



MSc  
*Integrated Urbanism  
& Sustainable Design*  
(IUSD)

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# Trash becomes Cash

*An applied intervention for  
the garbage problem solving in  
Ezbet Al-Nasr, Cairo, Egypt*





This booklet/report is produced as part of the “INT\_696/7\_Integrated Case Study“ core module of the M.Sc. Integrated Urbanism and Sustainable Design, 3rd semester.

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# TABLE OF CONTENTS

<b>1.INTRODUCTION</b>	1
<b>2. “Trash Becomes Cash” THE CONCEPT</b>	3
2.1. THE START	4
2.2. RETHINKING THE GARBAGE PROBLEM	4
2.3. WHO ALREADY WORKS IN THIS DOMAIN?	5
2.4. OBSTACLES, LIMITATIONS AND CHALLENGES	6
2.5. NARROWING DOWN SCOPE OF WORK	6
<b>3. THE ORGANIC WASTES: PROBLEM VS. SOLUTION</b>	7
3.1. ORGANIC AND BIODEGRADABLE WASTES	8
3.2. FROM A “Waste” TO A “Resource”	8
3.3. BIOGAS	8
3.4. THE ECONOMIC RETURN	8
<b>4. NETWORKING</b>	11
4.1.APPROACHING THE LOCAL COMMUNITY	13
4.2 RAISING AWARENESS	14
<b>5. IMPLEMENTATION</b>	15
5.1. FINANCIAL AND TECHNICAL SUPPORT	16
5.2. INSTALLATION PROCESS	16
5.3. WAS IT A DREAM?	16
<b>6. SUSTAINING THE PROJECT</b>	23
6.1. WHAT IS NEXT...?	24
6.2. MEASURES OF SUCCESS	25
<b>ACKNOWLEDGMENT</b>	26
<b>LIST OF ABBREVIATIONS</b>	27
<b>REFERENCES</b>	27
<b>ANNEXES</b>	iii
ANNEX I : BUILD YOUR OWN BIOGAS UNIT	iv
ANNEX II : RAISING AWARENESS SESSION	vi
ANNEX III : SURVEY TOOLS	vii
ANNEX IV : PROFILES	viii



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**1.**

# **INTRODUCTION**



# 1. INTRODUCTION

The informal area of Ezbet Al-Nasr (Basateen district-Cairo), was selected to be the scope of our study, for the core module of INT\_696/7\_ Integrated Case Study, in the third semester of the M.Sc. Integrated Urbanism and Sustainable Design (IUSD), Ain-Shams University (ASU).

During the first period of 8 weeks (September and October 2012), a comprehensive analysis of the site was conducted and a preliminary report was produced by the 21 students of M.Sc. IUSD 2011/13, see fig. (1\_02). The analysis and the report covered all the different aspects within the area, through focusing on six main axes of the study; the stakeholders involved into them and the cross-cutting issues between them, see fig. (1\_03). These main axes are:

- Basic urban services
- Local economic development
- Land and shelter
- Governance
- Environment
- Vulnerability

By the beginning of November 2012, the second phase of the work started, and based on the analysis, results and findings of the first phase; seven<sup>1</sup> issues of importance found to be in need of inevitable solutions. Consequently, new groups of work were formed to start design and write intervention proposals (Design brief documents).

Based on that, and because the number of students is limited and the time frame to work on these interventions is confined by two and a half months, until the third semester ends, four<sup>2</sup> focused interventions were chosen through a voting process among the students, see fig. (1\_04,05). This process ended up with the formation of the new four focused groups working on the implementation of the elected interventions, see fig. (1\_01,04).

Eventually, the Trash becomes Cash (TBC) group based his work on the key findings of the local economic development and the environment groups in the first phase, and the design brief which was produced in the second phase. Three students<sup>3</sup> from architectural background shared the same vision and joined effort to achieve it.

<sup>1</sup> These seven issues are 1)Roof gardens and constructed wetlands, 2)Developing tenure policy option, 3)Local production exhibition, 4)Quality and demand of labor force, 5)Upgrading of building envelope and structure, 6)Local think-tank consultancy unit, and 7)Improving streetscape.  
<sup>2</sup> The four selected focused interventions are: 1)Developing tenure policy for Mazarita area, 2) Local production exhibition, 3) Trash becomes Cash, and, 4) Improving streetscape at the school complex.  
<sup>3</sup> Nahla Makhlof (Egypt), Sandy Qarmout (Jordan) and Zeina Elcheikh (Syria).

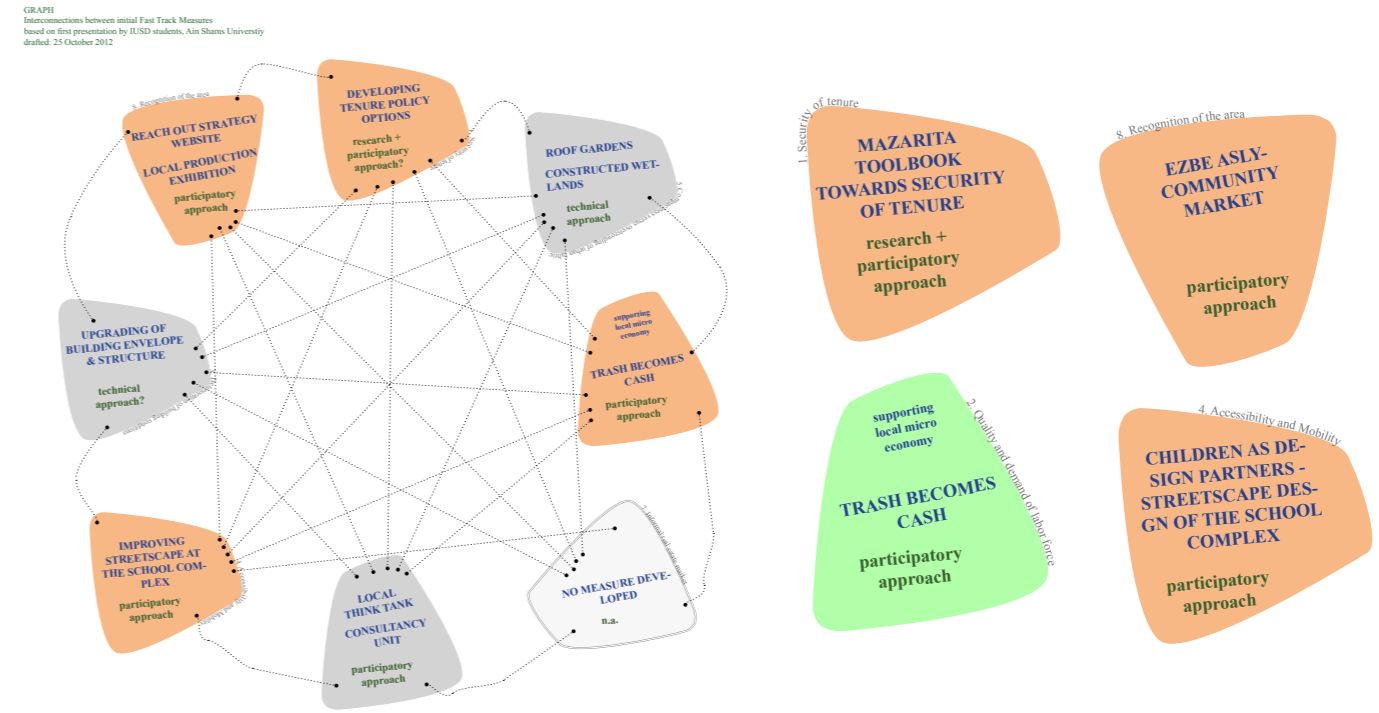


Fig.1\_01: Diagram showing the initial seven fast track measures and the interconnections between them (Franziska Laue, IUSD 2012). Based on first presentation by IUSD students, ASU.



Fig.1\_02: IUSD students on a site-visit in Ezbet Al-Nasr, September 2012. (Taken by: M. Salheen)

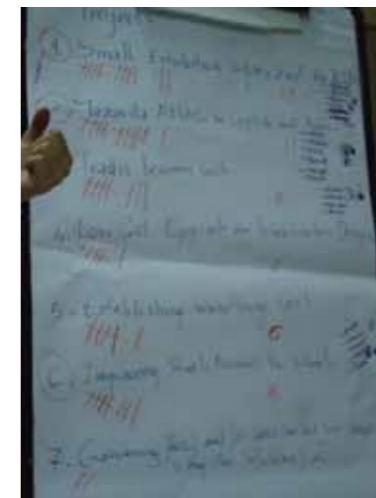


Fig.1\_04: Results of the IUSD voting process on the fast track measures. (Taken by: Mai Sabri)



Fig.1\_03: IUSD students in a discussion process, IUSD studio, ASU, October 2012. (Taken by: Franziska Laue, IUSD 2012)



Fig.1\_05: Voting process on the fast track measure, IUSD studio, ASU, November 2012. (Taken by: Mai Sabri)



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**2.**

**TRASH BECOMES CASH.***The concept*

## 2. “Trash becomes Cash” THE CONCEPT

### 2.1. THE START

Garbage is generally found almost everywhere in Ezbet Al-Nasr: on the streets, pathways, and neglected vacant spaces especially in the streets just adjacent to the Jewish cemetery, see fig. (2\_01,02,04). The government did not collect waste from the area on regular basis (IUSD report, 2012). Those massive amounts of garbage are a result of an oblivious behavior from the community as well as external wastes from neighboring areas which being thrown on the streets near the backward dump site (IUSD report, 2012). These recurrent acts stretch the situation in the area to an exaggerated level. And in some cases, as observed during site visits, garbage and wastes are treated by being burned, see fig. (2\_03), which made the situation even worse with the smoke and smell which are continuously causing several health problems; especially for the people who are living in proximity to the most densified locations.

Yet, as observed many people have already established a garbage-related business, through which they collect, separate “valuable” (easy reusable or recyclable) garbage, such as: metal, plastic, cartoons, glasses, ..etc., see fig. (2\_05,06), and sell them to the wholesalers,

who by their turn sell them eventually to some specialized factories for further processing, (IUSD report, 2012). By that, the solid garbage is reduced from the area. However, and since these garbage collectors are not trained or formally working in this business, they usually leave the streets worse than they were, because of their careless and untaught attitudes towards the environment and the beautification of the area.

### 2.2. RETHINKING THE GARBAGE PROBLEM

It is obvious that the huge amount of left-over garbage in Ezbet Al-Nasr is causing physical problems as a result of the direct exposure to the pathogenic germs of the organic wastes left. Here, we have decided that we want to work on solving this problem. However, we also noticed that people there are generally, a low-income community that is seeking any means for wellbeing and more comfortable circumstances. Therefore, an intervention that would focus mainly on tackling the garbage problem is highly needed to set it as a main goal for our work to solve one of the area’s problems and at the same time making use of its potentials.



Fig.2\_01: Garbage is thrown everywhere and on the Jewish cemetery proximities (Taken by: Lisa Deister, IUSD 2012)



Fig.2\_02: Garbage can be found also in passageways (Taken by: Lisa Deister, IUSD 2012)



Fig.2\_03: Getting rid from garbage by burning it in Ezbet Al-Nasr (Taken by: Pia Lorenz, IUSD 2012)

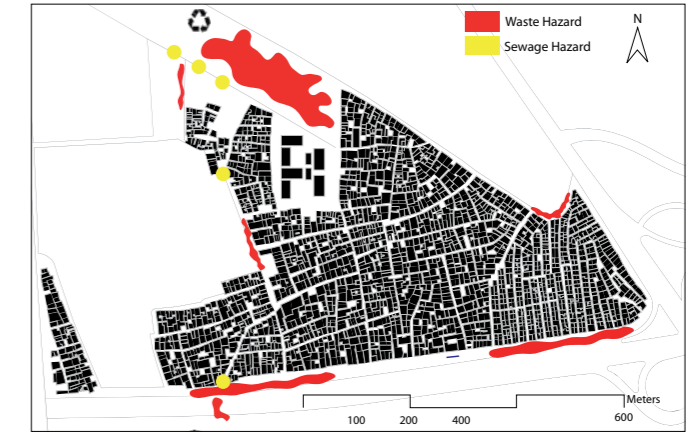


Fig.2\_04: Map of the initial identification of waste hazard areas (IUSD report, 2012)

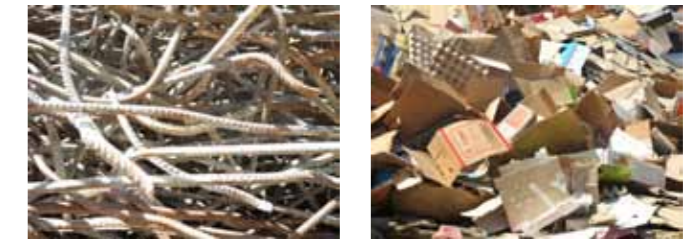


Fig.2\_05-06: A process of garbage sorting is already existing in Ezbet Al-Nasr (IUSD report, 2012)

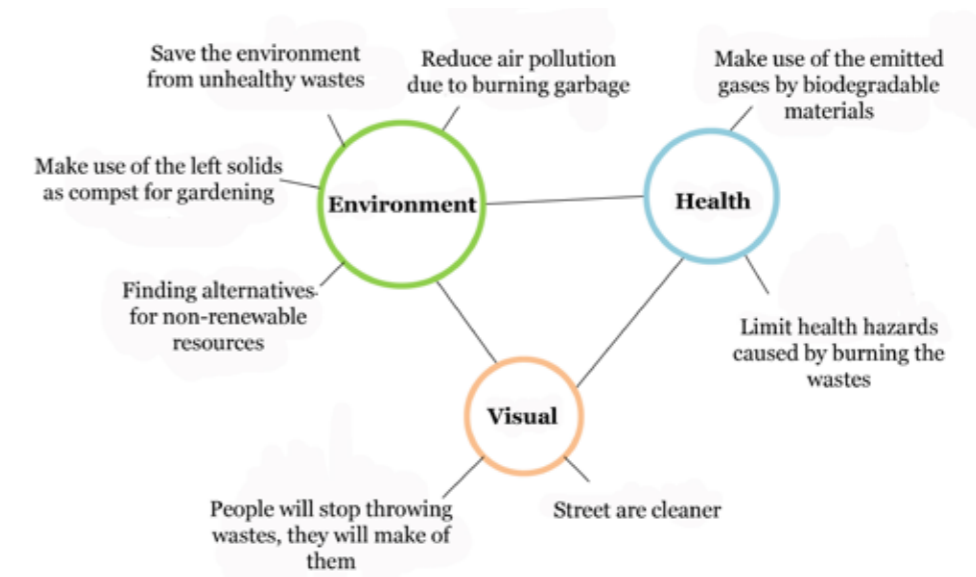


Fig.2\_07: Graphical representation of benefits from the solving the problem by implementing the project

Based on that, we, as the team members agreed upon developing a concept that deals with the wastes to solve an environmental, health and visual problem, see fig. (2\_07), and provide some support for the locals` income.

Accordingly, the project objectives were developed to include:

- Household participation as a first step for the cleanness of the district.
- Free the area from garbage, especially the unhealthy and harmful ones.
- Raising awareness in the area on the importance of recycling.
- Promote for the win-win situation of recycling.
- Set connections between local community and NGOs.
- Building reputation and increasing the area`s recognition through the initiative on the long run.

Thus, from this point, we came up with the motto:

*“Trash becomes Cash”*

### 2.3. WHO ALREADY WORKS IN THIS DOMAIN?

At the very early steps of designing the intervention, November 2012, TBC group made a thorough research on NGOs, associations

and even individuals who have experience in waste-related actions (sorting, recycling,...) and interests in environmental issues, see table. (2\_01). Some of these bodies were dealing with recycling electronic wastes, others were focusing on art-works made of sorted materials, and some were dealing with organic wastes.

After introducing the work through telephone calls with these selected NGOs, several meetings were held to explain the idea of the project and get introduced to these different bodies.

**Re-Art Workshop**, a non-profit group established by young graduates of Fine-Arts based in Nasr City. This group was among the first contacted bodies who offered the support for the project, by holding sessions on how to create artworks and gadgets from sorted waste materials. Furthermore, and due to their previous experience in organizing such workshops and expositions, they offered supporting and organizing an exhibition to show and even sell the recycled products from the area, if any.

**Green Ma`adi**, is a group of activists who work on raising awareness among the residents in their district for a greener neighborhood. They mainly organize environment-related events, festivals and initiatives (hobbies, rideshare, etc.).

**Recyclobekia**, a recent established association on scientific bases. It is founded by fresh Communication Engineers graduated from

Tanta University, however, their work is based in Maadi. They are dealing only with electronic wastes (computers, mobile phones, devices, etc...) working on the refurbishment and the recycling of its elements. They were excited about dealing with an informal area. They offered to help in holding awareness sessions, especially on the importance of electronic wastes, and in advertising the work, if any.

**Ain El-Biaa** is an association that focused on raising awareness on environmental issues. A collaboration in the project was intended to take place, but their engagement in the political situation during the work was an obstacle for the continuation of their contribution.

TBC also contacted and met **Al-Misbah Al-Mudii**. It is a wide ranged NGO based in Nasr city and working in several domains (charity, recycling, creating job opportunities, cleanliness campaigns,...), however, they are all related to environmental quality. This NGO got interested in the project and offered a financial support (For more details please check section 4. Implementation).

It was important as a first step to check possibilities of further contributions with and from them in our intervention, and better to know what kind of support would they be able to offer to the project (financial, technical, advertising,...). Other associations, with ongoing

No	Name	Location	Field of Experience	Potentials for cooperation
1	Re-Art Workshop	Nasr city	•Educate and promote recycled and re-purposed arts. •Organize workshops, small creative business development seminars.	•Holding workshop for artistic reuse and recycling.
2	Recyclobecia	Ma`adi district	Recycling of electronic wastes	•Support an advertising campaigns. •Holding workshops for advanced reusing and recycling techniques of electronic waste .
3	Ain Al-Bie`a	Basateen district	•Cleanness and beatification campaigns. •Rising awareness. •Collecting and sorting wastes. •Reusing and Recycling of sorted wastes.	•Cleanness and beatification campaigns. •Raising awareness. •Collecting and sorting wastes. •Reusing and Recycling of non-organic wastes. •Organic wastes treatment.
4	Al-Misbah Al-Mudii	Nasr City	Charity, Raising awareness, recycling	•Supporting activities financially
5	Green Ma`adi	Ma`adi district	•Rising Environmental awareness. •Environmental campaigns (festivals, beatification and marketing)	•Spreading awareness for kids. •Marketing for recycled products.
6	Sprtit of Youth	Zabaleen, Manshiet Naser	•Educate marginalized youths, children and women to play an active role in developing their communities •Improve the environment by spreading the concept, practice and use of waste segregation, recycling and renewable energies	•Awareness campaigns for children, youth and women. •Educational sessions on waste management processes and different phases.
7	Golden Trash	On-line contacts	Facilitate marketing sorted used materials.	•Raising awareness for locals. •Holding sorting sessions. •Marketing workshops.

Table 2\_01: Information and potentials of cooperation with the already contacted NGOs and associations.



businesses in the domain, were also contacted but without being involved in the work later on<sup>1</sup>.

From the previously mentioned contacts and meetings, it was not surprising that all these NGOs and associations are aware of each other's work, although they are not directly working with each other. Young generations in Cairo are completely aware of the garbage problem in the city, and they are trying with their enthusiasm and knowledge to make a change. Sharing ideas, and getting better to know about professionals' work in this domain was in itself a great opportunity that helped formulating and getting the whole process more focused.

## 2.4. OBSTACLES, LIMITATIONS AND CHALLENGES

Although TBC group worked hard to develop a comprehensive plan of waste management in Ezbet Al-Nasr, the work faced many conditions which were inevitable to avoid, some of these are:

- Administrative obstacles (permissions, administrations, etc...),
- Difficulties bringing several NGOs together (mediating and clash reducing, problem of commitment, etc...),

- Difficulties to build a common understanding with less-educated people,
- Cultural sensitivity of the conservative community in Ezbet Al-Nasr,
- Delays related to the political situation (end of November and mid- December 2012).

All the previously mentioned issues and the lack of time to tackle all kind of wastes on site worked as a pushing force to TBC group to re-think the scope of work accordingly.

## 2.5. NARROWING DOWN SCOPE OF WORK

As previously mentioned, the work was facing some limitations in time, and due to some external factors that had a role in delaying the work, TBC group got aware that initiating a project that involves all types of garbage in Ezbet Al-Nasr will be too ambitious, in other words unachievable in the given period of time.

Therefore, narrowing down the focus was very important to continue, but how to diminish the scope of work towards an issue that is the most crucial in the area? During field visits, observations and several meetings with the local community in Ezbet Al-Nasr, it was obvious that organic wastes are an issue with great priority to start a garbage-related intervention.



Fig.2\_o8: Organic waste is the only left type of wastes in the streets

As previously mentioned, waste collectors collect materials that would be beneficial for them, except for wastes that can be burnt or left to be rotten. However, in both cases health problems and bad smell are caused by the organic wastes, see fig. (2\_o8).

Some wastes could be sold, others could be transformed into artworks or gadgets that also could be sold or used, but what could be done with potatoes peeling? or fruits that cannot be eaten anymore? Or all these organic wastes which are found everywhere in the neighborhood, what should be done with them?

<sup>1</sup> Either because they are profit oriented ones or might be working in other areas and do not want competitors.

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3.

# THE ORGANIC WASTES *PROBLEM VS. SOLUTION*



## 3. ORGANIC WASTES: PROBLEM VS. SOLUTION

### 3.1. ORGANIC AND BIO-DEGRADABLE WASTES

“Biodegradable waste is a type of waste which can be broken down, in a reasonable amount of time, into its base compounds by microorganisms and other living bacteria, regardless of what those compounds may be. Biodegradable waste can be commonly found in municipal solid waste (sometimes called biodegradable municipal waste (BMW)) as green waste, food waste, paper waste, and biodegradable plastics. Other biodegradable wastes include human waste, manure, sewage, and slaughterhouse waste” (Wikipedia, Biodegradable waste 2013).

### 3.2. FROM A “Waste” TO A “Resource”

In the absence of oxygen, much of this waste will decay to methane by anaerobic digestion. “Biodegradable waste can often be used for composting or must doubtless be a resource for heat, electricity and fuel in future as it is being achieved by the Swiss Kompogas treatment for 20 years now. This produces addi-

tional Biogas and still delivers the compost for the soil.” (Wikipedia, Biodegradable waste 2013).

During the several meetings and talks with the concerned NGOs, associations and individuals, the idea that few people started in their own houses to set a biogas unit on their rooftops, in which one can use organic wastes from the kitchen to produce methane gas that can be used for cooking and heating purposes, was a very attracting one for us.

**But how this Biogas unit exactly works?**

### 3.3. BIOGAS

“Biogas typically refers to a gas produced by the breakdown of organic matter in the absence of oxygen, see fig. (3\_01). It is a renewable energy source, like solar and wind energy. Furthermore, biogas can be produced from locally available raw materials, see fig. (3\_03), and recycled waste and is environmentally friendly and CO<sub>2</sub> neutral....The gases methane, hydrogen, and carbon monoxide (CO) can be combusted or oxidized with oxygen.

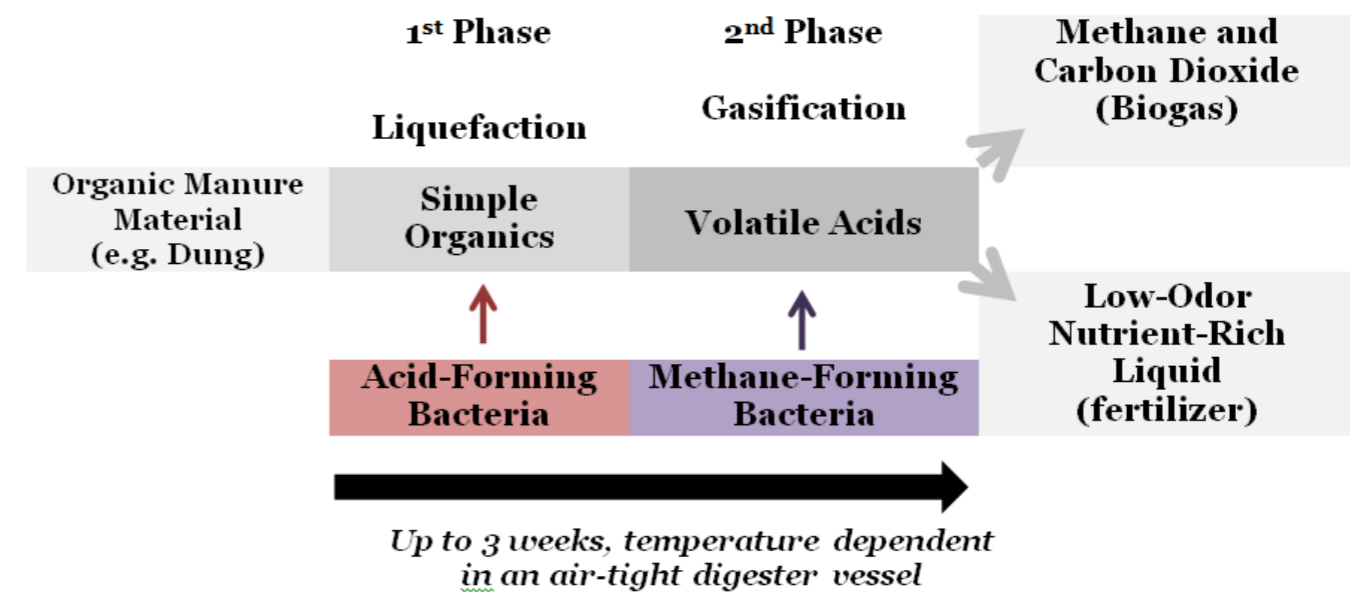


Fig. 3\_01: Illustration of the Biodegradable process from the organic waste to the Biogas (Methane gas). (Adopted by authors based on: Mechanical engineering online, 2011)

This energy release allows biogas to be used as a fuel. Since Methane is flammable, this biogas can be used as a fuel for any heating purpose, such as cooking.” (Wikipedia, Biogas 2013).

Although the gas provided by this method is limited to serve no more than 3-4 hours per day (2 hours in winter time), as said by Mr. Hussein Farag<sup>1</sup>, these few hours will be of great importance for Ezbet Al-Nasr local community where they are not connected to natural gas network, as observed during the site visits, and cannot afford being exploited each time they buy a gas cylinder besides the recurrent gas cylinder shortages, which put its price in unstable situation.

### 3.4. THE ECONOMIC RETURN

The cost for the materials required for installing one self-made biogas unit (the example TBC applied, see fig. (3\_02)), is around 1250 EGP<sup>2</sup>, including the needed single flame cooker and a kitchen blender, besides the salary required for the technician and experts.

As found out through distributing questionnaires among 18 inhabitants from the area, the average daily usage of natural gas in their kitchens is around 2:30 hours, while for this most of them use an average of almost two cylinders or less per month. This cylinder, regardless the instability of its price, costs around 15 EGP (Questionnaire result, Dec. 2013, for more details see annex III).

<sup>1</sup>Mr. Hussein Farag is a technical expert helped us in installing the low-cost self-built Biogas unit. He started to work in this field not less than five years ago with the people who were known widely of their first initiative idea of implementing the unit on their rooftops; in El-Darb Al-Ahmar and Zabaleen districts. He also has his Biogas unit on the rooftop of his house and is using it for more than four years till now.

<sup>2</sup>As applied in Ezbet Al-Nasr, December 2012.

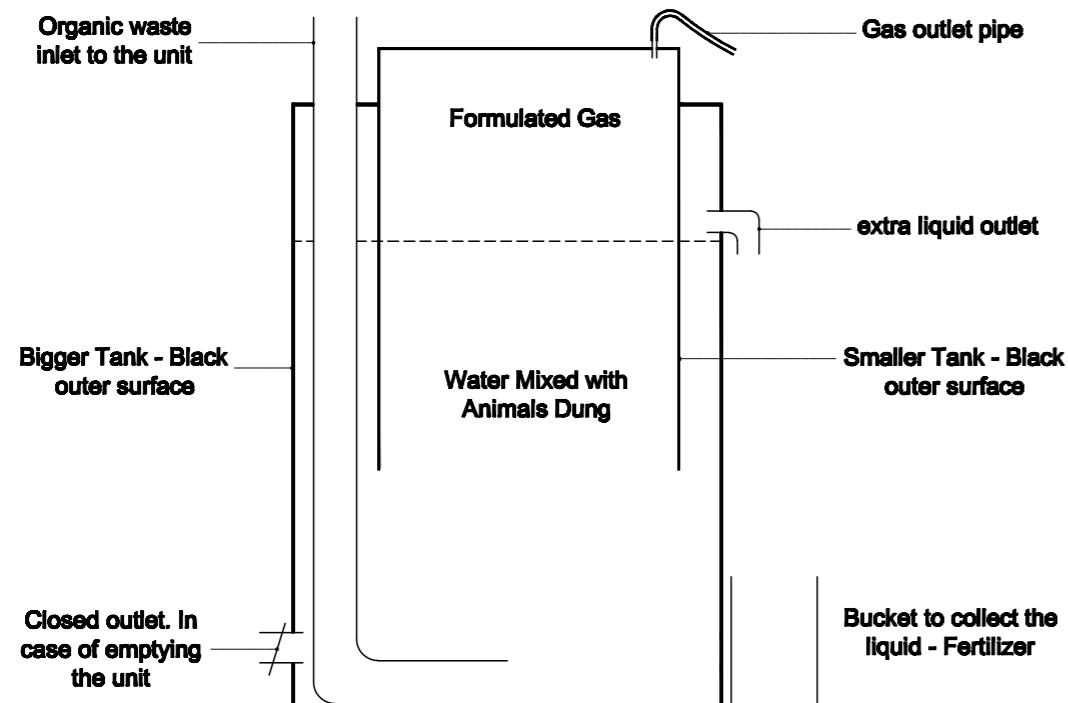


Fig.3\_02: Schematic cross section showing the applied self-built biogas in Ezbet Al-Nasr (developed by authers based on the site implementation, Dec. 2012)

In a simple calculation, it can be recognized that each gas cylinder produces around 38 hours of fire, while they use double loaded flame, if a continues usage.

The suggested biogas unit works along day in summer and winter, however the biodegradable process become slower in winter time, because of the positive relation between this process and temperature. In other words, when there is less heat, there is less biodegradable processes. As mentioned before and said by Mr. Hussein Farag, this unit produces in summer around 4 hours of gas daily, on a single flame cooker. However its production is around one hour less than summer times.

Thus, this biogas unit can save 80% of the amount consumed by each household per month. This means it saves around 24 EGP per month (or more, at the gas cylinder shortage

occasions), on these bases the household can start making a positive saving in a span of 52 months (4 years and 4 months). Despite it is such a long time for the low-income communities, but we have never to forget the intended aim of this double benefit process, which is cleaning the area from the source of health, environment and visual problem.

It is important also to mention that the leak liquid, from its left-over hole, is a perfect rich fertilizer for any agricultural or gardening activity.



Fig. 3\_03: Picture of the sources of organic wastes in Ezbet Al-Nasr (besides the street garbage)



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4.

# NETWORKING



# 4. NETWORKING

Since the scope of worked was reduced and communicated associations and NGOs were determind and confined, a network gathering all the experts, associations and community, see fig. (4\_03,04,05) were inevitable to be established in order to kick off the project, see fig. (4\_06).



Fig.4\_03: Networking meeting, the technician is introducing the biogas concept to Al-Misbah Al-Mudii representative



Fig.4\_01: Meeting with local NGO in Ezbet Al-Nasr (Plan international)



Fig.4\_04: Networking meeting, IUSD student with the technician and an environmental activist



Fig.4\_02: Brining the technician and experts together



Fig.4\_05: All together before site implementation

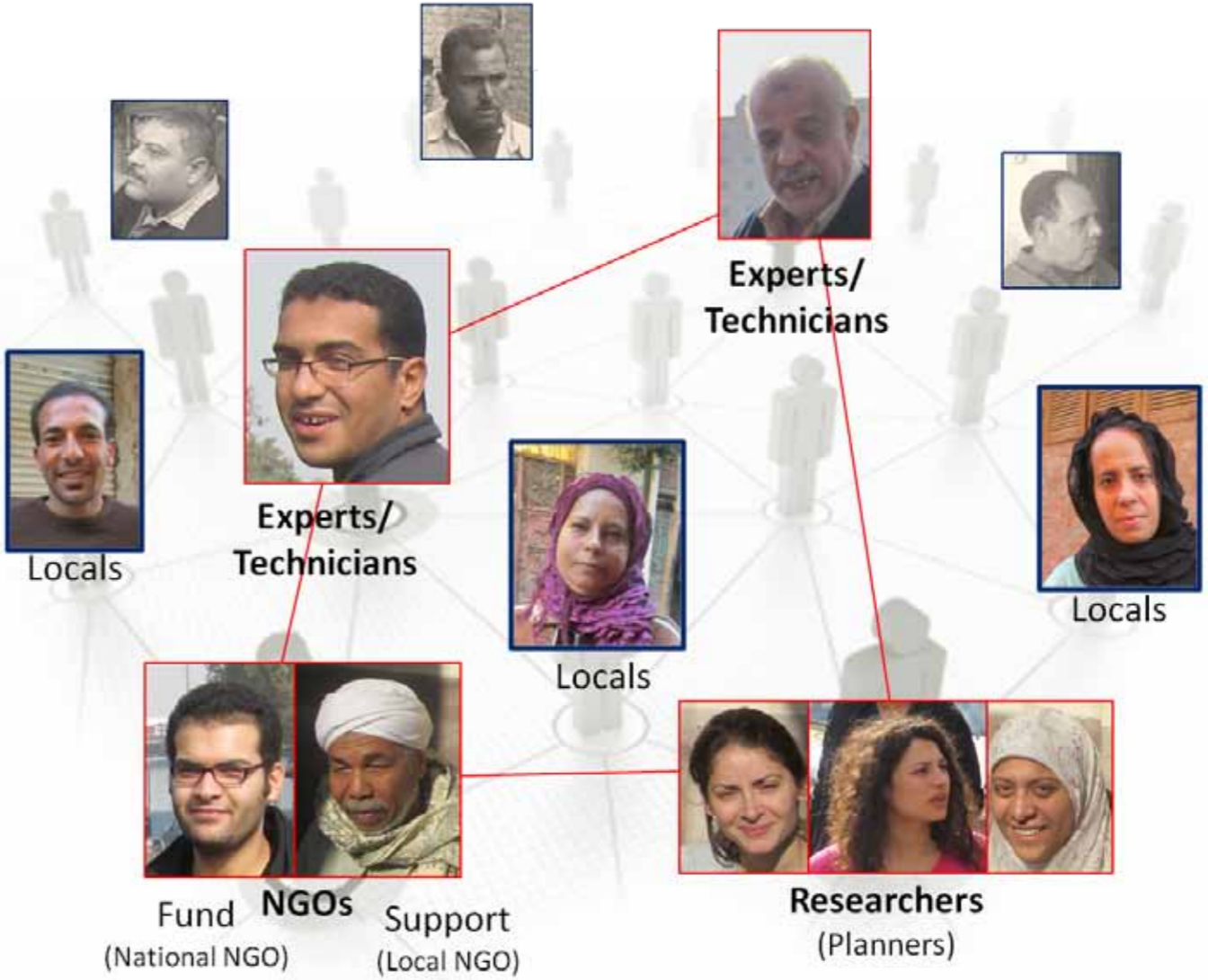


Fig.4\_06: Graphical representation of the coordinated network between all partners and the community





Fig.4\_07: Informal street-talks with the community, introducing the idea to the local community



Fig.4\_08: More informal talks with the local community



Fig.4\_09: Unstructured meeting with the community to introduce the biogas idea to them



Fig.4\_10: Meeting with Hajj Mahmoud (owner of local NGO place) to set formalities of holding the awareness session

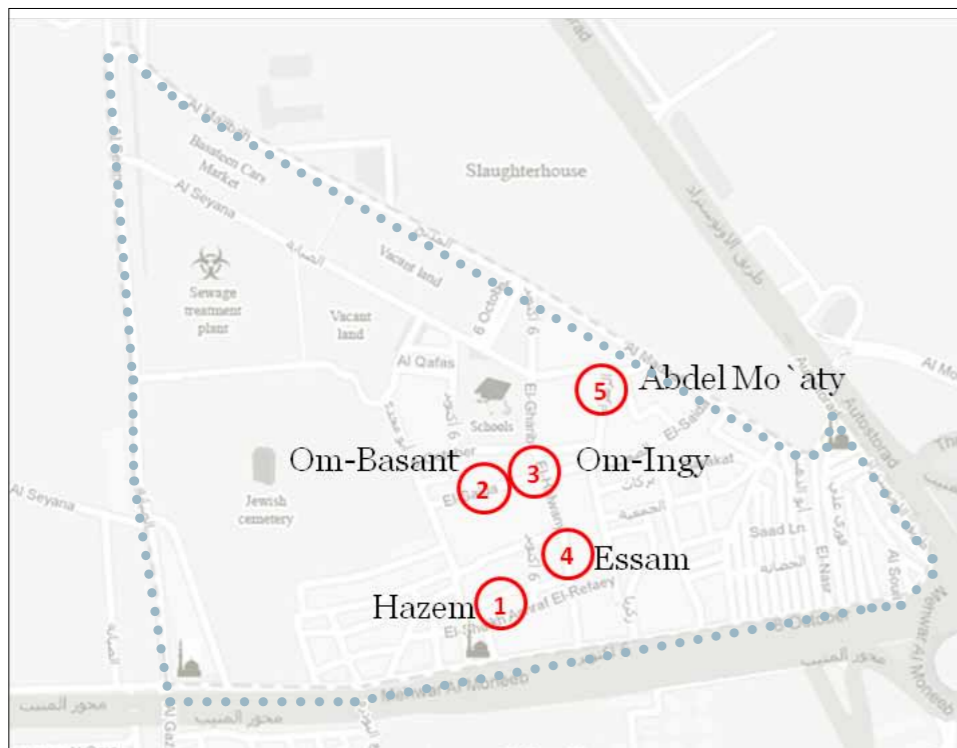
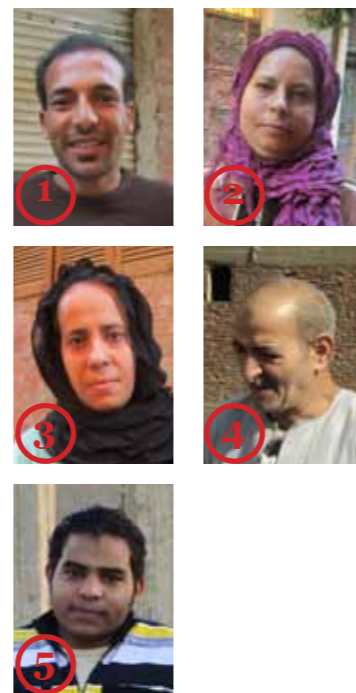


Fig.4\_11: Map for the distribution of the selected candidates and the locations of their houses



Therefore, the TBC group decided to take over the role of coordinating the process; between the community, experts and NGOs, and in some situations with the materials dealers, see fig. (4\_12).

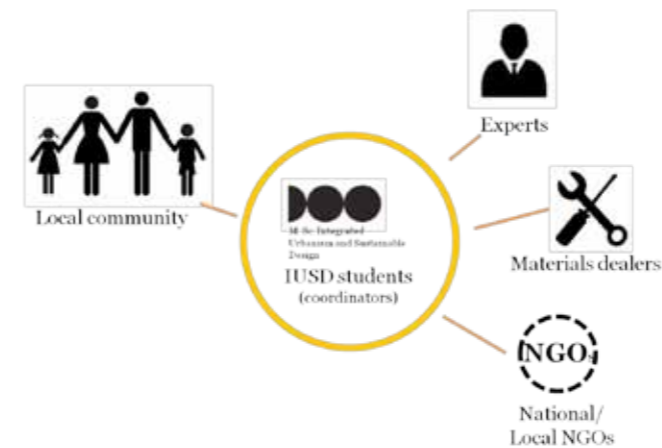


Fig.4\_12: Graphical representation of the communication/coordination role of IUSD students during the first phase to kick off the project

#### 4.1. APPROACHING THE LOCAL COMMUNITY

The TBC group did a big effort in talking to the people in Ezbet Al-Nasr. Around two weeks before the implementation and the installation of the first biogas units, many informal meetings took place on the streets, see fig. (4\_07,08,09). These informal meetings helped a lot in shaping the work by understanding the needs of the community and observing the reaction of the people towards such intervention in their neighborhood.

However, with the first steps of realizing the project some problems started to appear, on that matter, with the selected and already com

municated candidates. Part of these problems was due to distrustful reactions, lack of commitment or due to ethical and altruism<sup>1</sup> reasons, the other part was due to unsuitability of the construction situations, such as:

- The roof construction is either timber or trellis, which cannot resist the full tanks load.
- No direct sun light accessibility; e.g. the building is two story height and the surrounding buildings are much higher.
- On-site execution difficulties; e.g. the access exist to the rooftop is ladder
- The location of the rooftop is far from the kitchen location that needs long tubing, which were not convenient in some cases.
- Plans for the near future to build an additional floor, which might not be a problem in general, but in this case because the time was limited and there were no flexible possibilities to change the unit position in the short span.

Other positive points were put into consideration when choosing the first five samples; that those who are growing livestock or having a suitable roof for future gardening, have had a priority in our selection.

<sup>1</sup> Part of them felt, they can afford the units be themselves and many others are in more need to it than them. But they did not show that until the last minutes before implementation.

## 4.2. RAISING AWARE- NESS

Approaching the local community to pay their attention of the importance of the garbage as a “resource to be used” and not a “waste to be thrown away”, was an important step to push the work and the project forward. Sepcifically referring to the organic wastes.

Therefore, the process of raising their aware-ness started to take place parallel with the in-formal visits, meetings and street-talks. Sub-sequently, and while installing the biogas units on the selected houses in the area, the team organized a session to bring together local residents and to introduce the idea to them, in a more formal way. The raising awareness session<sup>1</sup>, was held on the 18th December 2012 and was entitled, see fig. (4\_13):

*“بلاش نرميها، تعالوا نستفاد بيها”*

**“Let’s not throw it, let’s make use of it”**

This first awareness event was semi-closed in local NGO place (Plan International or as local-ly known “the kindergarden”, see fig. (4\_10)); mainly including representatives from the in-volved NGOs and the two experts, the selected candidates (for the installation) from the com-munity along with the invited locals, see fig. (4\_14). This was for the sake of permissions limitations, people lack of understanding and also to fasten up the process. It is also impor-tant to mention that this session was supported



Fig.4\_13: Title of the presentation introduced to the local community during the awareness session



Fig.4\_14: Many females are attending the awareness session in Plan International place (the local NGO) in Ezbet Al-Nasr

by some locals themselves, who believed in the importance of the idea for their community community and helped us in spreading the word.

<sup>1</sup> For more details, please refer back to a detailed report on the session in annex II.

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**5.**  
**IMPLEMENTATION**



# 5. IMPLEMETATION

## 5.1.FINANCIAL AND TECHNICAL SUPPORT

Since it is a new idea for the community to produce gas from their wastes, and because of its cost which is not easily afforded by most of them, it was very important to ask for a financial support from an institution that would be in the first place interested in the general idea, and shows commitment to pursue the work on the long run with the people in Ezbet Al-Nasr.

Al-Musbah Al-Mudii has generously agreed to offer financial support to install five biogas units as a first step. This positive response came from the association's work in recycling, cleanliness campaigns and charity works. Two other people were involved in the installation phase. Mr. Hussein Farag and Mr. Hany El-Khodary<sup>1</sup> are Egyptian experts who provided the technical support and actually took the role of installing the five units in Ezbet Al-Nasr.

## 5.2. INSTALLATION PROCESS

The installation process of the first five Biogas units lasted for two weeks .

The work in these two weeks included:

- Buying the needed materials.
- Communication between the selected candidates, experts and the funding partner.
- Transferring the materials to the area.
- The installation process itself.
- In some cases, happened two times, removing all the equipments and materials after delivering them to the selected candidates due to either the candidate steps back again or because of unsuitability of the construction.

## 5.3. WAS IT A DREAM?.. *It just came true?*



Fig.5\_01: **STEP 01**\_Buying the needed materials from the market, the expert and the NGO representative



Fig.5\_02: Buying the tanks, the expert and the NGO representative



Fig.5\_03: Transferring the equipments to the site in Ezbet Al-Nasr



Fig.5\_04: PVC fittings needed for the installation of the unit



Fig.5\_05: Ten tanks for the five units is transferred to Ezbet Al-Nasr

<sup>1</sup>Mr. Hany El-Khodary is also a technical expert in installing the low-cost self-built Biogas unit. He has an experience in the field through his participation in several workshops in the same field. He and Mr. Hussein Farag are working usually together.

<sup>2</sup>Started by Mid. December 2012, further info on the work-plan; see last section "What is next?"



*The dream just came true..*



Fig.5\_06: Tanks, equipments and all materials arrived to the site



Fig.5\_07: Tanks are moved to the first house to start the installation



Fig.5\_08: **STEP 02**\_Cutting process to divide the materials on the five samples



Fig.5\_09: Technicians with the NGO representative speaking to the materials dealer



Fig.5\_10: Technicians are knocking the door on the first candidate to move the materials



Fig.5\_11: **STEP 03**\_Moving the materials and needed equipments to the selected house  
(taken by: Heidi Fink)



Fig.5\_12: NGO is knocking the same door again



Fig.5\_13: **STEP 04**\_NGO representative is setting formalities to start the installation of the unit, after moving the need equipments to the house



*The dream just came true..*



Fig.5\_14: The materials are ready down-stairs (taken by: Heidi Fink)



Fig.5\_15: **STEP 05**\_The start, lifting the tanks to the rooftop using a wooden rod and a long rope



Fig.5\_16: The tanks are ready on the rooftop



Fig.5\_17: **STEP 06**\_Cutting the top of both tanks (taken by: Heidi Fink)



Fig.5\_17: **STEP 07**\_Preparing for installing the in-let and the out-let pipes in the bigger tank (taken by: Heidi Fink)



*The dream just came true..*



Fig.5\_18: The needed pipes and equipments are ready downstairs (taken by: Heidi Fink)



Fig.5\_19: Moving the pipes and other small equipments through the staircase



Fig.5\_20: **STEP 06**\_Preparing pipes for the installation of the in-let and out-let holes



Fig.5\_21: **STEP 07**\_Installing the emergency (to empty) out-let pipe



Fig.5\_21: **STEP 08**\_The in-let pipe inside the bigger tank



Fig.5\_21: The bigger tank after installing the in-let and the emergency out-let pipes (taken by: Heidi Fink)



Fig.5\_22: **STEP 09**\_The installation of the main out-let pipe (for the leak liquid)



Fig.5\_23: **STEP 10**\_The installation of the gas out-let exit at the bottom of the smaller tank, it is used upside down (taken by: Heidi Fink)



Fig.5\_24: Installing the valve after the filling (taken by: Heidi Fink)

Fig.5\_25: All the pipes and exits are ready in both tanks





*The dream just came true..*



Fig.5\_26: Collecting dung to be added in the biogas unit as a starter for the biodegradable process



Fig.5\_27: **STEP 11**\_Dissolving dung in some water



Fig.5\_28: Inerting dung in the tank and dissolving it by some water



Fig.5\_29: Mixing dung with water after filling the tank with them (taken by: Heidi Fink)



Fig.5\_30: **STEP 12**\_Puttin the smaller tank above the bigger one (upside down) (taken by: Heidi Fink)



Fig.5\_31: The Biogas unit is ready, should be left for four weeks in winter times until it produces the biogas (the upper smaller tank should rise up as an indicator that the unit started to produce the gas)



Fig.5\_32: Children were participating in the dung gathering process



Fig.5\_33: Children were happy with the dung gathering process



Fig.5\_34: The community also got engaged in the gathering process



*The dream just came true..*



Fig.5\_35: Hazem, the house owner of the first sample (taken by:Heidi Fink)  
The process is completed and photos were taken with all the house owners we dealt with



Fig.5\_36: Abo Ingy, the house owner of the third sample



Fig.5\_37: Hossam`s family, the fourth house

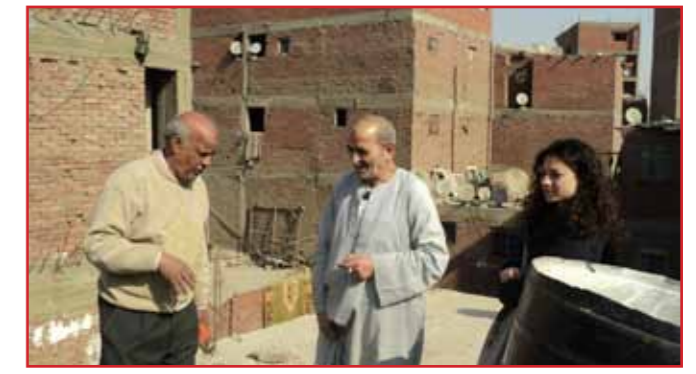


Fig.5\_38: Abdel Mo`aty, the house owner of the fifth sample (taken by: Heidi Fink)



Fig.5\_39: While moving from house to another after finishing one following one



Fig.5\_40: Arrival at the next sample... ..and the process continues



Fig.5\_41: Mr. Hussein is explaining the usage and the kick off of the unit

**KICKING OFF THE BIOGAS UNIT**

After finalizing the process of preparing the bits and pieces, the bigger tank should be filled with a mixture of dung and water (50% to 50%).

They should be mixed well, so all the big parts dissolve in water. Then it should be tightly covered by the smaller tank for two weeks in summer time and four weeks in winter time (this period is also depending on whether there is any added stimuli or not).

During this time, from the biodegradable process starts ,and so the upper tank starts to move upwards as the Methane gas starts to be produced. By then the keeper should start to add the minced wastes (using the kitchen blender) day after day. The daily added amount should not be less than half of a blender. Although the biogas unit does not need maintenance, sustain using it on regular bases avoids it from any disturbance in its function.





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6.

# SUSTAINING THE PROJECT

# 6. SUSTAINING THE PROJECT

## 6.1. WHAT IS NEXT...?

From the start, TBC group was aiming to achieve a sustainable intervention in Ezbet Al-Nasr, which would last beyond the period of time allocated for the academic semester or the academic assignment. An intervention that would be a start for a major change in the area, on both levels: the cleanliness, environment and health, and the economic level of households as well.

Although, the sustainability of the project depends mainly on the local residents; their awareness, commitment to the project on the long run, and on their belief that such effort will affect their lives in all its aspects (hygienic and healthy neighborhood, income-generation, moreover supporting an integrated social life). We believe in our role in ensuring that.

For this reason, TBC group held another meeting with Al-Misbah Al-Mudii, January 2013, for elaboration on the future plan and potential possibilities for sustaining the project see fig. (6\_01).

During the project, TBC group worked on establishing a network between the local community, experts, NGOs and associations.

This network aimed to help on the long run in monitoring and sustaining the initiative in Ezbet Al-Nasr. Therefore, the group started to select candidates from the area to take over the role of TBC in the area and to hand-over them the contacts and all needed information; in order to be able to continue and sustain the project by themselves.

***And the story continues...***  
*Who is next?*

The story here continues; the space is free to document down your experience. ....

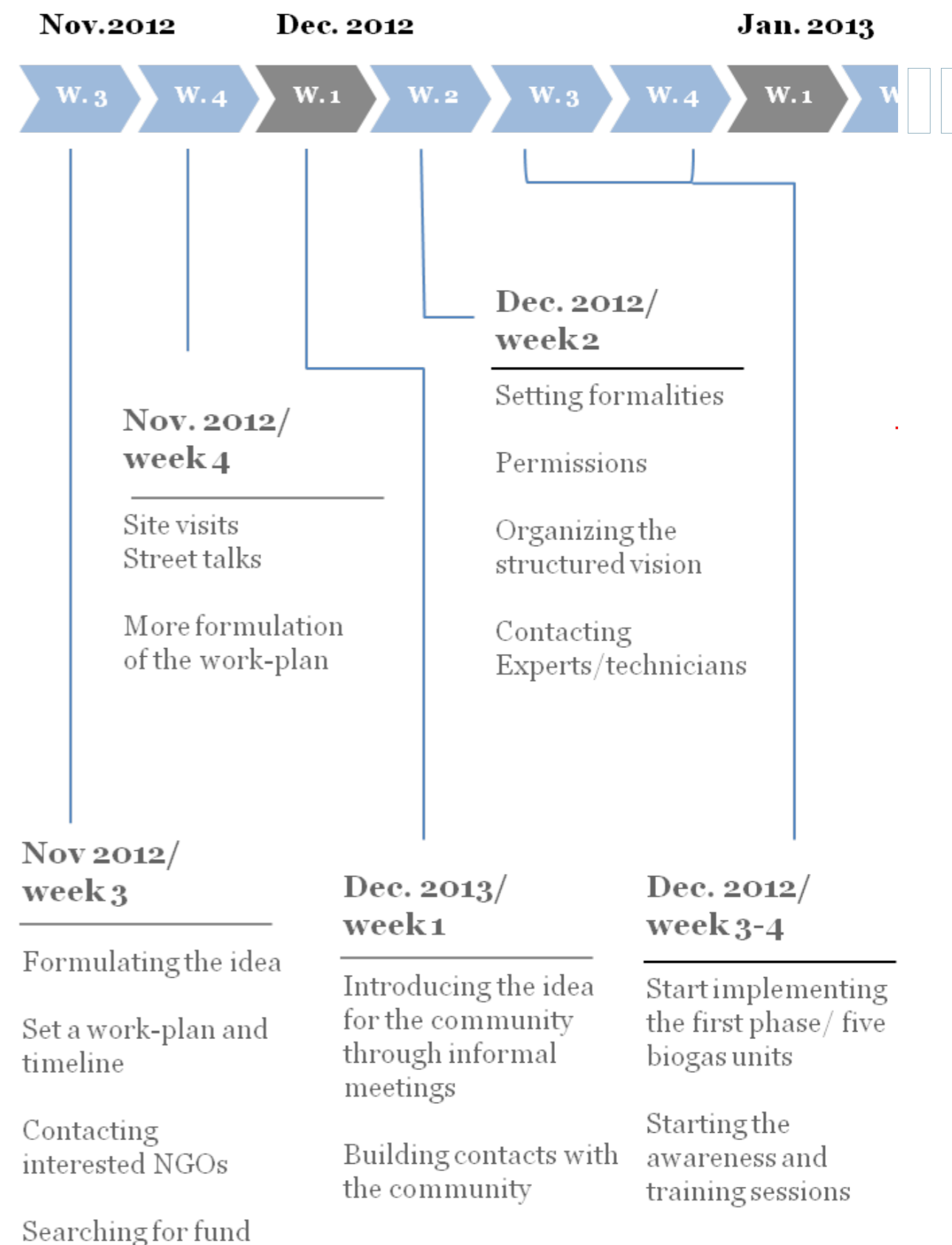
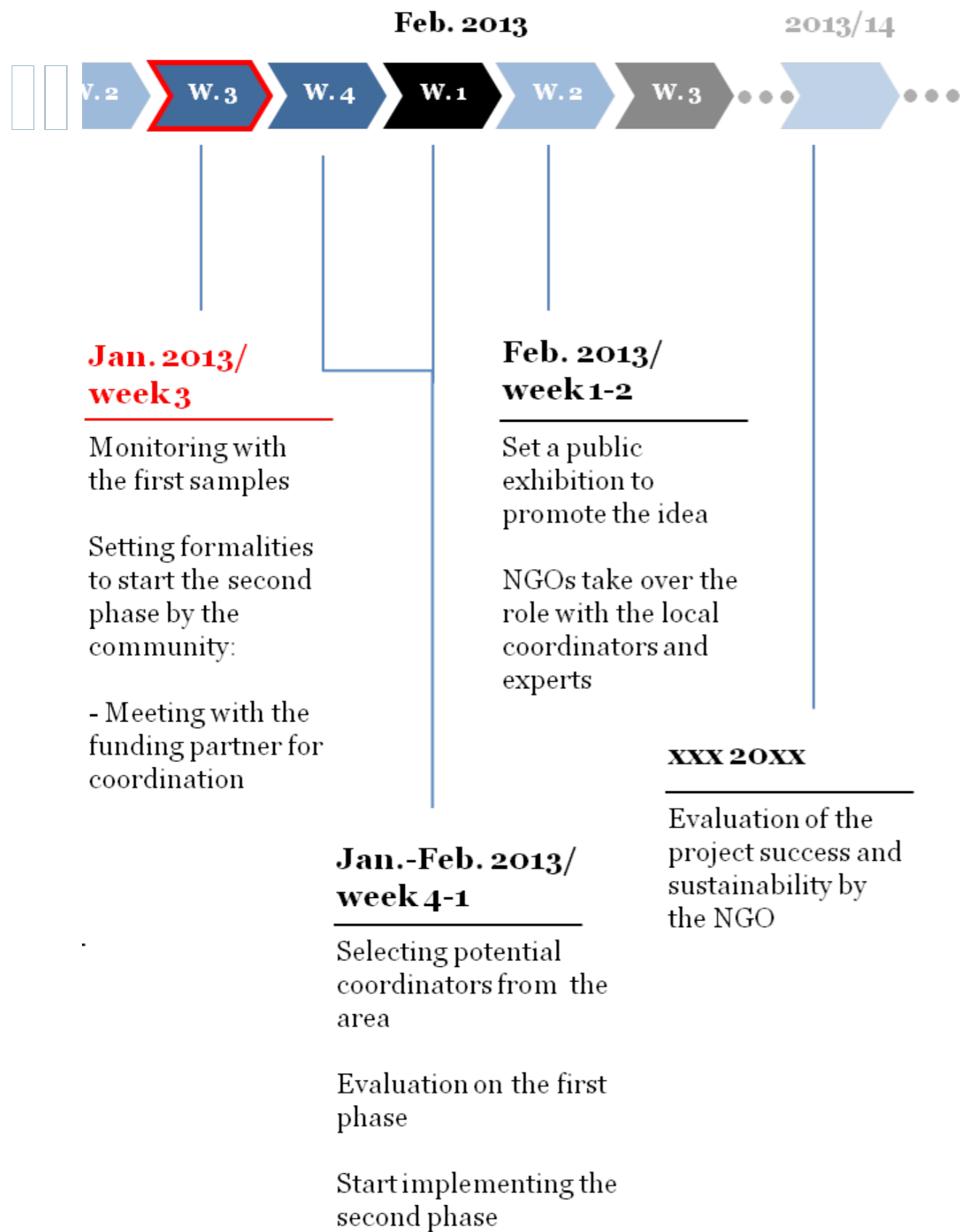


Fig.6\_01: Timeline of the project, for the steps which were already implemented and the planned future ones.



## 6.2. MEASURES OF SUCCESS

In order to reach the stage of evaluating whether the work which has been done in Ezbet Al-Nasr is successful, a set of measures should be put into mind and work as a datum line to comeback every now and then to them. However, these measures should be coordinated in a later stage to specifically define percentages and average numbers that if achieved, proves a high success of the project. At the moment, the wider scope of these measure should cover:

- The percentage of families who will start sorting and making use of the organic wastes from the household level on continuous basis.
- Evaluating if each family, from the ones who already installed the units, proves that using the Biogas units saves an average of 80% from their income and prevents them from gas cylinder shortages.
- The percentage of families who installed the biogas units and is using it on regular bases.
- A relatively positive impact on the visual, environmental and health levels is achieved within a period of time.

## ACKNOWLEDGEMENT

TBC members are thankful to our teaching staff who helped us with their experience, fruitful feedback, in guiding the work to stay on the right track.

The group is also grateful to Al-Misbah Al-Mudii, specially Mrs. Jehan, who has kindly supported the initiative financially and Mr. Ayman Ramadan and Mr. Moaz, who paid from their time and effort to volunteer joining us to the site. We cannot also forget our experts Mr. Hussein Farag and Mr. Hany El-Khodary, who took the tiring role of installing the five biogas units, joining us to the market to buy the needed materials and in spreading the idea during the awareness session.

TBC members are grateful to all the supporter; GIZ-PDP for supporting contacts, and with comments and feedback, and Mrs. Heidi Fink For joining the site installation, helping in photographing part of the process and also for her moral support. The group has not to forget the cooperation and welcoming we found by Hajj Mahmoud, the owner of the local NGO (Plan International) place without his cooperation in offering us the place the awareness campaign might have taken longer time.

A warm “thank you” and deep gratitude is passed from TBC group to each and every person in Ezbet Al-Nasr who helped us with love and did not spare any time, information, cooperation or even effort they believed it is helpful for us. Getting to know your daily problems, had been our motivation to do what we did. However, with the all cooperation we found with the community, Hazem and Om Basant did a great and positive role in facilitating our work in the area, helped us alot to get in contact with more candidates and also in spreading the word among the community, so special “thank you” to them.

Keep your neighborhood exciting as it is right now, and please do remember that any change, to be achieved, depends on you. You gave us a strong belief that dreams could come true, and we hope that we have solved something in return with our initiative.

*Trash Becomes Cash would have never existed without you, and without you involved it will never go on.....*



## LIST OF ABBREVIATIONS

<b>IUSD</b>	<i>Integrated Urbanism and Sustainable Design (M.Sc.)</i>
<b>ASU</b>	<i>Ain-Shams University</i>
<b>TBC</b>	<i>Trash Becomes Cash</i>
<b>NGO</b>	<i>Non-Governmental Organization</i>
<b>GIZ</b>	<i>German International Cooperation</i>
<b>BMW</b>	<i>Biodegradable Municipal Wastes</i>
<b>PDP</b>	<i>Participatory Development Program in Urban Areas</i>

## REFERENCES

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- Mechanical engineering (2011), Biogas production from human waste [online] available from <<http://www.mechanicalengineeringblog.com/2180-biogas-production-from-human-waste-anaerobic-digestion-anaerobic-fermentation-methane-production-methane-emission/>> [13 January 2013]
- Wikipedia (2013), Biogas [online] available from <[http://en.wikipedia.org/wiki/Organic\\_waste](http://en.wikipedia.org/wiki/Organic_waste)> [13 January 2013]
- Hany El-Khodary (2012), Interview on possibility of implementing the Biogas units in Ezbet Al-Nasr, by Sandy Qarmout [Skype meeting], 14 December 2012, 14:30.

## PHOTOGRAPHERS

Photographes in this report were taken by the IUSD students:

Nahla Makhlouf  
Sandy Qarmout  
Zeina El-Cheikh, otherwise it is metioned.

The TBC group is thankful to the contributions of:

Heidi Fink (special thanks)

and,

Mai Sabri  
Lisa Deister  
Mohamed salheen  
Pia Lorenz



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# ANNEXES

# ANNEXES

## ANNEX I

# BUILD YOUR OWN BIOGAS UNIT

### NEEDED MATERIALS

- Two dark plastic tanks (Preferable Niletex):
  - A bigger one of 1000 L size and the other one 750 L size.
- Three PVC pipes with diameters of: 3” , 2”-2.5” and 1”.
- One Brass valve for the 1” pipe
- One PVC valve for the 2”-2.5” pipe
- Plastic flexible tubing
- Kitchen blender
- Single flame cooker
- PVC (L-shape and spiral) fittings for each pipe
- PVC cement
- PVC adhesive tape
- Two big sacks of dung (as a starter added at the end)

filling the tank with water and 15-30 min. for mixing the dung with water inside the tank.



Fig.I\_01: Photos of all the materials, tools and equipments needed for the installation process

### PROCESS OF INSTALLING

For detailed and visualized steps on this process, check pictures in Chaprt.4, section 4.2: “The dream just came true..”

In this annex, you can find more detailed pictures.

The duration of installing one unit is around 3-4 hours<sup>1</sup> (if all the needed materials and tools are ready); Cutting the tanks and pipe takes around two hours, plus 30-60 min. for



Fig.I\_02: The needed valves



Fig.I\_03: The two tanks



Fig.I\_04: Use the automatic saw for cutting the top of both tanks



Fig.I\_05: Leave one semi-cube part for the installation of an inner in-let pipe



Fig.I\_06: Use a hot metal pipe to hole the pipe space (3” in Diameter)



Fig.I\_07: Cut the 3” pipe to the needed length



Fig.I\_08: Insert the pipe to make sure of the hole width, then fix the L-shape fitting and then re-install it again

<sup>1</sup>This time range is determined according to the implementation process that took place in Ezbet Al-Nasr, December 2012, with limited amount of resources and supporting equipments.





Fig.I\_09: Clip a lower hole on the side of the bigger tank, using a hot metal pipe (2" in Diameter)



Fig.I\_10: Fix the 2" fitting using the needed fibers



Fig.I\_11: Then install the PVC valve



Fig.I\_12: Cut another upper hole from another side of the same tank (the bigger one), then install the fittings, do not forget to use the suitable needed PVC cement and adhesive tapes



Fig.I\_13: Then fix the 2"-2.5" pipe



Fig.I\_14: With the needed L-shape fittings it will be finished



Fig.I\_15: Cut a third hole, this time, at the bottom of the smaller tank (for the gas exit), use the same materials as before



Fig.I\_16: Turn the smaller tank upside down



Fig.I\_17 (to the left): Put it inside the bigger tank, after filling the tank with dissolved dung and water

Fig.I\_18 (to the right): Then your own Biogas unit will be ready to produce gas





## ANNEX II

# RAISING AWARENESS SESSION

## *A detailed report*

### ***Raising awareness session held in Ezbet Al-Nasr***

18 December 2012

#### **ORGANISERS:**

##### **MSc. IUSD students**

- Arch. Nahla Makhlof (Egypt)
- Arch. Sandy Qarmout (Jordan)
- Arch. Zeina Elcheikh (Syria)

##### **In collaboration with:**

- Mr. Hussein Farag (technical expert)
- Mr. Hany El-Khodary (technical expert)
- Mr. Waleed Abou El-Naga (Al-Misbah Al-Mudii representative)
- Mr. Ayman Mustafa Ramadan (Al-Misbah Al-Mudii representative)

##### **Main participants:**

- Local community of Ezbet Al-Nasr (average attendees around 15 persons)

##### **Other participants:**

- Mrs. Sarah Asseel (GIZ-PDP representative)

*This first awareness event was semi-closed in a local NGO place within a kindergarten in Ezbet Al-Nasr. This was for the sake of permissions limitations, people lack of understanding and also to fasten up the process.*

14:00  
People from Ezbet Al-Nasr start to arrive

14:30  
The number of attendees increases

14:45  
The location of the session changes from an outdoor to indoor location, because of technical problems

14:50  
Arch. Sandy Qarmout started the presentation with a brief introduction on the IUSD students' work in Ezbet Al-Nasr.

Arch. Qarmout introduced where did the idea of the "Trash Becomes Cash" come from, and explained how the absence of garbage management in Ezbet Al-Nasr caused several problems that encouraged the TBC group to start a garbage-related initiative for the area.

She mentioned how the organic wastes are a main issue in the neighborhood, since other waste materials (metals, glass, paper,...) are considered valuable for garbage-collectors who collect them and sell them.

Afterwards, the idea of the Biogas is introduced to the attendees.

15:00  
Open discussion

15:10  
More people start to join

15:15  
Re-introduction to the discussed points for the new attendees

Mr. Hussein Farag joins the discussion by talking about his own experience with biogas, as he installed one in his own house around 4 years ago. He motivated the attendees by speaking about his own experience and how the process is useful in: getting rid of the resulted hazardous health problems, saving gas expenses; getting rid of organic wastes in the kitchen; and making use of the residue liquid as fertilizer for plants in the households.

15:30  
Open discussion

#### *Main questions raised by attendees:*

- Can a biogas unit be installed on a wooden roof?
- What kind of organic wastes in the kitchen can be used?

15:45  
Concluding the session with a PowerPoint presentation presented by Arch. Sandy Qarmout showing the informal meetings with people in Ezbet Al-Nasr and with NGOs and associations. This presentation showed how the biogas units were installed in the area starting from the materials purchase till the stage it reached at that time..

Arch. Nahla Makhlof, collects names and telephonenumberoftheattendeeswhoareinterested in installing a biogas unit in their own houses.



Fig.II\_01: Plan International classroom (the place where the session was held)



Fig.II\_02: Ladies started to arrive even before the session starts



Fig.II\_03: Mr. Hussein motivating the community during the session



Fig.II\_04: Gather contacts of interested locals

# ANNEX III

## SURVEY TOOLS

This section names shortly the important communication and site survey tools used during TBC work in the project.

### A1. Conducted communications

1. Informal meetings through site-visits
2. Structured meetings with experts, NGOs and associations
3. Networking meetings
4. Candidates selection process through site visits (house visits).

### A2. Questionnaires distributed on the local residents, on their gas cylinder consumption rate.

- 1-For how many hours do you use gas per day?
- 2-How many flames do you use?
- 3-How many gas cylinder do you need per month?
- 4-For how much do you buy a gas cylinder? How much is the average price?

### Questionnaire results

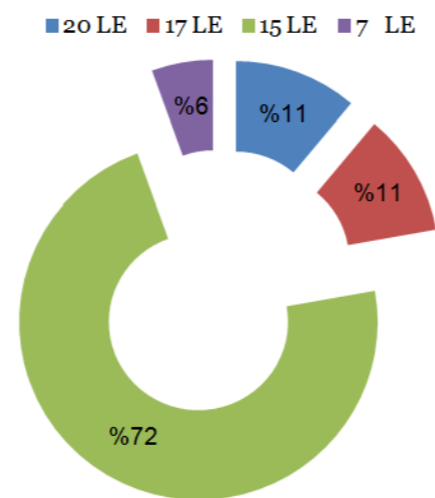


Fig.: 2.05-06: Price of the gas cylinder

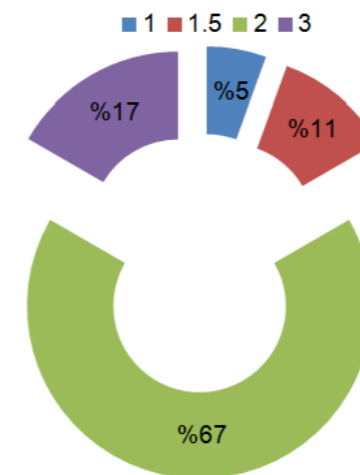


Fig.III\_01: Number of flames used in the households

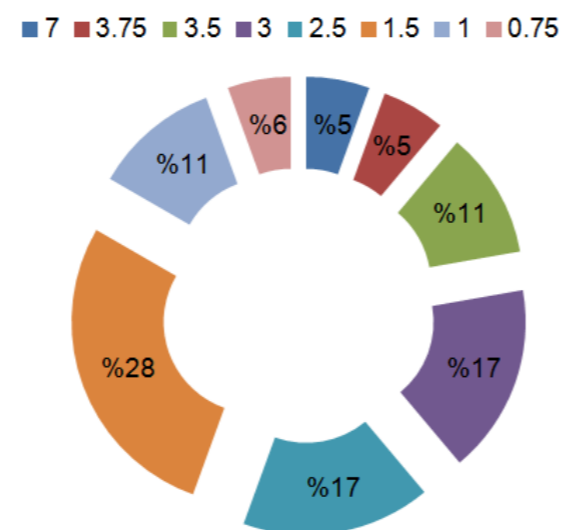


Fig.: 2.05-06: Gas usage rate (hour/day)

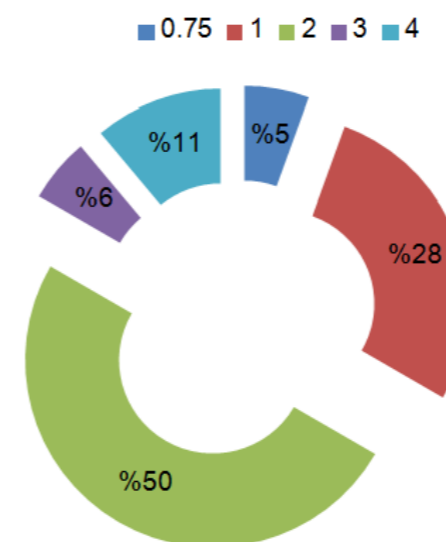


Fig.III\_02: Number of gas cylinders consumed per month

TBC group has also prepared another questionnaire for evaluating the usage of the Biogas units among the people who already got it installed. The group handed-over the questionnaire to Al-Misbah Al-Mudii to take over the role of evaluating the process, in term of one to two months, after the units start to produce gas. This questionnaire includes:

1. How many hours per day do you use gas for cooking purposes?
2. How many hours per day does the biogas unit provide you?
3. How many blenders of minced wastes do you add weekly?
4. How often do you add these minced wastes during the week?  

Daily	Day after day
Twice a week	Once a week



## ANNEX IV

# PROFILES

This page includes profiles of all people who were involved in the implementation of the first phase of the project and their contacts. Without the cooperation between all of those esteemed and potent people the project would have never existed. Thanks and gratitudes are passed to each one of them.

### EXPERTS AND TECHNICIANS



#### Hussein Farag

Biogas technician expert  
E.mail: hussfarag@yahoo.com



#### Hany El-Khodary

Biogas technician expert  
E.mail: matrikation@hotmail.com

Contact on FaceBook Page: **The Biogas People**  
<https://www.facebook.com/groups/306498012782724/?ref=ts&fref=ts>

### FUNDING PARTNER



#### Al-Misbah Al-Mudii

Tel: 16093 or 01270588869 (arab.)  
Mobile: 01143282727 or 01229970977 (engl. etc.)  
E.mail: almosba7almodce2@hotmail.com  
Address: 6b, Amarit Atlas, Ahmed Fakhry Street  
Nasr City , Cairo, EGYPT

### NGO REPRESENTATIVES



#### Ayman Ramadan



#### Moaz

### SUPPORTERS



#### Hajj Mahmoud

Owner of Plan International place (the local NGO)



#### Heidi Fink

Environmental Activist  
E.mail: h.j.fink@web.de

### LOCAL BENEFICIARIES

#### The first phase (five units)



#### Om Basant

Housewife  
Address: 8th Qotb Al-sharkawy st., Ezbet Al-Nasr, Basateen, Cairo



#### Hazem

Microbus driver  
Address: 6th Harat Abo-dessouky, from Ashraf El-Rafe`i st., Ezbet Al-Nasr, Basateen, Cairo



#### Om Ingy

Housewife  
Address: 10th Qotb Al-sharkawy st., Ezbet Al-Nasr, Basateen, Cairo



#### Abdel-Mo`aty

Address: 3rd Al-Zahraa st., from Sa`ayda st., Ezbet Al-Nasr, Basateen, Cairo



#### Mohamed (Essam`s brother)

Address: 8th El-Sayed Abdel-Rahim st., from 6th of October st., Ezbet Al-Nasr, Basateen, Cairo

### PROJECT COORDINATORS\*



#### Sandy Qarmout

26 years old  
M.Sc. IUSD student  
Jordanian architect  
E.mail: Sandy\_qarmout@hotmail.com



#### Zeina Elcheikh

33 years old  
M.Sc. IUSD student  
Syrian architect  
E.mail: elcheikh\_zeina@yahoo.com



#### Nahla Makhlof

25 years old  
M.Sc. IUSD student  
Egyptian architect  
E.mail: nahla.nabil@yahoo.com

\*Contacts and information on potential candidates for further implementation of the project can be provided, upon request, through the project coordinators.





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