

# New Tools: Integrated Planning and Assessment

Alexander Hollberg  
FCL Global, Powering the City Workshop  
Singapore, October 15th, 2024



# Tool development cycle



Tools in research



Tools in education



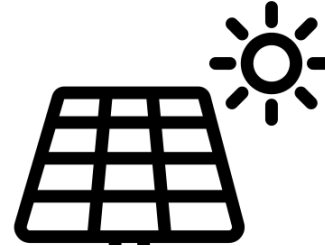
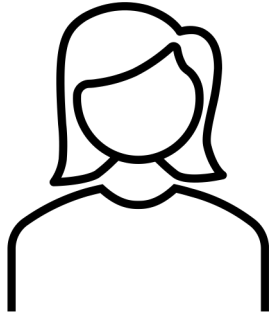
Tools in practice

Novelty  
Complexity



User  
experience

# POW tools applied



# 1 PV potential

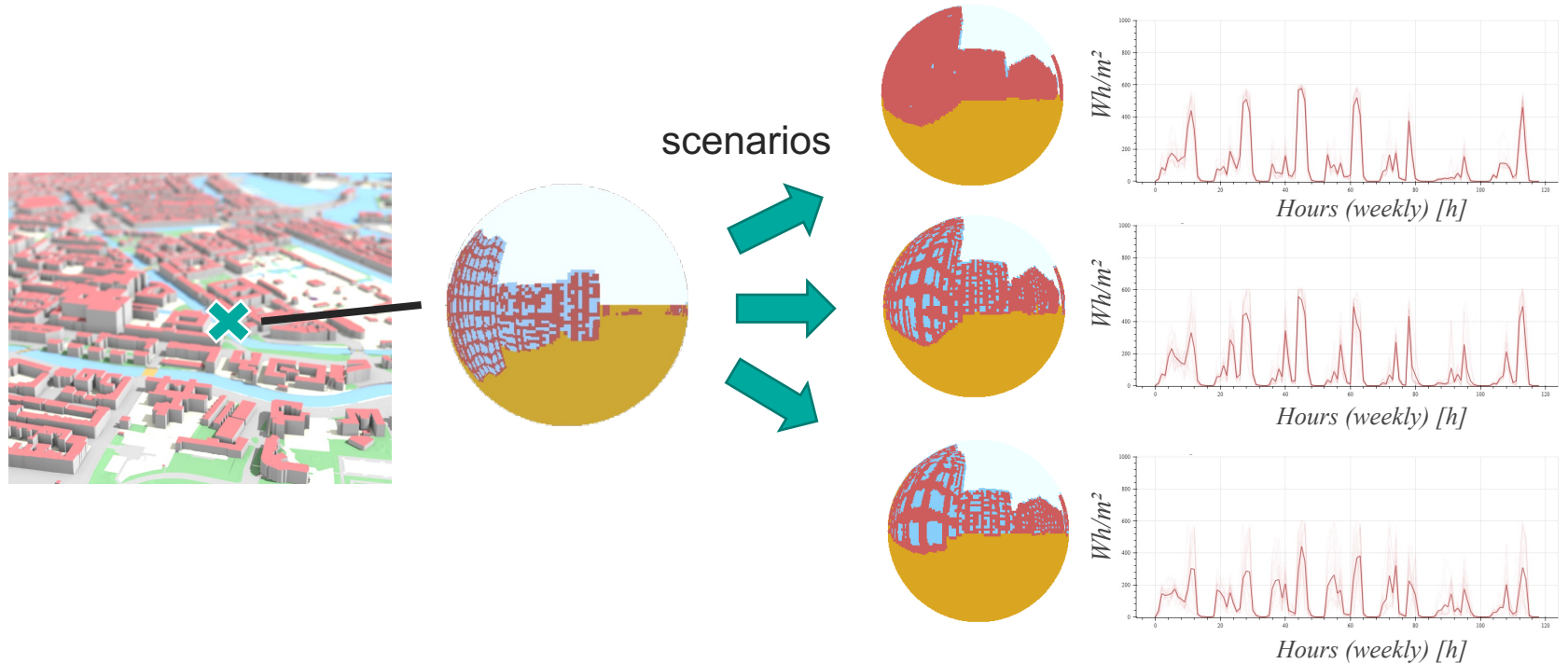
**Analyze Facade PV Potential**

**Select a Facade Image:**

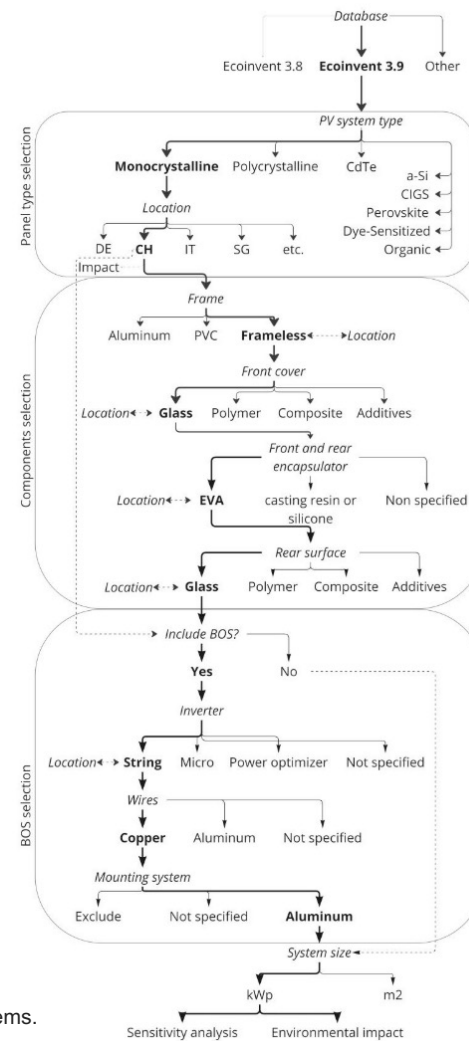
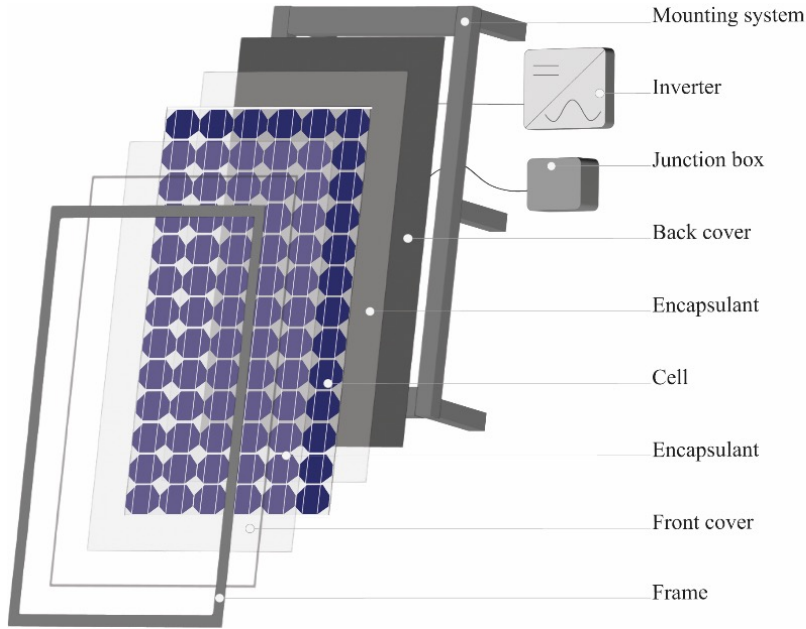
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Submit

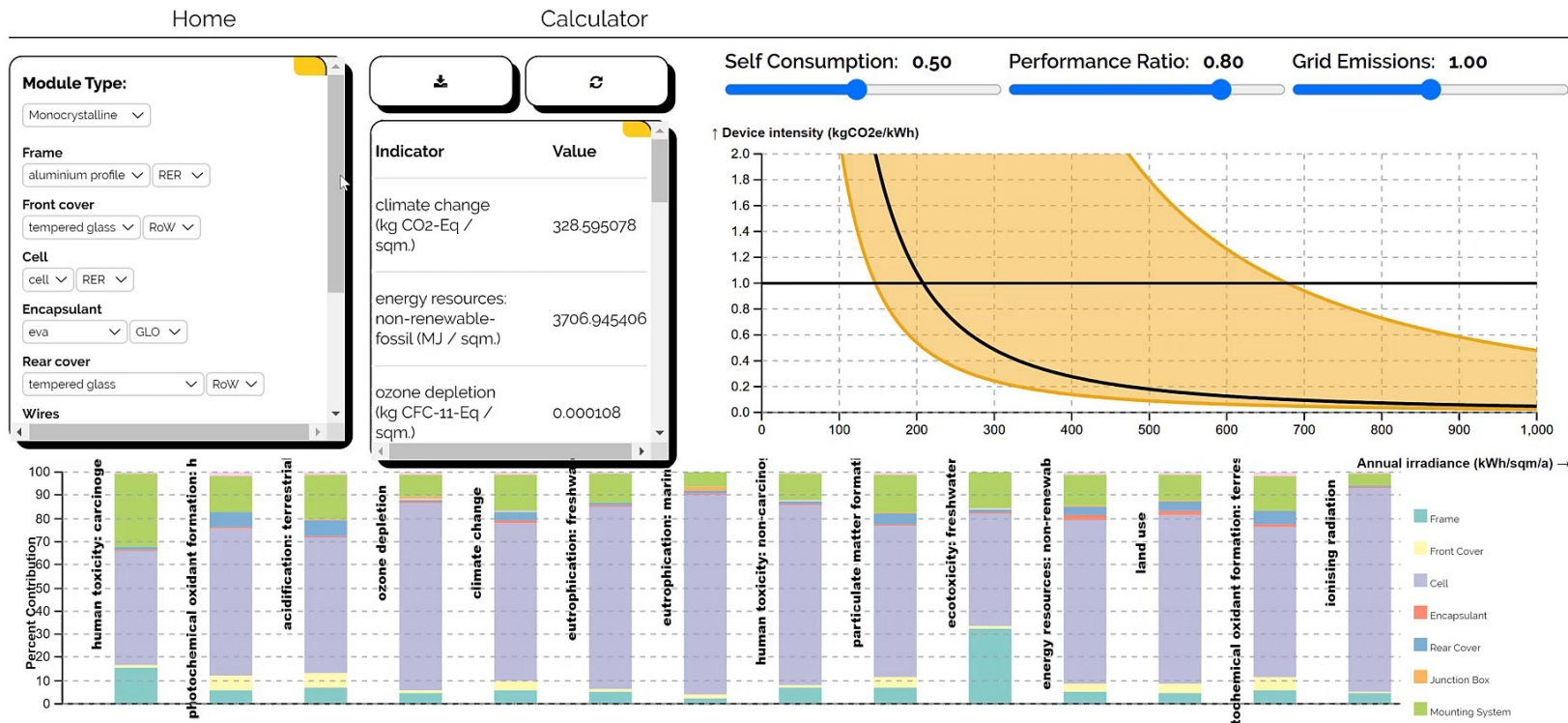
# 2 Urban setting



# 3 Embodied carbon



# 3 Embodied carbon

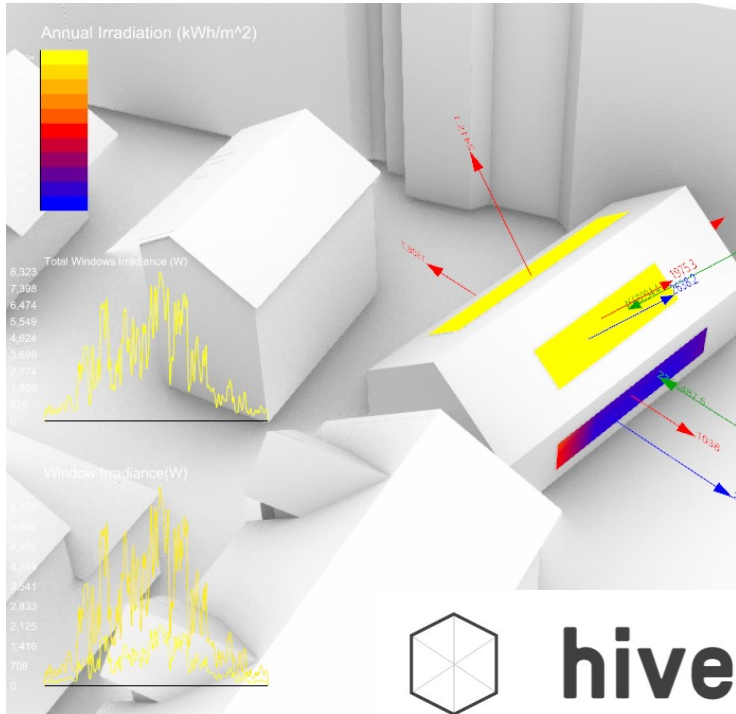


# 4 Panel layout

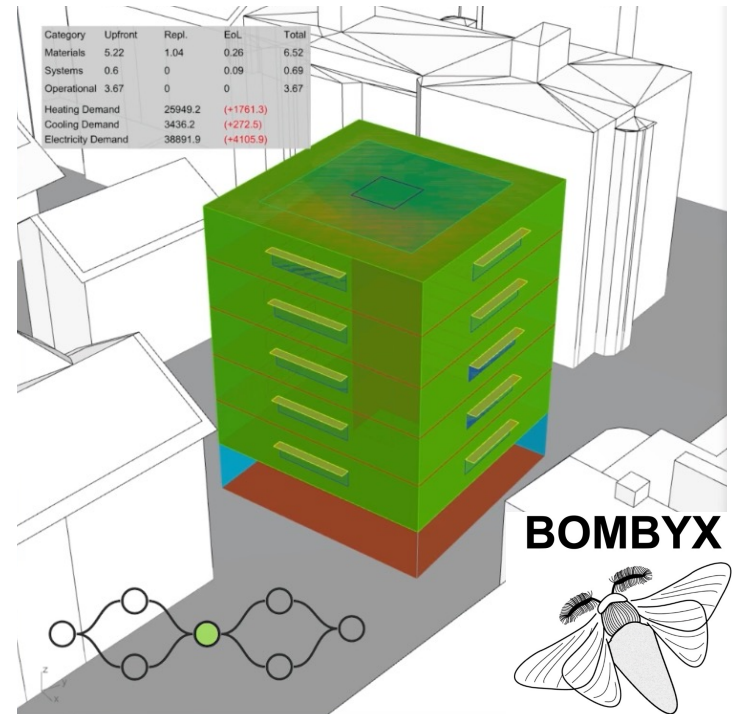
McCarty et. al. (2024), 'Towards a high resolution simulation framework for building integrated photovoltaics under partial shading in urban environments', Renewable Energy, 10.1016/j.renene.2024.12144



# 5 Whole building



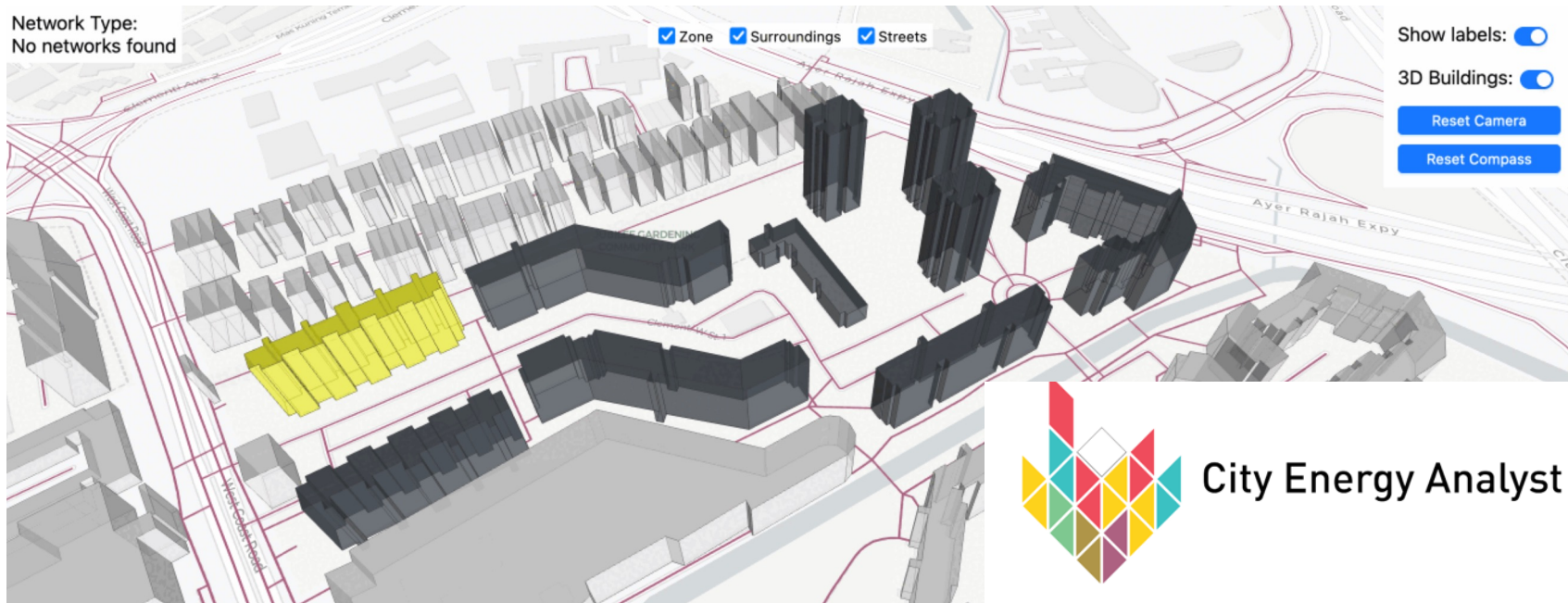
+





CHALMERS  
UNIVERSITY OF TECHNOLOGY

# 6 Urban energy system integration



# POW tools applied



Address

BIPV potential

Segment4Solar

Urban situation

SolarGAN

Embodied carbon

Acacia

Panel layout

CACTUS

Building concept

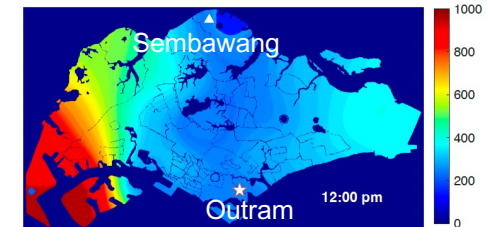
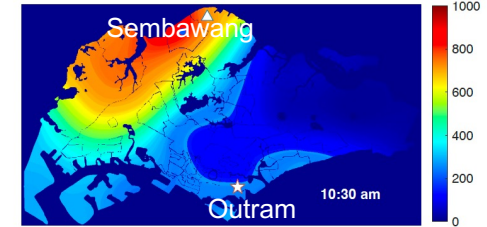
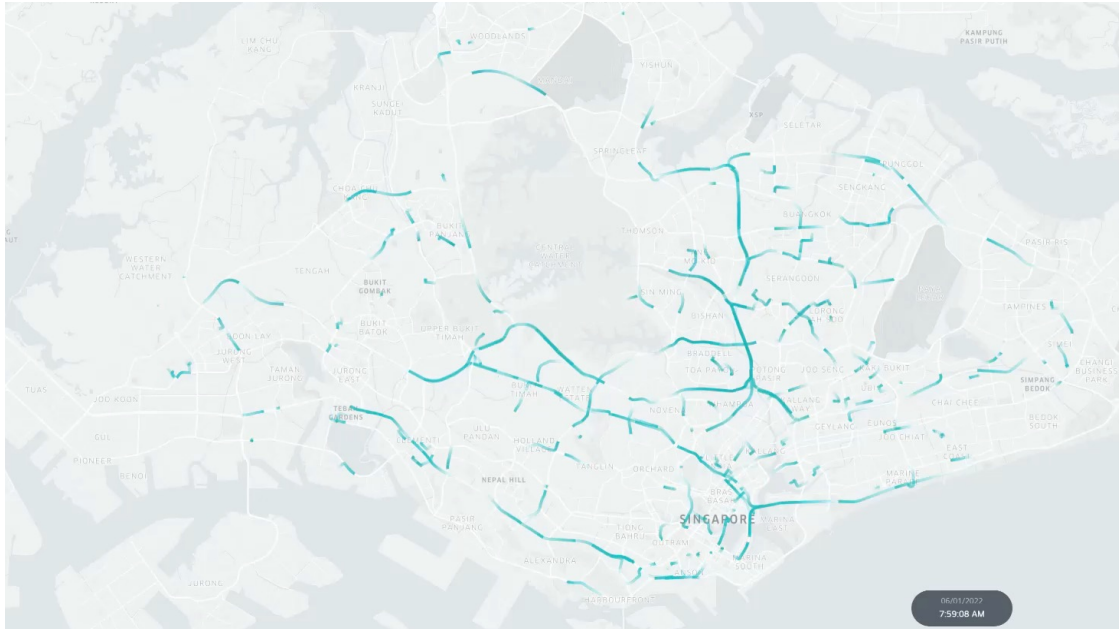
Bombyx + Hive

Urban integration

CEA

Optimized  
urban BIPV  
concept

# 7 Sector coupling

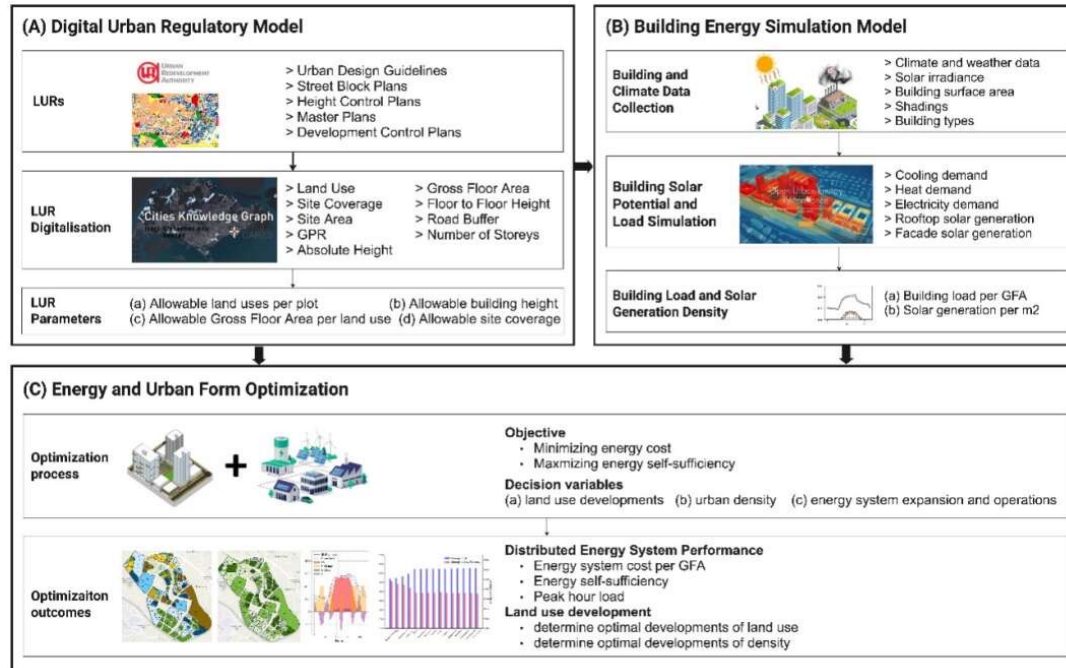


Zhou, J., Yean, Y., Dong, T., Lee, B.S., Schlöpfer, M. "Investigating electric vehicle charging demand on power grid using large-scale mobile phone data." In IEEE Intelligent Transportation Systems Conference (ITSC) 2024 (Best Application Paper Award)

Caviezel, D., Waibel, C., Schlöpfer, M., Schlüter, A. "Vehicle-to-Grid Coupled Photovoltaic Optimization for Singapore at a District Resolution". Proceedings of ECOS (2023)

Schlöpfer, M., Chew, HJ, Yean, S., Lee, BS. "Using mobility patterns for the planning of vehicle-to-grid infrastructures that support photovoltaics in cities. arXiv preprint arXiv:2112.15006 (2021)

# 8 Energy communities and regulation



Kang JD, Cai C, Waibel C, Fu Y. "Investigation of the Impact of Urban Planning Regulations on Distributed Energy Systems Performance". World Cities Summit 2024 Singapore.

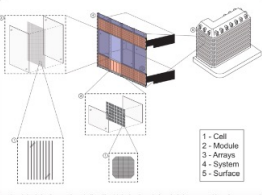
Kang JD, Cai C, Waibel C, Fu Y. "How Land-Use Regulation Impact Distributed Energy Systems: Integration of Energy System Optimization and Digital Urban Regulatory Models". International Conference on Applied Energy 2024, Niigata City, Japan.

# Engagement platform

ENGAGEMENT PLATFORM

Research Outreach Community

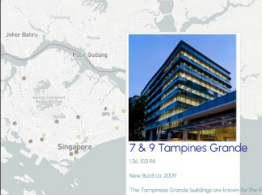
Overview Pages Events Media Outputs Details Team



**CACTUS**

CACTUS (Comprehensive Assessment and Computational Toolset for Urban Solar) is a Python-based set of tools an...

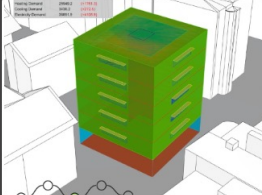
Read more



**ExploreRise**

explorerise

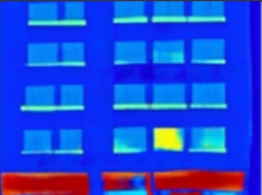
Read more




**Bombyx / Hive**

bombyx hive

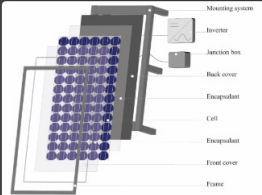
Read more



**SolarVision**

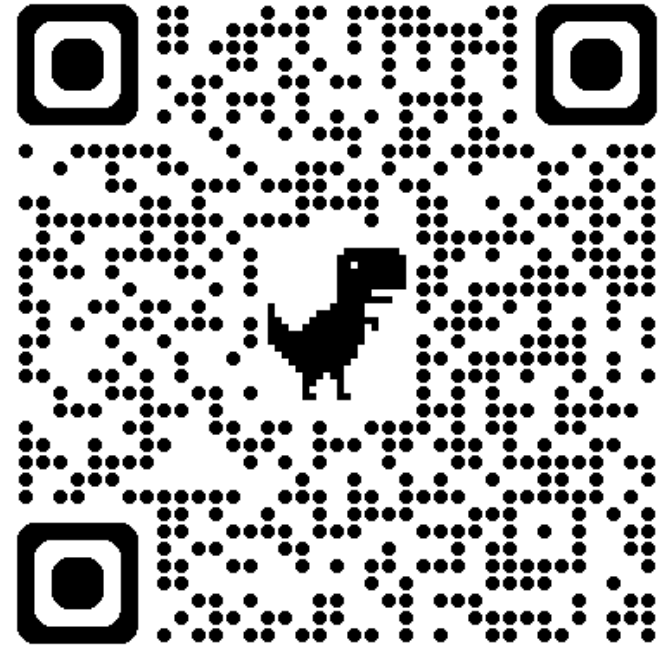


**Panelizer**



**Acacia**

- Mounting system
- Inverter
- Junction box
- Back cover
- Encapsulant
- Cell
- Encapsulant
- Front cover
- Frame



# Thank you!

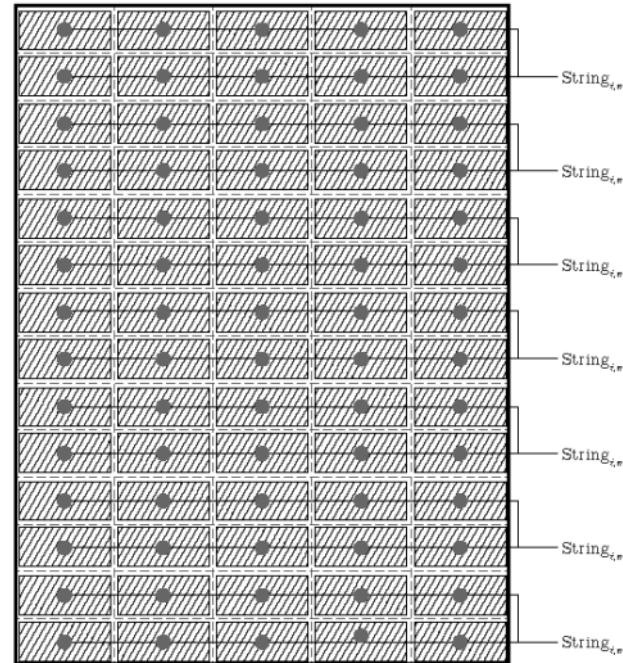


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[hollberg@chalmers.se](mailto:hollberg@chalmers.se)

<https://sb.chalmers.se/>

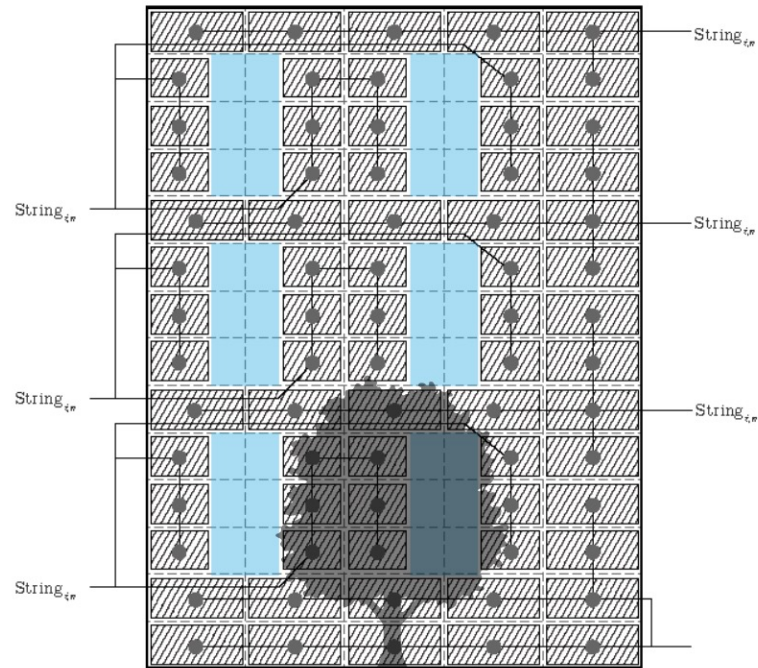
# 4 Panel layout



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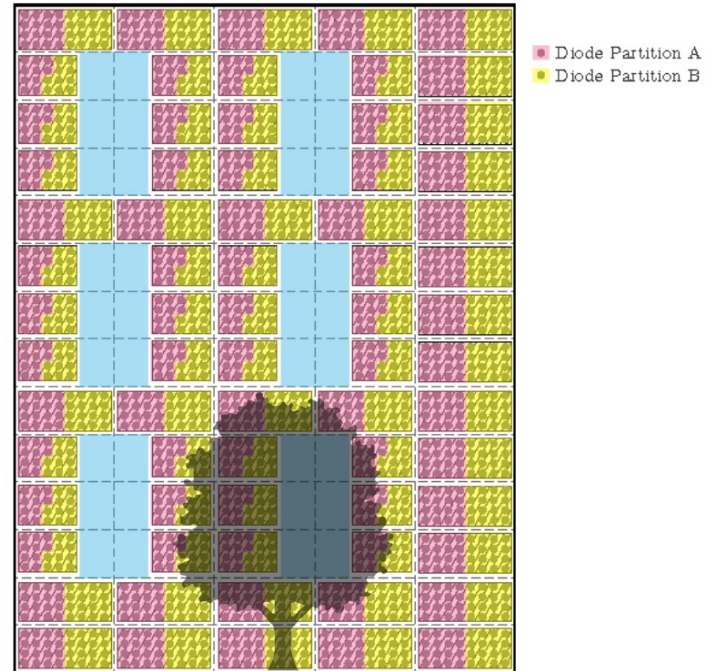


# 4 Panel layout



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