

**Part 1:** Skibbrogade 5 Room C1/12, Aalborg. Mornings from 8:30 to 12 - afternoons 12:30 to 16.

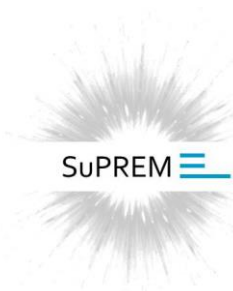
Monday April 11 <sup>th</sup> Present: PAØ + BVM	Tuesday April 12 <sup>th</sup> Present: PAØ + BVM	Wednesday April 13 <sup>th</sup> Present: HL + PAØ
<p><b>Introduction to EnergyPLAN</b></p> <ul style="list-style-type: none"> <li>Welcome and programme (10m PAØ)</li> <li><i>Introduction to Energy System Analysis</i> (45m PAØ)</li> <li>Participants present PhD projects and suggestions for integrating energy system analysis</li> </ul>	<p><b>Case presentation:</b></p> <ul style="list-style-type: none"> <li>Aalborg Energy Vision (1h PAØ)</li> </ul> <p><b>Remainder of day allocated for independent analyses</b>  <i>Lecturers will be available though not necessarily present in the seminar room</i></p> <p><b>18.00: Work shop dinner</b>  <i>Workshop dinner at a restaurant in the city centre. Individual payment</i></p>	<p><b>Modelling high-RES systems</b></p> <ul style="list-style-type: none"> <li>Energy systems analyses: Simulation vs optimisation (1h HL)</li> <li>Optimisation Criteria in high RE systems (70m PAØ)</li> <li><i>Workshop:</i> Work on individual analyses</li> </ul>
<ul style="list-style-type: none"> <li><i>Technical energy system analyses and electricity market exchange analyses</i> (60m BVM)</li> <li><i>Smart Energy Systems- Integrating electricity, heat and transport systems</i> (15 BVM)</li> <li><i>Workshop:</i> Work on individual analyses</li> </ul>		<p><b>Role of systems analyses:</b></p> <ul style="list-style-type: none"> <li><i>Workshop:</i> Work on individual analyses</li> </ul>

**Part 2:** Skibbrogade 5 Room C1/12, Aalborg. Mornings from 8:30 to 12 - afternoon 12:30 to 16.

Monday April 25 <sup>th</sup> Present: DC	Tuesday April 26 <sup>th</sup> Present: HL + DC	Wednesday April 27 <sup>th</sup> Present: PAØ
	<p><b>Participant presentations:</b>                      Presentation of analyses and results followed by questions. 20 minutes pp</p>	<p><b>Participant presentations:</b></p> <p>- continued</p>
<p><b>Empirical cases:</b></p> <ul style="list-style-type: none"> <li>Heat Roadmap Europe, (1h DC)</li> <li>Smart Energy Europe (1h DC)</li> <li><i>Workshop:</i> Work on individual analyses</li> </ul>	<p><b>Guest lectures:</b></p> <ul style="list-style-type: none"> <li>Long-term modelling and analyses of the Danish TSO, Niels Træholt Franck, Energinet.dk</li> <li>Transmission or storage; analyses on a European Scale, Gorm Andresen, Aarhus University</li> </ul>	<p><b>Feedback on the course</b></p>

PAØ	Poul Alberg Østergaard	BVM	Brian Vad Mathiesen
HL	Henrik Lund	DC	David Connolly

The PhD. Course is organised in collaboration with the SuPREME, 4DH, Cities, and HRE projects



## Practicalities

Time	Mornings from 8:30 to 12 - afternoons 12:30 to 16.
Place	Room C1/12, Skibbrogade 5, 9000 Aalborg
Meals	Lunch is not included. A student canteen in a neighbouring building may be used. Coffee and tea will be served

## Preparations prior to the course

1. Install EnergyPLAN from [energyplan.eu](http://energyplan.eu)
2. Consider how you wish to use EnergyPLAN – preferably in your Ph.D. project – alternatively in independent analyses only made for the Ph.D. course (notice that agenda for the first morning – third bullet-point)
3. Read the FIDE guide (Finding and inputting data to EnergyPLAN) from [energyplan.eu](http://energyplan.eu) and consider what data you will need to do 2.
4. There are a number of training exercises at [energyplan.eu](http://energyplan.eu) You are strongly encouraged / expected to do these beforehand as this will enable you to make more advanced independent analyses during the actual course
5. Read the articles
  - a. Reviewing EnergyPLAN simulations and performance indicator applications in EnergyPLAN simulations - <http://dx.doi.org/10.1016/j.apenergy.2015.05.086>
  - b. Reviewing optimisation criteria for energy systems analyses of renewable energy integration <http://dx.doi.org/10.1016/j.energy.2009.05.004>
  - c. Heat Roadmap Europe: Combining district heating with heat savings to decarbonise the EU energy system, <http://dx.doi.org/10.1016/j.enpol.2013.10.035>
  - d. A renewable energy scenario for Aalborg Municipality based on low-temperature geothermal heat, wind power and biomass, <http://dx.doi.org/10.1016/j.energy.2010.08.041>
  - e. Smart Energy Systems for coherent 100% renewable energy and transport solutions, <http://dx.doi.org/10.1016/j.apenergy.2015.01.075>
  - f.