**MATERIALS &** 

CIRCULAR SYSTEMS

thermal energy solutions

Buildings generate sufficient energy

to cover their electrical and thermal

demand, e.g. photovoltaic in

Supply and demand matching

together supply and demand on

district level, e.g. using waste heat

from industry in private buildings.

measurable units of control or energy

districts to optimise energy

consumption.

investments in energy upgrading and

renovation ('the truth of costs').

European level, including regular

ensumption profiles of the building.

peak-shaving measures and

districts of people and their

legislation to optimise resources.

behaviour, technical solutions and

roviding sufficient reserve capacity.

Organic materials, such as clay an

Electrical and thermal grid Advanced solar solutions

n-site renewable energy productio

technology, e.g. photovoltaic thermal based on renewable fuels, e.g. biogas

Building integrated energy

solar thermal collector facades.

**Market mechanisms** 

Smart balancing of the energy mix

shave peak demand using priority

through market mechanisms to

schemes; these are overruled in case

of scarcity or emergency.

Smart systems use public (e.g.

weather) and private (e.g.

Future-proof tendering

Tenders demand flexible and

future-proof solutions that allow

changed use of buildings in the

future and the integration of

eco-materials -materials with low life-cycle

New storage solutions that are cheaper to produce, e.g. flow batteries and graphene.

Local production of tailored

District storage solutions

Larger-scale storage solutions to

share electrical and thermal energ

e.g. power-to-gas or -hydrogen.

Swarm technologies Intervene in user assets (connected appliances) to balance the grid and adapt to fluctuating supply of renewable energy.

nnecting Europe, North Africa and grid capabilities.

nditions (e.g. weather) and usage.

Desired future scenario

Ajuntament de SantCugat

Comune di Forlì
Comune di Fo

their occupants by adoptin

nature-based strategies, beyond

biomimicry.

user needs, climatic conditions an

usage.

New city-wide solutions

New solutions that open up new

possibilities, e.g. superconductir

networks, or receiving energy from

solar space power stations.

Circular economy

A holistic, systemic approach an

total value business models

(including societal, environmental

and economical aspects) at all

suitable scales.



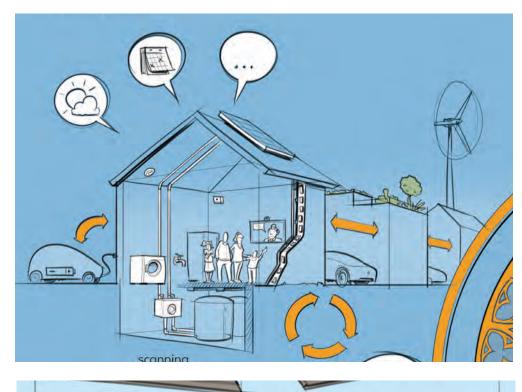








owners and users of the buildings are well-aware of the shared desire to save energy, and are actively engaged in achieving it by applying energy efficiency measures.



· Zero-emission and self-sufficient buildings through energy saving, generation and storage solutions

· Buildings focus on people's needs and comfort Continuous improvement strategies for buildings



Deep energy renovation of historical building

Versatile, flexible and proactive

 Versatile buildings and spaces · Buildings are prepared for future smart grid integration



Intelligent master system managing building performance

across the city Community-owned grid

Collective approach to infrastructure decision-making

Monitoring and learning

Roaming profiles for energy access and community sharing

Easily accessible open platforms Enabling the transition to sustainable energy

• Evidence-based, future-proof decision-making

Large-scale renewable energy

production

Making optimal use of territorial

qualities to generate renewable

District energy performance

New buildings are designed to

achieve higher standards to

ompensate for the negative energy

balances of existing buildings.

energy, e.g. wind and solar parks.

Direct current (DC) systems eneration solutions, e.g. translucent

standards and beyond.

in-house DC grids.

Bidirectional self-healing grid Creating a bidirectional energy gric to ensure stability and continuity o service, e.g. in case of a failure.

> Real-time data energy use, for monitoring and provement towards sustainable

> > behaviour patterns.

100% renewable energy

Cities and territory politics ensure

that all imported energy is 100%

renewably sourced.

patterns, e.g. for secure access to

connect systems and enable

Personal environmental

Consumption-based accountabilit

including embodied energy and CC

water and gas networks into one

orogressive standards, e.g. zero

emission, energy positive or

 $\mathsf{O}_{\scriptscriptstyle{\varsigma}}$ -neutral approaches to new ar

existing buildings.

Abundant renewable energy

Sustainable energy is widely

ailable and affordable as a result

of large-scale solutions such as win

& solar parks and alternatives.

**MANAGEMENT SYSTEMS** 

ICT & BUILDING

Sustainable behaviour

costs of fossil fuels) and solutions for savings, so people have the right

Pilot projects & living labs use of model buildings to initiate public discussion, change the aesthetic perception and create

New investment models

combining public, private and

mpany investments in inclusive

solutions, e.g. to increase renewable

energy.

ividual benefits, e.g. the right and

buildings in their environment to

increase the total amount of

**Smart networks** 

electrical and thermal energy

tworks to share (renewable) energ

with neighbours.

renewable energy in the community

education, neighbourhood mpetitions) to create a dialogue with citizens and increase awareness.

Inclusive value system

A coherent monetary system tha

includes value criteria for real

environmental impact, e.g. using

taxes and incentives.

life and social value

New policies that define the desired

them, e.g. procurement procedures

utcomes rather than the way to reach

nowledge and access to knowledge evidence-based decision-making.

romote and optimise the life-cycle

citizens on energy costs in relation to their lifestyle and behaviour.

Making efficiency fun the 'rebound effect' and to make striving for efficiency is fun, both now and over time.

Lifestyle coaching real-time data to optimise the use of resources in relation to individual lifestyles.

Credits for energy (similar to mobile

phone credits), that enable a higher

consumption at extra costs, with

discounts for sustainable behaviou

emissions from personal use of goods and services. Personal energy budget

Legal security for innovation safety of people while promoting innovative solutions, e.g. safe re-us of 'grey' water in buildings.

Flexible pricing and new business models

People can contribute to grid stabilit

2050



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