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Llotja del Cànem (Castellón)

Guide on renewable energies for small rural municipalities

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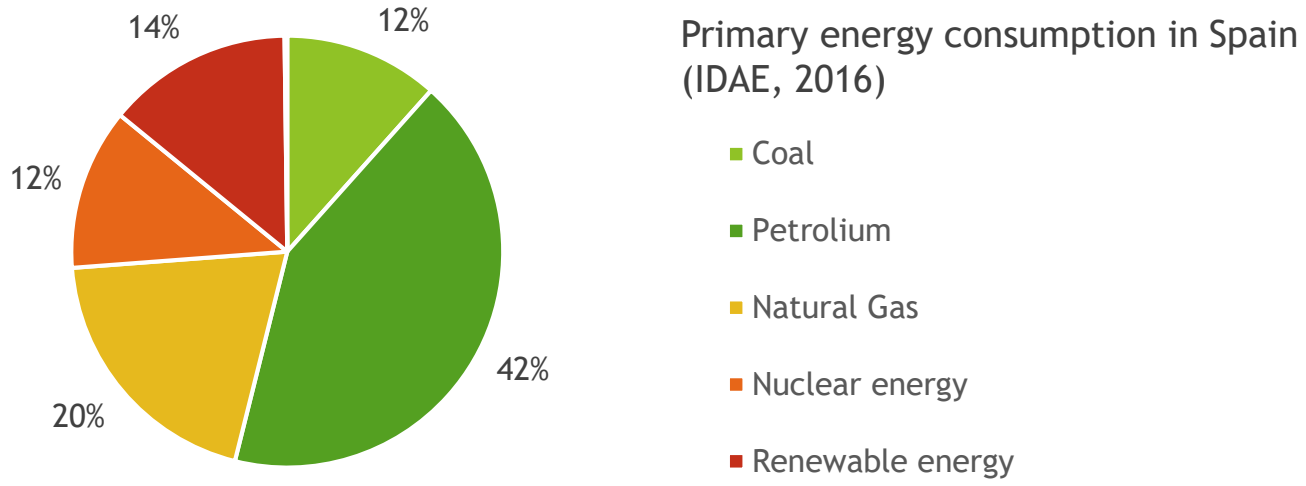
- 6. Projection

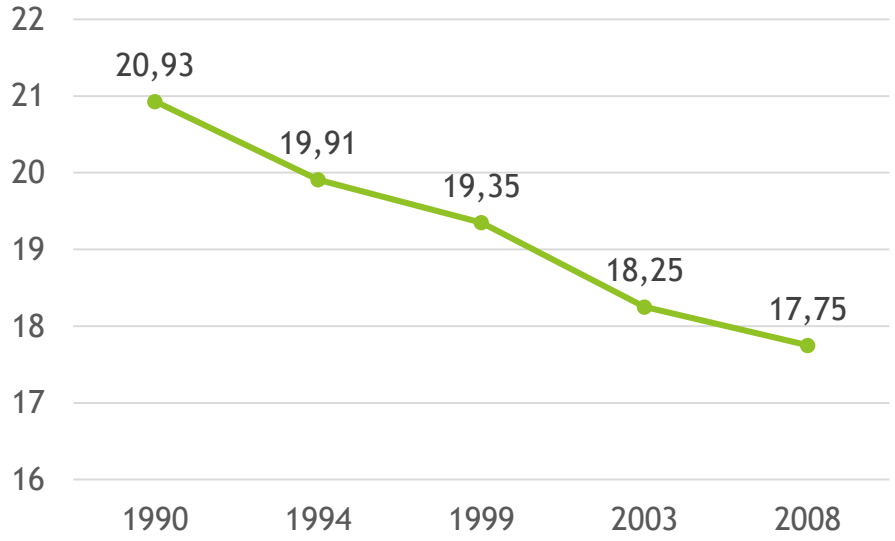
1. Justification

- The Europe 2020 strategy prioritizes the **flight agaisnt climate change** (20% de RREE)



- The EU has a population of 510 milion people, of which **28% live in rural areas** (Eurostat, 2016)
- Small munucupalities are facing **depopulation**, closely related to the lack of opportunities

1. Justificación



Evolution of rural population compared to urban (%) (MAPAMA, 2010)

- In rural areas, resources are abundant, but few initiatives are promoted renewable energies locally
- This is compounded by the lack of information and the lack of dissemination of good practices (**demonstrative effect**)
- The **ITforest** and **IN2RURAL** projects have allowed us to analize the impact of the renewable energies in the municipalities, to know good practices and identify needs

2. Objetives

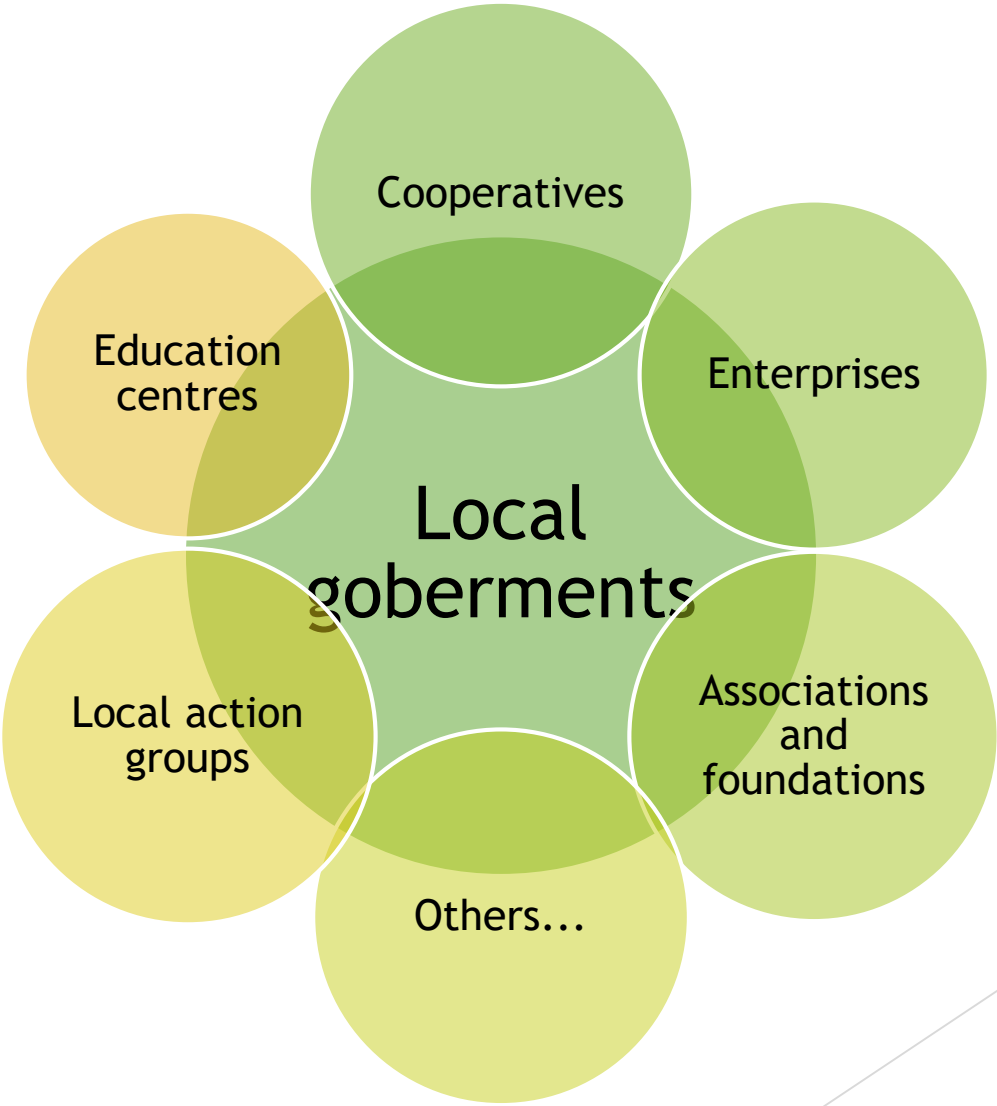
- General objective

> *Promote initiatives that generate new opportunities for socio-economic* ***development*** *in small municipalities in the* ***rural*** *area through the* ***renewable energies*** *and that at the same time have a positive impact on the environment.*

- Specific objectives
  - Support local governments in the desing of **strategies and plans.**
  - Increase the **technical skills** of local development actors
  - **Sensitize** civil society to favor an environment that encourages the implementation of these initiatives.

3. Beneficiaries

- Active stakeholders in the development of small municipalities



4. Development of small municipalities through renewable energies

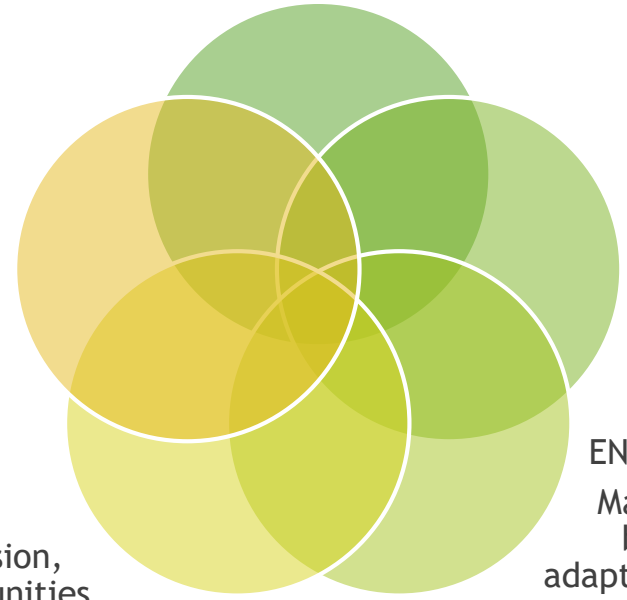
4.1. Rural development >> Sustainability

INSTITUTIONAL

Public participation, public-private cooperation, governance

CULTURAL

Assessment, recovery and strengthening of identities



ECONOMIC

Diversification of productive systems, "green jobs", productive quality, access to resources

SOCIAL

Social cohesion, equal opportunities

ENVIRONMENTAL

Maintenance of biodiversity, adaptation to carrying capacity, valorization of natural heritage

AGENDA 21

Pacto de los Alcaldes para el Clima y la Energía

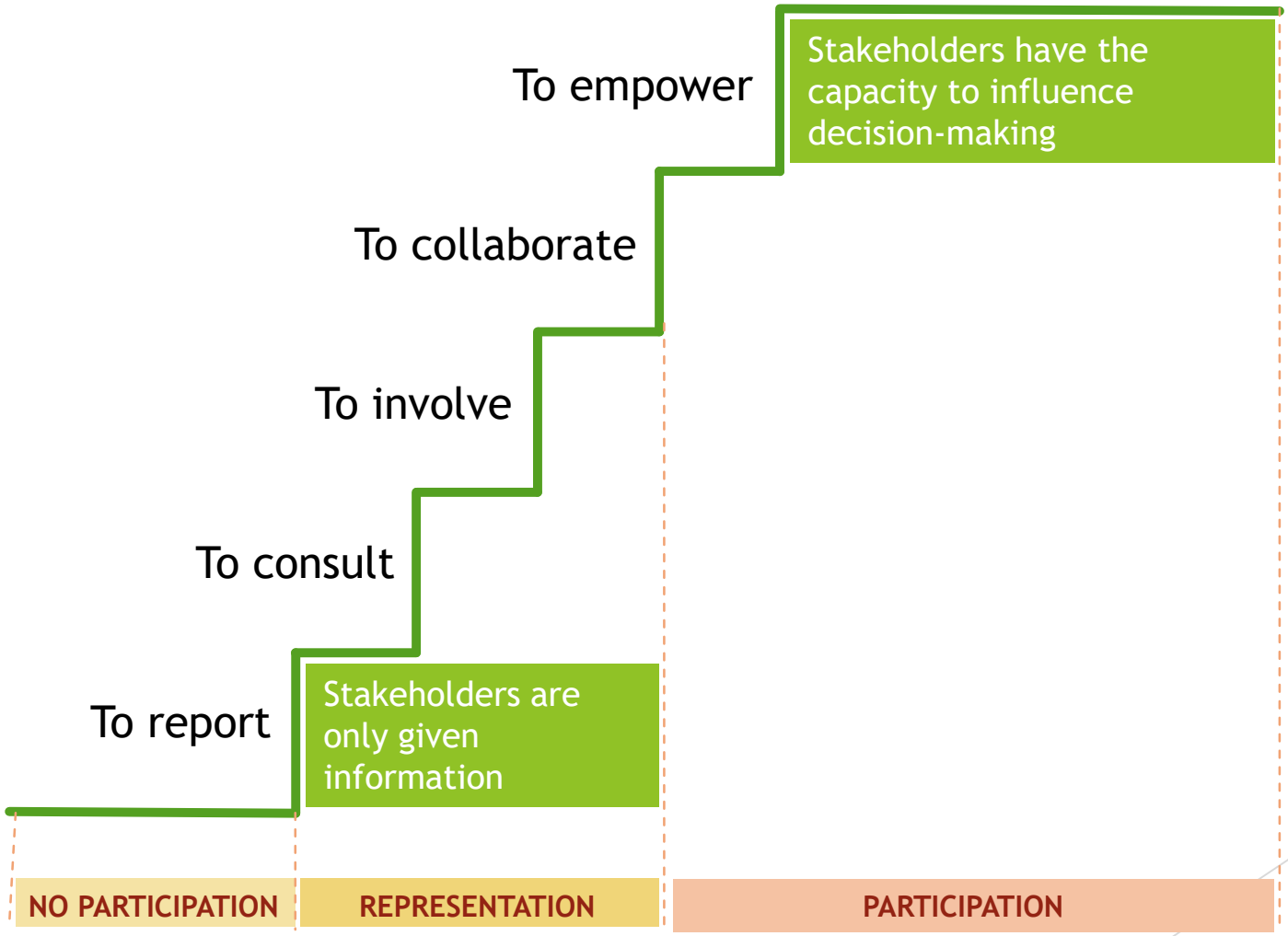
OBJETIVOS DE DESARROLLO SOSTENIBLE

7 ENERGÍA ASEQUIBLE Y NO CONTAMINANTE

11 CIUDADES Y COMUNIDADES SOSTENIBLES

13 ACCIÓN POR EL CLIMA

4.1. Rural development>> Participation



Participation ladder (adaptation of Arnstein, 1969)

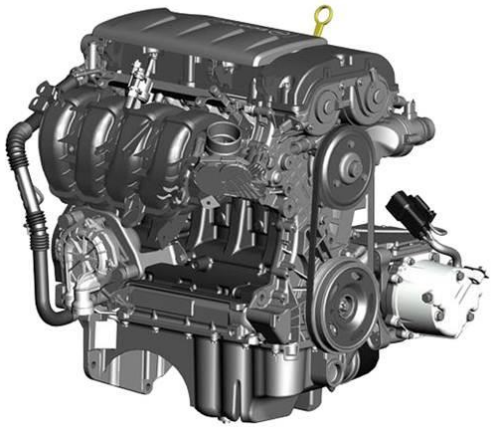
4.1. Rural development >> Project Cicle Management

4.2. Theoretical-practical approach to the renweable energies

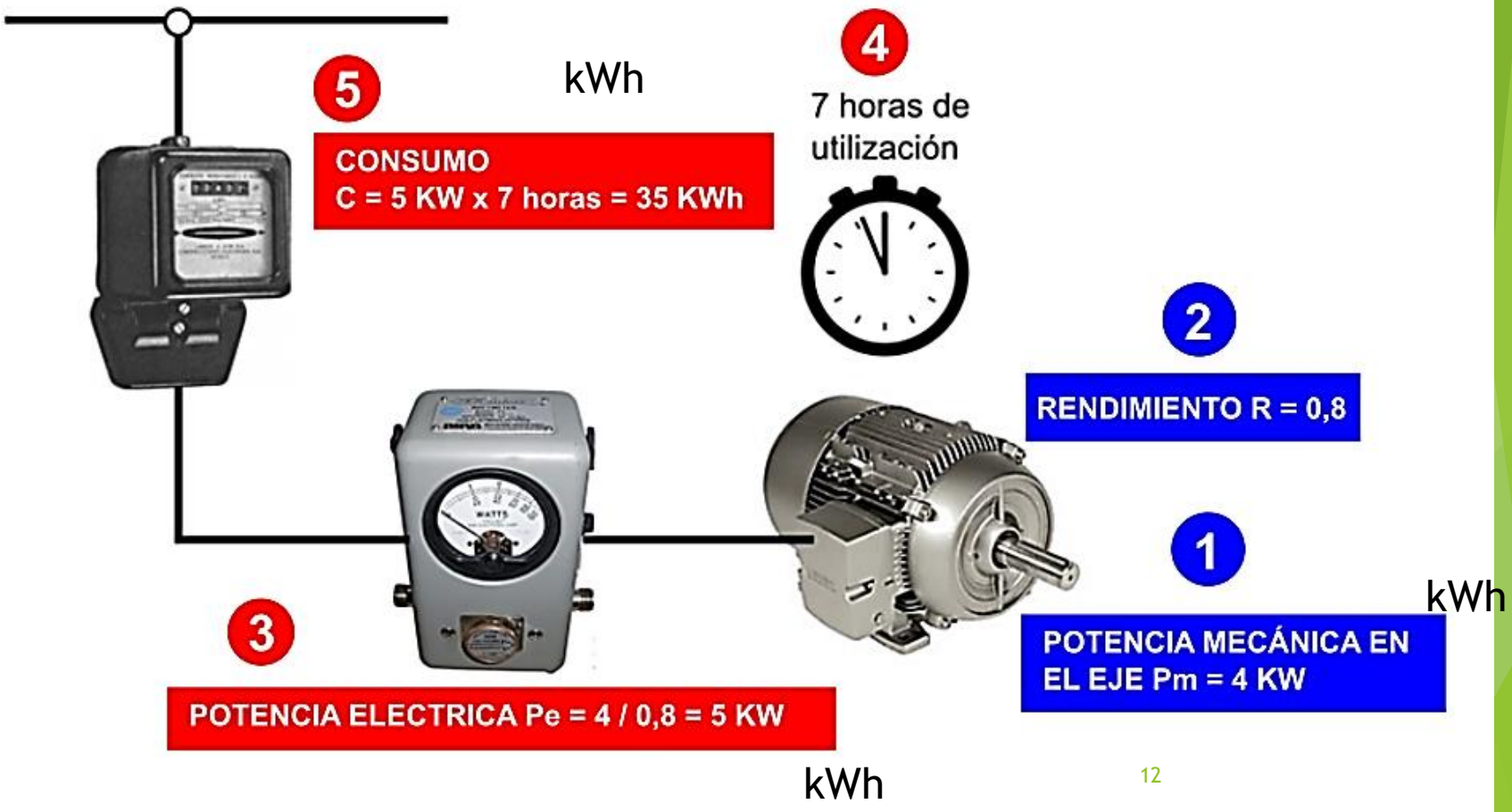
APPROACH ADOPTED IN THE GUIDE	
Origin	▪ Dissemination and awareness on qualitative aspects ▪ Specific technical training
Training level	▪ Pre-projects ▪ Analysis of proposals ▪ Transversal technical initiation
Qualitative contents	▪ Fundamentals and applications ▪ Equipment and facilities
Quantitative contents	▪ Tables and graphics ▪ Simplified Empirical Formulas ▪ Practical assumptions with numerical calculations

Previous concepts

- Energy
- Power
- Hot
- Work
- Units
- Applications



Energy, Power, Performance and Consumption



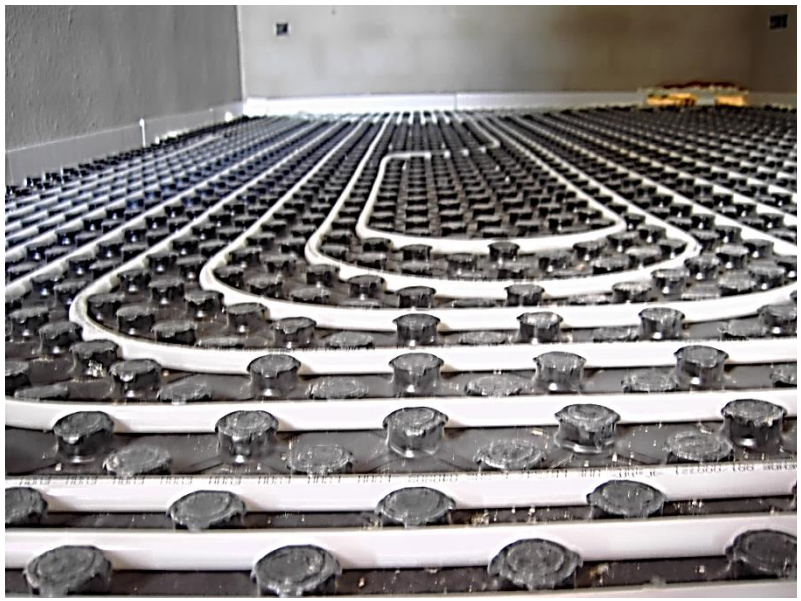
Renewable sources

- RES are "those that come from ***non-fossil fuels***, as a wind, solar, aerothermal, geothermal, hydrothermal and oceanic, hydropower, biomass, landfill gas, depuration plant gas and biogas" (2009/28/CE Directive)

- In our field (small installations):
  - Solid biomass
  - Biogas
  - Microhydraulics
  - Mini-wind energy
  - Solar thermal energy
  - Solar photovoltaic energy

Solid biomass

- Generalities
- Industrial and comfort facilities
- Practical numerical assumption



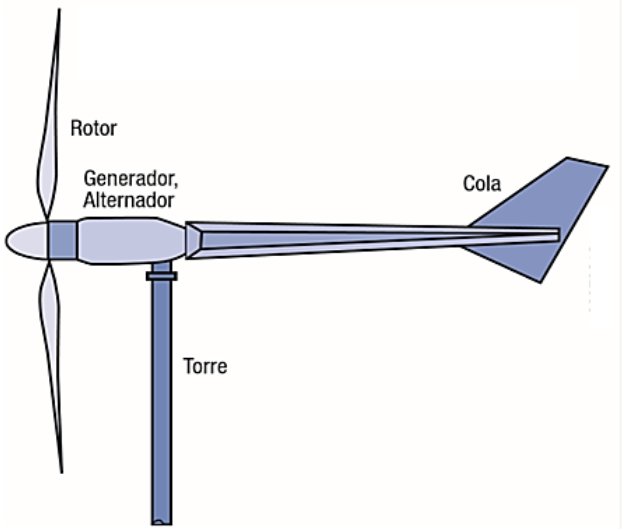
Biogas

- Basis and design of biodigesters
- Practical numerical assumption

Microhydraulics

- Generalities
- Power and energy to be supplied by a plant
- Turbines
- Practical numerical assumption

Mini-wind energy



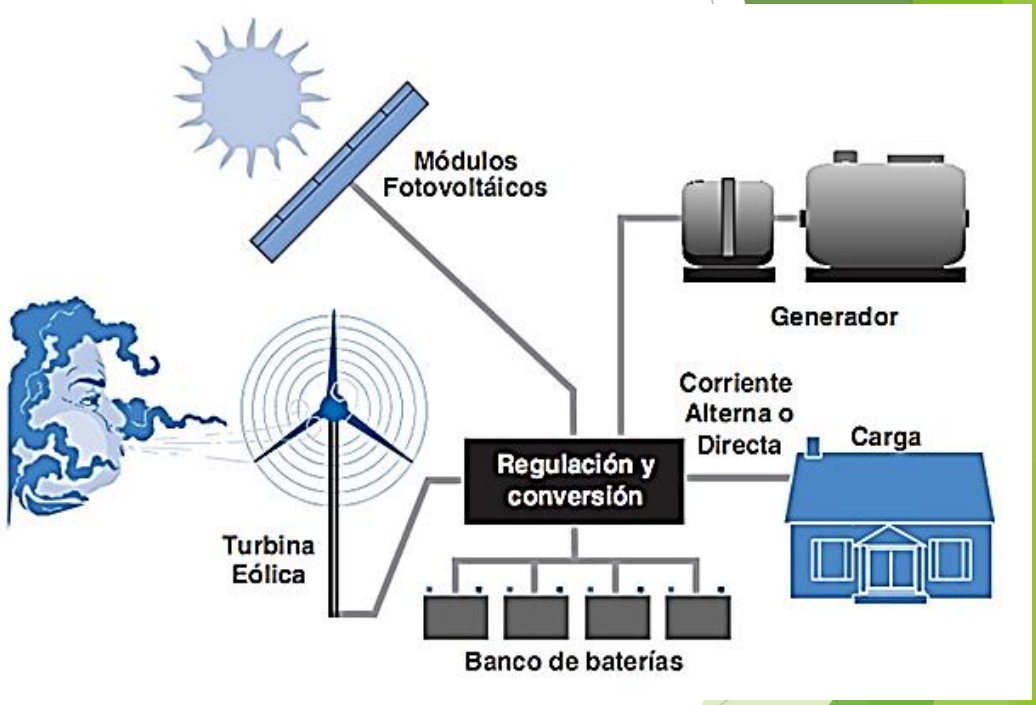
- Power Generators
- Electric power supplied
- Location and height
- Average annual wind speed
- Power Density
- Average useful power and electrical energy to be supplied
- Practical numerical assumption

Thermal solar energy

- Solar radiation
- Solar radiation incident on a pickup
- Performance of a pickup
- Balance between useful and demanded power
- Practical numerical assumption

Photovoltaic Solar Energy

- Solar radiation and electrical energy
- Photovoltaic Cells and Panels
- Isolated installations
- Switching facilities
- Hybrid installations
- Practical numerical assumption



5. Example of good practices: the case of Serra

5.1. Context

BASIC DATA	
Provincie	Valencia
Altitude (m)	330
Surface (Km^2)	57,29
Population density (habitants/Km^2)	54,84
Population (2015)	3,142

ACTIVE ENTERPRISES 2016 (Except primary sector)	
Industry	9
Building	39
Services	171
Total	219

5.1. Context

Field phase

- Landscaping pruning waste -
Public mount (pine)

Plant stage

- Chipped -
Pellet Processing

Operation

- Municipal buildings
- Sale (housing and industry)

5.2. Technological solution

- Central heating by 35 KW multi-fuel boiler with cast aluminum radiators

Starting data

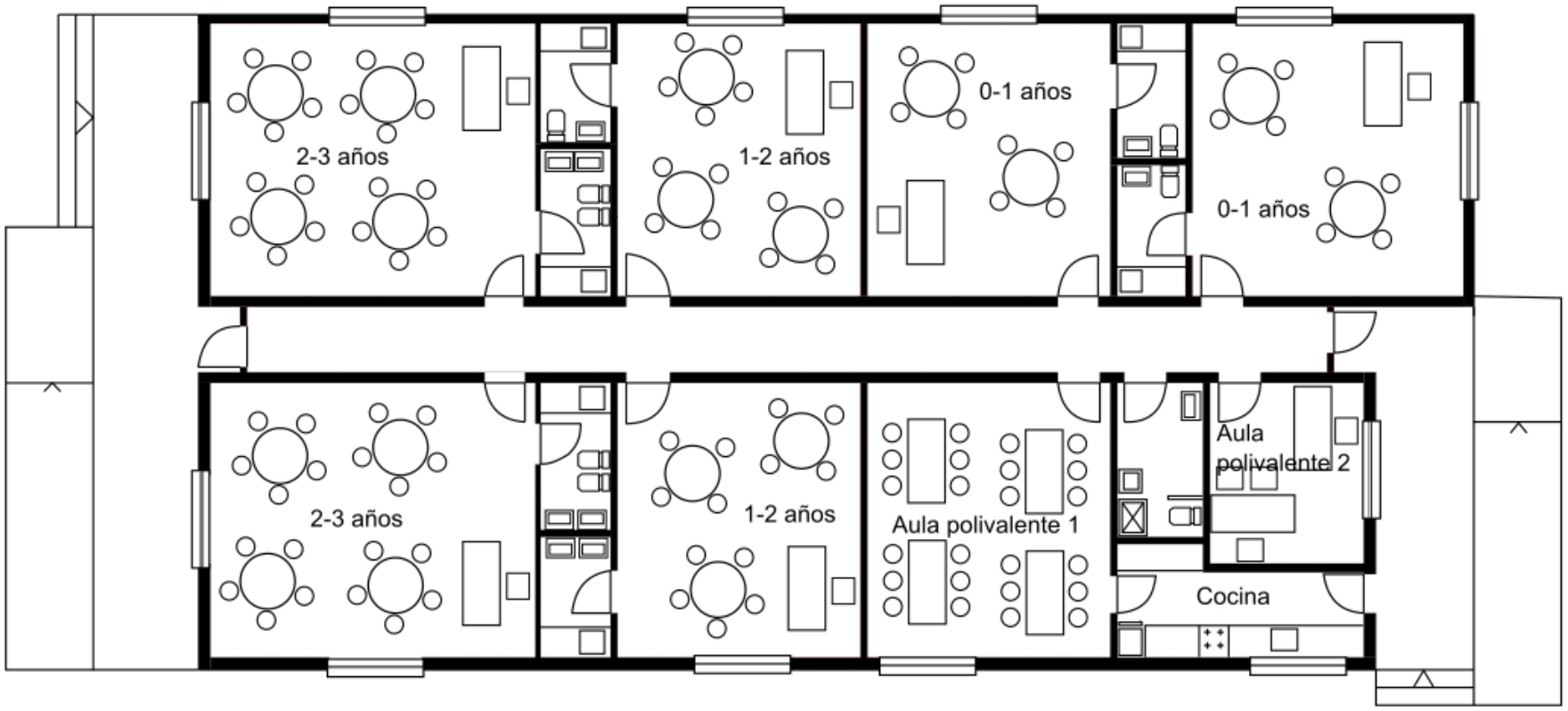
Boiler room

Superficies Construidas (m²c)

	Planta Baja
AULAS 0-1 AÑOS	71,31
AULAS 1-2 AÑOS	66,21
AULAS 2-3 AÑOS	90,57
ASEO PERSONAL	6,97
ASEOS AULAS	30,12
COCINAS	12,94
SALA POLIVALENTE	14,71
SALA USOS MÚLTIPLES	33,10
DISTRIBUIDOR	39,71
TOTAL	**365,64**

Thermal gradient: 24ºC
Insulation: Good
Operation: Intermittent

Distribution



ESCUELA MUNICIPAL DE EDUCACIÓN INFANTIL

ESCALA GRÁFICA 0 1 2 3 4 5 metros

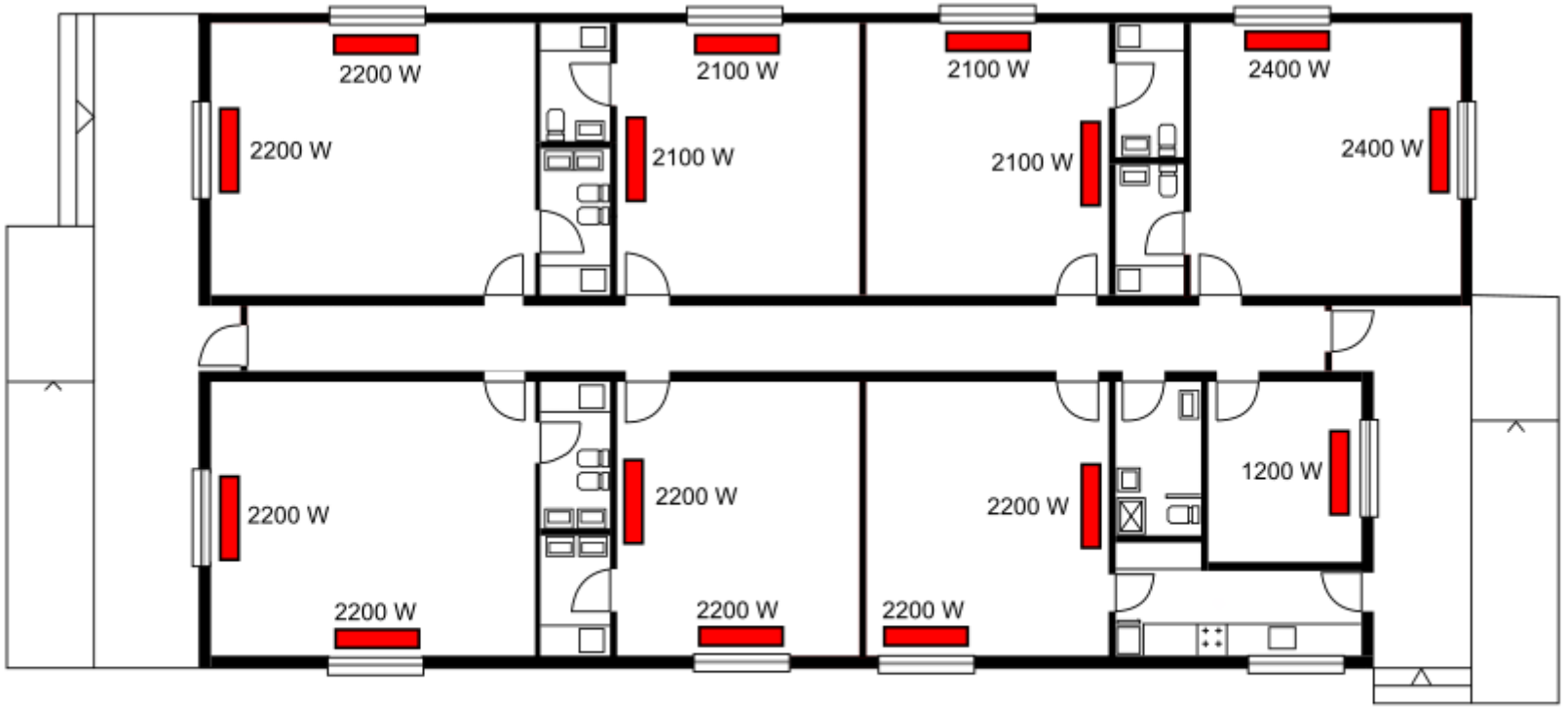
Boiler power verification

Thermal power density in W/m2 required in rural housing. Own elaboration based on the standard NBE-CT-79

INSULATION TYPE	IK	DT	W/m² según la orientación				
			S	O	E	N	Media
With thermal panel and double glazing	1	20K	39	55	59	63	54
		24K	47	66	71	76	65
Air chamber and single glazing	1,5	20K	65	70	74	79	72
		24K	86	92	99	105	96

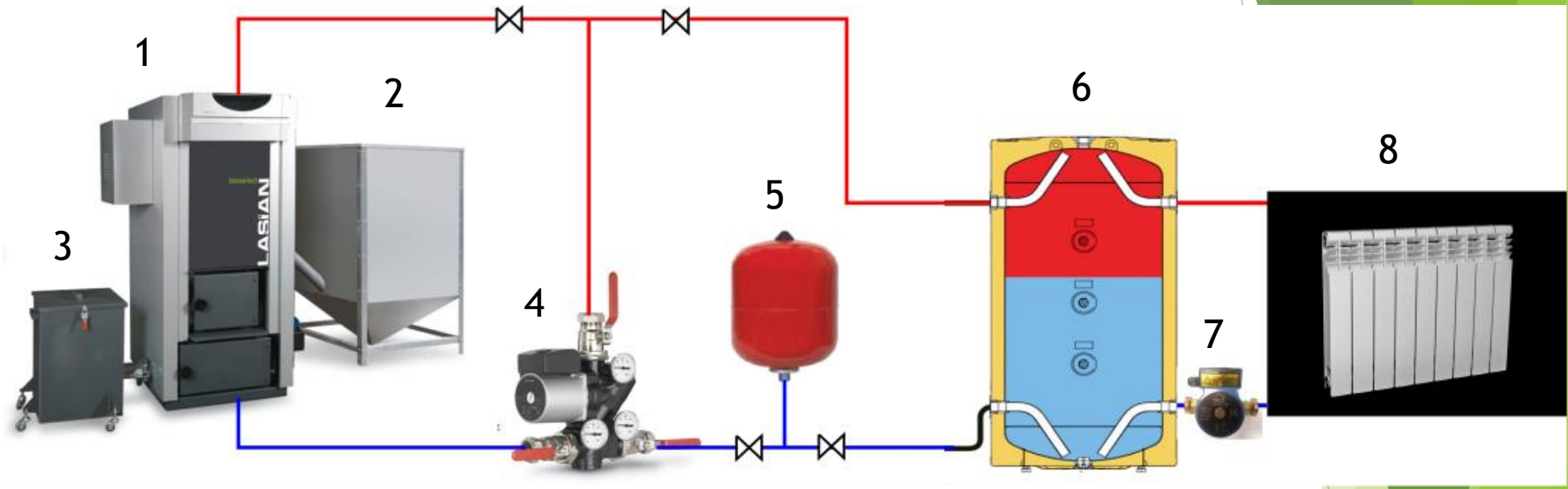
- Constructed area S = 365,64 m2
- Density of power according to table: 76 W/m2 for orientation N, high insulation and intermittent use
- Minimum power: 365.74 x 76 W/m2 = 27788 W = 27.78 KW
- Selected boiler: LASIAN Bioselect 35 Plus, 35 KW

Verification of thermal emitters



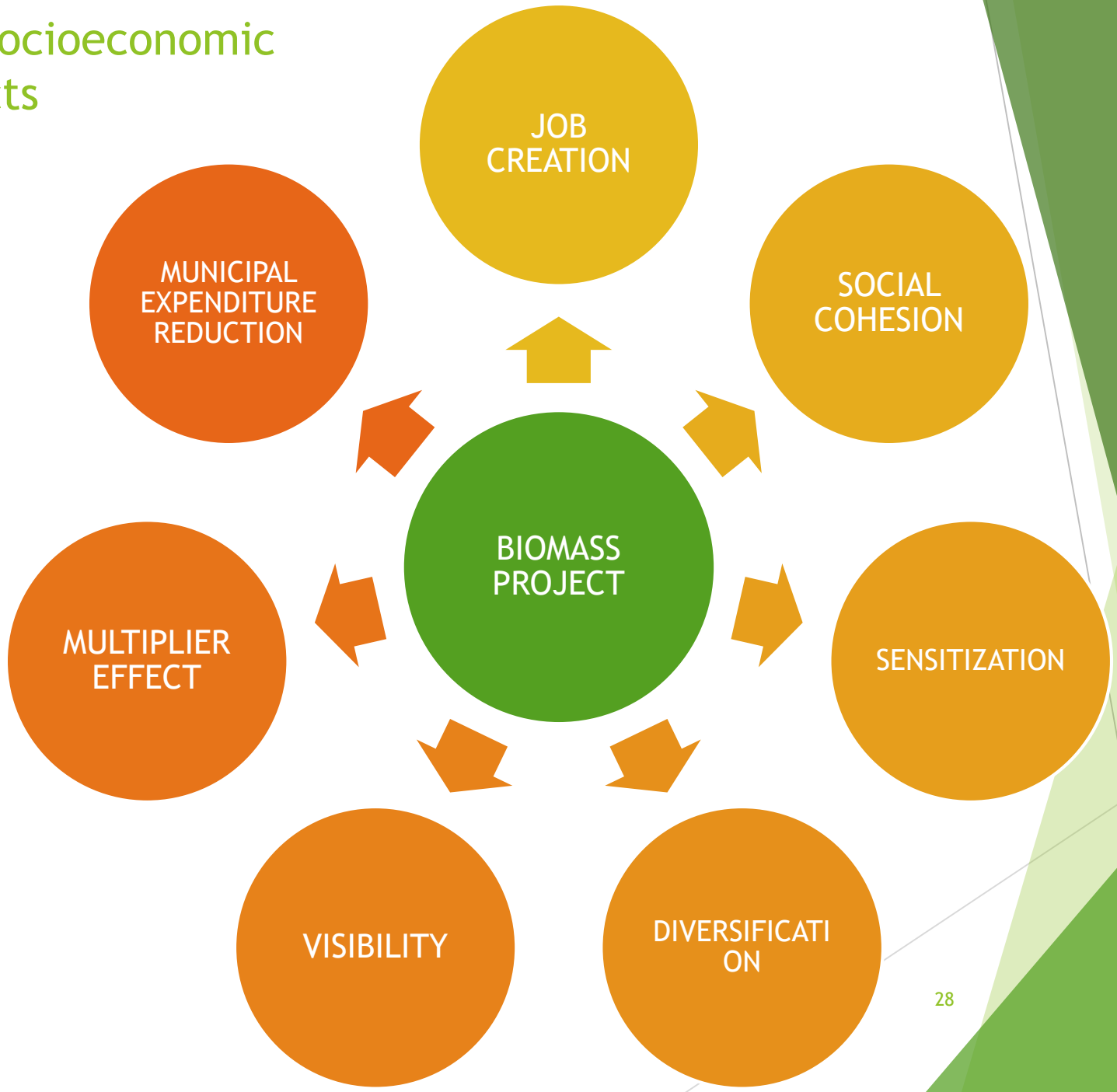
POTENCIA EN RADIADORES CON DT 50ºC = 27,2 KW
POTENCIA CALDERA = 35 KW
PÉRDIDAS 10% = 3,5 KW
POTENCIA DISPONIBLE = 30,7 KW (>27,2 KW)

Diagram



1. Boiler
2. Fuel silo
3. Ash collection
4. Primary circuit accelerator
5. Glass of expansion
6. Inertia tank
7. Secondary circuit accelerator
8. Radiators

5.3. Socioeconomic impacts



5.3. Impactos ambientales

6. Projection

- In the framework of the IN2RURAL Project
  - Publication as an open educational resource
  - Dissemination of the English version

- As of September 2017
  - Translation into local languages
  - Presentation and dissemination
  - Design of new instruments (eg checklist, indicators)
  - Link with training in small municipalities

Thank you so much for your attention ☺

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