Part A
The Hong Kong Institution of Engineers - Accreditation & Student Membership

Part B
Opportunities for Energy Engineering Graduates & Energy Engineers

25 November 2014
Dr C W Tso
Adjunct Professor

The Hong Kong Institution of Engineers (HKIE)

Vision & Mission

**Vision**

- Sustained Excellence in the Engineering Profession

**Mission**

- To promote the advancement of engineering and to facilitate the exchange of knowledge and ideas
- To provide a broad range of services to members, to assist them in developing their careers and to play their full role in contributing to society
- To maintain a high standard of the profession, and to raise the standing and visibility of engineers


School of Energy and Environment, City University of Hong Kong
History of The Hong Kong Institution of Engineers

Founding of Engineering Society of Hong Kong

Incorporated by Law as the Hong Kong Institution of Engineers

Recognition of the HKIE Corporate Members by the Government for Civil Service Appointments

50th Anniversary

Admitted to the Washington Accord

30th Anniversary of the HKIE Incorporation

Admitted to the Seoul Accord

Admitted to the Sydney Accord and the Engineers Mobility Forum (EMF)

60th Anniversary

Admitted to the Engineering Technologists Mobility Forum (ETMF)

35th Anniversary of the HKIE Incorporation


Source: http://www.hkie.org.hk/

HKIE Organisational Structure

COUNCIL

EXECUTIVE

Planned Committee

Engineers Registration Board

Accreditation Board

Administration Board

Qualification & Membership Board

Learned Society Board

Source: http://www.hkie.org.hk

School of Energy and Environment, City University of Hong Kong
**HKIE as a Qualifying Body for Engineers**

1975: HKIE was incorporated under the Hong Kong Institution of Engineers Ordinance, Chapter 1105 of the Laws of Hong Kong:
- sets standards for the training and admission of engineers.
- has strict rules governing the conduct of its members and, as a learned society
- enables its members to keep abreast of the latest developments in engineering.

1982: HK Government recognised Corporate Members of HKIE for Civil Service appointments of Engineers/Officers. Most engineering companies in Hong Kong recognise the same as the key qualification for employment of professional engineers. Source: http://www.hkie.org.hk

1995: HKIE admitted to the Washington Accord# and is now one of the seventeen (17) Signatories. The Engineering Degrees accredited by the HKIE are recognised by the other 16 Signatories, including Australia, Canada, Ireland, New Zealand, Singapore, the UK and the USA.

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**HKIE Accreditation of CityU ESE Programme (1/2)**

For Global Recognition and Enhancement of Employability

<table>
<thead>
<tr>
<th>No.</th>
<th>Event Description</th>
<th>Date</th>
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<tbody>
<tr>
<td>0.</td>
<td>Inception and 1st Dialogue with HKIE</td>
<td>January 2013</td>
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<tr>
<td>1.</td>
<td>1st Sharing Session by HKIE</td>
<td>10 Oct 2013</td>
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<td>2.</td>
<td>SEE 1st Draft Informal Submission to HKIE</td>
<td>22 Oct 2013</td>
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<td>3.</td>
<td>2nd Sharing Session by HKIE</td>
<td>18 Dec 2013</td>
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<tr>
<td>4.</td>
<td>SEE 2nd Draft Informal Submission to HKIE</td>
<td>23 Jan 2014</td>
</tr>
<tr>
<td>5.</td>
<td>3rd Sharing Session by HKIE</td>
<td>12 Feb 2014</td>
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<tr>
<td>6.</td>
<td>SEE Formal Submission to HKIE</td>
<td>26 Feb 2014</td>
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<tr>
<td>7.</td>
<td>HKIE Accreditation Visit</td>
<td>10 – 11 Apr 2014</td>
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<tr>
<td>8.</td>
<td>Receipt of HKIE Accreditation Visit Report</td>
<td>5 May 2014</td>
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<tr>
<td>9.</td>
<td>SEE Responses to Accreditation Visit Report</td>
<td>29 May 2014</td>
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<tr>
<td>10.</td>
<td>SEE Presentation to HKIE Accreditation Board</td>
<td>23 Sept 2014</td>
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<td>11.</td>
<td><strong>Provisional Accreditation# Granted by HKIE per Letter dated 24 Oct 2014 to University President Kuo.</strong></td>
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#At the HKIE Accreditation Board meeting on 23 September 2014, it was decided that City University of Hong Kong be granted:

Provisional accreditation for the BEng (Hons) Degree in Energy Science and Engineering (Full Time) until the first cohort of graduates (2016). Full accreditation will be considered following a full visit afterwards.
HKIE Accreditation of CityU ESE Programme (2/2)

HKIE has 21 Engineering Disciplines
- Aircraft
- Biomedical
- Building
- Building Services
- Chemical
- Civil
- Control, Automation & Instrumentation
- Electrical
- Electronics
- Energy
- Environmental
- Fire
- Gas
- Geotechnical
- Information
- Logistics & Transportation
- Manufacturing & Industrial
- Marine & Naval Architecture
- Materials
- Mechanical
- Structural

Energy Discipline: the newest Discipline established in Sept 2013, and the Discipline Panel Founding Chairman is Ir Dr C W Tso.

Graduates of ESE Programme are having met the academic requirements for entry to the practice of engineering in both Energy Discipline and Environmental Discipline.

ESE Students to Professional Energy Engineer and/or Environmental Engineer

- Professional Engineer
  - HKIE Corporate Member (MHKIE)

- Professional Assessment
  - HKIE Professional Assessment

- Working Experience
  - 2 Years Scheme “A” Training + 2 Years Relevant Experience

- 4-Year Honours Degree
  - Study an Engineering Degree Programme Accredited by HKIE

- BEng(Hons) Degree in Energy Science & Engineering

- Hong Kong Diploma of Secondary Education (HKDSE)

Source: http://www.hkie.org.hk
HKIE Membership Statistics

<table>
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<tr>
<th>Category</th>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>Hon Fellow</td>
<td>18</td>
</tr>
<tr>
<td>Fellow (FHKIE)</td>
<td>1,132</td>
</tr>
<tr>
<td>Member (MHKIE)</td>
<td></td>
</tr>
<tr>
<td>Graduate Member</td>
<td>7,255</td>
</tr>
<tr>
<td>Associate Member (AMHKIE)</td>
<td>1,194</td>
</tr>
<tr>
<td>Companion</td>
<td>15</td>
</tr>
<tr>
<td>Student Member</td>
<td>8,577</td>
</tr>
<tr>
<td>Affiliate</td>
<td>403</td>
</tr>
<tr>
<td>Total Membership</td>
<td>32,214</td>
</tr>
</tbody>
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As at 3 November 2014

Corporate Member can use the title “Ir” and designated letters “FHKIE” or “MHKIE”

Source: http://www.hkie.org.hk

Engineering Registration Board (ERB)

- Established by law to maintain Register of Professional Engineers
- Administered by The Hong Kong Institution of Engineers
- Assists public and government to identify qualified and competent engineers for the discharge of duties laid down by Laws
- Qualifications for Registration:
  - Member of the HKIE in a discipline or other professional qualifications recognised by the Board
  - One year relevant post-qualification professional experience in Hong Kong
  - Ordinarily resident in Hong Kong

Registered Professional Engineer can use the designated letters “RPE”

Source: http://www.hkie.org.hk
HKIE Free Student Membership

Under the Free Student Membership Scheme approved by the Council, students who are studying engineering degrees, higher diplomas and associate degrees accredited by the Institution are eligible to become Student Members under the Scheme as far as their studies of the programmes. Under the Scheme, it will be taken that the period of study of an accredited programme would normally be not more than 4 years and Student Members are required to update their status of study with the Institution in future for the purpose of enjoying this Scheme.

You can enjoy Free Student Membership with the following Benefits:

- Access to the Members' login
- Online Survey
- ENewsletter
- Relevant activities organised by the Institution

For membership enquiries, please contact our Membership Section at Tel: 2890 2926 or Fax: 2882 8402.

Source: http://www.hkie.org.hk/

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HKIE Student Chapters – Universities & IVE

The HKIE Student Chapters are set up to encourage and foster a spirit of friendly collaboration amongst its members and to encourage its members to maintain a close link with the Institution and to participate in the HKIE activities. Student Chapters have been established in five local universities (including CityU) and three campuses of Institute of Vocational Education.

In addition to social activities, Student Chapters are to organise activities including technical meetings, visits and other events for the benefit of the members of the Chapter and for the purpose of increasing their awareness of the engineering profession and the Institution.

Source: http://www.hkie.org.hk/
HKIE CityU Student Chapter Website

Founded on May 25, 2009
Welcome all Engineering Students at CityU

If you are:
- bound with our mission of engineering the future,
- fond of the magic and fantasy brought by technology development, and
- born with an engineering mindset and gift

Come and join us, the group of people where you belong

Email: hkie.scityu@gmail.com
Website: https://www.facebook.com/hkie.cityu

School of Energy and Environment, City University of Hong Kong

HKIE CityU Student Chapter Committee (2014/15)

Committee Members

Chairman  Mr Ray CHENG Chun Wai  chunwai0620@hotmail.com
Immediate Past Chairman  Mr Jimmy LEUNG Pan Chak  panchak723@gmail.com
Deputy Chairman  Mr Ronstar POON  poon434630@outlook.com
Honorary Secretary  Miss Kristie YAU Hoi Ching  kristieyh@gmail.com
Honorary Treasurer  Mr Brian TANG Tsz Ho  tang_g@live.hk
Ordinary Member  Miss LO Yuet Wah  hlcmoon@gmail.com
Ordinary Member  Miss PANG Lok Tung  lokloknatalie2005@yahoo.com.hk
Ordinary Member  Miss Tammy LO Lok Yiu  lolokyiutammy@gmail.com
Ordinary Member  Mr Polo LO Chun Po  polo93901@gmail.com

School of Energy and Environment, City University of Hong Kong
HKIE Student Membership – Application Form

Section B DECLARATION AND AUTHORISATION

I agree that in the event of my election to the class of Student Member in The Hong Kong Institution of Engineers (HKIE), I will be governed by the prevailing Constitution and the Rules of Conduct of the Institution.

I declare that the information in this application is complete and correct.

I consent to the HKIE making any necessary enquiries for purposes relating to this application and for the verification of the information given in this application. I authorise all government departments and other organisations or agencies to release any record or information as may be required for these enquiries.

Signature of applicant

Date

Section C SUPPORTERS

I support this application and recommend this applicant to be elected as a Student Member of the HKIE.

Full Name

Ir Dr TSO Che Wah

FR0223131

Signature

N.B. Supporter MUST be a Corporate Member / Associate Member of the HKIE

Section D

Academic Qualifications completed or in progress

Enrolment Date month & year

Completion Date month & year

Academic Institution and Country

(Please specify College if applicable)

Course Reference No./Course Full Title

I am in common admission scheme; I will provide evidence on my major of study at a later stage.

City University of Hong Kong

B1031

Source: http://www.hkie.org.hk/docs/downloads/membership/forms/FORM1S.doc

School of Energy and Environment, City University of Hong Kong
Application for HKIE Student Membership

Instructions

- The application form (Form 1/S) should be completed in block letters. All sections should be filled.

- Evidence of the enrolment in relevant course should be provided, such as Student Registration Card or enrolment letter issued by the university or college.

- Applications which have not been properly completed will be returned for clarification.

An acknowledgement of receipt of your application together with your application number will be issued. This number should be quoted in all correspondence with the Institution.

Under normal circumstance, if the application is found to be in order, you will be notified of the result within 3 months.

If you have any queries, please contact the Membership Section at Tel No. 2890 2926.

Source: http://www.hkie.org.hk/docs/downloads/membership/forms/FORM1S.doc

Q & A

If you have any query or need further information, please contact Dr C W Tso, Adjunct Professor
(Tel: 3442 9490 or Email: chewtso@cityu.edu.hk)
Part B - Opportunities for Energy Engineering Graduates & Energy Engineers

Importance of Energy

Energy is required for the effective and efficient operation of our society - from provision of utilities (electricity, gas & water), communication to transport, schools to hospitals, offices to factories, homes to restaurants, military to national security.....

Energy is part of our lives more than ever before, and a key driver for human development and economic prosperity.
World Energy Consumption

Huge increase in world energy consumption has taken place in roughly the last 200 years. This rise in energy consumption is primarily from increased use of fossil fuel (coal, oil and gas).

On a per capita basis, there is a huge spurt of growth between World War II and 1970, and a new spurt in growth recently, as a result of growing energy usage in Asia.

Even with advances in efficiency and efforts in conservation, rising populations, urbanization and expanding economies will produce a net increase of 30% in global energy demand from 2010 to 2040.

Sources: (i) http://ourfineworld.com/2012/03/12/world-energy-consumption-since-1820-in-charts/ (ii) ExxonMboile – The outlook of Energy

Global Energy – Energy/Fuel Mix

87% Energy from fossil fuels (oil, coal and natural gas)

Air Pollution & Climate Change

Unabated human consumption of Energy are responsible for air pollution and climate change - Not only damages human health, natural environment and ecosystems, causes famine/poverty, etc. but threatens the survival of humankind. Finding technological solutions (Clean and sustainable energy) is urgently required to meet our energy needs.

Energy for Hong Kong

Hong Kong - Asia World City, an International Finance centre and service-based economy with a GDP of US$723 billion and US$37,910 per capita in 2013.

With an area of 1,104 km² (less than 25% developed) and a population of 7.187 million, most economic and social activities are conducted in high-rise commercial and residential buildings, and about 12.4 million passenger journeys are made daily by public transport.

Secured Energy Resources are essential to create a quality habitable environment inside the buildings (electricity/towngas/water) and power the public transport system (electricity/diesel/petrol/LPG).
Energy End-Use in Hong Kong

Year 2013
Cost of Imported Fuels: HK$118B

2012
Energy Consumed
287,970TJ
40.25GJ/capita
(111,800kWh/capita)

Source: Hong Kong Energy End-Use Data 2014

Hong Kong Fuel Supply, Pollution and Climate Change

But Hong Kong has no indigenous energy resources and has to import all primary fuels (oil, gas, coal, etc.) to meet its energy requirements needed to support its economic growth, but facing the pressing challenges of local air pollution and global warming leading to climate change.

Air pollution caused more than 3,000 premature deaths and monetary loss of HK$39 billion to Hong Kong in 2013, according to a study by University of Hong Kong researchers
The Objectives of Hong Kong Energy Policy are:

- to ensure that the energy needs of the community are met safely, reliably, efficiently and at reasonable prices; and
- to minimise the environmental impact of energy production and use and promote the efficient use and conservation of energy.

Hong Kong Energy Efficiency and Conservation Policy objective is to increase and sustain conservation of energy in order to reduce the growing trend of energy use.

Source: Environmental Bureau Website
Actions on Energy Eff. & Emissions Reductions (1/3)

In pursuit of Hong Kong Energy Policy Objectives, following International/regional Cooperation or Agreements, green & low carbon Initiatives, energy conservation and efficiency measures, etc. are in place but all require significant inputs of Energy Science and Engineering:

- **2007 Sydney Declaration on Climate Change and Energy (悉尼宣言-氣候變化與能源)** - HK is among the 21 APEC economies and has committed to working towards reducing energy intensity of at least **25%** by 2030, using 2005 as base year. This requires a wide range of initiatives on energy conservation & efficiency, covering electricity generation, built environment & transport.

- **2009 New Air Quality Objectives (新空氣質素指標) by 2020** – Setting out a package of 19 air quality improvement measures including supply side: fuel/energy mix and operation efficiency, demand side: energy efficiency/conservation, green building, green transport, etc.

Actions on Energy Eff. & Emissions Reductions (2/3)

- **2010 Climate Change Strategy and Action Agenda for the Coming Decades (應對氣候變化策略及行動綱領)** – Setting out a series of supply-side options (fuel/energy mix) and demand-side measures (energy conservation/efficiency) to reduce HK’s carbon intensity by **50% to 60%** in 2020, using 2005 as base year.

- **2011 Regional Cooperation Plan on Building a Quality Living Area (建設優質生活圈的地區合作規劃綱要)** – published in Sept 2011 by Governments of HK, Macau and Guangdong to transform the Greater Pearl River Delta region in a model city cluster of green, low carbon and quality living.

- **2012 Buildings Energy Efficiency (建築物能源效益) Ordinance Cap 610** - (i) A/C, lightings, lifts & escalators and electrical installations in buildings (newly built & existing with major retrofitting works) to comply with requirements of Building Energy Code, (ii) energy audits of aforesaid installations and (iii) certification by Registered Energy Assessors.
• 2012 The Hong Kong Green Building Council has set out its vision to provide a healthier environment for the people of Hong Kong by transforming the city to a greener built environment. Its flagship HK3030 campaign targets to reduce the electricity consumption of buildings by 30% of the 2005 level by 2030.

• 2014 Policy Address by the Chief Executive (行政長官施政報告) – To achieve new Air Quality Objectives (AQOs) by 2020, further promote green buildings; launch a public consultation on fuel mix for electricity generation: commence the review of the future framework for the electricity market.

• 2014 Future Fuel Mix for Electricity Generation (未來發電燃料組合) - Two Options proposed in the Consultation Document, viz. Option1: Grid Purchase and Option 2: Local Generation in 2013 aiming to improve local air quality and reduce carbon emissions/carbon footprint.
Global Carbon Emissions

2013 Share of Global Emissions
China: 22.95%
USA: 15.5%

Sources:
http://www.globalcarbonproject.org/carbonbudget/14/hi-full.htm

Energy & Carbon Reductions by Major Economies (1/2)

12 November 2014: Historic Agreement on Climate Change between the world’s two major energy consumers/top two carbon emitters (actions are part of the longer range effort to transition to low-carbon economies, mindful of the global temperature goal of 2°C).

**China** has agreed that its carbon dioxide emissions would peak by around 2030 and non-fossil fuels would generate 20% of its energy by the same dead line.


The **USA** has agreed to cut net greenhouse gas emissions to 26 -28% below 2005 level by 2025.


**Energy & Carbon Reductions by Major Economies (2/2)**

**European Union**

For **2020**, the EU has committed to cutting its emissions to **20%** below **1990** levels.

The EU has offered to increase its emissions reduction to **30%** by **2020** if other major emitting countries in the developed and developing worlds commit to undertake their fair share of a global emissions reduction effort.

In the Climate and Energy Policy Framework for **2030**, the European Commission proposes that the EU set itself a target of reducing carbon emissions to **40%** below 1990 levels by **2030**.

Source: EU Climate Action (http://ec.europa.eu/clima/policies/brief/eu/index_en.htm)

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**The End of Fossil Fuels in 2088?**

**Fossil fuel** reserves are finite. So does 2088 mark the point that we run out of fossil fuels? The simple answer is no. Some new reserves will be found which will help extend this deadline, but these can’t last forever.

Are new reserves of fossil fuels are becoming harder to find, and those that are being discovered are significantly smaller than the ones that have been found in the past?

**Can the recent rapid development in exploration of huge “Shale Gas” reserves help solving the energy scarcity issue?**

Source: https://www.ecotricity.co.uk/our-green-energy/energy-independence/the-end-of-fossil-fuels
Implementation of Sustainable Energy Policy & Emissions Reduction requires the ingenuity of **Professional Energy Engineers** to address energy scarcity, and to combat energy-induced pollutions and carbon emissions leading to climate change by:

- **developing** innovative energy systems and technologies that can produce clean, renewable and sustainable energy, enhance energy transformation/delivery/ utilization efficiency, and advance energy storage capability;

- **critically examining** various initiatives/measures that can conserve energy, improve energy efficiency and reduce energy consumption; and

- **deriving** practical solutions taking due consideration of safety, costs, benefits and sustainability.

**Workplaces for ESE Graduates/ Energy Engineers**

- Research & Development organizations institutes (science/innovative technology)
- Power (electricity supply) companies
- Oil, gas and bio-diesel industries
- Consultants/Suppliers (energy solutions)
- Energy Services Companies (ESCO)
- Energy/Carbon Audit services providers
- Real Estate Developer
- Property Management companies
- Financial Institutes with business in energy investments and/or loans
- Government Bureaux/Departments (energy policy and energy efficiency implementation & enforcement).
### Potential Employers for ESE Graduates/Energy Engineers

#### HKSAR Government (6)
- Architectural Services Dept
- Drainage Services Dept
- E & M Services Dept
- Environmental Protection Dept
- Housing Dept
- Water Supplies Dept

#### Statutory Bodies (5)
- Airport Authority
- HK Productivity Council
- HK Housing Society
- Hospital Authority
- West Kowloon Cultural District Authority

#### Public Utilities/Service (6)
- CLP Power HK
- Power Assets
- HK & China Gas
- MTRC Corporation
- Kowloon Motor Bus
- Citybus & NWFB

#### Private Sectors (49)
- AECOM Asia
- ATAL Engineering
- Cathay Pacific Airways
- Chevalier (Envirotech)
- China State Construction Engg Corp
- Chun Wo Construction & Engineering
- Daniel Chan & Associates
- Far East Consulting Engineers
- Gammon Construction
- Hip Hing Construction
- HK Jockey Club
- Honeywell Limited
- Hsin Chong Aster Building Services
- Hsin Chong Construction
- Hyder Consulting
- ISPL Consulting
- Jardine Engineering Corporation
- J.R. Roger Preston
- Johnson Controls HK
- Kai Shing Management Services
- Krueger Engineering (Asia)
- Lik Kai Engineering
- Majestic Engineering
- Meco Engineering

#### Private Sectors (49)
- MECS Consulting Engineers
- Meinhardt (M&E)
- Mott MacDonald HK
- Ove Arup & Partners HK
- P&T (M&E)
- Parsons Brinckerhoff (Asia)
- Paul Y. (E&M) Contractors
- REC Engineering Company
- Sanfield Building Contractors
- Shinryo (HK)
- Shui On Construction & Materials
- Shun Cheong Electrical Engg
- Shun Hing Engineering Contracting
- Southa Technical
- Swire Properties Management
- Takasago Thermal Engg (HK)
- Talent Mechanical & Electrical Engr
- The Jardine Corporation
- TJ Engineering Services
- Twin Way Consulting Engineers
- TYS
- Wong & Ouyang (Building Services)
- WSP HK
- Young’s Engineering

### Q & A