EO to support of renewable-energy powered electricity grids

EO for Energy
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Challenges:
solar energy high penetration in urban areas

https://nantes-metropole.insunwetrust.solar
Challenge: Variability of solar energy in urban areas

- **Need**: knowledge of variability (spatial, temporal) of the PV production versus level of PV penetration
- **Challenge**: taking into account shadows, clouds and PV penetration ratio for grid operation (and self consumption)
Solar forecasting in urban areas

• **Need:** high quality of local or spatially aggregated solar forecasting (determinist and probabilistic) with different time horizons and resolution, for different usages (and different users)
  - For the instantaneous energy/consumption balance
  - For energy dispatching
  - For piloting energy storage units (at different scale, dispatched or centralized)
  - For trading on energy markets
  - For optimizing the solar energy production (adaptive sun tracking)

• **Challenge:**
  - Coupling the different EO sources (in-situ pyranometric sensors, fish-eye cameras, satellite, NWP) and different forecasting techniques to offer seamless solar forecasting along time horizons ranging from less than 5 min to few days ahead.
3D Cloud geolocation for solar energy prevision

\[ G_b = (1 - \frac{N_L}{N_{L\text{max}}}) \cdot G_{\text{CLS}} \]

DATA FUSION OF EO FOR IMPROVING SOLAR FORECASTING
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