OPTIMUS: Optimising the energy use in cities with smart decision support system

The goal of OPTIMUS is to provide a series of tools that enable local administrations:

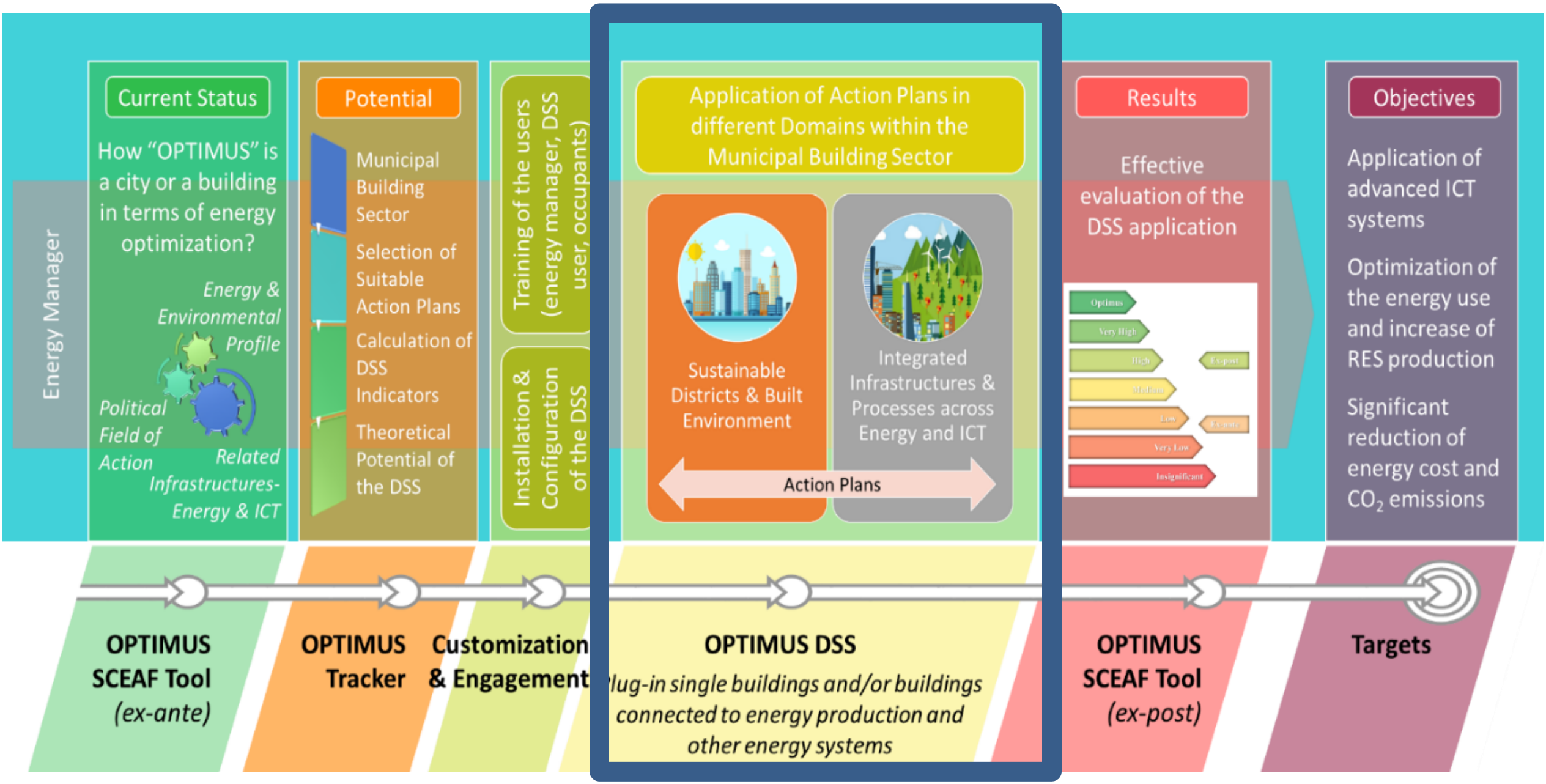
- **to assess the level of compliance of the city with regard to the energy performance targets at the city level**
- **to set up specific targets to achieve by improving the performance of buildings**
- **to adopt measures to improve the building performance over time**

OPTIMISING ENERGY USE IN CITIES THROUGH SMART DECISION SUPPORT SYSTEMS

WWW.OPTIMUS-SMARTCITY.EU

Local Renewables Conference Freiburg, September 27, 2016

Multiscale evaluation



OPTIMUS DSS

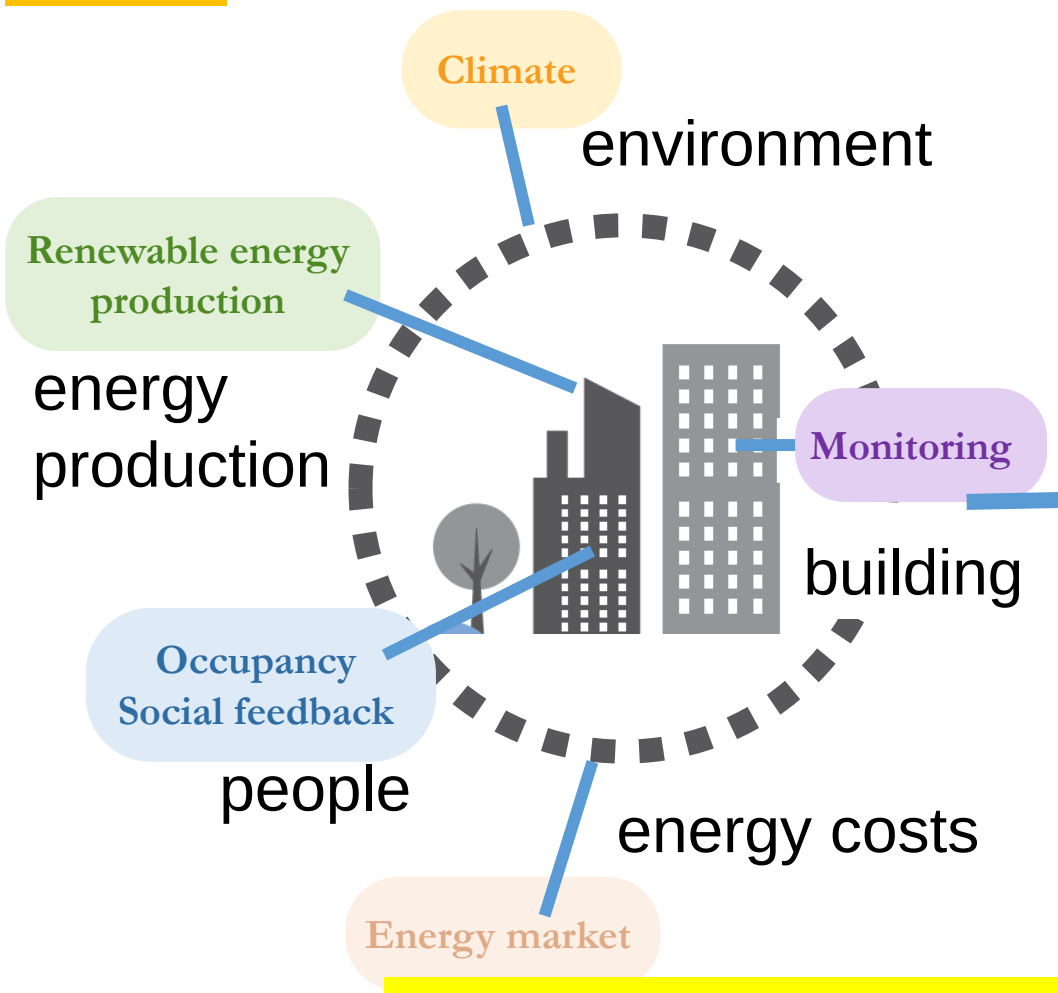
OPTIMUS
OPTIMISING ENERGY USE IN CITIES THROUGH SMART DECISION SUPPORT SYSTEMS

CITY level

Target indicators (SCEAF+Tracker)

BUILDING level

DSS



PREDICTIVE MODELS

To calculate predicted data

RECOMMENDED ACTIONS

Derived from inference rules

A systemic approach to energy efficiency

OPTIMUS DSS

OPTIMUS
OPTIMISING ENERGY USE IN CITIES THROUGH SMART DECISION SUPPORT SYSTEMS

CITY level

Target indicators (SCEAF+Tracker)

BUILDING level

DSS

Training / refining prediction models

Impact evaluation

Climate

environment

Renewable energy production

energy production

Monitoring

building

Occupancy
Social feedback

people

energy costs

Energy market

PREDICTIVE MODELS

RECOMMENDED ACTIONS

Actions modifying data

OPTIMUS DSS

OPTIMUS
OPTIMISING ENERGY USE IN CITIES THROUGH SMART DECISION SUPPORT SYSTEMS

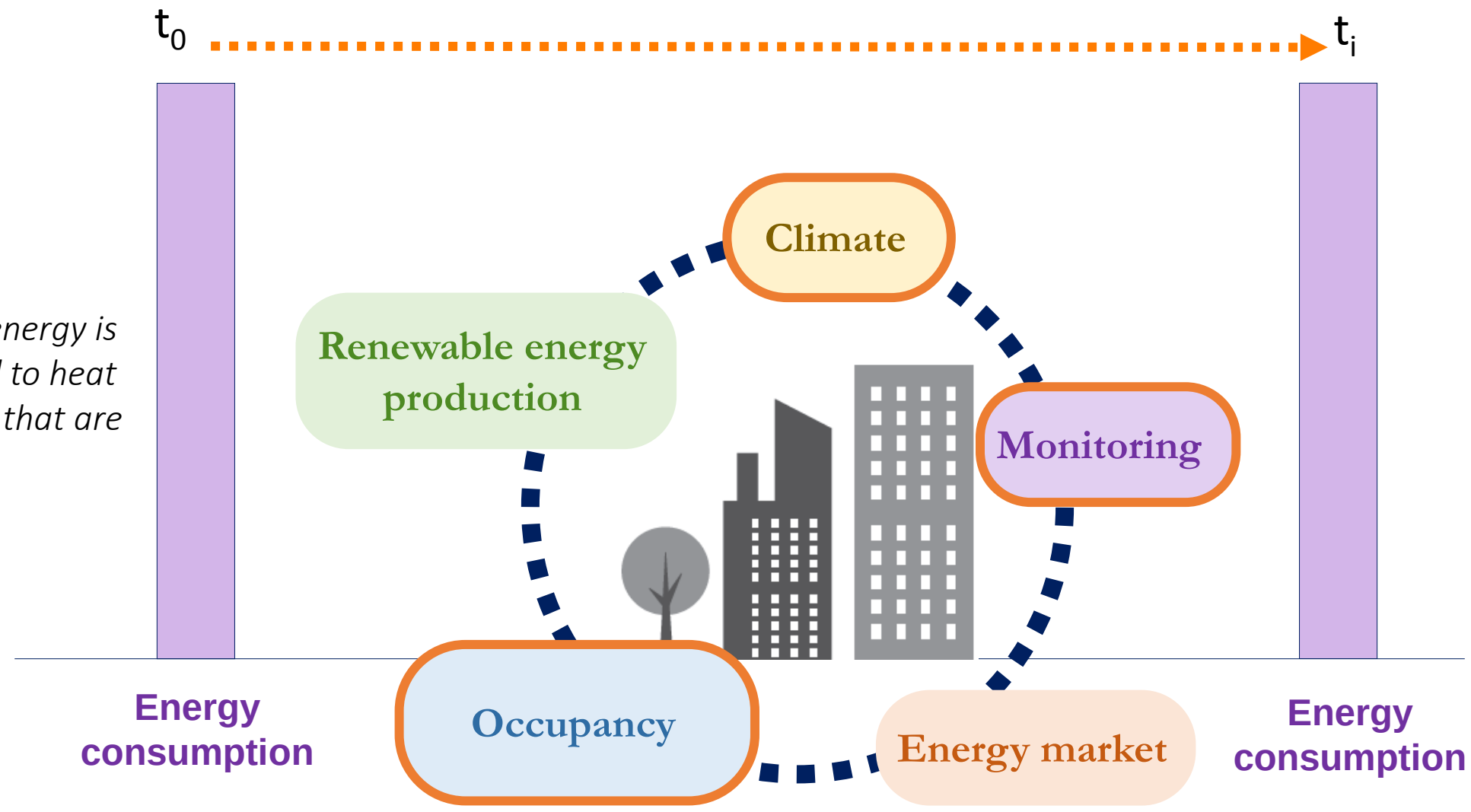
CURRENT SCENARIO

Nowadays, all rooms in a building are heated without taking into consideration climatic conditions of each room and their occupancy

Some energy is wasted to heat spaces that are empty

OPTIMIZED SCENARIO

Knowing the occupancy of the rooms and the climate it would be possible to adapt the consumption level to the forecasted conditions



1. ADAPTING OCCUPANCY OF ROOMS TO CONSUMPTION

OPTIMUS DSS

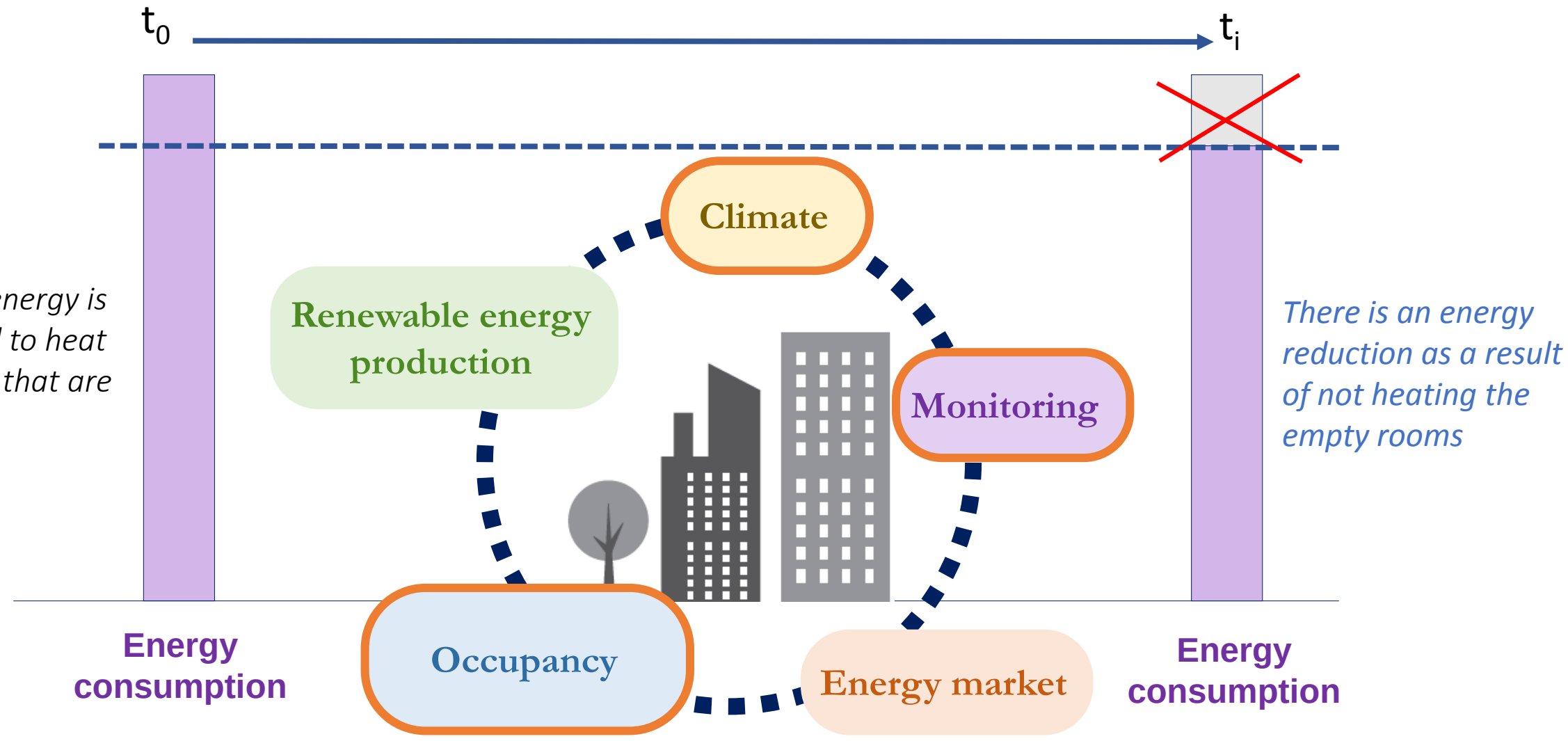
OPTIMUS
OPTIMISING ENERGY USE IN CITIES THROUGH SMART DECISION SUPPORT SYSTEMS

CURRENT SCENARIO

Nowadays, all rooms in a building are heated without taking into consideration climatic conditions of each room and their occupancy

OPTIMIZED SCENARIO

Knowing the occupancy of the rooms and the climate it would be possible to adapt the consumption level to the forecasted conditions



Some energy is wasted to heat spaces that are empty

There is an energy reduction as a result of not heating the empty rooms

1. ADAPTING OCCUPANCY OF ROOMS TO CONSUMPTION

OPTIMUS DSS

OPTIMUS
OPTIMISING ENERGY USE IN CITIES THROUGH SMART DECISION SUPPORT SYSTEMS

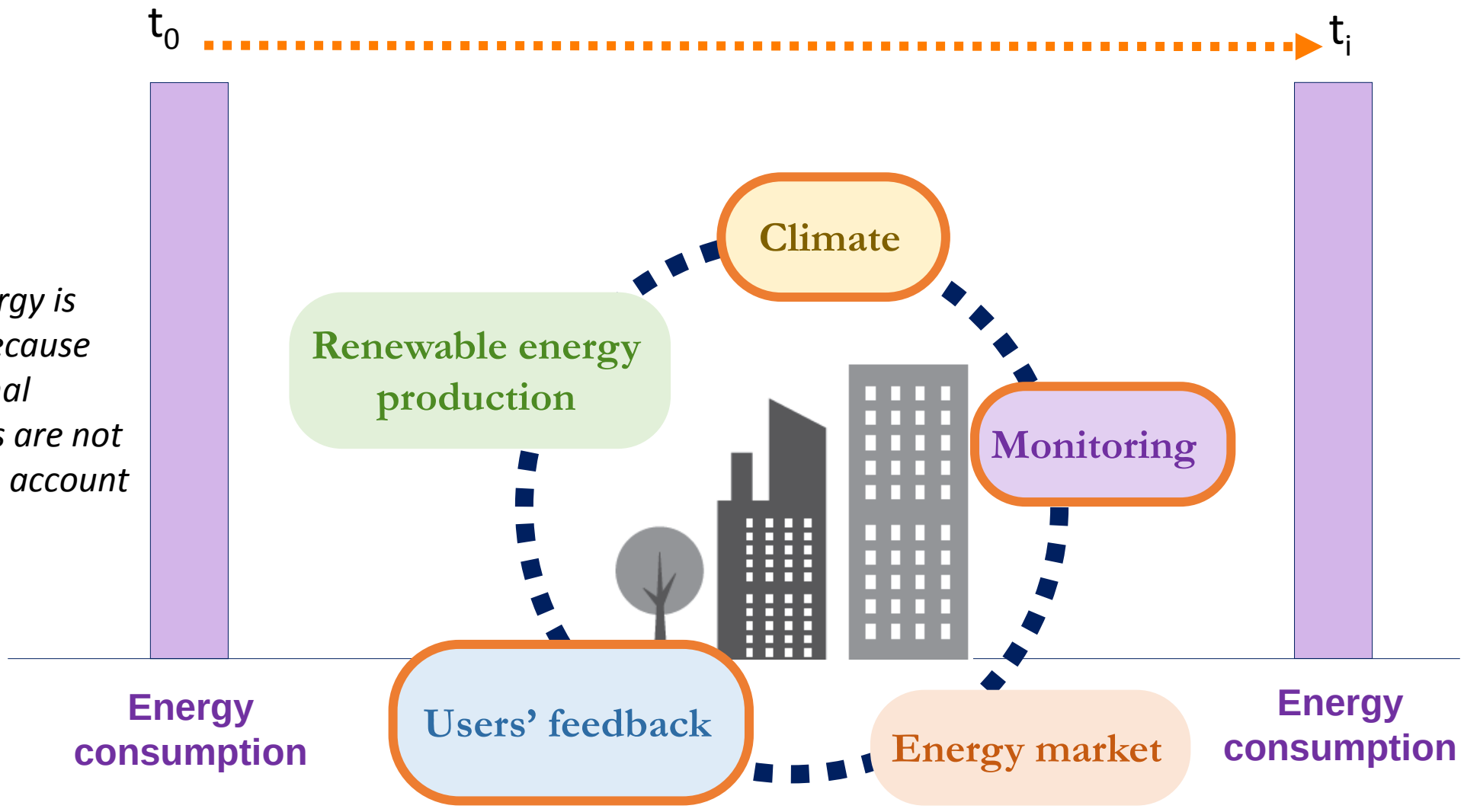
CURRENT SCENARIO

Nowadays, the set-point is established for a fix time every day independently from the temperature and the thermal sensation of occupants

Some energy is wasted because the external conditions are not taken into account

OPTIMIZED SCENARIO

Knowing the thermal sensation of occupants and the climate conditions we could change the set point temperature



2. ADAPTING SET-POINT TEMPERATURE TO THERMAL COMFORT

OPTIMUS DSS

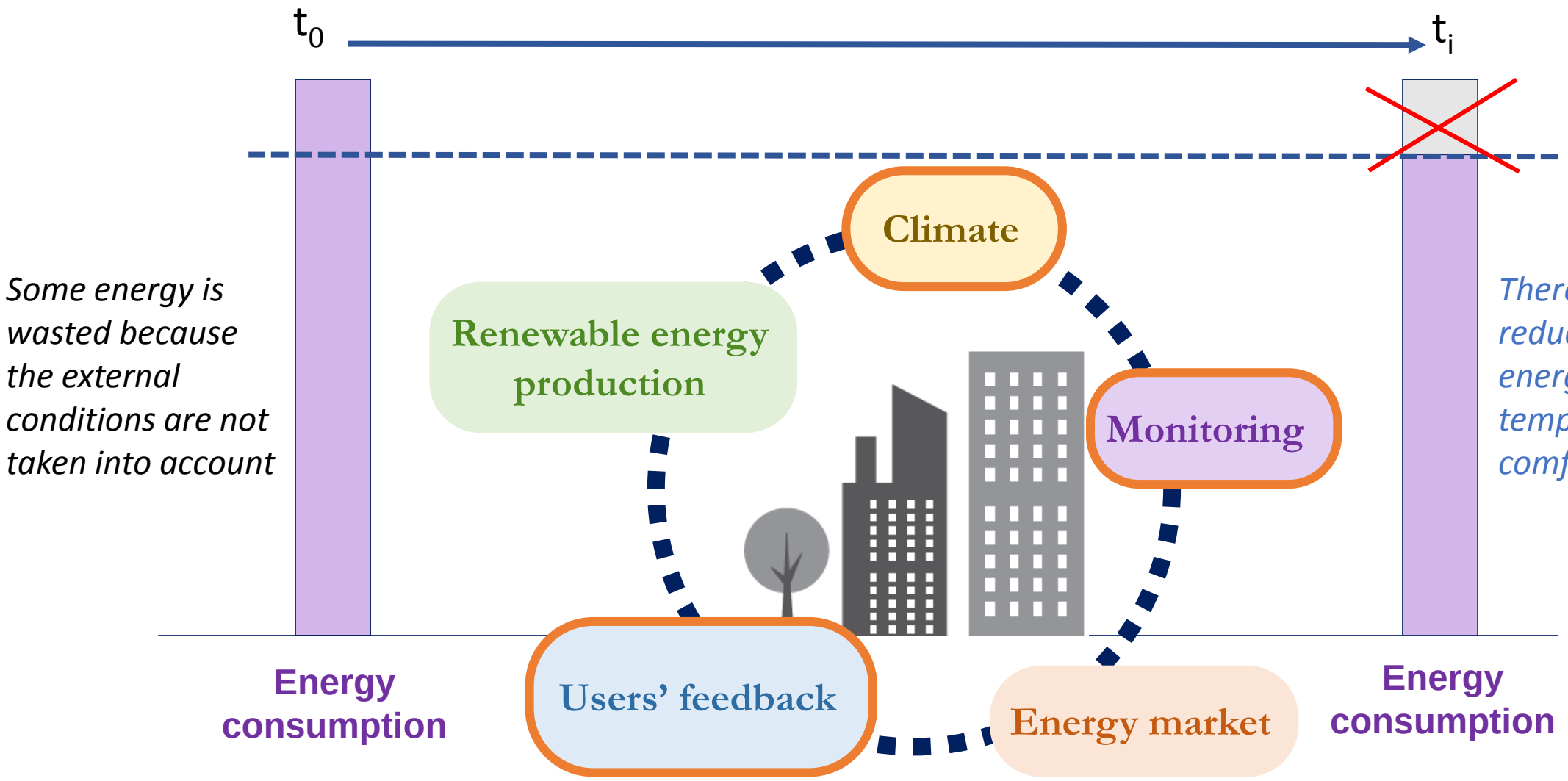
OPTIMUS
OPTIMISING ENERGY USE IN CITIES THROUGH SMART DECISION SUPPORT SYSTEMS

CURRENT SCENARIO

Nowadays, the set-point is established for a fix time every day independently from the temperature and the thermal sensation of occupants

OPTIMIZED SCENARIO

Knowing the thermal sensation of occupants and the climate conditions we could change the set point temperature



Some energy is wasted because the external conditions are not taken into account

There is an energy reduction using less energy to keep the temperature and comfort levels

2. ADAPTING SET-POINT TEMPERATURE TO THERMAL COMFORT

OPTIMUS DSS

OPTIMISING ENERGY USE IN CITIES THROUGH SMART DECISION SUPPORT SYSTEMS

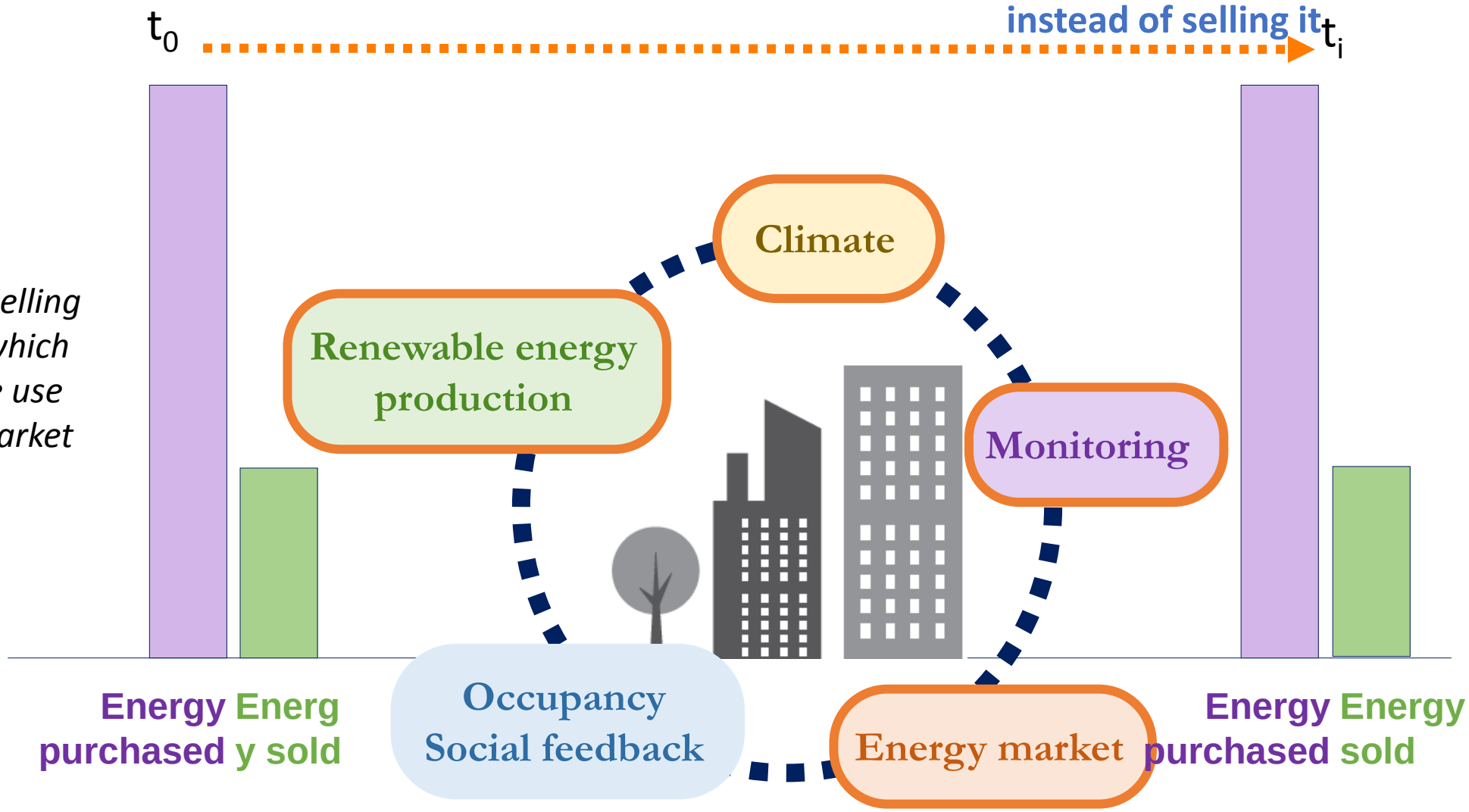
CURRENT SCENARIO

Nowadays, we might be selling all the produced renewable energy to the grid whereas it could be used by the system

OPTIMIZED SCENARIO

Knowing the prices of the energy in the market (selling and buying) and the consumption load it can make sense to shift some loads to use renewable energy instead of selling it

We are selling energy which could we use to the market



3. LOAD SHIFTING BASED ON RENEWABLE ENERGY PRODUCTION

OPTIMUS DSS

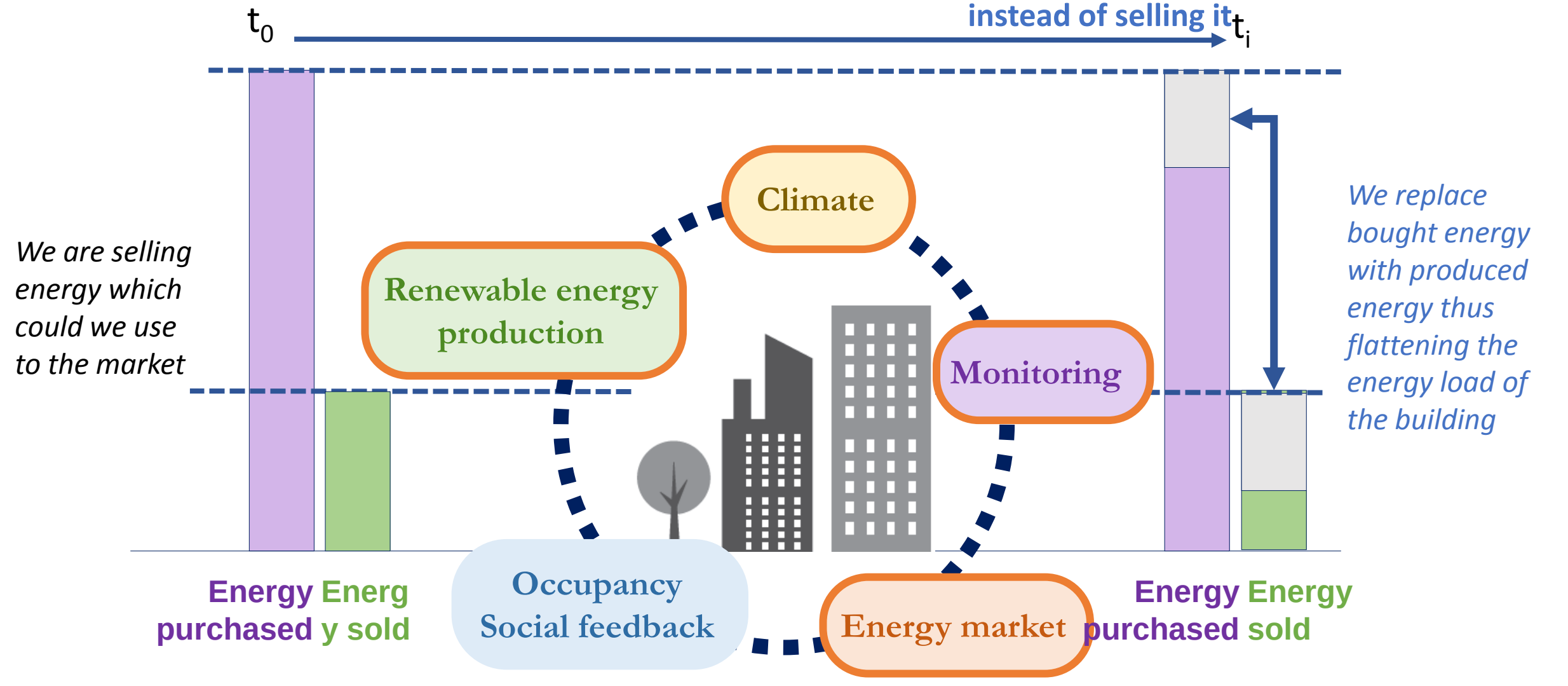
OPTIMUS
OPTIMISING ENERGY USE IN CITIES THROUGH SMART DECISION SUPPORT SYSTEMS

CURRENT SCENARIO

Nowadays, we might be selling all the produced renewable energy to the grid whereas it could be used by the system

OPTIMIZED SCENARIO

Knowing the prices of the energy in the market (selling and buying) and the consumption it might make sense to shift some loads to use renewable energy instead of selling it



3. LOAD SHIFTING BASED ON RENEWABLE ENERGY PRODUCTION