

# Gas installations

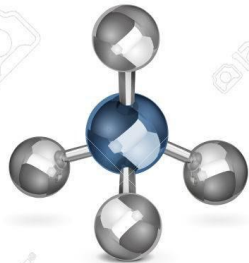
- A. Types of fuel.
- B. Gas installations.
- C. Climate Control Systems
- D. Regulations.
- E. The gas bill.
- F. Efficiency Measures.

# Types of fuel

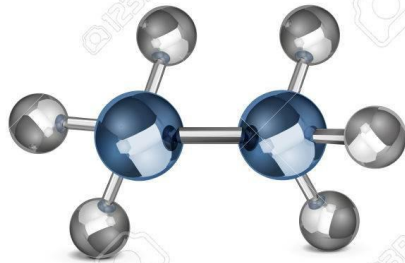
Vector Molecules



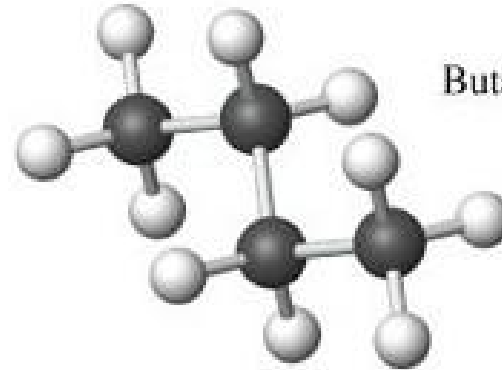
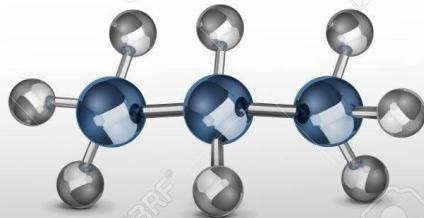
METHANE



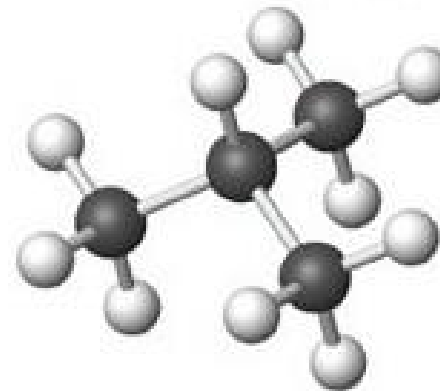
ETHANE



PROPANE



Butane,  $\text{C}_4\text{H}_{10}$

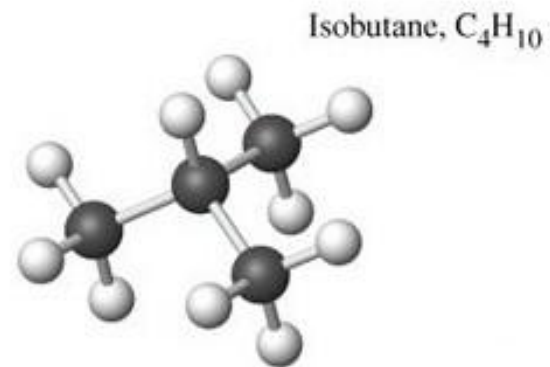
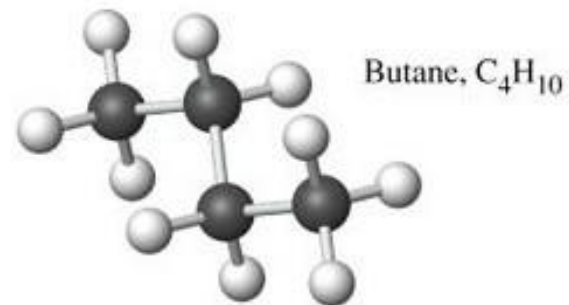
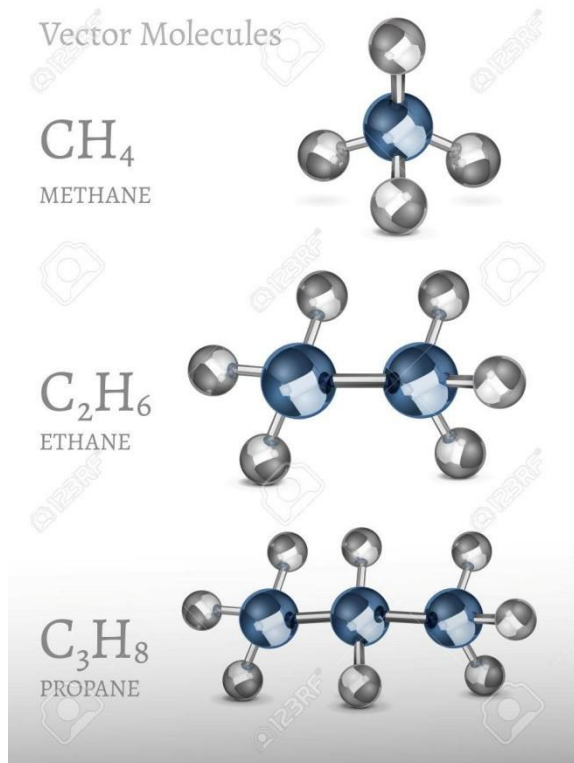


Isobutane,  $\text{C}_4\text{H}_{10}$

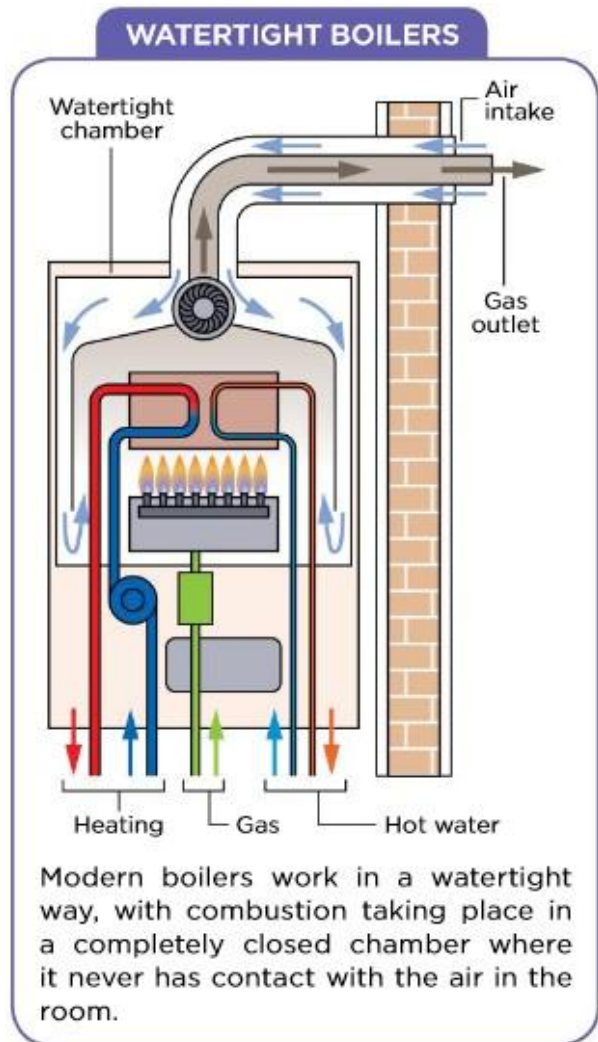
# Types of fuel

- Methane: 1 atom of carbon
- Ethane: 2 atoms of carbon
- Propane: 3 atoms of carbon
- Butane: 4 atoms of carbon

Hydrocarbide molecules with 5 or more atoms of carbon are in liquid state

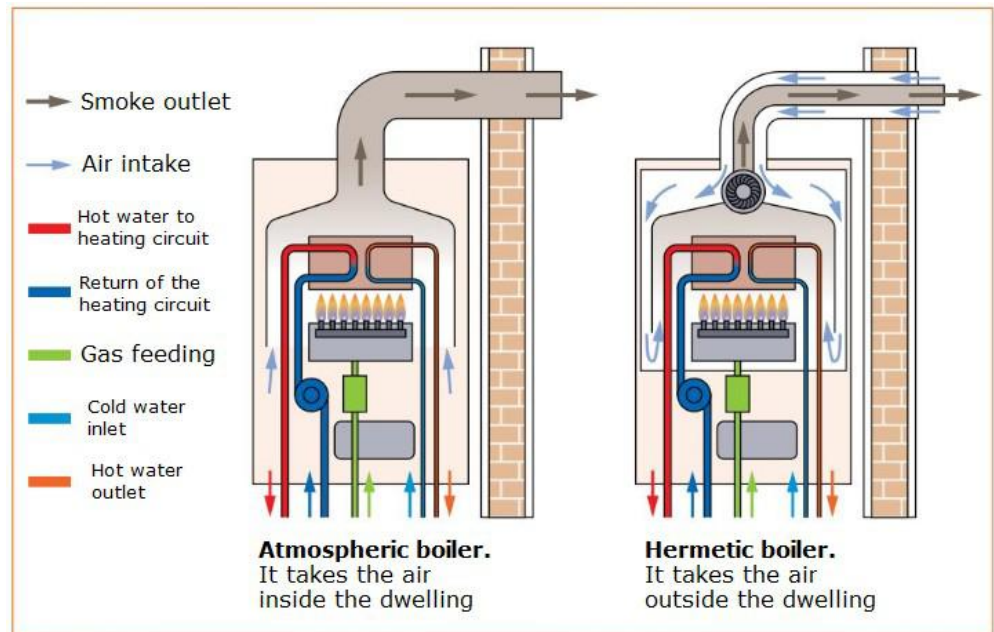


# Gas installations



## Types of boilers.

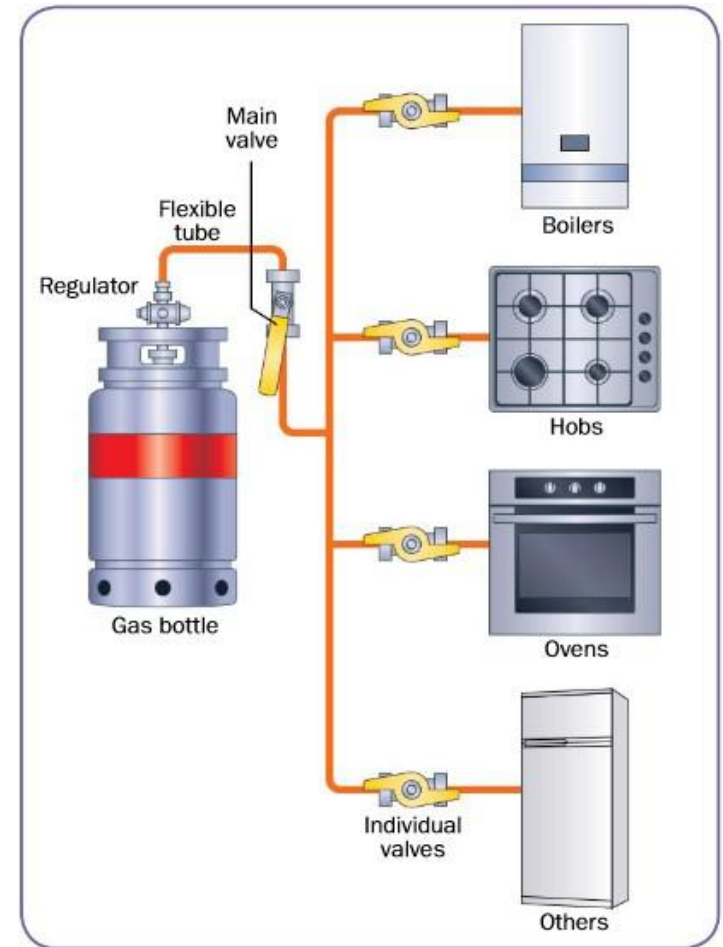
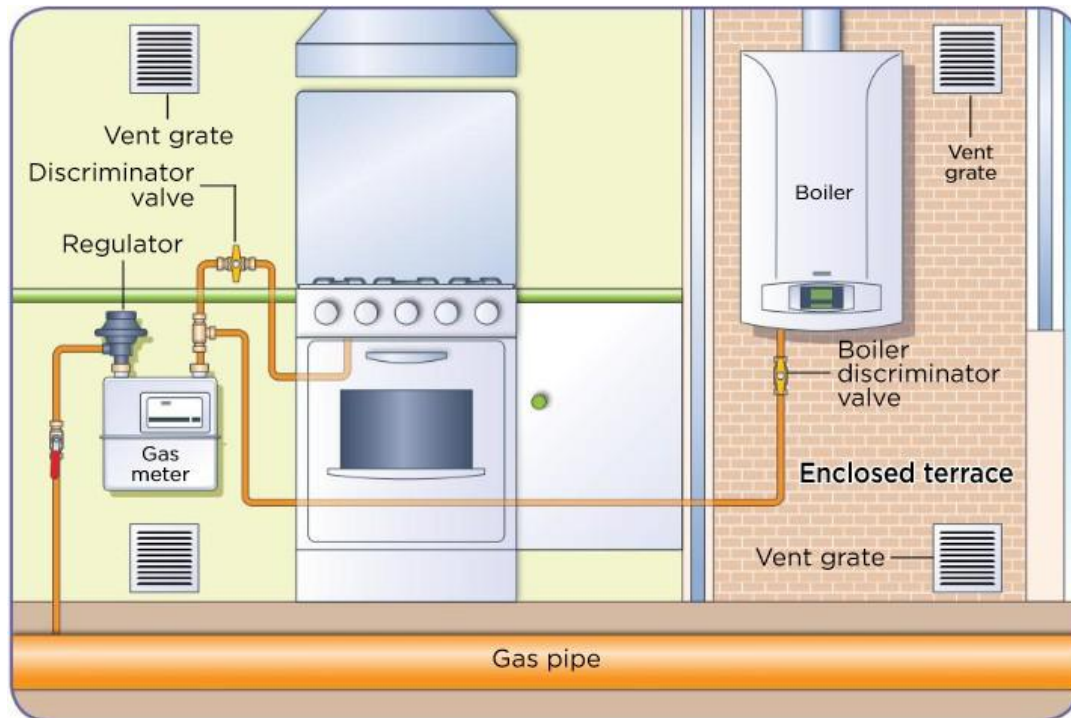
- ✓ Hermetic boilers.
- ✓ Atmospheric boilers



# Gas installations

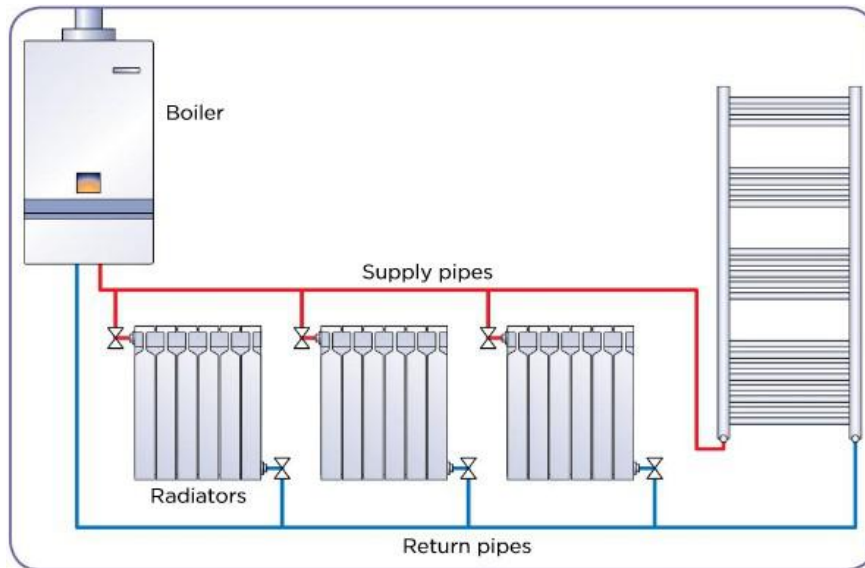
## Types of gas supply.

- ✓ By gas pipe.
- ✓ By gas bottles.

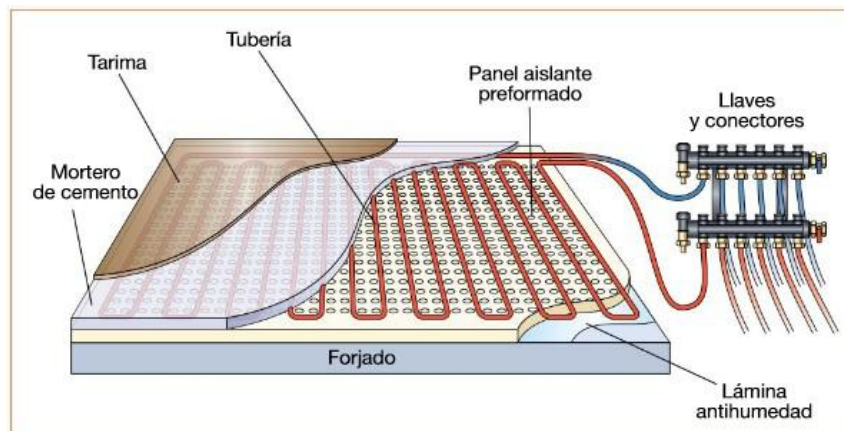


# Climate Control Systems. Heating.

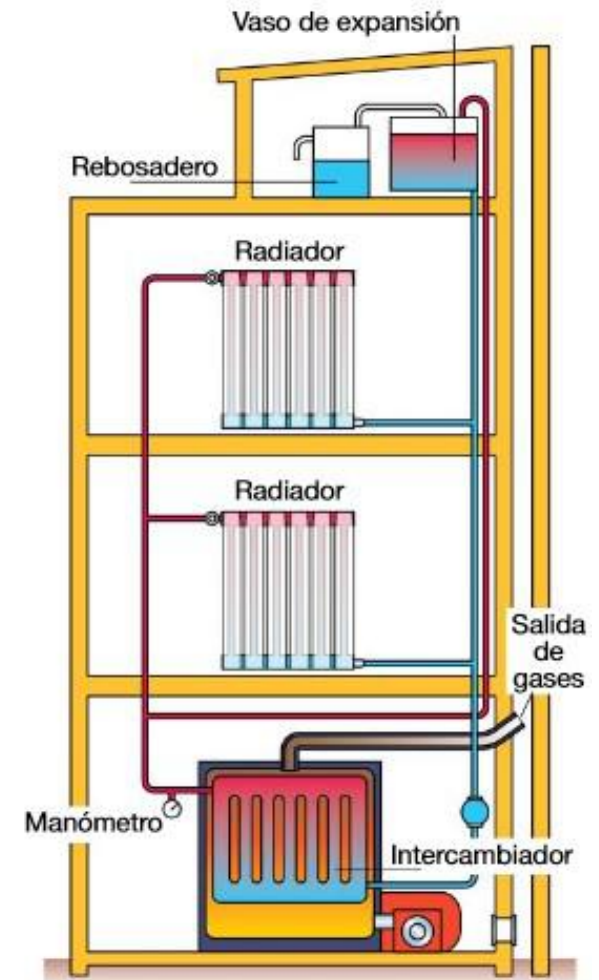
## Individualised heating circuit



## Underfloor heating circuit



## Community heating circuit



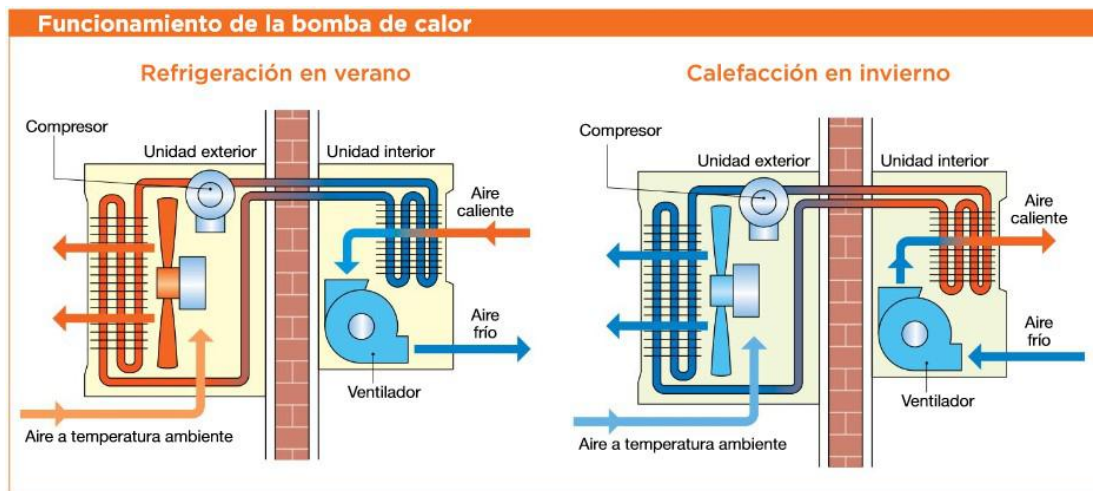
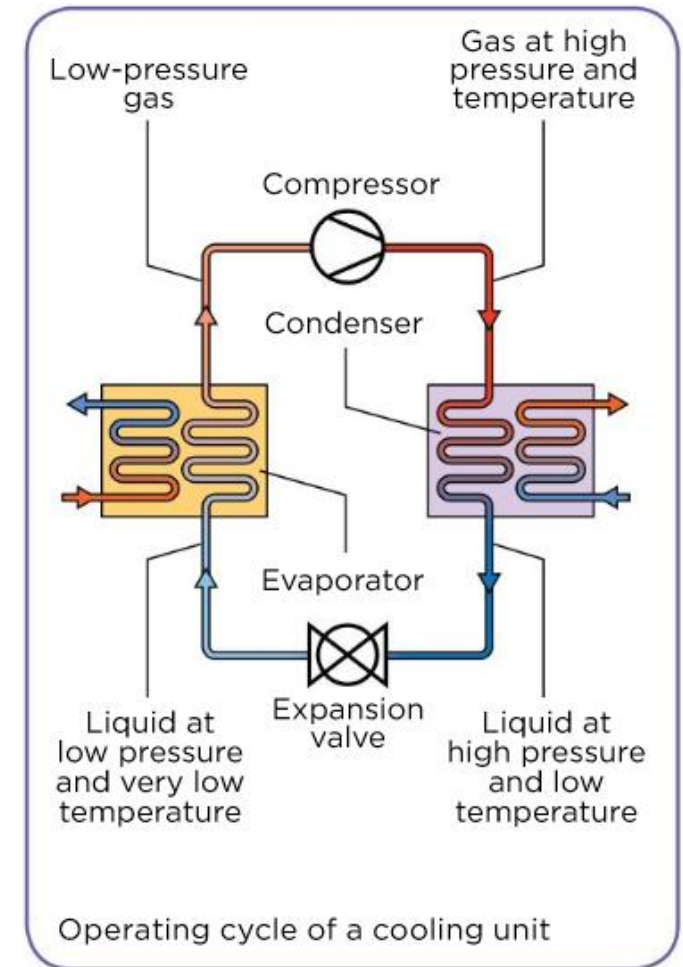
Sistema de calefacción por agua en un edificio.



# Climate Control Systems. Air-conditioning

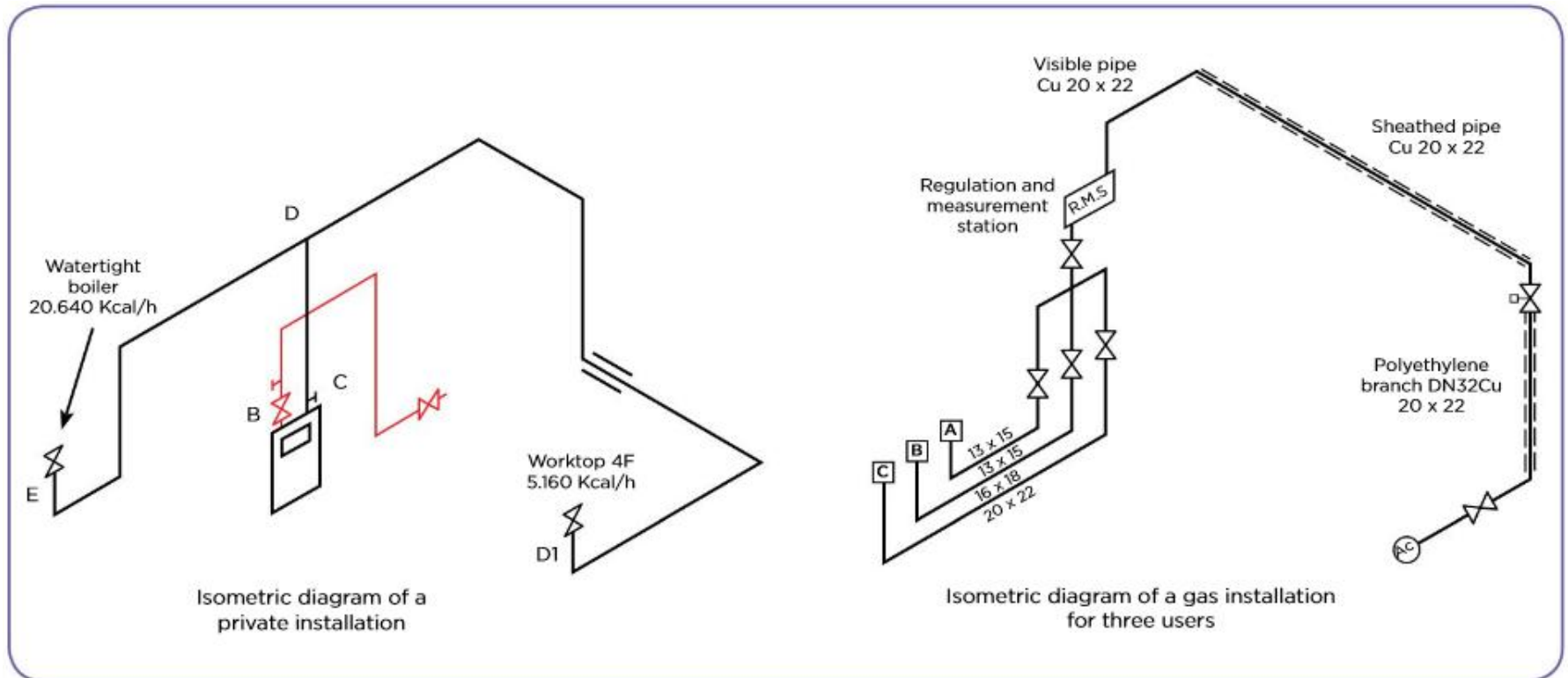
Air conditioning equipment consists of three elements that form a closed circuit through which a cooling fluid circulates. This fluid is in charge of making heat exchanges according to the following cycle:

- 1 **The compressor**, which compresses the cooling fluid in gas form, which by increasing the pressure and diminishing its volume, increases its temperature.
- 2 **The condenser** is a coil where the compressed gas loses heat and transforms into liquid, yielding heat outside the enclosure.
- 3 **The evaporator** is another coil where the cooling liquid again transforms into gas when absorbing the heat of this chamber. The cooling liquid is warmed, absorbing this heat from the enclosure, which cools off.
- 4 Finally, the gas returns to the compressor and the cycle begins again.



# Regulations

- Similar symbols to water installation.





# The gas bill

**IND**  
**Gas invoice**

**CLIENT DETAILS**  
Name: Xxxx Xxxxx Xxxxxxx  
CIF/NIF: 12345678X  
Delivery address: C/ XXXXXXX XXXXX  
XXXXX XXXXX

**TOTAL INVOICE: 163.35€**  
Billing period: 01-01-2016 to 01-02-2016  
Current reading (m³): 460  
Last reading (m³): 429

**Technical information**  
Fixed term: 27.02€  
Variable term: 96.02€  
Meter rent: 1.10€  
Access charge: 4.82€  
Hydrocarbon tax: 6.04€  
Subtotal: 135.00€  
VAT 21%: 28.35€  
**Total due: 163.35€**

**Usage history**  

Month	Usage (m³)
Feb	350
Apr	150
Jun	80
Aug	40
Oct	100
Dec	320

**Payment information**  
Bank: 0000 Bank S.A. Branch: 1234 Account N°: 98765432\*\*\*\* Name: Xxxx Xxxxx

- Fixed term by energy availability.
- Variable term of consumption.
- Meter rent.
- Access charge.
- Hydrocarbon tax.
- Value Added Tax (IVA).

# Efficiency Measures

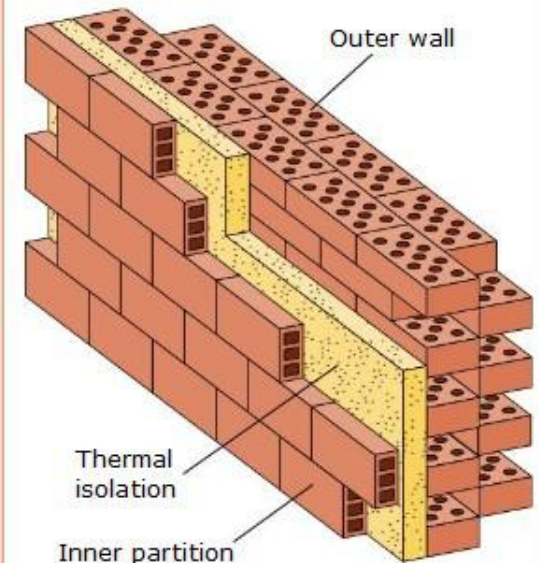
## ENERGY-SAVING PRACTICES

In addition to the technical solutions available for energy savings, there are many other solutions based solely on our behaviour that are much cheaper and easier to implement. For example:

- Use awnings and blinds. With correct use, a savings of up to 30% on air conditioning can be achieved.
- Ventilate the house only when necessary in the winter and open opposing windows during the summer to create cross-breezes.
- Take advantage of natural light whenever possible and do not leave lights on in empty rooms. This is easier if the walls and ceilings are painted light colours.
- Use the microwave instead of the oven. This enables energy savings of 60-70%.
- Washing dishes by hand consumes 40% more energy than a full dishwasher.
- When not in use turn television sets and other electronic equipment off completely. Disconnect chargers when you are not using them. When idle, they continue to consume up to 15% of their operational consumption. It is good idea to connect them all to multiple outlets on a power strip.
- Avoid opening the refrigerator door unnecessarily. Think of what you are going to need before opening it.




With the new Technical Building Code (CTE in Spanish) that was implemented in March 2007, all new buildings must install systems that collect solar energy for heating and domestic hot water.



# Exercises

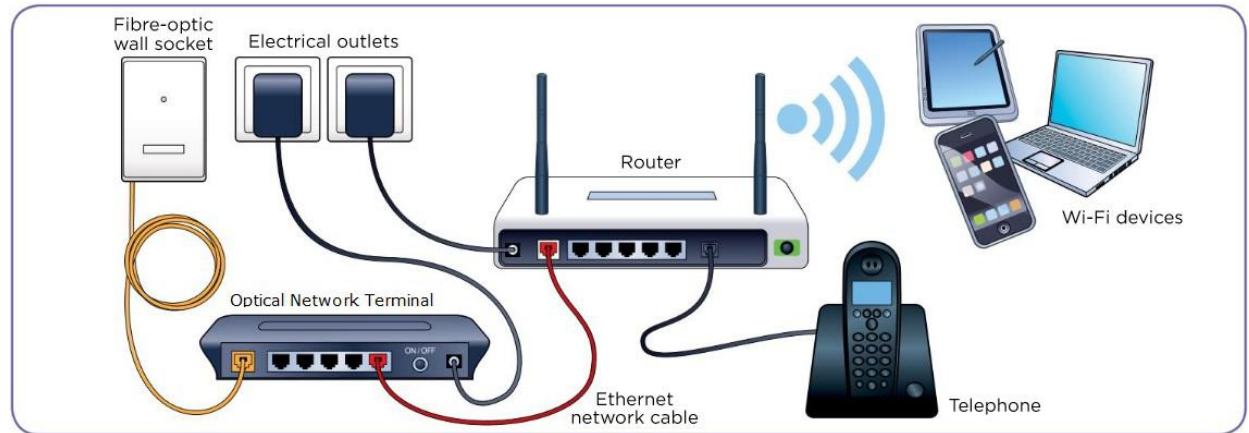
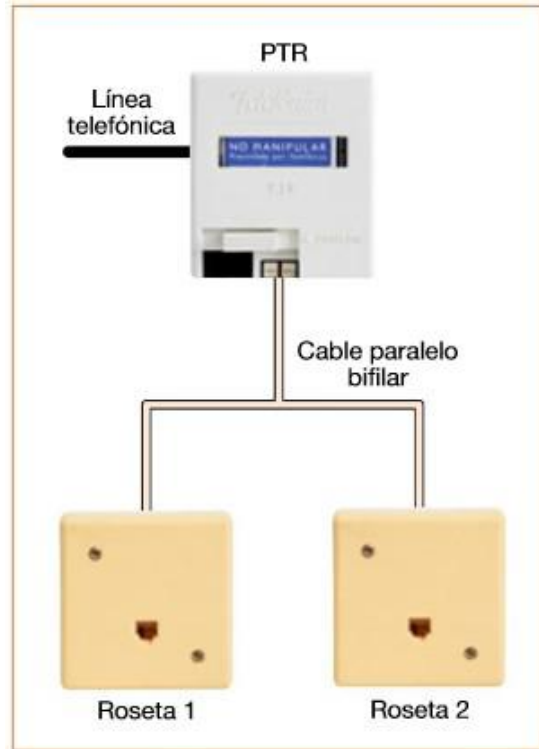
## Understand, think, search

- 2** Draw a graph and briefly explain the operation of refrigeration equipment.
  - 3** Investigate what inverter technology is in air conditioning equipment, and explain its advantages in terms of energy savings.
  - 4** Why can CFC gases no longer be used in refrigeration systems?
  - 5**  What consumes the most electrical energy in a house? Do you think that better quality of life implies greater consumption of electrical energy? Could less electrical energy be consumed without losing quality of life?
  - 6** Propose energy-saving measures that are easy to implement in your house (changing appliances or changing habits).
-

# Communications

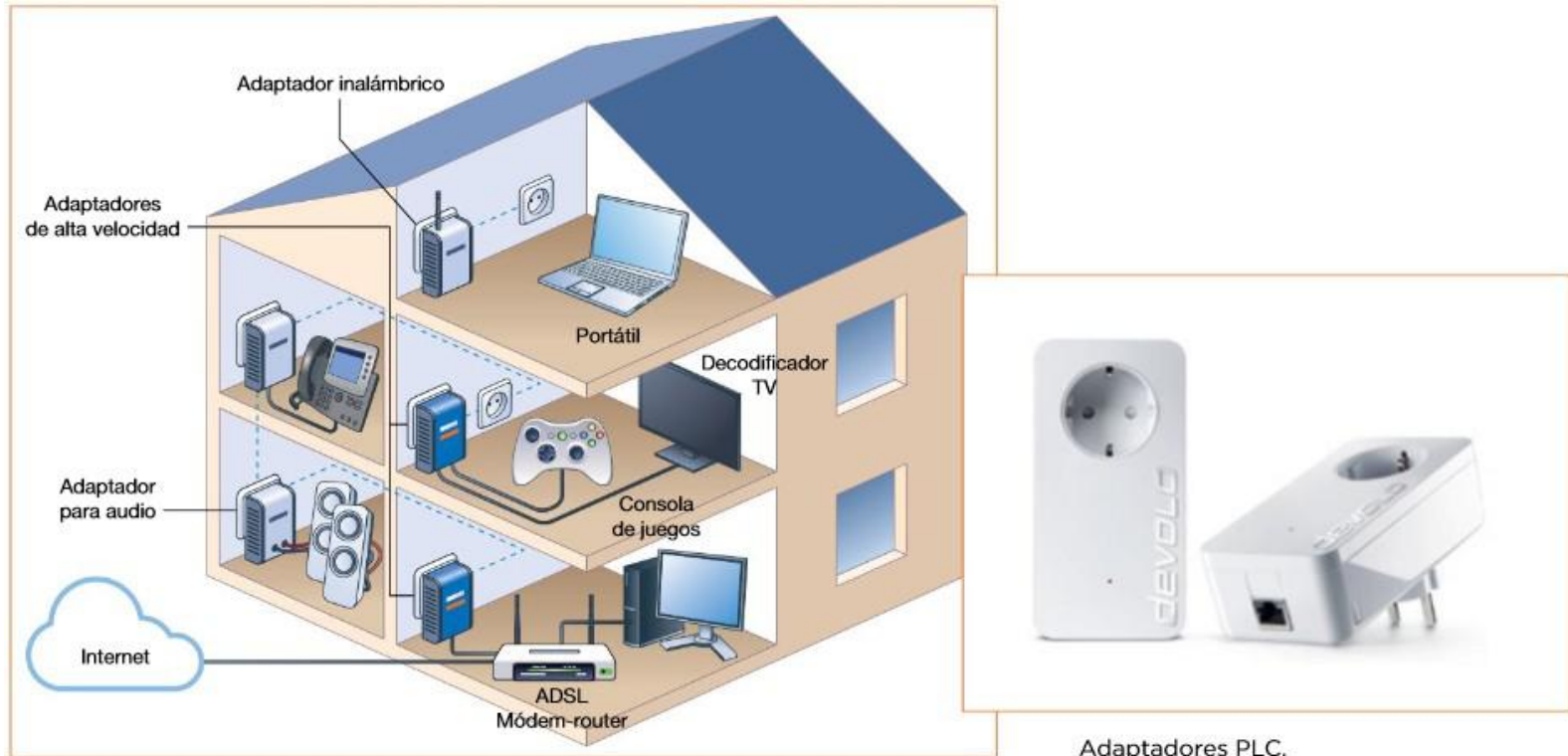
- Telephone and data
- Television
- Home automation system
  - Door phone

# Telephone and data



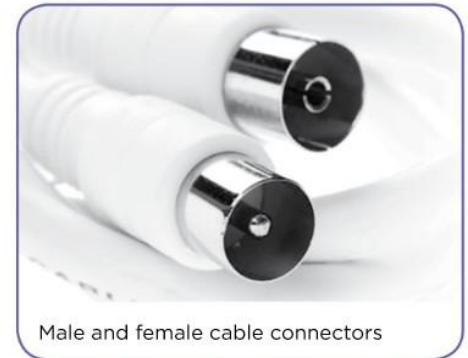
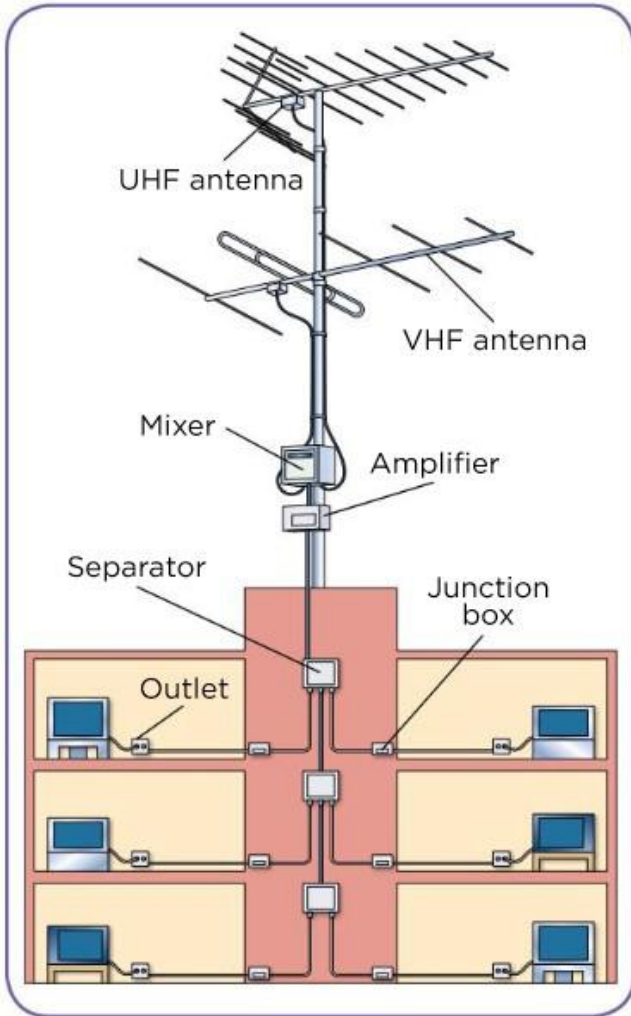
# Telephone and data

- PLC: Local Connection through electric network





# Television



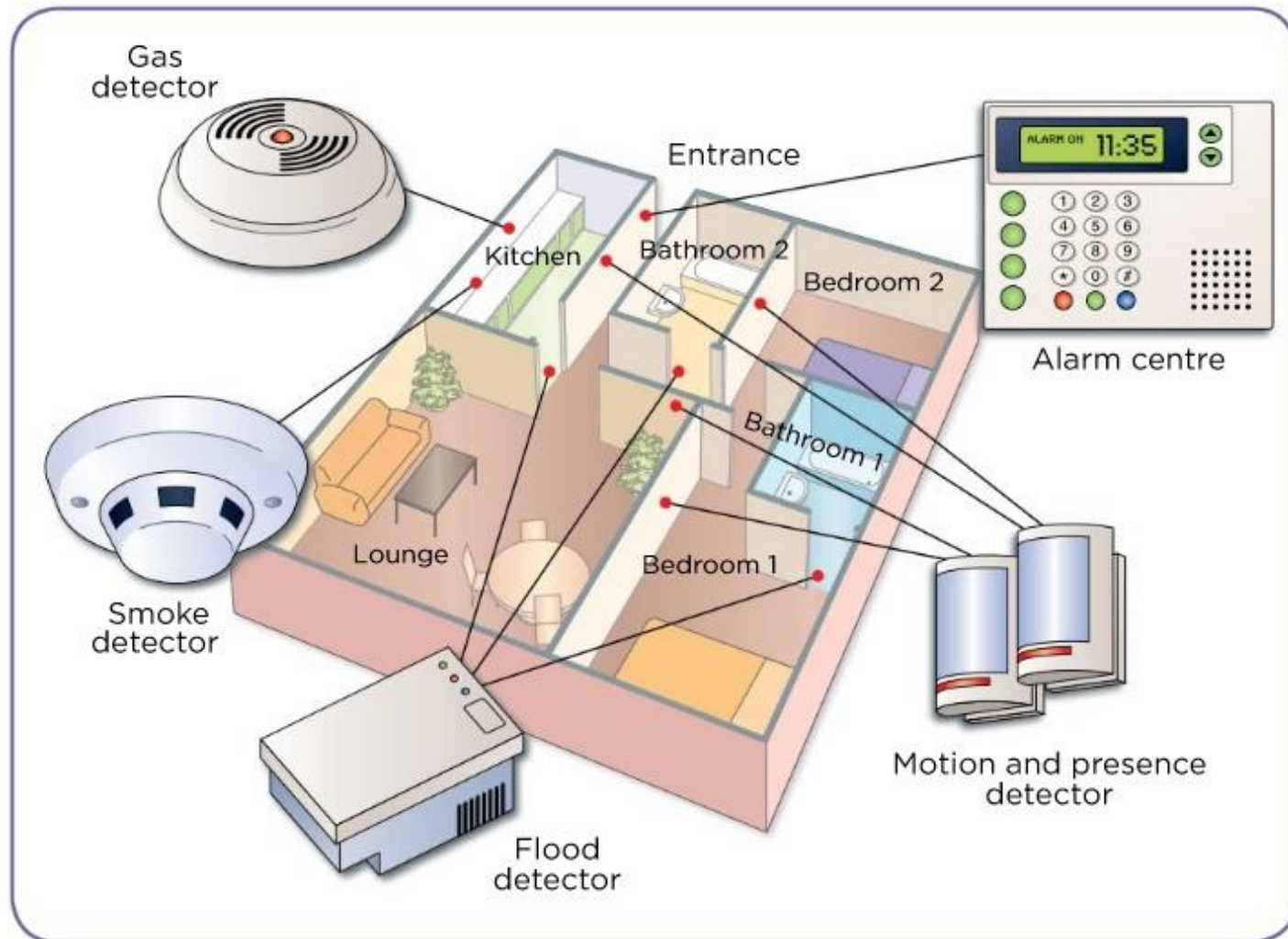
## Main elements:

- Capture elements
- Antenna Cable
- Amplifier and signal filters
- Individual dwelling installation.
- Decoders.

# Type of signals received

- Digital Video Broadcasting – Terrestrial (DVB-T)
  - Digital Terrestrial Television (DTT)
- Digital Video Broadcasting – Satellite (DVB-S)
  - Satellite.
- Digital Video Broadcasting – Cable (DVB-C)
  - Cable.
- IP Television.
  - Through ADSL
  - Through aerial signal (UMTS or 4G)

# Home automation systems



# Home automation systems

## Functions of an automation system

- Security functions
- Power management functions.
- Comfort functions.
- Communication functions



# BIOCLIMATIC ARCHITECTURE

## What is bioclimatic architecture?

It consists of the design of buildings taking into consideration the local climatic conditions in order to take advantage of the available resources.

What in a cold region could be a great design, in a warm region probably becomes the building non-habitable

# BIOCLIMATIC ARCHITECTURE

Pre-industrialization

- Few Resources Available
- People used natural resources.

Industrial Revolution

- Great amounts of fuel available
- Cheaper and lower-quality building materials

Nowadays

- Non-sustainable use of energy.
- More and more expensive fuel.
- Return to the use of natural resources.



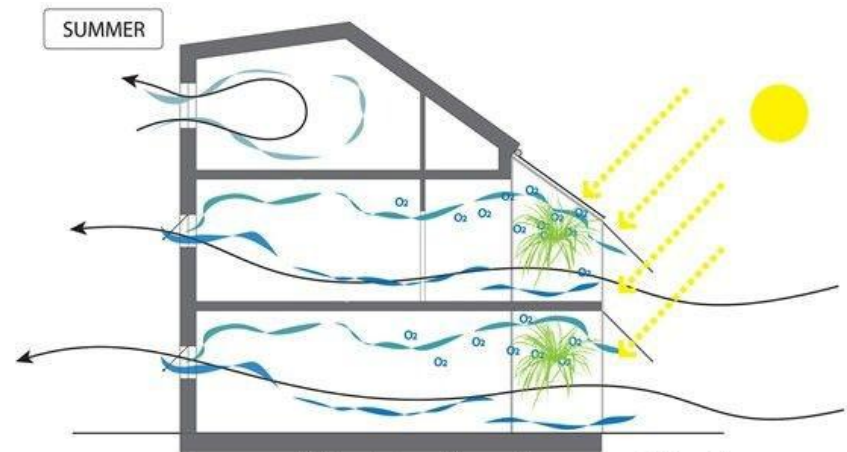
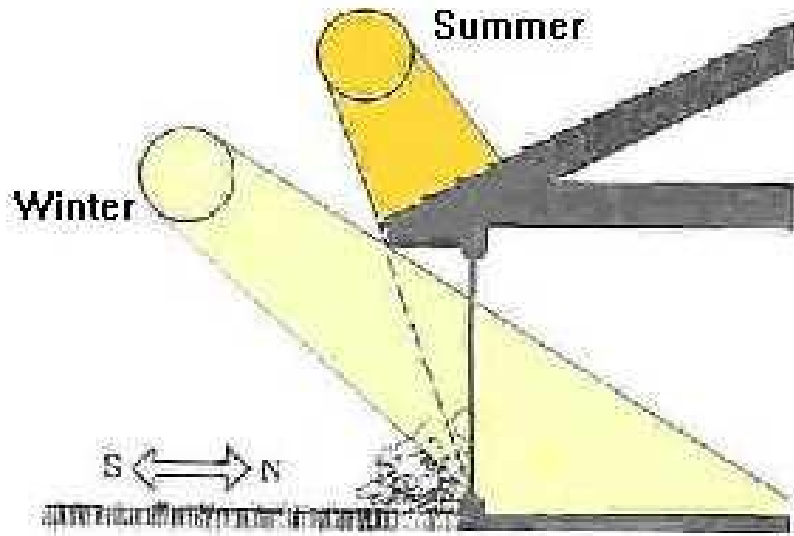
# BIOCLIMATIC ARCHITECTURE



A traditional Cyprus mountainous village.

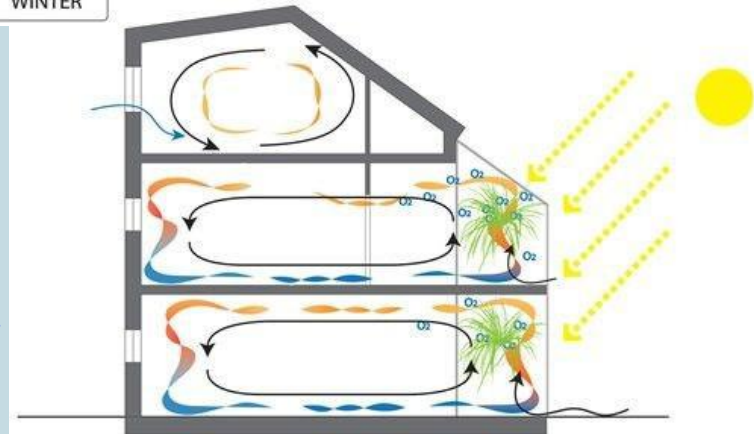


# BIOCLIMATIC ARCHITECTURE

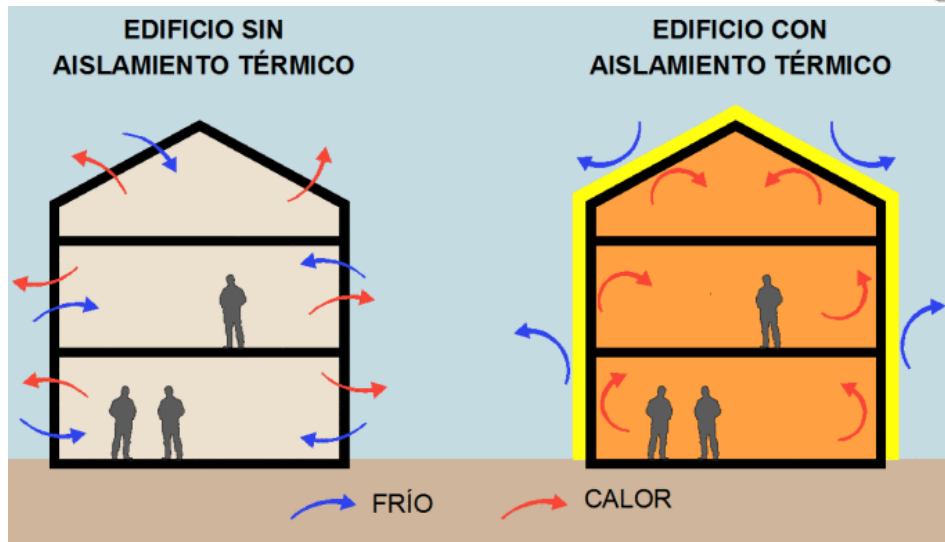


Summer ventilation strategy is focused on cross ventilation. Pressure differences encourage cross ventilation which also cools the building down.

WINTER

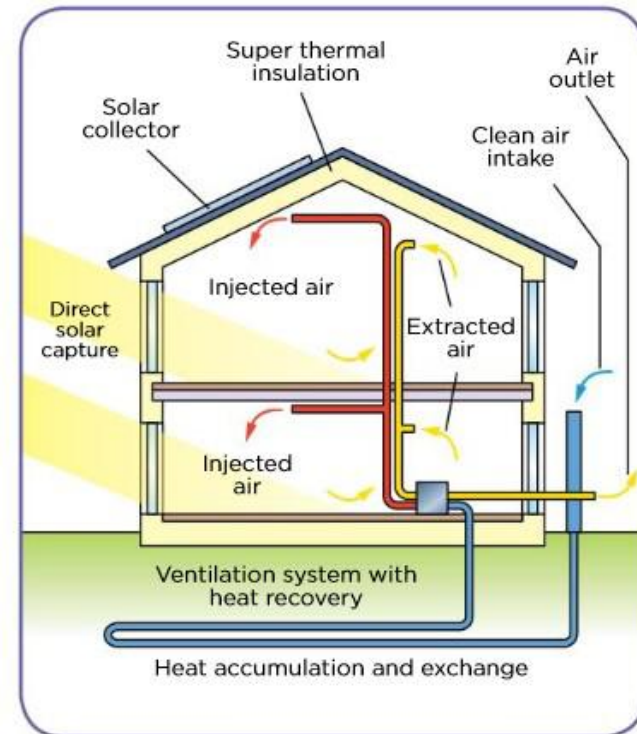
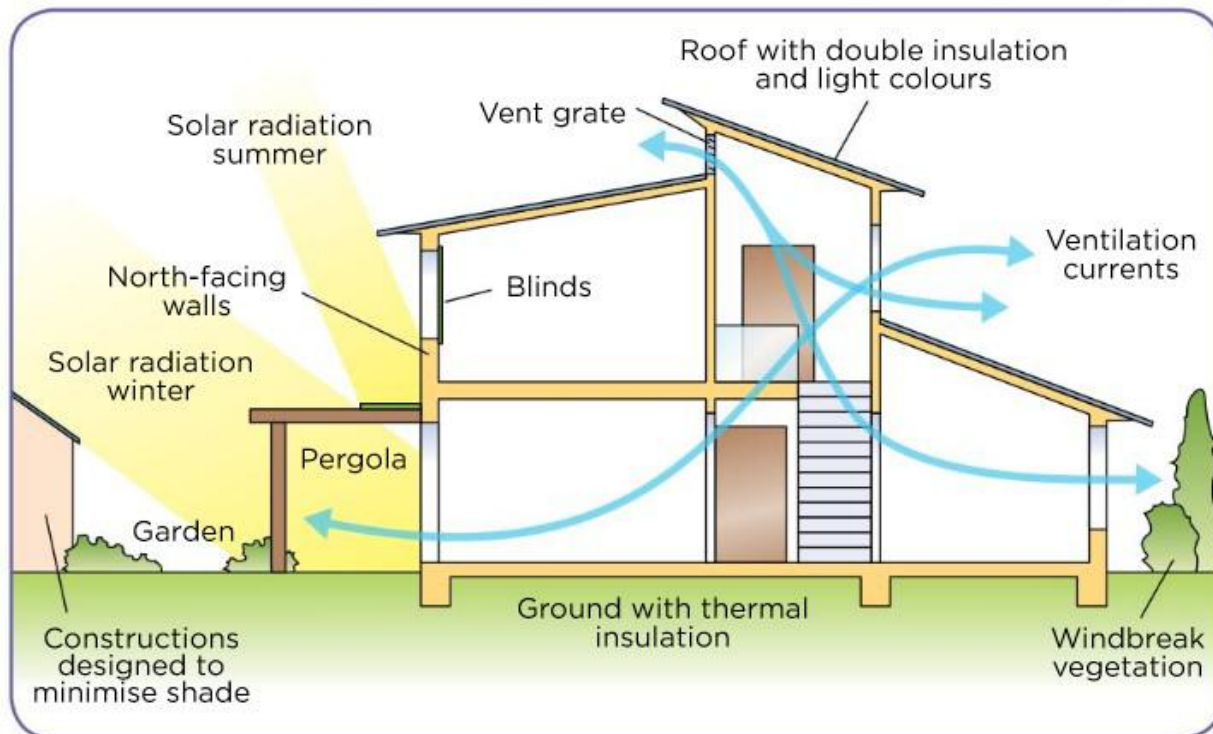


Winter ventilation strategy is focused on heat recycling with limited (to around 20% of overall air cycle) incoming fresh air. In addition, indoor air is being purified and humidified by plants in a conservatory.

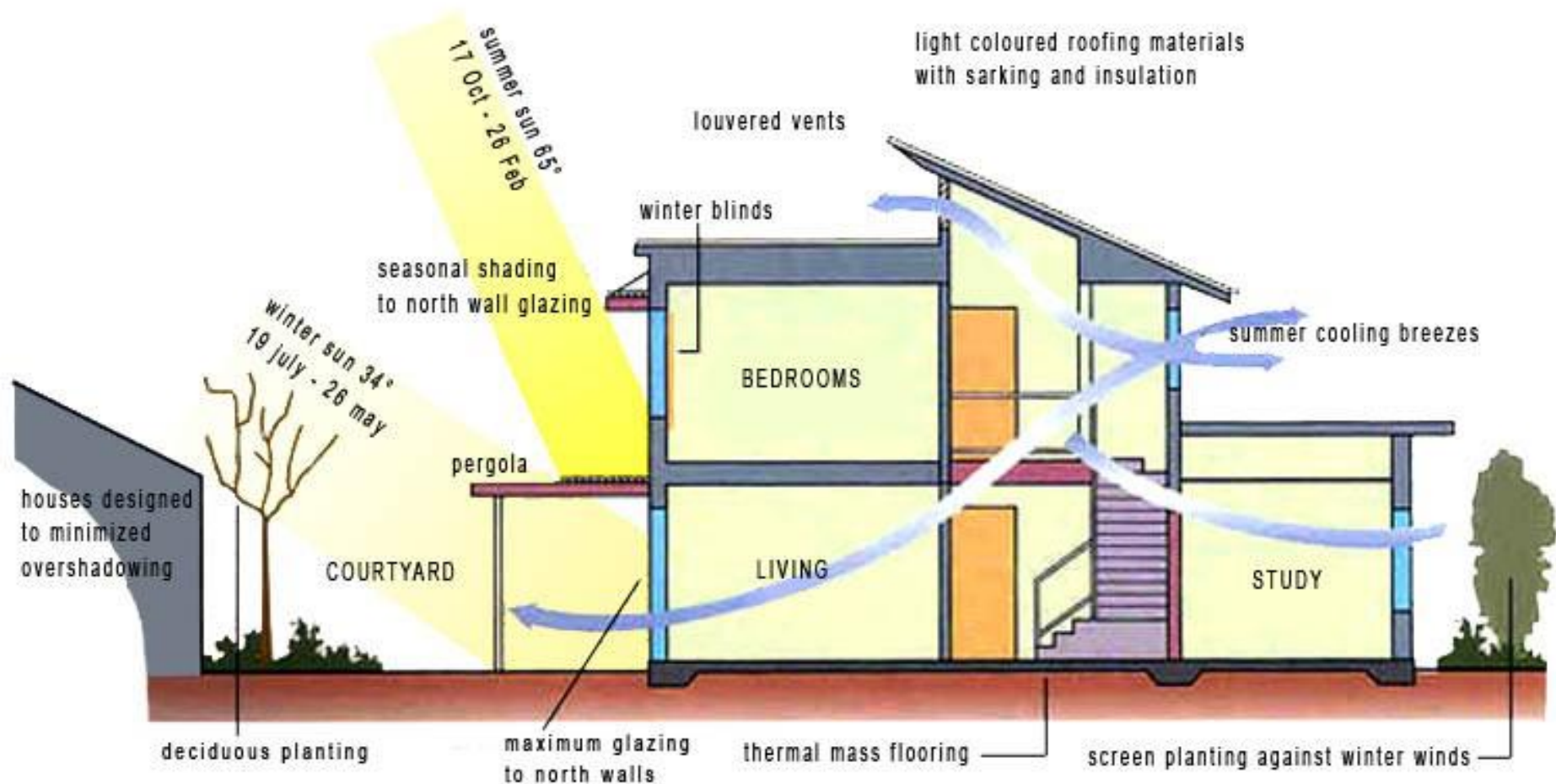


# BIOCLIMATIC ARCHITECTURE. Strategies

- Passive Solar systems
- Insulation
- Adequate positioning
- Awnings, blinds, pergolas
- Use of renewable energy
- Use of the land
- Local natural materials
- Vegetation in gardens
- Cross ventilation
- Clear colours

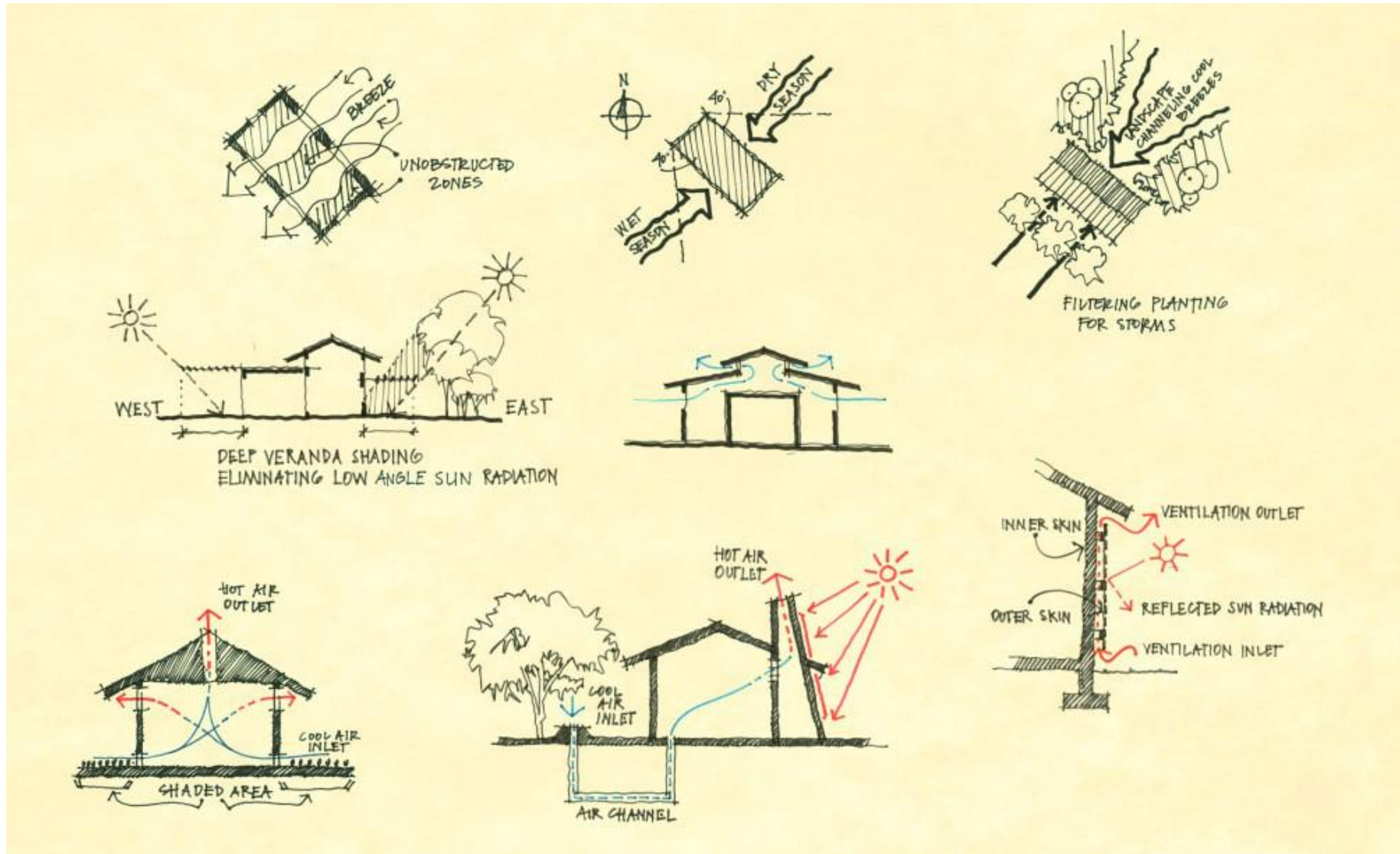


# BIOCLIMATIC ARCHITECTURE. Strategies

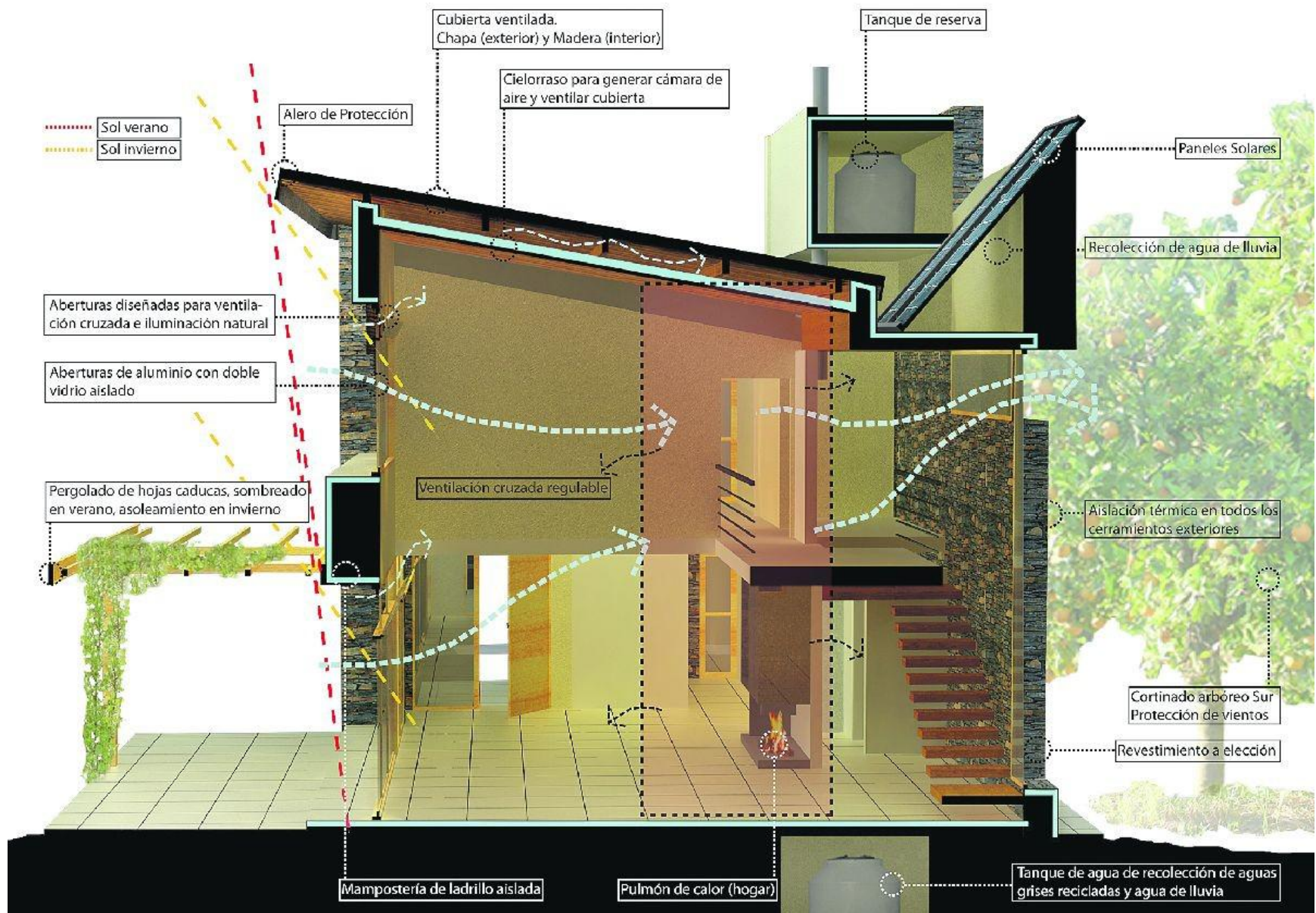




# BIOCLIMATIC ARCHITECTURE. Strategies



# BIOCLIMATIC ARCHITECTURE. Strategies





# BIOCLIMATIC ARCHITECTURE. Exercise

Translate and explain

