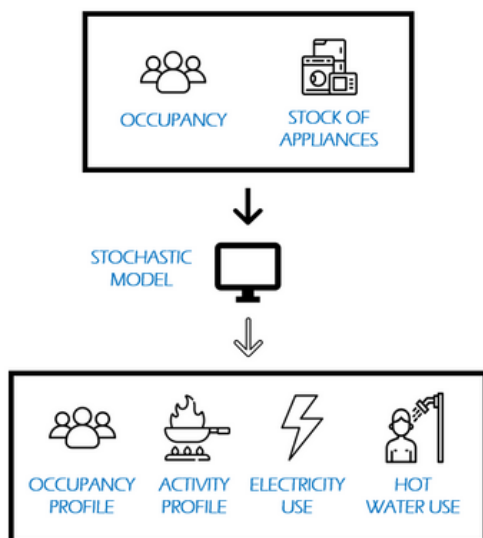




# STOCHASTIC MODEL FOR ENERGY DEMAND

FROM OCCUPANCY BEHAVIOUR, ELECTRIC CONSUMPTION AND DOMESTIC HOT WATER

## THE CONCEPT



## ADDED VALUE

- Specially adapted to Mediterranean climate
- Easy integration with other simulation tools

## TRL

7



## CONTACT

-  <https://irec.cat>
-  KTT area  
[ktt@irec.cat](mailto:ktt@irec.cat)
-  +34 933 562 615

## PRODUCT DESCRIPTION

- Stochastic model that generates **occupancy patterns, electric consumption** related to electric devices and **domestic hot water profiles for residential buildings**
- Profiles with a **high time resolution**
- Able to **reproduce realistic households** with different occupancy levels and electric devices.
- Implemented in **TRNSYS**, as a Type/Subroutine coded in Fortran.

## APPLICATIONS

Set of profiles/data available on request, for applications in:

- Positive energy districts and neighbourhoods
- Electrical grid optimisation
- Renewable energy systems integration

## DESIRED PARTNERS

- Urban planners
- Building designers
- Energy consultants

## EXPECTED BENEFITS



Realistic households



Flexible methodology



High resolution



Detailed information

technical details



## ADDITIONAL DETAILS

Modelling user behaviour and its interaction with household systems is a challenge to reduce the gap between simulation and reality. The hypotheses of occupancy could have an important effect on energy and peak power estimation, making the validity of simulation limited. In the framework of building performance analysis through simulation, the occupancy behaviour, the electricity consumption caused by appliances, and the operation of the heating and cooling systems have usually been based on daily and/or weekly profiles. This approach has some strong points when the focus is to evaluate the performance of the building envelope and the heating and cooling supply systems. However, it has not shown to be useful when a detailed characterization of the household consumption is needed, as for example when studying the interactions with the grid in a “prosumer” building. From this perspective, a solid modelling approach to evaluate grid interaction, peak power values, demand side management strategies and design of positive energy districts and energy communities should comprise both high-resolution time step models together with stochastic occupancy and electrical devices consumption models.

## KEY ELEMENTS

- The model is implemented in TRNSYS, as a Type/Subroutine coded in Fortran
- High-resolution: 3-min
- Occupancy, electricity and domestic hot water profiles as a result of the tool
- A flexible methodology that can be adapted to different scenarios:
  - Different occupancy levels (1, 2, 3 or 4 occupants)
  - Different stock of appliances and energy performance
  - Different occupancy scenarios (for example related to pandemic restrictions)
- Adapted to Spanish behaviour

