



Continuous Improvement at KPC: Enabling sustainable performance improvement amidst cost & market pressures

*(By Dasril Jailani, General Manager Business and Performance Improvement,
PT Kaltim Prima Coal)*

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Executive Summary

Over the last five years, KPC production has expanded by more than 40%, from 28 Mtpa to 42 Mtpa. There is a planned expansion to 70 Mtpa over the next three years. Since mid 2008 KPC has undertaken a number of formal Business Improvement Projects. The increasing costs of production have become the major driver of why we do improvement initiatives. In addition we can see that there are a lot of room for improvement within our operations and potentials to increase productivity. The main objective of these initiatives is to ensure our competitiveness is maintained. It was this competitiveness that allowed KPC to maintain healthy profits despite the market slowdown in 2009.

The presentation will be started by giving a brief summary of the KPC operation. Then we will discuss the market environment when KPC decided to run formal continuous improvement programs, in particular explaining the need and reasons) for the programs, including the preparation phase, the development of a vision and mission and the preparation of a strategic plan to help obtain management commitment.

I will then explain the project selection process and the running of pilot projects to prove the proposed programs. During the first cycle, six “big impact” projects were selected. The objective of pilot is to prove selected methodology and to obtain support and commitment from senior management.

The next part of the presentation will focus on the roll out process and the development of infrastructure for sustainability. Finally I will explain the process we have created to ensure that continuous improvement becomes institutionalized within KPC Culture

The Company

PT KPC has a Coal Contract of Work covering nearly 90,938 hectares, located in East Kalimantan, Indonesia. The company started exploration in 1982. The first full operational year was in 1992, and the Contract of Work applies until 2021.

The project was initially a Rio Tinto/BP joint development. KPC was developed under a Coal Production Sharing Agreement (PKB2B) and following a Feasibility Study in 1987 - 1988, the project moved through construction and development from 1988 to 1992. Mining operations commenced in late 1991. In 2003 the operation was purchased by Bumi Resources, and in 2007 Tata Power purchase 30% of the operations, and this ownership continues today.

KPC has more than 5500 employees and is supported by nearly 14,000 subcontractors.

KPC production has been increased from 3 Mtpa in 1992 to a planned 42 Mtpa this year. At the present time, the company is in the middle of expansion program to achieve production 70 Mtpa in 2013.

The main KPC loading fleet comprises: 17 Liebherr R996 and 14 Hitachi EX3600 hydraulic excavators. Two third the KPC production comes from mining contractors who use similar fleet. KPC moves nearly 500 MBCM of overburden per annum. This is the largest material moving operation in Indonesia and one of the largest in the world.

KPC has 8 stock piles with a combined capacity of more than 300,000 tonnes. Coal is transported by a 13 Kilometers overland conveyor with a capacity 4,500 tonnes per hour.

At the port site known as Tanjung Bara there is a Stacker – Reclaimer with a capacity of 4,200 ton per hour. There is a two kilometer conveyor leading to two Quadrant Ship Loaders. This facility is capable of handling Cape size ship of up to 200 thousand tones.

KPC also has two barge loading facilities, In addition there is an offshore Floating Transshipment Station and multiple Floating cranes for off shore coal handling of up to 40 thousand tonnes per day.

Formation of Business Improvement Division

KPC have done at least 3 of formal business improvement program since the early age of this company. The latest one was the PIP (Performance Improvement Program) which started when the coal price down to its lowest level in 2003. There are a lot of good initiatives done during the time and still valid until today. The PIP Program was ceased when there is drastic increase of coal price in 2004 when focus of company changed from cost reduction to expansion mode.

The idea of running formal business improvement programs was first floated in Q2 2008. While many other organizations run their business improvement during price declines and cost increases, KPC started the program during a period of

coal price increase. The programs were initiated mainly due to drastic operating cost increases and were continued in order to maintain KPC's competitiveness.

We may recall that in the first half of 2008, as the result of increase in the coal price, many new mining operations opened up and existing operations increased their out put. The increase resulted in a Mining Boom. As a consequence of this mining boom, production costs increased significantly mainly due to increases in the price of raw materials.

The price of fuel, for example, increased from \$60/barrel up to \$150/barrel. This increase resulted in a KPC fuel cost increase from 35% to 60% of the total unit production costs.

Explosive costs (AN) increased from nearly 100% in only six months.

Tires disappeared from the market and become very expensive. Even with high prices supply was severely limited. Other costs such as maintenance, labor and contractor rates were also increased.

Internally, KPC was under pressure due to increasing coal strip ratios and decreasing coal energy levels. Decreasing margins were affecting company profitability and something needed to be done. If KPC can maintain competitiveness then company profitability can be assured despite the variable coal price.

In August 2008 the coal price reached it's peak at nearly \$200 per metric ton (Index GCNEWC, Basis 6322 kcal/kg) and then crashed due to the Global Financial Crisis just as we started our Business Improvement program. The competitiveness that KPC exhibited was the reason profitability remained stable through 2009.

Following the establishment of the Business Performance Improvement Division, the first step that needed to be done was to develop a Vision and strategic plan and to obtain management commitment. After the Vision and Mission Statement were agreed, KPC recruited to complete the organizational structure (see Appendix A) and selected the most suitable improvement method

Approaches that were selected for the program are; use the 9 step of Business Improvement methodology that developed by Prof. W.E. Deming, (see Appendix B) Part Time team members, Cross Functional Teams, and "Fixed" project timeframe between 12-14 weeks.

The use of Part Time team members was done to ensure there were no increases needed in manpower. It was believed that by doing so we would increase ownership of the improvement initiatives, the improvements were best done by the use of internal resources,

The fixed time frame of 12-14 weeks was to ensure that the teams have enough time to implement the high impact initiatives and to ensure that the team

members have a defined finishing point, which helps to prevent “burn-out” and fatigue.

Initial Project Selection (Pilot) was Focus on “big impact” (big savings) projects. Project selection up to this stage was driven by Business Improvement Division.

Pilot Projects

During the process of selecting the projects for pilot programs we integrate inputs from Divisional leaders (General Managers), previous initiatives and programs, and cost model or economic analysis.

By analysing cost models we can target areas for business improvement. From the first stage of the selection process it was concluded that KPC business improvement should focus on the overburden removal Process. Overburden removal at KPC makes up more than 75% of total costs. Areas targeted for improvement during the Pilot program mainly focussed on costs of basic materials such as Fuel, Tyres and Explosive. KPC also selected one project related to human resources aspect and one project concerned with safety management.

The Six High Impact Projects selected for the pilot were:

1. Fuel Efficiency – target => to reduce fuel consumption by 6%.
2. Fuel Quality – target => to eliminate equipment down due to bad fuel quality (blocked filters etc.).
3. Tyre Life – target => to improve tire life by 30%.
4. Explosive – target => to reduce Powder Factor by 8%.
5. Dual Career Ladder (HR Project) – target => improve employee motivation and productivity by providing an alternative career paths.
6. Improve Prinasa Quality (Safety Project) – target => to have more than 60% of Prinasa (spot safety checks) relevant to the KPC Fatality Prevention Elements (FPEs).

The general approach used was as follows:

- Each project had 5 to 7 members. During the pilot most projects were lead by someone at Manager level to ensure the project has enough power and authority to make changes in the field.
- All teams attended two days of initial training.
- A Project Kick Off presentation was held with active participation by the Project Sponsors
- Teams received assistance and business improvement division
- There was a Mid Point Presentation to KPC Executives after 7 weeks
- Final Presentations were made to KPC Executives after 14 weeks

Result of the Pilot

All Pilot Projects conducted during the first cycle achieved or exceeded their mandates and were within Time Frames. They achieved minimal disruption to normal operations and much positive feedback was received from Team Members, particularly in term of personal learning and development.

Following is the illustration some Pilot project

Fuel Efficiency Project

KPC consumes over 300 million litres of fuel per annum. The objective of this project was to reduce fuel consumption by 6%. Following data collection and analysis it was found that about 28 million litres of fuel are wasted in KPC due to inefficiencies. The highest contributing issues that result in fuel wastage are:

- Excessive delays for shovels waiting on trucks
- Excessive truck queuing
- Excessive un-productive (non-work) running or equipment that has an engine running but is not performing any work.

The main initiatives proposed by the Team were: Conducting awareness programs for all operation personnel to reduce unproductive running equipment wait and queue times, Technical teams looked at cycle times and pit traffic to attempt to reduce unnecessary bunching.

During the first 6 months of pilot project; Operator Awareness improved, shovel/truck wait/queue delay and unproductive running times were reduced. This project saved 8 million litres of fuel equivalent which was valued at USD 7.6 million at the time.

Fuel Quality Project

This project was selected due to a very high number of equipment down times due to fuel filter blockages brought about by poor quality fuel. KPC introduced a fuel filtration and within six months reduced equipment downtimes due to poor fuel quality by 75%, from an average 20 downtimes per week to less than 5. Through this project there was an opportunity to extend the service intervals of the haul trucks from 250 hours up to 500 hours. During the first six month this project saved \$300k

Tyre Life Improvement Project

Improvements performed in this project included:

- Forming a Tyre Support Team that comprised Operation Supervisors and Tyre staff who are in the field 24 hours per day and seven days per week. Their main task was to increase tyre awareness, coach operators and to increase number of mine environment audits.
- A Tyre Damaged Alert system was developed in which every premature failure was identified and sent immediately to Pit Management via SMS. Management were then able to follow up every single premature failure and the reasons for the failure.
- A further team also set Target Payload Parameters to avoid overloading which can result tyre damage.
- Team also introduced a hazard report summary. Whenever the Tyre Support Team identified a “Tyre Damage” finding in the field, a tyre hazard report was completed and submitted.

During the first six month the team increased the tyre life of Euclid Hitachi 4500 trucks by 4%. Mine Environmental audits increased from less than 100 audits per week to more than 4,000 audits per week. These initiatives also significantly increased the personnel awareness about tyre wear. During the first six month this project saved \$900k

The positive results achieved during the pilot, resulted in Management committing to continue driving the programs.

Roll Out Business Improvement

The main objective of the roll out of the business improvement program was expanding the programs to larger area, run more projects, to increase improvement benefits and to build infrastructure for sustainability.

Approaches that were used during the roll out included:

- Programs were managed in 6-monthly Cycles.
- Each Cycle started with a Pre-Cycle Workshop attended by the Leadership team (Chief Executives and General Managers).
- During the workshops every team presented the Lessons learned from the previous Cycle
- At this stage Divisions worked together in the selection of new Projects.

The roll out phase requires active Participation by the Project Sponsors and progress is monitored on a monthly basis by KPC Executives.

During the roll out the focus still on the big ticket items, however, there were opportunities to run more projects and involve more participants to spread the business improvement 'gospel' quicker among all division.

Up to cycle 4, we have run 38 projects (some projects in series), involving more than 240 team members, involving all 10 divisions, plus 8 main contractors, result in more than 25 New SOP.

Total cumulated benefits made since the program is started until August 2010 was \$135.5 million, and mainly come from extra coal sales that obtained from coal chain improvement, fuel, explosive, and equipment usage improvement. The program now really attracts the attention from Board of Director.

Some of the results of full roll out can be seen in the following slides:

- The Fuel Efficiency project continues to make significant progress, and has saved more than 30 million liters of fuel to date. The saving not only comes from initiatives that introduced by the fuel efficiency team, but later from other project that increased the equipment usage.
- The Fuel Quality Project has reduced the breakdown frequency due to fuel filter blockages by 80% for both trucks and excavators. In addition, the haul truck service interval was able to be increased from 250 to 500 hrs and saved \$1.4m.
- The Tyre Life Improvement Project increase tyre life by 5 to 8% for overburden truck tyres.

- Wait delay for our main diggers reduced from average 5.5 hrs to less than 4 hrs per day per available units and saved \$8.3m.
- By optimizing the explosive vs material type, extending drilling patterns and improving stemming quality, the Explosive Improvement project reduced the Powder Factors in KPC pits from 0.38 to 0.34 and have saved \$5.4m
- By improving the drill and blast planning and reduce frequency of blasting Reducing Blasting Delays by 20% and saved 2.3m

There were a number of other projects but not all are listed for brevity.

Build Infrastructure for Sustainability

When Management announced that KPC would commence another formal business improvement program at KPC, a number of cynical comments and questions were revealed;

“Another business improvement project?”....

“We have done this before but the improvements that were made were not sustained”....

“Why would we make the same mistakes?”....

“Are we re-inventing the wheel?”..

etc..

Questions above are come up because there are many good improvements were made previously that were not sustained. Sustainability remains the biggest challenge.

Before we started the current Business Improvement Program, the lessons learned from our previous programs were evaluated. We looked back and analyze what worked well and what went wrong. It was concluded that first, the Business Improvement Projects were not necessarily expensive exercises, and second that all new attempts should be focused on answering the main challenges – this being to sustain the improvements that have been made. The third, all initiatives should be embedded to our normal process and should be come the normal way of doing things.

To ensure the sustainability of the programs some infrastructure has been developed.

Firstly, within the Business Improvement Division we have:

- Developed internal facilitators, who have been tasked to help and facilitate the improvement team during the projects. To ensure the meetings are run effectively, and the teams use correct improvement tools, to ensure the progress of the team is monitored and that the progress of the team is not blocked by the obstacles which can affect the project completion.
- Produced a KPC Business Improvement Handbook for use by the team members. The handbook explains steps needed when doing Business Improvement. They also can learn from a case study provided in the book.
- Developed and implemented communications strategies using various media such as the KPC monthly magazine, Safety Talks, posters and radio broadcasts.
- Developed and implemented a Rewards and Recognition program to ensure employees are motivated to be involved in the Business Improvement Project. Business Improvement is included as a staff critical task that is integrated with the Annual Appraisal system. Involvements in business improvement programs are also considered during promotions. Active business improvement team members are given the chance to get external training and/or benchmark visits to other operations, and given gifts such travel bags, T-shirt, or other gifts in appreciation of their involvement.
- Under development now, to establish a Business Improvement Knowledge Base/Library, including an internal website where people can learn about projects that have been finished and those currently underway.

Secondly Within each Division we have:

- Appointed Divisional Business Improvement Champions. Champions are personnel from within the Division (mainly Managers) who are responsible for the success of programs within their Division. These champions are nominated by General Managers and appointed by the CEO. They are actively involved in all divisional programs address any barriers encountered by the Project Teams, attend monthly Business Improvement Coordination Team Meetings and are involved in the review and audit of projects from the previous cycle.
- Project Sponsors who have active involvement and “walk the talk”. They attend all presentations given by the team. The sponsors give approval for the projects approve resources, are involved in some of the project meetings and frequently visit the area where the project is running.
- Business Improvement Notice Board are produced and displayed in strategic areas within division (see Appendix B). The notice board will display information relevant to running and previous cycle projects including the control charts, saving figures, photo of team members, and message from CEO.

- Process Control Charts from the improvement projects are incorporated as part of the normal divisional management reporting.

As for Executives, they agree to:

- Approve to include Business Improvement Parameters in Quarterly bonus scheme (Fuel Rate, Tire life, Explosive Powder factor, Unit Cost)
- Integrate the business improvement parameters in the budget (Equipment Usage, MTBF, Fuel Rate, Powder Factor, Tire Life)
- Actively participate in Pre Cycle Strategy workshops.
- Provide regular reports to the KPC Board of Directors. The board now spends a significant amount of time discussing the progress of the business improvement programs at every board meeting.
- Participate in the final team presentations and recognition events.
- Visibly participate and reinforce the importance of Business Improvement including in tacking the benefits.
- It was from one of Business Improvement Audit recommendation that management recently agreed to conduct the Strategic Alignment workshop where we update the Company Vision and Mission to include using of the Continuous Improvement to drive initiatives.

KPC Culture of Continuous Improvement

The last part of this presentation is about how to ensure that continuous improvement becomes institutionalized within the KPC Culture. It was understood that this would take time.

People in organization have different motive when they talk about business improvement, People at Executive level will more interested to look at what will be the bottom line benefits from the initiatives for the organization. People at the shop floor or operator level will be more interested with improvement which will make their working condition safer and easier for them to do their job. For most of our work force, they want safe and productive workplace. To get safe and productive workplace, we need to change people's behavior where each employee care for the workplace and their fellow team members.

Changing people's behavior in the **short term** can be done by improving the Environment by means of;

- Creating a structural organization that provides a sense of ownership.
- Support the employees when they are doing improvement programs by giving them resources such as time, tools, and support. This also helps them to reduce frustration.
- Provide and maintain a clean workplace and adequate equipment.
- Provide them with a better method or system for identification and management of defects.

Changing behavior in the **long term** can be done by improving the Attitude of the people by means of:

- Improve their skills through training and development.
- Improvement their knowledge through job enrichment.
- Improving the relationship between personnel - superiors and subordinates, peers/work colleagues and so on.
- Providing our employee with more experience.

To build sense of ownership, we have introduced Area Based teams, such as the ones that we are run their pilot in the Maintenance and Mining Operation Divisions. The idea is to get the employees to develop their own standards for the workplace, and then the discipline to follow those standards. The area based team member come from shop floor employees, and running a project that not so much dollar saving but increase the quality of working area, housekeeping house keeping type projects, making working condition safer and people's job easier.

In term of the training Needs was mainly focused teaching the Improvement Methodology and basic improvement tools such as Pareto, Fishbone etc. Training will be next focused on the more technical aspects of the job such as how to undertake basic care of the equipment, cleaning, lubricating etc.

Later on we will continue with the Area Based teams but then begin to move into helping employees develop not just Problem Identification skills, but also Problem Solving Skills. This is for the lower level employees, the aim being for them to take ownership and solve some of the smaller problems, working in small teams, rather than just telling the boss or reporting it.

Conclusion

It will take time for KPC to prove that the current formal business improvement program better than previous attempt. It will be known if we can answer the main challenge of most business improvement that is the "sustainability".

Finally, I would like to share some of the Lessons Learned and what we think are the Critical Success Factors for our Continuous Improvement Program:

- Executive Sponsorship and visible involvement is crucial.
- Training Teams prior to commencing projects ensures that everyone has a common knowledge base.
- Develop a proven methodology that manages improvement activities combined with normal operational pressures
- Securing "tangible" bottom line results early helps in securing commitment.
- Ensuring clear and frequent communications, particularly success stories. Everyone wants to be on the "winning team".

- Integrating Business Improvement activities into the Annual Performance Appraisal system
- Creating and maintaining Control Charts for all Improvement Projects, and embedding this reporting into the normal business activities after the team has disbanded.
- Fixed Time frames for project teams to avoid “burn out” from team members.
- Ensure “ownership” of the projects remain with the Business/Division from Project Selection through to implementation.
- Business Improvement Division is only facilitators/mentors/change agents – the drive come from within the relevant team.
- Make sure comprehensive communication program available to ensure all stake holder aware and support the program.
- Make sure reward and recognition programs prepared, approved and executed in order to motivate employee to become team members.

The journey to performance improvement has started. The structure and infrastructure have been established. Cross Functional Macro team continue running big dollar saving projects. We will run more Area based projects. We envisage Continuous Improvement as being the “normal” way of doing things. KPI’s will be set at the team level and the teams themselves will be empowered to monitor and improve their own performance

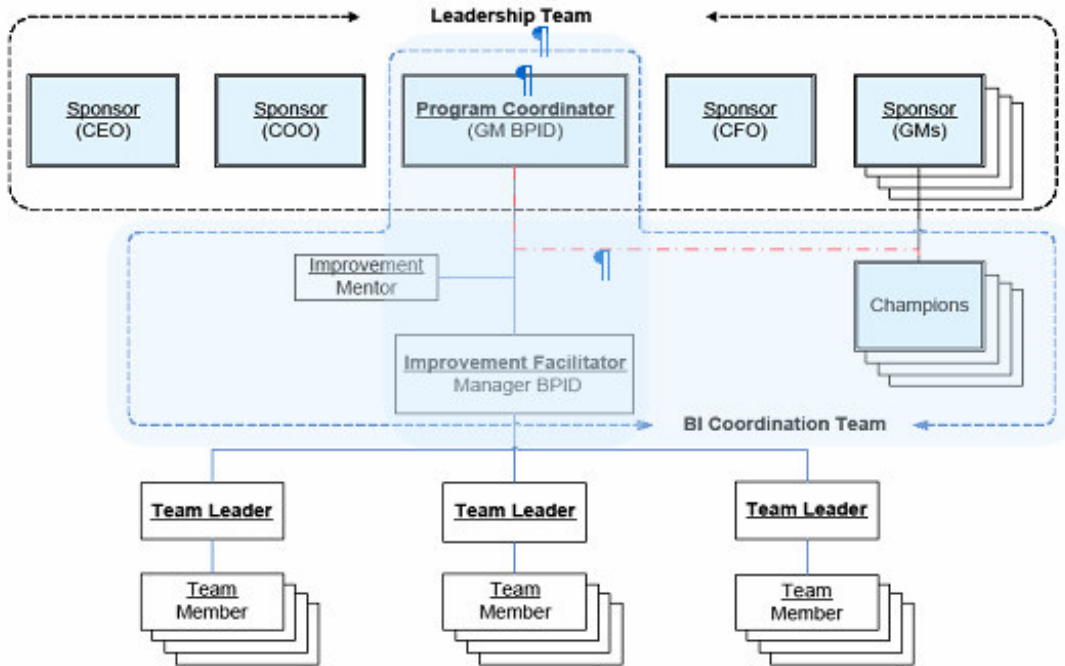
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### **List of Appendixes**

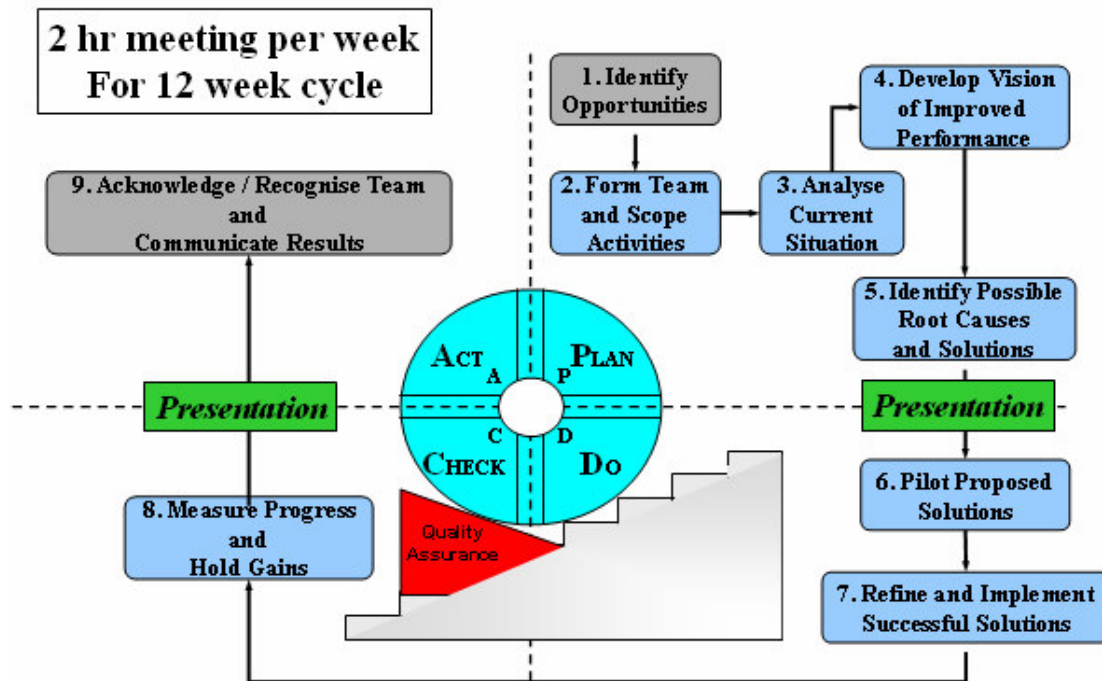
- A. Business Improvement Structure
- B. 9 Steps Business Improvement Program
- C. List of Projects
- D. Financial Benefits
- E. BI Notice Board
- F. Control Chart

## Appendixes

### A. Business Improvement Structure



### B. 9 Steps Business Improvement Program

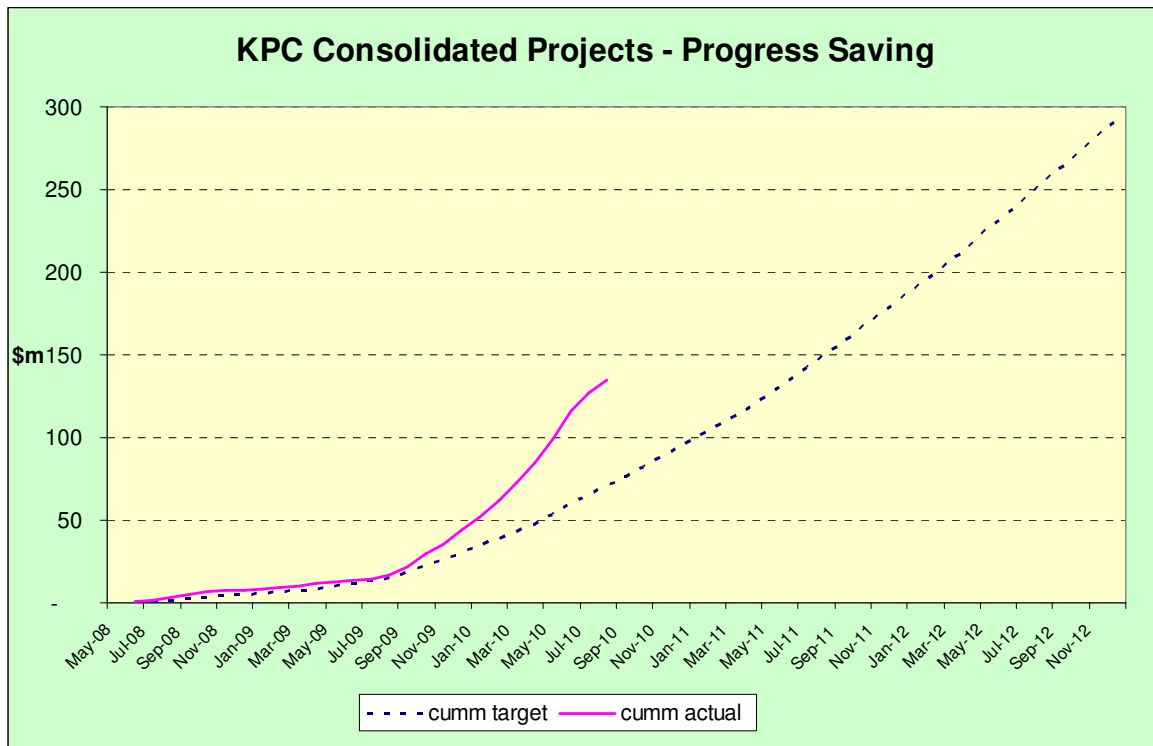


Quoted from: The Centre TPM, CTPM Australia

### C. List of Projects

|                                   | CYCLE 1<br>Pilot                                                                                                                                                                                                                      | CYCLE 2<br>Roll Out ⇌                                                                                                                                                                                                            | CYCLE 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | CYCLE 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Timing</b>                     | <b>2<sup>nd</sup> H 2008</b>                                                                                                                                                                                                          | <b>1<sup>st</sup> H 2009</b>                                                                                                                                                                                                     | <b>2<sup>nd</sup> H 2009</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>1<sup>st</sup> H 2010</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Projects</b>                   | <ol style="list-style-type: none"> <li>Fuel Efficiency</li> <li>Fuel Quality Improvement</li> <li>Tyre Life Improvement Part 1</li> <li>Drill &amp; Blast Improvement</li> <li>Prinasa Quality</li> <li>Dual Career Ladder</li> </ol> | <ol style="list-style-type: none"> <li>Tyre Life Improvement Part 2</li> <li>Overall Effectiveness R996</li> <li>Coal Reconciliation</li> <li>Coal Recovery</li> <li>Work Management</li> <li>Reduce Fatigue Incident</li> </ol> | <ol style="list-style-type: none"> <li>Liebherr R996</li> <li>Reduce Blast Usage on Shovel</li> <li>Improve Excavator Defect Identification</li> <li>Drill &amp; Blast at CMD Part 1</li> <li>Reduce Euclid Spindle Part Cost</li> <li>Increase Coal Road Truck Rate</li> <li>Increase Exploration Drill PA</li> <li>Increase Utilization Used Oil</li> <li>Reduce Equipment Washing Delay</li> <li>Reduce Tyre Changing Duration</li> <li>Land Monitoring System</li> <li>Control Outpatient Medical Treatment</li> <li>Reduce Crusher Shaft Damage</li> <li>Increase Utilization of Barges</li> <li>Project Planning &amp; Approval</li> <li>Core Management</li> </ol> | <ol style="list-style-type: none"> <li>Fuel Efficiency Part 2</li> <li>Drill &amp; Blast at CMD Part 2</li> <li>MOD Drill &amp; Blast Part 2</li> <li>Grader PA Improvement</li> <li>Dozer PA Improvement</li> <li>Improve Electric Energy Conservation</li> <li>Dual Career Ladder Part 2</li> <li>Financial manual Project</li> <li>Reduce Store 38 Transaction</li> <li>Optimizing Crusher#6</li> <li>Work Area Facility &amp; Tooling (ABT)</li> <li>Muster Area Cleanliness (ABT)</li> </ol> |
| <b>Savings Targets (Perannum)</b> | <b>\$27.5m</b>                                                                                                                                                                                                                        | <b>\$18.1m</b>                                                                                                                                                                                                                   | <b>\$59.3m</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>\$42.5m</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

### D. Financial Benefits

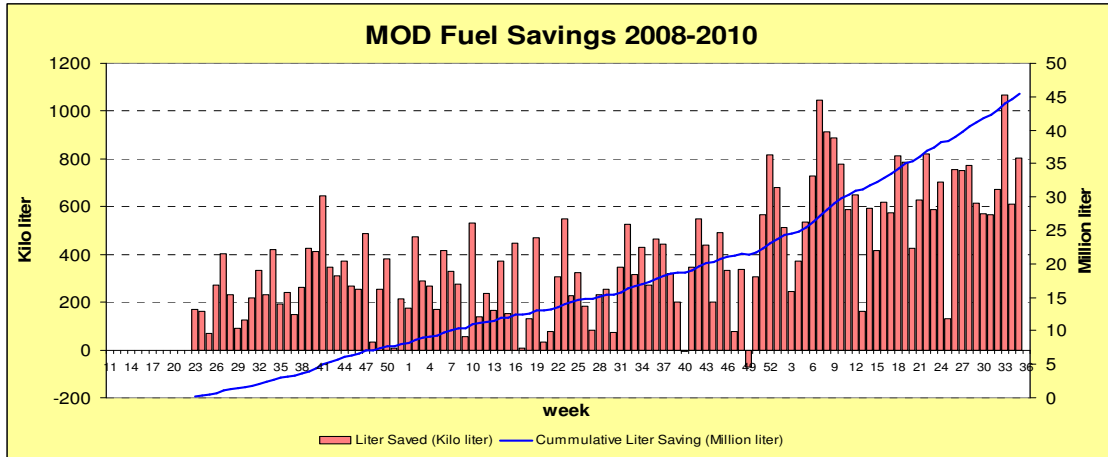




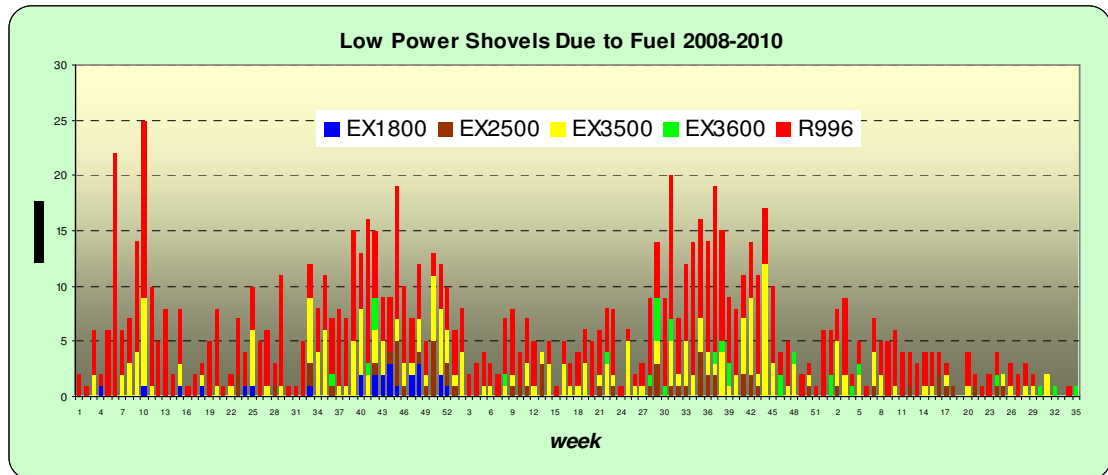


## F. Control Chart

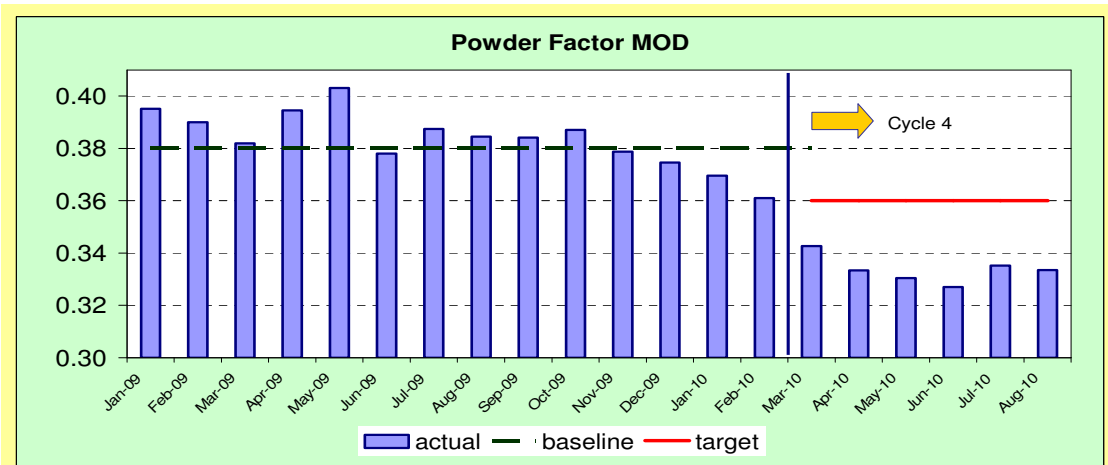
### 1. Fuel Efficiency Project



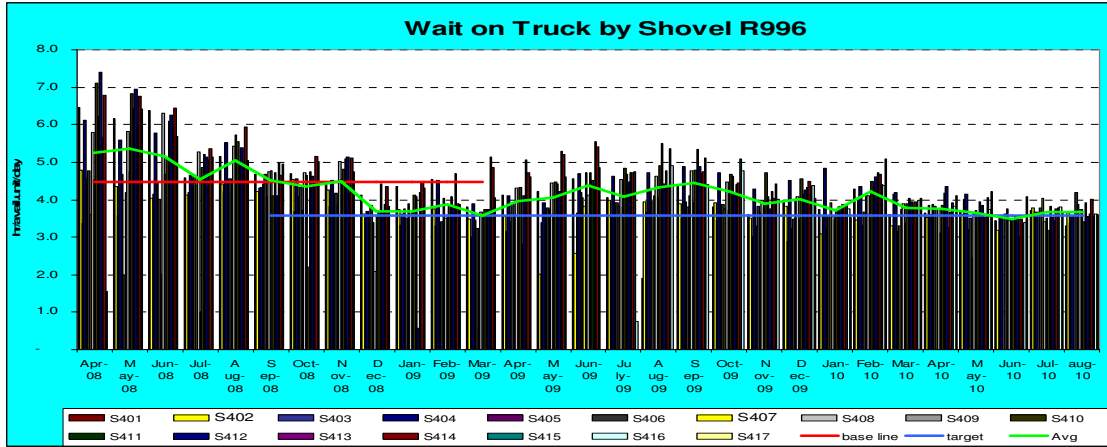
### 2. Fuel Quality Project



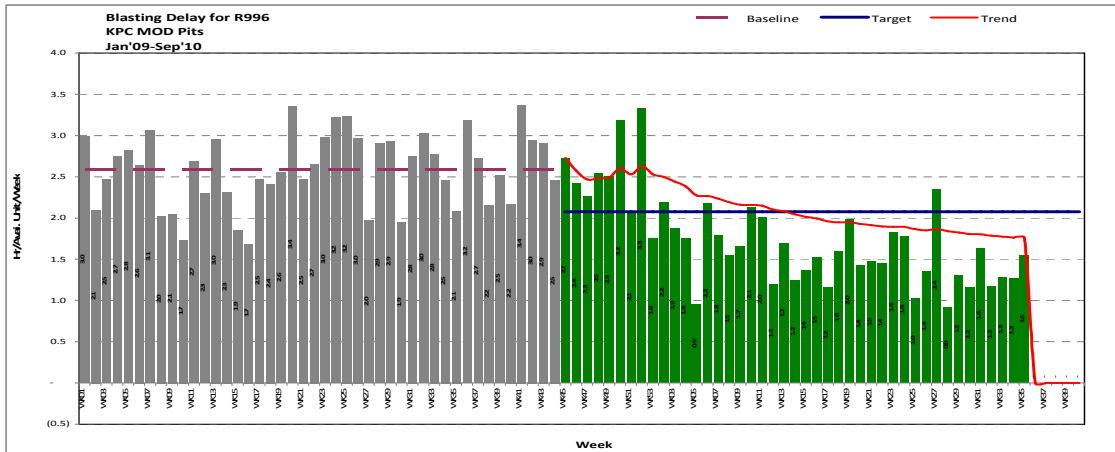
### 3. Drill and Blast Project



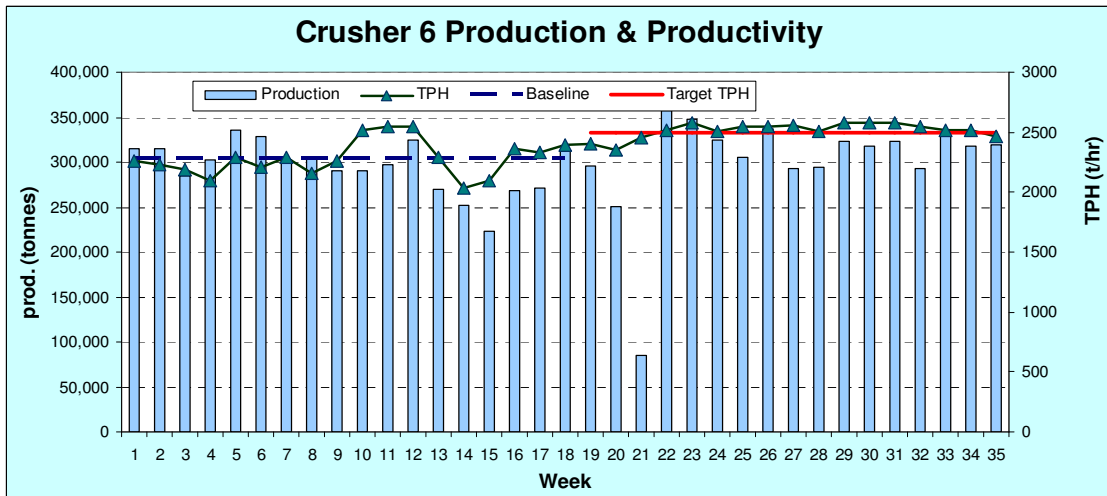
#### 4. Excavator Wait Truck delay



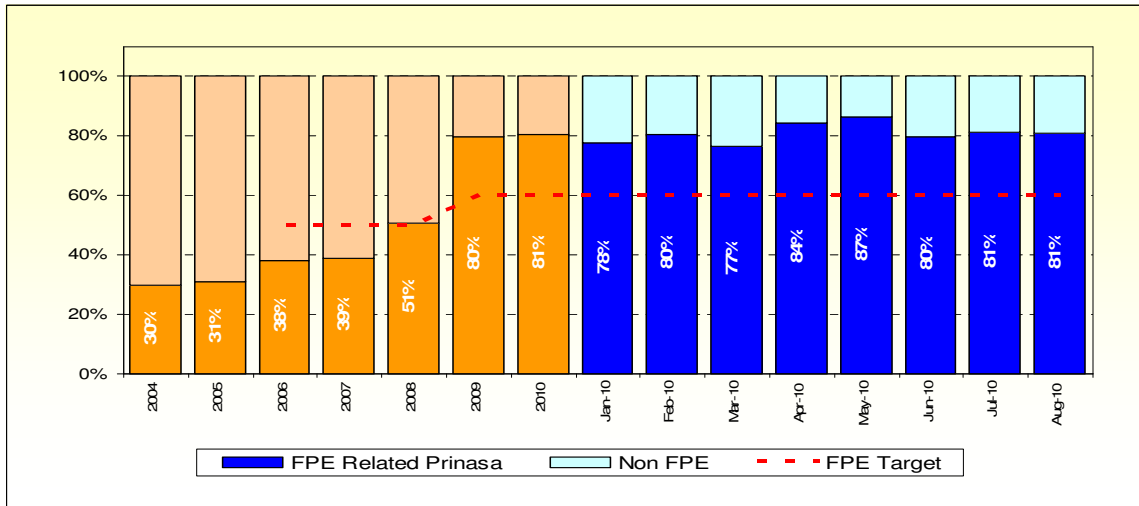
#### 5. Excavator Blasting Delay



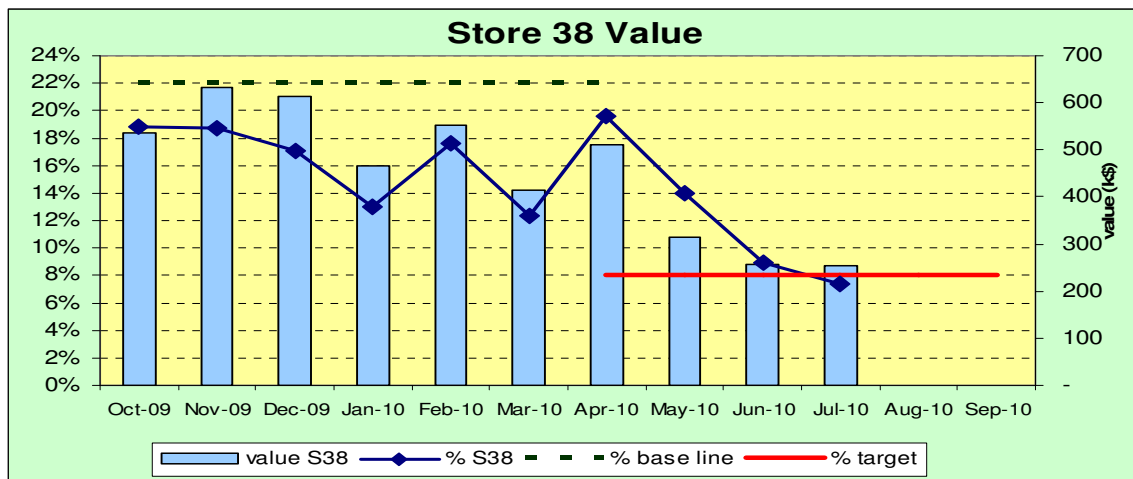
#### 6. Crusher #6 Rate



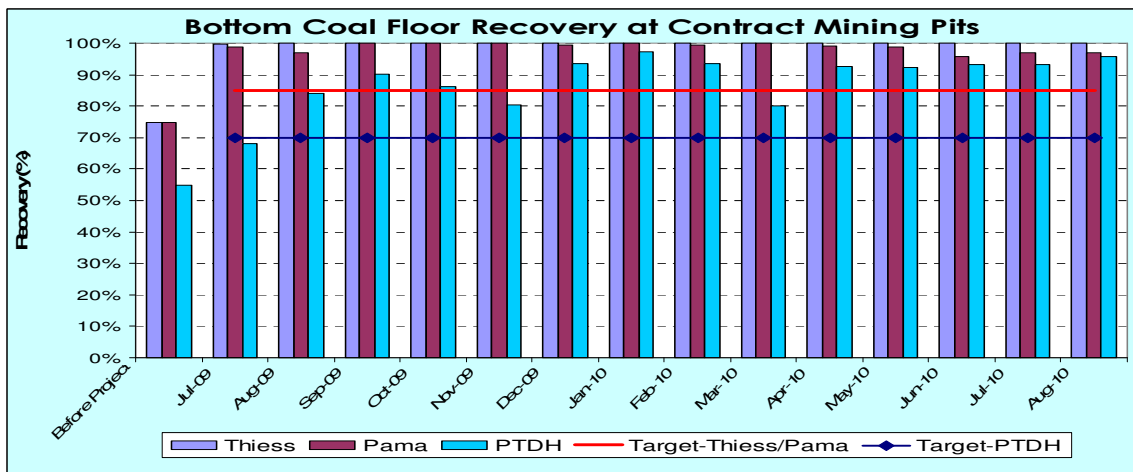
## 7. Prinasa Project



## 8. Store 38



## 9. Coal Recovery





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