Course Title **Advanced Steam and Compressed Air Systems**

1. Overview	Refineries and Petrochemical plants typically have complex steam systems. Minimising the energy cost of such systems requires a broad perspective that considers the conversions between different forms of energy including fuel, steam and power. In a real plant environment the energy saving objectives must be achieved whilst considering hardware limitations, external contracts, reliability and human behaviour
2. Objectives	The Advanced Steam system course builds on the basics taught in the Singapore Certified Energy Manager Programme. The objective is to give engineers and managers the following: • An ability to understand and calculate robust economics for complex systems • Understanding of the most appropriate steam system configuration for your individual context • Deeper understanding of key equipment (gas turbines, steam turbines, condensate systems) • Robust appreciation of implications for process reliability • Tools and skills to help improve the performance of all staff on site to achieve better energy efficiency

3. Outline	**DAY 1**
	Economics
	• Industry context
	• Steam/fuel/power and PEE
	• Marginal Steam Pricing
	  ○ Typical marginal mechanisms
	  ○ Alternative mechanisms when steam is a process byproduct
	• Contracts and best practices
	
	Cogeneration
	• Cogeneration Schemes (brief recap of SCEM)
	• R-Curve Analysis for determining optimal cogeneration schemes
	  ○ Using the R-Curve to improve the configuration
	  ○ Controllability and operability
	• Tips to increase backpressure power, Deaerator pressure, BFW heating, APH
	
	Gas Turbines and HRSGs
	• Marginal efficiency of fired and unfired HRSGs
	• Effect of ambient conditions on GTG and Combined cycle performance, and overcoming it
	• GT control systems and performance modifications
	• Augmentation/NOx steam
	
	Case Studies
	
	DAY 2
	Reliability, Availability, Maintenance
	• Cushion, reserve, sparing - managing the overall reliability of the system
	• Boosting cushion - peak firing mode, over-firing boilers, steam shedding
	• Reliability vs efficiency - rational decision making vs fear driven decision making
	• Turbine slow rolling, motor turbine switching - 21st century practices

	Steam Turbines • Control schemes • Performance maximisation • Condensing Turbines • Turndown and efficiency variation **Condensate Systems** • True cost of condensate • Deaerator operation & Optimisation • Steam traps **Steam system management** • KPIs and performance monitoring • Short term, medium term and long term management tools • Organisational and human aspects **Case Studies**
4. Target Audience	This course is aimed at personnel from sites with reasonably complex steam systems, including some or all of the following: • Multiple steam headers • Steam turbines for power generation or equipment drives • Have, or are considering a Cogen plant The focus of the course will be on the refining and petrochemical industries The course is aimed at engineers, technical managers, or energy managers who need to analyse and understand steam systems, or manage those who operate steam systems
5. Trainer	Andrew has spent five years with KBC, and is currently a Senior Consultant within the Energy Services team. He has been involved in many energy related projects including pinch analysis studies, process simulations and utility system modelling. Andrew has worked on energy improvement and design projects for oil refineries and petrochemical facilities throughout Europe, Russia, and Asia. He has presented lectures and delivered energy training to a wide range of audiences, and was previously based at the KBC Walton-on-Thames office in the United Kingdom. Prior to joining KBC, Andrew spent four years in his home country of New Zealand working on projects throughout the dairy, pulp and paper, and chemical industries. Andrew holds a BE (Honours, 1st Class) in Materials and Process Engineering from the University of Waikato, New Zealand. He has also published a number of journal papers and carried out postgraduate study in energy efficiency.

APPLICATION FORM

Course Date 15 – 16 April 2014
Venue SEAS Training Centre at Park Mall, #08-02
Course Fee Normal Fee: $642
*SEAS member and SEAS SCEM candidates: $513.60

PERSONAL PARTICULARS

Full Name:
*(*Mr/Ms/Mrs/Dr)* *(Name as in NRIC)*
NRIC no: Date of Birth:

Designation:

Contact No: (Hp) (Tel) (Fax)

Email:

Address:

Postal Code:

+Sponsor: ☐ Self-Sponsored ☐ Company-Sponsored

COMPANY PARTICULARS

Company Name:
(Full Name)
Address:

Postal Code:

CONTACT PERSON PARTICULARS

Contact Person:
*(*Mr/Ms/Mrs/Dr/Prof)*
Designation:

Contact No: (Hp) (Tel) (Fax)

Email:

- I hereby declare that the particulars given in the Application Form are true and correct in every respect. I understand that the application will be disqualified if any information given is found to be untrue and the fees paid will be forfeited.
- I accept that SEAS reserves the right to change course venue, cancel or reschedule the course if necessary or warranted by circumstances beyond our control.
- SEAS reserves the right to accept or reject the application for whatever reason and no refund of fees will be made for withdrawal on or after the commencement of the course where the applicant has been accepted.

Payment Mode

- Crossed cheque is made payable to: **'Sustainable Energy Association of Singapore'**
- NETS (payable only via our training centre at Park Mall)

*All payments required are inclusive of GST.

Send completed application form and documents to:

Sustainable Energy Association of Singapore (SEAS)
9 Penang Road
#08-02 Park Mall
Singapore 238459