

3rd Blended Mobility



Spijkenisse, The Netherlands 5-9 December 2016

NZEB for Enhancing STEM skills and motivating Students

2015-1-IT02-KA219-015139_1

Activities Program

Sunday, 4 December

Arrivals.

Bulgaria: 09:00 at Schiphol Airport
Romania: 10:00 at Schiphol Airport
Turkey: 13:30 at Schiphol Airport
Denmark: 13:35 at Schiphol Airport
Finland: 15:35 at Schiphol Airport
Italy: 22:55 at Rotterdam Airport

Take the train from Schiphol Airport to Rotterdam Centraal. Jan Chris and/or Hilgo will meet you at the trainstation of Rotterdam Centraal and join your walk or tram ride to the hostel (Italy will go by own transport to the hostel).

19h30 Dinner at restaurant *Very Italian Pizza at Blaak 31, Rotterdam*

Monday, 5 December

07:32-08:01 At metrostation Blaak take Metro C in the direction Akkers with Edwin and get off at metrostation Spijkenisse Centrum (Bulgaria 07:34 at metrostation Beurs).

08.30-09:20 Welcoming ceremony and short presentation about a NZEB school in Otta, Norway by miss *M. Håskjold Eide* in the auditorium.

Pupils and teachers will be welcomed by our headmaster and introduced to the program of the week. The pupils will be told that at the end of the week they have to write an official letter to our headmaster with their recommendations for making our schoolbuilding NZEB.

09:20-11:00 Ice-breaking activities in the classrooms.

classroom	group	classroom	group	classroom	group
T11	blue	T13	yellow	T15	orange
T12	green	T14	red	T16	purple

11:00-11:30 BREAK



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11:30-13:10 Fushion Road Show by mister dr. R.J.E. Jaspers of the Eindhoven University of Technology in the auditorium.

The show starts with a short film of three minutes, which immediately sets the tone of the show: an impressive story about the power of today and tomorrow. Then the energy is introduced: this century are scarce fossil fuel products. We already use worldwide 13 billion gallons of oil a day! And in 2100, the global demand for energy even four times greater. There must be a quick answer on found by tapping into renewable energy sources. During the show will be an experiment strongly put down that oil is a highly efficient energy source and there is a lot of need to compensate for this energy with other renewable energy sources.

Then the show zooms in on nuclear fusion as one of the possible alternatives. The energy of the sun and stars has enormous potential as a future energy source fuel from seawater. The show explains what fusion energy, how it works and how we recreate the sun on earth. The problems which scientists call are then brought very low threshold step into the limelight with beautiful experiments on stage.

The show ends with the message that by mid-2050 will deliver the first commercial fusion reactor power to the grid. The odds of fusion energy are underlined with a sharp comparison between oil and nuclear fusion.

13:10-13:40 BREAK

13:40-15:20 Problem-based learning in the classrooms.

The pupils make assignments in international groups inspired by the Fushion Road Show.

classroom	group	classroom	group	classroom	group
T11	blue	T13	yellow	T15	orange
T12	green	T14	red	T16	purple

15:20-16:10 Introduction to the experiments and excursions on Tuesday and Wednesday in the auditorium.

FREE EVENING

Tuesday, 6 December

07:32-08:01 At metrostation Blaak take Metro C in the direction Akkers with Edwin and get off at metrostation Spijkenisse Centrum (Bulgaria 07:34 at metrostation Beurs).

Teachers and pupils will be split in two groups. At Tuesday half of the group will go on an excursion and half of the group will do physics experiments at school. At Wednesday it will be the other way around.

At school the group will be split in four subgroups. Every 100 minutes the subgroups will go to another classroom with different physics experiments about, for example, solar panel efficiency, wind turbine efficiency, thermal conductivity and measuring with a FLIR camera and pyranometer. In one classroom *students of the Delft University of Technology* will challenge the subgroups to design an energy island in the North Sea:

Wind is erratic and unpredictable, wind turbines can't always be used optimally. Power plants should have enough power in low wind conditions. The storage of wind power can ensure that there are less power plants required. Wind energy could be stored on a large scale in a "reverse dam reservoir", For example, with an island in the North Sea. The excess of wind energy is then stored and when there is no wind this energy can be used. Pupils study problems in the realization of an inverted dam reservoir. The revenues are a significant part of the problem, but there are different stakeholders.



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Group 1-9 in bus 1:

- 08:15** Departure by bus to *Futureland* at the harbor of Rotterdam.
- 09:00-10:00** Tour by bus through the sustainable harbor of Rotterdam.
- 10:00-12:00** Visit exhibitions about the sustainable harbor of Rotterdam in *Futureland*.
Pupils will get an audiotour which will bring them through the exhibitions and will make assignments in groups.
- 12.15** Departure by bus to *the Amercentrale of Essent* at Geertruidenberg.
- 13.30-16:00** Presentation about *the Amercentrale* and guided tour around the power plant.
- 17:00** Arrival at school by bus.

Group 10-18 in bus 2:

- 08:15** Departure by bus to *the Amercentrale of Essent* at Geertruidenberg.
- 09:30-12:00** Presentation about *the Amercentrale* and guided tour around the power plant.
- 12.15** Departure by bus to *Futureland* at the harbor of Rotterdam.
- 13.30-14:30** Tour by bus through the sustainable harbor of Rotterdam.
- 14:30-16:30** Visit exhibitions about the sustainable harbor of Rotterdam in *Futureland*.
Pupils will get an audiotour which will bring them through the exhibitions and will make assignments in groups.
- 17:00** Arrival at school by bus.
Pupils can bring their own smartphone and headset to Futureland. They can use this as an audio guide in the exhibition. Bring your ID or passport to the Amercentrale.

Group 19-35 physics experiments and workshop energy Island:

	classroom W11	classroom w12	classroom w16	classroom W17
08:30-10:10	group 19-23	group 24-27	group 28-31	group 32-35
10:10-12:20	group 32-35	group 19-23	group 24-27	group 28-31
12:20-14:30	group 28-31	group 32-35	group 19-23	group 24-27
14:30-16:10	group 24-27	group 28-31	group 32-35	group 19-23

FREE EVENING

Wednesday, 7 December

- 07:32-08:01** At metrostation Blaak take Metro C in the direction Akkers with Hilgo and get off at metrostation Spijkensisse Centrum (Bulgaria 07:34 at metrostation Beurs).



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Group 19-27 in bus 1:

- 08:15** Departure by bus to *Futureland* at the harbor of Rotterdam.
- 09:00-10:00** Tour by bus through the sustainable harbor of Rotterdam.
- 10:00-12:00** Visit exhibitions about the sustainable harbor of Rotterdam in *Futureland*.
Pupils will get an audiotour which will bring them through the exhibitions and will make assignments in groups.
- 12.15** Departure by bus to *the Amercentrale of Essent* at Geertruidenberg.
- 13.30-16:00** Presentation about *the Amercentrale* and guided tour around the power plant.
- 17:00** Arrival at school by bus.

Group 27-35 in bus 2:

- 08:15** Departure by bus to *the Amercentrale of Essent* at Geertruidenberg.
- 09:30-12:00** Presentation about *the Amercentrale* and guided tour around the power plant.
- 12.15** Departure by bus to *Futureland* at the harbor of Rotterdam.
- 13.30-14:30** Tour by bus through the sustainable harbor of Rotterdam.
- 14:30-16:30** Visit exhibitions about the sustainable harbor of Rotterdam in *Futureland*.
Pupils will get an audiotour which will bring them through the exhibitions and will make assignments in groups.
- 17:00** Arrival at school by bus.
Pupils can bring their own smartphone and headset to Futureland. They can use this as an audio guide in the exhibition. **Bring your ID or passport to the Amercentrale.**

Group 19-35 physics experiments and workshop energy island:

	classroom W11	classroom w12	classroom w16	classroom W17
08:30-10:10	group 1-5	group 6-9	group 10-14	group 15-18
10:10-12:20	group 15-18	group 1-5	group 6-9	group 10-14
12:20-14:30	group 10-14	group 15-18	group 1-5	group 6-9
14:30-16:10	group 6-9	group 10-14	group 15-18	group 1-5

FREE EVENING



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Thursday, 8th November



07:32-08:01 At metrostation Blaak take Metro C in the direction Akkers with Edwin and get off at metrostation Spijkennis Centrum (Bulgaria 07:34 at metrostation Beurs).

08:30-09:30 Lecture: The sun as an energy source by mister N. Fennet of Leiden University in the auditorium.

The sun is the source of all energy on Earth. Even the so-called fossil fuels, oil, gas and coal, which are the result of long-decayed plants. For a sustainable energy supply in the future we will need to use the sun more efficiently. The best known way to do that is through the solar cell.

In a solar cell, light is converted into an electric current. More precisely, incident photons generate a flow of electrons. In this lecture we will explain first what exactly light. What is the difference between blue and red light? What is a photon (light particle)? Then we talk about the material from which solar cells are made. These are so-called. Semiconductors, often silicon. The electrons in a semiconductor "stuck" in a low energy state (or band). An incident photon of sufficient energy, can strike an electron and do jump into a higher state (band). If the solar cell is well built, this electron can flow through the semiconductor to the electrical circuit. If each incident photon would lead to such a stream, the cell would be more than efficient. However, the efficiency of practical solar cells is lower (max. 25%). We explain why and how we can work better and cheaper solar cells.

09:30-11:00 Problem-based learning in the classrooms.

The pupils make assignments in international groups inspired by the lecture about the sun as an energy source.

classroom	group	classroom	group	classroom	group
T11	blue	T13	yellow	T15	orange
T12	green	T14	red	T16	purple

11:00-11:30 BREAK

11:30-13:10 Lecture: Energy from wind by mister dr. ir. W. van de Water of Eindhoven University of Technology in the auditorium.

The wind blows not for nothing, in this wind is an enormous amount of energy. It is very easy to calculate how much energy that is. That energy we try to get out of the wind with a wind turbine. We discover that this is never going to work 100%. This is the consequence of the second law of thermodynamics (thermodynamics, the theory of energy). This is a "sorry" law, the law says that there is always something lost, and that the return can never be 100%. We discover that a wind turbine everything fly related to: the wings are wings, and the noise that makes the turbine has everything to do with the white stripes that we see on a sunny day with blue sky.

Dutch pupils have to bring their graphing calculators to do some calculations during the lecture, in duo's with a foreign pupil.

13:10-13:40 BREAK

13:40-16:10 Data-processing in the classrooms.

The pupils do data-processing, make diagrams, tables etc. of the data they collected during the physics experiments at Tuesday and Wednesday. They can use this data in their recommendation letter to the headmaster.



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(If possible bring your own laptop to school, groups with their own laptop are going to classroom W11, W12, W14 or W16, the groups without own laptop are going to classroom M1 or Z5).

FREE EVENING

Friday, 9 December

07:32-08:01 At metrostation Blaak take Metro C in the direction Akkers with Edwin and get off at metrostation Spijkenisse Centrum (Bulgaria 07:34 at metrostation Beurs).

08:30-09:30 Lecture: The future of building; the passive house concept. The first step to a Nearly Zero energy building by *dr. ir. B. Hasselaar of SBRCURnet, Delft* in the auditorium.

Homes that remain almost naturally cool in summer and naturally warm in winter. It seems too good to be true, but it can. Passive houses are not only thermally comfortable, but also have a very good indoor air quality and low energy consumption. All without the aid of complex systems, which explains the term 'passive'.

09:30-11:00 Problem-based learning in the classrooms.

The pupils make assignments in international groups inspired by the lecture about the passive house concept.

classroom	group	classroom	group	classroom	group
T11	blue	T13	yellow	T15	orange
T12	green	T14	red	T16	purple

11:00-11:30 BREAK

11:30-14:00 Writing recommendations in the classrooms.

The pupils write an official letter to our headmaster with recommendations to become a NZEB school. They have to use all the knowledge they gathered during the lectures, problem-based learning, experiments, excursions and data processing this week. It is necessary to make use of attachments with diagrams and tables (made on Thursday afternoon) in order to support the statements written in the official letter. The letters will be uploaded on Twinspace. (Possible: peer-reviewing in the week after the exchange). Some of the pupils in the group focus on making a powerpoint presentation, during writing the letter, with a summary of the recommendations.

(If possible bring your own laptop to school, groups with their own laptop are going to classroom W11, W12 or W16, the groups without own laptop are going to classroom M1, O18 or Z5).

14:00-14:30 BREAK

14:30-15:20 Powerpoint presentations of recommendations in the classrooms.

classroom	group	classroom	group	classroom	group
T11	blue	T13	yellow	T15	orange
T12	green	T14	red	T16	purple

Teachers have a meeting to evaluate the week.



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15:20-16:10 Pupil evaluation and final session in the auditorium.

17:00-19:30 Dinner altogether at restaurant Pak Boli in Spijkenisse.

20:00-00:00 Jingle ball party at school.

Teachers and pupils will gather at school, party and get the opportunity to say goodbye. **Bring your entrance tickets and ID/passport.**

00:14-00:42 At metrostation Spijkenisse Centrum take metro C to De Terp (last metro C goes at 00:25-00:53)

Saturday, 10 December

Departures.

Stakeholders:



Universiteit Leiden

TU/e Technische Universiteit
Eindhoven
University of Technology

TU Delft Delft
University of
Technology



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