Discussing the **multicriterial and systemic character** of the **land use regulation** and the impact of its parameters on the **energy performance of buildings**. Case study in an **urban area under densification** in São Paulo

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Objective

Discuss the impacts of increasing certain parameters as the floor area ratio, the site coverage, and building high, according to the limits allowed by Sao Paulo urban regulations, in terms of outdoors environmental comfort (thermal and lighting) and PV application on the top of the buildings, for areas under densification.
Context: URBAN MICRO SCALE ASSESSMENT

DENSIFICATION
Solid waste collection and treatment
Walkability, transport mobility and accessibility
Popular participation effectiveness in urban development decision-making

URBAN MORPHOLOGY

VERTICALISATION
Outdoors thermal comfort and lighting
PV potential roof top of comm. buildings
TOD application – private and public spaces development potential

MULTICRITERIA AND SYSTEMIC APPROACH
Solid waste collection and treatment

Context: URBAN MICRO SCALE ASSESSMENT

DENSIFICATION  URBAN MORPHOLOGY  VERTICALISATION

Master Plan | Zoning | Building Code | Sectoral instruments
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MULTICRITERIA URBAN MICRO SCALE ASSESSMENT
PV simulation
Roof top of commercial buildings

Method: Rhinoceros with Grasshopper and Diva Plug-ins

Source: Girotti, C. MSc. Thesis under development
Sunlight hours
Street level

Method: Rhinoceros (sunlight hours) and Rayman/ calibration based on Monteiro (2008), for physiological equivalent temperature (PET)

Preliminary findings

- There is greater photovoltaic possibility of application when the roof area is greater and exposed to the maximum solar incidence, i.e., application of maximum values for FAR and site coverage, without considering, at first, the variation of the urban height.

- However, the increase in built mass, in addition to the non-variance of the verticality pattern in the urban fabric, lead to damages to the environmental comfort of the external areas to the buildings. In addition, it reduces the solar radiation on the building façades and, therefore, also decreases natural lighting indoors, increasing energy consumption.

- As a conclusion, there is possibly a certain intermediate range of verticality and built up density, as well as some possibilities of vertical variance, which may result in one hand in certain losses in photovoltaic generation, but on the other hand, environmental conditions, better environmental comfort conditions outdoors and indoors.

