How AI and Emerging Digital Technologies will Influence the Future of the Energy Management Sector in the Built Environment

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Alexa; Tell me a Joke...
Digital Technologies
Energy Management
Built Environment
Barriers

Technical  Social  Financial  Legal/ Regulatory

Source: ECTP Strategic Research & Innovation Agenda 2021-2027
Barriers

Technical

Social

Financial

Legal/ Regulatory
The Landscape is Shifting...?
...The Landscape has Shifted
Control your heating from your phone...

Watch the video
But our energy consumption is still not reducing? Why?
In some houses, energy consumption is 3 times anticipated consumption.
In others, CO2 levels rising to 4,000 ppm overnight.
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Design Intent

vs

Building in Operation
How could AI help?
Ruth, why is your gas heating on, the temperature outside is warm and sunny, shall I turn it off for you?

Ruth, can you check your ventilation system is working, your CO2 levels are very high.
Why not just automate everything?
PEOPLE

Perception Matters

You are in control
AI can drive **behaviour**...
AI can enable better **choices**...
AI can **educate** and inform...
What about non-residential?
Meet "The Brain"

Studies show that emotive avatars or characters enhance performance and engagement of users. The character helps create an emotional connection with the activity you want people to engage in.
INDOOR CARBON DIOXIDE
699 ppm

AWESOME! WE'RE BACK IN THE ZONE
What about large commercial?
Performance based monitoring
Certification is for Core and Shell...
Performance based monitoring

65pts → 80pts

LEED v4

1pt
So how can we fix this?
Building Information Model (BIM)

Operational Digital Twin (DT) Models

SaaS enabled by AI

Energy management of all buildings, not just those with BMS

Drive Future Needs at Design Stage

Needs Live Data...

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Conservative construction sector...
Increased cost...
Unknown reward...
Will AI really help??...
Knowledge-powered fault detection & diagnosis implemented through AI...
In this case, we might be able to introduce **AUTOMATION** and take the **PEOPLE** into account also...
AI learns *perception and comfort levels*...

AI drives *behaviour*...

AI *educates* and informs...

AI allows the building to *adapt to the user*...
Without having a negative effect on the building energy consumption...
But what about groups of buildings?
Zero emission building stock by 2050...
Energy efficiency target of 32% by 2030...
100 Positive Energy Districts by 2025...
100 cities have reached net zero greenhouse gas emission by 2030...
We cannot do it 1 building at a time...
We cannot do it one building at a time…

Different solutions for different buildings

Some solutions can be automated, some can’t...

Demand Response and Demand Side Management...

Community Approach
Food for thought...
Watch out for the future...
Thank You