



Benefits of Biogas Plants

Concise Case Studies from Households in the Faisalabad District



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Introduction

The Rural Support Programmes Network (RSPN) is implementing the Pakistan Domestic Biogas Programme (PDBP) in the twelve districts of central Punjab. PDBP was initiated in January 2009 with the support from SNV the Netherlands Development Organisation. From November 2009, the Embassy of the Kingdom of the Netherlands began its support to PDBP. Winrock International has also provided technical support to PDBP.

The objective of PDBP is to improve the living standards of rural men and women, contribute to increasing local employment as well as output, reduce dependency on traditional energy sources and achieve sustainable development through integrating the alternative energy with the socio-economic activities of the people in rural communities.

PDBP has adopted a market led biogas sector development approach. While PDBP devises strategies to create awareness about the multiple benefits of biogas plants, it has also created a capacity within the private sector to install the biogas plants. Private sector Biogas Construction Companies (BCCs) construct the plants for rural farming households who want to install biogas plants. By December 2013, almost 3,500 biogas plants of various sizes have been installed by BCCs. Apart from installing the biogas plants BCCs also provide four year warranty and after sales services to biogas plant clients.

RSPN is grateful to Mr Hasan Waleed for preparing five concise case studies of biogas plant client households. These six households have installed biogas plants of sizes 4m³, 6m³, 8m³, 10m³, and 25m³ respectively. These households are from the Faisalabad district.

Case Study 1: Mr. Abdul Majeed (Size of biogas plant installed 4m³)

Mr. Abdul Majeed, an 80 year old man lives with his two sons and their families in a small house in a village located in the district of Faisalabad. Owing three buffaloes, he installed a 4 cubic meter biogas plant on 3rd May 2012 which was financed by his sons. His purpose for getting the plant constructed was to use the biogas produced for cooking purpose.

“We were using roughly about 12 maunds (total 480 kg) of firewood per month as fuel to meet our needs to cook food for the entire family, as well as sometimes using LPG”. Mr. Abdul Majeed has 9 family members. Food preparation for such a large family was never easy, and that it was very inconvenient and difficult at times to constantly get firewood collected. “I had to get people to go and collect firewood, paying them a fixed wage for collection and also paying for the firewood itself. Collection took about an hour but it took time to set it up in the kitchen and for it heat and reach the proper temperature suitable for cooking. I have young children at home and one who is still an infant so he needs milk every now and then and that milk has to be boiled before it can be given to the baby”. The kitchen was in constant use, not just for cooking main meals, but also for making tea, warming milk, etc. Women would spend the entire day in the kitchen with little time to give to their children. “The fumes from the burning wood caused a lot of problems as the smoke would spread around and would make standing there for too long difficult at times. Though, thankfully nobody in the house ever suffered any serious illness as a direct result of using firewood except for one time when my daughter in law suffered a minor burn caused by handling the hot wood”. He went on saying that the minor burn was treated by applying an ointment on it which was purchased for just a Rupee from a nearby government dispensary.

Mr. Abdul Majeed complained about how even the children did not get enough time to study or even play, since they spend most of their time assisting the adults of the household. Mr. Abdul Majeed said that, “After the installation of the plant, we have completely stopped using LPG cylinders and now only use firewood in the three winter months. As a result of this biogas plant considerable savings are being made, both in cash terms as well as in term of time. Where I was using about 12 maunds (480 Kgs) a month, now I only use about 2maunds (80 Kgs)”. The difference is quite significant.

He further added that the children now get time to concentrate on their studies and get time to play around when they are free and basically get to do things children are meant to and not be restricted to the household chores only. He said that the biogas is of direct benefit to household women as they are the ones responsible for all the activities in the kitchen. “Cooking on biogas is faster and easier than cooking on firewood. Biogas stoves do not take time to heat up, so as soon as the stove is turned on they can start cooking. It is quick, easy and clean. It has helped keep my kitchen clean and tidy, and it protects my

family from the dangers of indoor air pollution". Household women now get more time to tend to other personal matters; they give more time to their children and monitor their children's education. Mr. Abdul Majeed also mentioned that now the children get breakfast on time and because of that are not late for school.

Mr. Abdul Majeed is directly saving Rs. 3,544 per month as a result of switch to biogas from firewood. Net cost of the biogas plant was Rs. 33,000. This means that the cost of the biogas plant was recovered in the first eleven months of use. If the value of LPG and time saving is calculated, then the period will be further reduced. No wonder Mr. Abdul Majeed said that this investment in the biogas plant installation was one of his best investments ever made.

Case Study 2: Mr. Muhammad Idrees (Size of biogas plant installed 6m³)

Mr. Muhammad Idrees' six cubic meter biogas plant was installed on the 26th of June '2012. Muhammad Idrees explained that Faisalabad faced severe energy crisis and access to gas was very limited as well and could not be relied on at all. He opted for getting a six cubic meter biogas plant constructed just so it would be enough to fulfill his needs to cook in the kitchen without any inconveniences.

He explained how he was dependent on using firewood and LPG cylinders as fuel, saying 'It took us about 4 hours just to collect the wood, and once it had been collected, my wife had to wait till the stoves had been heated up properly before she could even begin cooking. That consumed quite a bit of time unnecessarily. As far as LPG cylinders are concerned, I would buy one 5kg cylinder which was used occasionally over a 3 month period during winters'. Mr. Idrees also mentioned the harm of using firewood has caused to those who use the kitchen. He explained that within a single year his wife caught eye infections twice as a direct result from the fumes of the burning wood, apart from that suffered respiratory problems, and on a total of eight occasions she suffered burns her hand while handling the wood twice. Every single time these had to be treated by a doctor. 'Using firewood as fuel has clearly been an issue for us since it's not an ideal choice because of health concerns'.

Mr. Idrees was quite satisfied with his decision to install the biogas plant. He elaborated by saying that since the installation of the plant, he has significantly reduced the use of firewood, which has led to savings in cost as well as in time from the collection process. Firewood is now only used during winters as an alternative because he does not want to rely on one source only, while he has completely eliminated the use of LPG cylinders. MR. Muhammad Idrees very proudly stated, 'Since the plant has been operational there has not been an incident that affected anyone's health as a direct result of using it. Biogas is quick, easy and clean. Cooking on gas has kept the kitchen clean, hygienic and orderly, and has protected my family from the dangers of the smoke collected indoors'.

Mr. Muhammad Idrees also grew sugarcane as a crop. He used to apply two main chemical fertilizers: Urea and Di-Ammonium Phosphate (DAP). Since the installation of the biogas plant, he has started using the slurry produced by it as an organic fertilizer. About 20% of savings on fertilizers was observed with an increased production of crop of about 20% due to the use of bio-slurry on the fields.

The financial benefits of the biogas plant to Mr. Idrees are estimated to be Rs. 4,701 per month as a result of fuel savings (fire wood and LPG), time savings (time in collecting firewood), savings on chemical fertilisers and increase in incremental crop production. Mr. Idrees installed the biogas plant at a cost of Rs. 41,475, so this means that pay back period was 8.8 months.

Case Study 3: Mr. Nazim Ali (Size of biogas plant installed 8m³)

Arif Ali and Nazim Ali are two brothers living in the same compound with a total of 13 household members. The biogas plant was installed in the name of Nazim as he was the one who financed majority of the costs and is also the elder of the two brothers. As Nazim was unavailable for the interview, Arif provided information about the biogas plant and its impact family's lives.

Arif, who is a mechanic, started by explaining what was his daily routine before getting the biogas plant. He said that they used about 10 maunds (400 Kgs) of firewood every month. It would take two people about 3 hours to collect firewood, while LPG was used only during winters. He mentioned how problematic it was for the women of the house to use firewood as fuel since there have been instances when they have had suffered from infections, burns, respiratory problems and cuts caused by handling the fuel wood. 'It was certainly worrisome when the women who at times were accompanied by children to assist them in the kitchen, would suffer from eye infections or would burn their hands. My sixteen year old daughter burnt her hand once and contracted a really bad eye infection and had to be taken to the nearby clinic to be treated. When carrying out a basic household chore becomes a nuisance coupled with the scarcity of natural gas, you know it is a big problem'. A big problem indeed and one could see why they opted for a biogas plant since they could not accomplish basic activities without hindrances.

Arif explained that when they were setting up the biogas plant, they were given thorough instructions on how to operate it, how much manure needs to be filled in on a daily basis and the sort of maintenance which is required. 'We only use small amount of fire wood now and that too only during winters but that is mostly for heating purposes but as far as cooking is concerned we have completely replaced firewood as well as LPG cylinders. This benefitted us greatly since there is a reduction in our expenses and the time that was spend collecting wood can now be utilized in other important matters. Apart from that since the installation of the plant, our kitchen is much cleaner, there is no smoke, no fumes and the differences are quite visible not only in terms of sanitation but in terms of hygiene as well. There has not been a single incident, and as I am very happy my family's health has been affected for the better. I am also glad since it has spared me of further expenses for the treatments'.

Arif Ali also acknowledged that he was well aware of the benefits of using slurry as an organic fertilizer, but said he did not own any land on which he could cultivate crop and also his primary motive for installing the biogas plant was so that the basic cooking functions could be carried out in the kitchen without the risk of catching diseases, illnesses and without any unwanted interruptions. When asked about what other benefits he experienced, he spoke about how all the members of the family are able to spend time with

one another more, the women are able to attend to their children and be more involved in their education. Meals are cooked on time and children are not late for school and as a result there is enhanced productivity in other functions of the household.

The financial benefits of the biogas plant to Mr. Arif are estimated to be savings of Rs. 4,678 per month as a result of fuel savings (fire wood and LPG) and time savings (time in collecting firewood). Mr. Arif installed the biogas plant at a cost of Rs. 45,759. The pay back period is 9.8 months.

Case Study 4: Mr. Khalid Parvez (Size of biogas plant installed 10m³)

Mr. Khalid Parvez is the owner of a ten cubic meter biogas plant which he installed on the 28th of March 2012. Mr. Parvez said that before the installation of the plant, his basic source of fuel for cooking and heating was firewood. He spoke about the difficulty of having proper access to natural gas in these areas, 'The situation here is not exactly favorable, as we are deprived of the basic necessities to carry out routine tasks like cooking since gas is scarce here. We had to rely on using firewood only and it took two men about two hours daily to collect 5 maunds (200 Kgs) of firewood.' Mr. Parvez added that it was not uncommon for the household women to suffer from eye infections or get burnt and cut from the firewood or experience temporary breathing problems after inhaling too much smoke from the burning wood. 'Every time I had to take them to the doctor to get them treated, I never took these matters lightly no matter how minor they may seem. It's better not to take any risks with your loved ones'.

With respect to the impact installing a biogas plant has had on the household, Mr. Parvez said, 'There is a considerable amount of reduction in the amount of firewood used now, even though I believe the use of firewood can completely be eliminated, I still use it for heating purposes during winter season over a three month period. Where I was using 5 maunds (200 Kgs) before, now I just use roughly over a mound (40 Kgs) and this has benefited me in not only saving costs but time as well. Now it takes just one man half an hour to collect the desired amount of wood. Apart from that there are no fumes, no gas emissions and sanitation has greatly increased'. He spoke about how health problems caused by the fumes have completely been eliminated since there are none. 'We now get time to spend as a family which before was more of a luxury we could not afford. My wife and daughter are able to contribute further in other household activities and have enough time for themselves and their own personal matters. It is almost like living in a big city now'.

Mr. Khalid Parvez owned agricultural land. Urea and DAP were used as his primary chemical fertilizers for the crops and he was producing wheat, bitter melon, round gourd and pumpkin. He also pointed that since the installation of the plant and use of slurry as an organic fertilizer there has been a reduction in the use of the chemical fertilizers of up to 20% while there is also a growth in the production of his crops. 'This year for the first time I produced 1 maund (40 Kgs) of lady finger and hopefully in the near future I plan on increasing the number of produce that are cultivated in a single year'.

The financial benefits for Mr Parvez are estimated at Rs. 7,796 per month as result of cost savings on fire wood and LPG, savings on related health expenses, saving from chemical fertilisers and incremental benefits on crop production. The total cost of the biogas plants was Rs. 51,894. The pay back period is estimated at 6.7 months.

Case Study 5: Mr. Muhammad Deen(Size of biogas plant installed 25m³)

Mr. Muhammad Deen has installed a 25 cubic meter biogas plant. This biogas plant was installed on the 13th of July 2013. He had a large house which accommodates 25 of his family members.

Mr. Deen explained that he had three kitchens in his premises, out of which one was used solely by his servants for their own needs and was located outside of the house. "I had to utilize up to 40 maunds (1600 Kgs) of firewood each month which was divided among all the kitchens and 11 kg of LPG was used monthly as well. The problem with LPG cylinders is that you have to dispose them off and get a new one each time and it can prove to be quite the hassle. It would take my servant about 4 hours just to gather wood". Mr. Deen also mentioned that his wife, daughters and even servants had suffered infections, multiple burns, respiratory problems as a result of the smoke from the burning of fire wood which collects inside the kitchens. 'It must have happened about more than 15 times so ofcourse it proved to be a problem'.

When discussing the benefits of the biogas, Mr. Deen said, "Biogas has definitely proved beneficial for me since the use of firewood and LPG has completely been eliminated. I have not only gained financial benefit but it has affected the health of my family members for the better. There has not been any incident in the kitchen since its use. It is much cleaner, there are no fumes and there is no smell inside the kitchen too which makes it all even easier to work in'.

Mr. Deen also said, "Bio- slurry has been quite beneficial for me as I now use it as a fertilizer for some of my crops. The chemicals I was using before this were Urea and DAP and still do but there has been a reduction in the amount of bags that I use now'. Mr. Deen mentioned that he grows cabbage, cauliflower and sugarcane. 'I have over a thousand acres of land so naturally I don't use slurry on all it but just a portion in comparison, and even then it has proved to be quite beneficial by saving costs'.

Simple financial benefits for Mr Deen are Rs. 20, 385 per month. The total cost of the biogas plant is Rs 140,000. The payback period is 7 months.

Concluding words: Biogas presents an opportunity for individuals to use renewable energy and overcome the difficulties caused by the energy crisis of the country. With the ability to produce energy and organic fertiliser, and meet the basic needs of the household, biogas has proved to be a very promising alternative for the users