Eco-City Project

SUSTAINABLE TOWN-PLANNING

TABLE OF CONTENTS

I. WHY sustainable development?

Sustainable Development

WHY?

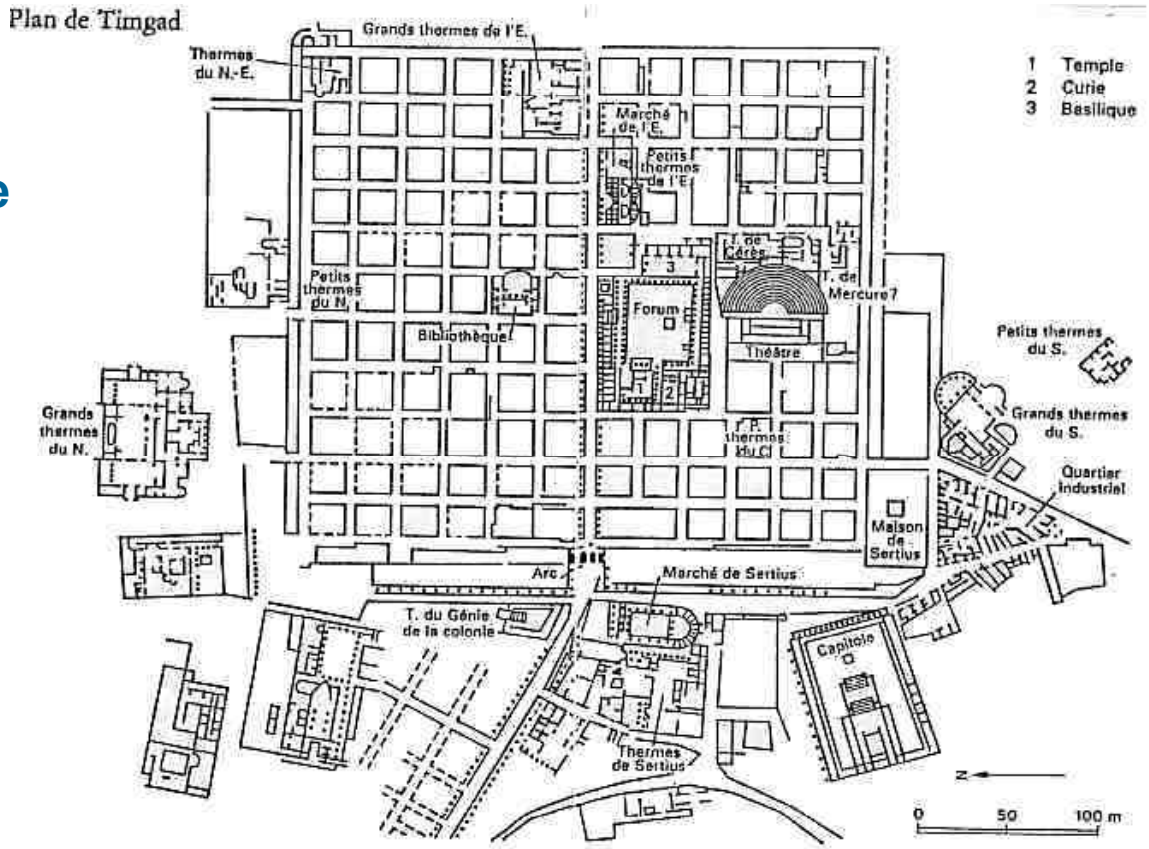
- **Important state of concern in our society.**
- **The History of Cities.**
- **There have been many advances in last years regulations.**
- **New Technical Code regulation (CTE).**
  - **Section 13: Basic healthiness requirementes “environmental hygiene, health and protection”**
  - **Section 15: Basic energy saving requirements.**

Sustainable Development

The History of Cities.

Vitruvius:
Relationship betwee natural and artificial environment.

Timgad
year 100 AD

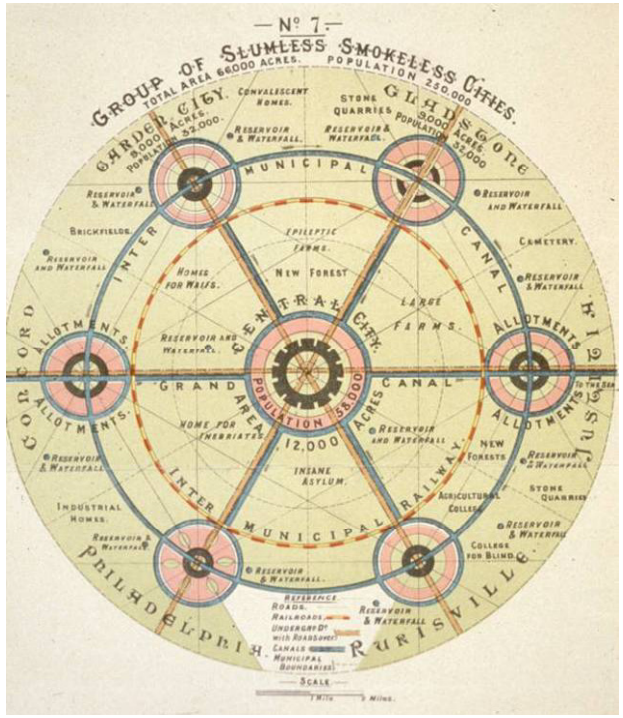


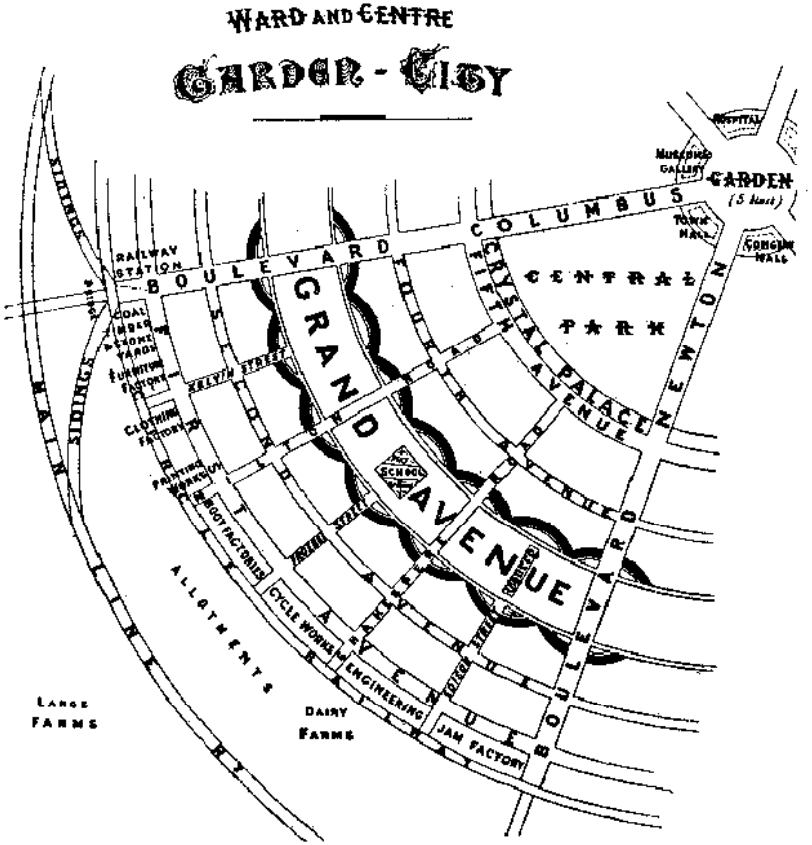
Sustainable Development

19th Century: Creation of big industrial cities.

Response:

Howard's Garden City





Sustainable Development

The History of Cities.

- Modern Movement. Social role of architecture and town-planning. no consideration for depletion of resources.

City of Le Corbusier

Sustainable Development

The History of Cities.

- In 1992, leaders from 172 countries met in **Rio de Janeiro** in the First Summit on Environment.
- The term **sustainability** was coined: Nature's health became essential for mankind well-being and survival,
- After that, there were other international meetings:
  - Aalborg Conference (1994)
  - Istanbul Declaration (1996)
  - Johannesburg Summit (2002).

Sustainable Development

I. WHY?

Environmental reasons:

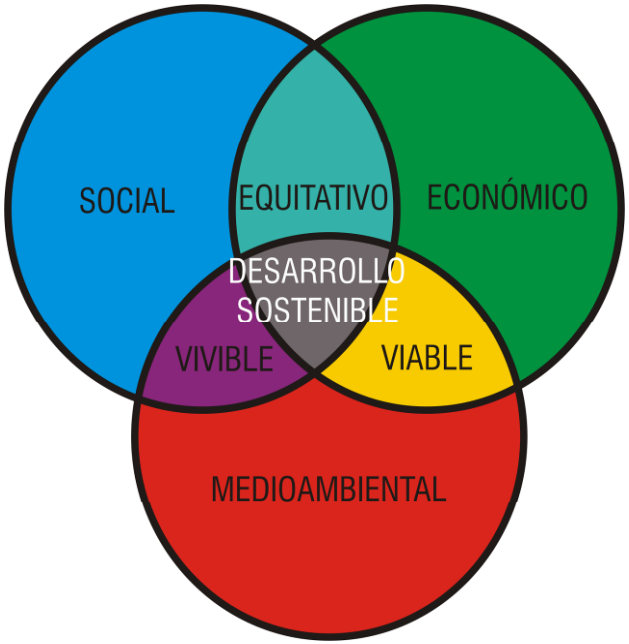
- ❑ Global heating
- ❑ Ecological footprint

Financial reasons:

- ❑ Town-planning related.
- ❑ Construction.
- ❑ Use of renewable energy.

Social reasons:

- ❑ Urban quality (complexity and diversity).



II. WHAT is sustainable?

WHAT is sustainable?

WHAT is sustainable?

Scattering
Specialization
Segregation

Compactness
Complexity
Social integration and cohesion

WHAT is sustainable?

It is achieved by combining some aspects:

- ❑ Optimization of resources management.
- ❑ Limitation of waste emissions.
- ❑ Rational use of energy.
- ❑ Energy saving.
- ❑ Use or renewable energy.
- ❑ Healthy construction.

WHAT is sustainable?

WHAT is sustainable?

These aspects will be studied next for different building stages:

1. Responsible Town-Planning.
   - ❑ Reduction of urban energy needs.
   - ❑ Increase of buildings' energy efficiency. (passive systems).
   - ❑ Integration of renewable energy.
   - ❑ Healthy construction.

2. Integration of renewable energy in urban spaces and architecture.

1. RESPONSIBLE TOWN-Planning

Responsible Town-Planning

- Urban planning determines **energy future**.
- **Energy saving** as one of its targets.
- Introduction of **considerations** contributing to build energy behaviour and environmental quality in urban spaces.

Responsible Town-Planning

Objectives

- Reduction of energy needs.
- Increase of buildings' energy efficiency.
- Integration of renewable energies.
- Healthy construction.

Responsible Town-Planning

Reduction of energy needs.

2.- Site analysis.

2.- Town layout.

3.- Streets.

4.- Green areas.

5.- Climatic control.

6.- Utilities networks.

7.- Morphology.

8.- Land plotting.

9.- Typology.

Responsible Town-Planning

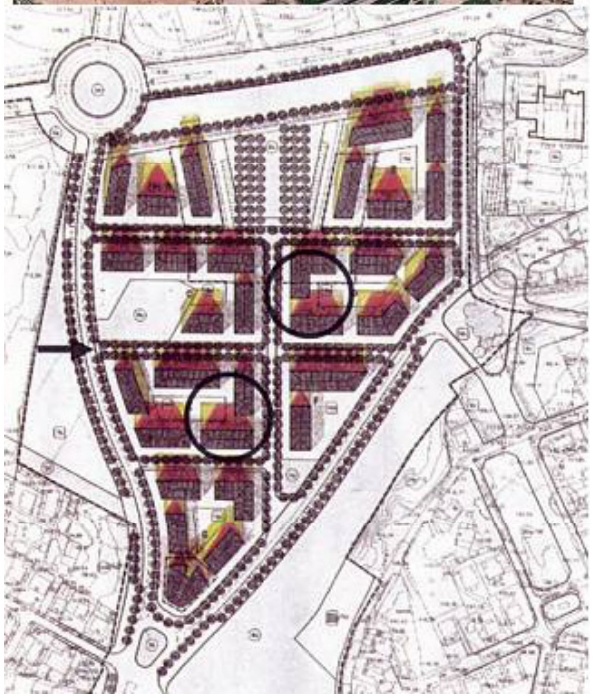
2.- Site analysis.

- Climatic conditions of the area (climate, topography…)
- Environmental Impact Assessment.
- Search for balance between density and occupancy.
- Preference for regeneration of town old quarters.

Responsible Town-Planning

2.- Town layout.

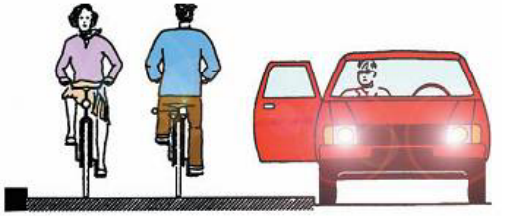
- Study of the **ratio between the building height and the width** of free space, such as streets, green or public areas according to solar incidence.
- Solar collection in cold periods and protection in warm ones.
- Winds: protection and use.



Responsible Town-Planning

3.- Streets.

- Planning of the road network so it can moderate transit and adapt to public transport, cyclers and pedestrians. (**mobility**), with enough quantity of attractive safe paths or separate from vehicular traffic.
- Taking into account of **solar obstructions** due to buildings when deciding streets widths and a particular building position with respect to road alignment.
- Beneficial street shading in summertime should be considered. **East-West orientation** is the position which generates the most shading in summer.
- Creation of attractive and safe pedestrian spaces and paths, to impulse walking.



Responsible Town-Planning

4.- Green areas.

- Interconnected free spaces network to walk round, adequate to the needs of humidity, evaporation and solar radiation absorption.
- The development technical report will justify the choice of **selected plant species** and their location in the street and in relation to buildings or common areas as environmental controllers.

Responsible Town-Planning

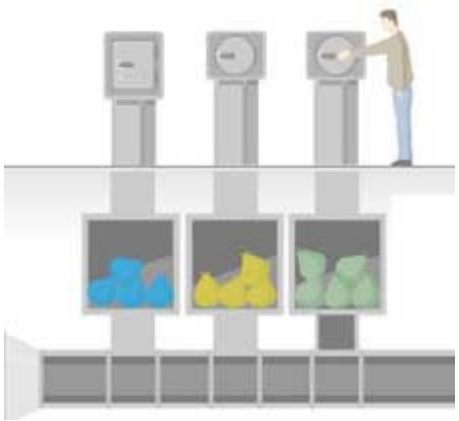
5.- Climatic control.

- Use of deciduous shade trees to protect ground and low floors of buildings in summer, allowing them to get sunshine in winter.
- Use of heat-absorbing pavements in hot or very exposed climates.
- Use of green or porous filter systems in the development, because of their features of solar radiation absorption, low temperature, permeability, in short, to improve ground thermal performance, etc.

Responsible Town-Planning

6.- Utilities networks.

- Network to separate sewage and rain water collectors.
- Waste: implementation of a waste collection system which guarantees the impulse of its selective collection.
- Use of galleries and utility tunnels along longitudinal layouts of main routes and in junctions.



Responsible Town-Planning

7.- Morphology.

- **South orientation** in buildings is the one with the highest energy performance both in summer and winter.
- Avoidance of town planning imposing restrictions that can prevent bioclimatic solutions or detailed architectural studies.
- The Urban Planning Regulations draft must include the concept of façades orientation and diversity.

Responsible Town-Planning

Increase of buildings' energy efficiency.

1.- Location and orientation.

2.- Solar control.

3.- Building ways.

4.- Thermal effects of materials.

5.- Electricity saving.

6.- Water saving.

7.- Integration of renewable energies.

8.- Healthy construction.

Responsible Town-Planning

1.- Location and orientation.

- Parameters (winter: at least half the living space in a home shall get 30 minutes of direct sunshine when the sun is at its highest intensity - midday -).

Responsible Town-Planning

2.- Solar control.

1. Increase of solar gains in winter:
   - ❑ Through the glazing (direct gain):
     - Well positioned glazing.
     - Attached greenhouses.
   - ❑ Through storage walls.
     - Thermal inertia (indirect gain).

2. Reduction of energy losses:
   - ❑ Good thermal insulation.
   - ❑ Adequate framing.
   - ❑ Correct use by user.

Responsible Town-Planning

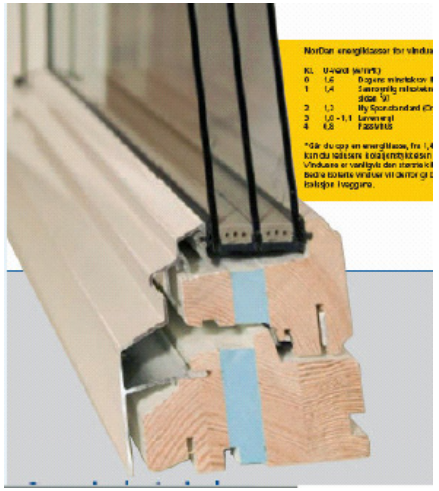
3.- Building ways.

- Compact and flexible.
- Must permit cross ventilation.
- Minimum sizes for building wells should be studied and analysed.

Responsible Town-Planning

4.- Thermal effects of materials.

- Levels of brightness inside the rooms are conditioned by the envelope finishing materials, as well as their covering.



Responsible Town-Planning

5 & 6.- Electricity and water saving.

- ❑ Promoting natural lightning.
- ❑ Minimizing air conditioning systems.

- Water saving by using separative systems (greywater and rain water recycling)
- In detached houses typologies, the inner use of grey waters for non drinkable uses (washing, toilet and gardens) should be required.
- In collective housing, the standards to which it would be cost-effective to require greywater recycling too, should be studied.

Responsible Town-Planning

7.- Integration of renewable energies.

1.- Reserve of spaces.

2.- Preference of district conditioning systems.

3.- Use of solar energy.

- ❑ Production of DHW.
- ❑ Production of water for hygrothermal conditioning.
- ❑ Production of electricity.

Responsible Town-Planning

8.- Healthy construction.

- Low production impact.
- Use of renewable/recyclable materials.
- Low environmental impact waste.

2. Integration of renewable energies in urban spaces and architecture.

Renewable Energies

- Renewable energy is the continuously generated energy which is inexhaustible at human scale. They are also environmentally friendly energy sources.
- They are clean.
- They do not generate waste.
- They are inexhaustible.
- They are local.

Renewable Energies

Types of renewable energies.

- ❑ Solar Thermal Energy.
- ❑ Photovoltaic Energy.
- ❑ Wind Energy.
- ❑ Biomass / Biogas Energy.
- ❑ Geothermal Energy.
- ❑ Other types of energy.

Renewable Energies

Solar Thermal Energy.

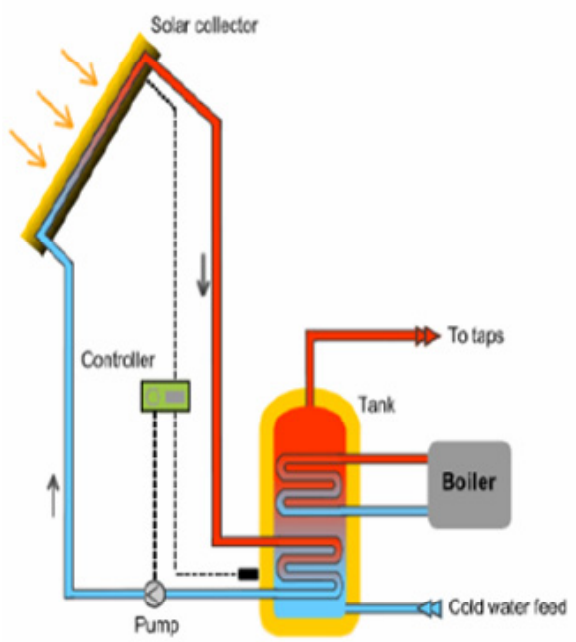
The design of a building including a solar installation consists of - as in any other type of installation - studying 4 aspects of the installation:

1.- Town-planning.

2.- Typological.

3.- Functional.

4.- Constructive.



Renewable Energies

Solar Thermal Energy.

- Solar exposure requirements of solar collectors.
- Margins for orientation and tilt.

Town-planning aspect

The CTE Code includes some basic requirements of buildings: CTE_HE-4

Administration technicians should propose adequate strategies to impulse the use solar thermal energy.

- With a **local bylaw.**

Renewable Energies

- Level of Planning: ***Partial Plan***. The instruments that can contribute to it are:

1. Plotting Conditions and Distribution Areas.
2. Maximum heights and distances between buildings.
3. Plot area, use, suitability for building.
4. Maximum roof pitches. (minimum pitch of 15º; ideally 30º roof pitch).
5. Domestic Hot Water System.
6. Boiler and equipment rooms.
7. Visual Impact.

Renewable Energies

Solar Thermal Energy.

- Solar exposure requirements of solar collectors.
- Margins for orientation and tilt.

Typological Aspects

Aspects that affect depending on

USE:
Residential
Industrial
Hotel trade

TYPOLOGY:
Detached house
Block of flats
One or several owners…

Renewable Energies

Solar Thermal Energy.

- Solar exposure requirements of solar collectors.
- Margins for orientation and tilt.

1.- Functional Aspects

- Regarding components or system configuration features for correct performance.
- We distinguish between 3 parts of the system:

  Collecting system (It can have different layouts):

  - Single-centralized (for several users).
  - Zone-centralized.
  - Individual (for each user).

Renewable Energies

Storage system. In storage tanks.

- Centralized.
- Individual.

Auxiliary energy system.

- Centralized with storage (in an auxiliary storage tank).
- Individual in line.
- Individual with storage.

2.- Constructive Aspects.

Constructive Solutions:

- ❑ Detail of meeting between collector and facing (roof, wall, etc.).
- ❑ Storage tanks fixing.
- ❑ Hydraulic circuit layout.

Load calculation:

- ❑ Storage tanks load to structure.
- ❑ Wind generated loads.
- ❑ Accessibility to components for maintenance.

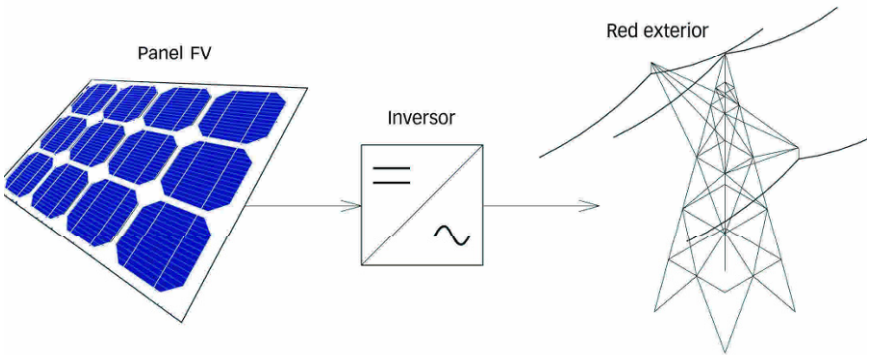
Renewable Energies

Photovoltaic Energy.

A solar photovoltaic installation is a system that uses the r diant energy from the sun and turns it into electricity through photovoltaic effect.

4 aspects of integration:

1.- Town-planning.
2.- Typological.
3.- Functional.
4.- Constructive.



Renewable Energies

Photovoltaic Energy.

- Solar exposure requirements of photovoltaic panels.
- Margins for orientation and tilt

1.- Town-planning aspect

Administration technicians should propose adequate strategies to promote the use of solar photovoltaic energy.

- With a local bylaw.
- Level of Planning: Partial Plan. Inclusion of spaces to install PV panels.

Renewable Energies

Also, the new regulations include some basic requirements to buildings: CTE_HE-5

Renewable Energies

Solar Photovoltaic Energy.

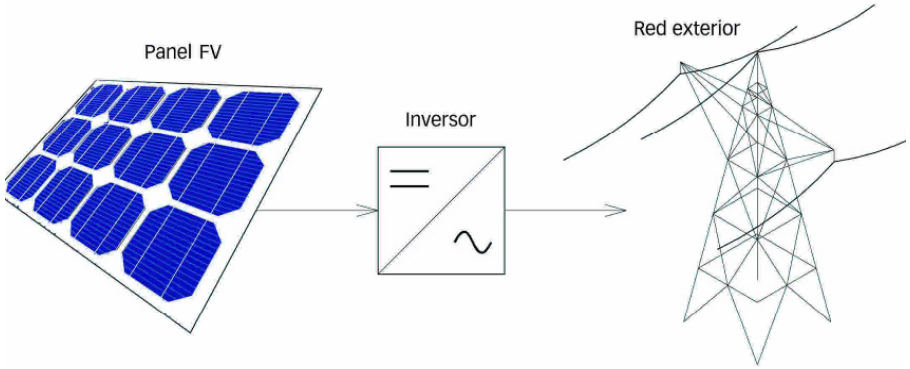
- Solar exposure requirements of solar collectors.
- Margins for orientation and tilt.

Typological Aspects

Basically, there are two types of photovoltaic systems:

- **Stand-alone systems:** Generally installed in rural areas for diverse uses: home electrification, water pumping systems, etc,…
- **Grid-connected systems:** are the systems which send the generated electricity to the grid. Urban environment.

Renewable Energies



Solar Photovoltaic Energy.

- Solar exposure requirements of solar collectors.
- Margins for orientation and tilt.

1.- Functional Aspects

Regarding components or system configuration features for correct performance.

Main components of a grid-connected photovoltaic system.

– Photovoltaic panel.

– Inverter.

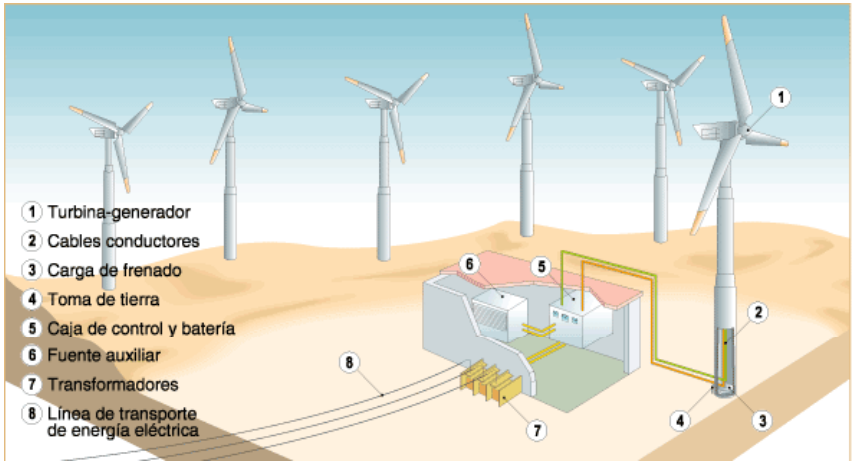
Renewable Energies

Wind Energy.

- The wind is a consequence of solar radiation incidence on Earth, which causes the heating of surrounding air masses. As the planet surface is irregularly heated depending on latitude, different pressures are created and the air flow tries to even them.

- Out of all renewable energy technologies, solar and wind energy are the best distributed ones, which represent a great advantage: production where needed.

Renewable Energies



Wind Energy.

1.- Typological Aspects

Basically, there are two types of wind energy systems:

- **Stand-alone systems:**
  - They need storage.
  - They need a specific control system.

- **Grid-connected:**
  - Search for ideal site.
  - Well oriented and grouped together.

Renewable Energies

Energy from Biomass / Biogas.

- "Biomass is all organic matter liable for energetic uses".
- It includes all type of organic matter, either vegetable, animal or industrial.
- Biogas is a combustible gas generated in natural environments or through specific devices. When organic matter is decomposed by some type of bacteria, without the presence of oxigene, it generates biogas.

Renewable Energies

Energy from Biomass / Biogas.

1.- Typological Aspects

There are, basically, these types of biomass:

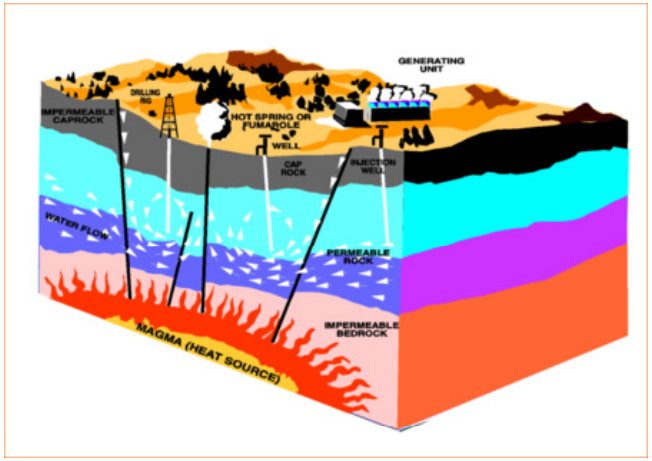
- Agroforestry waste.
- Industrial waste.
- Urban solid waste.
- Energy crops.

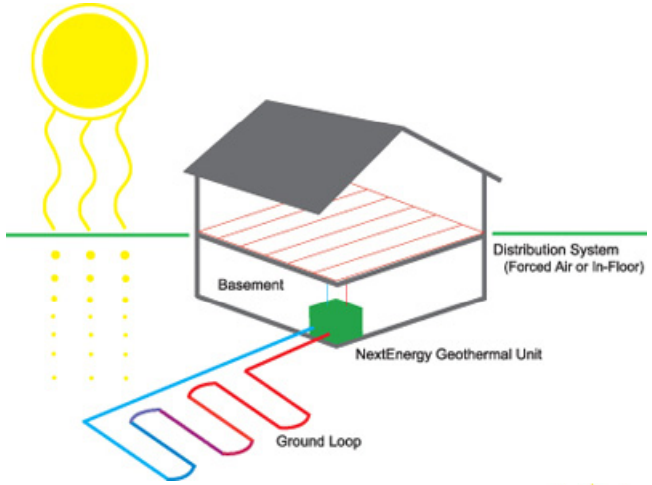
Renewable Energies

Geothermal Energy.

- Geothermal energy is the one that can be obtained by using the heat from inside the Earth.

- It can be used to:
  - Electricity generation.
  - Direct use of heat.
  - Heating and DHW.
  - Absorption cooling.





Renewable Energies

Other types of energy.

- Small scale hydro.

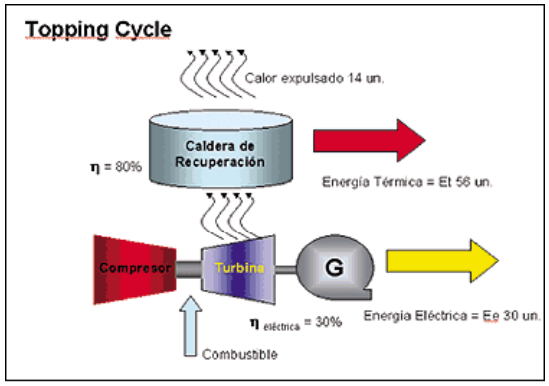
It consists of using small natural waterfalls to generate electricity out of water potential orwater kinetics, such as small (mini / micro) hydroelectric plant.

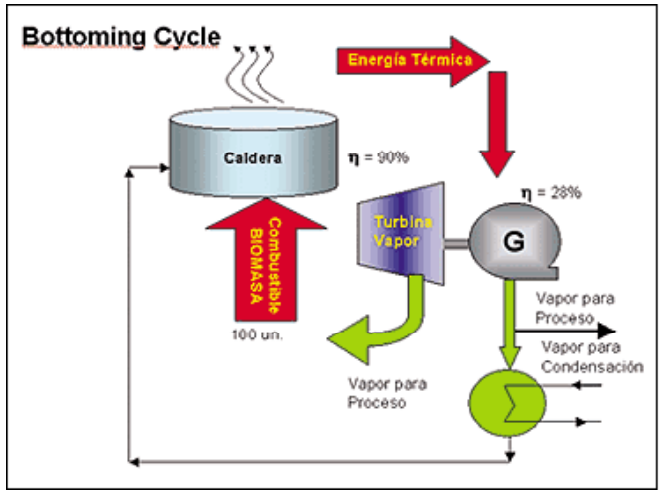
Renewable Energies

❑ Cogeneration.

Cogeneration is the process to obtain, at the same time, both electricity and usable thermal energy (steam, domestic hot water, ice, cold water, cool air, for instance).

The use of residual heat that, in other type of systems, is only partially used, makes cogeneration plants performance significantly higher; this being the reason for the present impulse of this type of technologies.





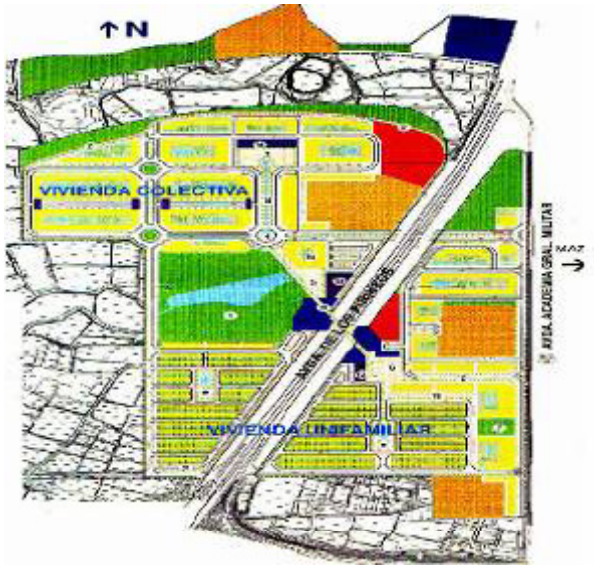
III. HOW to carry out a sustainable development?

Parque Goya

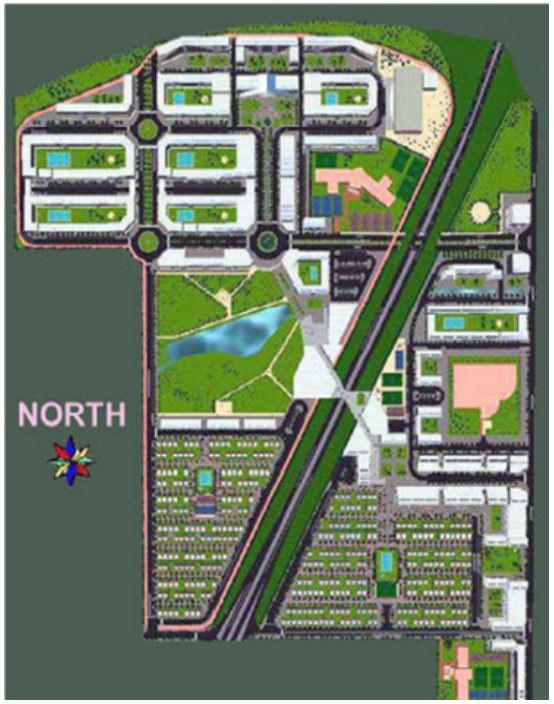
Parque Goya

Residencial Parque Goya – 3,500 VPO (State-subsidized housing)

- Agricultural land (54 ha).
- Expropiation (**90 ptas/sq.m.**).
- **Total energy saving: 60%.**
  - Heating.
  - DHW (600 sq.m. solar collectors).
  - Cooling.
- **90% of plots are south facing.**
- Measures taken in the **Partial Plan**.
  - kg 20% lower than NBE-CT-79.
  - Winter solar gain.
  - Solar protections in summer.
  - Efficient auxiliary systems.



Parque Goya



Commitment

- **Energy saving**
  - Sustainable town-planning (solar use).
  - Bioclimatic Architecture. Efficient auxiliary systems (800,000 pts/house-flat extra charge).
  - Partial Plan. Regulatory Bylaws. (energy efficiency).
- **State-subsidized housing (*VPO*).**
- **Social nature.**

Bid

- Plots (10 projects/plot).
- Bioclimatic measures 5 points/30 points.

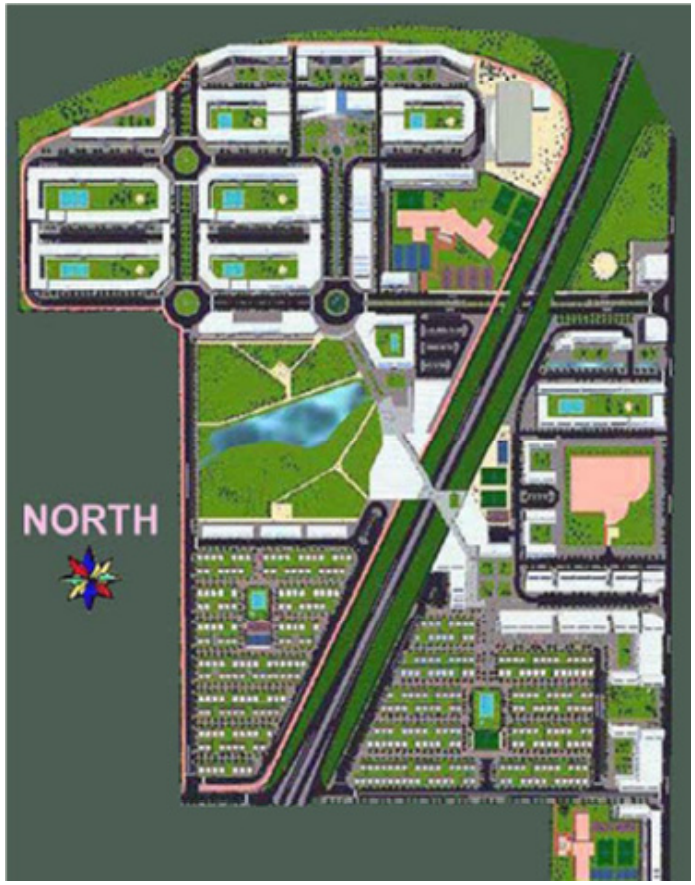
Repercussions of building land

- From 1.2 to 1.7 millon pts/home.

Parque Goya

Basic design criteria

- Look for the best places to locate the highest density of houses.
- Look for the best façade orientation, SOUTH, in the highest number of buildings.
- Noise protection.
- Creation of refreshing water surfaces in summer, by using the existing irrigation channel.
- Costs reductions in infraestructure and urbanization.
- Integration of different disciplines (architecture, town-planning. engineering, thermodynamics, ecology, social, economics and law).



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CONCERTO ECO-City project

Parque Goya

Town-planning parameters

USE	square metres	%
Residential area	160,153 sq.m.	28.8
Commercial area	15,820 sq.m.	3.0
Social welfare facilities	5,432 sq.m.	1.0
Sport facilities	32,294 sq.m.	6.0
School facilities	56,467 sq.m.	10.5
Free and common use areas	87,760 sq.m.	16.3
Infrastructures utility areas	3,312 sq.m.	0.6
Roads and parking areas	176,053 sq.m.	32.8
Total	**537,291 sq.m.**	100.0

Parque Goya

Partial Plan Requirements

- High level of insulation.
- Use of solar gains (winter)
- High thermal inertia.
- Elimination of thermal bridges.
- Reduction of unwanted leakages.
- Cross ventilation (summer).
- Shading by eaves.
- Centralized systems (heating, DHW).
- Monitorizing and checking of simulation analysis.

Partial Plan Requirements

Different glazing in SOUTH-NORTH façades

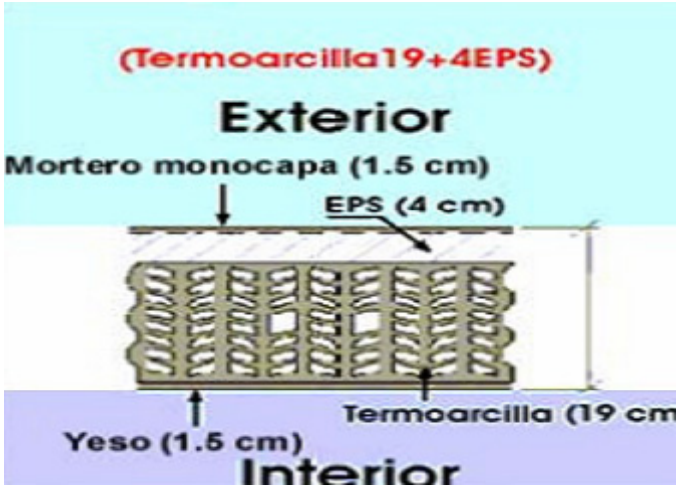
South façade

North façade

Parque Goya

Partial Plan Requirements

High thermal inertia



Parque Goya

An inadequate use of the house can eliminate its advantages.

- Winter:
  - Make the most of solar collection: closed balconies, open blinders at daytime and closed at night.
  - Avoid excess of ventilation.
  - Thermostat temperature 20 ºC.

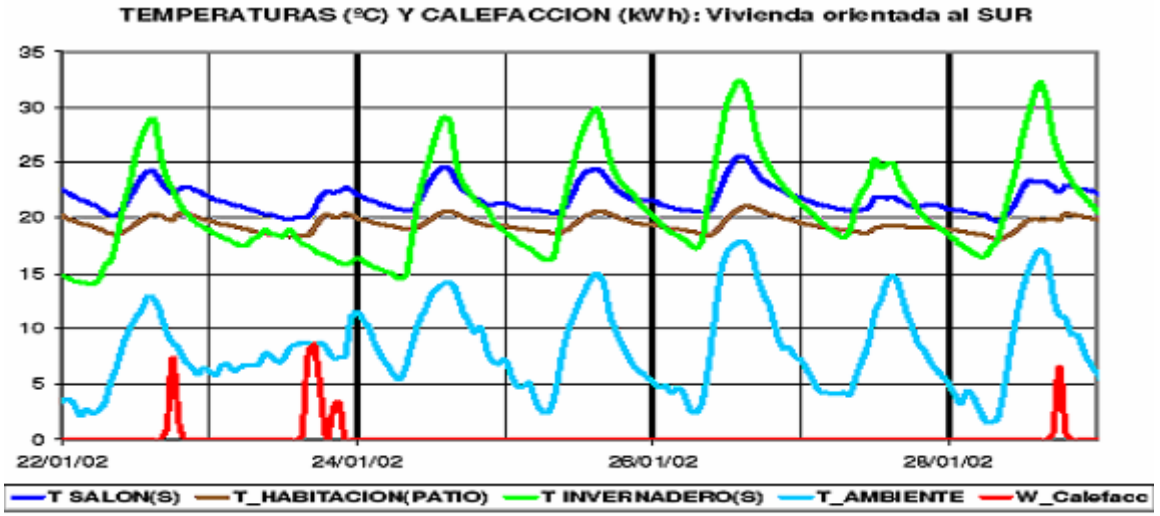
- Summer:
  - Open balconies. Do not place indoor shading when balcony is closed.
  - Down blinders.
  - Do not ventilate when outside temperature is hot.
  - Use night ventilation to cool the house.

Parque Goya

Partial Plan Requirements

Solar use.

Winter: inhabited house with good solar use

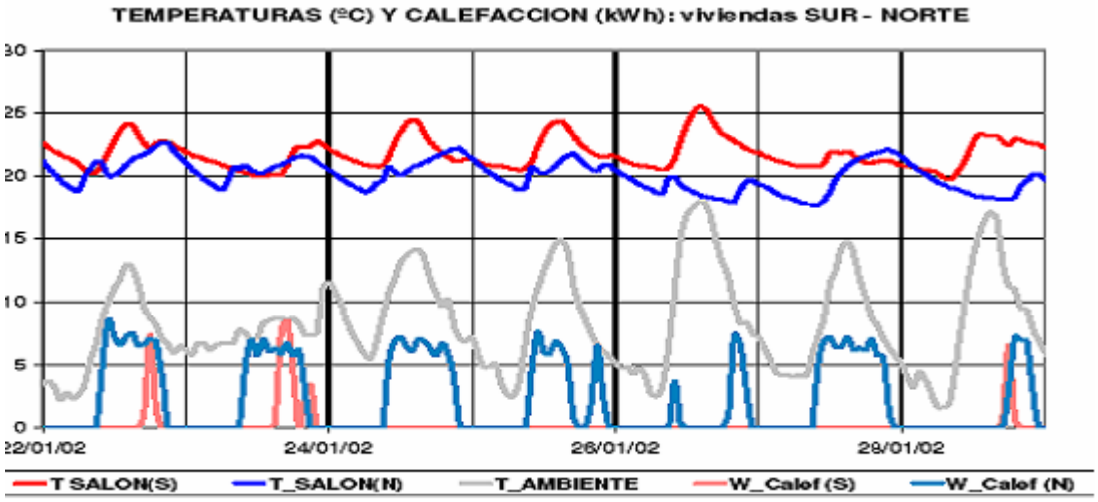


Parque Goya

Partial Plan Requirements

Solar use.

Solar collection in south facing houses matches heating in north ones.



Partial Plan Requirements

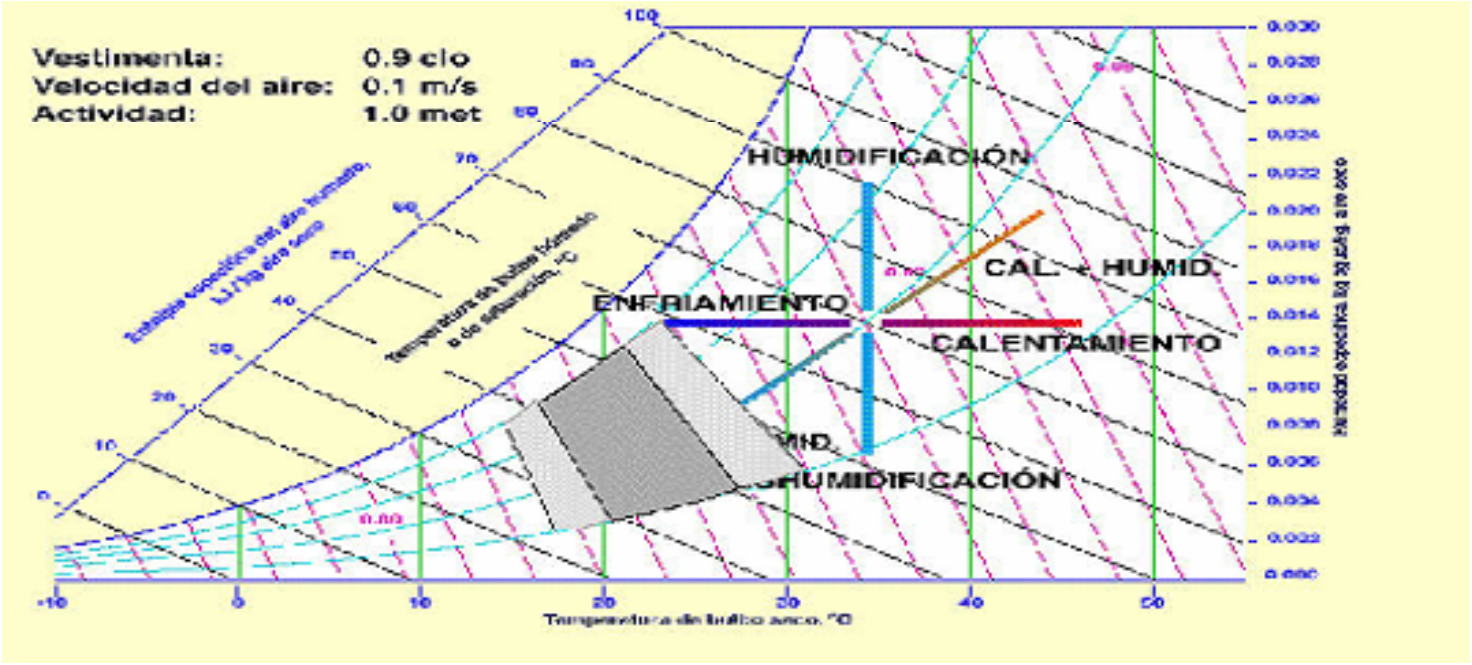
Solar use.

- Elimination of solar collection with curtain in SOUTH facing balcony, originates overheating in greenhouse.
- No excess of ventilation in winter; **20 minutes is enough**.
- In summer, shading is one of the means to avoid
- solar gain and, also, greenhouses should be opened.
- The use of curtains inside the greenhouse does not prevent overheating, damages ventilation even.

Parque Goya

Partial Plan Requirements

Thermal comfort area



Eco-City Valdespartera

Eco-City Valdespartera

- **Eco-City Valdespartera - 9,600 State-subsidized housing (*VPO*). Bioclimatic Partial Plan.**
- A saving of **5,000 tons of CO2** is expected.
- **Budget:**

  around 385,000 EUR (60% of it European Commission funded).
- **November 2006.**

CENIFER Formación en Energías Renovables

CONCERTO ECO-City project

Eco-City Valdespartera

- It was done through a call for demonstration-cooperation projects promoted by the Directorate-General for Energy and Transport (DG TREN) of the European Commission.

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CONCERTO ECO-City project

Eco-City Valdespartera

- Partners:

  Ayuntamiento de Zaragoza (leader of the Spanish consortium).

  SMRUZ: Sociedad Municipal de Rehabilitación Urbana y Promoción de la Edificación de Zaragoza, S.L.

  EVZ: Ecociudad Valdespartera Zaragoza, S.A.

  ECODES: Fundación Ecología y Desarrollo.

  ENDESA: Energy supplier company.

  Universidad de Zaragoza (group of research *Energía y Edificación*).

  CENER: Centro Nacional de Energías Renovables.

  UB: Universidad de Barcelona.

  URBIC: Engineering Company.

Eco-City Valdespartera

- The *Plan Estratégico de Zaragoza y su Área de Influencia (Ebrópolis)* + the Agenda 21 Local set the following target:

  10% reduction of CO2 emissions in the period 1990-2010.

- Urban Restoration Policies:

  1. Saragossa has more than 70,000 flats older that 40 years in the traditionals districts of city enlargement.

  2. The City Council has been carrying out, from a number of years, an intense Restoration policy.

- New housing policies:

  Previous experience of Parque Goya (3,600 homes) and 10,000 new homes in Valdespartera.

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CONCERTO ECO-City project

Eco-City Valdespartera

STRATEGIC Objectives:

- Management of natural resources; going one step further towards sustainability.
- Improvement of housing social policies.
- Development of economics activities with innovative approaches.

IMPROVEMENT OF CITIZENS QUALITY OF LIFE

Eco-City Valdespartera

OPERATIONAL Objectives:

- Energy saving in new buildings (Valdespartera) and in restoration (Picarral)
- Energy efficiency measures.
- Use of renewable energy (solar and wind technologies).
- Monitoring and indicators.
- Training, awareness and participation.

Eco-City Valdespartera

Town-planning:

- ❑ Orientation of buildings.
- ❑ Solar collection.
- ❑ Green areas between buildings.
- ❑ Wind protective screens.
- ❑ Microclimates.
- ❑ Mobility: connectivity, cycle path, light transport.
- ❑ Urban spaces: squares, parks, multifunctional spaces.

Eco-City Valdespartera

Architectural design:

- ❑ Flat roofs.
- ❑ Positioned for cross ventilation.
- ❑ Glazed balconies in south facing façades.
- ❑ Passive collectors.

CENIFER

CONCERTO ECO-City project

Eco-City Valdespartera

Constructive system:

- ❑ Constructive materials.
- ❑ High levels of insulation.
- ❑ Surfaces with storage capability.
- ❑ Energy system.
- ❑ Underground pneumatic solid waste collection.
- ❑ Street furniture: sustainable materials, litter bins, benches, children's playgrounds.
- ❑ Low consumption lightning.

Eco-City Valdespartera

New housing.

Eco-City Valdespartera

Home restoration (district of Picarral)

Monitoring of 193 homes in 49 buildings located in 22 parcels.

- ❑ Energy restoration.
  - • Data collection:
    - – Consumption data.
    - – State of the home (envelope and systems).
    - – Habits of human behaviour.
  - • Energy assessment:
    - – Quantitative -> Energy simulations.
    - – Cualitative -> Infrared thermography.
- ❑ Analysis of solutions.
  - • Monitoring methodology.

Eco-City Valdespartera

Activity in Valdespartera

- 30 kW connected to lightning systems.
- 2 MW/h wind turbine.
- Software for data extraction of gas and electricity consumption to compare.

Eco-City Valdespartera

Action in *el Picarral*

Colegio Público “Cándido Domingo”

Actions

- ❑ Saving: Insulation in façades.
- ❑ Efficiency: Improvement in heating systems.
- ❑ Innovation: 20 kW photovoltaic energy.

Environmental Education Program

- ❑ Program STOP-CO2.

Environmental Education Program

- ❑ Office of Agenda 21 Local.
- ❑ Department of Conservation and Infraestructures.

Eco-City Valdespartera

Tres Cantos: Bioclimatic Bylaw

Tres Cantos: Bioclimatic Bylaw

Background:

- Local and regional Administration awareness
- Objective: to reduce resources consumption according to sustainability.
- Bylaw including defined concepts.
- Year 2001-2004
- 300 ha.
- 1000 homes in urban land.
- 4000 homes in building land.
- 450 flats
- 300 homes for social integration
- Land for industry and offices.

Tres Cantos: bioclimatic bylaw

Exhaustive land study.

- Slopes analysis
- Draining of superficial water.
- Slopes orientation.
- Protection of areas with vegetation.

Tres Cantos: bioclimatic bylaw

Bylaw:

- **Reduction of non-renewable energy consumption**
  - Building orientation,
  - Composition of façades
  - or solar energy collection;

- **Reduction of drinking water consumption**
  - Adequate choice of vegetation,
  - Use of rain water
  - Recycling of grey water,
  - Procedures to reduce consumption;

Tres Cantos: bioclimatic bylaw

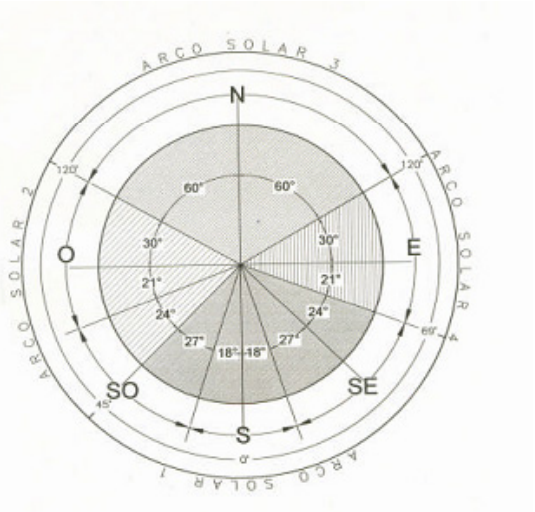
- **Reduction of environmental pollution**
  - Measures about traffic generated noise,
  - Emission of particles to the atmosphere
  - Sky glow.
- **In its most global sense, reduction of CO2 emissions.**

Tres Cantos: bioclimatic bylaw

Building position according bioclimatic criteria:

The solar arches used in this Bylaw are defined as follows:

I. Solar arch 1= 69º SE - 45º SW
II. Solar arch 2= 45º SW - 120º NW.
III. Solar arch 3= 120º NW - 120º NE.
IV. Solar arch 4= 120º NE - 69º SE.



At least 80% of buildings in each plot and development should have a minimum of 25% of total surface of internal and external façades oriented within solar arch 1.

Tres Cantos: bioclimatic bylaw

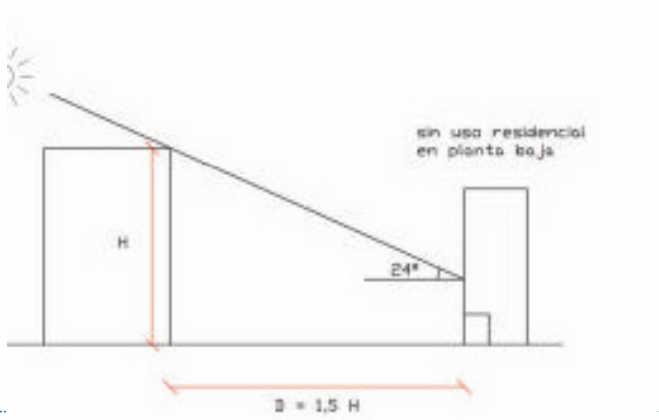
Building position according bioclimatic criteria:

Distance between façades:

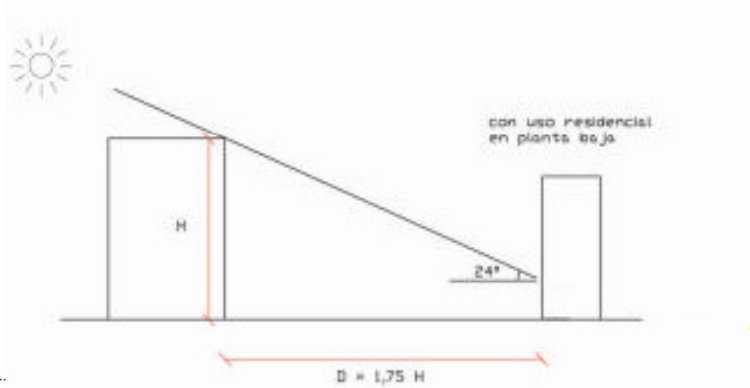
To guarantee sun exposure, the ratio between the distance for each plot between façades planes (D) and the building "shading height" (H) should be:

Facing buildings with same height

- Low/ground floors with **non** residential use
- Get shade: **D= 1.5H.**

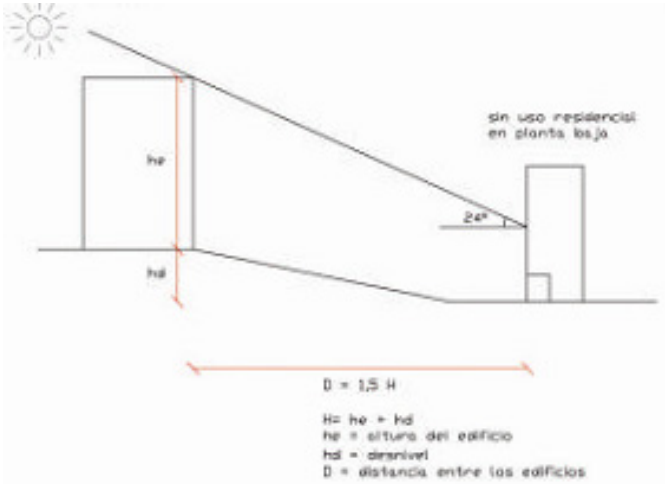


- Low/ground floors with **residential** use
- Get shade: **D= 1.75H.**



Tres Cantos: bioclimatic bylaw

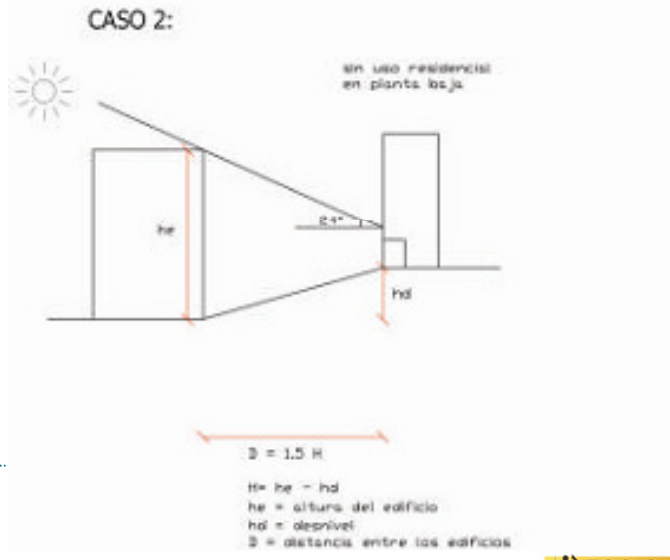
Building position according bioclimatic criteria:



Distance between façades:

Facing buildings with different height

- Low floors with **non** residential use
- Get shade: **D= 1.5H.**
- H= h building+/-h drop



Formación en Energías Renovables CENIFER

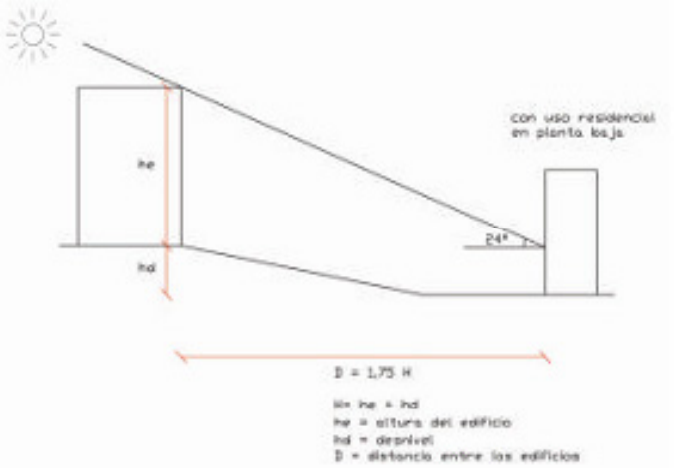
ECO-City project

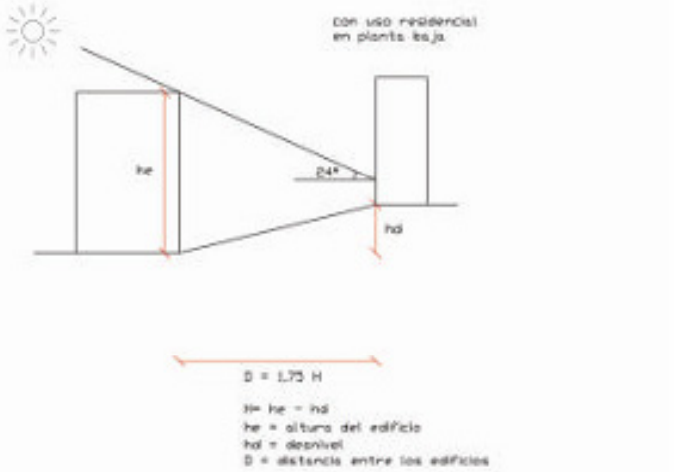
Tres Cantos: bioclimatic bylaw

Building position according bioclimatic criteria:

Distance between façades:

- Low floors with **residential** use
- Get shade: **D= 1.75H.**





Tres Cantos: bioclimatic bylaw

Town-planning according bioclimatic criteria:

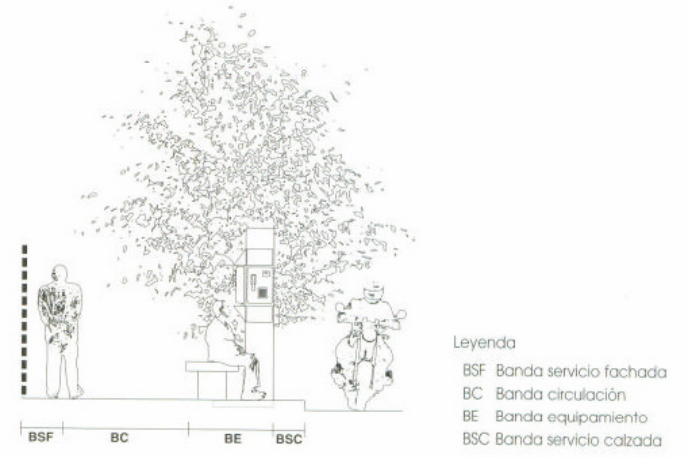
- Aiming at reducing motor traffic; pedestrians and public space are the main figures.
- It is compulsory to include a gardening project in all projects of developments.
- Design of water collection and irrigation system.

ALQUILER MECÁNICO DE BICICLETAS

Tres Cantos: bioclimatic bylaw

Town-planning according bioclimatic criteria:

1. **Façade service strip** (minimum 0.70 metres).
2. **Pedestrian lane** (minimum 0.70 metres).
3. **Equipment strip** (Strip in which trees will be lined - minimum1 metre wide).
4. **Road service lane** (minimum 0.45 metres).



Planning proposal: ZOLINA surroundings

Proposal of Planning in ZOLINA surroundings

Background:

- **22.5 ha.**
- Commissioned by the Department of Environment, Town-Planning and Housing of the Government of Navarre, from the proposal of Bioclimatic City by **E. Mitre.**
- Low density subsidized housing (VPO).
- Low levels of CO2 emissions.

Proposal of Planning in ZOLINA surroundings

Environmental Feasibility Study (EFS):

- Planning of spaces for renewable energies.
- Bioclimatic study of the development.
- Bioclimatic study of the buildings.
- Study of social aspects (subsidized housing “VPO”).
- Vast park around the pond.
- Sport areas.
- Environmental recovery.
  - -Water study.
  - -Ground study.
  - -Vegetation study.
  - -Landscape impact.
  - -CO2 emissions.

Proposal of Planning in ZOLINA surroundings

Contributions:

- Land and water recovery.
- Environmental recovery; pond recovery (it will become a singular recreation area for Pamplona).
- 956 low cost homes.
- High levels of energy self-sufficiency.
- Low levels of CO2 emissions.

Proposal of Planning in ZOLINA surroundings

Economic data:

216 homes	Type1	VPO in block ground floor+2 fl.13,421,754 pts
288 homes	Type2	non subsidized in flats in 2 floors 25,000,000 pts
192 homes	Type3	non subs. Flats 21,000,000 pts
200 homes	Type4	detached house 170 sq.m.30,000,000 pts
60 homes	Type5	detached house 250 sq.m.43,000,000 pts

Eco-City Sarriguren

Eco-City Sarriguren

Background:

- Sectorial Plan of Supramunicipal Influence.
- 4,600 VPO.
- Year 2004.
- Comparative study with district Goya.

Eco-City Sarriguren

Thermo environmental analysis:

- Climatic study.
- Establishing comparative criteria.
  - reference development "base case"
  - development with bioclimatic bylaws “proposal”
  - development with concrete bioclimatic bylaws “optimum proposal”
- Comparative tables con results.
- Conclusions / Recommendations.

Eco-City Sarriguren

Thermo environmental analysis:

Example

Establishing comparative criteria.

- "Base case" CO_2 emissions 10,643 tons / year.
  - Kg less than 25% according to NBE-CT-79.
  - Envelope: maximum thermal conductivity less than 33%.
  - Percentage of glazing in all façades is 20%.
  - Heating system performance is 72%.
- "Proposal" CO_2 emissions 7,115 ton / year.
  - Increase of glazing area in southern façades from 40% to 80%.
  - Heating system performance is 90%.

Eco-City Sarriguren

- "Optimum proposal" CO2 emissions 3,223 ton / year.
  - Increase of level of insulation up to 0.5 W/sq.m. in vertical and horizontal walls.
  - Improvement of windows quality.
  - 60% glazing in south facing façades.
  - Heating system performance is 90%.

Up to 70% saving with optimized proposal respect to the base proposal.

Eco-City Sarriguren

Typology Study and Characterization:

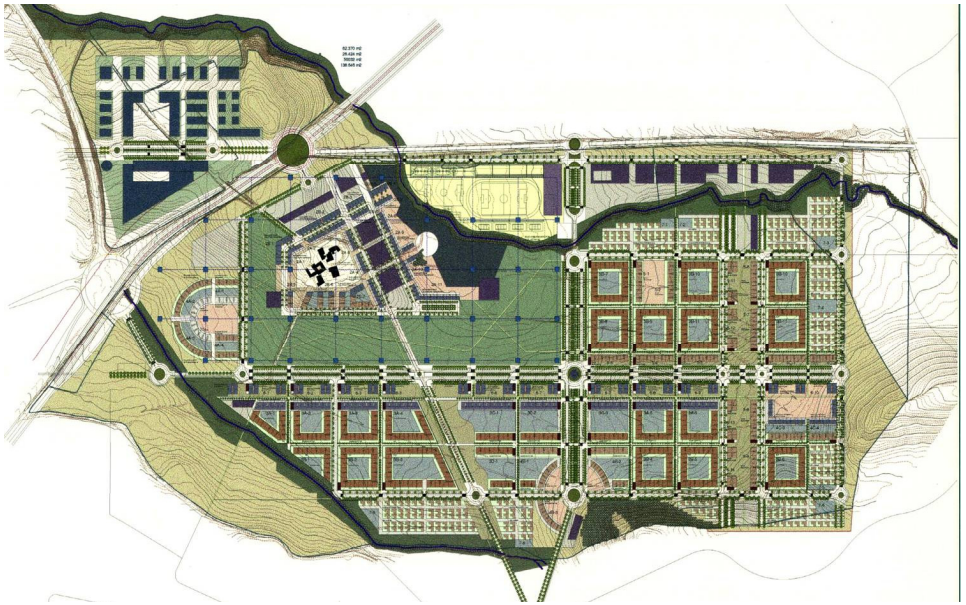
Detached____325 houses.

Condominium__1547 homes.

Line block__928 homes.

Small-tower___ 660 homes.

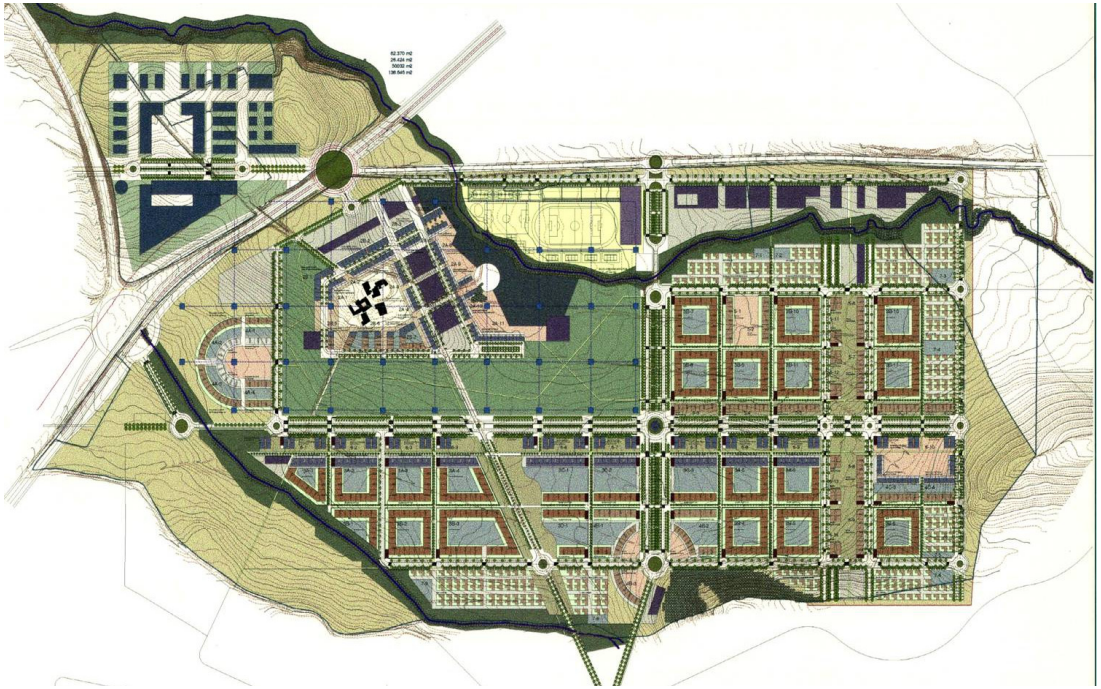
The village____360 homes.



There are specific bylaws regarding energy efficiency for each building typology (plot design, building heights, positioning…)

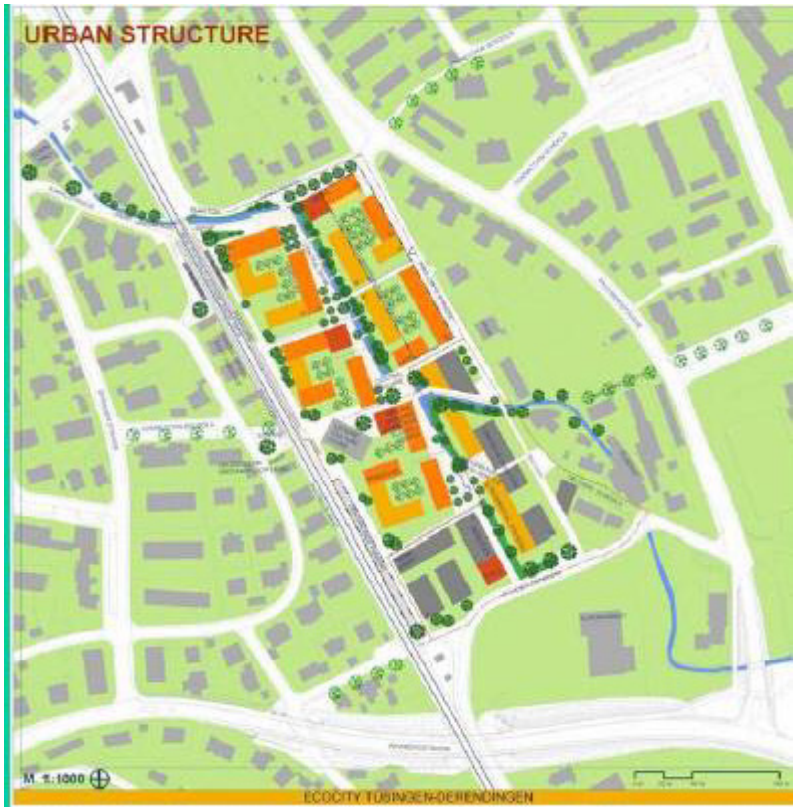
Eco-City Sarriguren

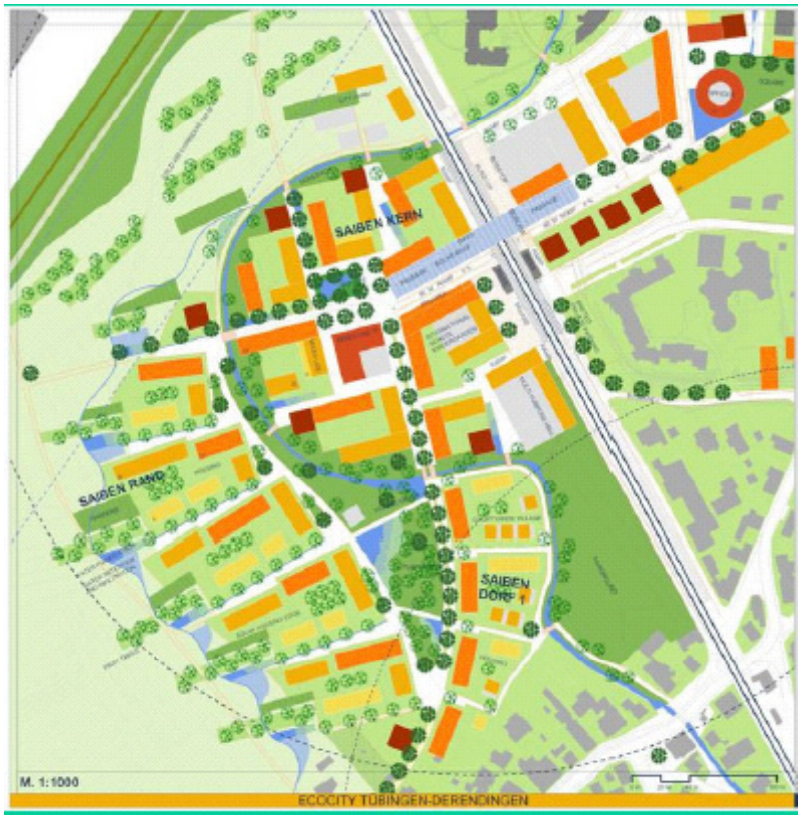
Background:



EUROPEAN PROJECT TÜBINGEN (GERMANY)

TÜBINGEN (Germany)





CENIFER Formación en Energías Renovables

CONCERTO ECO-City project

TÜBINGEN (Germany)

Urban structure:

Compactness

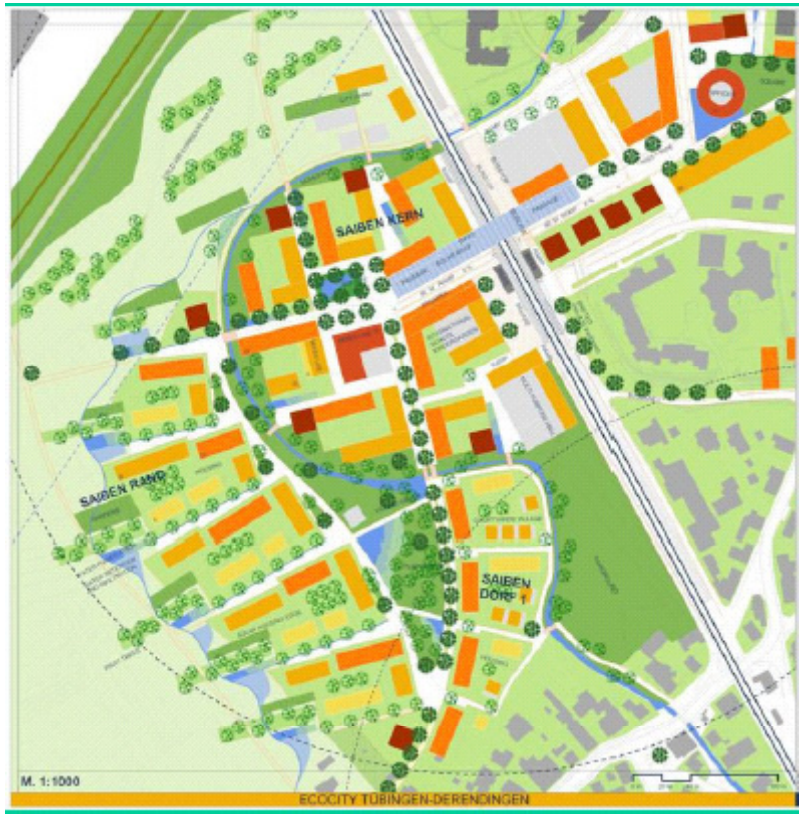
Reasonable density

Mixed uses

Quality of public spaces

Quality of green areas

Balance between facilities and services



TÜBINGEN (Germany)

Mixed uses at small scale:

TÜBINGEN (Germany)

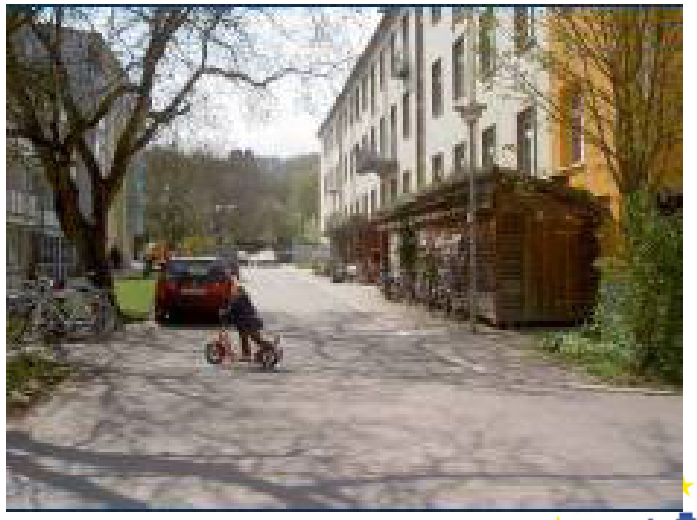
Mobility and accesibility:

Infraestructure for non motor transport

Infrastructure for public and colective transport

Traffic management of private vehicles

Parking management



TÜBINGEN (Germany)

Energy flows:

Reduction of energy demand

Reduction of peak consumptions

Position of buildings and public spaces

Compactness of built areas

Use of renewable energy

Insulation and inertias

Use of winds and plantations

Reduction Congestion

Bibliography and References

Bibliography

- "*Arquitectura y Clima*". Víctor Olgyay.
- "*Urbanismo Bioclimático*". Ester Higueras.
- "*Ecourbanismo*". Miguel Ruano.
- "*Guía del planeamiento urbanístico energéticamente eficiente*". IDAE.
- "*Guía de la eficiencia energética en vivienda en Navarra*". IDAE.
- "*Guía de la construcción sostenible*". Ministerio de Medio Ambiente.
- "*Textos sobre sostenibilidad. Ciudades para un futuro más sostenible*". José Fariña.

Links of interest

- **CONCERTO Iniciative**

http://concertoplus.eu/CMS/component/option,com_frontpage/Itemid,239

- **Eco-City Valdespartera**

http://www.valdespartera.es

- **Tres Cantos: bioclimatic bylaw**

http://www.trescantos.es/admin/uploads/files/a60fcfe38a435883f15757b87230a2b7bioclimatica.pdf

- **Sarriguren**

http://www.nasursa.es/es/Suelo/indexProyectos.asp?idp=2

- **Tübingen**

http://www.ecocityprojects.net/presentation/city_tuebingen/index.htm

Thank you very much for your attention!