JRC SJTU – NTNU Meeting Minutes
Energy in Buildings Group

Time & Location:

•Shanghai, 22 – 23 Janunary 2015

•Green Energy Laboratoy

Energy in Building Experts:

•SJTU: Ruzhu WANG, Yanjun DAI, Yong LI, Xiaoqiang ZHAI, Tianshu GE
Jinfeng CHEN, Rui LI, Chengyang JIANG

•NTNU: Annemie WYCKMANS , Vojislav NOVAKOVIC, Rolf André BOHNE
Laurent GEORGES, Arild GUSTAVSEN, Gabriele LOBACCARO, Yu WANG

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Programme Thursday 22 January 2015

Time	Title	Name	Room
10:30	Research activities in GEL: Renewable Energy and high efficiency building energy systems.	Yong Li Associate Prof.	GEL meeting room
11:00	Zero Emission Building Lab in NTNU	Arild Gustavsen Prof.	GEL meeting room
11:30-13:00	Lunch		Campus Coffee
13:00-13:45	GEL visiting	Yanjun DAI, Prof.	GEL meeting room
13:45-14:00	Coffee break		A3
14:00-15:00	Group meeting - Plans for students issue: results of students exchange, and plans for Double Degree - Plans for the coming period according to the agenda: scientific exchange, and co-publications - Results of PhD cooperation, and future plans	Building energy members	
15:00-17:00	Planning and preparation of the Summer Course - Experiences & examples of simulation exercises with students in Sustainable Architecture - Experts in Team: Powerhouse 2014 and 2015 - Key Performance Indicators for Smart Energy Communities; using Shanghai neighbourhood cases - Scope, assignments and activities	ALL Laurent Georges & Gabriele Lobaccaro Rolf André Bohne Annemie Wyckmans	GEL meeting room

Programme Friday 23 January 2015

Time	Title	Name	Room
9:00-9:15	Heating and cooling by air-source heat pump using low temperature fan coils	Xiaoqiang Zhai Associate Prof.	GEL meeting room
9:15-9:30	Salvatore Carlucci, a new professor on Building Performance Simulations. E39, a 1100 km corridor for mobility in western Norway. Research opportunities on sustainability and renewable energy production. Klima 2050, a 200 mill NOK research project on Climate adaptation of Buildings & Infrastructure	Rolf André Bohne Associate Prof	
9:30-9:45	PV/T testing and performance analysis	Jinfeng Chen, PhD cand.	
9:45~ 10:00	Urban Heat Island mitigation in urban communities in Bilbao, Spain: modelling and design guidelines Solar Energy in Urban Areas: a Trondheim case study	Gabriele Lobaccaro Postdoctoral cand	
10:00-10:15	Performance of Solar curtain wall	Rui Li , PhD cand.	
10:15-10:30	Coffee Break		
10:30~10:45	Urban Energy Resilience	Yu Wang PhD cand	
10:45~11:00	A novel all glass heat pipe collector	Chengyang Jiang	
11:00-12:00	Group meeting - Plans for the new collaboration topics: Zero Emission Neighbourhoods (Prof GUSTAVSEN) - New research projects and staff (Assoc Prof BOHNE) - Summary	Building energy members	

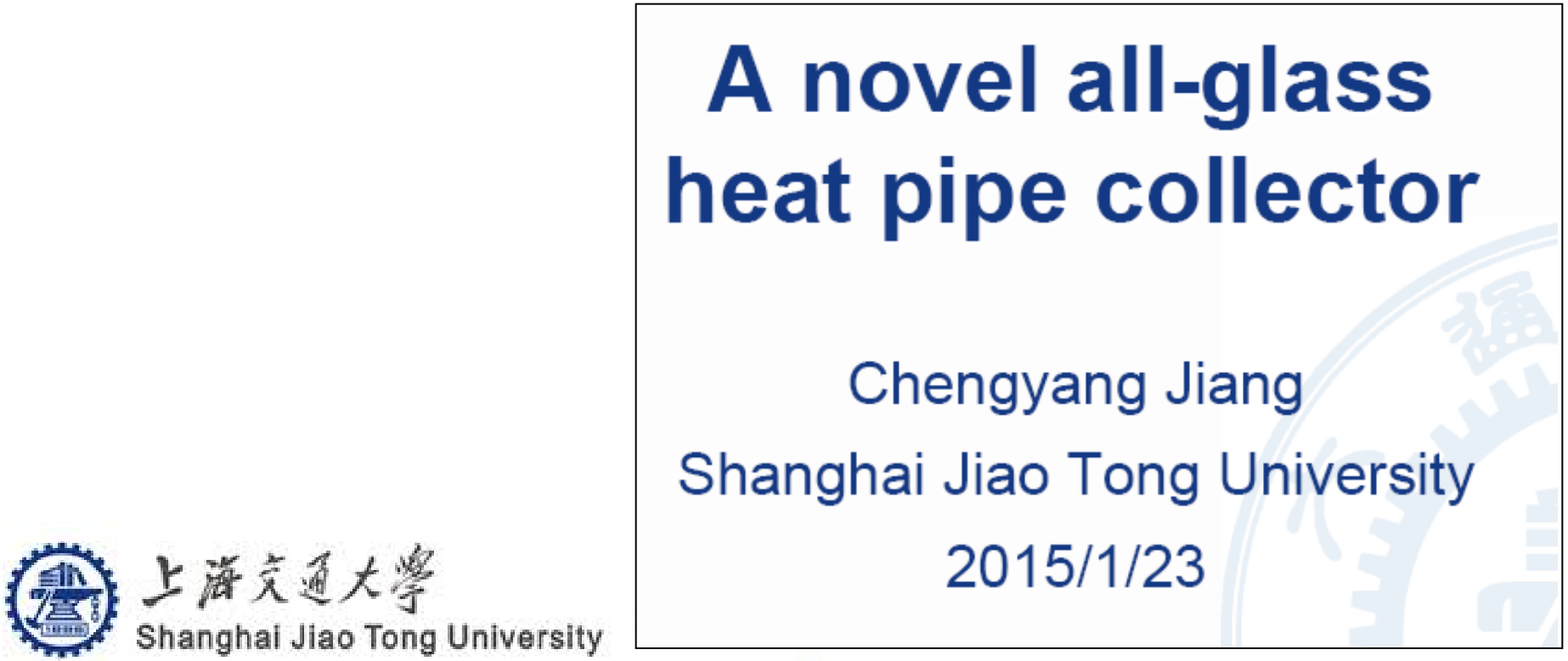
Double Degree in Sustainable Energy Use in Buildings / Zero emission buildings

Sustainable Energy Use in Buildings				
Semester	7.5 ETCS	7.5 ETCS	7.5 ETCS	7.5 ETCS
4th	Compulsory course: TEP4910 - Energy and Indoor Environment, Master Thesis (30 ECTS)			
3rd	Compulsory course: TEP4535 Energy and Indoor Environment, Specialization Course	Compulsory course: TEP4530 Energy and Indoor Environment, Specialization Project (15 ECTS)		Eligible courses: KULT2207 [1)] Gender and Norwegian Culture: Paradoxes of Equality I TEP4180 Experimental Methods in Process Engineering TEP4223 Life Cycle Assessment
2nd	Compulsory course: TEP4245 Building Environmental Design and Engineering	Compulsory course: TEP4260 Heat Pumps for Heating and Cooling of Buildings	Compulsory course: Experts in Teamwork	Eligible courses: TEP4220 Energy and environmental consequences TEP4130 Heat and Mass Transfer TET4170 Electrical Installations AAR4935 Light
1st	Compulsory course: TEP4235 Energy Management in Buildings	Eligible courses: TEP4180 Experimental Methods in Process Engineering TEP4240 System simulation	Eligible courses: TEP4223 Life Cycle Assessment TET4115 Power System Analysis	Eligible courses: TEP4165 Numerical heat and flow engineering TET4165 Light and Lighting

Master Project

Recruitment:

•Chenyang JIANG (SJTU, Autumn 2015 will be involved in double master degree)



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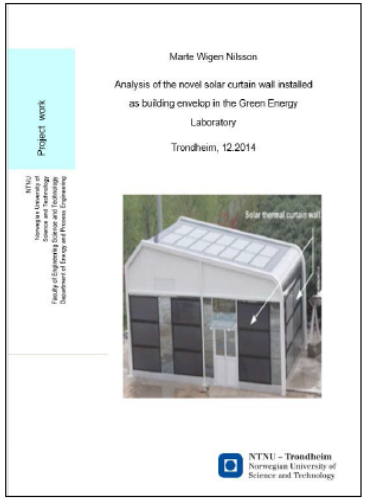
Student exchange

Autumn 2014 (from NTNU to SJTU): Marte Wigen Nilsson & Ludvig Nielsen

Project work- Marte Wigen Nilsson

Autumn 2014

- *«Analysis of the novel solar heating wall installed as building envelop in the Green Energy Laboratory»*
- Preparatory work for the master thesis that is to be conducted at the Green Energy Laboratory spring 2015



MASTER THESIS:

Analysis of the radiant heating and cooling system in the Green Energy Laboratory

Autumn 2014

Ludvig Nielsen

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PhD/Postdoc Projects

Recruitment:

- NTNU:
  - Clara GOOD (JRC funding)
  - Gabriele LOBACCARO (NTNU funding, Postdoctoral researcher Smart Cities / Solar Energy)
- SJTU:
  - Jinfeng CHEN (Master + PhD) Solar cooling in buildings
  - Rui Li (Master + PhD) Envelope of solar house

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PhD Projects

Recruitment:

•Jinfeng CHEN (SJTU, Autumn 2013),

Recruitment:

•Rui LI (SJTU, Autumn 2011),

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Joint Publications

Jinfeng Chen, Yanjun Dai, Clara Good, Annemie Wyckmans [C], Experimental and theoretical study on solar assisted CO2 heat pump for space heating, International Conference on Solar Heating and Cooling for Buildings and Industry, SHC, Beijing, 2014

Jinfeng Chen, Yanjun Dai, Clara Good, Annemie Wyckmans [J]， Experimental and theoretical study on solar assisted CO2 heat pump for space heating, Renewable energy （under review）

Clara Good, Jinfeng Chen, Yanjun Dai, Anne Grete Hestnes [C], Hybrid photovoltaic-thermal systems in buildings – a review， International Conference on Solar Heating and Cooling for Buildings and Industry, SHC, Beijing, 2014

Clara Good, Jinfeng Chen, Yanjun Dai, Anne Grete Hestnes [J], Hybrid photovoltaic-thermal systems in buildings – a review， Energy Procedia (accepted)

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New Cooperation Possibilities: SJTU Green Energy Lab & ZEB Living Lab / Test Cell

Development, research and testing of Building Integrated Solar Systems

- NTNU: Building Physics (climate robustness – e.g. frost and rain)
- SJTU: Component Performance

New cooperation possibilities: Zero Emission Smart Neighbourhoods

New Centre application on Zero Emission Smart Neighborhoods (ZEN)

- Formalized international collaboration is needed (which we have); A letter of intent from SJTU would be beneficial for the ZEN application
- ZEN can allocate funds for common workshops, and support research stays at NTNU and SJTU employees
  - PhD on similar topics at NTNU and SJTU
  - Would be good to have specific areas where collaboration will happen
  - Zero Emission Neighborhood Cases (work together on cases in e.g. Trondheim/Shanghai)
- NTNU: Building envelope and LCA, SJTU: Energy Supply and HVAC Components
  - Component development (e.g. also connect with industry partners in China)
  - Energy supply (HP, CHP, Solar Systems)

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New cooperation Possibilities: Renewable Energy Utilisation & Production

Renewable energy production

- Climate
- Location
- Area
- Traffic

Research topics and relationships

Thermal comfort
Improvement of adaptive models
Long-term discomfort indices
Set explicit design requirements

Visual comfort
Short-term comfort indices
Long-term discomfort indices
Set explicit design requirements

Optimization
Advanced & customized design
Versatile & powerful technique

Comfortable NZEBs
Definition & requirements
Grid interaction/load match
Cost-optimality

Post-Occupancy Evaluation
Calculated vs. real performance
Occupant's adaptation
People's feedback & feedforward

Building simulation
Stochastic analysis/Robustness
Accuracy existing physical models
Add calculation of new indices

Experimental investigation
Model validation
Performance testing
User feedbacks & POE

IMPACT on
Professional practice
Teaching
Society

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New cooperation Possibilities: Urban Energy Resilience

2011 Thailand Flood is "the worst flooding yet in terms of the amount of water and people affected."

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Summer Course SJTU – NTNU 2015
Sustainable Energy in Cities (SEniC)

The Summer School will allow students to gain a cross-cultural and interdisciplinary perspective on sustainable energy, in particular on smart sustainable cities

Asian and Nordic perspectives on e.g.

- Integrated Energy Solutions: Design, Simulation & Practice
- Other?

To contribute to smarter, energy-efficient, sustainable cities with high quality of life, using Shanghai as a case

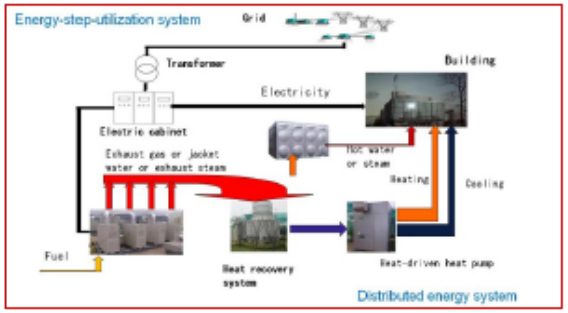
- Horizontal cooperation across all SJTU-NTNU Sustainable Energy groups
- Links to strategic development of EU – China cooperation (incl Norway)
- Inclusion of other schools (EERA Joint Programme Smart Cities etc)
- Chinese funding related to Sustainable Development

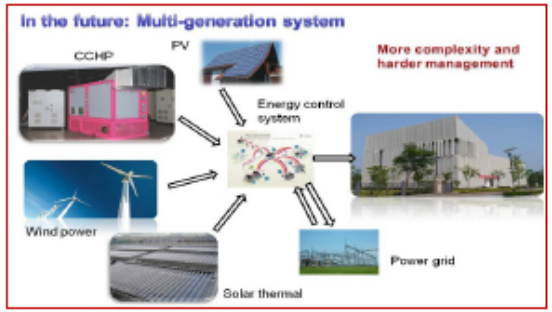
Summer Course SJTU – NTNU 2015
Sustainable Energy in Cities (SEniC)

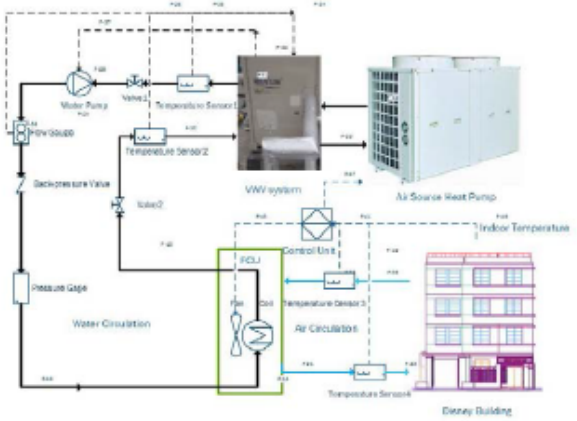
Cooperation between Shanghai Jiao Tong University and Disney Shanghai Research Center

Energy utilization in buildings:

- CCHP research and evaluation.
- Low temperature difference air conditioning terminal.
- Air-source heat pump system in the lab of Disney Shanghai.
- Ground source heat pump and its effect on climate and green land.







Summer Course SJTU – NTNU 2015
Sustainable Energy in Cities (SEniC)

Integrated Energy Solutions: Design, Simulation & Practice:
(Right) Solar Energy Potential of Buildings in Urban Areas
(Left) HVAC analysis and Building Performance Simulation

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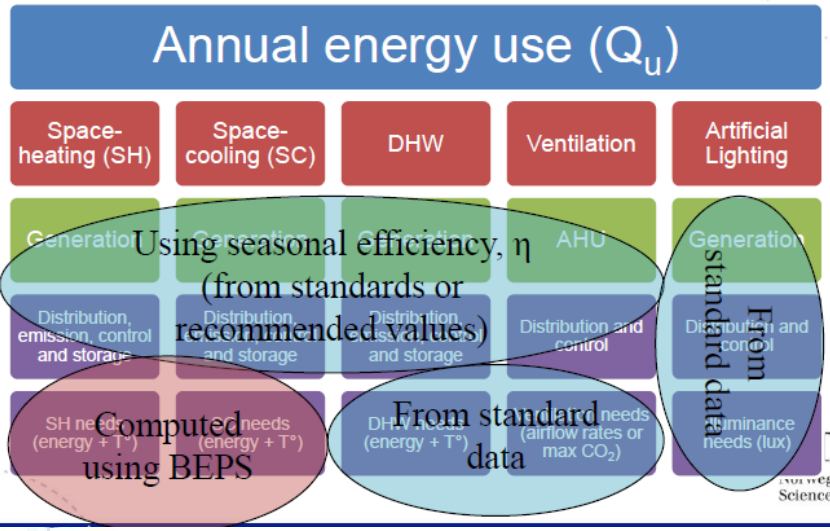
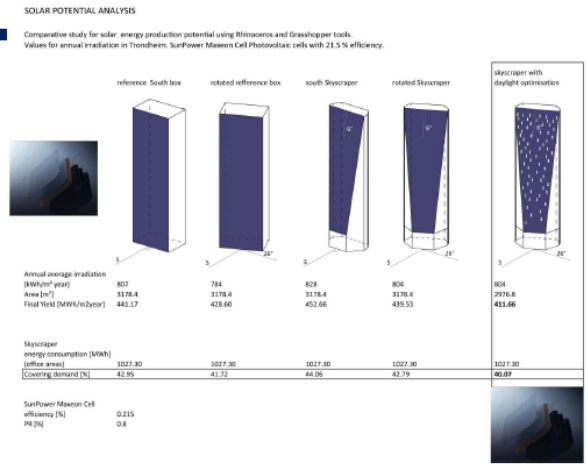
Simplified evaluation of the energy use (1)

- More compatible with the data available during the early-stage design phase
- Given the background of students



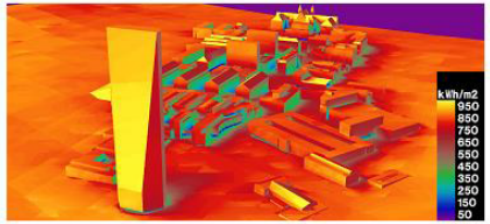
Aims

- Determine the ***solar potential for integrated photovoltaic façade***
- **BiPV** as strategy for both, ***produce energy and avoid thermal gains***.
- ***Optimized orientation*** of the South Façade



Concepts and study

- Study of performance simulation ***PiXEL*** facade and ***Daylight***



Summer Course SJTU – NTNU 2015
Sustainable Energy in Cities (SEniC)

2-3 weeks intensive Summer School

Kick-off activities

- students and teaching staff get to know each other
- clarify intended learning outcomes and expectations regarding participation, outcomes and ambitions

Timeline

- 9h – 12h: Plenary presentations and discussions
- After 13h: “Experts in Team” student group work on Shanghai case study

Excursion

- 1 weekend excursion to a location outside of Shanghai

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