“Building a passive house with an attached waste water purification treatment plant”

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   被动式房屋

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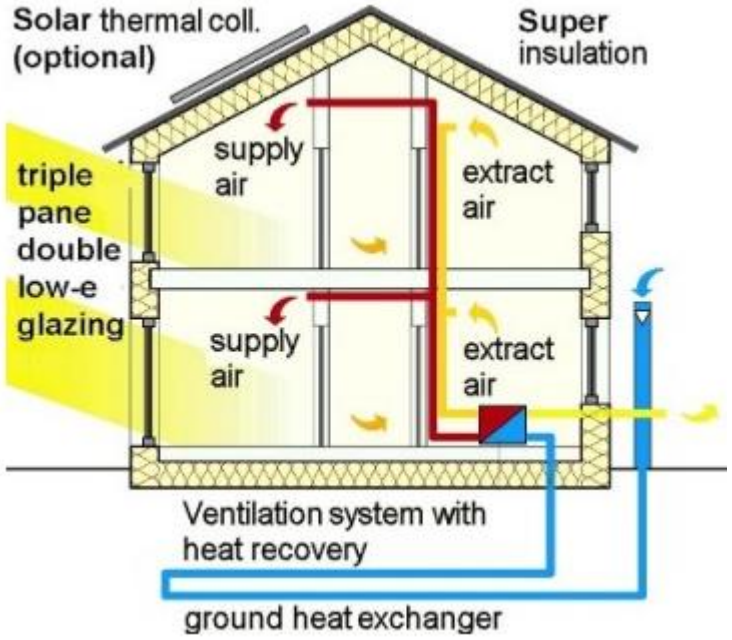

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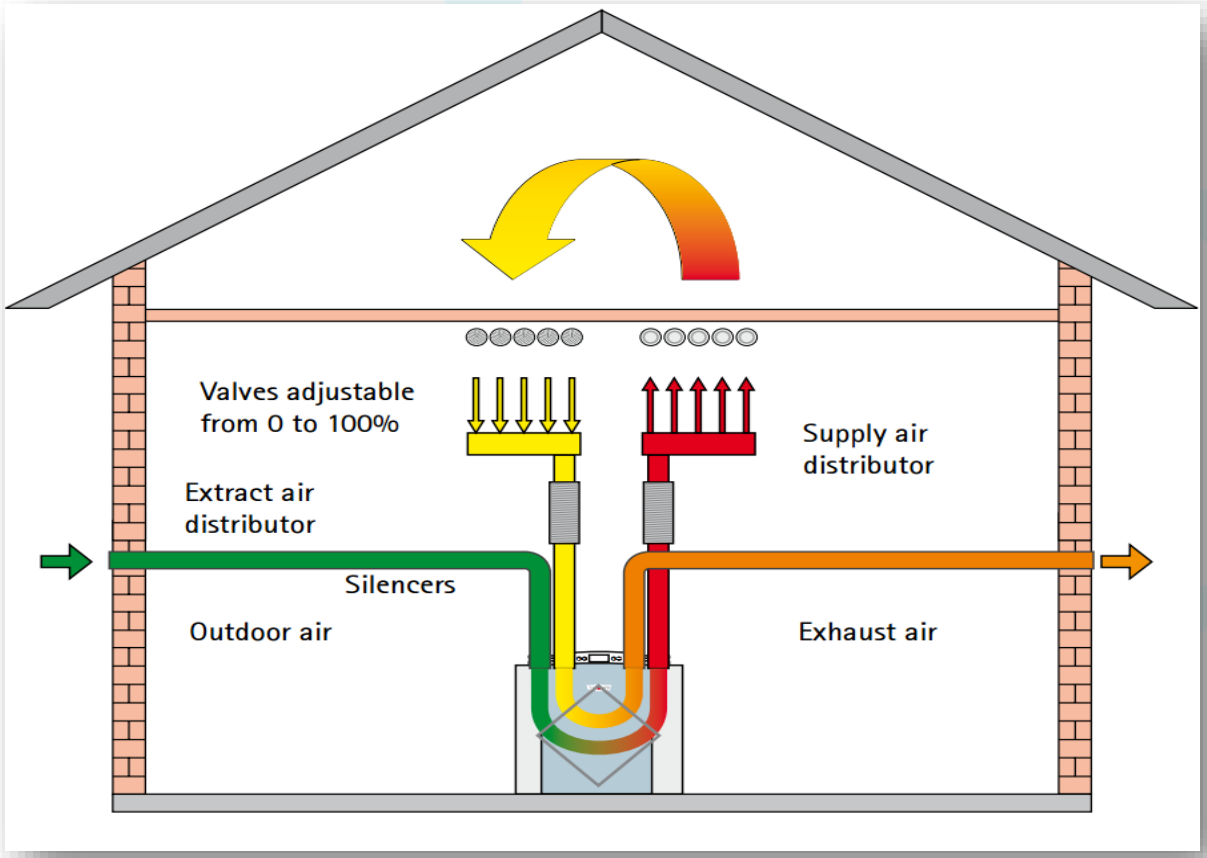
First part

The passive house

被动式房屋



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The Passive House

Passive House describes a performance standard and not a specific construction method.

Passive House buildings combine **unparalleled comfort** with **very low energy consumption**.

Quality design and craftsmanship paired with superior windows, high levels of insulation and heat recovery ventilation are **the key elements** that set Passive House construction apart.

In terms of appearance, however, these extremely efficient buildings blend in perfectly with their conventional neighbors.

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What is passive about a Passive House?

A Passive House requires very little energy to maintain a constant, pleasant temperature. In this sense, such buildings are almost “passive” as they need hardly any active heating or cooling to stay comfortable year-round.

The concept is not as much about letting things happen without using any energy, though, as it is about intelligent design: reaching the desired goal with minimal use of complex systems and non-renewable resources.

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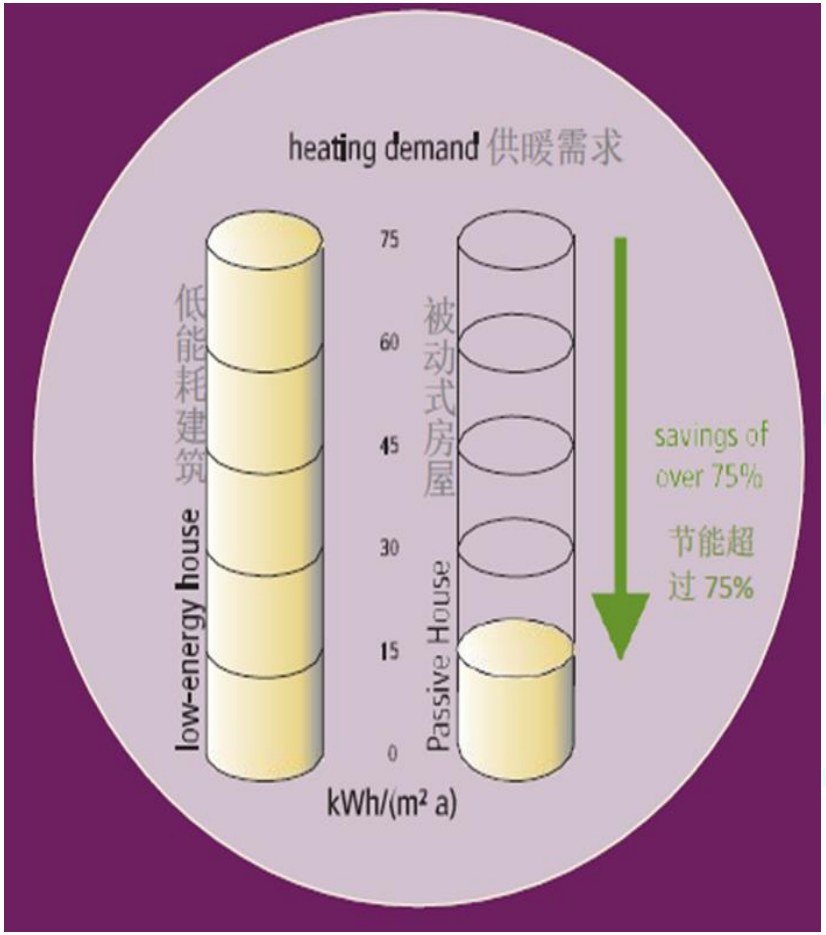
The 5 main principles of a Passive House



1. Exceptionally high levels of insulation

2. Well-insulated window frames and glazing

3. Thermal bridge free design and construction

4. An airtight building envelope

5.Ventilation with highly efficient heat or energy recovery

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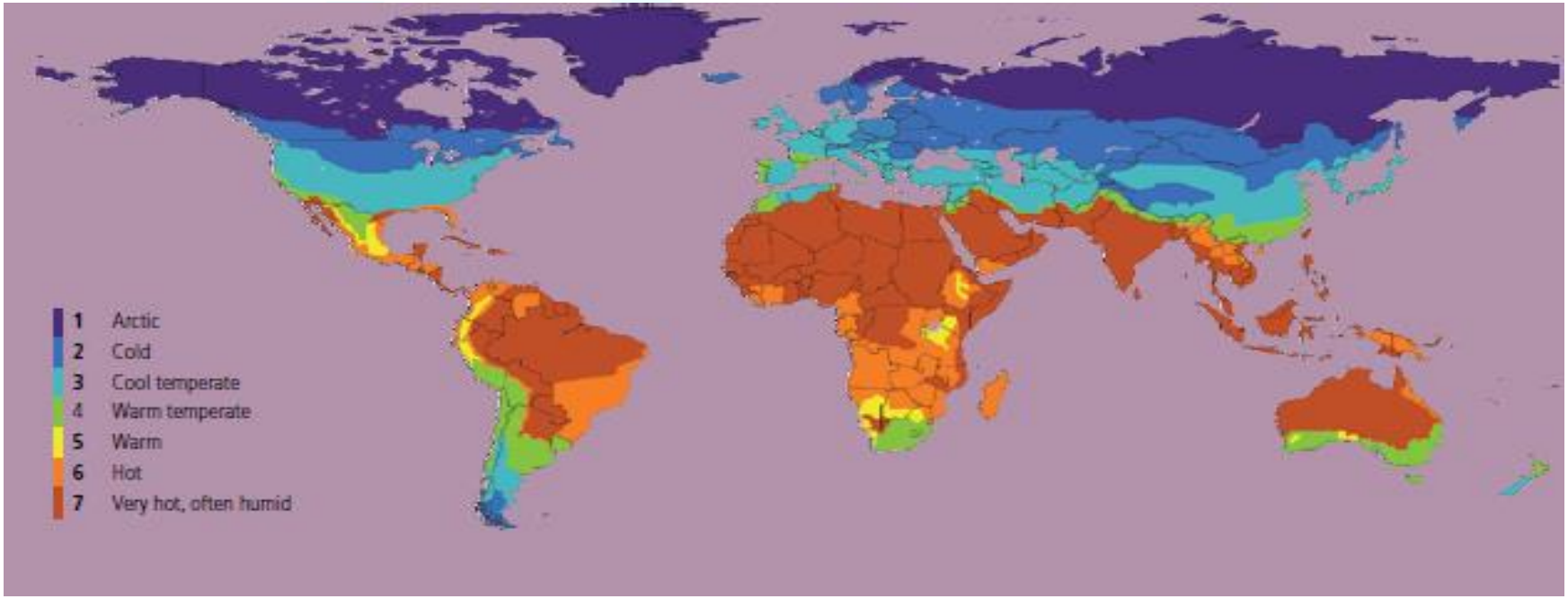
How comfortable are Passive Houses in warm conditions?

Passive House also functions well in hot and humid climates.

e.g Quanzhou

Ventilation with energy recovery effectively reduces heat and humidity inside the building. In areas where active cooling is a necessity, the application of Passive House principles can dramatically reduce cooling needs. Different measures for different climates.



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An international standard

Space Heating Demand	not to exceed **15 kWh** annually OR **10W** (peak demand) per square metre of usable living space.
Space Cooling Demand	roughly matches the heat demand with an additional, climate-dependent allowance for dehumidification.
Primary Energy Demand	not to exceed **120 kWh** annually for all domestic applications (heating, cooling, hot water, and domestic electricity) per square metre of usable living space.
Airtightness	maximum of **0.6 air changes** per hour at 50 Pascals pressure (as verified with an onsite pressure test in both pressurised and depressurised states).
Thermal comfort	must be met for all living areas year-round with not more than **10%** of the hours **in any given year over 25°C.**

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Detailed information about Passive House

- ✓ Thermal bridge free and airtight
- ✓ Passive House windows
- ✓ Superior ventilation
- ✓ Passive House and renewables – a perfect combination!

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Thermal bridge free and airtight

Stopping energy leaks

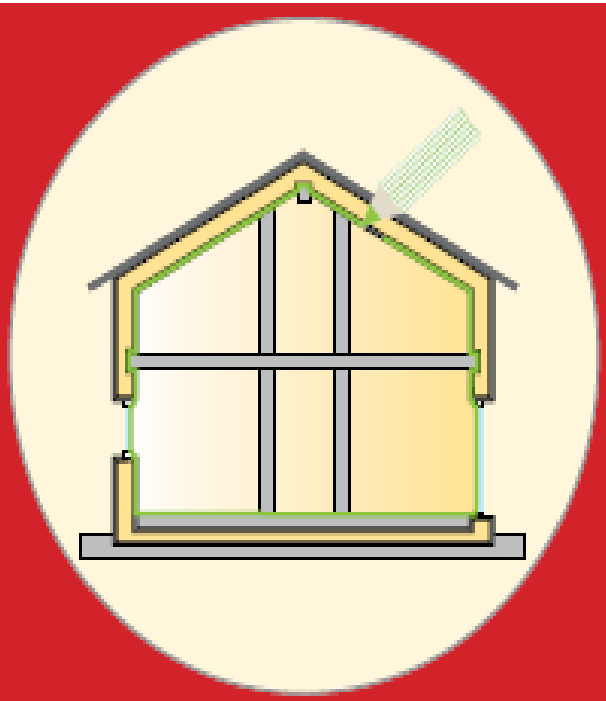
Passive House emphasizes thermal bridge free construction whenever possible. The aim is to reduce thermal bridge effects to the point that they are so insignificant, they no longer need to be taken into account in calculations.

Stopping air leaks

Airtight buildings can be achieved through careful planning and intelligent solutions such as full interior plastering, the use of sheeting, reinforced building paper, or wood composite boards.

The airtight layer in a Passive House (green line) seamlessly encloses a building's thermal envelope. It should be possible to draw a continuous line of airtightness without ever lifting your pencil. For each detail, the materials to be used and the connections to be made should be defined during the planning phase.

A similar pencil rule also applies to the thermal bridge free insulation layer (yellow). Unavoidable penetrations should involve components and materials with minimal thermal conductivity.

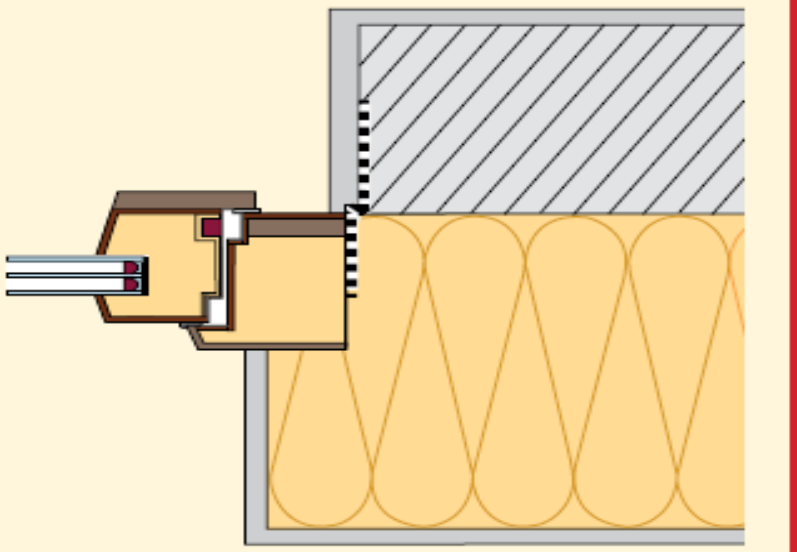


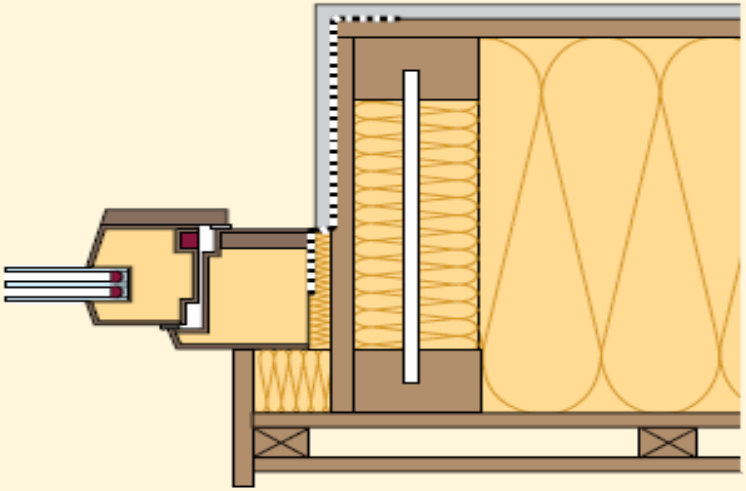
Passive House windows

Installing windows in the insulation layer minimises thermal bridges;

extending insulation over part of the frame reduces heat losses.

Installation cross sections in solid and timber frame walls.





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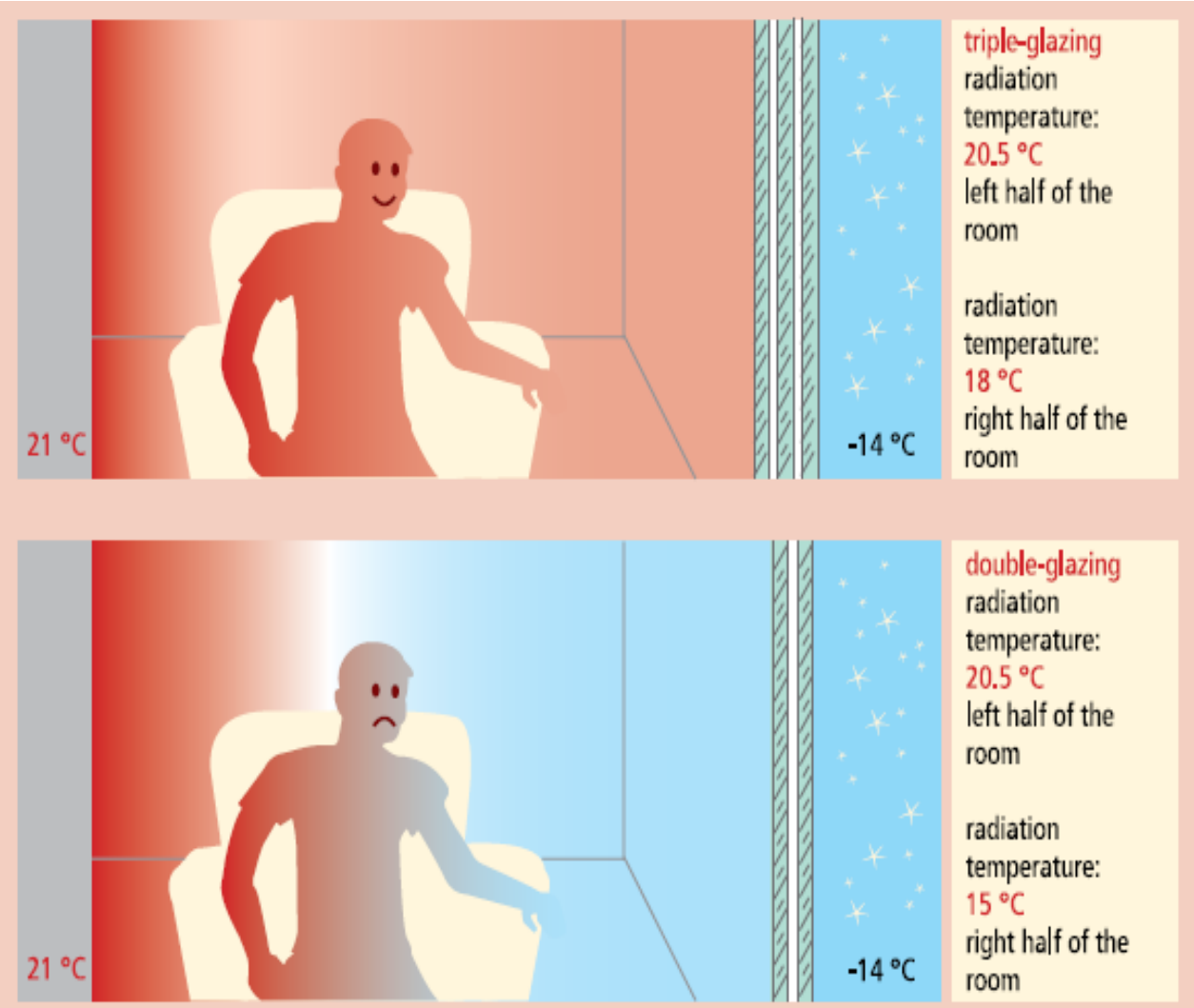
Passive House windows



Well-insulated Passive House windows improve comfort dramatically by keeping average inside surface temperatures above 17°C, even in the coldest of outdoor conditions. This, of course, also prevents condensation and mould growth.

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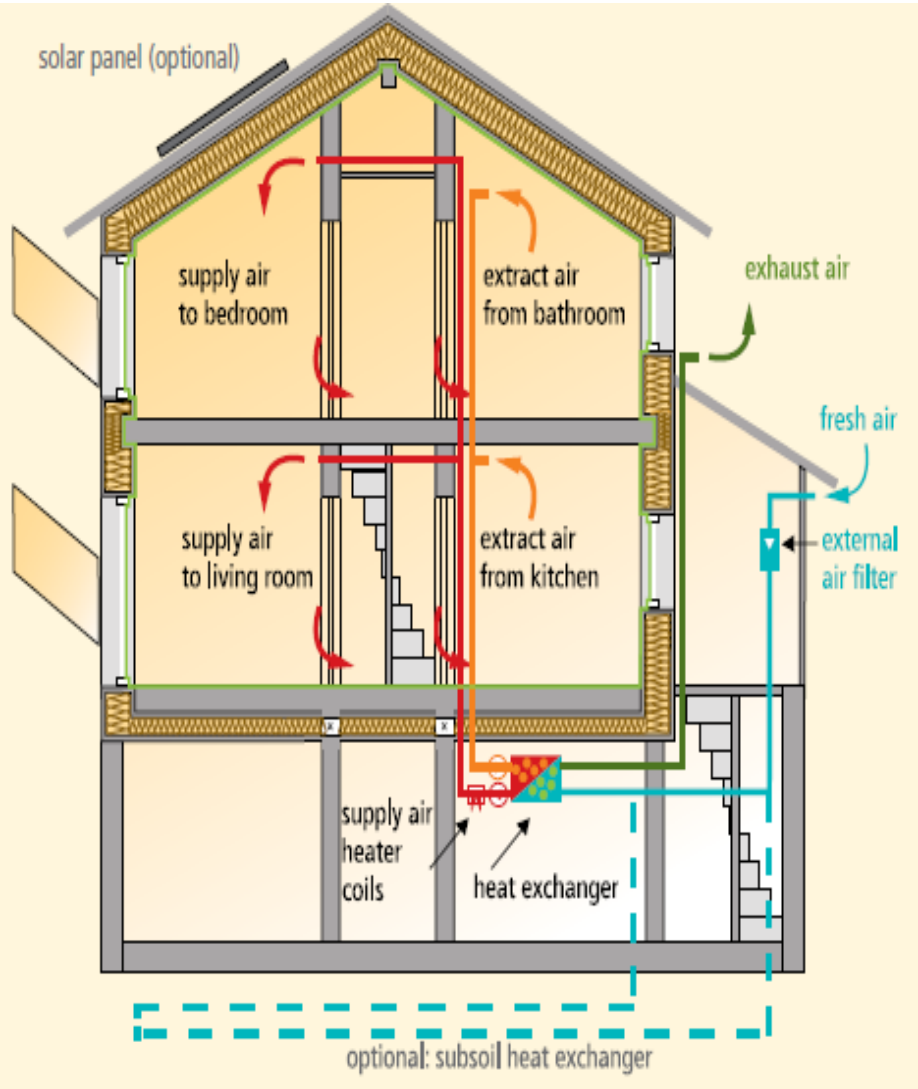
Superior ventilation



- **Ventilation with heat recovery**
- **Intelligent layout**
- **Clean air and a pleasant indoor climate**

The basic principle of Passive House ventilation:

moist, stale air is extracted from the kitchen and the bathrooms (extract air) while fresh air (supply air) flows into the living areas. As a result, the hallways are automatically ventilated.

As a general rule, the ventilation system should be designed to provide 30 m^3 of fresh air per person per hour. For a living space of 30 m^2 per person, this equates to a supply air volume of 1 $m^3/(m^2h)$.

The maximum temperature to which this supply air can be heated is limited to 50°C so as to avoid odor problems resulting from burnt dust particles.

The resulting maximum heating load amounts to 10 W/m^2, which can easily be met via the supply air.

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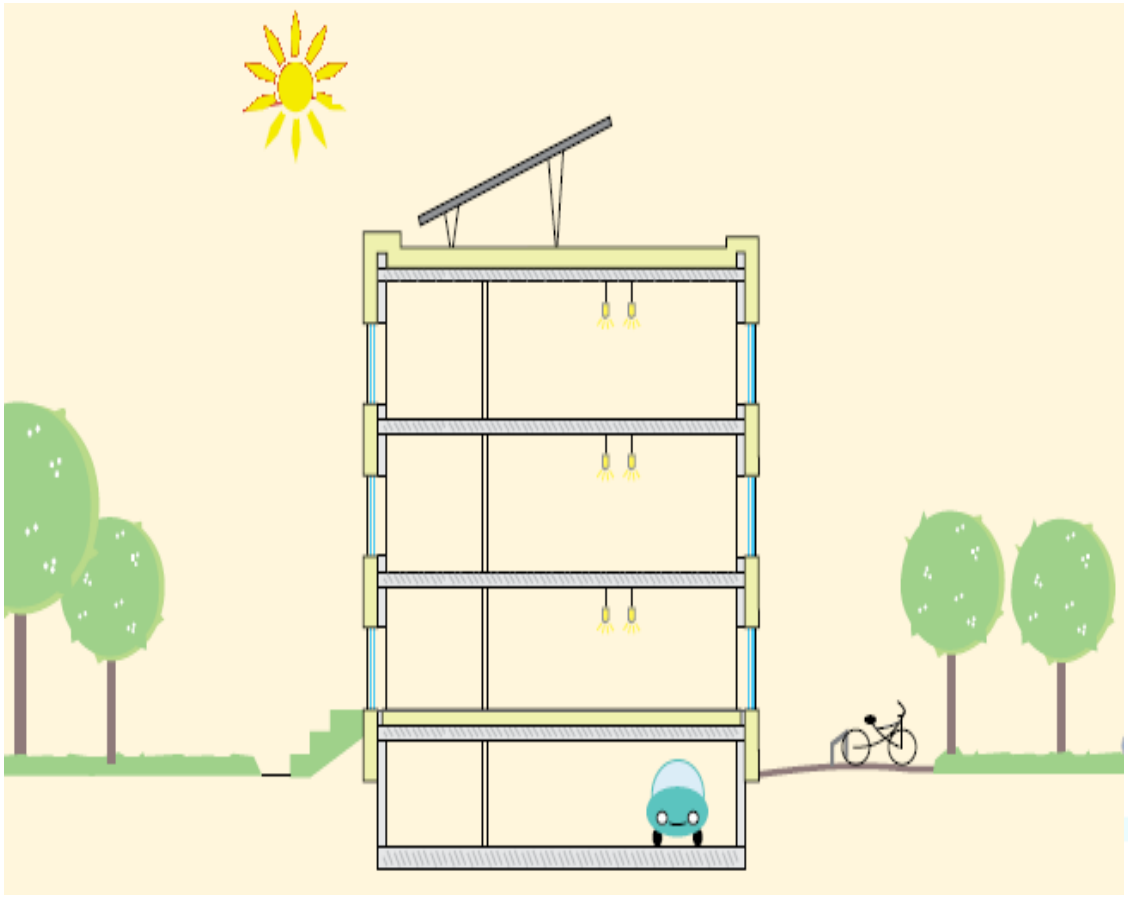
Passive House and renewables – a perfect combination!



highly efficient buildings require smaller photovoltaic systems resulting in sustainable housing and reduced land use

The smartest way to build or refurbish a building is to aim for Passive House efficiency first.

This can then be complemented by photovoltaic systems on roof and potentially other surfaces that face the equator and are exposed to direct sunlight.

This approach offers an ideal combination of Passive House principles and renewable energies.

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Passive House – not just for houses

Certified skyscraper
Vienna I Austria

Whether school, hospital, office building, supermarket, industrial facility, or commercial complex – almost any building type can be built to the Passive House Standard.

When designing non-residential Passive Houses, it is important to keep the building type and its use profile in mind.

A kindergarten must be planned very differently from a manufacturing plant and the planning of a government ministry will require different considerations than for an indoor swimming pool, a bank, or a fire department.

This said, the key principles remain the same: optimal insulation of the building envelope ensures minimal influences of outdoor temperatures on indoor climates while efficient ventilation systems provide high quality air with minimal energy losses.

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Do Passive House buildings cost more?

While thicker insulation layers may cost a bit more due to the additional materials required, the related installation costs do not increase significantly.

The costs of higher quality components can be at least partially offset by the reduced dimensions of Passive House heating and cooling systems.

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A prudent investment

a) Saving costs through energy efficiency

In the long run, a building's energy efficiency is the factor that goes the farthest in lightening financial burdens. Building to the Passive House Standard today is a sensible and rewarding long term investment.

b) Risk insurance

Investing in real estate is about security and the elimination of risks. Compared with their conventional counterparts, Passive Houses are secure investments with a much lower overall risk and a higher total investment value. For one, building to the Passive House Standard is a sure way to avoid structural damage due to moisture and mould, a substantial risk that owners of conventional buildings are forced to take. Passive House also reduces risk in the face of potential energy price hikes.

A prudent investment

c) Win-win-win

Passive House buildings are high quality products:

1. increased comfort levels, reduced risk of structural damage, and
2. very low energy costs all increase the value of the property.
3. the additional independence from insecure, external energy supplies brings security to the investment.

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Retrofit for the future

Why refurbish?

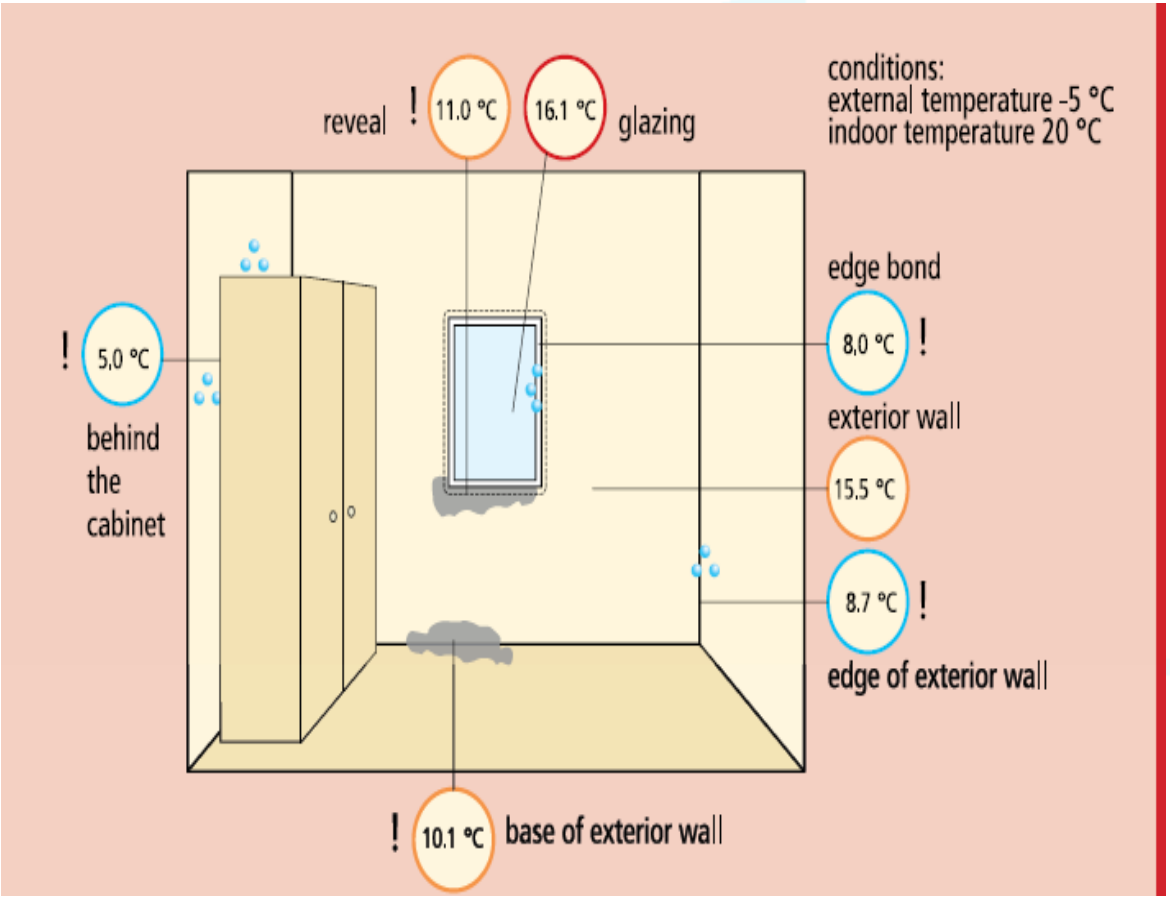
In many developed countries, a larger number of buildings are being refurbished than being newly built each year. Most people in such areas will therefore continue to live and work in already existing buildings over the next few decades.

As older buildings use even more energy than conventional new builds, they offer an even greater potential for energy savings. What works for new buildings can be applied to existing ones as well, and this is good news, as deep energy refurbishments are both profitable and further reduce our dependence on energy imports.

Additionally, retrofitting an existing building with Passive House components, based on Passive House principles, brings almost all the advantages of a Passive House new build.

Insulation matters

Old situation: Cold surface temperatures can lead to humidity-related damage



Before a deep retrofit:

Cold surface temperatures can lead to moisture-related damage.

The walls of older buildings are usually poorly insulated. The temperatures of the interior surfaces drop in cold conditions and humidity levels rise, often so much so that mould growth occurs.

Good exterior insulation can prevent this from happening.

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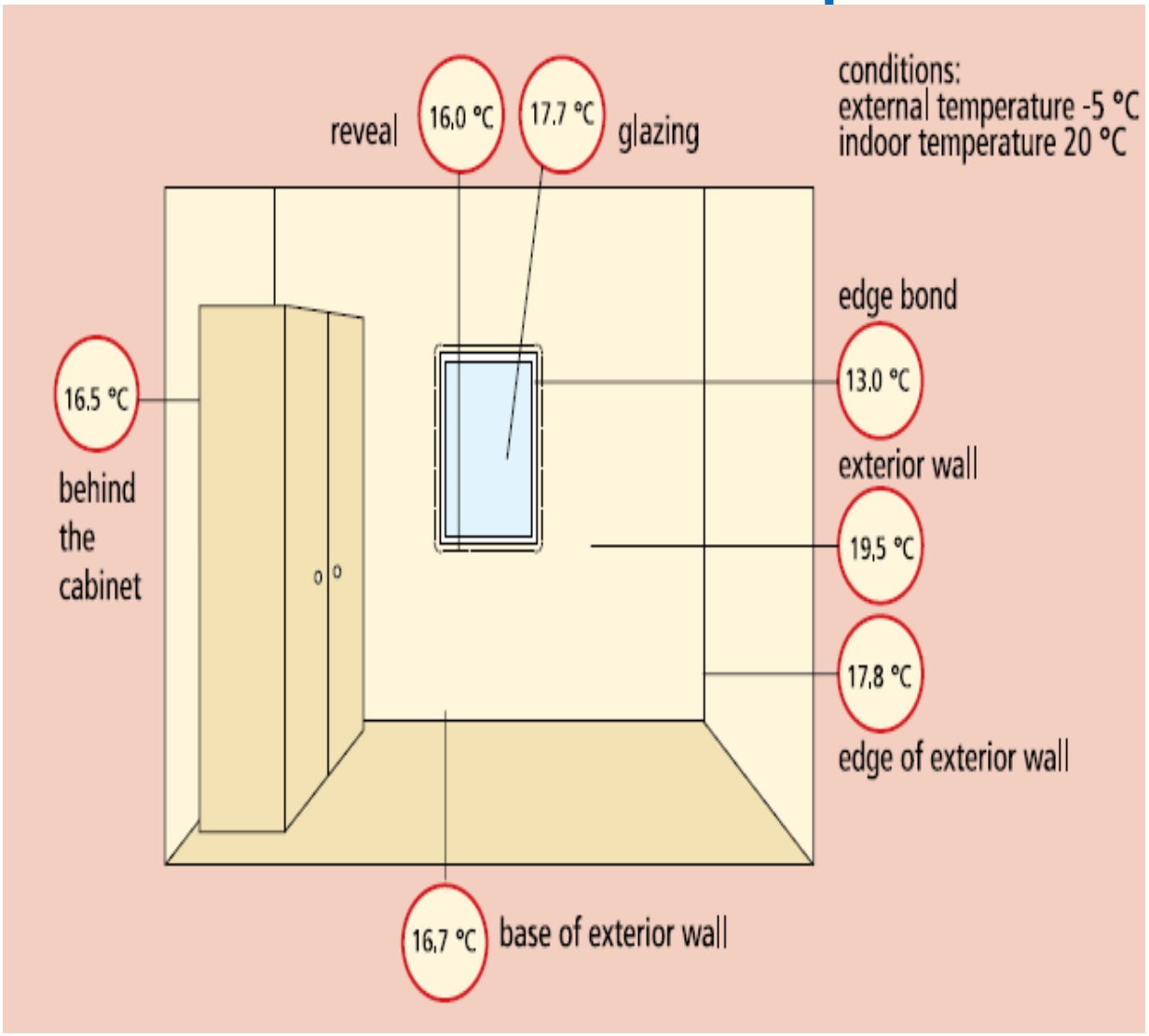
New situation: Refurbished with Passive House components



After a deep retrofit: Refurbishment with Passive House components prevents humidity-related damage.

The same living room after renovation with 200 mm of external insulation and Passive House windows.

On a cold winter day, almost all surface temperatures remain above 16°C. This is even true at the skirting board and in the corner behind the cabinet.

The moisture level remains low so that there is no risk of mould growth.

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Passive House advantages

1. High levels of comfort

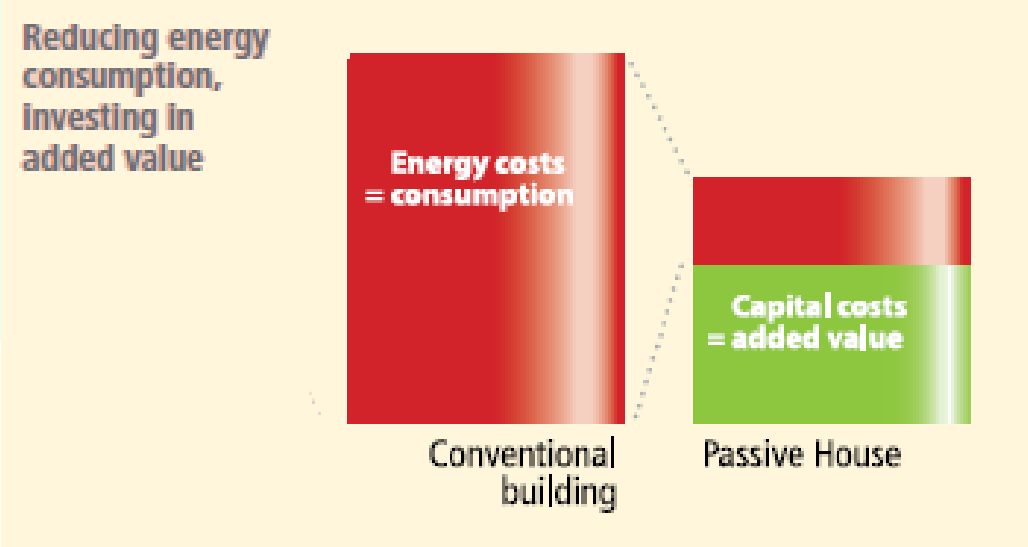
2. Consistent fresh air all throughout the building

3. Structural longevity: mould free buildings with a highly reduced risk of moisture damage

4. Extremely low heating and cooling costs, despite rising energy prices

5. A radically improved indoor environment

6. Savings on your investment



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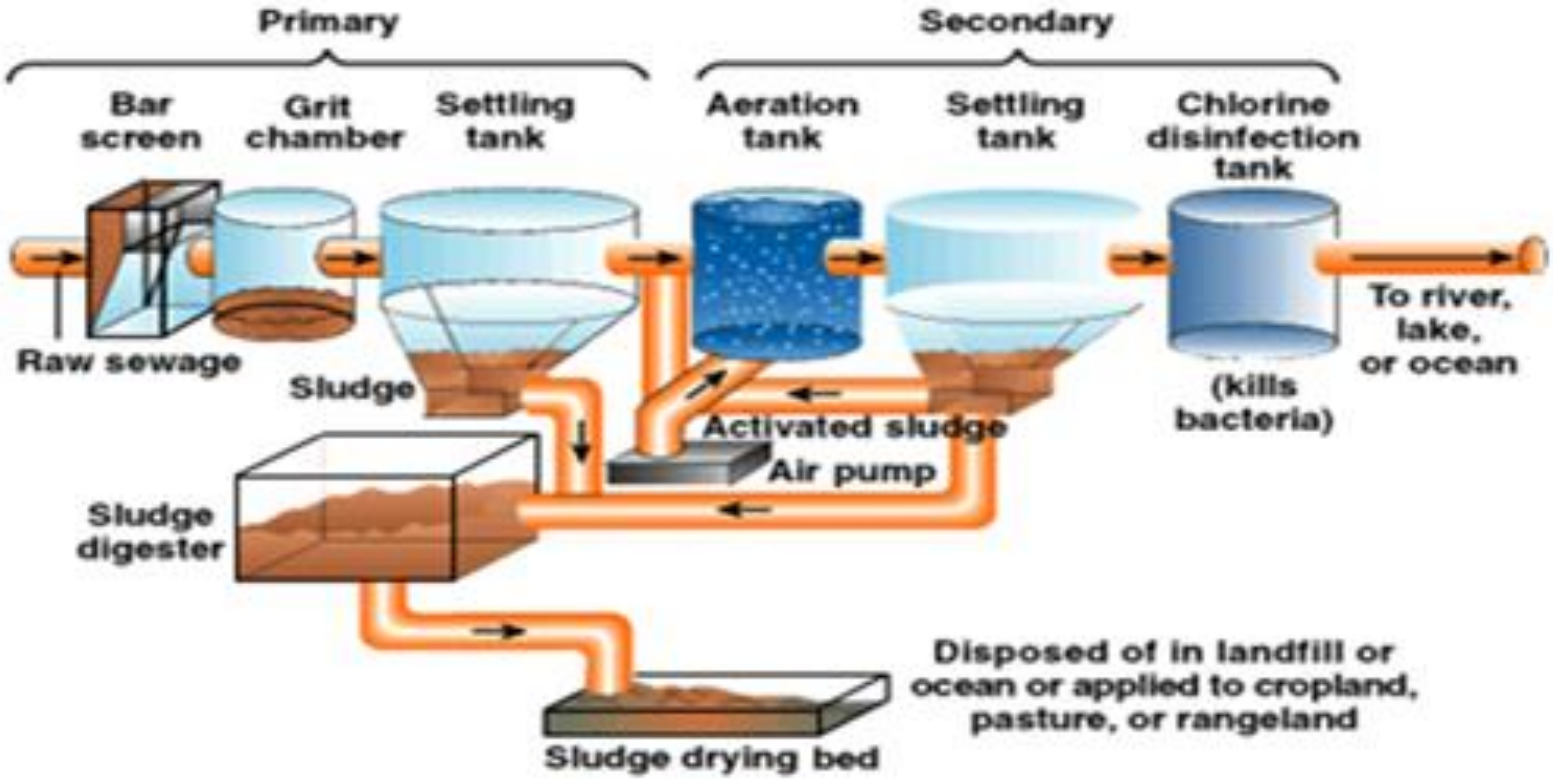
Second part

Biological Waste Water Purification Treatment

生物废水净化处理系统



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Sewage or Wastewater Treatment

Sewage or wastewater is composed of sewage or wastewater from:

- ✓ Domestic used water and toilet wastes
- ✓ Rainwater
- ✓ Industrial effluent (Toxic industrial water is pretreated)
- ✓ Livestock wastes

** microbes degrade organic compounds

** elimination of pathogens occurs

Wastewater Treatment

Types of treatment systems include: Septic Tanks or Wastewater Treatment Plants (WWTPs).

- ✓ Septic Tanks typically treat small volumes of waste (e.g., from a single household, small commercial/industral)
- ✓ WWTPs typically treat larger volumes of municipal or industrial waste.

Biological Waste Water Treatment

Biological wastewater treatment is the use of bacteria to degrade and decompose organic materials during treatment.

Due to their growth, adaptability, and resilience, wastewater treatment systems rely on microorganisms to degrade organic material and produce clear effluent water.

Waste Water Treatment Process

Wastewater or sewage treatment is a multistep process:

1. Primary Treatment (Physical Process)

- ✓ Removal of large objects using grates and screens
- ✓ Settling to remove suspended solids (primary sludge)
- * flocculating chemicals are added to enhance sedimentation

Waste Water Treatment Process

2. Secondary Treatment (Microbial Process)

- ✓ Supernatant or primary effluent contains high levels of dissolved organic load (Biological Oxygen Demand)
- ✓ Aeration to stimulate aerobic degradation
- * activated sludge reactor
- * trickling filter reactor

} bacteria degrade organic carbon to CO_2

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Waste Water Treatment Process

3. Tertiary Treatment (Physicochemical Process)

- ✓ Precipitation
- ✓ Filtration
- ✓ Chlorination

expensive process, sharply reduces inorganic nutrients (PO_4, NO_3)

- ✓ Treated water is discharged to waterways
- ✓ Used for irrigation
- ✓ Recycled into drinking water

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Pathogen Removal by Activated Sludge

- ✓ More than 90% of E.coli. and Salmonella are destroyed
- ✓ Bacteria are removed by inactivation, grazing by ciliated protozoa, and adsorption to sludge solids
- ✓ Viruses are removed mainly by adsorption process

Anaerobic Digestion of Sludge

- ✓ Sludges from the primary and secondary treatment settling tanks are pumped into an anaerobic digester
- ✓ Sludges contain cellulose, proteins, lipid and other insoluble polymers
- ✓ Anaerobic bacteria digest the sludge to methane and carbon dioxide

Advantages of Waste Water Treatment

1. Low manufacturing, installation and operating costs.
2. Efficient degradation of organic and inorganic compounds
3. Automatic adjustment to water level fluctuation
4. Small Installation space requirements
5. Minimum noise and smell & very low power demand
6. High reliability based on the experience of similar systems
7. Easily available standardized parts for almost the entire system
8. High degree of automation
9. This method is simple and flexible, and can be applied in all kinds of buildings (houses, departments, hospitals, schools, hotels, etc.)

Sino-Hellenic Investment & Trade Consultants

Company's Aim:

- ✓To sell excellent Greek products in China

  (such as olive oil, olives, honey, laundry detergent from olive oil, marble, cosmetics from olive oil, fish etc)

- ✓To create investing opportunities in Greece for Chinese investing companies and help in the realization of them

Manager of the Company

Mr. Yannis (雅宓思) is a mechanic engineer and a successful businessman in the field of pumps. He has 35 years of experience in acquiring public & private tender offers in Greece. He is the co-founder of Sino-Hellenic Consultants and is an active partner since 2012. He is currently an advisory consultant on business establishment and gives training seminars on management to employees of big companies. He has a network of lawyers, finance managers & banking associates who work in tandem with him for the acquisition of tenders. His knowledge, experience and connections can be a valuable asset to an Investment Company.

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Thank you for your attention !

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