



INDUSTRIAL ENERGY EFFICIENCY IMPROVEMENT IN IRAN

Management Report: EnPIM mission of January 2018

Prepared for
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1 Executive Summary

The original purpose of this mission was to check the use of the EnPI tool in the 3 plants and solve minor problems or doubts that could have arisen during this period since November 2017 when the tool was planned to be in use.

At the beginning of the project, all 3 plants displayed strong interest in the project and the concept. This was evident during the mission of early 2017, when the EnPI training was delivered. All 3 plants had enough data to calculate energy baselines to allow performance monitoring and to estimate potential savings. This was successfully completed, and in November 2017, the 3 plants received the EnPI tool developed by Luis.

Following the development of the baseline models and the tool, the intent was to update the tool data base for energy consumption and variables on a daily or weekly basis in each plant. This would have permitted the identification of deviations and savings opportunities in each plant since November. There has been no feedback from any of the plants since November. Thus UNIDO was not aware of progress or problems. During the visits it was seen that none of the plants have gotten to the stage of routinely monitoring deviations or taking any actions to save energy.

Thus, the visits became a mixture of training and explanation of how to use and interpret the tool rather than the intended verification that the tool was working properly and that savings were being made.



It does not appear that any of the plants fully appreciate the potential energy saving benefits yet as they have not started to use the tool, nor have they responded to requests for feedback.

During the visits, the benefits were explained again. The data bases used by the plants had different format problems, that were also solved during the visit, explaining the importance of data base format and consistency. Once the data bases were adjusted to meet the required format, there were discussions about the savings opportunities that were apparent directly from the tool.

All 3 plants said they would start to use it from now going forward. If the plants follow up over the coming months as agreed, then it will be possible to demonstrate the potential of the UNIDO approach to energy performance monitoring and using the EnPI tool in supporting companies who want to monitor and improve their energy performance.

The estimated minimum potential savings in these plants was calculated by them based on best previous performance. It means this can be achieved with the current staff and the current equipment, just reacting effectively against deviations.

Plant	Electricity potential savings	Natural gas potential savings
Sarooj	16 %	1.3 %
Regal	7.5 %	5.2 %



Behbahan	9.2 %	4.2 %
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2 Recommendations

These recommendations are based on what we have seen on the 3 plants and are grouped according to what could be done to improve the outcome of this project and secondly to improve the overall approach to EnPI monitoring if the project is expanded to other plants in Iran or elsewhere.

Items to improve the outcome of this project:

- The most significant problem is related to lack of communication and feedback. All other UNIDO projects use online tools such as Basecamp to facilitate this communication. It should also be considered for communication for this project until its completion. Regardless if Basecamp is used or not, communication through email and online calls should be improved. Note that Basecamp was set up for Behbahan Cement and the other 2 plants should be encouraged to adopt in in the next week. Later than that will not give any benefits. Post meeting note: All 3 plants are now set up in Basecamp.
- Send a letter to the top management of each plant to inform them of our findings in this visit and to encourage them to support the efforts of their energy managers in achieving savings from here forward.
- Each plant will send its completed report on a weekly basis to UNIDO. This should include a list of actions they have taken to react to the results of the report. It will be reviewed weekly and comments returned. The results over the coming 2 months will be used as a basis to estimate the overall savings that can be achieved. This will guarantee that the EnPI tool starts being used and the staff understand the potential of it.



- Luis will send a PPT to the plants showing how to update the tool with new energy models or how to include new SEUs in the tool in the future. This has been already shown during the visit, but we consider that having a short manual can be beneficial in the future.

For other EnPMI projects:

- Develop a complete user manual for the tool. It could include instructions on using the tool and updating and maintaining it, how to interpret the results including the tables and CUSUM trends. It should also include fault finding and analysis.
- Develop a manual focused specifically on fault finding, follow up, etc. This would be an energy technical document.
- Develop a program for dissemination of the tool using online training and online support to reduce the cost of travel and face to face time.
- Ensure future users of the tool have knowledge of the UNIDO EnPI methodology, e.g. Attend the two-day training on EnPIs.
- Consider online training version of the EnPI training and associated manual.
- Highlight difference between UNIDO EnPI methodology and Specific Energy Consumption (SEC). Using SEC, the typical excuse when there is a deviation is that production changed. In UNIDO EnPI methodology, the cause of deviations is not a variation in production. It points to an operational change. During this mission, the first reaction against the deviations detected by the UNIDO experts was to explain that there was a change in production volumes. This shows the methodology is not fully understood yet.
- Reinforce the fact that the savings are made by going into the factory and making changes. The software tool alone will not result in savings, it is only through reaction to its results that this happens.



3 Details from each of the plant visits.

Sarooj Report (29th January 2017)

Project status:

- Apparently Sarooj do not have full internal support for the concept of reducing costs and energy consumption. Anecdotally it seems the plant manager does not support the work of the energy manager.
- Data was collected and checked, and good regression models and targets were developed before November 2017.
- The EnPI tool was sent by UNIDO in November 2017
- Data has not been added since November 2017 and no monitoring or use of the tool has occurred.
- As a result of the above, no monitoring of energy performance has occurred and no savings have been made from the use of the tool.
- Prior to the meeting no information was received on the use of the EnPI tool. We were not aware whether savings had been achieved or if difficulties were being encountered.

Meeting details:

- There were difficulties in attending the meeting. A number of reasons were given by Sarooj that the meeting should be cancelled despite having agreed the date a month in advance and the international experts having flown to Isfahan, especially to meet them. Eventually (08:00 am) on the day of the meeting it was agreed to proceed with the meeting.
- The plant was not in production due to lack of availability of natural gas since the 10th of December. The plant also shut down for two months in the summer due to electricity supply limitations.



- There were 14 participants from the plant at the meeting, which was too many for the purpose of the meeting. The purpose of the meeting was to review progress in the use of the tool. This is done by going through the Excel spreadsheet and checking results and reviewing progress with identifying and correcting causes of deviations. In order to get maximum value from the meeting, the group was split in two.
 - Luis worked with the energy manager and the data person to review the tool and show them how to use and interpret it.
 - Liam worked with the remainder of the people to explain the purpose and benefits of the tool and also some of the underlying principles behind the tool.
- Special thanks to Ali Motallebi for support on this visit and impromptu translation of the EnPI material to the attendees. His help was excellent and made a big difference to the success of the visit to Sarooj.

Next steps:

- Update data daily
- The company will include real targets in the tool.
- Upload a copy to Basecamp in one week to review and comment.
- Send a copy every week for comment and monitoring for 2 months.
- Luis will send PowerPoint showing steps in using the tool.

Regal Petrochemical (30th January 2017)

Project status:

- Data was collected and checked, and good regression models and targets were developed before November 2017.
- The EnPI tool was sent by UNIDO in November 2017



- Data has been added in a weekly basis since November 2017. They had input data into the tool prior to the meeting and are maintaining the data. However, the version produced at the meeting was 10 days old, i.e. the last month end.
- No monitoring or effective use of the tool has occurred.
- As a result of the above, no savings have been made from the use of the tool.
- Overall good enthusiasm and good data management, good work. Mr. Dehestani is the energy manager. He works on a type of shift system and has a deputy during periods of his absence..

Meeting details:

- 4 attendees from Regal, MS, LMA, LMCL.
- ERP system has most plant data.
- Plant management monitors SEC, compared with design and best practice. This is used by plant management and government agencies. SEC is fully automated and has a dashboard. It was the first thing they showed us. They have previously been trained on the limitations of SEC and the fact that it cannot be used as an effective energy performance indicator for this industry.
- They have summed the energy consumption of each SEU as a virtual meter.
- There is a problem with one of the models, i.e. the number of extruders running. Luis will find and test a solution to this problem.
- There are some small problems with the tool which should have been communicated months ago and rectified before this final visit. This communication problem needs to be considered for future project. Use Basecamp as in other UNIDO projects for continuous online support. Many issues can be quickly and easily rectified.
- They didn't fully read the instructions delivered in November.
 - The targets have not yet been input.
 - They did not understand the meanings of the different colours and values in the report table.
- Deviations in trends are not being investigated, they are merely being explained away. For example, SEU4 increase was stated to be due to a change of raw material MFI. This MFI is a variable already included in the model and thus will not cause a deviation. Upon



investigation the deviation was not due to MFI but another cause. The discussion of this deviation was very useful and effective to show the potential of this tool.

- The meeting became a training event to show them what the tool can do. This should not be the case. The purpose of the meeting was to verify that progress was real, and savings are being made.

Next steps:

- From now on, data will be added to the tool daily.
- Weekly report (up to date copy of the tool) will be sent to UNIDO as part of monitoring and evaluation of the project for the next 2 months.
- The company will include real targets in the tool.
- Luis will review the electricity model to try to include the effect of the number of extruders used each day. He will send back an updated version with the updated total electricity model.
- Upload a copy every week to Basecamp for comment and monitoring for 2 months.
- If possible, use Skype for further support. It might be not possible.
- Luis will send PowerPoint showing steps in using the tool.

Behbahan Cement Company

Project status:

- Data was collected and checked, and good regression models and targets were developed before November 2017.
- The EnPI tool was sent by UNIDO in November 2017
- They use WINCC for automated data collection.
- They have done a lot of work on trying to automate the data transfer. They started having automated data collection at 4pm on the day prior to the visit.
- On arrival, the Excel file was corrupted. It does not appear that any work had been done on the tool since it was supplied to them in November.



- As a result of the above, no monitoring of energy performance has occurred, and no savings have been made from the use of the tool.
- Prior to the meeting no information was received on the use of the EnPI tool. We were not aware whether savings had been achieved or if difficulties were being encountered.

Meeting details:

- They asked if a real time version can be developed. It is not a problem but they should start using the existing version first. It was explained that regular use of the tool with daily reports will yield significant results. They can then decide if they want higher frequency than daily. Some of the variable values cannot be obtained more frequently than daily and thus it will not be possible for those parts. There is a difficulty getting data from the laboratory. This data also sometimes has different frequency from time to time, e.g. 10 minute or 20 minute intervals.
- Data quality and reliability was not consistent. At the beginning of the meeting, energy or variable data was missing for many models. Later, it was found that they had 2 copies, each with different data. Once these were consolidated the tool started to work and show results.
- Some instruction was given on how to use the tool and interpret results and deviations. The discussion of real deviations was very useful and effective to show the potential of this tool.
- An additional variable could be needed in the electricity model (partial shutdowns). Luis will work on this.
- Basecamp was set up for BCC and they agreed to upload the file weekly for the next 2 months. We will comment weekly on any items or anomalies in the report.

Next steps:

- From now on, data will be added to the tool daily.
- The company will include real targets in the tool.
- Luis will review the electricity model to include the partial shutdowns as a variable. He will send back an updated version with the updated total electricity model.



- Weekly report (up to date copy of the tool) will be sent to UNIDO through Basecamp as part of monitoring and evaluation of the project for the next 2 months.
- Luis will send PowerPoint showing steps in using the tool.