



**Analysis of the social aspects before the
different POLYCITY applications in
Arquata, Torino**

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Summary

The report presents the results highlighted by the first application of the preliminary socio-economic framework developed during the first months of Polycity project. The framework was described in detail in the past deliverable RI 3.1.

The socio- economic framework consists of four main elements:

- objective and subjective indicators;
- methods to collect data;
- methods to analyse data;
- communication plan

During the present phase, methods to collect data and to analyse them were applied, moreover an effective communication plan was developed.

Through survey and diaries, subjective data were collected from a representative sample of Arquata Inhabitants.

Thanks to statistical analysis a "picture" of the quarter was carried out.

In particular the information collected are:

- demographic description of Arquata Inhabitants;
- general attitudes citizen showed towards their district before Polycity interventions and during first applications of some interventions;
- energetic and thermal consumption of the quarter.

The report is divided in the following chapters:

- in the first chapter a general description of the organization of socio-economic framework has been given;
- the second chapter describes the general approach adopted to develop all the socio-economic studies;
- the third chapter gives a detailed explanation of the method used to collect the main results of this first application;
- the fourth chapter describes in detail the obtained results;
- the chapter five provides general conclusions and further application for the future socio-economic POLYCITY work.

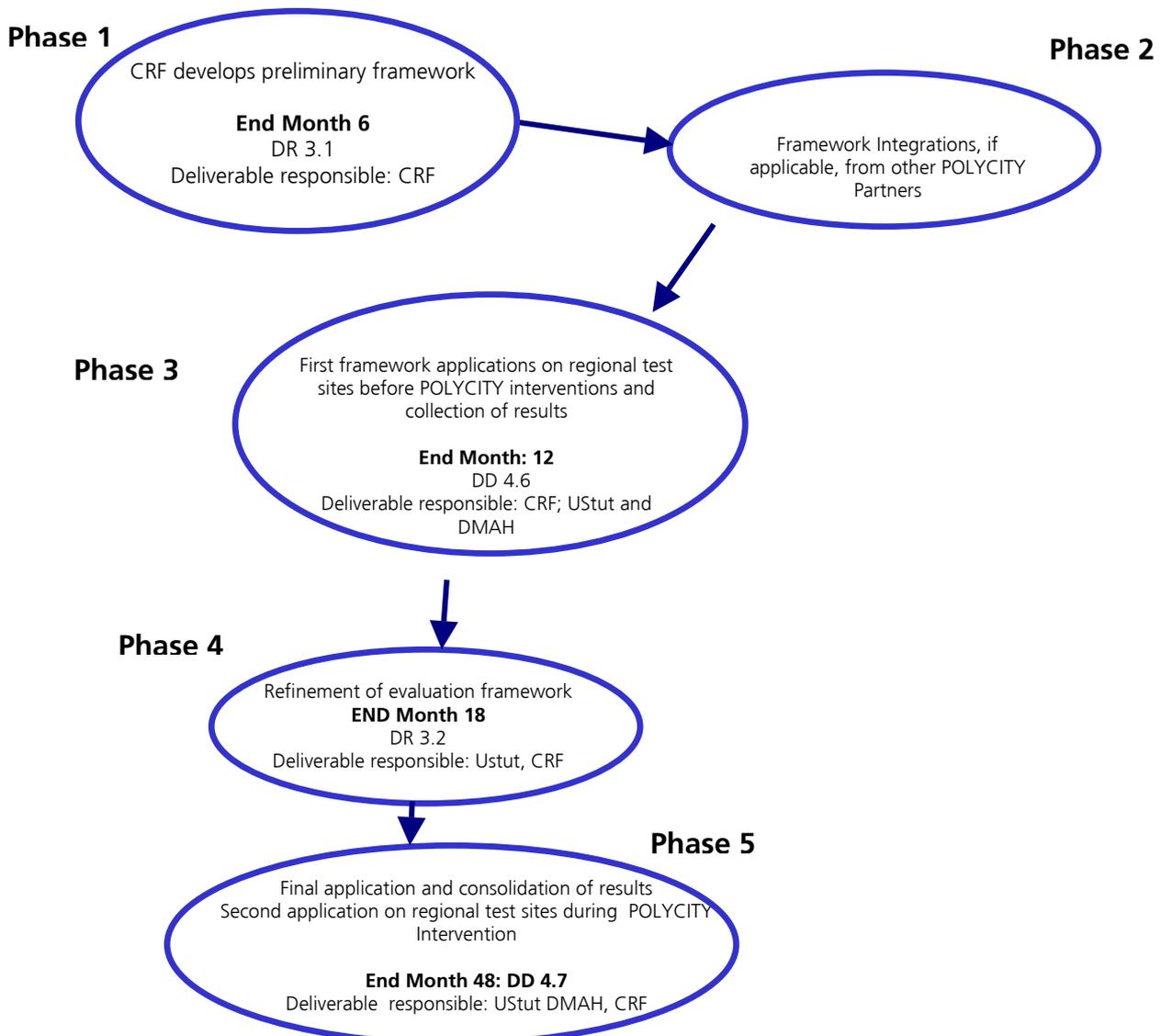
1 Socio economic Research

1.1 General organization

The socio-economic research in POLYCITY has the following aims:

- to create a common framework for assessing and comparing the social aspects of the urban development projects in the energetic field;
- to define criteria and indicators for the sustainability of the innovations;
- to analyse changes in socio-economic parameters due to the innovations, e. g. quality of life, income, employment, added value, attractiveness of the area;
- to understand the perception and attitude of the citizens and stakeholders towards the innovations introduced in the service and technologies (risks, expectations, apprehensions, reluctance etc.);
- to help the actual final users to understand and use new technologies.

The general schematic organization of the socio-economic study is the following:



The present report concludes Phase 3 of the research.

In particular, the framework developed during phase 1 and 2 was applied and the first preliminary results were here analysed. The next step (phase 4) will be to transform the collected data in general indicators, that could be used also in other context. These data will be worked out through adequate statistical analysis and they will build the social and economic indicators for the final general socio-economic framework of Phase 5.

2 General approach of socio-economic research

As deeply described in deliverable RI 3.1, CRF applied and is applying a User-Centred approach in Polycity Project. This approach is a consolidated methodology for ergonomic design of products and services. Such approach involves, in every stage of the framework developing process, all the relevant users and stakeholders of the value chain of the energy services.

All the instruments proposed have been created using an iterative approach. It means that a preliminary version has been defined, then this version was shared with experts and final users in order to refine it, and an updated version has been, at the end, produced.

Different actors have been involved in order to develop the socio-economic research: Fiat Research Centre, Agenzia di Sviluppo di Arquata, ATC, Politecnico di Torino, AEM. Each partners had different competencies and roles.

For a detailed description of each role see deliverable RI 3.1, chapter 2.2.

3 First application of the framework in Italy site

The first application of the framework was done during the installation of some Polycity interventions (public lighting and district heating). So, we consider the data collected so far as a picture of the very first impact of the Polycity project on the test site. The work of framework first application lasted about four months from November 2005 to the end of February 2006.

Three main aims were reached:

- the development of a communication plan;
- the collection of social information:
 - o demographic characteristics of the involved sample;
 - o attitudes towards the quarter;
 - o opinions and expectations towards new Polycity interventions;
 - o general attitudes of Arquata Inhabitants towards environment in general.
- the collection of economic information:
 - o economic impact on Arquata Inhabitants;
 - o economic impact on entrepreneurial subjects.

The social information were collected through the application of survey method (see 3.1).

The economic information, on the other hand, were gathered through data collection from inhabitants, interview with stakeholders and simulation of energetic parameters (see 3.3).

In the following the different methods used to reach the three aims are described.

3.1 Method for communication plan

Communication for Italian Polycity project means:

- to inform;
- to form;
- to involve.

Different steps were followed for the definition of the plan.

Brief planning

The communication project started from the **brief** planning, a document which collects information, aims and clients' requests for the communication plan.

The aim of our brief was to provide to the creative team with all the necessary information in order to develop the communication image.

Different information were collected and defined to develop a specific brief:

- *Polycity background;*

European Partners had already developed:

- o a web site www.policity.net;
- o english informative leaflets describing Polycity project and European Partners

- *The receivers of the communication plan*

Three categories of receivers were identified:

- o Arquata Inhabitants (100 families participating in the survey and, in general, all the people living in Arquata district);
- o Turin community (wider public, local institution);
- o Polycity Italian Partners and other sector experts

- *The communication tone*

- o As most of receivers are principally families and retired so people not experts, not too much interested in the topic, diversified for ages and for education level, we chose a communication tone informative, not intrusive, simple, familiar and engaging.

- *The keywords to develop the general image of the plan*

- o Positiveness
- o Warmth
- o Sustainability

- Collaboration
- Renewable Energy
- Community
- Europe
- Usability
- Saving

- *The mandatory points*

The graphical interface has to take into consideration the following information:

- POLYCITY Logo
- Corporate Color Blu of POLYCITY and also of European Community
- UE and Sixth Framework Programme (FP6) Logo
- Italian Polycity Partners Logos

- *The advised points*

Another aspect to be considered was the logo "Magic Sun" of "Agenzia di Sviluppo di Arquata".

The Agency is the hearth of Arquata district social activities and the "bridge" between Arquata and the socio-economic Polycity Project. So their logo is an important point of reference for all inhabitants. Using something which remembers the "Magic Sun" could help Polycity to became more familiar in Arquata.



Figure 1: the logo "Magic Sun" of Agenzia di Sviluppo di Arquata.

Definition of a general concept

Another step was to define the general idea at the basis of our plan: a cross concept present in all instruments of the communication plan.

The general concept developed was:

POLYCITY chooses
Arquata as ideal
development environment

POLYCITY provides
Arquata a new added
value

POLYCITY
FOR ARQUATA

From a graphical point of view the following image was defined to characterize each communication instruments:



Figure 2: graphic concept for Polycity Italian site.

The image used to communicate the presence of the POLYCITY in Arquata is a dawn behind a city skyline. The green skyline is a revision of POLYCITY logo.

The meaning is the feeling of flats enlightened by the sunshine.

The sun is a recurring symbol for the energy field, so it has been used also to talk about renewable energy.

The colours want to suggest positiveness, warmth, environment and respect.

At the end, a mascot was developed to improve the engaging of the communication and to make the communication nearer to district Inhabitants.

His name is Polycity and he is the spokesman of the Project contents for Arquata Inhabitants.

He wears the Polycity colours



Figure 3: Italian Polycity mascotte.

Choice of the suitable communicative strategies

The choice of the suitable instruments for the communications towards different target users came at the end of the former phases.

Also in this case an iterative process was followed.

Different aims for different target users were decided and some devices were chosen. A designer developed different graphical proposals, a group of psychologists and ergonomics experts overhauled the proposal. At the end of this phase, some naïf users read all the instruments and gave their comments about the comprehensibility of the messages. At the end of the process, the final instruments (see 4.1) were produced and printed by a typography.

3.2 Method for social information

The survey method was applied during this project phase to collect social data. In particular the **household drop-off survey** was used. Following this approach, the group of interviewers, adequately instructed by CRF and Agenzia di Sviluppo di Arquata¹, went to the respondent's home and delivered personally the instruments in their hands. Moreover, each interviewer joined the participants during the filling of the questionnaire in order to clarify doubts and to decrease as much as possible the number of missed answers.

3.2.1 Instrument

The survey instrument was a questionnaire with closed and open questions. Also for the developing of this instrument an iterative process was followed in order to adapt it to the real characteristics of participants.

Draft version of questionnaire was shared with representative of Arquata Inhabitants and experts of Agenzia di Sviluppo di Arquata. They gave CRF a fundamental feedback concerning the suitability of the questionnaire. Each question was analysed and evaluated by Arquata representative with a comprehensibility five point scale (1 = not comprehensible at

¹ As already reported in deliverable RI 3.1, the Agenzia di Sviluppo di Arquata was created in 2000 as a spin off of an urban development initiative promoted by the municipality of Turin.

The agency purpose is to help Arquata inhabitants to cope with the requalification programs, acting as an interface between the citizens and the public institutions involved in the requalification process.

Its role in the Polycity project was:

- to involve the Arquata citizens in POLYCITY;
- to help CRF team in the collection of subjective indicators through one to one interviews to a group of inhabitants;
- to help CRF in the organization and diffusion of a communication plan.

all, 5 = very much comprehensible). The question with a score below 3 point, was re-written or deleted.

The final questionnaire was divided in the following sessions:

Demographic description

Data related to the following dimensions were collected both on people interviewed and on people who live with them:

- sex,
- age,
- level and type of instruction,
- employment,
- description of the relationships among people living in a singular dwelling,

Flat's characteristics

- floor of the flat,
- number of rooms,
- involvement in the POLYCITY project,
- presence of photovoltaic panels on the rooftop of the building,
- rented or privately bought flats,
- previous and actual heating system in the flat.

Knowledge about interventions carried out on flats, buildings and district during the last ten years

Attitudes

Towards the district

The evaluation is done on different dimensions: security, modernity, cleanness, noisiness, acceptance, accommodation, dynamicity.

An eight items questionnaire was then developed with a seven-point scale.

Towards environment

The evaluation is done through a reduced version of the New Ecological Paradigm (NEP). A 13 items questionnaire based on 5 point Likert-scale was adopted.

Towards new energetic systems

Three aspects are investigated:

- knowledge of people about co-generation and distributed generation,
- availability to use clean energy at home,
- availability to pay something more in the bill in order to use clean energy,
- interest in using an independent generator of electric energy in the district.

Expectations towards interventions

The evaluation is done on the following dimensions: improvements on personal quality of life, improvements on district quality of life, reduction of costs and consumption, reduction of environment pollution, reduction of air pollution, reduction of risks, improvements of dwelling acceptance.

Nine items questionnaire based on 5 point Likert-scale was developed.

Satisfaction of local context

Different aspects will be taken under consideration.

- *Sense of community*

Sense of community scale (SOC) is used. An eight questions instrument based on 5-item Likert-scale was used.

- *Sense of involvement in the district changes*

Three questions about adequacy or insufficiency of type and quality of information about new energy interventions in the district are presented.

- *Quality of service²*

Some questions about quality services located in the district and in the nearby zone were asked.

In particular, the following services were evaluated:

- public transport,
- grocer's shops,
- clothes shops,
- pub/ coffee bar,
- restaurants,
- cinemas,
- recreational centre,
- gyms,
- help desktop,
- parkings,
- public gardens,
- schools,
- sanitary services (hospitals, surgeries).

Opinions about interventions

On interventions in general

Three aspects are investigated:

- impact of interventions on daily life of the district,

² Freely adapted from **Indicator 1** "Citizens' satisfaction with the local community", pag 40. Ambientitalia, European Common Indicators.

- the worst aspects of the carried out interventions,
- the best aspects of the carried out interventions,

On new installations of public lightings

Three aspects are investigated:

- adequacy of the new lighting situation ,
- improvement or decline of night-time visibility,
- general satisfaction about the lighting installation.

On personal heating systems

Different questions are proposed, listed below according to the object under evaluation:

- description of personal heating system;
- satisfaction of **personal heating**, on the basis of the following dimensions:
 - security
 - cost
 - noisiness
 - reliability
 - utility
 - level of ecology
 - cleanness
 - tidiness
 - satisfaction
- Satisfaction of **heating equipment**, on the basis of the following dimensions:
 - size
 - security
 - easiness to use
 - modern
 - easiness to clean
 - easiness to repair
 - comfortable to use
 - well-built
- **Impact of heating on house living**, on the basis of the following dimensions:
 - cleanliness
 - tidiness
 - warmth
 - dryness
 - suitable for children
 - suitable for Elderly
 - suitable for adults

A semantic-differential on a 7 point-scale were used for all the items.

At the end of the session a general evaluation of the heating system was requested on a 10 point-scale.

Opinions based on memory regarding the former heating system

This part is carried out only for participants with new installations.

Questions similar to those of the session “opinions on personal heating system” were requested. Object of evaluation is the former heating installation, that was replaced by the systems of POLYCITY.

3.2.2 Sample

A sample of 100 families was selected in order to obtain a realistic image of the very first impact of the POLYCITY interventions. They were chosen on the basis of specific characteristics to be fully representative of the wider group of inhabitants (650 families are the total population of Arquata).

The families were selected on the basis of the following social-demographic-economic characteristics:

- **family unit type** (single, married with children, married without children, large family unit, old couple, old single, alone with children);
- **type of heating before POLYCITY district heating** (e.g. single boiler, wood stove);
- **income;**
- **number of years lived in the district;**
- **owner or renter;**
- **type of lodging** (number of rooms).

3.2.3 Procedure

A group of twelve interviewers was chosen to contact and to conduct the surveys in Arquata. They were trained through different seminar with Agenzia di Sviluppo di Arquata and CRF.

In particular, Agenzia di Sviluppo di Arquata organized different meetings with the interviewers in order to:

- develop interviewers' sense of group,
- increase the competencies on the survey methodology,
- face possible problems during the questionnaire administration.

During the meetings the following activities were developed:

- a “*interviewer onus and rights*” card was created;
- some role playings were developed to simulate possible situations with Arquata citizen;
- a deep study about the image of Arquata were analysed through information collected on world wide web.

At the same time, a specific communication plan (see paragraph 4.1) was developed in order to inform citizens about the project and to recruit families for the research.

The questionnaire was given to the 100 families available. Two interviewers for each family were at its complete disposal to support the correct filling.

The phase of data collection lasted one month and half, afterwards all data were inserted by interviewers in a electronic file developed by CRF. Also for this phase, CRF managed some meetings in order to teach interviewers how to fill up the electronic table.

CRF carried out all the descriptive statistical analysis of the collected social data.

3.3 Method for economic information

Economic indicators are defined as parameters able to monitor POLYCITY impact from an economic point of view.

To this purpose, two different stakeholder categories have to be taken into account: *End Users* (mainly Arquata Inhabitants) and *Other Stakeholders* (involved entrepreneurial subjects).

The year 2003 was chosen as the reference year for the evaluation of the economic impact before POLYCITY interventions in Arquata district. This year guarantees to position the evaluation before all the POLYCITY interventions, including district heating.

This assumption required to make some hypotheses and simulations, in order to estimate data not available for this period, in particular concerning thermal consumptions.

The indicators considered in this research are listed in the following table, together with the method for data calculation

Category	Indicator	Method for calculation
Impact on end users	Annual Electrical bill [€/year]	Collection of bills from Arquata district and ATC office
	Annual Average Thermal Bill [€/year/flat]	Simulation of thermal consumption, starting from the thermal plant configuration in 2003
	Mean land register value per square meter [€/m ²]	Interview with ATC
	Mean monthly impartial rent fee per square meter [€/month/m ²]	Interview with ATC
	% of rented flats	Interview with ATC
Impact on other stakeholders	Employment rate (number of people working in the district)	Interview with ATC
	Number of commercial activities in the district	Interview with ATC

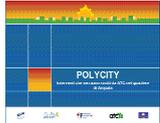
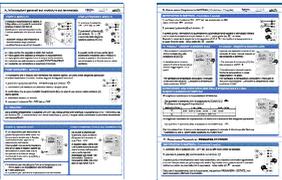
4 Results

In the following, results were listed, grouped for communication plan, social data and economic data.

4.1 Communication plan

The final instruments were chosen on the basis of either the communication aims and different target users.

The following table shows all the instruments created. All of them but one were developed by CRF³. The last instrument, Italian Web site, was developed by Politecnico of Torino.

AIMS	TARGET USERS	COMMUNICATION INSTRUMENTS		
To provide information concerning POLYCITY Project	Arquata Inhabitants	<p>a leaflet</p> 	<p>a informative poster</p> 	<p>slide for formative meeting with Arquata district representative and interviewers</p> 
To support the socio-economic research in order to collect social indicators for the characterization of Arquata Inhabitants	Arquata Inhabitants	<p>Questionnaire to collect social indicators</p> 	<p>Diary to collect household appliance usage data</p> 	
To encourage the knowledge and to increase the usability of new systems evaluated by POLYCITY Project	Arquata Inhabitants	<p>a quick guide - with the description of the first steps to start district heating usage</p> 	<p>a handbook about: - district heating, - modality of usage of module and thermostat, - suggestions to improve the efficiency of heating and so to reduce consumption</p> 	

³ All the graphic solutions were designed and developed by Marianna Mazzaferro, for her degree thesis in Industrial Design Faculty.

AIMS	TARGET USERS	COMMUNICATION INSTRUMENTS
To promote favourable attitudes for an aware consumption and for the energetic savings	Arquata Inhabitants	Energy saving guide about: The smart usage of household appliances and heating for saving energy and decreasing pollution
To spread knowledge of POLYCITY Project	Field Experts	<p data-bbox="820 779 1011 808">Informative poster</p> 
To share knowledge of Italian POLYCITY Project	Italian POLYCITY Partners, all people interested	<p data-bbox="858 1144 1011 1173">Italian web site</p> 

Table 1: summary of all Italian communication instruments developed for POLYCITY.

4.2 Social information

The information collected and analysed from here on come from 100 questionnaires. They were filled in by a representative of each contacted family.

4.2.1 Demographic description of the sample

This paragraph describes the characteristics of people answering the questionnaire.

A little more than the half of the interviewees are women.

The age is included in the range 24 – 91 years. The large part of people has an age between 50 and 80 years, a smaller group is between 30 and 50 years old, finally only somebody is less than 30 years old or more than 80.

The people live in the quarter from 22.4 years on the average and the large part of them has a basic school-certificate.

People living in Arquata district are characterized by a strong presence of retireds who are about the half of the whole sample. The people with work have job as factory worker, health operator, school operator, engineer, driver, employee, housewife. Finally, a little part of people is unemployed.

Only a share of people living in the quarter is involved in activities organized in Arquata (as POLYCITY project, some activities in the Agenzia di Sviluppo di Arquata, district laboratories).

4.2.2 Demographic description of families involved in Polycity research

223 people live in the 100 flats considered in Polycity reasearch.

The proportion between genders is the same of the one described in the previous paragraph.

Because of the high percentage of people retired who live in Arquata, more than one-third persons live alone in their flat and many of them have more than 65 years.

The percentage of people who have a basic school-certificate is very high, as for the answerers while the percentage of retired (people older than 65) fairly decreases.

People unemployed are a little more than among the interviewees as the people who work.

The sample of the 100 flats selected to answer the questionnaire can be considered representative of the 758 flats located in Arquata district in accordance with:

- the demographic characteristics described (sex, age, level and type of instruction, employment);
- the proportion between renters and owners of the flats;
- the presence of people living in flats involved in the POLYCITY project and people living in flats which didn't.

4.2.3 Flat's characteristics

The flats of interviewees have different dimensions: the large part have the kitchen and two rooms, another group have the kitchen and one room, finally someone have the kitchen and three rooms.

Among the flats involved in the project a little less than the half have photovoltaic panels installed on the rooftop of their buildings, another group of equal dimensions haven't but it is included in other changes (for example district heating, lighting, ...) and a little part isn't involved in the Polycity project.

One of the aims of the POLYCITY project in Arquata is to supervise the installation of a district heating system and the reaction of inhabitants who use it and not.

Many of the flats in the district are rented to people by ATC. The others had been privately bought from people who lived in Arquata (someone of these are rented in turn to other people).

Concerning the typology of heating, before the installation of the district heating, people living in Arquata had very different system heating and, in some cases, even none. The previous heating system of people interviewed were: gas stove, single boiler, stove with cylinder, electric stove, wood stove.

At present more than the half of the sample have changed their personal heating into district one, but there is still somebody who is expected to change it in the next future.

Another question concerns the use of other heating modality in addition to the principal heating system: only somebody use another modality of heating (electric stove).

4.2.4 Knowledge about interventions carried out in the district

During the last years some interventions of requalification was started in the district in order to improve the common areas and the singular buildings. Some interventions were done for Polycity Project, the others were carried out thanks to Regional funds.

In order to understand the knowledge of the Arquata inhabitants about the interventions and the state of their own flat, some open questions were administered.

The first question dealt with interventions carried out in the flat.

The large part of the people of the sample carried out at least one intervention in their flat (one-third of them redecorated the whole flat, while the others are divided in equal parts among who made only one intervention, who two, who three and who four or more).

The questionnaire asked also if in the last ten years some changes in the district and in the building in which people live had been made.

About the totality of people answered this question for a few people no intervention was done in the building they are living in during the last ten years.

For many of them the wall faces of the buildings were coloured and the roofs were rebuilt, as the under-roofs and the stairs for more than one-third of the people.

Much more than the half of people declared that also the area outside the building in which they live was redecorated (common garden, internal yards and gates were improved in matter of lights, playing areas for children and paths).

The last question of the session asked information about labours developed in the district.

Three-fourths of people answered this questions. In particular one third of them declared that the whole district was redecorated; interventions on buildings were quoted for another one-third and, during last period, interventions for the introduction of district heating (about one-fourth of them).

4.2.5 Attitudes towards the district

More than the half of the sample declares that living in Arquata was a choice they made spontaneously for different reasons:

- the low rent of flats in that area,
- the closeness to the place in which they work,
- the proximity to the downtown,
- the pleasantness of the district.

Arquata district is considered quite convenient, central and welcoming; on the other hand, people think it is also fairly dangerous, dirty and inactive because of the insufficient number of activities organised or their low involvement in them. They also evaluate the area as a little noisy and antiquate.

4.2.6 Attitudes towards environment (New Ecological Paradigm)

A reduced version of the New Ecological Paradigm was used to assess environmental attitude. The questionnaire consists of 13 questions designed to provide an indication of environmentalism based on measures of ecological consciousness, anthropocentrism, and ecocentrism, as

- 'have we to learn how to develop the natural resources?'
- 'have plants and animals the same right as humans to exist?'
- 'when humans interfere with nature do they often produces disastrous consequences or not?'
- 'are they severely abusing the environment?'
- 'is the strength of nature balance enough to cope with the impacts of modern industrial nations?'
- 'is the earth like a space hip with limited room and resources?'
- 'is the earth in danger?'

Summarizing, the people think that the humans improperly use, or don't know how to develop, the natural resources so in the future the nature will turn against them.

4.2.6.1 Attitudes towards new energetic systems

A part of the questionnaire deals with the knowledge of new type of energy systems. Generally in Arquata people appreciated the installation of an innovative heating system and of an improved night lighting system. Nevertheless they are not very acquainted with what cogeneration is and how it works: only about one-third of the sample, in fact, had already heard before about distributed generation and even less, about cogeneration.

Another question is about how many people is willing to pay for clean energy. Among who is interested in using clean energy, the half wouldn't pay nothing more in its bill for this innovation, while less than one-fourth seems to be willing to pay 1% more. Only somebody said it would pay at least 3% more than its actual bill to have the possibility to be provided with clean energy.

Another question asked people if they were interested to use an independent district generator of electric energy. Most of interviewees don't have an opinion about that. Unfortunately this topic is already less known.

4.2.7 Expectations towards interventions

People evaluate that the interventions will improve their own lives and the district quality of life: less risks at home with an easier home management, a more comfortable house

and less pollution; anyway, they realize they aren't still able to forecast the impact on their bills and consumptions.

4.2.8 Satisfaction of local context

4.2.8.1 Sense of community

To give a measure of Arquata inhabitant sense of community, nine statements were presented to interviewees with a scale of agreement or disagreement.

The mean of the given evaluations can be considered as the people global judgement about the place in which they live and the relationship they have with their neighbours.

People generally like the place in which they live and generally they know both their neighbours and people of the district, that they meet in the outdoors common spaces; this is probably one of the reasons why they feel safe when they are in their district.

On the other hand, people complain about the missing sense of care of district inhabitants with regard to environmental and about the fact that their neighbours aren't their mates for common leisure. Only half of the sample agrees in saying that the district is characterized by a sense of community.

4.2.8.2 Sense of involvement in the district changes

To test the sense of involvement in the district changes, some questions were asked on the quantity and quality of information spread among inhabitants. Most of the people living in Arquata are satisfied with both given information concerning the proper use of district new installations and the type of interventions carried out.

About the half of people interviewed received at least a telephone number or an address in order to obtain information about ongoing and carried out interventions.

4.2.8.3 Quality of services

When it was asked people to make a choice, in a scale of values from "much inadequate" to "much adequate", regarding the quality of services offered by the district, they gave the following results.

Public transports, health centres - hospitals or doctor's offices - and public gardens are evaluated as adequate. Shops, groceries, community centres for recreational activities and cinemas or theatres are definitely quite inadequate for their needs. People don't have a clear position about the valuation of restaurants and pubs in Arquata or nearby, parking, gyms and sport centres, schools, help centres for supporting people.

It seems clear that people who live in Arquata want more structures for leisure.

4.2.9 Opinions about interventions

4.2.9.1 Impact of interventions on daily life of the district

The great part of the people didn't notice a disease while interventions were going on.

So, even if some people complain about handymen and scaffolds that impeded the everyday actions or movements, the global impact of interventions on people seems to be very low for more than the half of inhabitants.

Moreover, an overall evaluation about the utility of realized requalification works (e.g. district heating, lighting) reveals a general people satisfaction: only some people give a negative valuation while the large part thinks that the interventions have been useful and satisfactory.

To better understand the opinion of inhabitants, two open questions were provided. People were asked to list the three most positive and the three worst aspects of the interventions. They had to order them for importance, so people had to put the interventions they judged worst or best in first position and the others in second and third position.

To analyse data, the order of the answers was weighted in a different way. First of all, three independent judges grouped answers with the same meaning. Then, to all the answers in first position three points were given, the answers in second position obtained two points, the last ones obtained 1 point.

People think something wasn't carried out in a suitable way: the colours of the wall faces, of the balconies and the windows for one-third of them were perfunctory and not polished, for a group of them, in fact, the interventions went awry and with a bothersome delay.

Even if there was some bother while the intervention were going on, about one-fourth of people think the district, after the interventions, is now aesthetically improved; many of them appreciate the redecoration of the roofs. It is interesting to notice the even little percentage of people who believe the district will be considered a nicer place for living than in the past thanks to these interventions.

4.2.9.2 New installations of public lightings

Common areas and gardens lighting have been modified but not yet in the whole district: more than the half of people didn't notice any change in lighting; among them, valuations on suitability of the actual system are quite equally divided between great inadequacy and great adequacy of the system.

If merely more than one-third of the sample declared that common lighting had changed, only few people didn't notice the difference between the previous and the actual lighting system. More than somebody declared also that now the district has an higher visibility.

Three-fourth of the sample who saw a real change thinks that the night visibility is improved with the new lighting system and that it gives inhabitants much more safety during night time because of the presence of a strong light, avoiding dark place in the district.

But, even if the new lighting system improves the night visibility for the great part of the sample, there is somebody who isn't satisfied with it: many, in fact, declared they don't

appreciate the new system for different reasons that could be referred to the fact the old lights didn't work while the interventions were going on; there is also somebody who is unsatisfied at all because the lights of the district are now too many.

4.2.9.3 Noise in own flat

People were asked to evaluate the noise perceived in their flat in order to get an evaluation before the implementation of POLYCITY intervention. For example, it can be important to understand if cogeneration plant, that will be installed in the next months, can be considered a source of noise during its running.

The questionnaire asked people if the changes made in their flats had improved the noise they heard in their house or not.

The mean of valuations is positioned under the "Acceptable" value but the reason is to ascribe to sources of noise people suggested in the open question: scooters, barking dogs, cars, trains, neighbours and the disco.

Another question was the request to make a comparison with between to the situation before the intervention: interviewees didn't notice differences at all about flat noisiness before and after the interventions.

4.2.9.4 Personal heating system

A questionnaire session was dedicated to describe the actual and previous heating system of participants. As already written (see 4.2.3) not all the sample has installed in its flat the new district heating. Different analysis were carried out to obtain perceptions among different situations.

In particular, statistical analysis were applied in order to obtain:

- a comparison of opinions about district heating (working from November 2005) and previous type of heating; only questionnaires of participants with district heating were analysed;
- a comparison of opinions about the actual type of heating, in particular between district heating and autonomous heating.

Three main aspects were analysed:

- a general evaluation of the personal heating system;
- the heating equipment;
- the impact of the heating system on the house.

The results about comparison between previous heating and the district heating concerning general evaluation protrudes that the only very important differences pointed out from people are the feeling about a more ecologic device with district heating and, as a consequence, the sensation of a little more cleanness. After all, people declare to obtain more usability, satisfaction, safety, saving and reliance by using district heating, even if they think it is a little noisier than their previous heating system.

The evaluation of the equipment of the district and previous heating shows that the actual equipment is more difficult to clean and to repair than the one of their previous

heating systems; but the new one is surely safer and more modern. People perceive a sense of fragility and trouble in using new equipment even if it is smaller and finer than the previous one and likewise more comfortable.

People interviewed think that their home, with a district heating, has changed becoming more adequate for children, old people and adult than before, probably because they notice the heating system is now a little less dirty and dangerous. Generally they think district heating has improved the pleasantness of their home also concerning the aspect of orderliness, comfort ability, dampness in the air and heat. It seems that the pleasantness of the house doesn't depend on the heating system installed because there aren't significant statistical differences among judgements means.

As we made with the comparison between district heating and previous heating system, an analysis of valuations of people who have now the district heating and people who remained with an autonomous heating system was carried out (less of the half of the flats in the sample).

Generally people consider the district heating as an innovation that improves the quality of life: it is more useful, a little more satisfactory, safer, cleaner and ecological but not much more reliable than the autonomous one. Anyway, people realize there is a price to pay for this innovation: males more than females are convinced, in fact, that the district heating is more expensive and noisier than the autonomous heating.

It is clear, from the analysis, that district heating equipment is considered a modern innovation, but it becomes a problem repairing, cleaning or using it because of its supposed fragility compared to the autonomous one. Positive aspects are anyway its good looking, the same comfort ability, the smaller dimensions and the safety it gives.

Concerning how heating makes own home, comparing district and autonomous heating, the opinions don't change between people who have the new district heating and people who maintain their autonomous heating.

Finally people have to express an overall judgment. It is clear that, as first impact, people think introduction of district heating will improve their quality of life.

The overall evaluation of heating system has a very good mean both for district and autonomous heating. People seems to be generally satisfied about the system heating they have.

About the temperature provided by the heating system, there aren't statistical important differences between the temperature perceived before the district heating and the previous one. In fact, the perceived temperature with district heating is a little less adequate than the one perceived with the autonomous heating.

It is probably due to the fact that people is now testing the new heating system to understand the amount of their consumptions after the installation.

4.3 Economic information

4.3.1 Electrical bills

The monitoring of this indicator aims at showing differences in family and ATC building costs, due to POLYCITY interventions. In order to get the picture of the situation before POLYCITY, the available electrical consumptions have been analysed.

The indicator is measured in €/year for ATC building and for an average Arquata flat. The time unit (year) is intended from January to December.

ATC building

Indicator is 2003 *Annual Electrical Bill [€/year]*

Arquata building

For Arquata district, two indicators have been considered: electrical bills for private use and for common spaces.

As bills for 2003 were not available, the indicators have been calculated as an average for the accessible period (1993-2001, considering only years with complete information available) and buildings (11 council buildings). The time unit (year) is intended from June to May.

Private use:

Indicator is *Annual average electrical private bill per flat [€/year/flat]*

Common use (common lighting)

Indicator is *Annual average electrical Common Bill per flat [€/year/flat]*

4.3.2 Thermal bills

In order to get the picture of the situation before POLYCITY, the available consumptions of primary energy for heating have been analysed.

The indicator is measured in €/year for an average Arquata flat. The time unit (year) is intended from January to December. The total 2003 estimated thermal demand in Arquata is 11.375.000 kWh (87.500 square meter for 130 kWh). In the table below the calculation flow for the estimation for thermal bills related to the different heating plants pre Polycity is shown.

Starting from the over mentioned date, the indicator has been calculated as *Annual average thermal bill per flat [€/year/flat]*

4.3.3 Real estate market value

Real estate evaluation for Arquata district is not comparable with traditional residential buildings. In fact, Arquata is a housing project district and for this reason prices for flat sale and rent are not free market values.

Furthermore, flat sale is managed by ATC only in specific periods, when Arquata Inhabitants are suitable to buy a flat only after 5 years renting. Flat owners are then authorized to re-sell apartments after 10 years of ownership.

Coming back to sale and rent prices in Arquata, these can be significantly lower with respect to market values. In particular:

- rent rates are calculated starting from a base fee (*impartial rent fee*), fixed by the government, and applying to this different deductions depending on economic and social status of tenants;

- sale prices are calculated with a similar mechanism, starting from values supplied by the Italian land register (*land register value*).

Both values are regularly updated, considering the realization of redecoration interventions and this fact makes interesting their monitoring during POLYCITY project. In particular, the base values (independent from economic status of inhabitants) are being considered, as shown in the following table. Furthermore the percentage of rented flat towards the owned ones is an interesting indicator to be monitored.

4.3.4 District productivity

District productivity is being monitored through two main indicators, listed in the following table.

Arquata district doesn't host commercial activities and people working within the district. It will be interesting to monitor the above mentioned indicators in order to see if POLYCITY will impact on these aspects.

5 Conclusions

The first application of the preliminary socio-economic framework within the Italian demonstration site (Arquata district, about 600 families) was concluded with success. In particular, this report summarizes the evaluation of economic measures before POLYCITY intervention. For social measures we collect the very first perceived impact of some POLYCITY interventions. District heating partial installation and common lighting improvement were already done in Arquata district. These first works were installed in November 2005, so people aren't acquainted yet with these innovations.

Social research started with the definition of a 100 sample families to be interviewed. The social-demographic-economic characteristics of the interviewed sample reflect the Arquata context (e.g. age, gender, job, study and family unit); then, the sample can be considered fully representative of the population of Arquata district.

As first result of the social research, people living in Arquata is fond of the district.

It is interesting to show that most people didn't notice a disease while interventions were going on and they are satisfied about the interventions. Moreover, Arquata inhabitants think the works will improve the life in the district. The visibility is improved with the new lighting system that gives inhabitants much more safety during night time. The perception of the district heating is on average good, in comparison with the previous heating. Furthermore, district heating seems to be better perceived, with respect to inhabitants actually having autonomous heating.

People evaluate that the interventions will reduce the risk at home and the air pollution, but they aren't able to forecast the impact on their bills and consumptions.

Only a part of the inhabitants knows the distributed generation and the co-generation, almost all are interested in clean energy but aren't willing to pay for it.

Economic indicators (electrical and thermal bills, real estate market and rent values, productivity) have been evaluated in order to characterize the Arquata status before Polycity interventions (2003).

The data collected will be analysed with adequate statistical tools in order to find summarizing indicators general enough to be applied also to other situations.

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