ENERGY CALCULATION TOOLS

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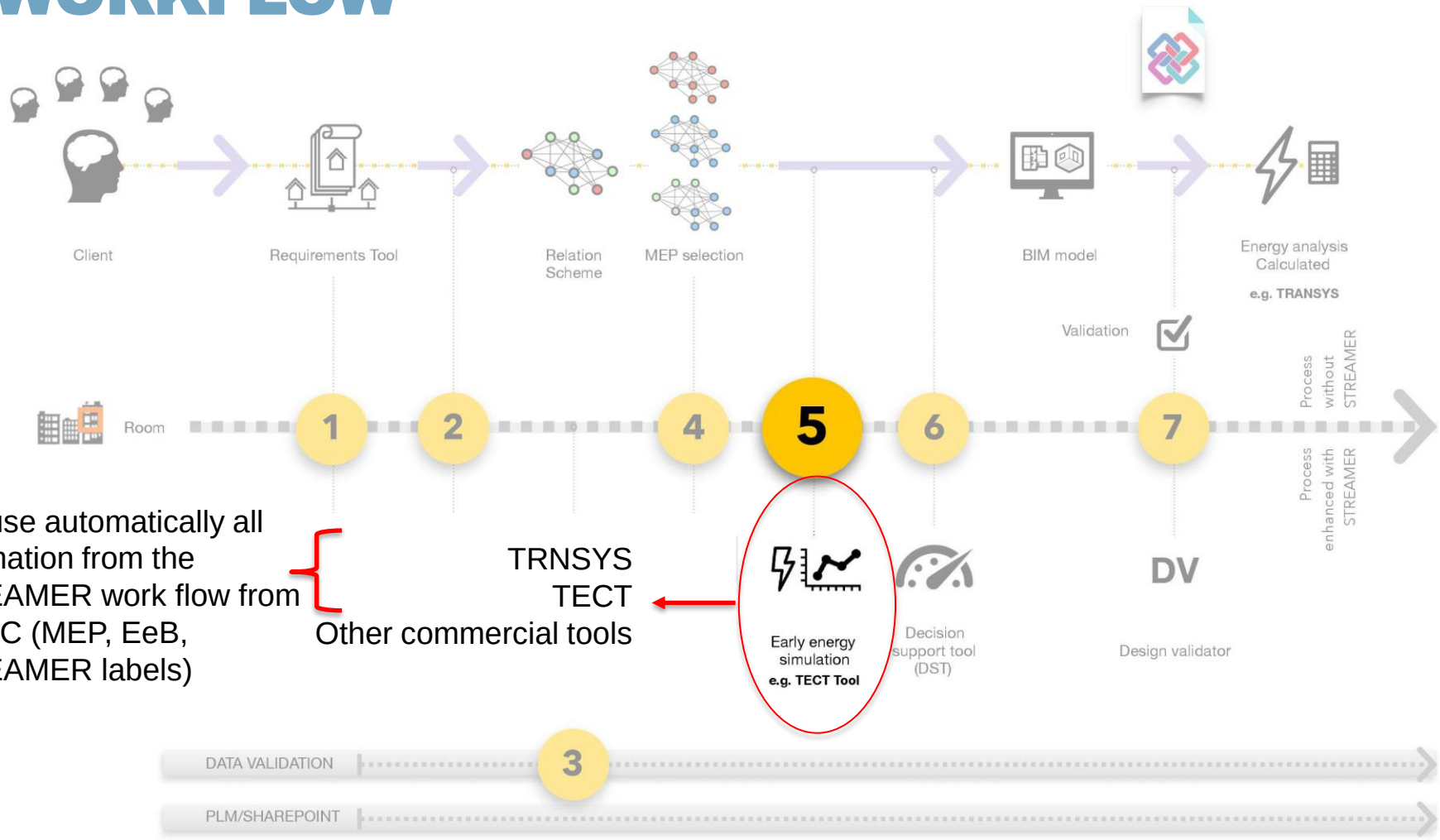
Streamer
European research on energy-efficient healthcare districts

POSITION IN THE STREAMER DESIGN WORKFLOW



Can use automatically all information from the STREAMER work flow from the IFC (MEP, EeB, STREAMER labels)

TRNSYS
TECT
Other commercial tools

ENERGY CALCULATION TOOLS NEED A LOT OF DETAILED INPUT

Most energy calculation tools need a lot of detailed input that is not available in the early design phase

- HVAC system emitters, generation, ventilation system, controls
- Occupants and the way of use
- Internal heat loads

Majority of energy calculation tools don’t calculate at room level

Most information (e.g. MEP systems, must be added manually on room level (not possible trough IFC)

ENERGY CALCULATION TOOLS NEED A LOT OF DETAILED INPUT

TECT can handle IFC files including:

- STREAMER labels (PoR, EDC) -> setpoints temperature, time in use, heat load equipment, amount of ventilation
- MEP and EeB systems (eveBIM) -> physic properties of the building, installation efficiencies
- Location for the climate conditions

TECT

Easy to operate

Is based on the EU standards regarding the Energy Performance of Buildings Directive (EPBD)

- EN/ISO 52016-1: 2017 Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads
- EN/ISO 52010-1: 2017 External climatic conditions
- EN standards regarding HVAC systems and ventilation (infiltration) can and likely will be integrated in the TECT in the future

Can use IFC files from the EDC and eveBIM directly

If the IFC files doesn't contain STREAMER labels and MEP/EeB systems default values are used

Writes results into the IFC file

INPUT FROM THE STREAMER WORKFLOW

STREAMER Labels (defined in the PoR):

- External heat source (occupancy, equipment including schedule based on comfort class, equipment class and user profile)
- Amount of ventilation based on hygienic label.

MEP systems (assigned with eveBIM):

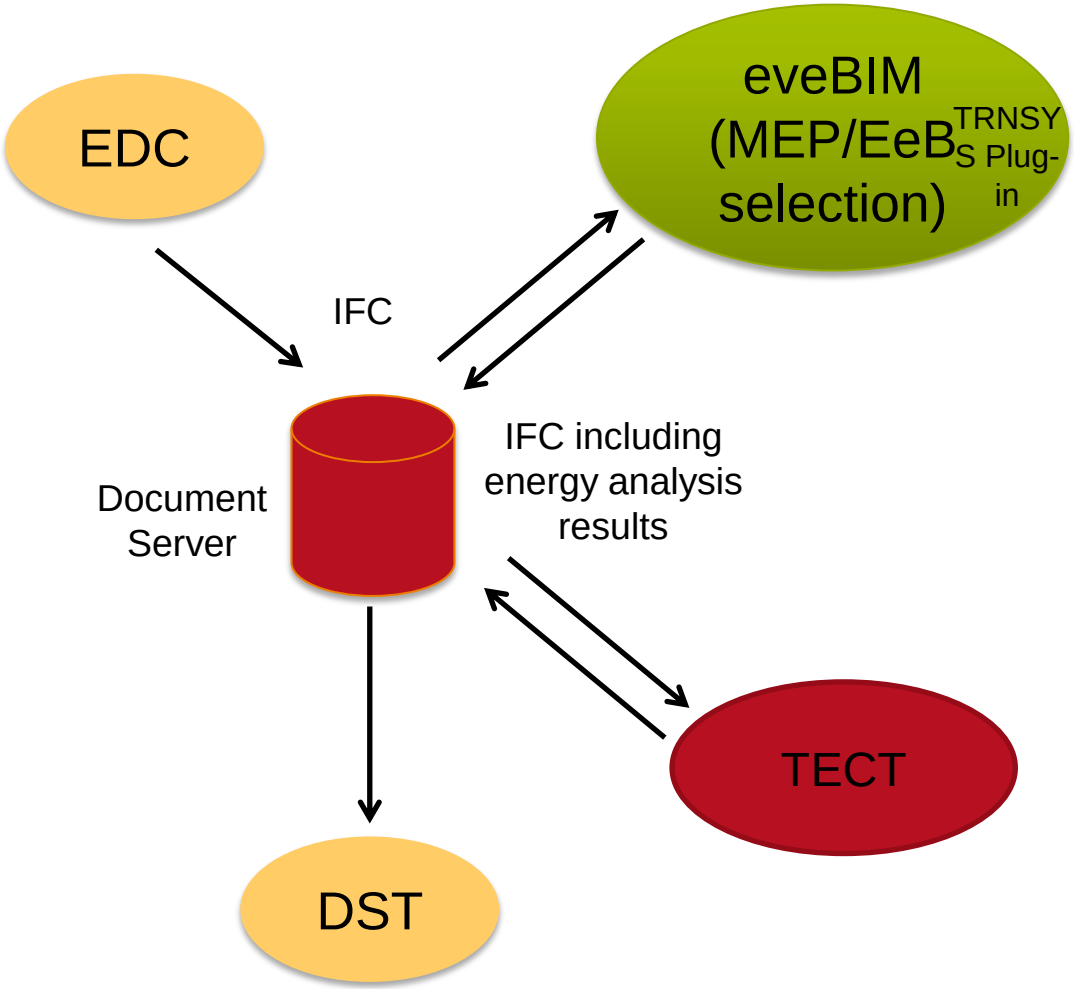
- Definition of the MEP system (generation, distribution and emission) based of efficiency

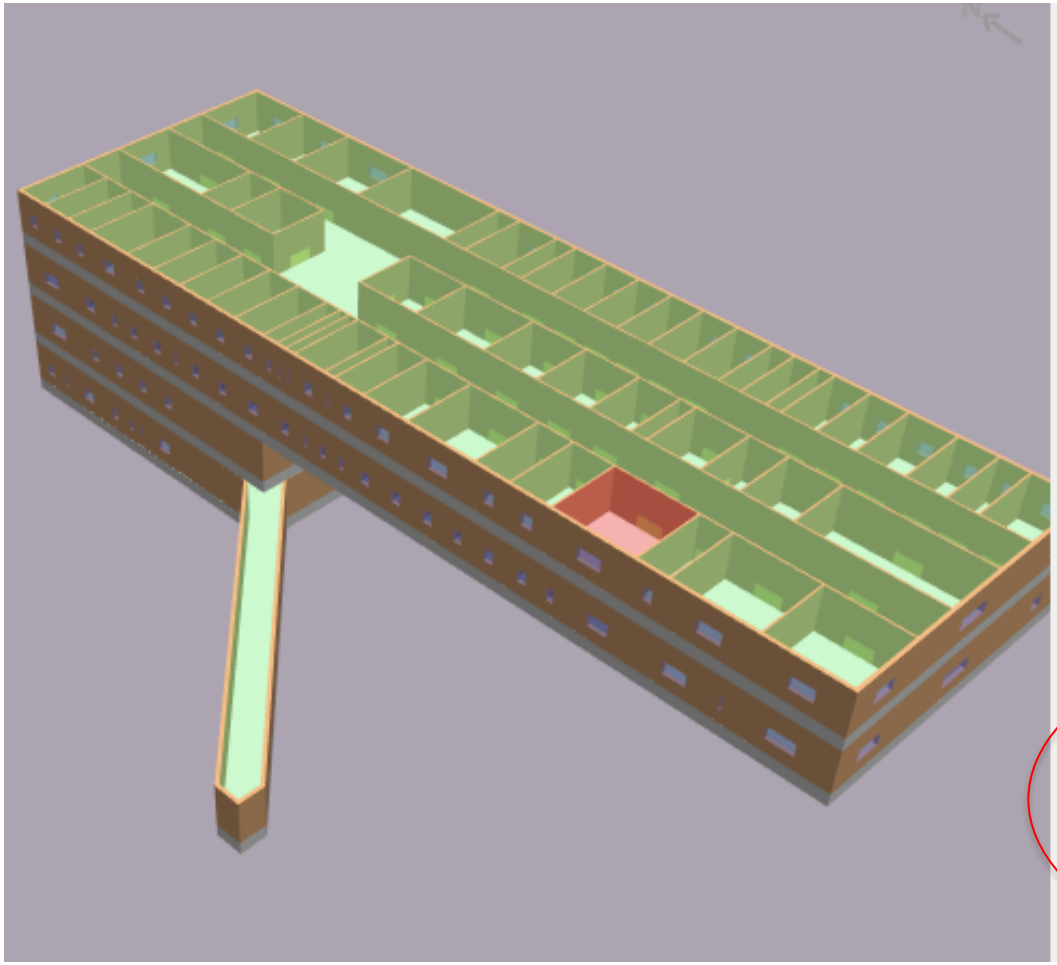
EeB systems (assigned with eveBIM):

- Definition of the envelope properties (U-value, thermal capacity, etc.)

If no labels, MEP or EeB systems are assigned default values will be used!

ENERGY ANALYSIS – INTERFACING WITH THE ENERGY CALCULATION TOOLS

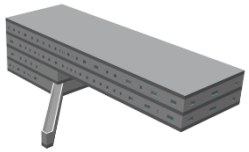
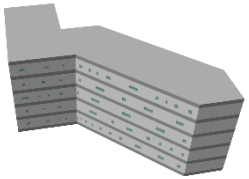
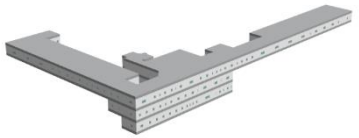




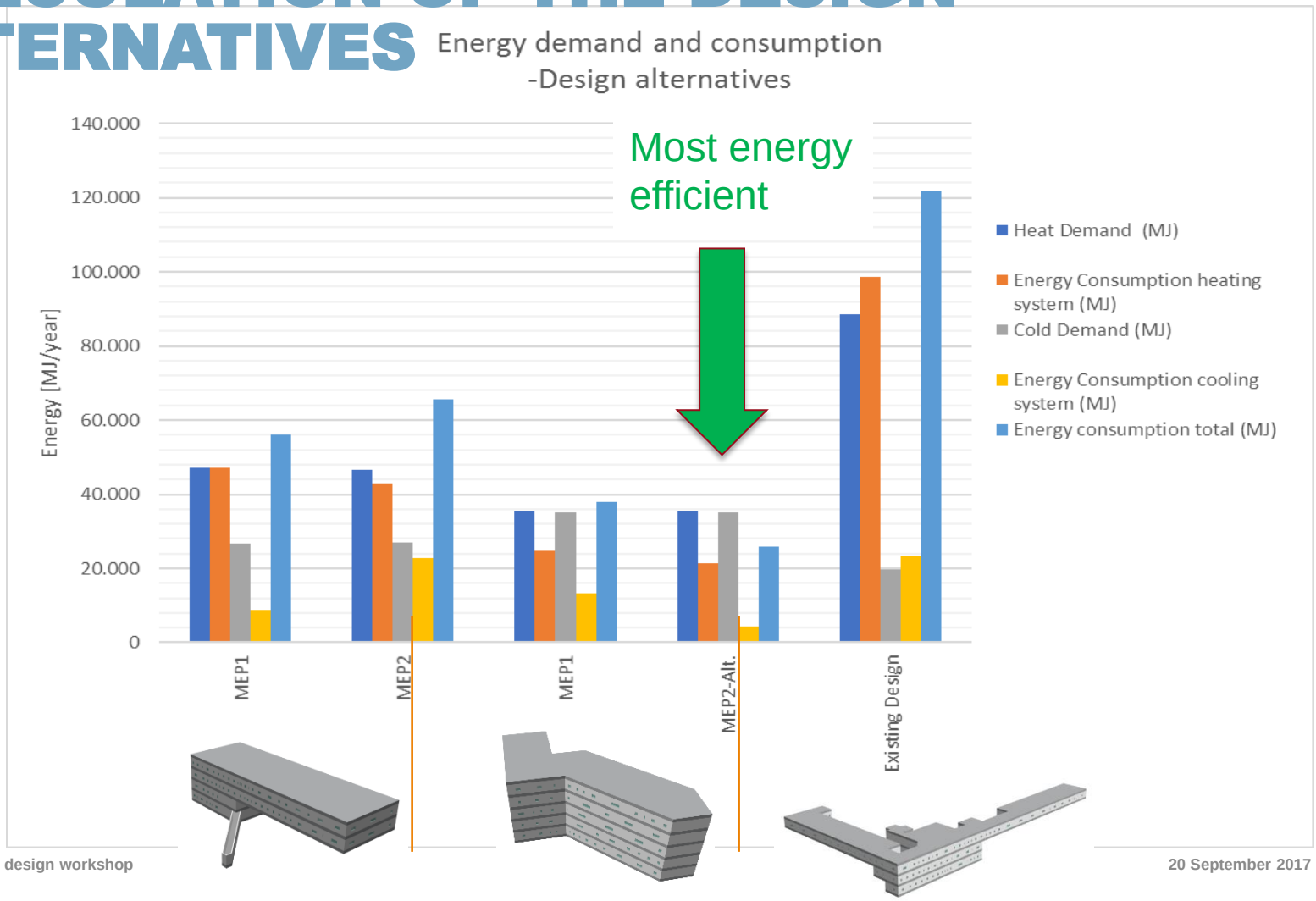
Functional Description | Detailed IFC Description

Name	Value
Pset_SpaceCommon	1
STREAMER_Labels_PoR	7
AccessSecurity	A2
BouwcollegeLayer	O
ComfortClass	CT3
Construction	C1
Equipment	EQ1
HygienicClass	H1
UserProfile	U1
STREAMER_PoR	4
Amount	1
FunctionalAreaType	DiagnosticImaging
Required_Area	37.1 [SQUARE_METRE]
RoomType	WaitingRoom
STREAMER_Room	3
Streamer Energy	7
Cold Demand	153.551
Energy Consumption cooling system	180.648
Energy Consumption heating system	287.607
Floor Area	37.1
Heat Demand	258.847
Max Power Cold Demand	0.946307
Max Power Heat Demand	3.13277

DESIGN ALTERNATIVES

Building	Design alternative 1 		Design alternative 2 		Existing design 
MEP system	**MEP 1**	**MEP 2**	**MEP 1**	**MEP 1 atlt**	**Existing**
Heating :					
Emission	Local heating	Concrete core	Local heating	Local heating	Concrete core
Generation	Electrical heating	Electric heat pump (W/W)	Electrical heating	District heating	Boiler
Cooling:					
Emission	Fan coil units	Concrete core	Fan coil units	Fan coil units	Concrete core
Generation	Mechanical compression	Electric heat pump (W/W)	Mechanical compression	Absorption chiller with district heating	Mechanical compression

RESULTS OF THE ENERGY CALCULATION OF THE DESIGN ALTERNATIVES



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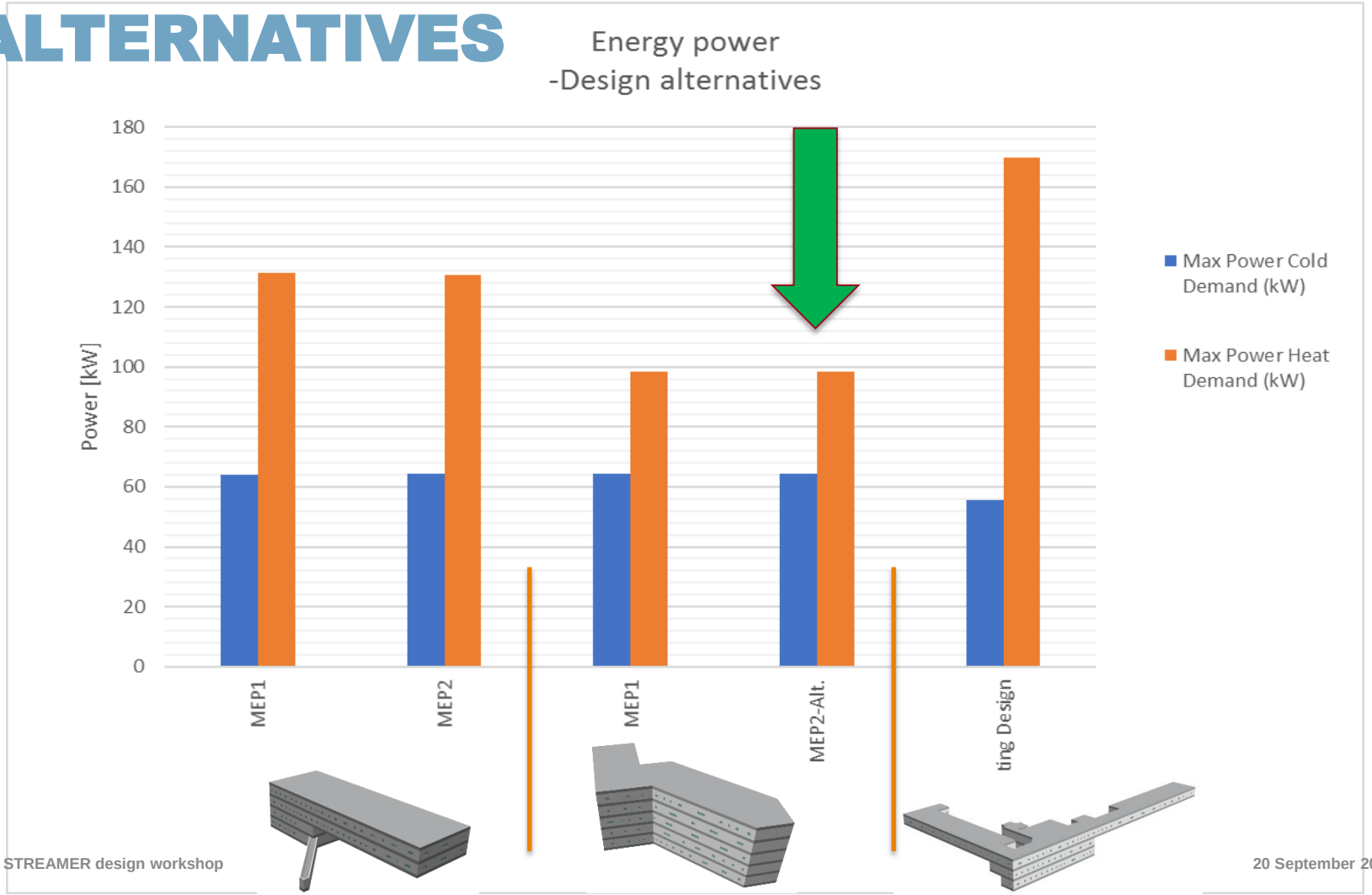

CONCLUSIONS

TECT can be used in the STREAMER work flow using all available information without manual input (STREAMER Labels, MEP, EeB,)

When using other energy calculation tools detailed manual input is necessary

Knowledge regarding energy calculations is necessary to use energy calculation tools

The TECT is based on the EU standards (EN 52016 and EN 52010)

Due to varying results of energy calculation tools, alternative designs can only be compared using the same energy calculation tool