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Swiss environmental know-how for the Philippine power industry

In the impending privatisation of the Philippine National Power Corporation NAPOCOR, environmental upgrading of existing power plants will result in added cash value.

Protection of the environment has not been among the top priorities of earlier Philippine Governments. Metro Manila with its 11 Million inhabitants is arguably one of the most polluted capitals in South East Asia. Fortunately, there are signs of hope. The Parliament has adopted a tough new Clean Air Act in 1999. Implementation will take time, but economic liberalisation, normally not associated with ecological priorities, may help by unleashing market forces which impose the observation of international environmental and safety standards.

The Limay Bataan heavy-oil fired power plant (Figure 1) was installed in 1993-95 with the aid of a Swiss mixed-credit facility totalling 67.75 Mio CHF. The ABB-designed combined-cycle power plant consists of 6 gas turbines driving 2 additional steam turbines with their waste heat, delivering a total of 600 MW of peak power. The plant essentially runs on "bunker C" grade heavy oil with a Sulfur content of up to 3%. Given that all of the Sulfur in the spent fuel escapes through the stack in the form of SO₂ (sulfur dioxide), the plant - situated just 40 km from Metro Manila - is a considerable source of air pollution in the Bataan region. SO₂ is a biodegradable but smelly and poisonous gas, which contributes to smog and acid rain.

In view of this, the Swiss-Philippine mixed-credit contract, concluded in 1994, contained a provision obliging plant owners to install an air-quality monitoring and management system at the plant site. For this purpose, some 1.5% of the investment credit was set aside. Neosys AG¹, in a joint partnership with Ernst Basler+Partners Inc., won a consultancy contract with NAPOCOR in 1999 to design and implement an adequate system.

Reducing emissions always comes at a prize. For the Limay plant it either means reducing output power or switching to cleaner – more costly – fuels. It is therefore in the interest of the plant owner to dose emission control measures to a level at which ambient pollutant concentration stays safely within legal limits – no more and no less. How can this be achieved? The key is to realize that the allowable level of plant emission depends on the weather conditions: When the stack plume rises vertically to high altitude and touches ground only far away on the open sea, a given amount of emission causes far less ambient pollution than if the plume is drawn downwards by turbulent winds after leaving the stack (Figure 2).

The monitoring system we designed for NAPOCOR takes this consideration into account (Figure 3). Based on continuously monitored meteo parameters like wind speed and wind direction and using an atmospheric dispersion model, the system informs plant operators continuously on the level of expected ambient pollution and instructs them to take emission reducing action only

¹ then under its former name, DR.GRAF AG

when necessary. This systems minimizes the cost of keeping air quality standards, and it does so without relying on expensive ambient pollution measurements. Such measurements are still in order to check and calibrate the dispersion model form time to time, but the measuring equipment can be kept simpler and might be shared by several plants.

Apart from getting an air quality management and monitoring system at their Limay plant, NAPOCOR will benefit also in other ways from the collaboration. The new Philippine Clean Air Act requests power plants to continuously monitor and record their pollutant emissions on behalf of the government agency supervising environmental protection (as common also in western countries). Thanks to the savings achieved with the ambient pollution control system described above, the available funds are sufficient also to procure a continuous emission measurement system (known as a CEMS) now required by Philippine law.

A further benefit for NAPOCOR, targeted from the beginning as an important part of the collaboration, is the transfer of know-how.

- The future operators of the supplied equipment will be trained after installation on-site by Swiss experts from the supplying companies
- A group of NAPOCOR staff will be hosted in Switzerland to receive training courses in pertinent topics such as environmental monitoring, gas measurement technology and pollution modelling.
- The Swiss consultants are providing coaching and support towards the achievement of an environmental management system (EMS) according to ISO 14'000 for another of NAPOCOR's power plants, the Batangas Coal-Fired Thermal Power Plant Complex situated 120 km south of Manila. Achieving EMS certification will require some clean-up work by the Batangas plant, but it will be an important asset when in comes to privatisation.

Figure 1. The Limay Combined-Cycle Thermal Power Plant. To the right is Manila Bay.

Figure 2. Stack plume from Bataan oil refinery in turbulent winds

Figure 3. Concept of the Air-quality management system

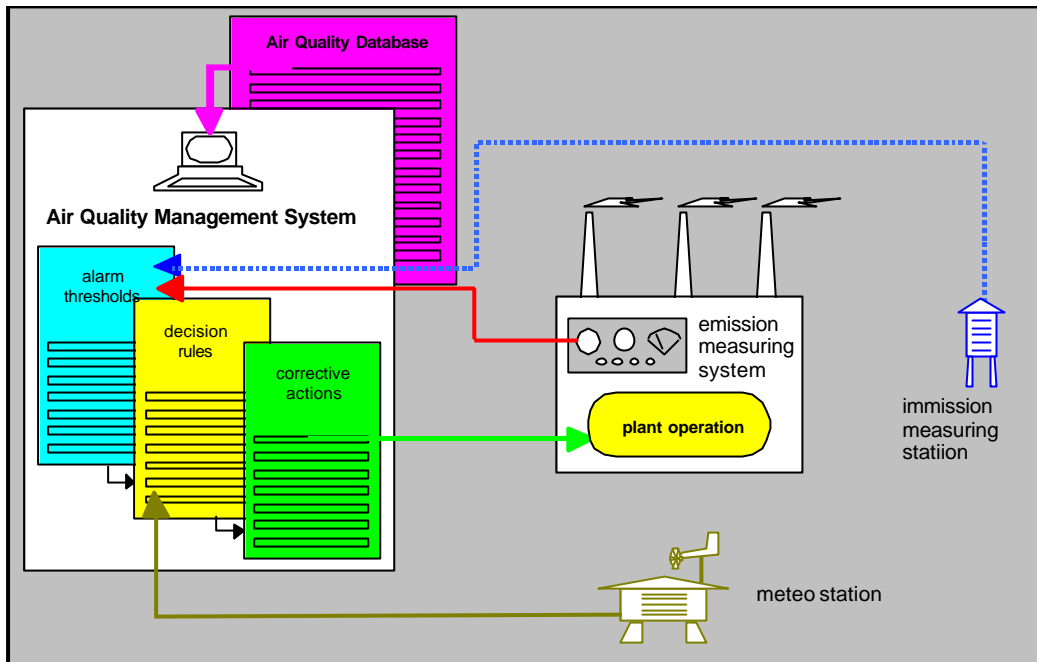
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