIENCe:

Active Managed Buildings with Energy Performance Contracting

19 February 2020, Brussels

Covenant of Mayors Investment Forum – Energy Efficiency Finance Market Place

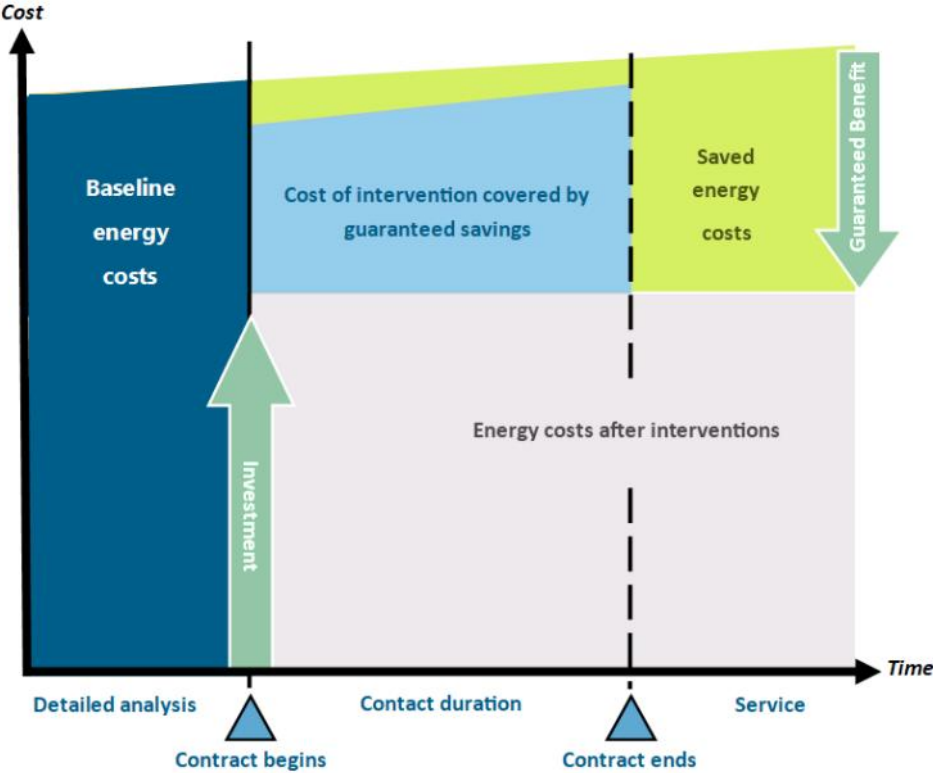
Maarten De Groot

Senior Expert Built Environment & Smart Cities

Vito / EnergyVille



Introducing Energy Performance Contracting



- Outsources energy savings and management
- From optimisation of operations to deep energy retrofits
- Shifts risk of under performance to a private party (i.e. ESCO)
- Potential extension with ESCO Financing to provide an overall integrated solution
- Maintenance is mostly incorporated → Maintenance & Energy Performance Contracts (M-EPC)

The EPC model is flexible & adoptable

Flexible approach

Guaranteed Savings Model
(50% of EU market)

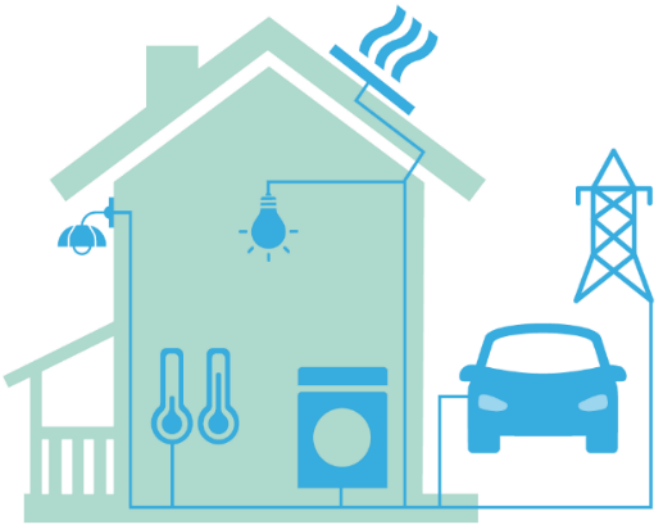


Shared Savings Model
(20% of EU market)



Energy Supply Contracting
(30% of EU market)

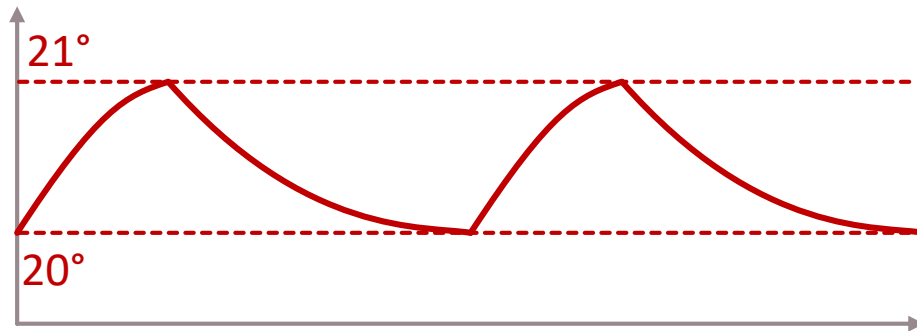
Buildings become smart(er)



- Active management enables significant emission savings in a cost-effective way (5 to 30% for space heating)
- Improve comfort, occupant satisfaction & productivity (up to 12%)
- Demand Response (DR) enables buildings to answer the flexibility need of the energy system

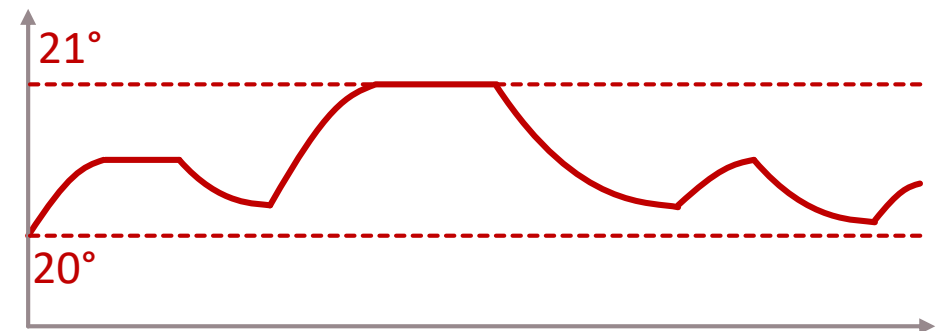
What is energy flexibility? An example ...

Heating of building with traditional **ON/OFF** control



→ Heating switches **ON/OFF** when the **lower/upper** comfort limit is reached

Heating of a building with **Smart** control



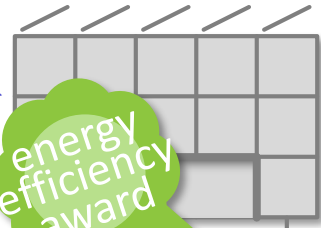
→ Heating switches **ON/OFF** **whenever it wants** as long as the comfort is not compromised

this is "energy flexibility"

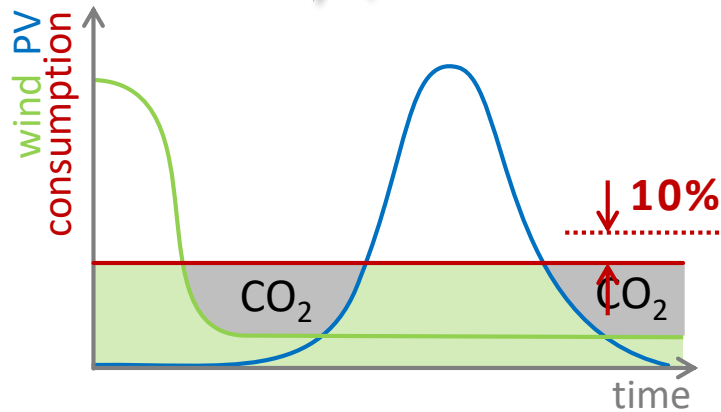
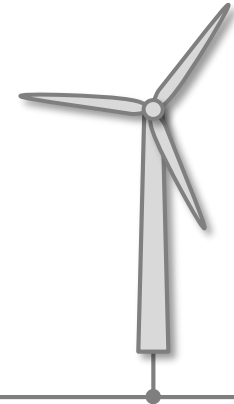
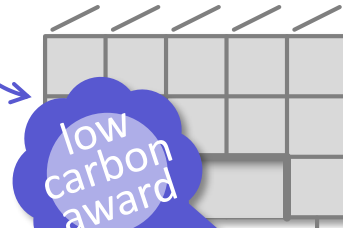
Why energy flexibility gains importance?



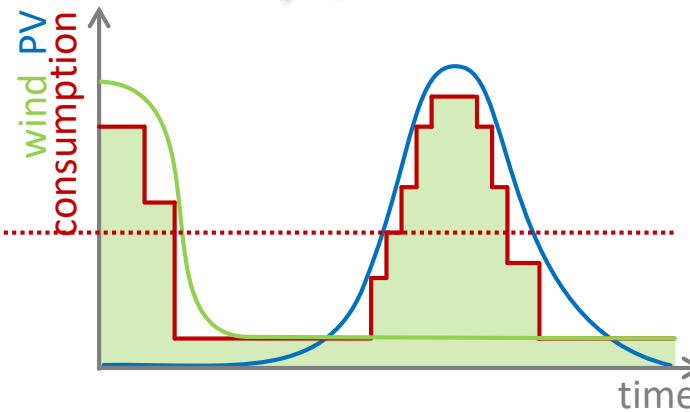
Office building with high **efficiency** heat pump



Office building with high **flexibility** heat pump



540 kWh
54 kg CO₂



600 kWh
0 kg CO₂

Demonstrating system imbalance & predictability wind forecast



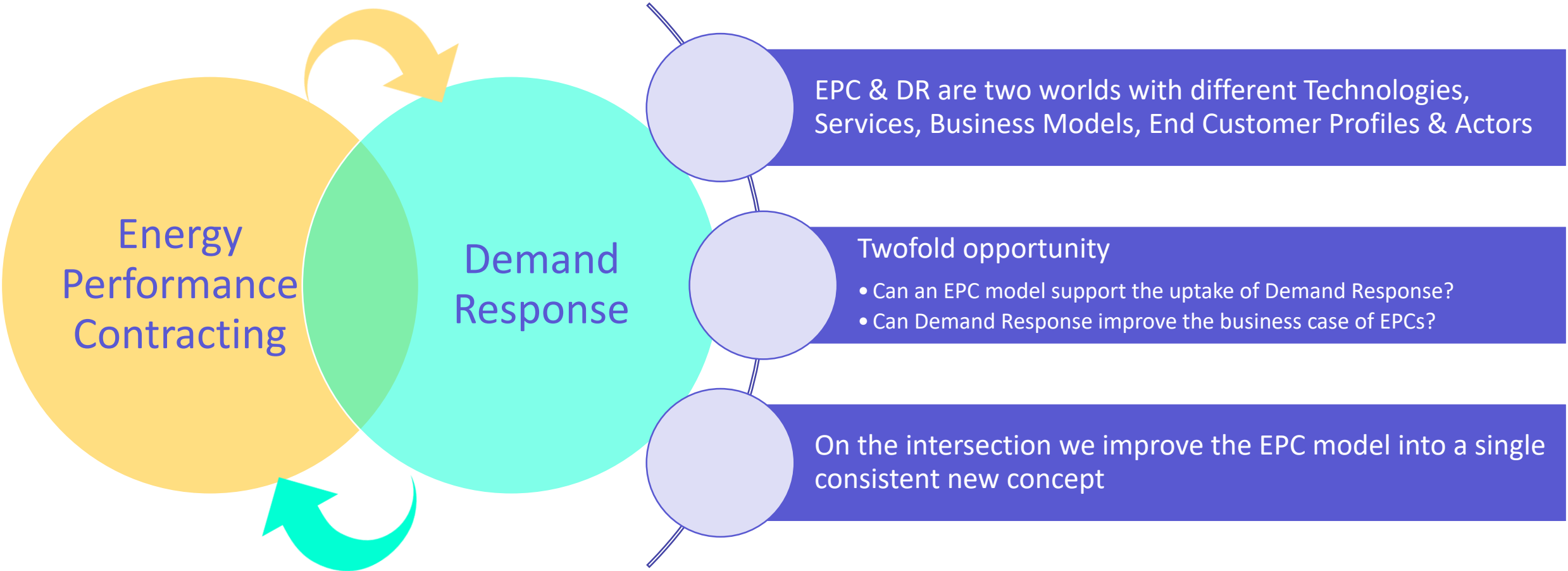
IMBALANCE PRICES



















WIND FORECAST & MEASURED



Combining EPC & Demand Response



Analysing the active building EPC concept & business models in IT, BE, ES, PT

	Italy 	Belgium 	Spain 	Portugal 
Current status of EPC/ESCOs				
Current status of DR services				
Current status of other enabling factors				

Building segments for Active Building EPC



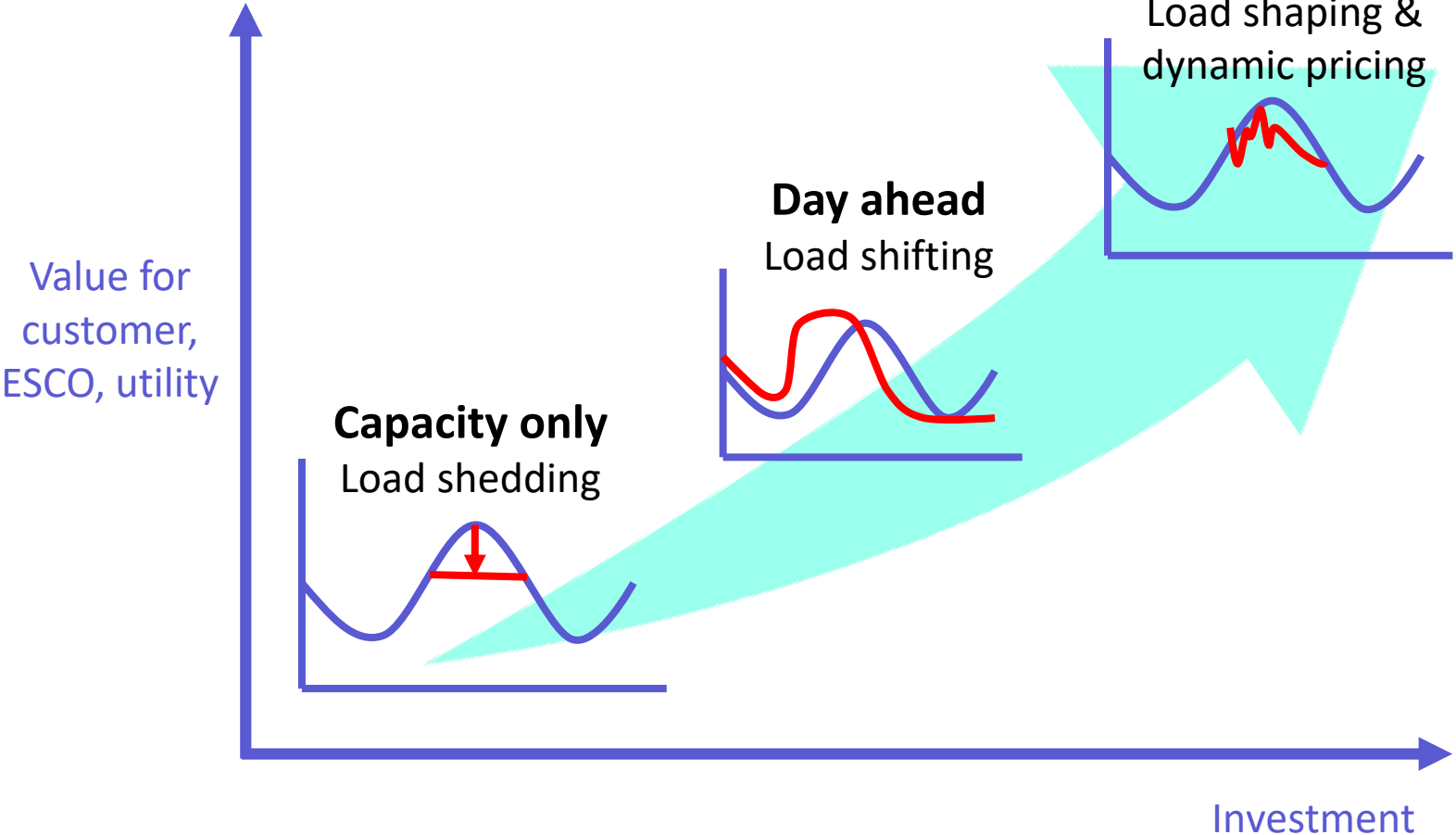
Building segments		EPC potential today	DR/Flexibility potential today
Residential	Private Individual	Very low	Low
	Private Collective	Moderate	Low
	Public (social) Collective	Low	Low
Public		High	Moderate
Commercial		Moderate	Moderate
Industrial	Small/Medium	Moderate	High
	Large	Low	Very High

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The business value of DR in active building EPC



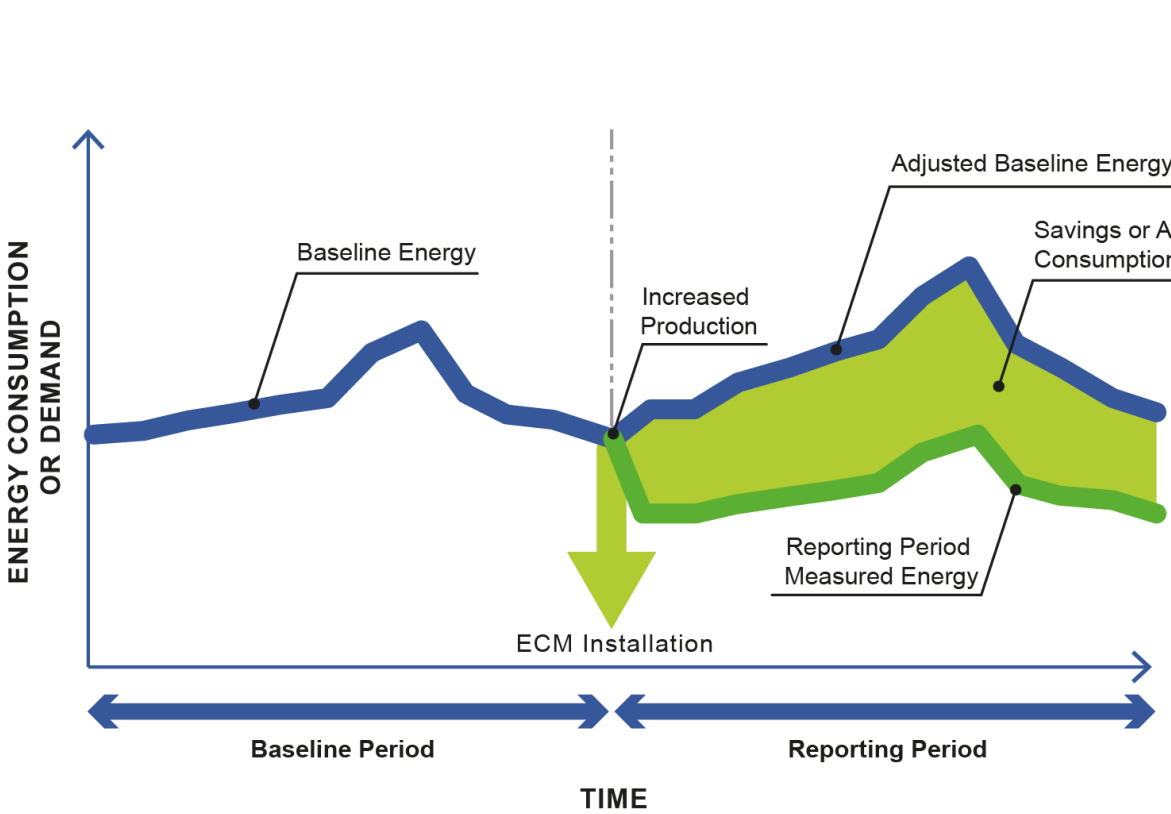
Business value for end-customer

Cost reductions by avoiding higher energy prices

Additional revenue streams (onsite generation, storage, or shiftable loads)

Better understanding of consumption patterns

Flexibility tailored M&V protocol



- Measurement and verification algorithm using before/after measuring scheme to evaluate the changes in energy use
- For the monitoring phase, improved and extended M&V methods for demand response services will be proposed
- Hight time resolution for monitoring
- AmBIENCE will analyse the need for specific DR-related routine and non-routine adjustments factors

Source: evo-world.org

Is active building management the silver bullet for energy performance contracting?



Lower energy consumption

Decreased energy bills

Higher comfort & wellbeing

Guaranteed performance

Secure building operation

Improved business case through flexibility



Any questions?

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 **ambience**

www.ambience-project.eu



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An aerial, top-down view of a dense urban cityscape, heavily color-cast in a monochromatic blue. The image shows a complex network of buildings, streets, and green spaces, with a central focus on a large, multi-story building. The perspective is from directly above, looking down into the city.

a_≡ ambience



NOVICE:

New Buildings Energy Renovation Business Models incorporating dual energy services

Jo Southernwood
Senior Research Engineer
International Energy Research Centre



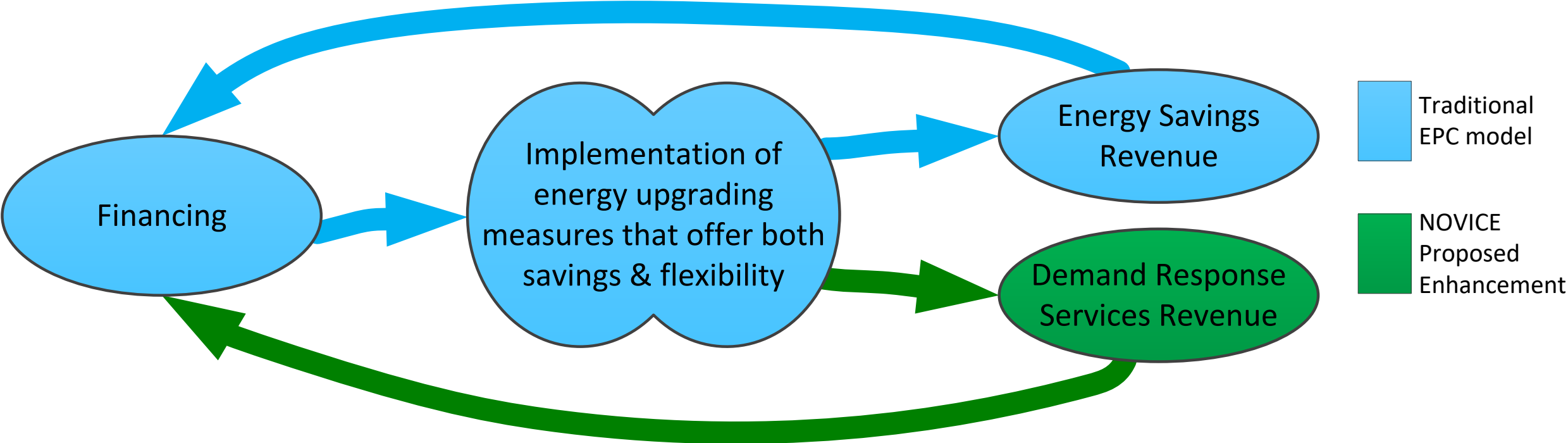
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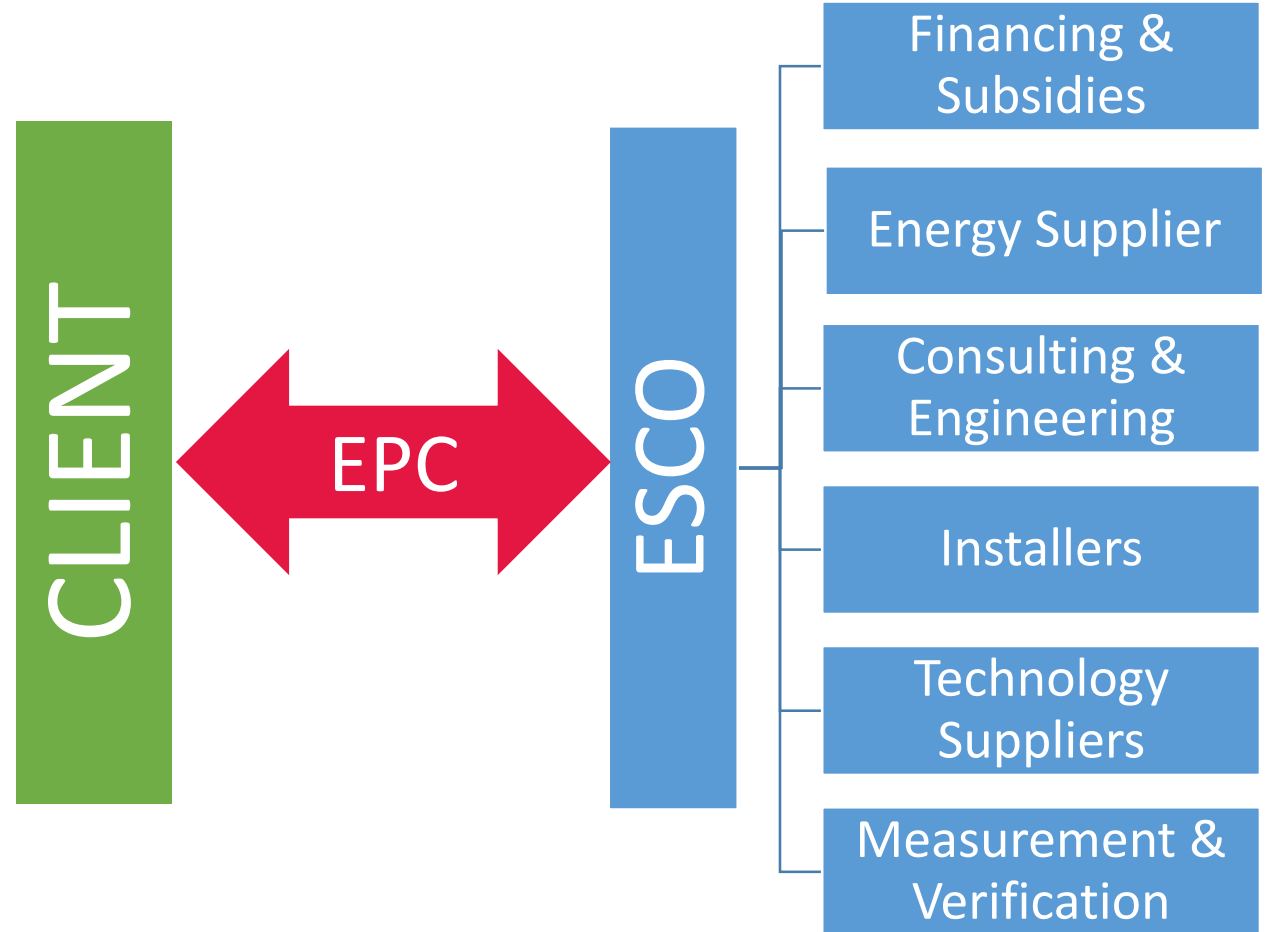
NOVICE in a Nutshell: An Enhanced EPC



Traditional EPC model

Energy Performance Contracts (EPCs) have many advantages:

- Client does not require upfront capital.
- Finance for the project is provided by the ESCO or a third party finance provider.
- Energy Savings are guaranteed by the ESCO, removing the operational risk from client.
- The loan is repaid from the savings on energy bills.
- Single contract between client and ESCO covers all energy efficiency measures.
- Deeper renovations can be achieved through taking a whole building approach.





Barriers to EPC

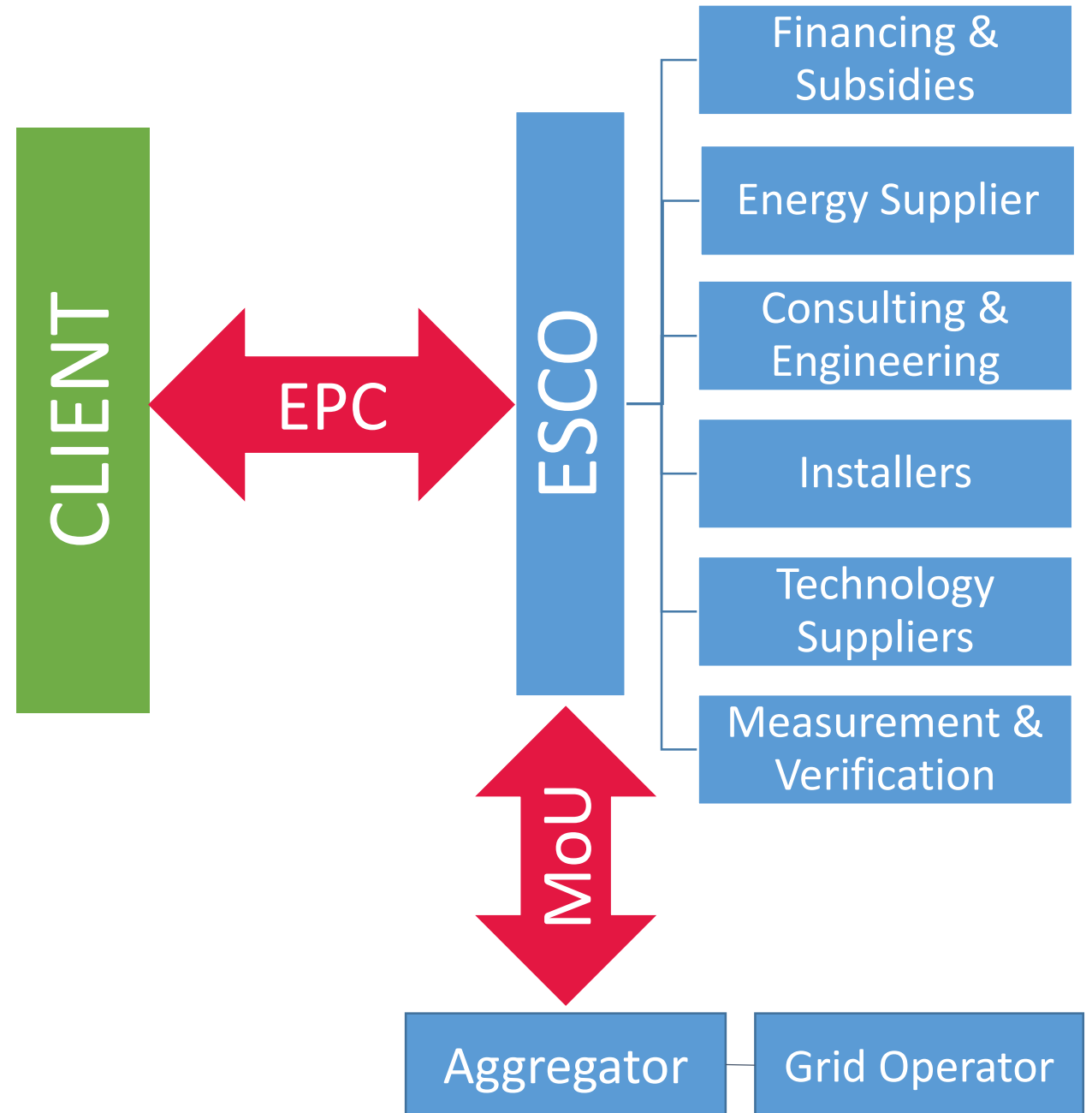
Uptake of EPCs has been slow in many countries because:

- EPCs are complex contracts.
- High cost of procurement & contract development.
- Contract durations of 5-15 years are typical.
- ESCOs find it difficult to obtain finance - loans tend to be secured based on client credit rating, not energy saving potential of project.
- Lack of government support and lack of information about EPCs.

NOVICE Enhanced EPCs

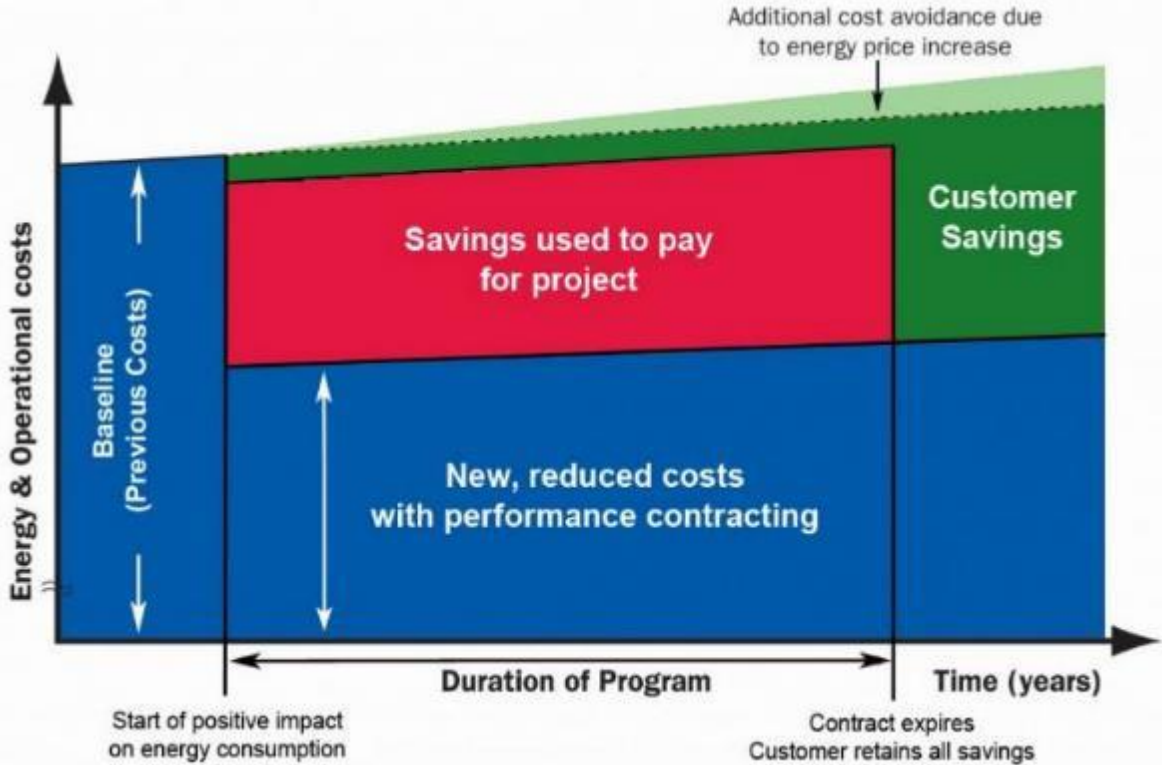
How do they work?

- NOVICE project is looking at an Enhanced EPC business model for ESCOs.
- It considers demand response as well as energy efficiency measures
- This creates a dual revenue stream – one from energy efficiency, another from demand response.
- The ESCO remains the single point of contact for all measures but uses the services of a demand response aggregator to provide services to the grid.
- A Memorandum of Understanding (MoU) governs the relationship between ESCO and Aggregator

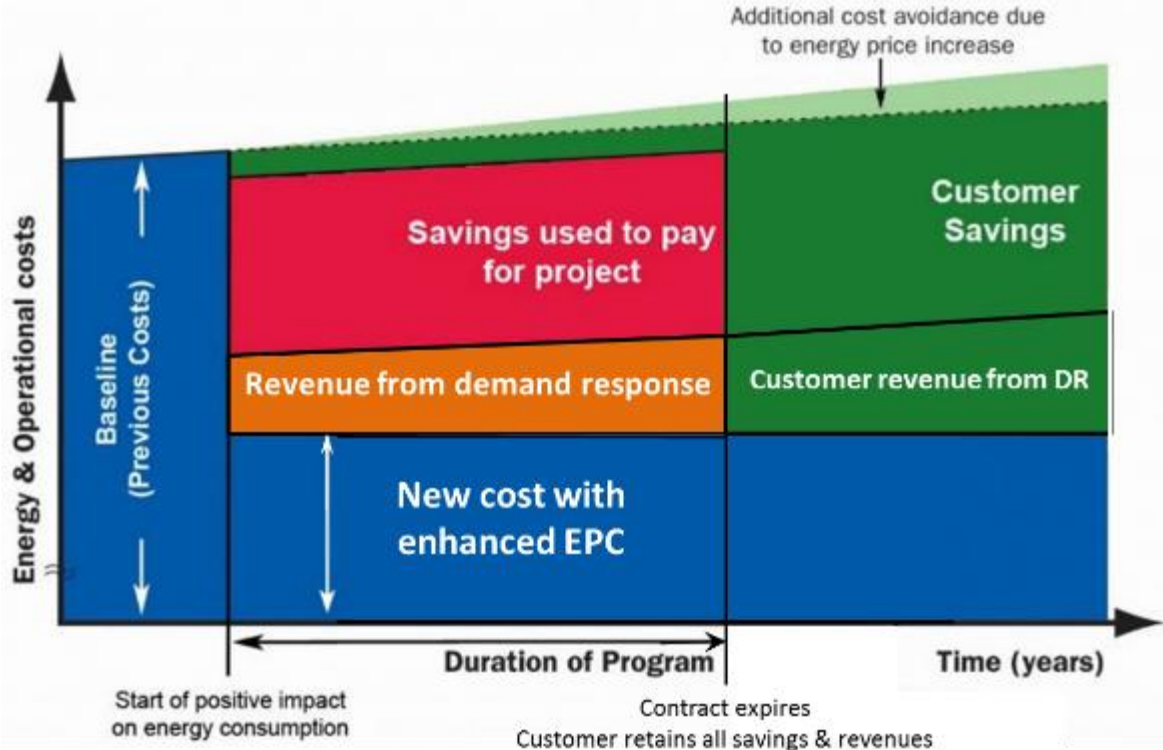


Traditional EPC vs Enhanced EPC finance

Traditional



Enhanced



How much flexibility is available from this building?

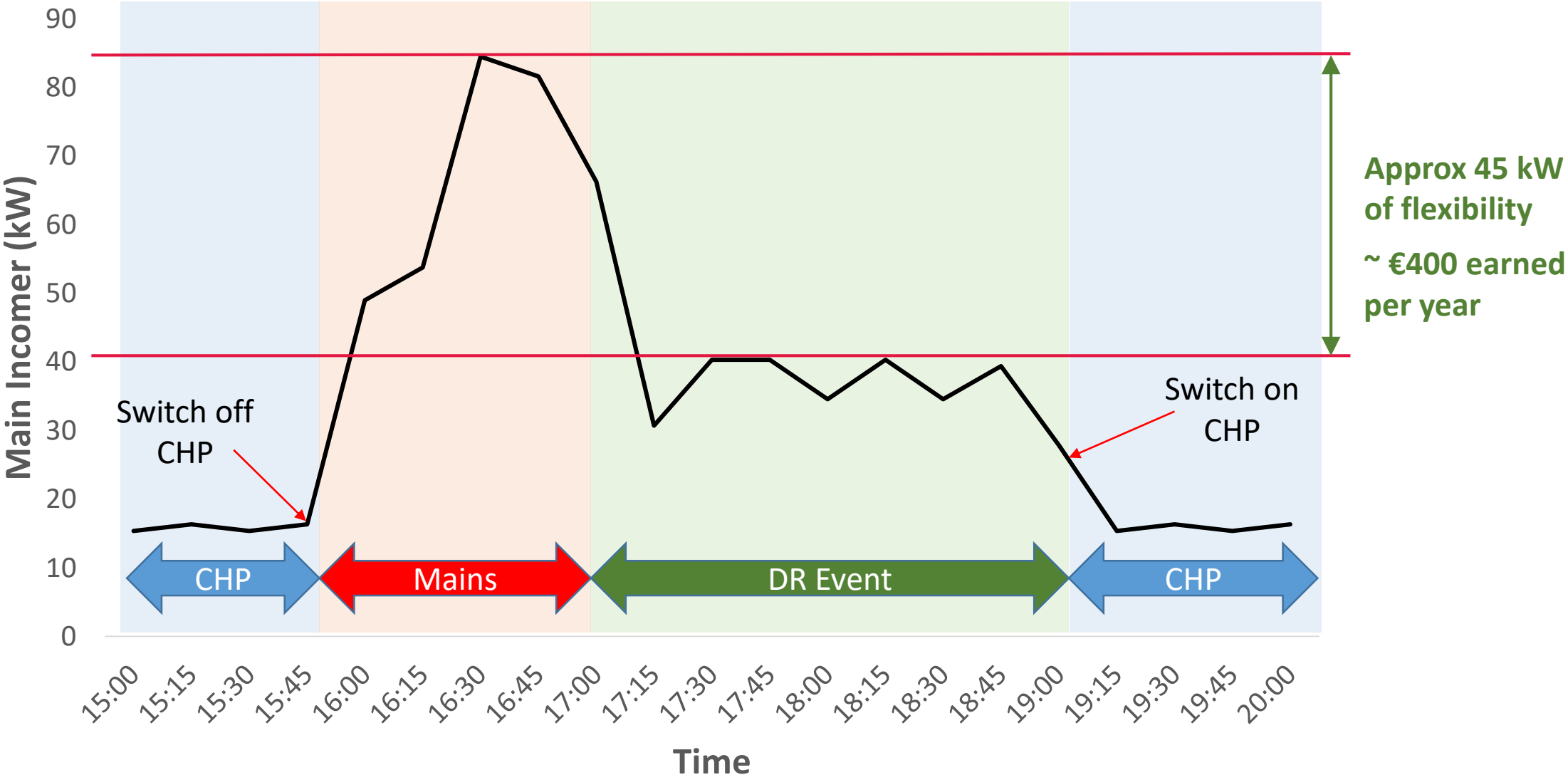


How Flexible?

- Aggregators in Ireland only want to deal with large industrial sites
- So NOVICE simulated a demand response event at a leisure centre in Dublin
- All non essential HVAC equipment was shut down for 2 hours between 5pm-7pm
- How much flexibility is available?
- Would building users notice a DR event?



How much flexibility is available from this building?



What about building users?

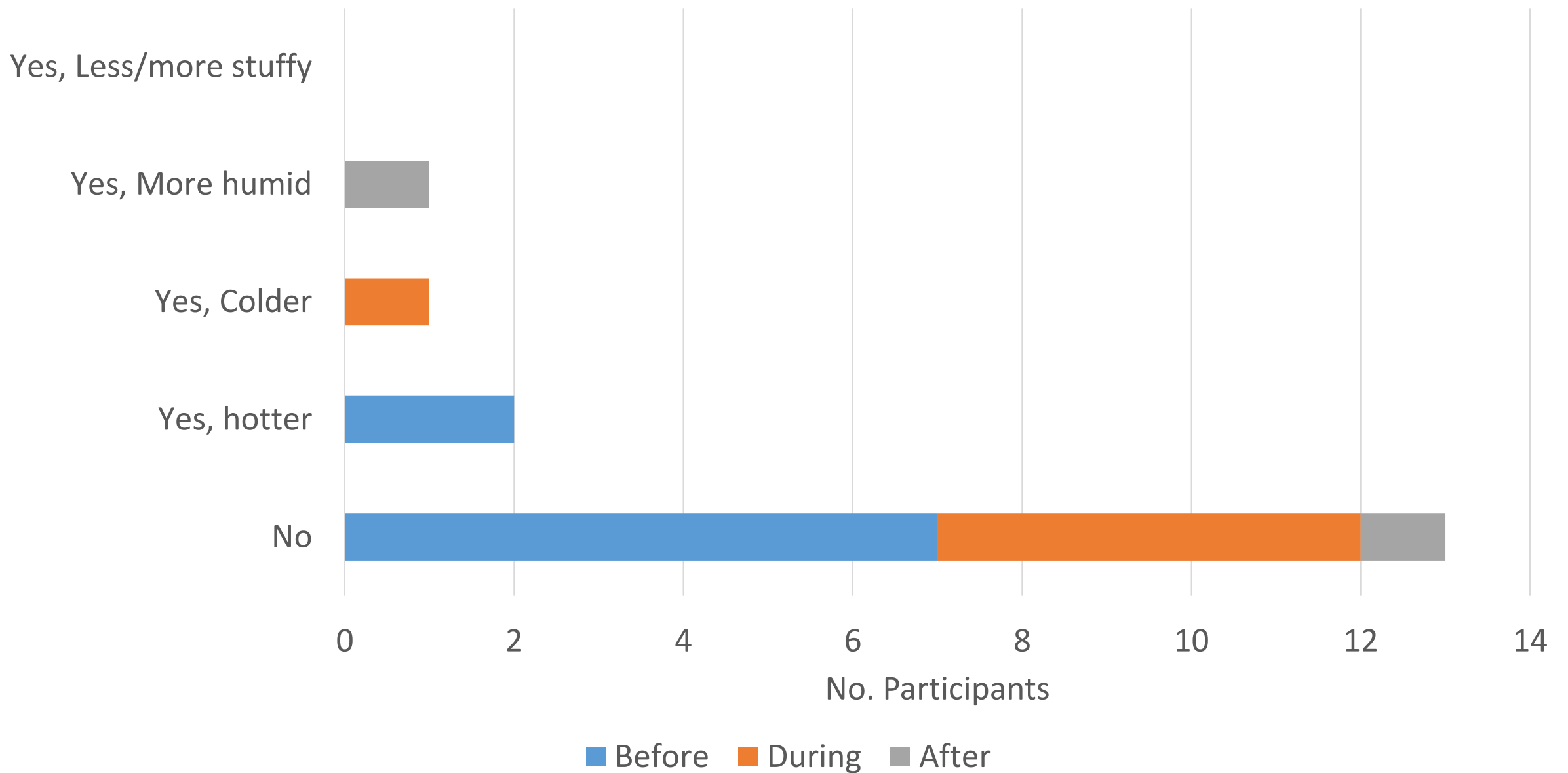
- Carried out a survey with building users
- Control group: Before DR event started
Test Group: During & after event
- Participants were not told about the DR event to avoid any bias - 'anchoring' effect
- A range of questions were asked to gauge satisfaction with temperature, humidity and air quality.

1	What is your gender?
2	What was your main activity in the last 20 minutes?
3	How satisfied are you with the temperature in the area we are in now?
4	How would you rate the humidity levels in the area we are in now?
5	How would you rate the air quality in the area we are in now?
6	In which other area of the leisure center did you spend most time today?
7	Thinking about that area, and the time you spent there, how satisfied were you with the temperature in that area?
8	How would you rate the humidity levels in that area at the time you were there?
9	How would you rate the air quality in that area at the time you were there?
10	Did you notice any change in conditions during the time you were there?
11	If you would like to make any other comments about the temperature or air quality at the leisure center today, please do so below.
12	Please indicate which items of clothing from the list below the participant is wearing.
13	What is the date?
14	What is the time now?
15	What time did the DR event start?
16	Record the approximate outdoor temperature and seasonal conditions

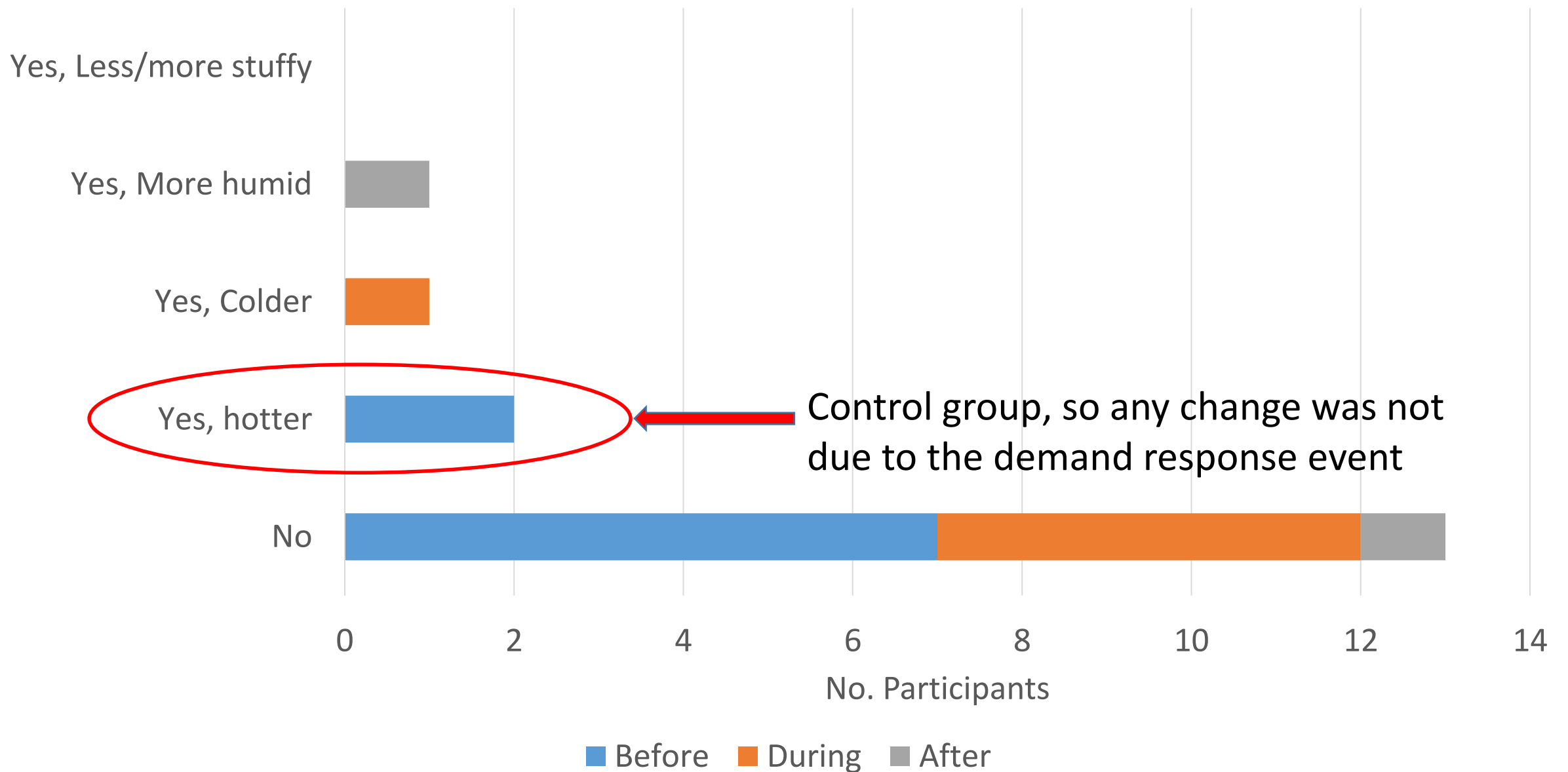
We asked:

“Did you notice a change in conditions during your time in the leisure centre today?”

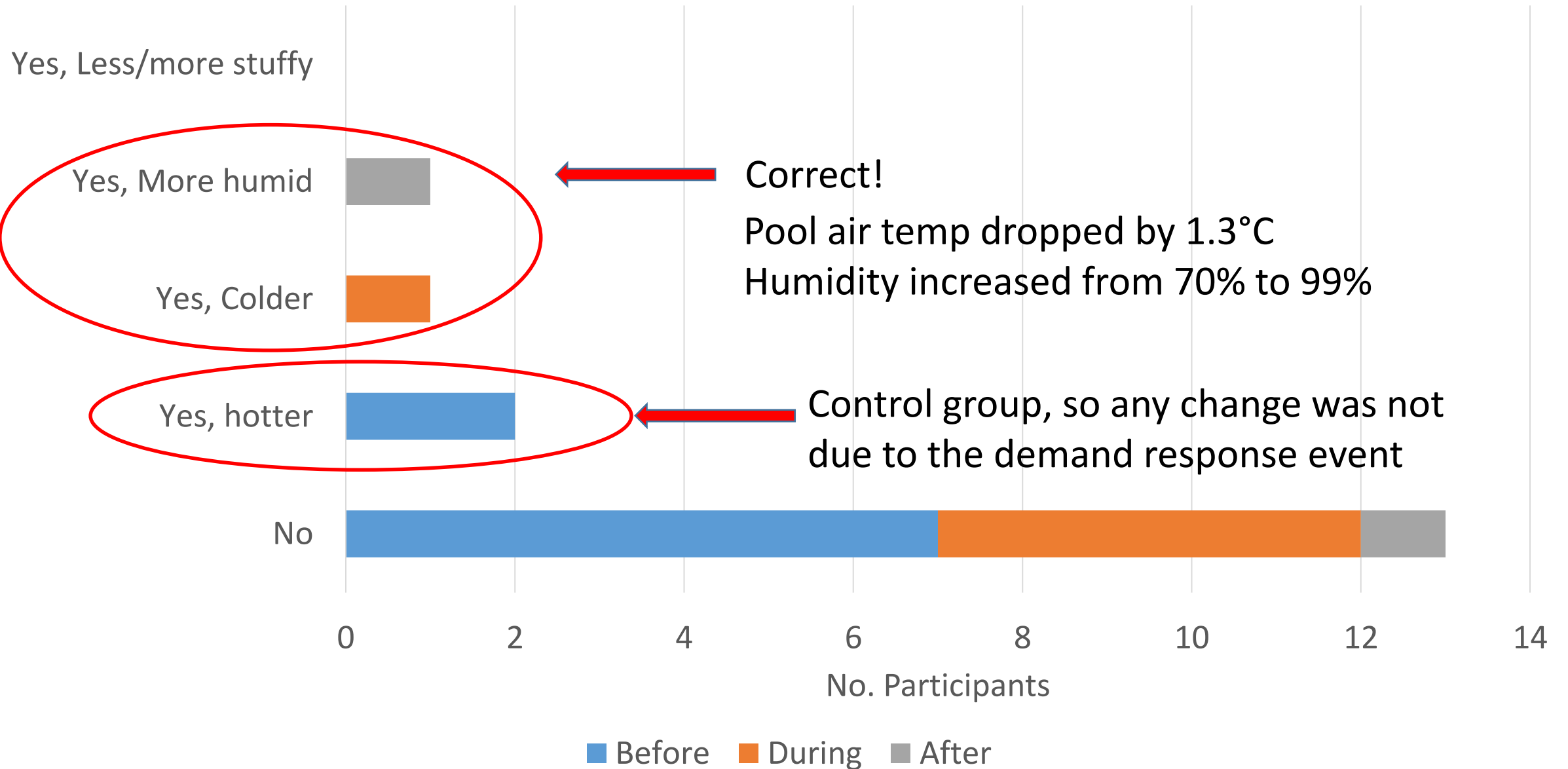
Did you notice a change in conditions during your time here today?



Did you notice a change in conditions during your time here today?



Did you notice a change in conditions during your time here today?



How does the NOVICE approach affect project bankability?

Key findings from online interviews conducted with 10 investors:

- Demand response is an unknown programme type with unsteady and unpredictable revenue streams and is a 'grey technology area' for many investors
- The current state of the art is that financing EPC using pure energy efficiency measures remains a challenge for investors:
- There is no set definition of 'bankability' among investors; the concept of 'bankability' itself is largely investor-specific:





Thank you!

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