

Technology to Deliver Low Carbon Districts (Modelling & Simulation)

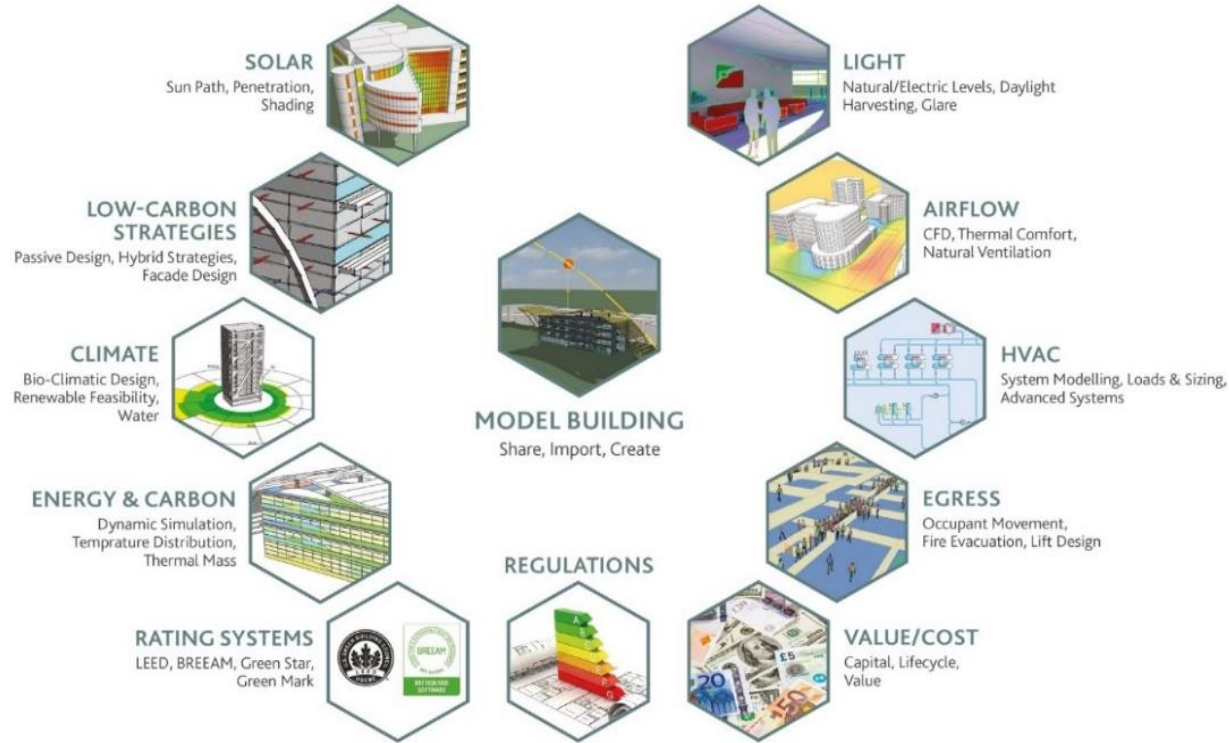
Rohan Rawte
Director
IESVE Singapore Pte Ltd



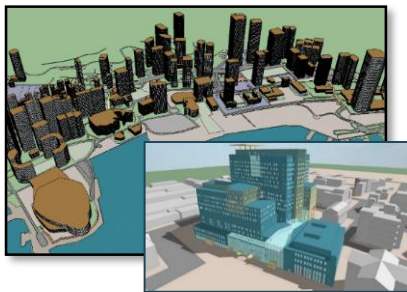
IES Corporate Information



- IES Founded June 1994
- Head Office in **Glasgow, Scotland**
 - Offices: Dublin (Ireland), Atlanta (USA), Pune (India), Melbourne (Australia), **Singapore**, Dubai (UAE)
 - Business Development Managers: San Francisco, Minneapolis, Mumbai, Johannesburg, Hong Kong, London, Vancouver, Moscow and Paris
- Technology development, technology deployment and knowledge sharing
- **World leaders in building performance analysis technologies with a focus on sustainability**
- Arguably the largest dedicated team under a single company for this niche sector in the world
- Over 30% of revenue spent on R&D
- Move towards Intelligent Community Lifecycle (ICL) suite of solutions



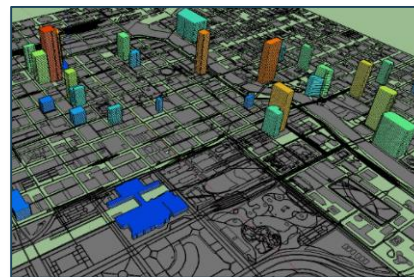
ICL: Intelligent Community Lifecycle



Communities

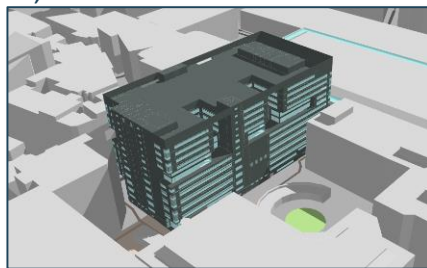
(Cities, Neighbourhoods, Districts, Campuses, Utilities)

**From Single Building
Performance Analysis –
to:
Community / Portfolio-
Level Sustainability**



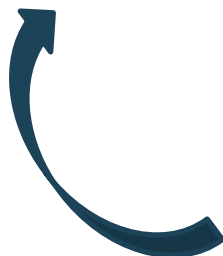
Building Portfolios

(Local, National, Global Portfolios)

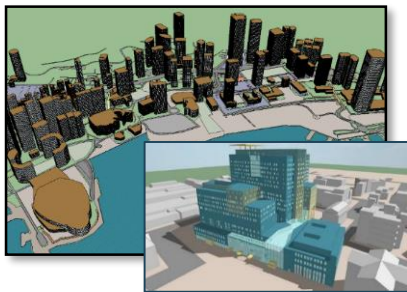


Single Building

(IES VE for Design & Retrofit)



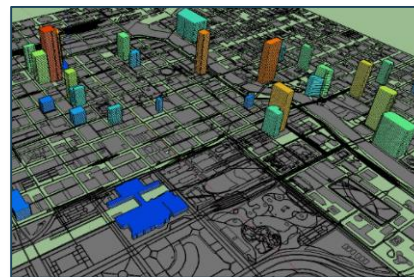
ICL: Intelligent Community Lifecycle



Communities

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Building Portfolios

(Local, National,
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Technology to help **create**, **plan** and **manage**
communities that are resource efficient, resilient,
low carbon and sustainable

Challenges/Opportunities for technology
development to model and simulate LCDs:
Three Aspects – Design, Operation & Lifecycle



Challenges or Opportunities?

- What data do we need? **Answer: Under research**
 - Design
 - Operation
 - Lifecycle
- What data do we have? How can we use that data effectively? **Answer: Under research**
 - Templates/standards/indexes
 - Historic data
 - Live data, continuous monitoring
- What metrics/KPIs give highest impact to the LCD? **Answer: Under research**
 - Energy performance
 - Renewables
 - Comfort/User experience
- Level of detail? **Answer: Under research**
 - Too less = low value/accuracy
 - Too much = high cost

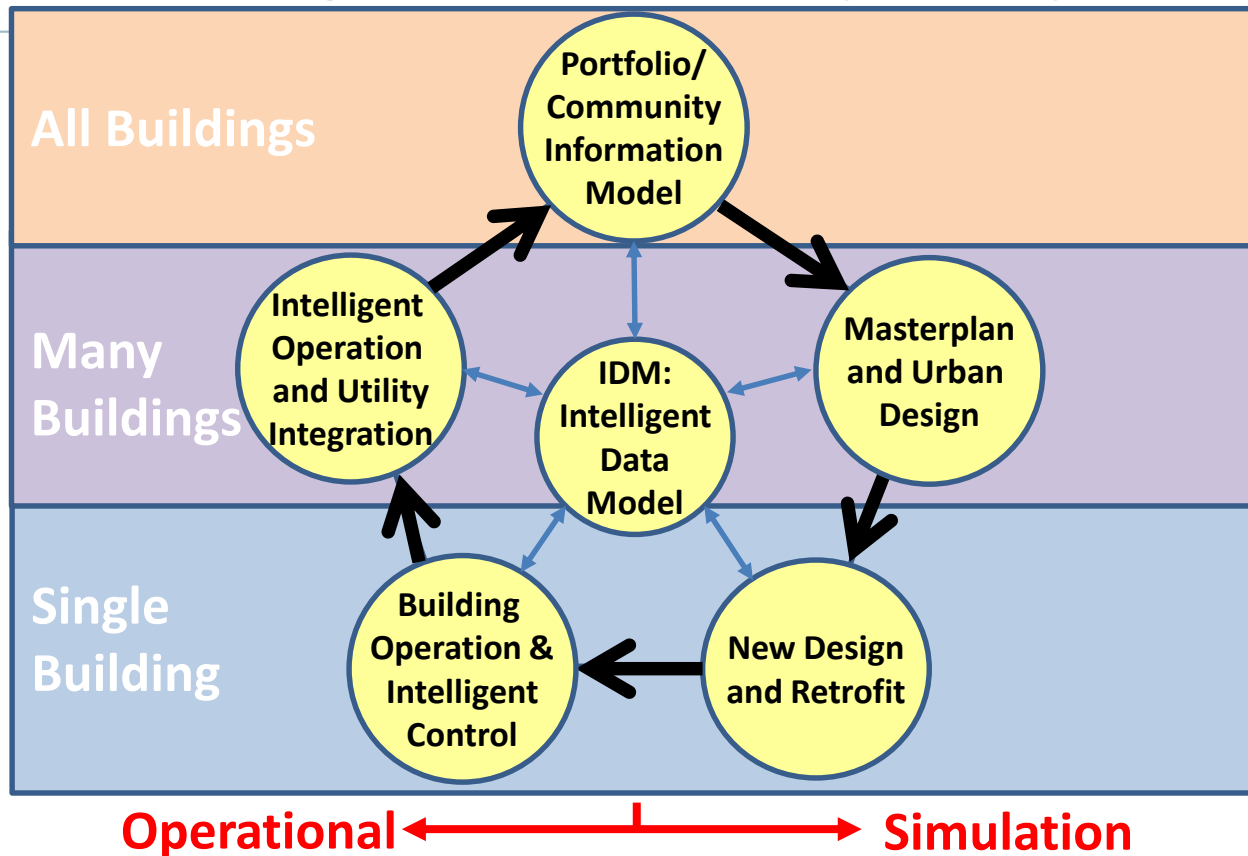
Challenges or Opportunities?

- Interlinking of physics/domains? Answer: Under research
 - Energy
 - Water
 - Waste
- Interlinking of allied technologies? Answer: Under research
 - BIM
 - GIS
 - IOT
 - Machine learning/AI
- Scalable? Answer: Under research
 - Offline or online?
 - Data security
 - API link

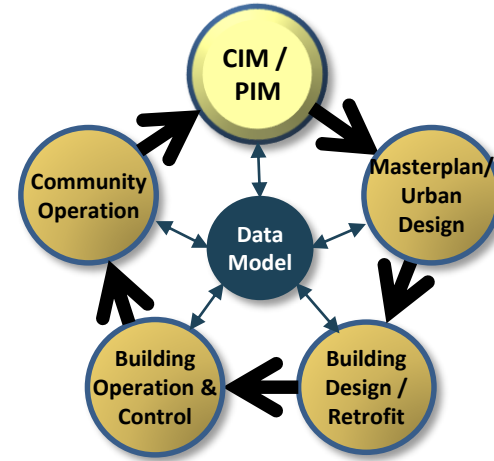
Our Approach: Integration



ICL: Intelligent Community Lifecycle



CIM: Community Information Model

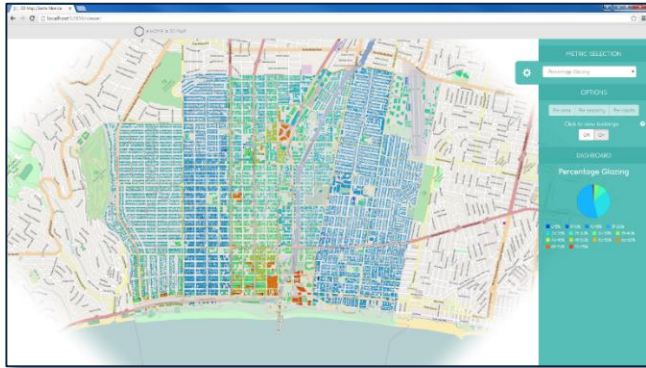


A 3D interactive model of the community for visualisation and ongoing sustainability planning & strategy

CIM: Community Information Model



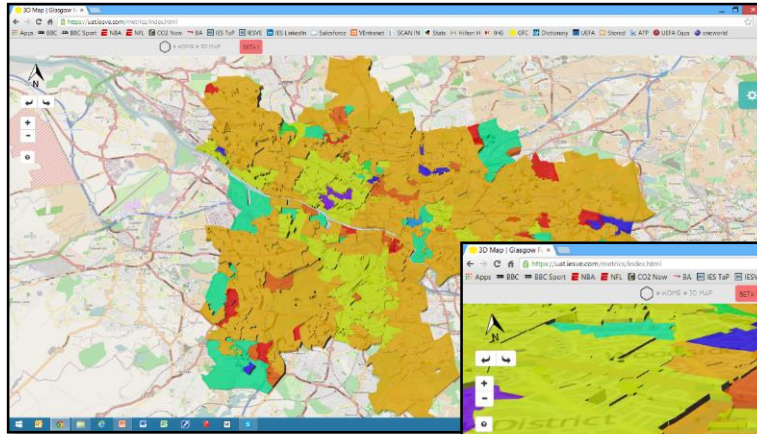
- A web-based portal to the **intelligent data model** of the community
- Tools to **filter** and **interrogate** volumes of data using any metric
- A means to **plan**, **track** and **share** project status, progress towards sustainability goals



SANTA MONICA, CA CITY VIEW

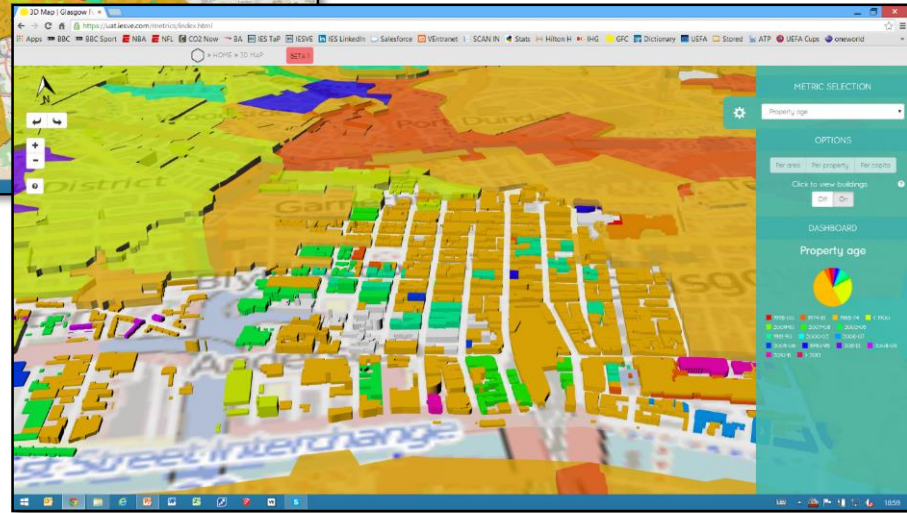
- A single, common data platform
- Data integrated from many sources:
 - GIS / climate / planners / BIM
 - Commissioning / BMS data
 - Building performance benchmarks
 - Lifecycle performance analytics
- Customisable with apps, dashboards

CIM: Web-based Glasgow CIM

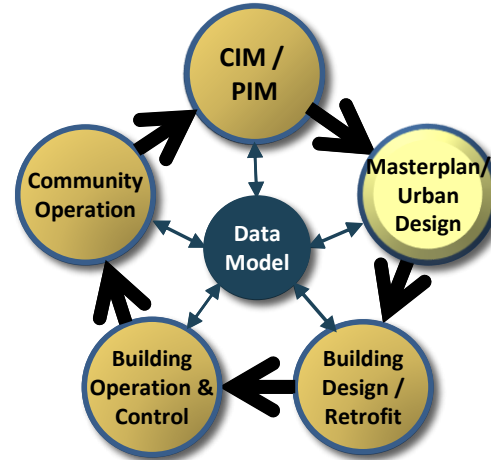
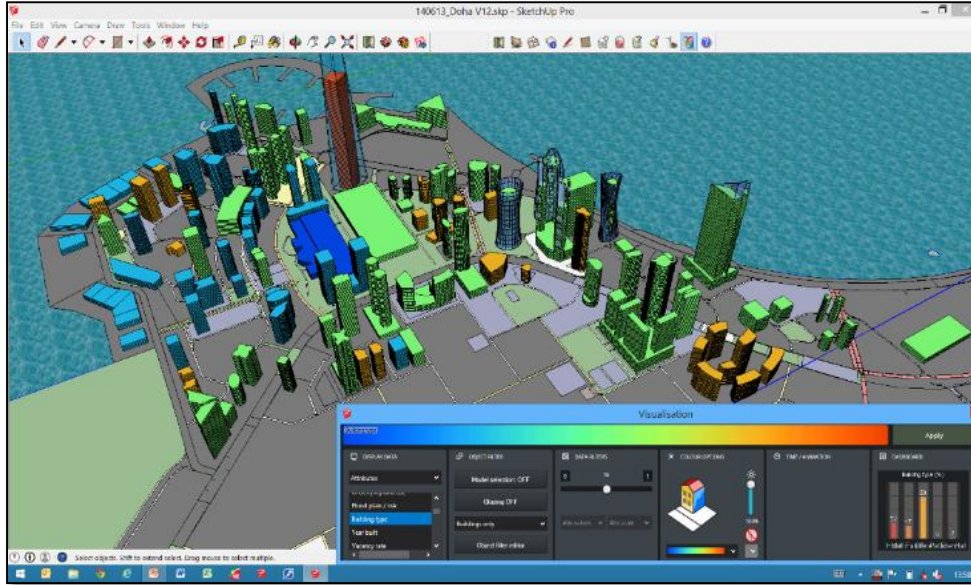


CITY OF GLASGOW, SCOTLAND
[Glasgow Future Cities App](https://glasgowenergyapp.org/)

[www.glasgowenergyapp.org](https://glasgowenergyapp.org/)



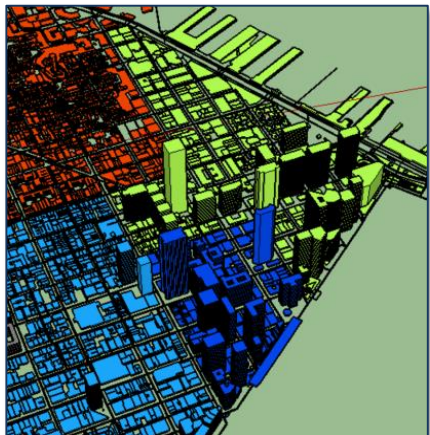
Masterplanning Tools



Sustainability, environmental & energy consumption analytics for a group of buildings in close proximity (e.g. campus, district)

Rapid, early stage energy/resources modelling:

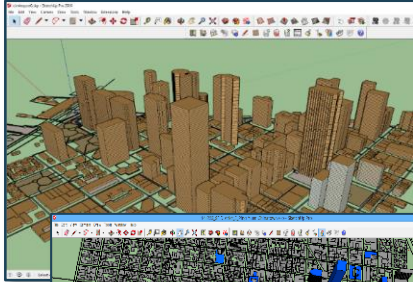
- Quickly identify the poorest performing buildings
- Quantify & prioritise the highest impact sustainability improvements
- Calculate energy savings, cost savings & ROI
- Masterplan a more sustainable, energy efficient community



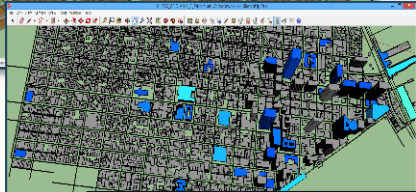
- **Quick, easy** 3D model creation & manipulation
- Example masterplanning analytics:
 - Energy & Carbon assessments
 - Resource (energy, water, etc.) usage
 - Renewables potential
 - Storm water collection
 - Heat island effect
 - Open space analysis
 - Urban form spatial analysis
 - Walkability / Accessibility
 - Several others

MP: Masterplanning Projects

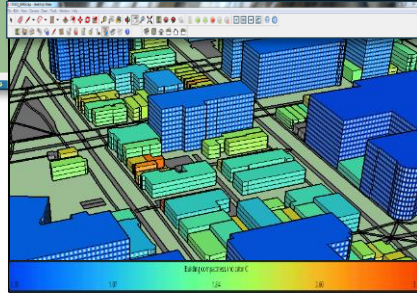
City-Level



VIEW ALL BUILDINGS

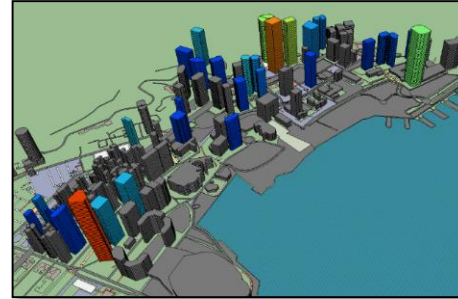


SAN FRANCISCO
ROOFTOPS >25K SQFT



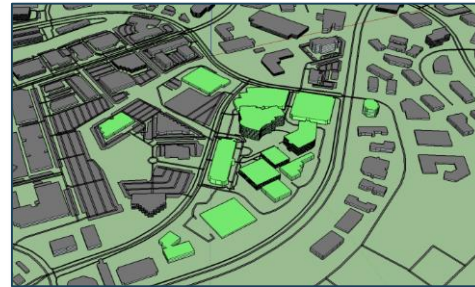
WASHINGTON DC: URBAN DENSITY ANALYSIS

Portfolio-Level



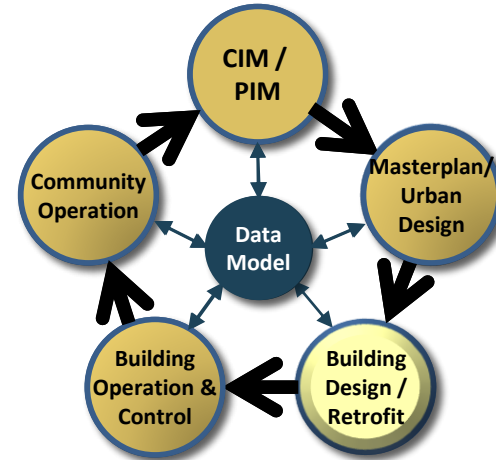
A HONG KONG BUILDING PORTFOLIO

Campus-Level



QUALCOMM CAMPUS

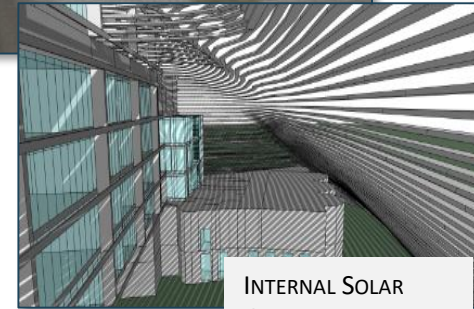
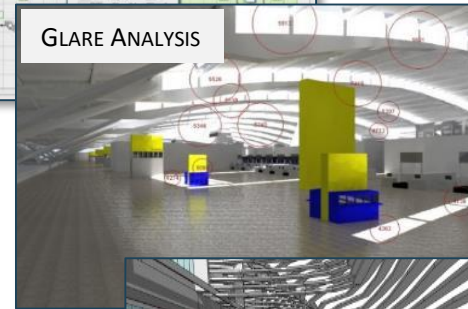
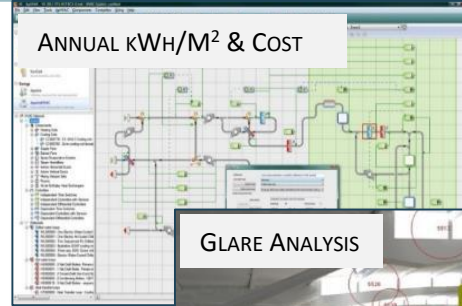
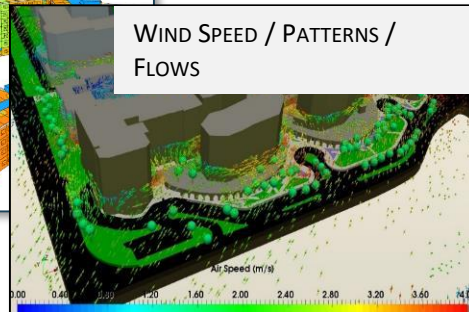
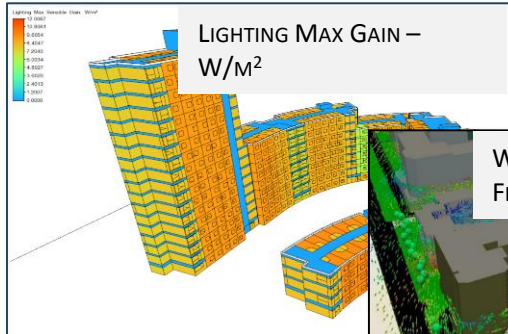
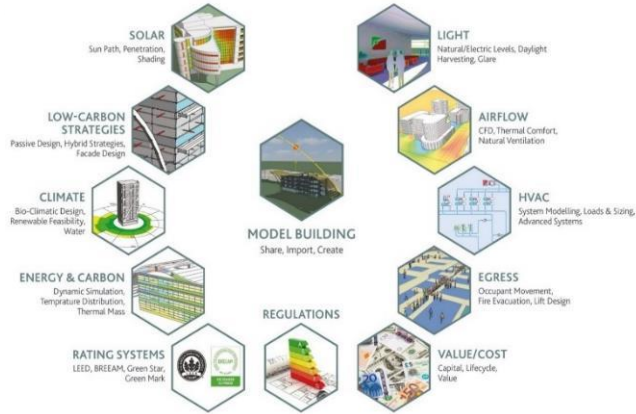
Building Design/Retrofit



Building Performance analyses for any building design or retrofit

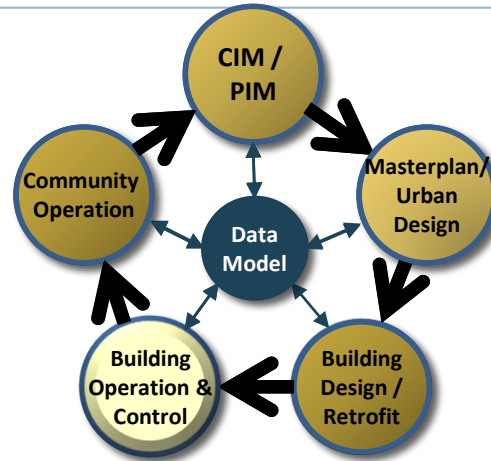
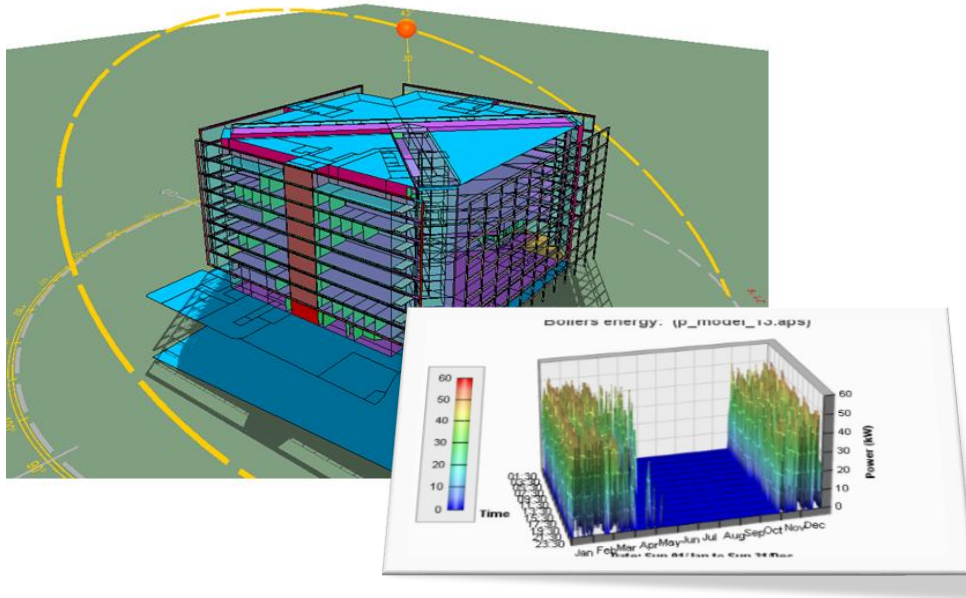
Building Design/Retrofit

IES



[Case Studies](#)

Building Operation



State of the art tools for more sustainable & energy efficient buildings

BOC: Building Operation & Control

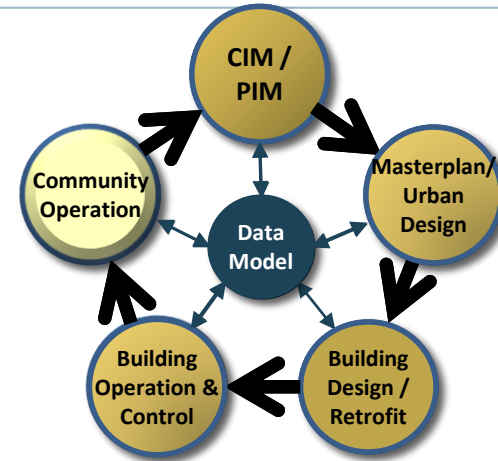
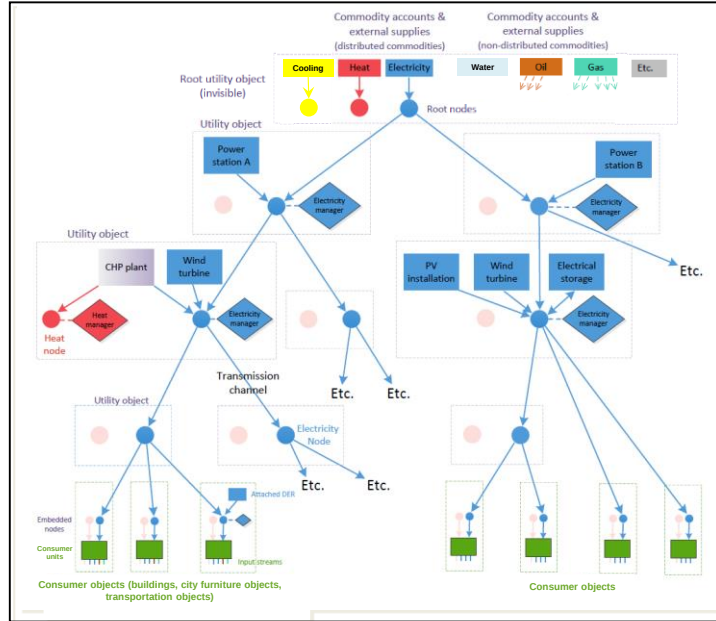
Web-based data analysis platform:

- Assess building performance
- Analyse & find hidden inefficiencies, other performance issues
- Identify cost-effective solutions to improve energy efficiency
- Predict performance and adjust building controls for ongoing efficient operation - based on real-time data



- **Ci²™ Process:**
 - **Collect** actual building performance
 - **Investigate** issues, inefficiencies
 - **Compare** to plan or benchmark data
 - **invest** in efficiency improvements

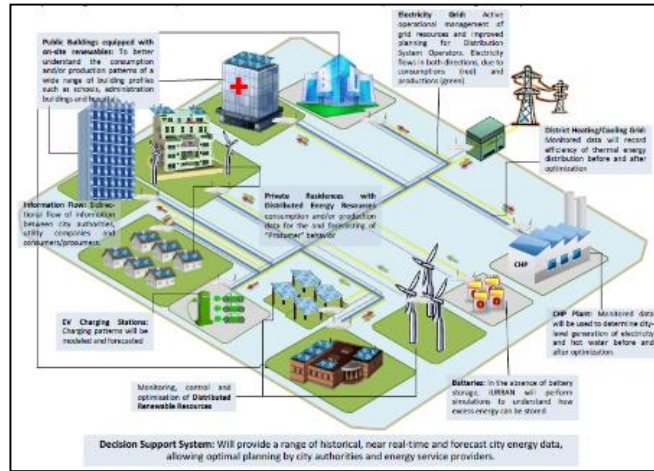
Community Operation



Integrated resource (energy, gas, water, waste) planning & management at the community, campus or district level

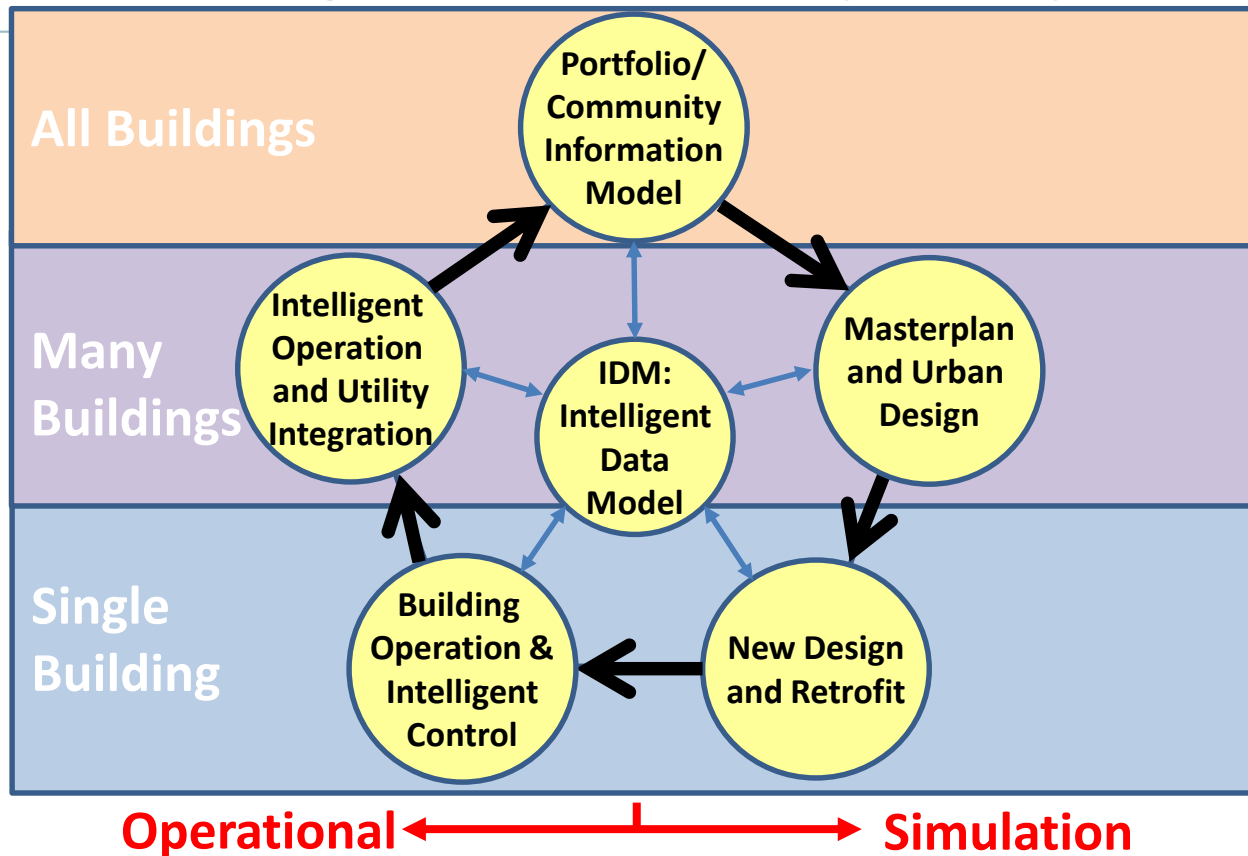
Community-level Energy Management:

- Understand current & future community energy needs
- Make informed decisions on energy conservation strategies and options
- Analyse the impact of new community growth on the energy network

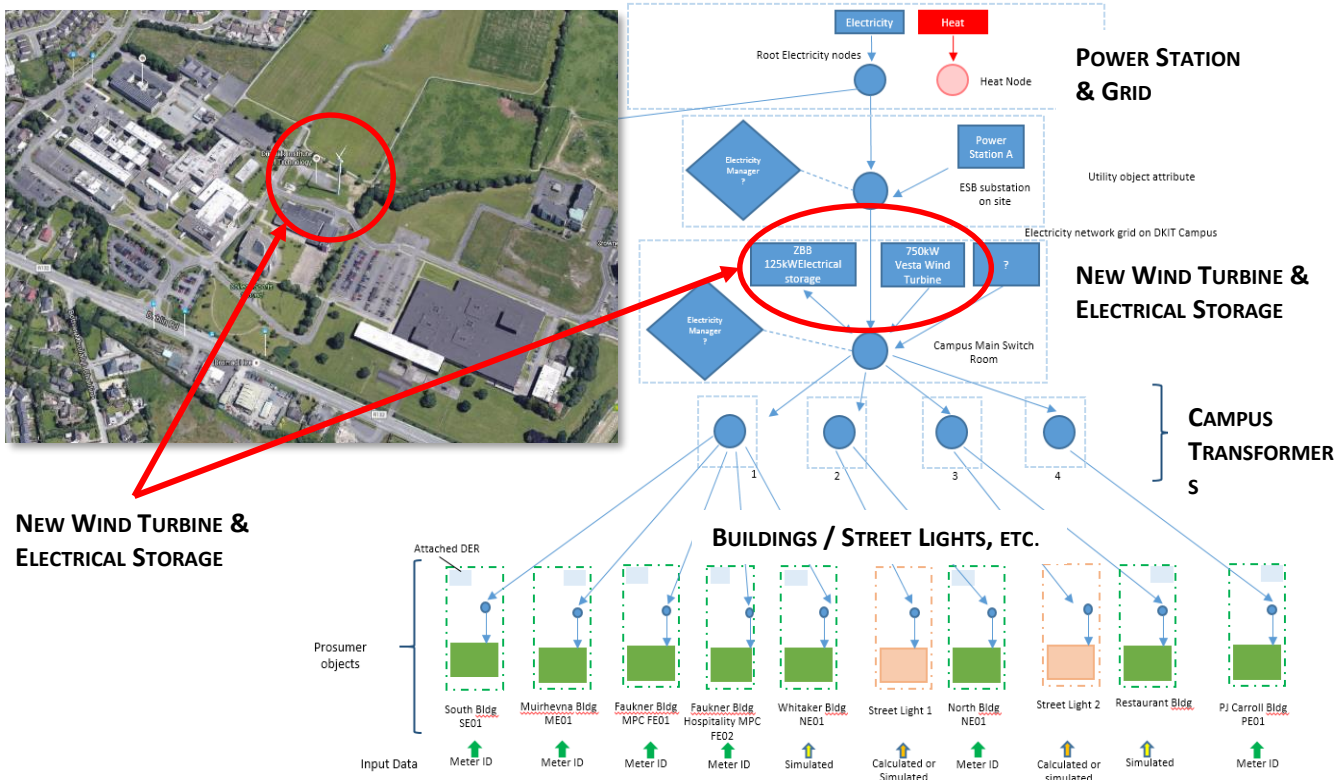


- Virtual Power Plant (VPP)
- Demand Response
- Community Microgrid
- District heating / cooling feasibility
- Analyse new renewable energy options

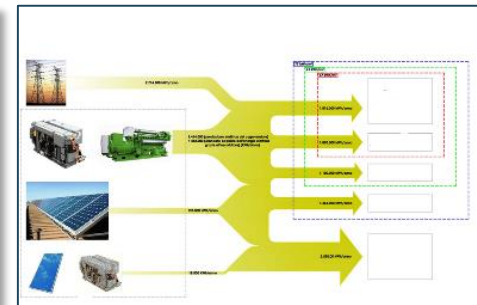
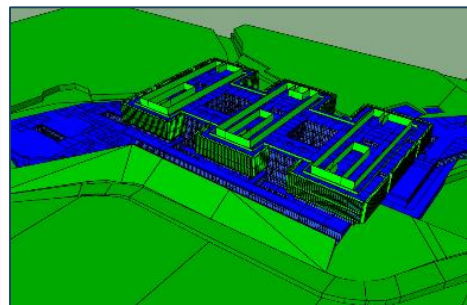
ICL: Intelligent Community Lifecycle



Dundalk Institute of Tech Campus, Ireland

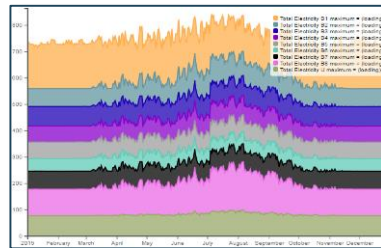
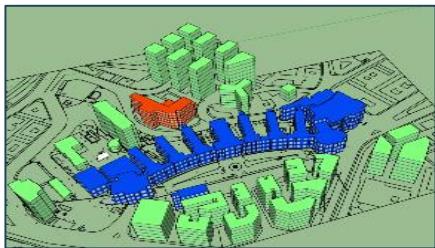


Galliera Hospital Campus, Italy



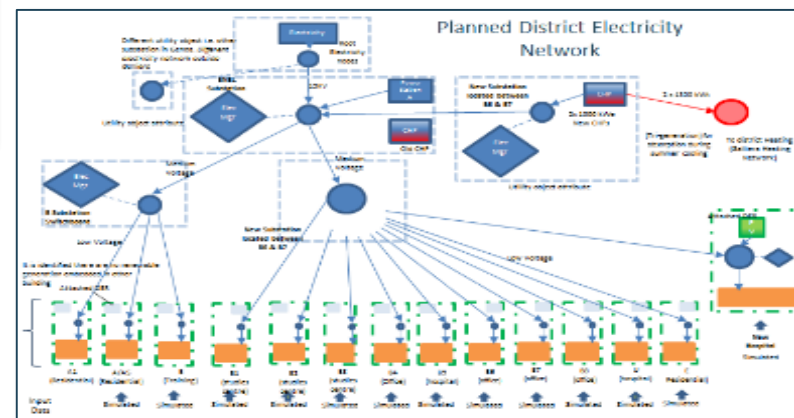
NEW HOSPITAL VE MODEL

NEW HOSPITAL ELECTRICITY ENERGY FLOW



CAMPUS MASTERPLAN MODEL

SIMULATED BUILDINGS ELECTRICITY LOADS



PLANNED DISTRICT ELECTRICITY NETWORK



Thank You!





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Thank You
