Survey on existing European virtuous districts – Short version

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Summary

1. Objective of this survey

"This activity will aim at establishing a benchmark of virtuous European and national districts by setting up Key performance Indicators (KPI) for energy consumption (heating, cooling, specific electricity...), GHG emissions and RE production (annually, monthly and even daily) and correction methods for like-for like comparison (surface, weather, activities....). This benchmark will be based on a minimum of 10 districts."

The 1st deliverable of the Working Package 7 (Energy performance evaluation methodology) is to carry out an inventory of the energy performance of European eco-neighbourhoods. This inventory focuses mainly on analysing the objectives initially set (particularly in terms of energy consumption and production) in relation to the performance actually achieved. The aim is to compare the ambitions of the Clichy-Batignolles district with other European districts. In addition, we also investigated whether the energy consumption drifts observed in the eastern sector of the district can be generalized to other European districts. This work will also identify good evaluation methods which could inspire the CoRDEES project.

2. Complexity of district comparison approach

Today, the information made available on these new districts is very heterogeneous, with a variable level of information and different key indicators from one district to another (total energy consumption, heating consumption, final energy, primary energy...). The data are sometime not sourced and the methods used for calculating these indicators are not explained. Harmonization of districts assessment methods (and the information provided) seems to be essential at European level. Conscious of this reality, we have opted for a compromise between a quantitative analysis of energy data and an overall understanding of the issues facing the studied districts. In addition, we choose to focus this work on the comparison between real energy performance and the theoretical performance of district.
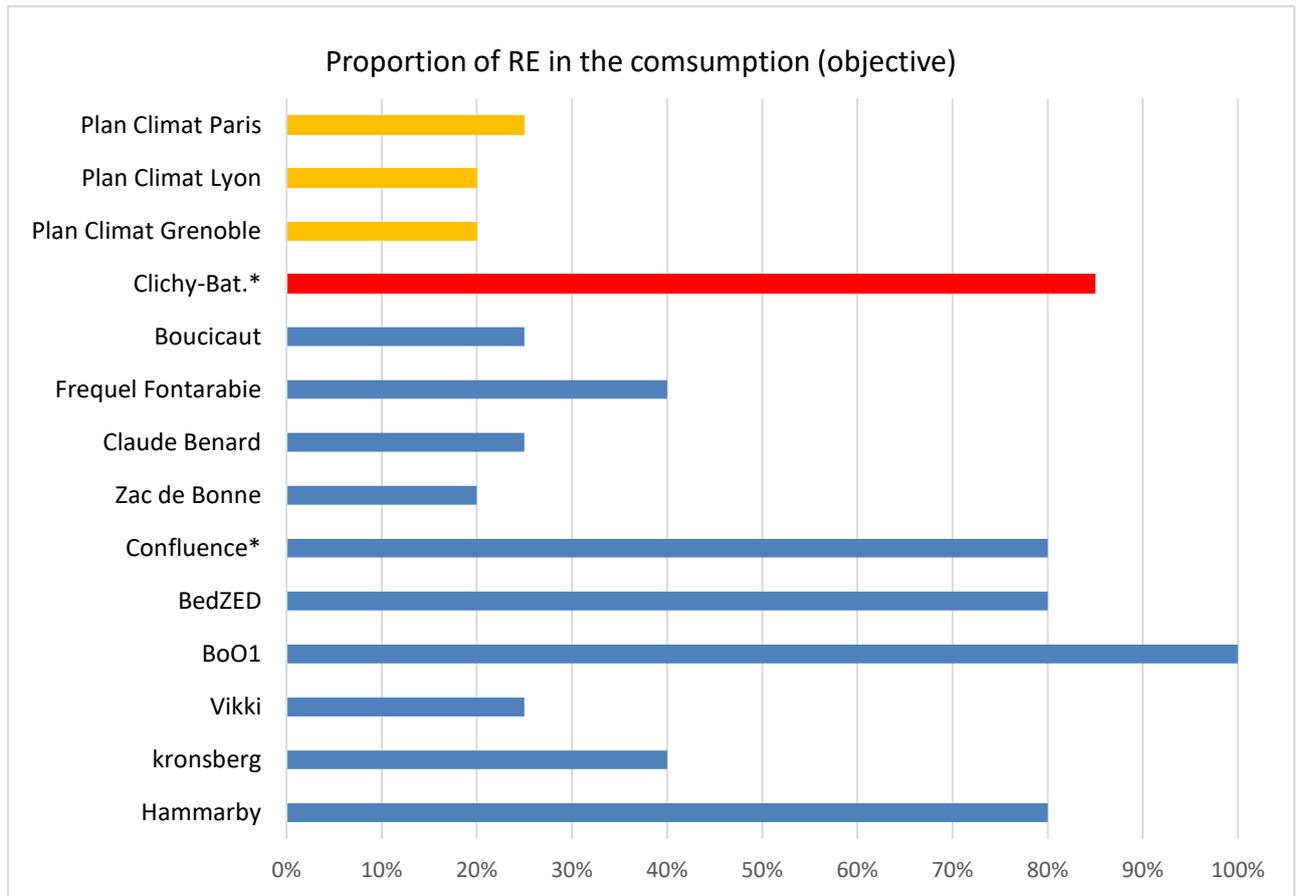
Figure 1 : Objective of RE consumption ratio in European eco-districts

In the first group, it can be observed that five of the six districts were built before 2005 (BedZED, BoO1, Hammarby Sjöstad, Zac de Bonne and Renaissance) and at least three years before the adoption of the Climate and Energy Package by the European Union (figure 1). In comparison with the objectives of the climate plans of French cities such as Grenoble, Paris and Lyon, it can be seen that the RE (Renewable Energy) coverage of this first group is at least twice as high as the objectives set. This shows that some older projects were already ahead of today's standards and the need for more "virtuous" district to achieve citywide objectives. Analyses of the technological choices made in these districts provide a better understanding of the differences between the objectives (see full report). However, few neighbourhoods have separate RE coverage targets for heating and electrical use.
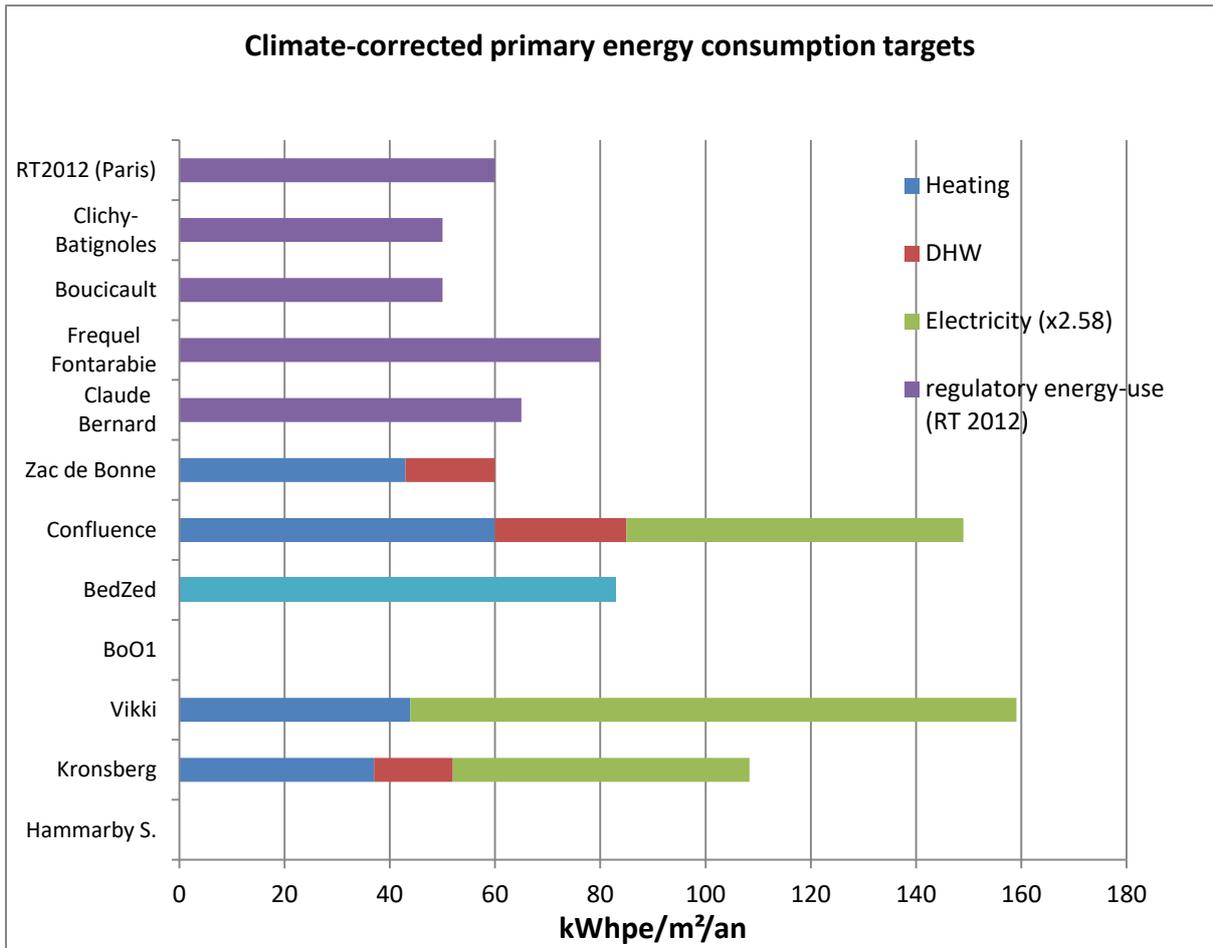
Climate-corrected primary energy consumption targets

Legend:
- Heating
- DHW
- Electricity (x2.58)
- regulatory energy-use (RT 2012)

Districts (top to bottom): RT2012 (Paris), Clichy-Batignoles, Boucicault, Frequel Fontarabie, Claude Bernard, Zac de Bonne, Confluence, BedZed, BoO1, Vikki, Kronsberg, Hammarby S.

X-axis: kWhpe/m²/an (0 to 180)

Figure 2 : Energy consumption target in European eco-districts

Figure 2 shows energy consumption targets for 9 European eco-districts. Like the RE coverage objectives, the majority of eco-neighbourhoods are ahead on regulations at the time of project launch. Taking the 2005 French thermal regulations as a baseline, it can be seen that all projects prior to 2005 set a higher requirement level than the thermal regulation. The RT2005 required a maximum level of 190 kWhPE/m² and all the projects in question have targets for heating and domestic hot water of less than 100 kWhPE/m². On the other hand, this is less true for more recent eco-neighbourhoods built after 2010. The objectives set for these districts converge with the RT2012 (French building regulation).
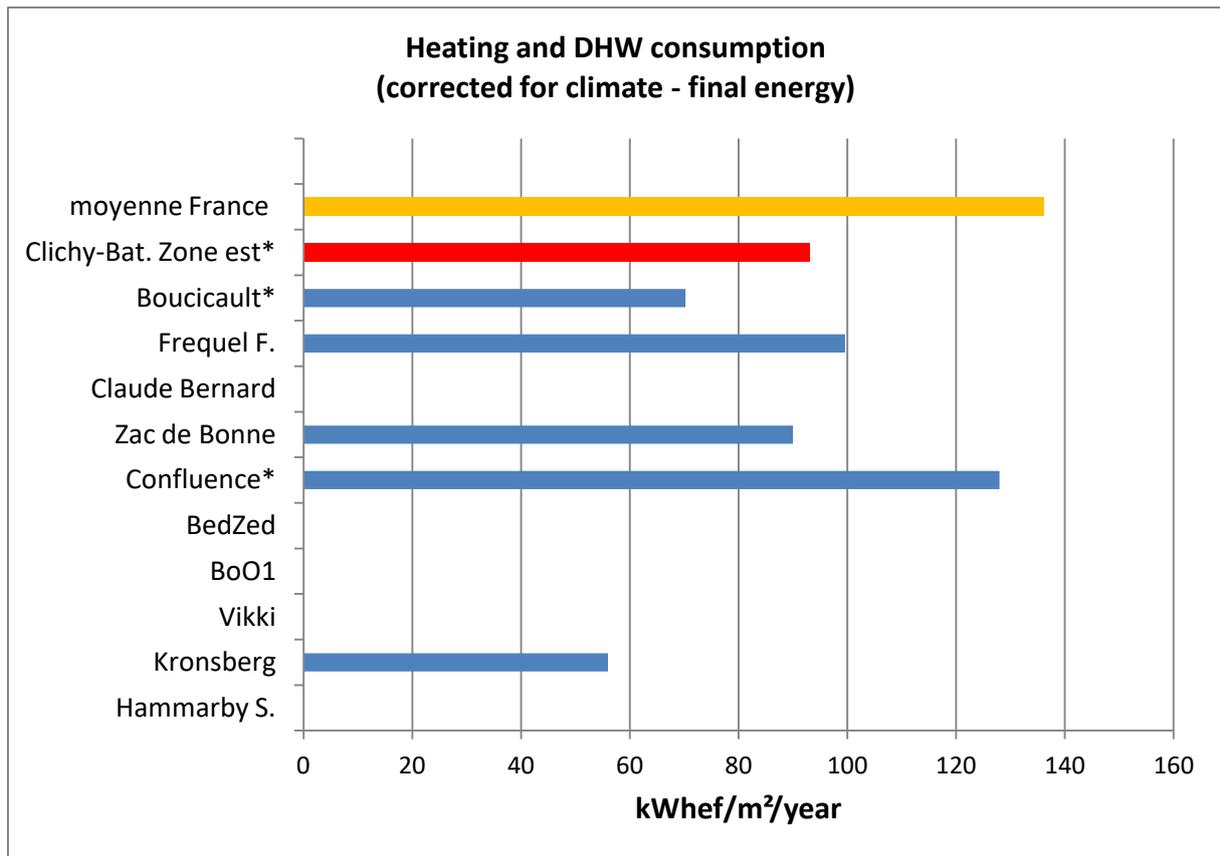
Figure 3 : Measured Heating and DWH consumption in European eco-districts

In figure 3 it can be seen that all the European districts studied have a lower consumption than the average French consumption for all buildings combined. The initial objective was to create more energy-efficient neighbourhoods. However, this conclusion should be put into perspective, since this figure also includes very poorly isolated buildings built before the 1st thermal regulation. This observation shows that the buildings designed in the studied eco-neighbourhoods are part of a higher energy performance dynamic than conventional buildings. Even if we do not have national data for the other countries studied, it is legitimate to think that this observation is also valid for the other countries.

3. *Draft from initial objectives*

For all the studied districts, a calculation of the deviation from the initial objectives was carried out and provided when the data was available. For some of them, actual consumption data and consumption targets do not coincide.

Heating needs	Bonne	Confluence	Kronsberg	Vikki	Clichy-Bat.
objective FE kWh/m²	43	60	50	105	15
measurements FE kWh/m²	63	100	56	120	59
deviation (%)	46	67	12	14	293

Table 1 : Draft between objectives and measurements for heating consumption

There is a 12 to 300% difference between the initial targets and the measured heating performance for the studied district. Other energy end-uses are not discussed in this section because there is too much missing information to calculate deviation from targets. Today, even if the East zone of Clichy-Batignolles differs by 300% from the heating consumption targets, the absolute value remains far below from the national average and close to the other French eco-districts. These differences are discussed in the full report.

4. *Conclusion*

More than a detailed analysis of each eco-neighbourhoods, this report aims to draw up a general overview of the European situation. The small sample size of the studied districts cannot be considered a statistical representation good enough to draw strong conclusions. The heterogeneity of the data collected and the doubts about their reliability also tend to this remark. Aware of these limitations, the following lines summarize the main conclusions of this study and open up topics for further reflection for the CoRDEES project.

This report made it possible to compare Clichy-Batignolles with other European neighbourhoods on two main points: the renewable energy coverage in the district and the energy performance of the district's buildings. From the point of view of renewable energy coverage, the objectives set for the district are demanding and in line with the other eco-neighbourhoods studied. With an overall RE coverage target approaching 60% (85% for heating and DHW), Clichy-Batignolles ranks among the most ambitious neighbourhoods in the sample. In terms of energy consumption in buildings, the district's objectives are also consistent with those of other European districts. The final point concerns the fulfillment of initial commitments. Initial commitments are not achieve, with the exception of the oldest eco-neighbourhoods, which all have a smaller gap between actual and expected performance. These better performing neighbourhoods are now mature and have had time to make some corrections on potentially faulty systems like Kronsberg in Germany. Clichy-Batignolles is a neighbourhood still under construction and the first inhabitants are just discovering their buildings. This

drift should be reduced after this launch period and the CoRDEES project will lead to a more global reflection on the subject.

Annex: description of districts

	Zac de Bonne	Confluence[1]	Claude Bernard	Frequel F.	Boucicaut	Hammarby S.	Kronsberg	Vikki	BedZed	BoO1	Clichy-Bat.
Start of works	2006	2005	2009	2009	2009	1994	1995	1998	1999	1997	2010
End of works	2012	2010	2015	2015	2016	2010	2000	2004	2002	2001	2020
Number of inhabitants	4000	3500	3000	300	1300	20000	15000	1920	249	2684	7500
district area (ha)	8.5	4.2	14	1.7	3	200	61	30	1.7	22	54
number of dwellings	850	620	675	109	510	12000	3150	-	100	1303	3400
social housing	35%	25%	30%	100%	57%	-	-	-	25	0	50%
Tertiary surface area (m²)	25000	18000	59675	545	6497	25000	-	-	-	0	140000
Land use coefficient (aprox.)	0.28	0.29	0.19	0.51	0.42	0.26	0.21	0.26	0.35	0.18	0.37*
floor area ratio (aprox.)	1.32	2.28	0.96	1.88	1.21	1.7	-	1.44	0.82	1.96	1.7*
Compactness factor	0.45	0.34	0.48	0.61	0.37	-	-	-	-	-	-
Average height (m)	18.15	25.3	15.26	11.58	12.3	19	-	15.5	7.5	-	19.6*

*regulatory energy-use

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[1] Zone de la Zac de la Confluence, projet Concerto