

NORWAY-SINGAPORE ENERGY WORKSHOP

NANYANG TECHNOLOGICAL UNIVERSITY, SINGAPORE,

FEBRUAR 19-22, 2017

Program draft as of December 14, 2016

BACKGROUND:

The Norwegian Energy Collaboratorium (NEC) is a “platform for innovative collaboration” between Norwegian and Singaporean companies, research institutions and universities engaged in the energy community in South-East Asia. NEC is an initiative by Innovation Norway (IN), the Research Council of Norway (RCN) and Energy Research Institute at Nanyang Technological University (ERI@N). This Norway-Singapore Energy Workshop is the kick-off event for NEC.

MOTIVATION AND OBJECTIVES:

Norwegian and Singaporean research institutions and universities have long lasting collaboration within the areas of maritime technologies, business management and to some extent energy areas. Over the last two years there has been an increased attention to enhance the collaboration into a wider range of energy related areas; electrification of transport, smart energy systems, energy storage, maritime energy, energy informatics etc. This was firmly confirmed by the state visit to Norway in October 2016, where 10 MoUs for research collaboration and student exchange was signed, including 4 explicitly within the energy domain.

At the same period, Norwegian companies have increased their interest towards the rapidly growing south-east Asian energy markets, with Singapore as their “base camp”. This include maritime and shipping companies looking at LNG/power solutions; offgrid/microgrid renewable energy solutions; maritime and lands-based green transport; in addition to enhancing more conventional hydropower and electricity grid projects.

Combining the growing interest for research collaboration with the increasing business opportunities is the foundation for establishing NEC and for kicking it off with this energy workshop at NTU.

THE OBJECTIVES FOR THE WORKSHOP ARE:

1. For the attending Norwegian and Singaporean research institutions to identify and establish areas for research cooperation. Clarification of research focus and approaches; joint research project opportunities; common goals and drivers.
2. For Norwegian and Singaporean companies to interact with the research groups to both gain insights into the state-of-the art research and technology advances; but also to influence the

research focus to support commercial interest. Identify and discuss project opportunities with company participation.

3. For the research funding organizations such as RCN, National Research Foundation and A*STAR to identify and discuss options for joint or bilateral funding of research projects and programs.
4. To facilitate discussions on trends, road maps, strategies for business opportunities in the wider Southeast Asian energy markets.

INVITED PARTICIPANTS:

From Norwegian side:

- Research institutes and universities with expressed interest for collaboration with Singapore: NTNU, Sintef/Marintek, Tel-Tek and University of Oslo.
- Research institutions, universities and clusters with interest to explore/expand collaboration with Singaporean R&D partners.
- Research Council of Norway, Innovation Norway, Embassy in Singapore.
- Innovation Norway offices in India, Thailand/Myanmar, Vietnam, Malaysia and Indonesia.
- Norwegian companies with energy related business interests in Southeast Asia.

From Singapore side:

- Research institutes and universities: NTU, NUS, A*STAR (..), BCA
- National Research Foundation
- Relevant companies and associations: IE Singapore, IPI (Spring, EDB, ..)

THEMATIC FOCUS – WORKGROUPS:

Based on expressed interests from participants, we propose to focus the workshop onto the following thematic areas and build workgroups around these:

- 1: Energy System Integration.**
This includes smart grids, smart systems, renewable energy integration, power system operation and balancing, electrification of transport, system wise energy storage etc. Energy informatics, demand response. Energy markets. More system and societal aspects than specific technologies. Thermal energy systems is be included in this section, to "match" the heat/cold side in the energy efficiency section.
- 2: Energy efficiency.**
Energy efficiency in industry, in services, in buildings and communities. Combination electricity and thermal energy. Storage and re-use of heat and cold etc.
- 3: Maritime energy.**
Clean maritime fuel, electrification of maritime transport, electrification of ships in harbor/ports. Ocean energy. Maritime LNG. Barge/FSRU based gas power generation.
- 4: Renewable energy technology.**
Solar/PV, Wind, geothermal, bioenergy. Integration of renewables. Local and system wide energy storage technologies.

PROGRAM

SUNDAY FEBRUARY 19TH.

Evening: Social gathering of Norwegian incoming delegation.

Venue: Norwegian Ambassador's residence

MONDAY FEBRUARY 20TH (@ NTU)

AM: PLENARY SESSION:

Opening addresses:

- Top management, Nanyang Technological University
- International director, Research Council of Norway
National Research Foundation
- Ambassador Tormod C. Endresen

Inauguration of Norwegian Energy Collaboratorium:

- Dr. Per Christer Lund, Director, NEC
- Dr. Subodh Mhaisalkar, executive director, ERI@N

Introduction of the participants:

- Presentations of the various research institutions, universities, companies and associations attending: introduction to their organization, special interests and focus, expectations and objectives for the workshop.

Lunch break

PM: RESEARCH PRESENTATIONS – PARALELL SESSIONS:

Work group 1: **Energy System Integration**

Work group 2: **Energy efficiency**

Work group 3: **Maritime energy**

Work group 4: **Renewable energy technology**

Networking dinner

TUESDAY FEBRUARY 21ST (@ NTU)

AM: RESEARCH PRESENTATIONS – PARALELL SESSIONS (CONTD)

- Work group 1: **Energy System Integration**
- Work group 2: **Energy efficiency**
- Work group 3: **Maritime energy**
- Work group 4: **Renewable energy technology**

Networking Lunch

PM: LABORATORY TOURS.

Social gathering/dinner (TBD)

WEDNESDAY FEBRUARY 22ST (@ NTU)

AM PLENARY SESSION:

Funding and financing:

- Research Council of Norway
- NRF/A*STAR
- Project funding through EU, international banks..

Business opportunities in the SEA energy markets:

- Reps., from IN offices in SEA
- Asian Development Bank, director Joar Strand
- IE Singapore/IPI/EDB..

Presentations from the work groups:

- Work group 1: **Energy System Integration**
- Work group 2: **Energy efficiency**
- Work group 3: **Maritime energy**
- Work group 4: **Renewable energy technology**

Open discussions - conclusions – way forward

- ERI@N: Dr. Sanjay Kuttan, Program Director
- NEC: Per Christer Lund, NEC

Lunch – end of Workshop.