REVOLUTIONIZING SUSTAINABILITY BY UTILIZING 3D ENERGY MODELING AND BIM

WHAT IS 3D ENERGY MODELING?

Energy models simulate the consumption process of energy based on BIM model.

Energy modelling is a virtual, computerized simulation of a building or structure that focuses on:

- Energy consumption and
- Life cycle costs of various energy related items such as HVAC, lights, and hot water, etc.

AEC's INVENTION

AEC has successfully developed the programming linking the available softwares to run simultaneously to produce one combined **3D Energy Modeling Output**.
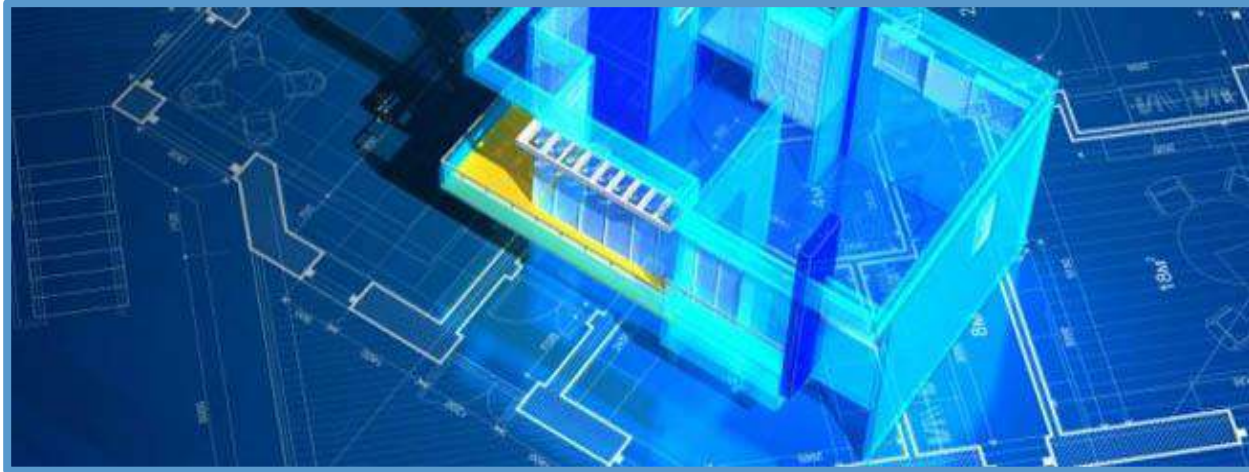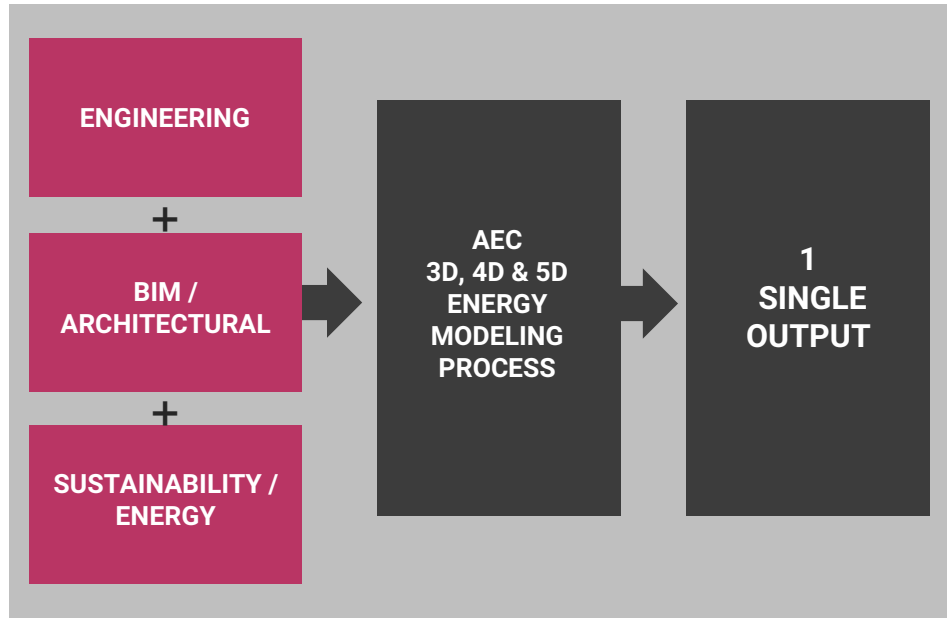
TYPICAL PROGRAMS THAT RUN INDIVIDUALLY

Selected samples of softwares & fields that run individually
and provide limited analysis in their field

ENGINEERING	BIM / ARCHITECTURAL	SUSTAINABILITY / ENERGY
ETABS	AUTODESK REVIT	ENERGY +
AUTODESK PRODUCT DESIGN	AUTOCAD	SAPSUSTAINABILITY
MATLAB	RHINO CEROS	RIHNO GRASSHOPPER
SOLID EDGE / SOLID WORKS	SKETCHUP	LADYBUG TOOLS
ZW3D	3D MAX	ACCUVIO
ANSYS	DIFFERENT AUTODESK PRODUCTS	AQUARIUS
CATIA	VECTOR WORKS	TRACE700
ALIBRE	MICROSTATION	eQUEST
STAAD PRO	BENTLY	OPENSTUDIO
PRIMAVERA	ALL PLAN	DESIGNBUILDER
MICROSOFT PRODUCTS	ARCHICAD	TRNSYS
AND MANY MORE	AND MANY MORE	AND MANY MORE

AEC APPROACH

AEC inventions & programming are combining all individual
or selected softwares to run simultaneously to provide
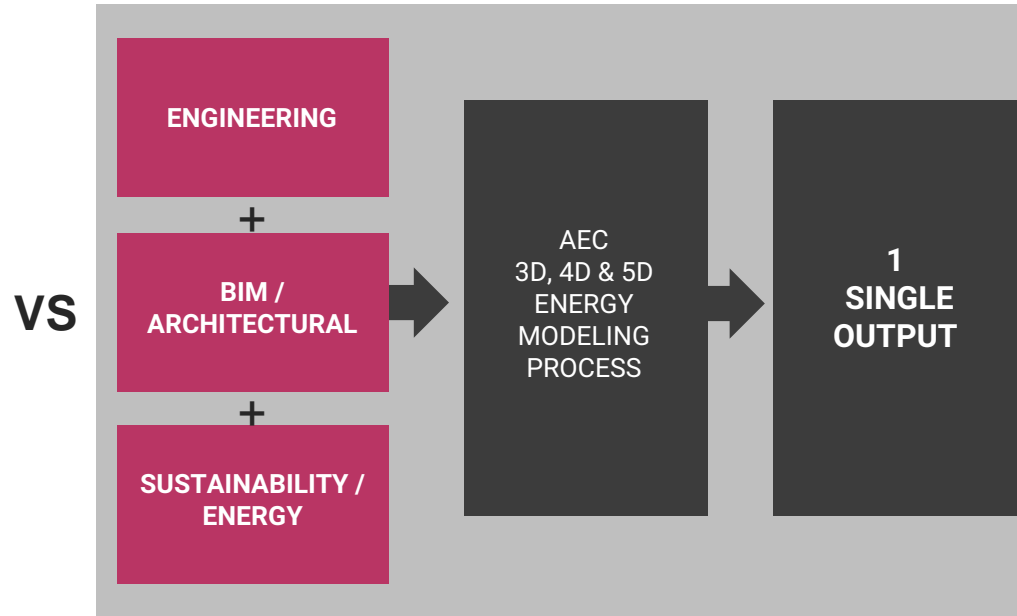1 combined single output

CONCLUSION

Selected samples of softwares & fields that run individually and provide limited analysis in their field

ENGINEERING	BIM / ARCHITECTURAL	SUSTAINABILITY / ENERGY
ETABS	AUTODESK REVIT	ENERGY +
AUTODESK PRODUCT DESIGN	AUTOCAD	SAPSUSTAINABILITY
MATLAB	RHINO CEROS	RIHNO GRASSHOPPER
SOLID EDGE / SOLID WORKS	SKETCHUP	LADYBUG TOOLS
ZW3D	3D MAX	ACCUVIO
ANSYS	DIFFERENT AUTODESK PRODUCTS	AQUARIUS
CATIA	VECTOR WORKS	TRACE700
ALIBRE	MICROSTATION	eQUEST
STAAD PRO	BENTLY	OPENSTUDIO
PRIMAVERA	ALL PLAN	DESIGNBUILDER
MICROSOFT PRODUCTS	ARCHICAD	TRNSYS
AND MANY MORE	AND MANY MORE	AND MANY MORE

AEC inventions & programming are combining all individual or selected softwares to run simultaneously to provide 1 combined single output

VS

ENGINEERING

+

BIM / ARCHITECTURAL

+

SUSTAINABILITY / ENERGY

→ AEC 3D, 4D & 5D ENERGY MODELING PROCESS →

1 SINGLE OUTPUT

aec

BENEFITS OF AEC PROCESS

3D Energy Modeling should provide the following:

- Predict the monthly energy consumption and bills.
- Predict the U-value and R-value.
- Energy efficiency of the materials used.
- Predict the annual energy cost.
- Annual CO2 emissions.
- Compare and contrast different efficiency options.
- Determine life cycle payback on various options.
- Analyze different technological ways to save energy.
- Determine the Energy needed to operate a building thus can predict entire cities.
- Predict points of loses and where the energy is being consumed.
- Provide an energy chart and ratings.
- Help create conclusions for how energy can be saved.
- Help us optimize the design and materials used in a building or a structure to save energy.

THE AEC PROCESS OF CREATING A 3D ENERGY MODEL

1. 2D Architectural and MEP design analysis and implementation.

2. After obtaining the architectural BIM Model or creating it. MEP elements are installed in the 3D Modeling software.

3. Convert to a 3D printable version to analyze and determine the energy zones and energy loses locations.

4. Analyzing the MEP services, building dimensions, materials, and all the available technologies and innovations using various softwares.

5. After obtaining the results, all the simulations are compiled for value engineering and an environmental analysis is conducted to determine the rating or the efficiency of the building or structure. Then the improvements are suggested in the final step and value engineering is provided for a better sustainable and energy efficient project.

EXAMPLE PROJECT: SPORTS CITY LEISURE CLUB
3D ENERGY MODELING PROCESS

## 1) 2D ARCHITECTURAL AND MEP DESIGN ANALYSIS AND IMPLEMENTATION.

EXAMPLE PROJECT: SPORTS CITY LEISURE CLUB
3D ENERGY MODELING PROGRESS

2) CREATING THE 3D ARCHITECTURAL BIM AND INSERTING THE MEP DESIGN INTO 3D MODEL.

EXAMPLE PROJECT: SPORTS CITY LEISURE CLUB
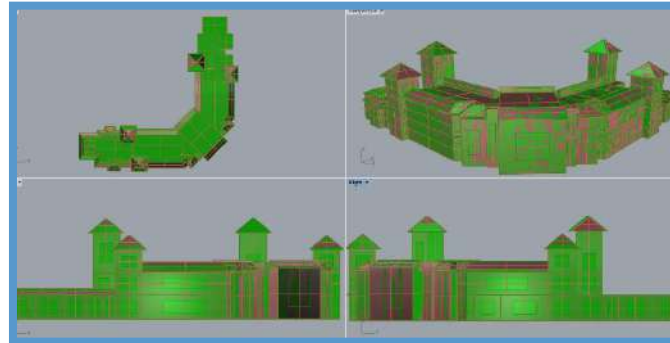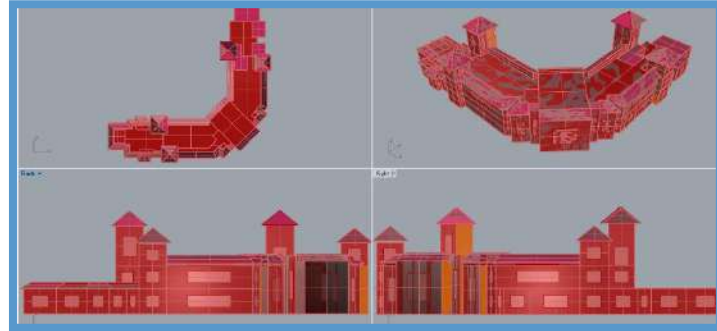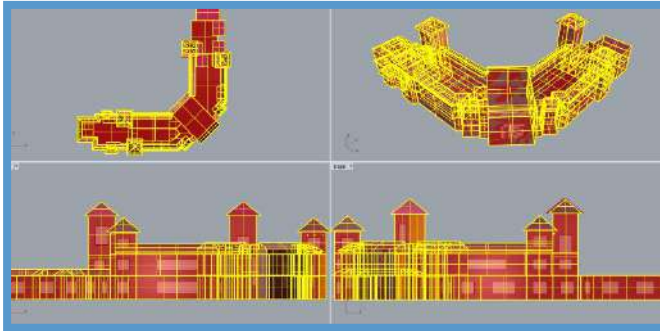# 3D ENERGY MODELING PROCESS

3) CONVERTING THE 3D BIM TO A 3D PRINTIG MODEL TO ANALYSE AND DETERMINE THE ENERGY ZONES AND IDENTIFY THE ENERGY LOSES LOCATIONS.
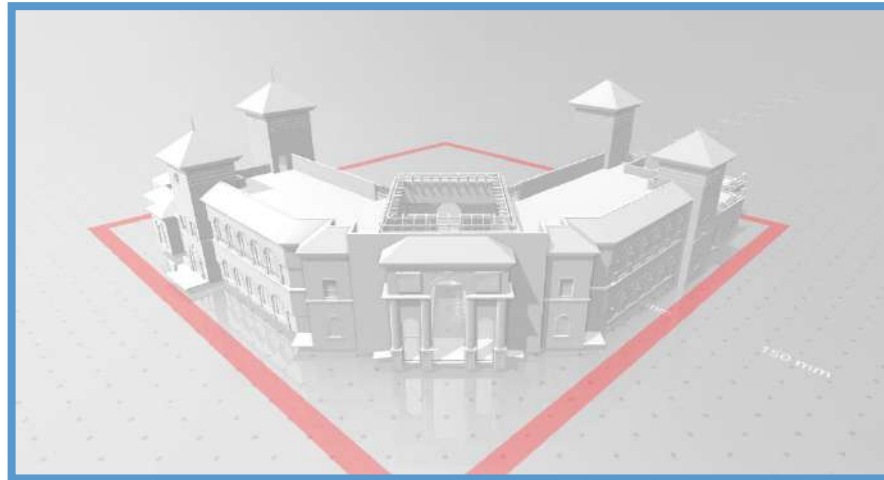
EXAMPLE PROJECT: SPORTS CITY LEISURE CLUB
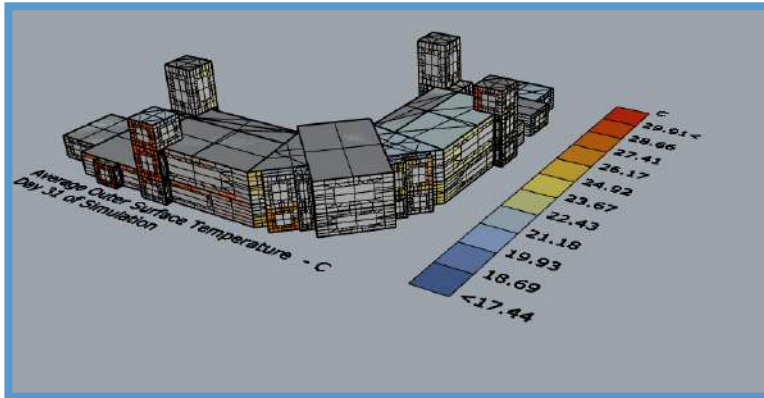# 3D ENERGY MODELING PROGRESS

4) CREATING THE 3D MODELING AND SIMULATIONS THROUGH THE COMBINATION OF MANY SOFTWARES AND PROGRAMMING TOOLS THAT AEC HAS DEVELOPED.
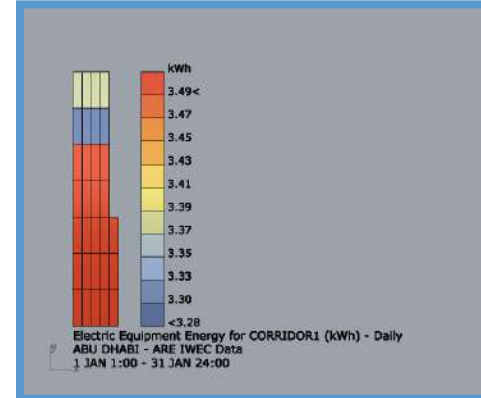
EXAMPLE PROJECT: SPORTS CITY LEISURE CLUB
3D ENERGY MODELING PROGRESS

4) CREATING THE 3D MODELING AND SIMULATIONS THROUGH THE COMBINATION OF MANY SOFTWARES AND PROGRAMMING TOOLS THAT AEC HAS DEVELOPED.
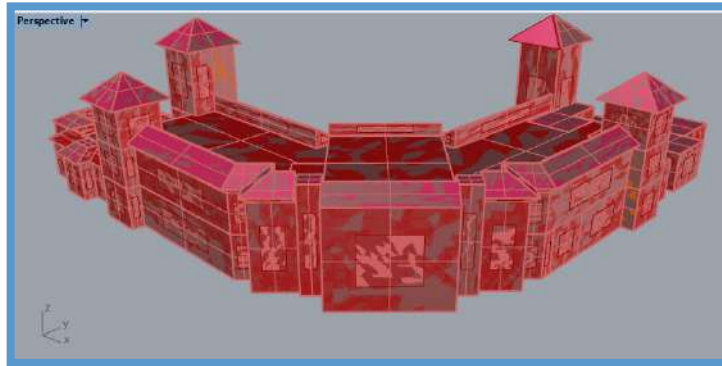

ENERGY CONSUMPTION
ANALYSIS RATINGS
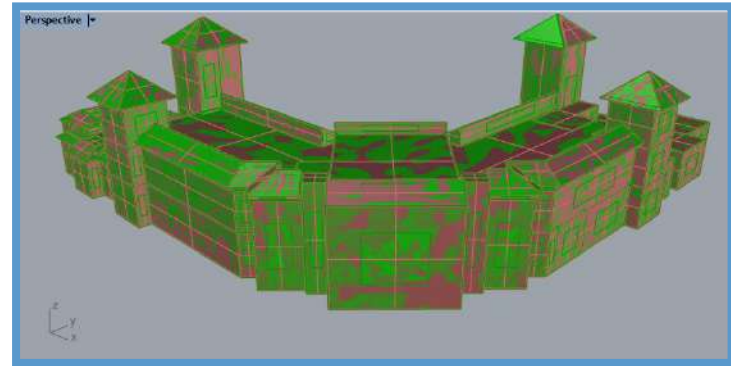

ENERGY CONSUMPTION
RATINGS CHARTS

EXAMPLE PROJECT: SPORTS CITY LEISURE CLUB
3D ENERGY MODELING PROGRESS

4) CREATING THE 3D MODELING AND SIMULATIONS THROUGH THE COMBINATION OF MANY SOFTWARES AND PROGRAMMING TOOLS THAT AEC HAS DEVELOPED.

ENERGY CONSUMPTIOAN **BEFORE AEC ANALYSIS** BASED ON A TYPICAL DESIGN

ENERGY CONSUMPTION **AFTER AEC ANALYSIS** BASED ON THE OPTIMIZED DESIGN PARAMETERS

EXAMPLE PROJECT: SPORTS CITY LEISURE CLUB
3D ENERGY MODELING PROGRESS

## 5. SELECTED RESULTS AND RECOMMENDATIONS EXAMPLES

LEISURE CLUB 3D ENERGY MODELING ANALYSIS RESULTS		
ITEM	**RANGE**	
ENERGY SAVINGS / BUILDING AND CONSTRUCTION MATERIALS	9%	12%
ENERGY CONSUMPTION SAVINGS / MEP EQUIPMENT	8%	11%
ENERGY SAVINGS / VALUE ENGINEERING	6%	9%
ENERGY SAVINGS TOTALS	23%	32%
ENERGY SAVINGS UTILIZING NEW INNOVATIONS & SOLAR POWER		
ITEM	**RANGE**	
ENERGY SAVINGS / NEW INNOVATIONS & SOLAR INSTALLATIONS	16%	19%
ENERGY SAVINGS TOTALS INCLUDING NEW INNOVATIONS & SOLAR POWER	39%	51%

ENERGY CONSUMPTION EFFICIENCY WORLD WIDE

Lowest Efficiency

Highest Efficiency
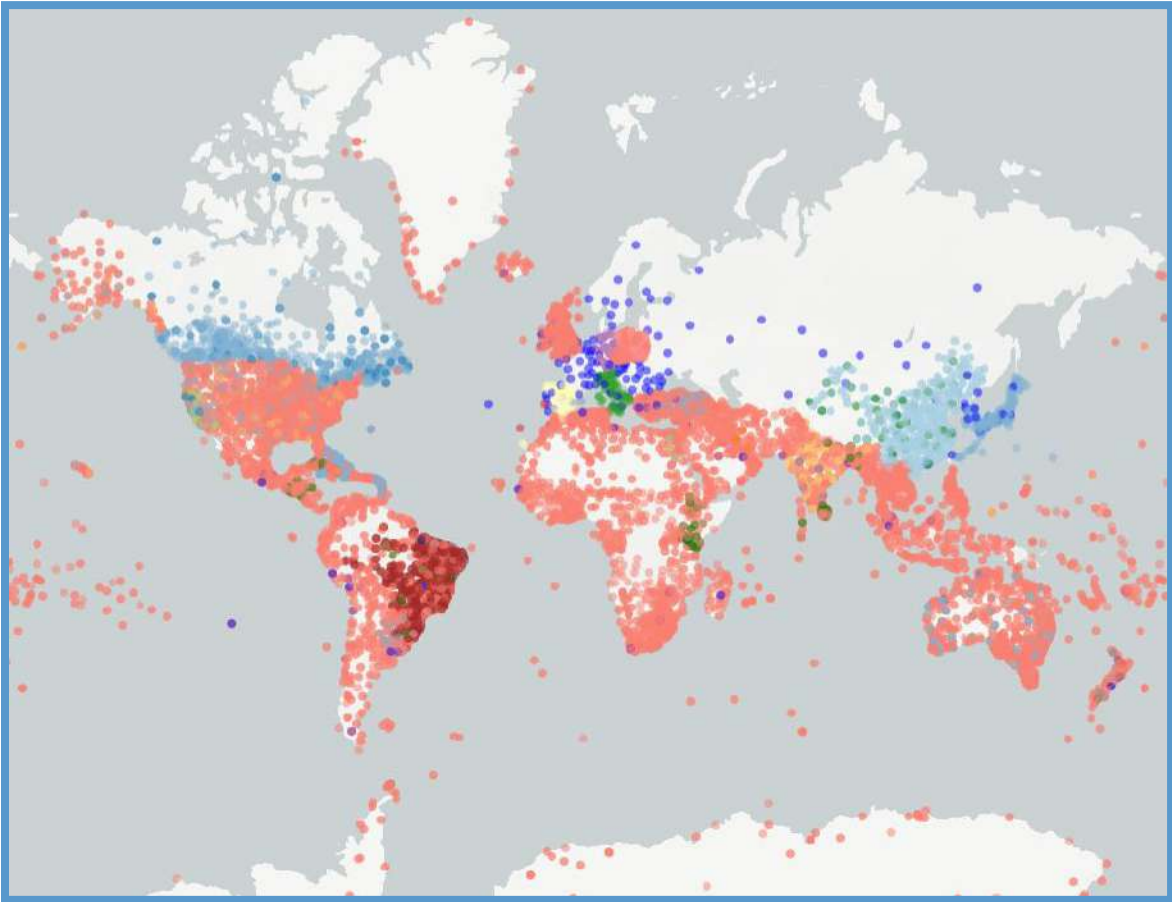
OUR HOPE

The Challenge is to move UAE & other parts of the world from the RED ZONE to the BLUE ZONE!