



Sui Northern Gas Pipelines Limited

sng

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50th Annual General Meeting of SNGPL



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The news of LNG supply deal between Pakistan and Qatar has come as a breath of fresh air for the country's energy sector which has been facing acute shortage for quite long time now. LNG import is expected to increase power production besides increasing economic activities in the industrial sector. SNGPL is transporting over 450 MMCFD LNG through its transmission network at this time thus playing its role in serving the nation. Influx of LNG has led to considerable input in gas demand-supply situation wherein natural gas/ LNG is being provided to all categories of consumers in Punjab on around the clock basis, which has only been possible after a lapse of over seven years.

Annual General Meeting (AGM) is an important occasion for any organization to connect with its shareholders. SNGPL had its 50th AGM this month which was attended by the company shareholders in a large number. SNGPL was represented by the Chairman, Board of Directors Saeed Mehdi, Managing Director Amer Tufail and senior members of the management. The annual event provided shareholders with a chance to interact on the company position and policies.

Another annual event which needs a mention is Annual Dinner organized by the Sui Northern Executive Officers Association (SNOEA) every year. This program offers officers and their families a good break from the routine life. SNGPL management participates heartily in this gathering thus delivering on the company's commitment to be an ideal employer. ■

50th Annual General Meeting of SNGPL



Corporate Affairs Department

The 50th Annual General Meeting (AGM) of Sui Northern Gas Pipelines Limited (SNGPL) was held recently in Lahore. Muhammad Saeed Mehdi, Chairman SNGPL chaired the meeting. Mian Misbah-ur-Rehman, Director; Amer Tufail, Managing Director and Wajiha Anwar, Company Secretary were present at the meeting with the senior management of the company. The Company's Annual Accounts for the year ended June 30, 2013 were placed before the shareholders. During the period under review, the Company incurred a net loss of Rs 9,749 million after incorporating an adverse adjustment of Rs. 12,743 million arising after the decision of Lahore High Court in 2013 relating to financial years 2010-11 and 2011-12

representing additional Unaccounted for Gas (UFG) disallowances and treatment of Late Payment Surcharge (LPS) /interest on delayed payments by consumers as operating income. The loss is attributable to the arbitrary reduction in UFG bench mark from 7 per cent to 4.5 per cent by OGRA and treatment of Interest / LPS as operating income, by the Regulator. The Company's efforts to reduce UFG were offset by continuous shift of gas from bulk to retail sector, enormous increase in gas losses in law and order affected areas of Khyber Pakhtunkhwa, and theft by non- consumers. Recognizing these factors as beyond the Company's control, the Company has raised these issues at ECC level, wherein detailed deliberations were

held and directions were issued to OGRA for carrying out a detailed UFG study and allow provisional recognition of the factors beyond Company's control. OGRA in its determination for the FY 2012-13 has recognized the partial impact of law and order affected areas and non- consumers. However, the impact of bulk to retail ratio has been deferred till completion of the UFG study. Moreover, the Company considers that the impact of bulk retail ratio is critical for its financial health. The Company is continuously engaged in the expansion of its distribution network providing gas to areas having higher distribution losses as compared to bulk consumers with minimum line losses. The Company has taken up the matter with OGRA for implementation of complete ECC guidelines.

The company has taken various steps including, but not limited to, increased vigilance against illegal connections/ re-connections, leakage rectification, minimization of measurement errors and gas theft control etc. to reduce the UFG losses. However, until and unless legal and factual flaws in the determination of



UFG benchmark are not addressed, the same will result in major financial issues for the company.

During the year under report, 321 new towns, villages, District Head Quarters (DHQs) & Tehsil Head Quarters (THQs) were connected with the existing system by laying 5,671 KMs of distribution mains and service lines. A total of 2,815 towns, villages, DHQs and THQs now exist on the company's network, which are being

facilitated with natural gas facility at their door step. Moreover, the company in line with its vision and mission statements has improved the quality of life of its consumers by providing 277,634

new gas connections during the year under review. The share- holders also approved the post facto re-appointment of M/s. A.F. Ferguson & Co. Chartered Accountants, as statutory Auditor of the Company for the Financial Year 2012-13. The shareholders raised certain questions, which were responded by the Management satisfactorily. ■

Pre-Admission hearing held on SNGPL's review petitions Determination of RLNG Price



Regulatory Affairs Department

SNGPL had filed petitions before the Oil and Gas Regulatory Authority (OGRA) for determination of Final Revenue Requirement (FRR) for the financial years 2012-13, 2013-14, 2014-15 and 2015-16 on 14 August 2013, 13 August 2014, 28 August 2015 and 01 December 2014 respectively. The authority issued its decisions on the petitions on 5, 6 and 27 November, and 1 December respectively. SNGPL had reservations on the decisions taken by OGRA hence under section 13 of the OGRA Ordinance

2002 read with rule 16 of Natural Gas Tariff Rules 2002. Accordingly the company had filed motion for review petition against DFRR for FY 2012-13 and FY 2013-14 on 3 December 2015, FY 2014-15 on 22 December 2015 and for FY 2015-16 on 15 January 2016. OGRA decided to conduct pre-admission hearing for the above mentioned motion for review petitions in Lahore on February 11, 2016.

At the hearing, the SNGPL team was led by Managing Director Amer Tufail along with Deputy Managing

Director (Operations) Amjad Latif, Chief Financial Officer (CFO) Faisal Iqbal, Senior General Managers and other senior officers of the Company.

The hearing started with the Registrar OGRA reading out the rules and procedure of the hearing. Chairman

OGRA requested SNGPL to present its stance.

Amer Tufail, Managing Director, gave opening remarks highlighting the basis on which

the company filed the motion for review petitions.

The Managing Director then asked Faisal Iqbal, CFO to give a detailed presentation on the petitions. CFO gave a detailed presentation with the help of multi-media, highlighting the observations pointed out in

motion for review.

After the CFO's presentation, legal arguments were delivered by the company's Legal Counsel Mehmood Ahmed Mirza, who gave detailed arguments. Eminent lawyers representing shareholders also intervened in

the matter and presented shareholders' reservations regarding the Authority's decisions.

The hearing concluded with the ending remarks

by the Chairman OGRA and vote of thanks. ■



MD visits SNGTI

Asad Fawad

Honorable Managing Director Mr. Amir Tufail, visited Sui Northern Gas Training Institute (SNGTI) last month. He was briefed about activities and progress of SNGTI. Moreover, General Manager (T&D) also briefed him about training methodology which includes Class room lectures, Technical workshops, Hands on Trainings, Case studies, Assignments, Presentations, Interviews, Trade tests, & Theoretical and Practical examinations.

He visited training halls and personally observed the trainings under process. He interacted with the 31st Executive Development Program (EDP) participants and got detailed

insight about their learning throughout the Program from every participant one by one. He also visited the ongoing Welding Training program and observed the practical training activity.



He appreciated the efforts of SNGTI team to train and prepare the SNGPL manpower to meet the future challenges. He praised SNGTI team for working with

unremitting zeal, efforts and commitment not only to fulfill but to exceed the training requirements and demands of each employee to strengthen his/her skills. ■

The writer is Officer at SNGTI.

Sustainable use of natural resources Children educated on the importance of conservation

Natural gas is a precious and scarce natural resource and Pakistan is fortunate to have been blessed with it. It therefore becomes necessary to educate masses for wise use of natural gas to ensure its

sustainability. Equally important is to make consumers aware of safety measures in case of an emergency.

Keeping in view the significance of the issue, Sui Northern Gas Pipelines Limited (SNGPL)

entered into partnership with the Worldwide Fund for nature (WWF – Pakistan) for energy conservation. One important component of this project is gas conservation lecture in schools. These lectures are specially designed for the school students and comprise of different sections in order to impart information to them while

keeping their interest intact.

Due to the prevailing security situation in the country, the lecture series took some time to take off this year

but with the cooperation of schools' administration it finally began in the month of February. Asif Shakeel, Officer Media Affairs represented SNGPL while WWF – Pakistan was represented by Muhammad Amin and

Imran Rabbani during the programs. The lecture begins with introduction of WWF – Pakistan by their representative along with a brief on conservation of natural resources and wildlife. It is followed by an interesting quiz focusing on the importance of conservation and global environmental challenges. Gifts are also distrib-





uted among the participating students.

The representative from SNGPL then starts an interactive session on natural gas and functions of SNGPL. Students took great interest in the session and were surprised once they knew that many of their assumptions about the natural gas were wrong. They are told about the discovery and features of natural gas. The lecture then moves on to the safety measures in case of gas leakage. SNGPL Officer informed students that use of rubber pipes in kitchen or anywhere in the home or hanging on gas pipeline, which usually children do, may result in gas leakage hence such practices must be avoided. They are also informed about the SNGPL emergency helpline phone number 1199. Students seemed much interested in knowing about the precautionary measures and also shared the measures that they think,

should be taken in any such case.

Next students were asked about the usage of geysers in their homes. Majority of the students told that their elders switch on geysers at night for warming up water in the morning. They were told that geyser takes only 30 minutes to warm up the water hence their practice causes wastage of an already scarce natural resource while unnecessarily adding on amount in the monthly bill. Students said

that they would pass on the useful information to their parents.

In the last part of the lecture, students were told about safe and wise use of gas heaters. They were told to switch off the heater before going to bed. SNGPL representative suggested students to wear warm clothes during the winter season instead of depending wholly on gas heaters.

In the end, students are asked to answer questions related to the points taken up during the lecture. Students enthusiastically tried answering the questions which indicated that the sessions successfully achieved the intended outcomes. ■



ECO Internship Programme: Collaboration for a better future

Asma Maqbool

To reinforce its commitment towards environment, Sui Northern Gas Pipelines Limited (SNGPL) has taken a number of initiatives and 'Eco Internship Programme' is one of them. The internship programme has been launched in collaboration with the Worldwide Fund for nature (WWF- Pakistan).

Under the programme, a total of 3,000 students of grade 7 and above from public and private sector educational institutions of Punjab, Khyber Pakhtunkhwa, and Azad Jammu and Kashmir (AJK) will be selected for a structure workshop consisting of six sessions. In addition to these, 1,000 underprivileged students will also be made part of the programme. The programme objective is to create awareness about conservation and the pressing environmental issues. Six different sessions of the programme cover a wide range of topics including biodiversity, sustainable development, water conservation, renewable energy, climate change, green journalism, solid waste management and nature photography.

Students are provided with some great learning oppor-

tunities including hand on activities related to documentary film making, eco designing, picture story and survival training. It is expected that the number of internees will increase to more than 3,000 in near future.

In this connection, a certificate distribution ceremony was organized in January at The Educators School in Sarai Alamgir. Mohammad Zahoor, General Manager (Rawalpindi - D) was the Chief Guest of the evening. Farrukh Majeed, General Manager (HSE) also attended the ceremony.

Speaking at the occasion, Farrukh Majeed and Mohammad Zahoor said that students should share the knowledge they gain from the internship programme with their peers as we need to create more awareness about environmental challenges and sustainable use of natural resources. At the end, certificates were distributed among the interns of Eco Internship Programme. ■

The writer is Executive Engineer (HSE).

▶▶ Member National Assembly (MNA) Malik Parvez meets MD SNGPL, Amer Tufail at the Gas House.



▶▶ Minister of state for water and power Abid Sher Ali calls on MD SNGPL, Amer Tufail in his office.

▶▶ Ruhail Muhammad, CEO, Engro Fertilizers visited MD SNGPL, Amer Tufail in his office.



▶▶ Punjab's provincial minister for food Bilal Yaseen visited MD SNGPL, Amer Tufail at the Head Office



▶▶ Clara Arrighi of Global Business Worldwide pays a visit to MD SNGPL, Amer Tufail.



▶▶ HSE Department briefs MD SNGPL Amer Tufail on the Company's CSR activities.



▶▶ Naeem Bajwa of Shahnawaz Motors visited MD SNGPL, Amer Tufail at the Head Office.



▶▶ Ex-MD SNGPL, Javed Hussain and Farrukh Qayyum, CEO, GEI Pak in a meeting with MD SNGPL, Amer Tufail.



▶▶ A Delegation from HBL led by Amir Irshad, Country Corporate Head, in a meeting with MD SNGPL, Amer Tufail at the Gas House.



▶▶ A delegation of All Pakistan CNG Association met with MD SNGPL, Amer Tufail at the Gas House.

▶▶ Participants of National Management course meet MD SNGPL Amer Tufail at the Head Office.



SNGPL signs contract with Ufone



Contract for provision of cellular services to the company employees was recently awarded to Ufone. An Agreement signing ceremony in this connection was held at the SNGPL Head office.

Retirements



▶▶ Abdul Razzaq Khan, Deputy Foreman (Civil) retired after serving the company for more than 40 years.

Mir Nafees Agha, Senior Accountant, Abbottabad (D) retired from service after serving the company for more than 37 years.

Annual dinner and Fun, music and food: A the SNGPL



At an hour's distance from the Hustle and Bustle of the city of Lahore, arrangements were made for the daylong festivity which literally transformed the otherwise quite surroundings into a mini recreational city on one mildly cold weekend of February. The event was the annual dinner and family extravaganza hosted by Sui Northern Executive Officers Association (SNOEA) in tranquil environment of a farmhouse.



The much awaited event recorded a remarkable participation of the company executives and their families, and was also attended by who's who of the company. Cricketing stars Yasir Shah and Taufiq Umer also graced the occasion with their presence.

The background

A longstanding tradition, Annual dinner is a signature event organized by Sui Northern Executive Officers Association (SNEOA). SNOEA is a body of the Executives working with SNGPL. It is currently headed by Azam Khan Wazir, General Manager (Logistic Support) and an Executive Council, comprising of Executives, works under him. The event, though meant to be held on annual



family extravaganza memorable day out for family

basis saw prolong gaps during the past one decade. This year the dinner was organized after a break of three years so the excitement was quite natural. The event aimed at strengthening the employees' relationship with SNGPL apart from providing them with recreational and rejoicing moments with their families away from work stress.

Preparations

An organizing committee was formed to look after the arrangements and smooth execution of the event. Mr Ashraf Nadeem, General Secretary, SNEOA, headed the committee who was assisted by members of the organizing committee. Preparations for the programme had started month before the event. Organizing committee members were given different tasks as the dinner was being organized at enormous scale. For the venue, the committee agreed on a farmhouse in the outskirts of Lahore. The chosen venue was fit for two reasons: First, the serene locality of the farmhouse and secondly, its vast area which was perfect choice for a programme of this scale.





The big day

Finally came the day people at SNGPL had been waiting for. Arrangements were ready before the noon. Entire organizing committee could be seen running between the different event spots in order to make sure that everything is perfectly in place. They looked exhausted after days of working tirelessly for the event.

The event was organized on a massive level. To put it simple, the venue was divided into four spots with all ingredients of a festival present there. Executives were welcomed with welcome gifts. Children too were given goody bags at the reception. At little distance from the reception, an entire area was decorated. Desi delicacies like dahi bhalley, goul gappey, along with our childhood favourite item, cotton candy was served to one and all. This whole place should be called a total fun place for the kids where puppet show, face painting, mural painting, solve-a-riddle competition, rides, jumping castle and lots of other fun filled activities were organized for them. While kids got busy in these activities, couples moved to the other area to enjoy boating and fishing. As the sun went down making way to the chilly air, families were served with coffee and tea before they moved on to the main event area.

Soon after the sunset, stage with giant size SMD screen playing beautifully designed graphics and some stunning lighting was ready to host the main function on the other corner of the venue. Proper seating arrangement was made while welcome drinks were served to the guests as soon as they took their seats.

The main program had two parts. The program started with welcome speech by Mr Azam Khan wazir, President, SNEOA, which was followed by the speech of MD SNGPL Amer Tufail. It was hosted by Ali Raza Awan, Executive Officer media Affairs and Anila Liaqat, Officer HRS. The other part of the programme was musical night which was hosted by Riaz Khan.

At the beginning of the program, a film on the history of SNGPL was played. The film brilliantly covered the 51 years of SNGPL highlighting the development work carried out and

milestones achieved during the entire period.

MD SNGPL Amer Tufail, in his speech, appreciated the efforts put into the program and said that such programs should be held regularly to provide employees with the opportunity to socialize. He told the audience that he, despite high fever, attended all the meetings and finally came to annual dinner. "I'm unwell today but still I didn't miss any of the meetings and have finally come here. I could have missed these meetings but I chose not to just because I want to show my commitment towards improving the company's situation." He said that the UFG has dropped to almost single digit figure in three-month time which is a huge achievement. He further said that the long delayed quarterly, half yearly and annual reports were also completed within the same period. "Despite the huge losses we suffered during the last few years, I assure that we will double the profitability within a year time."

Azam Khan Wazir thanked the Managing Director for his all out support in arranging the annual program. He put forward some issues before the MD and assured him of full commitment and dedication on behalf of the company executives.

SNEOA had also announced prizes for the members through lucky draw which took place during the event and the lucky winners got Umrah tickets and mobile phones.

A melodious end to a beautiful night

The daylong festivity finally concluded on a memorable musical night. Presence of the renowned ghazal singer Ustad Hamid Ali Khan added to the excitement of the guests. Singers including Tahir Parvez Mehdi, Saima Jahan, Waqar and others also sang variety of songs. Executives and their families were entertained by great performances by some of the country's best voices. ■



1st Annual General Meeting of the Retired Officers Forum held in Lahore

Naeem A. Khan

Retired Officers Forum of SNGPL had its first ever Annual General Meeting (AGM) in Lahore recently. The meeting took off with the welcome speech of Nadeem Asghar, General Secretary of the forum who welcomed the participants and explained the meeting objectives.

Mohammad Ilyas, President, Retired Officers Forum in his speech highlighted the achievements of the forum and cordial relationship it enjoys with the SNGPL management. In accordance with the agenda of the annual general meeting, Nadeem Asghar presented draft constitution of the forum before the house, already approved by the Executive Committee, for the approval. Senior members Abdul Rashid Lone, M. Arif

Hameed, Pervez Azeez Khan, Ghulam Qadir Awan and others shared some valuable suggestions and proposed amendments in the draft constitution. With consensus, amendments in the draft constitution were approved by the house. The constitution was passed unanimously.

A copy of the approved constitution has been published

and shared with the members in hard and through E-mail besides posting it on the forum's official page on Facebook 'Sui Northern Retired Officers Forum'.

The Annual General Meeting concluded

with fateha prayers for the departed souls of SNGPL companions. ■

The writer is Information Secretary of the Retired Officers Forum and Ex-GM (Media Affairs) SNGPL.



DCO Lahore National Squash Cup 2016: Madina Zafar of SNGPL wins the ladies final

Madina Zafar of SNGPL won the DCO Lahore National Squash Cup 2016 title after beating defending champion Riffat Khan at the final played at the Punjab Squash Complex. Madina Zafar was praised by all for putting on a great performance against the country's top player. Riffat Khan despite winning the first set couldn't stand for long against Madina Zafar who outclassed Riffat Khan 6-11, 11-9, 11-8, 11-9. Governor Punjab Malik Rafiq Rajwana was chief guest at the final .



Football: SNGPL participation in Federation Cup 2016

SNGPL football team recently participated in the second round of PFF Federation Cup 2016 held in Lahore. First round of the tournament took place from 29 January to 05 February 2016. SNGPL was placed in Group IV alongside the teams of HEC, PTV and Bhatti United. SNGPL qualified comfortably by winning matches against HEC and PTV by 1 - 0. The match against Bhatti United ended in a tie. In the second round, SNGPL was placed in GROUP 'C' alongside KRL, NBP and ASM. SNGPL lost first two matches against NBP and KRL while won the last game against ASM by 1-0. The team performed well but couldn't make it to the quarter finals.



Biomass and BioEnergy Plants SAVE RESOURCES, DEVELOP NATION

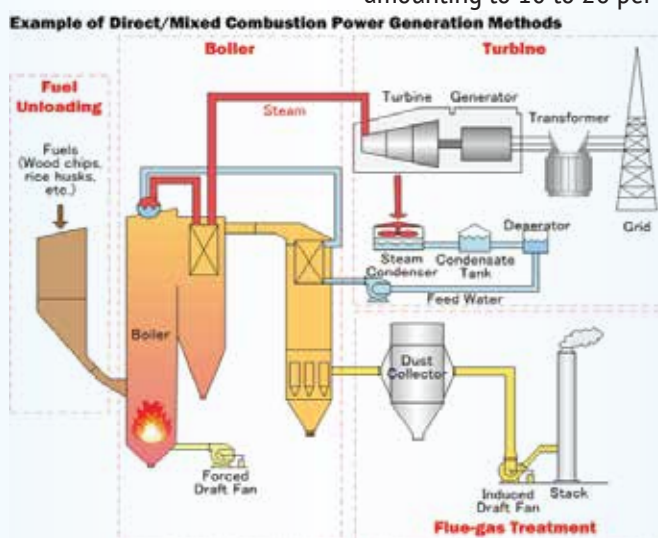
Nauman Saeed

Biomass is defined as organic material, available on renewable basis, produced directly or indirectly from living organisms without contamination from other substances or effluents. Biomass includes forest and mill residue, agricultural crops and wastes, wood and wood wastes, animal waste, livestock operation residues, aquatic plants, fast growing trees and plants, municipal and industrial waste. Biomass ranks fourth as an energy resource, providing approximately 14 per cent of the world's energy needs.

In a country like Pakistan, Energy from biomass is anticipated at 20 per cent of the requirements since biomass material is available in adequate quantity in rural as well as in urban areas, efforts are needed to manage this waste and deploy efficient technologies even indigenously at cheaper rates. Biomass power, also called biopower produced from biomass fuels, which is easily produced in almost any environment, regenerated quickly and has a long history of being used for direct heating applications and attained significant attention as a substitute for

fossil fuels. Working of the Biomass energy plants is depicted below for understanding of the readers.

The biomass energy technologies have gained popularity worldwide using solid biomass, animal waste and landfills in over 26 countries while 62 countries are adopting this technology for production of electricity amounting to 10 to 26 per cent of their needs.



Biopower technologies convert renewable biomass fuels into electricity (and heat) in several ways, but can be classified into three major types. Each category has undergone significant development and therefore has many different methods available.

A large portion of biomass electricity is generated by the direct combustion process. This process involves the direct burning of biomass in a boiler to make steam; the steam then turns a turbine, which is connected to a generator that produces electricity. Biomass can also be burned with coal in a boiler (in a conventional power plant) to produce steam and electricity. It typically

operates on a Rankine cycle.

Pyrolysis is the thermal destruction of biomass in an anaerobic environment, without the addition of steam or air to produce gases and condensate vapours. Combustion of these gases occurs in a gas turbine, typically combined cycles.

In gasification, biomass is partly oxidized by controlling oxygen by the addition of steam to produce combustible gases, having high calorific value. Product gases are then fed into a combined cycle gas turbine power plant.

Direct combustion is the oldest and simplest, but inefficient technology. Gasification and pyrolysis have higher efficiencies, but require more process control and investment. Biopower is a natural fit for the electric power industry and is good for the environment. This is because biomass fuels are renewable, they help reduce greenhouse gas emissions from fossil fuels and make productive use of crop residues, wood – manufacturing wastes, and the clean portion of urban wastes.

The design of the power plant is based on a high – value/high – return community based approach, the centre piece of this approach is the development of value – adding processing centers that can create economic opportunities for the market operators and management. This approach needs collective participation of the local communities, involving the market operators, managers and the local government as stakeholders in the biomass development project. This will create opportunities for the employment of the people and revival of the economy. The plant capacity determination can be realized depending on the availability of the biomass

materials, density of the population and per capita use of the energy.

The most significant factor considered in the choice and scale of technology for the proposed biomass power plant is to minimize investment risk while maximizing financial returns. The proposed plant is expected to use the conventional steam cycle generating electrical self – operating plant, using the direct combustion/steam turbine conversion based on Rankine cycle.

The estimated capital cost of the plant includes the preliminary cost, cost of design and planning, cost of land and other real estate, cost of transportation, erection and installation of equipment and overheads.

The annual cost of BioEnergy plant can be analyzed and estimated as per equations here under:

$$APC=AFC+AOC \quad (2a)$$

$$AFC=FCR*UC*C \quad (2b)$$

$$AOC=FC+OM \quad (2c)$$

Where APC is Annual Plant Cost, AFC (\$ per year) is Annual Fixed Cost and AOC (\$ per year) is the Annual Operating Cost. The AFC consists of the interests, taxes, insurance, depreciation, managerial and general maintenance costs and rate of return of the plant and is evaluated with equation 2b. FCR (%) is the fixed Charge Rate, UC (\$ /MW) is the Unit Capital Cost and C (MW) is the Plant Capacity. The AOC consists of the annual operating cost of the plant. The items which constitute the operating cost are: fuel, operating labour, maintenance cost and supplies. This cost is evaluated by using equation 2c; FC (\$ per year) is the Fuel Cost and OM

(\$ per year) is annual cost of operating labour, maintenance, and supplies.

The Generation Cost consists of the cost of one unit of electricity generated from the plant and this can be estimated using equation 3a and b.

$$GC = \frac{100 * APC}{E} \quad (3a)$$

$$E = 8760 * C * x 10^3 \quad (3b)$$

Where GC (\$ /kWh) is the Generation Cost, APC (\$ per year) is the Annual Plant cost and E is the expected output of the generating unit for one year and is given by equation 3b. CF is the Capacity Factor for the plant and C (MW) is the capacity of the plant.

The present worth method is used to evaluate the feasibility of biomass energy plants which dictates the sum which is invested at the beginning of the project, yield an amount equal to the annual cost every year comparing with the cost of diesel plants. The rules for calculating the present worth are:

- The present worth of different plans is estimated using the same period of analysis and the same time base irrespective of whether they have a common life or not or whether they are initiated in the same year or not.
- The same interest rate is used for calculating the present worth of different plans.
- The plan with the lowest present worth represents the minimum over all expenditure and is the optimum plan.

Equations are used to estimate the present worth of the different plans.

$$\text{Total Annual Costs} = \left(r + \frac{r}{(1+r)^t} + t+i \right) P + AOC$$

$$\text{Present Worth} = \frac{P + \left(r + \frac{r}{(1+r)^t} + t+i \right) P + AOC}{r[1-(1+r)^{-n}]} = P + \left(r + \frac{r}{(1+r)^t} + t+i \right) \frac{P + AOC}{r[1-(1+r)^{-n}]}$$

Where P is the Capital Investment, r is the interest rate, n is number of years, i is the insurance rate, t is the tax rate on capital investment and AOC is the Annual Operating Cost.

Conclusively the Government of Pakistan as well as provincial regimes should take bold steps to develop a mechanism involving stakeholders for development of such energy sectors boosting economy, opportunities for the resident of the rural areas, employments for the unemployed people and tapping wasteful resources. ■

The writer is Sub Engineer at Compression department.

Achievement

Ifreen Fakhar d/o Fakhar Iqbal (Sales Officer, Head Office) passed her class 6 annual examinations acquiring 94.93 per cent marks.

We wish Ifreen all the best for the future.



Syed Hassan Tahir

We often debate on morality, principles or rules, what are they? For what they are designed or are these utopian creeds to be adopted? No, these terms are not merely concepts but are interrelated realities net to weave an ideal model in front of us. Starting from morality, there are two forces residing within human nature with equal propensity pushing us against each other to behave. One is morality sweating out to prevail and other is immorality enticing us to grab short-term selfish comforts which is the other face of corruption.

Corruption is an instinct which dwells in human nature with much prospects to grow because it is watered

by our thirst for short-term gains. Usually we look around for ways to shift the rationale of our wrong deeds over system, rules or society by spelling out

justifications. But in actual this is the root cause of our consistent failure at all fronts. Let's have a brief glimpse over our immoral practices we often ignore.

Being an employee of any company, firm or institute, we are reluctant to observe the stipulated office timing leaving the work for next day. Beside real emergencies, we sometimes cook finesses to quest for short leaves for

hangouts or other work which can be suspended for spare time. Similarly, during office timings, we use to make long calls, chats or discussions ignoring the assigned responsibilities which inflict serious damage to the productivity of the company we belong to. We employees are the

drivers and companies/-firms are the elevators to lift up our living condi-

tions. Any lapses on our part can break this relationship leaving far-reaching impact on our lives.

In public sector departments or private sector business-



Usually we look around for ways to shift the rationale of our wrong deeds over system, rules or society by spelling out justifications. But in actual this is the root cause of our consistent failure at all fronts.

es, we often promote immoral practices by offering hefty bribery for hasty work or getting job done. Instead of doing hard work, we offer and opt shortcuts to hold greater position in society by various illegal means i.e. favouritism, nepotism, bribery and flattery. Any system or company is designed by us and for us.

Being student, we skip classes giving priority to hang-outs, sitting in cafes through days, hustle bustle in balconies/corridors which will never serve us in the way we often aspire. We remain incognizant about syllabus through the academic year/semester and at the end, we seek extra favours from our teachers to score better in exams. Similarly, as driver, we are reluctant to obey traffic signals and rules on roads that are particularly designed for our own safety and comfort while travel-

ling. Instead of leaving with the margin of 15-20 minutes, we mostly rush out for our respective jobs/destination at the eleventh hour which pushes us to reach on time that creates mess.

Interestingly we ourselves plant the seeds of corruption and expect the sweet fruit to grow which can't be reaped. When we keep on giving space to immoral powers to excel for timely comforts then automatically morality will dump under the garb of corruption. Neither saints nor prophets are yet to come with the aim of putting our house in order. It's our individual and collective responsibility to ensure morality among us in order to end the crisis from our society.

The writer is Coordination Officer (HR).

EARTHQUAKE PROOF BUILDING

One might imagine an earthquake proof building to be heavy and bulky to ensure that it's strong enough to defend itself from the force of an earthquake's impact. However, studies show that the more light-weight a building, the more impact it can absorb.

It's also important that the floors of the building are made as light weight as possible. This means that its light, flexible structure is able to absorb and if necessary, even bend with the impact, preventing the building from being damaged. To ensure that a building is made earthquake proof it must be built on the correct foundations. Earthquake often knock buildings from their foundations.

To effectively dampen the impact of energy created by earthquake the building must be created with material of high ductility. This means that the materials must have the ability to undergo large processes of plastic malformations. Brick concrete for example are not good materials to use when trying to make a building earthquake proof due to their low ductility, they absorb very little energy.

Cyber Security for Industrial Control Systems

Ehsan Elahi

The need for strong cyber security on Industrial Control Systems (ICS) like PLC, DCS and SCADA has never been greater. These systems, vital to the production industries, help companies monitor their field devices, collect data and control operations. These systems are growingly under cyber threat. Cyber security events affecting ICS have increased by 2100 per cent over the past three years, according to data from the U.S. Department of Homeland Security's ICS Cyber Emergency Response Team. These include targeted attacks by well-funded organizations, including both nation-states and criminal groups.

In 1982, a Trojan program inserted into a SCADA system caused a huge explosion on Trans-Siberian Natural Gas Pipeline. The Washington Post reported that the resulting fireball yielded "the most monumental non-nuclear explosion and fire ever seen from space."

In his book "At The Abyss", Thomas Reed, a senior U.S. national security official, reported that U.S. allowed U.S.S.R. to steal Pipeline Control software from a Canadian Company and U.S. agencies embedded a malicious program also known as Trojan Horse into the stolen software. He writes: "In order to disrupt the Soviet gas supply, its hard currency earnings from the West, and the internal Russian economy, the pipeline software that was to run the pumps, turbines, and valves was programmed to go haywire, after a decent interval, to reset pump speeds and valve settings to produce pressures far

beyond those acceptable to pipeline joints and welds." The over pressure, caused an explosion which was estimated to have the power of three kiloton nuclear weapon.

In the same way, in August 2008, a Turkish Oil Pipeline was blown by hackers. Bloomberg News reported the story as a watershed event in the history of cyber warfare. Hackers, by hacking the SCADA system, accessed the computerized control system of pipeline, shut down the alarms, cutoff the backup communication link and then highly increased the pressure of crude oil flowing in pipeline. Attackers were able to hack the cameras and sensors used to monitor pipeline and surroundings, and

accordingly operators were clueless about the blast until security staff saw the flames 40 minutes later to the incident.

According to the Bloomberg: Instead of receiving digital alerts from sensors placed along the line, the control room didn't learn about the blast until 40 minutes after it happened, from a security worker who saw the flames, according to a person who worked on the probe. As investigators followed the trail of the failed alarm system, they found the hackers' point of entry was an unexpected one: the surveillance cameras themselves. The cameras' communication software had vulnerabilities the hackers used to gain entry and move deep into the internal network, according to the people briefed on the matter.

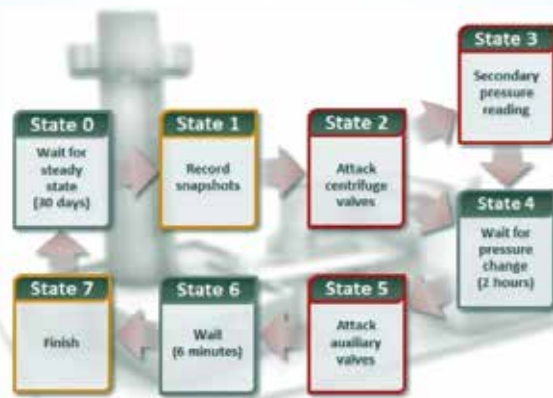


Once inside, the attackers found a computer running on a Windows operating system that was in charge of the alarm-management network, and placed a malicious program on it. That gave them the ability to sneak back in whenever they wanted.

The central element of the attack was gaining access to the operational controls to increase the pressure without setting off alarms. Because of the line's design, the hackers could manipulate the pressure by cracking into small industrial computers at a few valve stations without having to hack the main control room. The presence of the attackers at the site could mean the sabotage was a blended attack, using a combination of physical and digital techniques. The super-high pressure may have been enough on its own to create the explosion, according to two of the people familiar with the incident. No evidence of a physical bomb was found. Having performed extensive reconnaissance on the computer network, the infiltrators tampered with the units used to send alerts about malfunctions and leaks back to the control room. The back-up satellite signals failed, which suggested to the investigators that the attackers used sophisticated jamming equipment, according to the people familiar with the probe. Investigators compared the time-stamp on the infrared image of the two people with laptops to data logs that showed the computer system had been probed by an outsider. It was an exact match, according to the people familiar with the investigation.

A well-known, powerful & successful Trojan was Stuxnet, which destructed the uranium enrichment centrifuges of Iran's Natanz Nuclear Facility in 2009. Stuxnet and another

malware Flame were developed to target sensitive Iranian Computers. These malwares were spread by monitoring and pointing specific targets. Malwares infected the targets almost two years after their spread, Stuxnet 0.5 version caused valves to be operated to undesirable closed positions and the other version put fluctuations in spinning of centrifuges, which resulted into physical damage of the nuclear facility. Symantec officials announced the discovery at the RSA security conference in San Francisco. Stuxnet has also infected internal network of a Russian Nuclear Power Plant in the same way it infected Nuclear Facilities in Natanz, this network was physically isolated from internet via Air Gapping and attackers approached the ICS via devised USB Flash drives.



The state flow of a never-before-seen attack contained in Stuxnet 0.5. Rather than targeting the speed of spinning centrifuges, this new attack tampered with valves that feed gas into the cylinders.

Historically, critical infrastructures like SCADA, DCS and other ICS were prevented from cyber attacks by using a technique called 'Air Gapping'. In Air Gapping, ICS and Business networks were completely isolated and ICS were not connected to internet for remote access. Due to mobile computing approaches, Air Gapping is no longer viable.

The development of ICS and SCADA was started before the internet became common, so design of these systems does not meet today's business requirements. For example, many of these ICS still run on old Windows OS like Windows 98 or Windows 2000, which are not secure in current mobile computation environments. These systems can't be secured using prevailing IT security and firewall systems due to hidden compatibility issues, a very good example of this incompatibility was discussed at an ISA Industrial Security Conference in Philadelphia a few

years ago. When an emergency shutdown system on a boiler failed to operate correctly, investigators discovered that anti-virus software had been installed on the computer used to configure the safety system. This software blocked the proper operation of the safety system, putting the entire plant at risk. There was nothing wrong with the safety system or the anti-virus software on their own, but together they made a life-threatening combination. Therefore securing an ICS network is much different from securing a traditional LAN/WAN based IT network.

A hacker or threat can't be dangerous to the system unless there are vulnerabilities that can be exploited. With little effort a hacker can scan the communication links between remote sites and control centers, and access to field devices can be gained by overriding that communication using back channels as most of the communication in older ICS does not require any kind of authentication. In this way an attacker can access sensitive data and can control field devices to disrupt normal operation of the ICS.

Threats to ICS can be from many groups of people. As per American Gas Association analysis, these attackers have a wide range of capabilities, resources, organizational support and motivations. Harmful programs, capable of paralyzing automation systems, have many sources. External service technicians, contractors, employees and visiting consultants with laptops can inadvertently (or deliberately) introduce malicious software behind the external firewall. Surveys reveal that roughly 40 percent of security incidents involved insiders.

Stuxnet malware has shown that even air gapped ICSs are prone to cyber attacks, the probability of attack is higher if the ICS is connected to business network via firewall, and this probability increases on large when ICS is directly connected to internet. However Stuxnet deployment on Russian and Iranian systems was possible purely due to inadequate awareness of their nuclear plant workers, as they unknowingly plugged pre-devised

USB drives in their plant's ICS.

A good deal of cyber security is awareness and education. Hackers are con artists as well as computer scientists, so employees of infrastructure facilities should be taught not to fall for social-engineering tricks. Stuxnet was spread by targeting plant employees and putting devised USB drives at the places in their regular access like in their home lawn or parking place etc., therefore ICS workers must be educated to remain careful of such tactics and to avoid becoming carrier of outside attackers. Steps required to prevent ICS of a critical process can be briefly summarized as follows:

- Maintain Air Gap between business and ICS networks as far as possible, though it has become difficult in current environment; however it is the easiest possible approach.
- Establish ICS usage policies and Conduct Trainings to minimize the likelihood that Organizational personnel will inadvertently disclose sensitive information regarding ICS design, operations or security controls, or will become a carrier of devised malware.
- Identify all connections to ICS network including DSL, dialup modems, business vendors and regulatory agencies, Disconnect unnecessary connections as any connection to another network possess another risk, and finally Evaluate and Strengthen the security of remaining connections by conducting penetration test and vulnerability analysis.
- Identify Cyber Security requirements and systems that require additional level of protection.
- Encrypt communication of critical processes, do not rely on proprietary protocols, and implement security features including Cryptographic techniques advised by internationally recommended standards/algorithms like AGA-12, Advanced Encryption Standard (AES) and security features provided by system vendors.
- Put strong firewalls over remote access points and back access channels, and perform intrusion detection analysis

using IDS system software like SNORT & Industrial Defender etc. These softwares are aware of ICS protocols including Modbus, TCP/IP, ODVA and others commonly used for SCADA/DCS communication.

- Establish intrusion detection and incident monitoring system that would alert network administrators in case of any external or internal access and enable logging and auditing on all systems to detect suspicious activity as early as possible.
- Conduct physical security survey for remote sites connected to ICS and evaluate their security to stop physical access to the ICS including remote telephones, RTUs, radios and Fiber Optic Cables.
- Defining cyber security roles for ICS and Business network administrators and users, effective cyber security requires commitment and it requires that managers/administrators communicate this commitment to the bottom. Strong access control like Two Factor Authentication must be implemented at the entry points of DCS/SCADA network to authenticate users trying to access a protected zone.
- Establish ICS backups, disaster recovery systems and plans, and exercise them routinely to ensure that they work and that personnel are familiar with the procedure.
- Conduct routine self-assessment and internal cyber security audits.

At SNGPL, most of our electronic flow measurement gadgets (such as EVCs, Flow Computers etc), Pressure Control Valves (PCVs), Compressor units and Pressure Operated Valves (POVs) and also other instruments (like Gas Chromatograph, H₂S and moisture analyzer) are operated through SCADA or any other wireless communication system and are also under cyber threats which necessitates extensive study in this field.

Cyber security for ICS including DCS and SCADA has become high stake task and a very rich topic. Most of the ICSs have vulnerabilities of both that's why ICS owners

have to develop a culture that places security priorities at par with operational priorities. Employees must be educated about their role in ICS security, and not to become victim of cyber-attacker's tactics.

Risk assessment of cyber threats must be carried out and ICS backups should be created/ restored regularly, any system can be made secure as long as there are no vulnerabilities from inside the system or vice versa. Air Gapping the ICS network would be a good approach for critical industries and remote communication to RTUs or other devices should be encrypted with proper authentication control so that even after physical access to remote site, a hacker cannot hack into ICS. Emerging proven techniques for ICS security including Cryptography and Encryption as laid in international standards needs to be adopted. ■

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**IF YOU'RE
THE LAST
ONE OUT...**



**TURN
OFF THE LIGHTS**



HEALTH SAFETY & ENVIRONMENT DEPARTMENT



15-SP-HSE-13

SOME **MISTAKES** DON'T GIVE YOU A SECOND CHANCE



IN CASE OF GAS LEAKAGE

DO

- Shut off the main valve.
- Turn off levers of all appliances.
- Open all doors and windows.

DON'T

- Never light a match.
- Do not turn any switches on or off.
- Never attempt to fix the gas leakage by yourself.



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