#### **Building materials passport**

Materials passports contain information about the quality, origins and location of materials and products used in the construction of buildings and other construction objects. All in such a way that owners and/or managers of real estate and infrastructure always have up-to-date information on the financial and circular value, toxicity, demountability and reuse potential of the materials and products applied in their properties.







#### **Compost production**

Kitchen scraps, yard waste and/or stabilised blackwater from anaerobic digestion systems can be used as compost for local gardening, substituting or competing with commercial compost.







#### **Biogas production**

Solids from blackwater and organic waste from kitchens and gardens can be used to produce biogas. The generated biogas can be used for cooking or heating. The gas is stored in inflatable and impermeable fabrics. This energy storage can be further used for potential grid injection, or combustion in a natural gas boiler and can support the NZEB or passive house claim to reach full autonomy even in winter months.







#### **Biobased materials**

A bio-based material is a material made from substances derived from living (or once-living) organisms. Using building materials based on natural and renewable sources is more sustainable and circular than materials based on finite and/or carbon intensive exploitation.







#### Reusing existing building products an recycled materials

Reusing existing building materials can reduce emissions, but also help to retain the value of buildings over their lifetime and support the local economy.

To increase reuse it is necessary to maximize the amount of valuable materials recovered by increasing the acceptance of Construction and Demolation Waste CDW – based products. E.g. CDW-derived materials can be effectively reintroduced in the production cycles of concrete and timber components with a replacement rate of 50-85 %





#### Local and/or certified circular materials

It is important to choose certified circular construction materials and products from the different seals available during the design phase that are available as close to the building as possible. The use of certified building circular material will be essential for the improvement of building circularity.







#### **Prefabricated products**

Circular materials can be used to produce prefabricated, fully reusable buildings. It can be done by designing reusable building components to be produced in automated BIM controlled production processes.

Prefab plug & play solutions have proven to be effective to come to a:

- Reduction of both renovation time on site and costs.
- Reduction of disturbance for occupants during the renovation works.
- Quality improvement by better quality control during the production process.







#### Circular waste management

Construction and demolition belong to the five priority areas to be tackled in the context of the European circular economy. It is the built environment where the majority of the European waste production originates, in form of construction and demolition waste, wastewater and organic waste. Circular economy principles allow for the implementation and incorporation of waste management into economically viable and sustainable solutions that convert retrofit investments from a liability into an asset.







### **ENERGY**

#### **Energy smart meters**

A smart meter is another way you can potentially reduce your carbon footprint. Utilising one you can easily see how much energy you are using via a digital display, and so adapt your energy use accordingly. It also cuts out having to send meter readings to your energy company or have someone come to your house.







### **ENERGY**

#### **Energy efficient windows**

It is recommended the double-glazed casement, tilt-and-turn windows and HR+++ or HR++ glass (3 or 2 panes of glass separated by an insulating gas). Very well insulated windows help save energy and increase comfort.







### **ENERGY**

#### Green walls and roofs

A green roof or facade buffers and absorbs rainwater, insulates the home, increases biodiversity and reduces the heat island effect. Evaporating water cools the home and makes solar panels more efficient.











### **ENERGY**

## Hot water, heat and/or cold generation

It is important to replace Domestic Hot Water, heating and cooling systems using fossil fuels with others using renewable energy. It is advisable to install electrical systems and combine them with renewable energies. Biomass heating is also a desirable low-carbon heating option.







### **ENERGY**

#### **Renewable energies**

It is important to replace Domestic Hot Water, heating and cooling systems using fossil fuels with others using renewable energy. It is advisable to install electrical systems and combine them with renewable energies. 24 m² of solar panels (south) convert solar energy into 4,800 kWh of electricity that can be used in the home or fed back to the main grid. Roofs with a southeasterly to southwesterly orientation are often very suitable for PV panels.







### **ENERGY**

#### **Shading**

In the summer months, overheating can occur since direct sunlight enters through the windows. It is important to avoid the latter, by using sunscreens such as overhangs, slats, awnings, blackout curtains or deciduous vegetation.







### **ENERGY**

#### Thermal Insulation

There are several ways to insulate buildings, both on the inside and outside (best option), and both of them will achieve a remarkable reduction in energy consumption, with greater comfort and lower costs. In existing buildings, roof insulation is often installed between purlins. Facade insulation can be improved by filling the cavity in the wall with insulation, but to create a well-insulated facade the most common solutions are insulating panels.







### **WATER**

#### **Water saving devices**

Water is considered a renewable natural resource, however, there are factors, such as the inefficient use of water by society, pollution and over-exploitation of the main sources of supply, that lead to situations in which the water cycle water breaks or its quality is not suitable for human consumption, making this essential good a scarce commodity difficult to obtain. Thus, the demands for comfort and hygiene make it necessary to propose viable alternatives for saving water without losing quality, quantity and guarantee of supply.







### WATER

#### **Harvesting rainwater**

There are many types of rainwater recycling systems, from the most simple water butt for garden use to a system that offers complete self-sufficiency without the need for utility mains water or sewage connections.

A typical system, somewhere in the middle of this range, will supply untreated rainwater for toilet, outside use and laundry. Water is collected from the roof, fed through a filter into a storage tank.







### WATER

#### **Monitor water consumption**

A water meter is another way you can potentially reduce your water consumption. Utilising one you can easily see how much water you are using, and so adapt your water use accordingly.







### WATER

### **Reusing blackwater**

Blackwater is wastewater from toilets. It can be separated with retrofitting measures in existing buildings. Blackwater can be used to produce biogas or compost. This can be consumed directly in a building, or else sold for a profit.







### WATER

### **Reusing greywater**

Greywater is wastewater from non-toilet plumbing systems, such as wash basins, washing machines or showers. It can be separated with retrofitting measures in existing buildings. Greywater can be treated using innovative nature-based solutions for indoor application in multilevel green walls with minimum energy cost (<1.5kWh/m3) and disinfected using commercial O3/UV systems for >90% water reuse.



# DRIVE 🝣





### **WATER**

### Reuse of un-segregated water

Wastewater can be combined in one single pipe with kitchen-shred organic waste from all floors of an existing building. The liquid fraction of this combined WW can be separated from the solid fraction with a separation unit. The liquid fraction can be treated with NBS indoor allowing >95% water reuse. The effluent water can further be disinfected and used for toilet flushing, urban gardening and compost production. The solid fraction can be used for biogas production.

# DRIVE 🝣





#### **Biophilia**

Biophilia is our sense of connection with nature. It can change human attitude, behaviors and positively reduce the so-called 'Sick building syndrome', whereby people suffer from health symptoms linked to the buildings in which they spend time. The biophilic patterns can be designed for several purposes, such as lowering the temperature of indoor spaces, removing VOC particles, improving air cooling, and cleaning indoor and outdoor water.





# DRIVE 🝣





#### **Acoustic insulation**

Noise affects people's well-being and has important consequences for their health. Sound insulation of buildings eliminates disturbance caused by common impact noise as well as airborne noise.







### **Building airtightness**

Airtightness is an essential part of creating a healthy, comfortable, energy-efficient living environment.

The main advantages are: save energy and heating costs which means less CO2 emissions, no structural damage due to hidden mould, better indoor air quality (dust, pollen, odours), less pollutants from outside, ventilation systems work more efficiently and better sound insulation.







### **Home and building automation**

Having an intelligent house or building that uses tools such as domotics is a decision that brings not only personal benefits, but also collective ones and helps to make society aware of sustainability and the environment. The main objective of home automation is to provide comfort, wellbeing and security to all members of the family. Here, family habits and routines are merged with the system of lights, heating, locks, air conditioning and irrigation systems, among others, to contribute directly to energy saving and ecology.







### **Ecological paints**

An ecological paint is made from principally vegetable or mineral-based raw materials which are renewable and non-toxic. An ecological paint therefore has a limited impact on the environment and is characterised by its absence of toxic substances for the user.



# DRIVE 🝣





### Indoor air purification

Indoor air quality (IAQ) is the air quality within and around buildings and structures. IAQ is known to affect the health, comfort, and well-being of building occupants. Poor indoor air quality has been linked to sick building syndrome, reduced productivity, and impaired learning in schools.







### **Indoor air quality**

If you want to optimize the air inside the house, air monitoring will offer information about its quality: find out about an adequate device for this, to identify polluting substances and avoid putting your health or comfort at risk. CO2 is exhaled by people and is a suitable indicator to detect when it is necessary to ventilate.

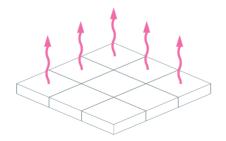






### **Radiant heating floor**

Radiant systems heat the floor, and that heat radiates up and is absorbed by other objects in the room, helping to warm the entire space efficiently.







#### **Thermostats**

Thermostats favour both energy efficiency and comfort. With a smart thermostat, you can control your home's heating remotely and programme your heating to turn on at a certain time, at a particular temperature and in the rooms of your choice.

Not only does having a smart thermostat make controlling your heating system more convenient, it should also save you energy and money as you can programme the heating to come on only when you need it.







#### Ventilation

A good ventilation ensures healthy air quality and comfort in the home. Besides, if a heat recovery system is installed, rather than just extracting air and replacing it with the air from outside, the system draws the heat from the extracted air and passes it to the air which is being filtered in from outside. The extract and supply air do not flow within the same pipes and there would be no cross contamination of the different air flows.



# DRIVE 🝣



