



### Project information

Project type:	New eco-dwellings
Address:	Manuel AltoAguirre 4,6,8 Tudela
End construction year:	2011
Building type:	Apartment row houses
Dwellings:	46
Storeys:	3
Gross area BTA:	6276 m <sup>2</sup>
Net area:	4130 m <sup>2</sup>
Heated area:	4342 m <sup>2</sup>
Additional costs* for eco-applications:	642.960 €
Total building costs*:	2.644.890 €

\* Not included industrial benefits, overheads and taxes

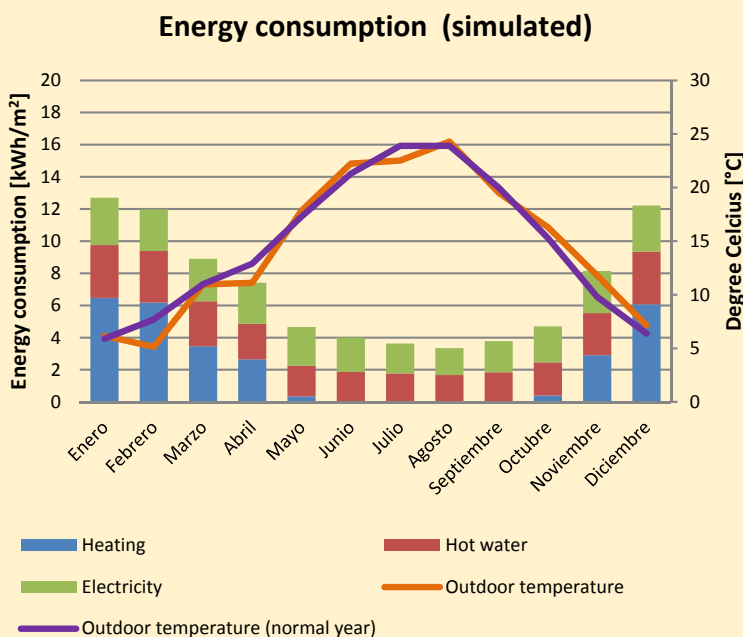
### Special ECO-technologies applied:

- Optimization of window type
- Passive solar
- Avoidance of thermal bridges
- Increased insulation in roof, floor and facade
- Intelligent control system (TIC) for DHW+Heating
- Individual measurement system
- Improved air tightness of building envelope
- ECO-materials (mineral wool insulation and wood frames for the windows)
- Biomass powered DHW+Heating



### Energy consumption

#### \* National Regulations (2006)



Heat trans.	Unit	National reg.*	Concerto spec.	Actual
Outerwall	W/m <sup>2</sup> K	0.66	0.3	0.26
Roof	W/m <sup>2</sup> K	0.49	0.2	0.17-0.18
Floor	W/m <sup>2</sup> K	0.49	0.25	0.24
Windows (north)	W/m <sup>2</sup> K	3	-	-
Windows (south)	W/m <sup>2</sup> K	3.5	-	-
Glazing	W/m <sup>2</sup> K	-	1.6	1.4
Vent. rate	h <sup>-1</sup>	1	0.5	0.5

Energy consumption	Unit	National reg.*	Concerto spec.	Actual 2012
Heat	kWh/m <sup>2</sup>	56.1	31.5	-
Hot water	kWh/m <sup>2</sup>	18	14.5	-
Electricity	kWh/m <sup>2</sup>	23	15.5	-
<b>Total</b>	<b>kWh/m<sup>2</sup></b>	<b>97.1</b>	<b>61.5</b>	<b>-</b>

### ECO-City project partners

## Lessons learned:

- Designer subject to urban regulations, buildings cannot be optimally oriented. As a result, savings could be higher.
- Since these were private property developments, public administrations have been unable to have an influence on the design. As a consequence of the little know-how in bioclimatic architecture of private architects, design geometry is not optimal although concerto specifications have been successfully achieved.
- Extra costs due to energy efficiency improvement measures have been lower than expected.



## Key figures

Heat trans.	Unit	Normal practice	Concerto spec.	Actual
Outerwall	W/m <sup>2</sup> K	0.66	0.3	0.26
Roof	W/m <sup>2</sup> K	0.49	0.2	0.17-0.18
Floor	W/m <sup>2</sup> K	0.49	0.25	0.24
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Glazing	W/m <sup>2</sup> K	–	1.6	1.4
Vent. rate	h <sup>-1</sup>	1	0.5	0.5

Energy consumption	Unit	Normal practice	Concerto spec.	Actual 2012
Heat	kWh/m <sup>2</sup>	56.1	31.2	-
Pipe losses	kWh/m <sup>2</sup>	Inc	Inc	-
Ventilation	kWh/m <sup>2</sup>	Inc	Inc	-
Hot water	kWh/m <sup>2</sup>	18	14.5	-
<b>Total heat</b>	<b>kWh/m<sup>2</sup></b>	<b>74.1</b>	<b>45.7</b>	-
Lighting	kWh/m <sup>2</sup>	Inc	Inc	-
Other	kWh/m <sup>2</sup>	Inc	Inc	-
<b>Total elec.</b>	<b>kWh/m<sup>2</sup></b>	<b>23</b>	<b>15.5</b>	-
<b>Total</b>	<b>kWh/m<sup>2</sup></b>	<b>97.1</b>	<b>61.2</b>	-

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