First Batch of Domestic TOP TENs List

Australia BP List

BP1:Optimising Generator Controls

Generator controls are used in the Electricity Generator sector,as well as manufacturing,oil and gas sectors. This technology has very good current (175 PJpa) and prospective (435 PJpa) estimated energy savings.

Generator controls are used in various ways. These include analysing operation of extraction or back-pressure steam control to optimise reuse of steam energy between electricity generation and process use. Monitoring of steam turbine discharge pressure can improve thermodynamic performance to optimise efficiency,power output and net heat rate.

Other controls include operation of individual or multiple units to optimise heat rates,as well as monitoring of turbine performance deterioration and predictive maintenance programs for turbine and condenser.

This practice has good energy and cost savings. as well as good market contexts.

Example: Sliding Pressure Set-point - A reduction in the main steam pressure set point on one company's boiler would result in a reduction in the throttle losses across the turbine control valves. Investigation predicts this would save 154,526 GJ and 12,728 t CO_2-e per year for the entity. The annual net financial saving is predicted to be $88,900 over a four year period,equivalent to a payback period of less than one year.

BP2:Flight Planning

Flight planning is utilised in the air transport sector and involves minimising taxi and flight times. Fuel burned while waiting to take off or in holding patterns waiting to land at a busy airport can be reduced through coordination of gate departure times with air traffic control. The aim is to have aircraft taxi straight from the gate to the take-off runway at the correct time so there is no waiting for a take-off opportunity and arrival is timed for the destination airport to minimise holding patterns before landing.

While its Transferability to other sectors is low,this practice scored well across all other indicators. it also has good energy savings estimates of 127 and 400 PJpa to 2017.

BP3:Reducing Idle Running in Manufacturing

This practice is applicable to not only Manufacturing but also the Mining and Oil & Gas sectors. Energy savings of 61 – 200 PJpa reflect its relatively high score in energy and cost achievement. Other indicators in which this practice scored well were originality & innovation and market contexts.

Management of idle running of machinery is used primarily in the manufacturing sector,but also in mining and the oil and gas sectors. It involves turning off machinery rather than keeping them running idle in between active use,preventing energy wastage. Conveyor systems that run with no product,mining trucks and excavators left idling during downtime periods and pumps recirculating when there is no demand are all examples of where idle running could be reduced to save energy.

Example 1: Energy Saving Mode (EMS) is a new mode of operation designed for a car-manufacturer's paint shop air supply system during non-production periods.

Example 2: Another company analysed 3 large product dryers & coolers' operational times and identified significant periods (2 hours/day) of running with no product in them. During these periods the dryers & coolers revert to idle mode but they still consume significant quantities of natural gas and electricity. A time based system to automatically shut down the dryers and coolers completely exists but continual use of a manual override system has limited its effectiveness. Optimisation of the auto shutdown feature & limiting manual override capability will deliver significant energy and cost savings.

BP4:Optimising HVAC controls

HVAC Controls are used in the Services sector.

Heating,ventilation and cooling (HVAC) represent a large percentage of energy consumption within buildings and is therefore relevant in the services sector,for example hospitals,office space and institutional buildings. Energy efficiency can be improved through the adjustment of temperature set points,either year round or adjustment for seasonal conditions and using zone controls to provide comfortable conditions in every zone of the building. More careful control of the HVAC systems outside of normal occupancy hours to avoid unnecessary heating and cooling can also provide significant energy savings.

Energy savings were scored relatively higher,although its estimated total,sector-wide current savings are low relative to other practices (19 to 59 PJpa to 2017). This reflects the lack of weighting for sector-wide energy savings in the methodology.

Example: Heating ventilation and air conditioning (HVAC) initiatives at seven stores of a national retailer. These have included night setback whereby the fans are turned off and the temperature band is widened to reduce heating and cooling requirements when the store is closed. networking all plant,which provides remote visibility to ensure any excess or irregular usage is investigated and rectified.Other initiatives are implementation of Variable Speed Drive which provides an adjustable speed setting on main ventilation fan,AC timer control for adjusting temperature according to the operational hours of individual areas/ departments,and hood controls.This latter initiative involved retrospectively connecting the activation of exhaust hoods to ovens.Over 200 stores have had these HVAC controls implemented.

BP5:Reducing Product Losses

Product loss is a practice that has good sector energy savings,the manufacturing,mining,oil and gas sectors.

Reducing losses of product in a process can provide both energy savings and output improvements. Depending on the stage of the process where the product is lost,varying amounts energy will have already been used. For example,product lost into a waste stream or spilled during transport in a mining operation has a small energy loss associated. Contrast with the loss of a final product from a manufacturing process through spillage or off-specification product,where large amounts of energy have been invested to achieve the final form. Losses can arise from many sources including out of specification feedstock,spillage from transport systems such as conveyors,process upsets,breakdowns and incorrect operation of equipment.

Example: A coal mining company optimised their mining process which translated to an increase in coal recovery and reduction of coal product loss. A set of rules was developed to highlight the actions necessary to reduce coal loss and contamination. Losses of around 9% have been assessed at the mine and an annual target reduction of 7% per annum has been set. A reduction in losses results in significant reductions associated with additional mining,therefore reducing diesel and electricity consumption and GHG emissions. Project cost is 'low'because this is a part of normal operations.

BP6:Use of Driver Advisory Systems

This practice is applicable to Mining and Transport sectors. Its inclusion on the Top Ten list is attributed to its originality,innovation and transferability. Energy savings are estimated at 30 -130 PJpa to 2017.

Mining and transport sectors can implement driver advisory systems as a practice to improve the fuel efficiency of their operations. Efficiency can be improved by providing feedback information to the driver so that they can make adjustments according to conditions. A driver advisory system can provide very precise information about the variables operating on a vehicle,such as payload and gradient,where the energy is going and where it is being wasted.

For example,by changing travelling speed according to factors such as payload or slope gradient,more efficient use of energy can be achieved. More sophisticated systems can involve sensors which track changes in the wind,acceleration or resistance on the vehicle and provide advice to the driver to achieve optimum energy efficiency in response to these changes.

Example 1: One company decided to trial a Driver Advisory System (DAS) to advise train drivers of the optimum driving speed and powering mode to reduce energy use. The trial showed an average energy saving of 8.5%. Trial results and implementation requirements are under review.

Example 2: Another company has commenced implementation of an advanced on-road driver management system in metropolitan areas to optimise pickup & deIivery movements. This is designed to improve service and performance quality,and to minimise fuel use. It is anticipated that kilometres travelled by drivers will be reduced due to missed pick-ups as well as the minimisation of return to base volumes.

BP7:Optimising Processes

Process optimization is available to Services,Mining and Oil & Gas sectors. It has excellent energy savings across these sectors estimated at almost 800 PJpa in 2017.

Process optimisation achieves energy efficiencies through reducing process cycle times,wastage,or costs. This practice can include redesign of processes or revisions to the layout of a plant to improve material flows and production. In the services sector,process optimisation can involve improving performance and response times through identifying unnecessary delays in the service process or by introduction of more effective system operations.

Example: Seasonal,opportunistic reduction in aeration blowers based on suitable process conditions. One company assessed that the aeration levels of their activated sludge plant may be reduced for short periods of time during periods of high recycled water flows and suitable process conditions,without compromising the sewage treatment objectives or Environmental Protection Authority Victoria licence conditions. In these circumstances one of four large aeration blowers may be turned off for up to 2-3 months every year. This is not,however,a permanent solution that can be relied upon every year,but a good opportunity that can be taken advantage of where conditions allow,and will be reviewed every year moving forward.

BP8:Cleaning Condensers and Heat Exchangers

This practice relates to maintenance in the Electricity Generation sector. Despite low scores for originality and innovation,this practice scored well across the other indicators. energy savings are 17 to 44 PJpa between current and 2017.

Condensers remove heat from steam exhausted in the electricity generation process using cooling water. The removal of heat from the exhausted steam is essential because it maintains the pressure gradient exiting the turbine. The surfaces of condensers can be polluted by dust,moisture,dirt or other contaminants within the cooling water stream. Over time these can decrease the heat transfer properties of the condenser and increase energy consumption.

Generally,condenser tube cleaning is carried out during a turbine maintenance outage. For large coal fired plant,this occurs every few years. For plants where condenser fouling is a significant issue,monitoring of condenser backpressure and cooling water and condensed steam temperatures can indicate that on line cleaning is required be undertaken.

Off line cleaning during an outage can be done using high pressure water jets or mechanical tube cleaners that scape the fouling loose from the inside surface of the tubes. On line cleaning can be achieved by injecting plastic balls or bullets into the cooling water stream the loosen fouling as they pass through the condenser tubes. Cleaning condensers can also improve detection of leaks.

Example: Power Station condenser cleaning - A company undertook a series of offline condenser cleans across four of their units. This was the first time cleaning had been undertaken using a plastic bullet being passed through each tube. At the same time the acid dosing plant was re-established and a drain line which allowed dirty water to enter the cooling tower basin was also isolated. Significant improvement in condenser performance was identified across all units,one with its original condenser.

BP9:Removing Furnace Soot

Furnace Soot Removal and Soot-Blowing is used in the Manufacturing and Oil & Gas sectors. Over time,there is typically a build-up of soot inside furnaces. This soot is a layer of which effectively insulates the system and reduces efficiency.

Furnace soot removal scored relatively well for Market Contexts and individual Energy Savings. 38 to 100 PJpa sector-wide energy savings are predicted.

Example: Refinery Furnaces – The reformer unit upgrades the quality of crude oil products for use as gasoline. The process requires a number of large furnaces. Over time,soot and dust had built up in the furnaces of one company,resulting in decreased performance and efficiency of the furnace. In 2010 an opportunity was identified to clean this furnace to improve the efficiency,decreasing the fuel required. This work took a number of weeks,with an external company brought in to cut access ports in to the furnace wall and then carefully spraying a chemical mix on to the tube surfaces to remove built up soot and dust. After the clean,the temperature of the gas leaving the furnace decreased by 53 degrees Celsius,indicating significant improvements in heat recovery and furnace efficiency.

BP10:Monitoring and Managing Data

Data Monitoring / Management is unique as it is applicable across all sectors. These have the potential to realise 90 PJpa to 420 PJpa in energy savings to 2017.

Data monitoring and management can be applied in almost any industrial systems and involves measurement of critical energy related data. Data management refers to several approaches to use data once it has been measured. These include using energy baselines and energy-mass balances to estimate energy savings,determine the economic implications and wider benefits from energy efficiency initiatives,identify the level of accuracy for energy and financial savings predictions and to estimate payback periods.

Example 1: A structural assessment of management practices was undertaken by a large waste management company. This involved a review of management systems to identify key triggers for capturing,analysing and managing energy efficiency. This assessment identified improvements in processes to capture poor energy efficiency performance. The process is likely to provide improved consistency in the identification of performance and issues to improve responsiveness.

Example 2: A manufacturing company saw that provision of accurate and timely energy management data was vital to the sustainability of their operations. Particularly the end use of steam which was not being reported (eg: digestion and evaporation steam energy). The aim of the opportunity was to identify and reduce inefficiencies resulting from poor information and subsequently improve decision making processes leading to improved energy efficiency. The tools developed by this project have been implemented and are used for online energy consumption monitoring and energy balance optimisation,i.e. for determining energy inputs,outputs and users around site. The resultant model of the plant for optimising plant operation and its applications for viewing and archiving plant data continues to be used successfully. It has proved to be a great benefit to the site for determining savings. While the direct energy savings associated with the project are small,the wider implications of the improved energy monitoring have enabled new opportunities to be identified which have major energy savings.■