IEA DSM Task 24
Behaviour Change in Demand-Side Management

Task 24 Phase 2: Helping the Behaviour Changers
Status Report Netherlands - Annexes

Annexes

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Content

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ANNEX A – Overview of Task 24

Task 24 is aimed at improving demand-side management and sustainable energy use by influencing human behaviour. During Phase 1 (2012-2015), the teams in the different participating countries focussed on translating theory into practice. They built a network of >250 behaviour change experts who made an inventory of available theories, models and approaches and gathered over 60 practical examples and case studies from 20+ countries.

Main lessons learned from Phase 1:

- There are a variety of applicable theories and models that are currently underutilised when designing behavioural interventions. There is much to be gained by using combinations of approaches, and moving from mostly technocratic to more 'human' perspectives including facilitating multi-stakeholder collaborations;
- Many of the collected stories and case studies showed a lack of in-depth understanding and a clear need of further research and tools;
- Most countries had not clearly identified the top DSM issues for further research, or failed to include all relevant stakeholders in the selection process;.
- There were some top DSM issues in each country where the theory from Phase 1 could be turned into best practice in Phase 2.

In 2015, Task 24 continued with a new Phase 2 based on these insights. The national teams selected their countries' top-priority areas in DSM. This selection of top areas was performed with the IEA DSM Executive Committee of each participating country, the appointed National Experts and other country experts (*Behaviour Changers*). In the Netherlands, this also drew on an already-performed stakeholder analysis. The DSM priorities differed between countries, as did their (technical, economic, political and societal) potentials and risks due to different national contexts. These country differences will be highlighted in Subtask 10 (overall story), where possible.

After having identified the top priority areas for energy efficiency within a country, one area was selected for further research in detail. Once the top areas were selected for further analysis in each country, the national teams brought all relevant Behaviour Changers together to explore the key issues hindering the uptake of DSM in the current system (Subtask 7). Once the key systemic issues were explored in facilitated multi-stakeholder workshops, we could engage the relevant Behaviour Changers in a real-life intervention in some countries, but not the Netherlands (Subtask 11). Task 24 project partners also co-developed more focused intervention approaches and behaviour change and evaluation tools (Subtasks 8 and 9).

For more information on the various tools and approaches, see the publication list on http://www.ieadsm.org/task/task-24-phase-2/#section-8

Annex B – Selection of Key Area and Top DSM Issues in the Netherlands

In the 2013 Dutch *Energy Agreement for Sustainable Growth* ("Energieakkoord voor Duurzame Groei", 2013), more than 40 organisations including Cabinet, employers, trade unions, environmental organisations, energy companies, provinces and municipalities agreed to achieve the following objectives:

- a saving in final energy consumption averaging 1.5% annually. This is expected to be more than enough to comply with the relevant EU *Energy Efficiency Directive*;
- in this context, a 100 Petajoule (PJ) saving in the country's final energy consumption by 2020;
- an increase in the proportion of energy generated from renewable sources from 4.4% currently to 14% in 2020, in accordance with EU arrangements;
- a further increase in that proportion to 16% in 2023;
- at least 15,000 full-time jobs, a large proportion of which will be created in the next few years.

This agreement pointed out several sectors and subsectors where energy efficiency is regarded as crucial for boosting competitiveness of (energy-intensive) businesses, creating jobs and achieving climate objectives in a cost-effective manner.

We used this and other available documents to identify several promising areas for further research. After reviewing these and debating the outcomes, we came to the conclusion that the top area in terms of energy efficiency potential and changeability in the Netherlands, is the sector of higher educational institutes: the universities and vocational training institutes, with a focus on information and communication technology (ICT).

The arguments for this conclusions were:
Generally speaking, Dutch higher educational institutes have, in recent years, shown an increasing attention to sustainability issues. That raised the question how this increased attention is translated into energy efficiency and energy conservation interventions, in practice. Dutch universities often have a mix of old and new buildings, raising the question how differently energy efficiency is targeted in each. In addition, there is a strong link between energy conservation and energy efficiency and information and communication technology (ICT). Both the purchase, use and disposal of ICT as well as the use of ICT to curb energy use are relevant in terms of behaviour change interventions.

Discussions with the ICT service provider to all Dutch HE organisations, SURFsara, which has sustainability as a key theme, led us to the observation that energy efficiency and conservation in relation to ICT in the HE sector is a very interesting and relevant theme. Furthermore, it appears that HE organisations in the Netherlands face similar organisational and institutional challenges and engage in a shared effort towards become more energy efficient.

Long-term Agreements for Energy Efficiency (LTA EE) have been in place for several years and are aligned with the *Energy Agreement for Sustainable Growth*. In 1999 and 2002, all Dutch universities and most universities of applied sciences signed *Long Term Agreements* (LTA3) in which they expressed their commitment to reduce energy use in 2020 by 30 percent compared to 2005 (ter Hofte 2011). Furthermore, non ETS-enterprises and municipalities are also involved in the LTA3 EE. Focus of the LTA3 is process efficiency, supply chain efficiency and renewable energy (RVO 2015). The aim to reach 30% of efficiency improvement in the period 2005-2020 means an average reduction of 1.5% per year. The higher education sector is engaged in these covenants as well, with the distinction between 'Universities', 'Higher vocational training centres' and 'University Medical Centres'. Each participating organisation needs to have an energy efficiency plan ready within 9 months of signing the agreement. This plan needs to be updated

every 4 years so that it gives insights into the energy profile and energy saving options and helps to plan out efficiency measures. The *Environmental Management Act*[1] requires participants to the LTAs to aim for set energy conservation targets. Municipalities are responsible to enforce this law.

For schools, a *Green Deal Sustainable Schools* ("Green Deal Verduurzaming Scholen"), agreed on by the national government, the educational sector and municipalities aims at making the learning and working environments more sustainable for pupils and teachers at schools and to accelerate this process. The *Green Deal* will help schoolboards and municipalities to realise their ambitions in energy conservation and improving the air quality at schools. While this *Green Deal* targets elementary and secondary schools, no such programme exists for the higher educational sector in the Netherlands.

An evaluation of the LTA3 (2008-2020) pointed out that in 2011 the 'Universities' sector and the 'University Medical Centres' have both reached fewer savings than the economic potential allowed for, while the higher vocational educational sector realised more (Ecorys 2013).[2] Another observation derived from this evaluation was that, when looking at the maximum planned savings for the period 2013-2016 versus the actual savings achieved up to and including 2014 (looking at process efficiency, chain efficiency and renewable energy), the sectors 'Universities' and 'Higher vocational training' have done quite well, unlike the 'University Medical Centres' which have lagged behind their planned savings (RVO 2015).[3] The overall improvement so far for all participating sectors is 21.2% (or 2.4% per year) (RVO 2015).

In 2015, the *Progress Report on the Energy Agreement* showed a need to intensify efforts. The progress report stated how the government has urged to intensify efforts. In addition, the introduction of lists with measures for energy efficiency and energy savings (with a 5-year pay-back time) as well as a new Expertise Centre for Energy Conservation is expected to support offices, the healthcare and educational sectors.

The sector of Trade, Services and Government is responsible for 12% of the energy use in the Netherlands and of this, 9% is used by the Educational sector (RIVM 2009). Other large users within this group include Health and the Financial and Business Services (15% excluding, and 24% including motor fuels). The Healthcare sector uses relatively large percentages of energy (18-14%). The part of the subsectors Wholesale, Retail, Catering, Other Services, Government and Education lies in between 7% and 12% per subsector. This roughly equals 1 to 1.5% of the total domestic energy consumption per subsector.

Within those sectors, attention on sustainability and energy efficiency is growing, as evidenced by student networks[4] around sustainability; by annual awards for the most sustainable University; annual conferences on sustainability in relation to ICT in higher education etc. Growing attention can also be witnessed within the curricula, and by looking at R&D projects, innovations and patents aimed at energy efficiency improvements and savings and academic publications. Hence, there is a great potential for innovation, dissemination and capacity building in this sector. While interest in energy efficiency and energy conservation is growing, the Higher Education buildings and campuses face several significant challenges. Partly, because universities reside in old historical buildings that are not energy efficient. New university buildings are often more efficient and sometimes even energy neutral. However, at the same time buildings need to offer room for a seemingly ever-increasing number of ICT and other office

[1] Wet Milieubeheer
[2] For 2011, the energy conservation potential under the Environmental Management Act was calculated. The potential of the realisation of all measures with the payback time of less than 5 years was calculated. So the calculated potential of executing these measures (in line with a strict following of the Environmental Management Act) was contrasted with the reported savings results of the investigated sectors (Ecorys 2013)
[3] In this evaluation, reported savings results were contrasted with planned savings, not with economic potentials like in the previous evaluation by Ecorys
[4] Student voor Morgen (Student for Tomorrow)-network and the Green Offices at several universities also have active students

machinery that is needed to perform top-level research and education activities. Several campuses now have their own data centres, their own (renewable) energy-generating facilities and many HE organisations have initiated serious energy efficiency measures. However, more is needed to achieve the substantial improvements required. Part of the issue here lies with the established ways of doing, organisational hierarchies, and cultures. In terms of behaviour, we refer to the behaviour of not just people but also the organisation. Hierarchical decision-making structures, a lack of orchestration when it comes to efforts at greater energy efficiency and energy saving, split incentives that are not tackled, are all not conducive to achieve greater sustainability. Hence, this sector has an interesting dynamic and interplay between, on the one hand, enthusiasm, bottom-up initiative, innovativeness and ambition – and, on the other hand, existing structures and priorities that are not conducive to energy conservation.

We thus decided that the focus for the Netherlands will be on the **higher educational sector** which includes universities and higher vocational education/applied science universities but which excludes university medical centres as these have rather different characteristics and core processes.

In our focus we decided to pay special attention to **ICT use**. In 2011, ICT equipment was responsible for approximately 20% of electricity use in the HE sector and this percentage has been rising ever since (Ter Hofte 2011). ICT refers both to the use of ICT to manage the energy use in the higher education buildings and the more energy-efficient use of ICT in higher education buildings. Moreover, attention for non-ICT related interventions that result in energy-efficiency improvements and savings will also receive attention where relevant (e.g. where interventions without an ICT dimension are contrasted with those that involve ICT by relevant stakeholders).

This decision was taken in close cooperation with the national expert for the Netherlands from RVO, and was further discussed with representatives from the Dutch Ministry of Economic Affairs and the ExCo representative.

References are provided in Annex F

Annex C - Theoretical Framework: Collective Impact Approach and Behaviour Changers Framework

Behaviour Changers, collective impact and storytelling

We use both **storytelling** (Rotmann, 2017) and a **Collective Impact Approach** (Kania and Kramer, 2011) as methodologies to overcome various challenges and barriers, as explained in more detail below. An important point of departure in this Task is that *our energy system begins and ends with the human need for the services derived from energy (warmth, comfort, entertainment, mobility, hygiene, safety etc.) and that behavioural interventions using technology, market and business models and changes to supply and delivery of energy are the all-important means to that end*.

The *End User* is placed at the centre in our approach and usually, behavioural change interventions target the behaviours of end users. However, addressing end-use also entails paying attention to behaviours, norms and practices which shape and are shaped by the environment in which these are embedded. In our Dutch example (energy efficiency and ICT in Higher Education) you can think of organisational culture at a University, social norms among employees, in the boardroom, among students, research and educational staff. And you can think of practices as ways of doing when it comes to the management of buildings, infrastructure and ICT equipment. Changes in *End User* behaviours – e.g. towards using less energy – are strongly influenced by all these contextual characteristics.

We use the term '*Behaviour Changers'* to denote those that can affect the conditions for energy conservation and efficiency behaviours. They have influence due to their role, mandate, and position in an organisation. They may have ICT knowledge needed for saving energy; or have information about the occupancy of parts of the buildings throughout the year; or have knowledge about the heating and cooling systems; or have influence on decision-making that affects current practices; or may have access to important intermediaries; or access to staff and students etc.

Every one of these *Behaviour Changers* holds an important piece of the puzzle and has a power and/or tools needed to affect changes within the organisation (or cluster of organisations or sector). However, none of them is in the position to affect systematic change on their own. The *Behaviour Changers* are interdependent on each other, on other stakeholders and they operate in different and sometimes very complex contexts confronted with political, financial and social pressures. Their individual mandates may be insufficient to affect change. Hence, complex problems that include technical, organisational, social and behavioural dimensions, ask for a collective addressing of the challenges. Since the *Behaviour Changers* involved have different perspectives, preferences and interests, the first step is to arrive at a shared understanding of what the main challenges are when attempting to design an intervention aimed at energy conservation and improving efficiency. Such a shared understanding provides the starting point for developing ways to address these challenges – always with due attention to *End User* needs.

Behaviour Changer heuristic for a collective impact approach

The *Behaviour Changer Framework* (Rotmann, 2016) is meant to be used as a 'heuristic' to make the roles, mandates and relationships of the *Behaviour Changers* and their interaction with the *End Users* more clear. In addition, it enables storytelling of each of the *Behaviour Changers* working on a specific behavioural intervention in a specific domain, context and country. The framework is used in workshops to explore the stories of each relevant *Behaviour Changer* working towards a very specific common intervention goal (for example, how to overcome the split incentive issues when retrofitting in the residential sector). We used the framework to explore the current situation, the different mandates, drivers, barriers, conflicts and intervention tools each *Behaviour Changer* has and their relationships with each other, their primary stakeholders and the *End User*. Then, we explored what the system should look like and

collectively develop a roadmaps towards the desired behavioural change. The roadmaps will contain a shared vision and end goal and the different steps set in a specific timeframe to achieve this end goal, including the concrete actions and roles of the involved *Behaviour Changers*. Each workshop will explore the changes already realised and the still-existing differences between Business as Usual and the desired behavioural change. The framework will then be used to evaluate, re-iterate and test the completion towards the collectively agreed-upon roadmap. This process will be messy and sometimes difficult to manage. Even when the *Behaviour Changers* will have reached consensus about where to go and how to get there, reality will be less malleable than expected. The *Behaviour Changer Framework*, however, is also explicitly focused on collective and shared learning about the process and appreciates that shared learning might also imply that the roadmap needs to be adjusted to changed context during the process. For a detailed analysis of the *Collective Impact Approach* and its usefulness for energy behaviour type of interventions, please see Annex E on the case studies.

It is important to realise that ICT–related energy conservation projects in hierarchical and bureaucratic organisations need a different approach compared to the standard *Collective Impact Approach* as defined by Kania and Kramer (2011). Matters that arise at hierarchical and bureaucratic organisations such as Universities include a separation of *Decisionmakers* and *Middle Actors*, Board of Executives setting the general agenda of projects, lack of internal backbone organisations and many different internal hierarchies. These issues mean that the *Collective Impact Approach* needs to be adapted in order to create multi-stakeholder collaboration that works (see Cobben, 2017). Whereas the definition of a **shared measurement system, mutually reinforcing activities** and a **common agenda** stay rather the same in the case of ICT energy conservation projects at hierarchical and bureaucratic organisations, the definitions of a **backbone organisation** and a **common agenda** should be redefined in order to create a successful collective impact.

Annex D – Real-Life Intervention: Action Research Case Study at Groningen University

The Task 24 extension has formulated two further areas of attention that we took as a starting point for choosing our methodology and approach. Overall, we combined two *ex-post* case studies (Utrecht University and Cambridge University case studies, see Cobben, 2017) with an action research case study at the University of Groningen.

Different sectors/domains face very different challenges and even within a sector (e.g. higher education) it is difficult to generalise. However, we expect that within sectors, similar practices, norms, organisational structures and physical characteristics may apply. Therefore, it makes sense to broaden the Task's empirical knowledge base and for the Netherlands this will be done for the higher education sector. After a quick scan of multiple cases at the national and international level, two in-depth case studies and an action research case at the University of Groningen were considered as a useful approach to explore and investigate how the role of the *Behaviour Changers* can affect energy efficiency improvements, and if a *Collective Impact Approach* might be useful to identify and tackle complex behaviour change issues.

Our starting point was that historically-evolved patterns of organisations, institutions, physical infrastructure developments and the characteristics of all involved groups and individuals pose particular challenges and opportunities for reaching the Netherland's DSM goals. In addition, we formulated (an incomplete set of) challenges and opportunities that could apply to the cases:

- split incentive issues
- history of buildings and more recent campus developments
- options to couple ICT to building management
- organisational structures of decision-making
- role of tradition, social norms and room for radical change when challenging them
- characteristics of the *End Users* (students and employees)
- primary processes (research and education) that can contribute (e.g. research on e-efficiency options and/or behavioural change; evaluation of initiatives at the university)

Initial versions of the case study and interview templates included these issues as well as more open-ended questions.

The action research case with Groningen University was intended to set up a local platform of experts and *Behaviour Changers* on-site. The aim was to use a **Collective Impact Approach** and **storytelling** with this group in a series of workshops.

A first workshop was held in February 2016. In May 2016, at the Dutch conference for ICT and Sustainability in Higher Education, the first results were presented and discussed with participants from other HE organisations. A second workshop with the University of Groningen took place in September 2016, to discuss further steps and develop a roadmap. In addition, another workshop was planned in 2017 where we planned to invite other universities (of applied sciences) and student networks to discuss the findings so far and to see if there is potential to broaden the roadmap.

Methods used here include desk-study research, interviews, workshops, co-creation dialogues and storytelling. To collect and organise the data in a systematic manner, we developed templates for the preceding interviews, workshop-templates (e.g. for participants to fill in their role and mandate; or to write up a story); and for the case studies. The rather broad and general case-study framework used in Subtasks 1 and 2 was adapted in an iterative process of discussion, comparison and contrasting these cases with findings in Groningen, since these addressed very specific interventions. As for the Groningen case, we have built up empirical reporting (in Dutch), and shared *ex durante* analyses with the participating stakeholders, always collecting their feedback. The case study was thus developed in iterative, double-loop learning cycles (see Mourik et al, 2015 for an explanation on double-loop learning).

First round of Interviews: Behaviour Changers in the Groningen case:

For Groningen University, we set up an interactive trajectory based on the "Behaviour Changer Framework", as elaborated in Annex C. The aim of the workshops was to arrive at a strategy for the participating stakeholders ('*Behaviour Changers*') to improve energy conservation and efficiency at their University. More importantly, we wanted to clarify which conditions are conducive and which conditions are not conducive to this goal.

The aim of the first round of interviews preceding the workshops was, firstly, to get to know the relevant *Behaviour Changers*, and learn about their ideas, questions, perspectives and needs. Secondly, we hoped to get an impression of how well they already worked with others, and how they regarded their own role and position in the organisation. Thirdly, we wanted to get more clarity on their conflicting visions and perspectives. Based on these three aims and the preceding interviews, we were able to use the limited time during the workshop (only one afternoon) to get a better understanding of the issues and the underlying problems.

Below, we present the main findings from the interviews, paying attention to most commonly-expressed views as well as conflicting views on how the University is doing, what goes well and not so well and why, and what ways of improvement can be thought of. We aim to present the breadth of diversity in opinions found.

'The University is already doing so well…'

What became clear was that the University of Groningen (RUG) is doing many things to become more sustainable and – as part of that – also more energy efficient. Almost all interview respondents confirmed how the University and its Board of Executives has become much more committed to the green cause in the last couple of years. The RUG is the most sustainable Dutch University in the *Green Metric Ranking* (first place: Nottingham University).[5] In addition, in several of its buildings measures have been taken to save energy, like installing sensors, addressing inefficient lighting (e.g. replacing incandescent with LED), ventilation, heat, etc. Furthermore, in the purchase of ICT hardware, attention in tenders is awarded to the embedded energy as well. There are efforts to get staff and researchers to work more from smaller and less powerful computers, and to use the power of the central server when they need to perform energy-intensive processes. The move towards cloud services is also expected to contribute to ICT-related energy efficiency improvements. The Board of Executives has started the "Green Mind" Award – an internal award between institutes that goes to the best ideas for pilots for which funds will then be allocated. This award is considered a good initiative that shows the Board's commitment, according to most respondents. One pilot, entailing various micro-level interventions in one of the University buildings (the Bernouille Building), has been made possible by this award.[6] Finally, following the example of several other universities in the Netherlands, a so-called 'Green Office' has started at the RUG. This organisation, embedded within an existing department that is responsible for employment, environment and sustainability (AMD), has the explicit task to make the RUG more sustainable. It has one staff member for 4 days/week and several part-time staff members, most of whom are also students at the RUG.

Low hanging fruit…what about the rest?

While the RUG clearly has improved its commitment to sustainability in general, and energy efficiency and conservation in particular, the problem is that this commitment is not sufficient enough according to various *Behaviour Changers*. The more difficult things that cost time, money and that do not have short pay-back times (but would result in better savings and efficiency improvements), are not taken up. For instance, measures like insulation of the older

[5] http://www.rug.nl/about-us/who-are-we/sustainability/ accessed 13.06.2016
[6] http://www.rug.nl/about-us/who-are-we/sustainability/green-mind-award/sustainable-buildings_-the-bernoulliborg-%28the-results%29

buildings are not chosen due to the current low energy price, in combination with the focus on financial payback times, even though these and other measures would result in the highest energy and CO_2 emission savings. When asked about the type of challenges that would need to be addressed at the RUG (and discussed at the workshop) the following themes were mentioned:

Behavioural change among staff (including researchers) and students

Most students and staff are not interested in sustainability and awareness is generally low. Students and staff don't turn off their computers. Student computers turn off automatically in the evening, but staff computers do not. That has the added disadvantage that important updates are not installed on these staff computers. Some staff members use two monitors, a new one which was meant to replace the old one, and their old one. The latter are usually very energy inefficient. There is a general trend to get staff and students to work more at the central server (instead of on their hard disk) and working directly in the cloud. However, it is difficult to get all of them to make this change.

Different perspectives

Whereas some respondents feel that efforts are needed to get students and staff more aware and committed ("You turn off the light at your home as well, why not do it at office?") , others feel that more ICT and automated software would be more helpful ("Don't bother staff and students with things like turning off the lights or computers"). Yet others feel that both is needed (both more ICT hardware and software as well as behavioural change).

Issues raised:

Turning off computers: people complain that turning computers on again takes too much time, which is why they won't turn them off when they leave their room for an hour to have a meeting or go for lunch.
Awareness: The question is how to reach them, especially when considering the information overload that students are already confronted with.
Efficacy: A pilot that has been performed at the RUG (in the Bernouille Building) showed that interventions were not successful in getting staff members to change their behaviours. They felt that their contribution would hardly amount to anything ('"There are already sensors in place. What more except turning off computers can we do, what is the impact of that?")

Anchoring of energy efficiency and energy saving in University policies

Sustainability still is insufficiently a structural part of the policies and therefore no one carries final responsibility. Everyone finds sustainability a good thing to do, but there is no broadly-shared responsibility for it. The limited attention for sustainability in the University's *ICT Strategy 2020* is evidence of this. But it is also evidenced by the strong prevalence of financial short-term calculations in decision-making. When the financial pay-back times are not within 5-10 years, regardless of the CO_2 or energy savings, an intervention will simply not take place. There are no specific policy aims or programmes regarding ICT and sustainability.

The *Green Mind Award* enabled an interesting pilot which resulted in a spin-off, which was considered positively. However, any further uptake of the actions that were piloted did not get repeated in other buildings. University rules also make it difficult to engage this spin-off company in further interventions based on the successes of the first pilot. The *Green Office* has been set up with the explicit aim to help sustainability themes to take shape in reality. Some feel that it is the responsibility of this office to come up with proposals (for policy) for energy conservation and efficiency improvements.
Question: how can you get to a situation where people in important positions are being freed (i.e. get time, formally) to do something about improving energy efficiency and saving?

What counts as success?

How much energy reduction can be achieved when focusing on behavioural changes only? Is it not a better idea to look at increased automation, remote control etc. instead of bothering people with behavioural change? So rather than asking people to change their daily practices

and work differently, adapting the system around it so that it becomes easier to make the more sustainable choice (as default), may be easier. Compared to behavioural change interventions, other interventions are not much more promising: e.g.
- deep retrofitting of old buildings
- better matching of demand and supply (e.g. not heating all buildings during the weekend, but only parts of buildings; coupling schedules to heating and ventilation management using ICT)
- e-waste policies: finding a central solution rather than individual faculty-led approaches

Other questions that arose during the interviews with respect to success, were how interventions count as improvements, and how? e.g.:

- Social norm-changes on the work floor?
    - CO_2 and energy savings? Financial costs in the short- and long-term?

Monitoring and ownership of data

When energy consumption is measured and monitored, in what detail should that be done? Should it be done real-time? And if so: why? Some regard micro-level and real-time monitoring as necessary, especially when you will start using more sensors and feedback-mechanisms supported by ICT. Part of the feedback will be based on real-time information. People who see this as useful are researchers engaged in the pilot in the Bernouille Building, form the Distributed Systems Group. Others, like the RUG energy manager, don't see the added value of this. Moreover, the current energy monitoring system (a new system) does not allow for real time data use, for all measurements are validated during the night. In some buildings, energy consumption can be measured per floor or room, but it won't get more detailed than that. According to the energy manager, more detail is not really needed, especially since the really big steps for reducing consumption lie in measures like insulation and e.g. not heating all buildings each weekend. Such measures will have a much higher energy conservation impact than sensors that allow computers to go into sleep mode when the user is not at his place. The energy consumption data are not only difficult to get, it is also unclear who owns these data. Coupling the data to schedules is not straightforward. Currently, the annual energy consumption of the RUG is around 56 million kWh and 5 million cubic meters of gas. The long term agreements require the RUG to continue to improve its energy-saving efforts. Various interventions can be distinguished, e.g. based on their expected attractiveness to *Decisionmakers* like the Board of Executives, as Table 1 shows. The question (also brought up in interviews), however, is if the RUG has the luxury to choose the most attractive options or if it has to embark on all the routes.

Based on the above feedback collected during the first round of interviews, the following Table was designed, to highlight the options and what the interviewees felt their take up might be by the University *Decisionmakers*:

Table 1 Expected popularity of interventions for the Decision-makers

• **Success guaranteed (very popular)**: large technical interventions that look good, with a very positive payback time • Examples: hardware purchase; sensors; newly-built energy neutral or positive buildings.
• **Large successes possible (popular)**: the big behavioural issues that need coordinated action of a few *Behaviour Changers*. • Examples: re-using residual heat; heating the RUG buildings more sparingly in weekends
• **Popular, but only once:** *Green Mind*-award funded innovation that had a very nice effect but are not subsequently rolled out. Good for the RUG Green Image. • Example: Bernouille Building pilot.

• **Somewhat popular:** behavioural changes in daily work-and research routines. Both behavioural changes and ICT-led changes in the use of hard-and software • Examples: turning appliances on/off; working in the cloud; using central data centres
• **Not popular**: large building-technical interventions that do not have a good pay-back time but that bring tremendous energy savings and CO2 emission reduction. • Examples: insulation; deep retrofitting
• **Popular but doomed to fail:** efforts that fail due to external circumstances. • Examples: the green façade and the library project; own generation with wind turbines (provincial policy is a barrier); solar meadow that is only an option if subsidies are available

First workshop: Identifying and Exploring the Issues for further research

On February 25th, 2016 the first stakeholder workshop took place at the University of Groningen. We started with a brief introduction round, gave some background on the project, and presented preliminary material from other cases where efforts at energy efficiency improvement and energy conservation with attention to ICT have been reported on. Next, we reported the interview findings to the participants, asked for their response to it and we proposed three questions that summarise important areas brought forward in the interviews.

The top three issues discussed during the workshop

These top three questions were proposed as *central issues* around which the discussions would be structured using the *Behaviour Changer Framework* as a dialogue tool.

1. *How can ICT be used to arrive at a better match of demand and supply? And which forms of collaboration are needed? (types of behaviour: organisational, logistic)*
2. *How to arrive at behavioural propositions for groups that so far have not been activated? And how can we reach behavioural change in this group? (types of behaviour: routine behaviour; social norms; mind-set oriented)*
3. *How can energy efficiency and conservation become more structurally embedded in the RUG policy? How to arrive at a business case (including non-energy benefits) for the Board of Executives (type of behaviour is organisational-political)*

Before continuing, the group was asked to undertake a 'physical network analysis': to stand up and touch everyone that they work with or have regular work-related contact with. This exercise revealed clearly that the researchers (both the social scientist and the people from the distributed systems group) and the person from SURFsara are least integrated in the network (they stand outside left and right of the group).

Table 2 Agenda afternoon workshop Groningen

Activity	**Explanation**
Introduction round	Speed dating 2 minutes followed by plenary introduction where people introduced others to the group.
Network analysis	People physically undertake a network analysis (touch each person that you are regularly in contact with for work)
Presentations DW and RVO	Introduction to IEA DSM Task 24 Case studies national and international Groningen case: presentation of findings so far and discussion
Top 3 Questions	Around each of the three questions, participants were invited to note down risks, opportunities and areas for improvement. Followed by plenary feedback round
Break	
BCF roles and mandates	Participants were asked to choose their role and tell others about the their mandate, restrictions, resources, relations, needs – all in relation to achieving improved energy conservation and efficiency improvements.
BCF now (problem)	Joint assessment of the current situation for each of the three main questions, with attention for roles, mandates, needs for collaboration.
BCF 2017 (solution)	Storytelling: each participant is asked to write a fairy tale using a template. Next, in turns participants read a section of their fairy tale.
Wrap up and next steps	Wrap-up with information on follow-up and evaluation forms that are filled in by the participants

The participants were very positive in their evaluation feedback and our impression was also that they were enthusiastic, provided good input, had good-quality conversations and shared inspiring stories. The challenge is to maintain this enthusiasm, to translate their input to concrete plans, to ensure that good conversations are being conducted outside of the workshops and to have the stories inspire action and results.

We briefly summarise the opportunities, challenges and risks identified in the group discussion on each of the three questions.

1. How can ICT be used to arrive at a better match of demand and supply? And which forms of collaboration are needed? (types of behaviour: organisational, logistic)

Benefits and opportunities identified:

- Coupling ICT to occupancy-schedules (data generate enormous amounts of information).
- Improve energy-efficiency of buildings in terms of their energy use (which may entail the disposal/selling off of inefficient buildings).
- Using ICT to better match supply and demand can make peoples' daily work easier by improving indoor climate.

- Using ICT to better match supply and demand can contribute to productivity because less travelling is involved or people can work at home undisturbed.
- Using ICT to better match supply and demand can be coupled to contribute to safety.
- If people have to switch between buildings more often and walk or cycle more as a result, this can have a positive impact on their health.
- It can also be coupled to increase flexibility (e.g. allowing people to work from home).

Challenges:

- Behavioural problem of the no-show: just to be sure, everyone makes as many reservations for rooms as they might possibly need and people subsequently do not cancel these reservations when the meeting or college is cancelled. So how to organise this better? Or should ICT be used to monitor this better?
- Behavioural issue: people experience the indoor climate and comfort differently so how much room will there be to influence settings (heating, cooling, ventilation, and light) yourself? And in which buildings is that possible? (Coupled to the need to better understand how the different buildings are being used).

Risks:

- People still want to work together physically at their work and not too much from home How much responsibility is moved from people to ICT?
- Will people accept changes in routines (e.g. moving more between the buildings) and will these change be acceptable (what distances, in how much time)? Will an ICT-based allocation system be able to take into account special needs that people have (e.g. when they have difficulties walking/cycling)?

To conclude on this first question: when ICT is going to be used to better match supply and demand, end-user satisfaction should be a central consideration. Safety, health and control/choice considerations have to be added to achieve this end.

2. How to arrive at behavioural propositions for groups that so far have not been activated. And how can we reach behavioural change in this group? (types of behaviour: routine behaviour; social norm; mind-set oriented)

Chances and opportunities:

- The larger the familiarity with measures, the better.
- Taking along the 'non-interested' as well (for example, the meat-free canteen).
- Make it part and parcel of the curriculum (will also help save costs).
- Build new networks and encourage knowledge exchange and learning.
- Visibility is key: make the invisible visible (energy usage).
- Provide staff and students opportunities to identify with the sustainable character of the RUG.
- Address other issues and spill-overs as well (e.g. more working in the cloud; tele-working; efficiency in communication – these things potential have a positive impact on energy conservation as well).

Challenges:

- Staff and students suffer at the same time both of a lack of information (ill-informed when it comes to sustainability, energy efficiency etc.) and information overload. How to best guide them through the web of information (e.g. having an information system that is user-friendly)?
- How and in what manner can the interactions with end users be improved so that it becomes clear: What the *'what's-in-it-for-me'* is for the different end-users?

How are the end-users allowed to and able to take responsibility?

Risk:

- Staff and students get fed up by interventions and information provision (unclear 'what's-in-it-for-me').

To conclude, in addressing the behavioural question, user satisfaction should be central as well, with added values like identification with a sustainable RUG, better-tailored communication, engagement, making a difference, choice options.

How can energy efficiency and saving become more structurally embedded in the RUG policy? How to arrive at a business case (including non-energy benefits) for the Board of Executives (type of behaviour is organisational-political)

This question triggered some discussion at first. Was it a lack of structural embedment? Or were the policies all there, but do they fail to trickle down to the operational levels? Or a combination of both? In any case, this question was pointed out as being a necessary condition for issues addressed in question 1 and 2.

Chances and opportunities:

- Necessary condition for question 1 and 2.
- Less talk and more action.
- From profit to value! (moving away from thinking merely in terms of financial pay-back times).
- Better coordination and orchestration between faculties.
- People that are doing good things in terms of sustainability, realise things become easier (rather than extra difficult) - sustainable options become the default rather than the detour options.
- More research will be enabled that supports a research agenda that contribute to sustainability (e.g. to tackle question 1).
- A stronger role of the Green Office (more direct).

Challenges:

- How to get ambassadors for sustainability on all levels and layers?
- How to ensure that people are being rewarded for being sustainable (and not just for being cost-efficient)?
- How to reach a change in culture and norms?
- How to frame this to make it more attractive to the Board of Executives?
- How to get to a business model that works for the Board of Executives?

Risks:

- It may turn into a top-down policy exercise.
- It may become regarded as an organisational and management problem only.
- Both may actually undermine broad engagement and embedment.

Based on the discussions on the three risks, sustainability can be regarded as contributing to a good working environment, where the satisfaction and wellbeing of staff and students is central, and whereby the aim is to enable a healthy and productive working environment in order to continue to perform as a top-level research and education institution. Hence, as part of the discussion, we arrived at a different frame regarding to what sustainability actually is. That also means that solutions will work towards a good working place for all, and therefore will not go at the cost of the primary processes. And as for the wellbeing of users, the following values have been added: identification with the RUG; better tailored communication, engagement; making a difference; control and choice options; health; comfort; safety.

Roles, Mandates and Restrictions of Groningen's Behaviour Changers

The *Behaviour Changers* in Groningen played the following roles in random order: Conscience (D, R); Intermediary (DR, L); End-user (all, especially De); Expert (F, E); Media (L); Investor (T, W); Provider (A); Broker (G); Decisionmaker (T, D). Below we describe for each role its mandate, stakeholders, restrictions and tools. (Note: the capitals refer to the respective participants)

Conscience (Green Office):

Mandate: guarding that interventions are not happening at expense of others, no matter where and when, problem owners, advice to board of executives, controlling output
Most important stakeholders: *Decisionmakers, End Users*, suppliers (*Providers*), board of executives, staff, students, Green Office
Restrictions: appeal to conscience is tiring, mindset, routines, too much focus on primary processes
Most important instruments: explaining, making up ideas, understand systems, Green Office, passion

Middle Actor:

Mandate: wishes of customers translating into purchase, linking wishes to knowledge, practical facilitation, guarding sustainability ambitions
Most important stakeholders: PH's, students, staff, community, education officers, research directors, customers
Restrictions: financial resources, time, options suppliers, commitment, space
Most important instruments: advice, procedures, networks, policy proposals, drinks, lectures, meetings

End-users (Students and/or staff):

Mandate: working productively in buildings, adapting/using new ICT solutions, using appliances as sustainably as possible, demand of good facilities that support their daily activities
Most important stakeholders: facility managers, faculty in general, study associations
Restrictions: no/low influence on working environmental adjustments, financial, publicity at faculties, know-how at faculties
Most important instruments: complaints, learning and working environment, needed facilities inside environment

Experts:

Mandate: accept intervention, increase effectivity, simplify transition to more sustainable organisation by providing technological tools and solutions
Most important stakeholders: *Decisionmakers*, investors, facility managers, ICT implementers, contact person to reach/research *End Users*
Restrictions: dependencies on external parties, incomplete knowledge
Most important instruments: monitoring tools and feedback, control tools, consultancy, knowledge about acceptation about systems and factors that stimulate behaviour change

Media:

Mandate: Convincing and communicating of sustainable initiatives, results and disseminating available information
Most important stakeholders: students, staff and community
Restrictions: Time, awareness, financial
Most important instruments: website, social media, newsletter, flyers, lectures, workshops

Investor:

Mandate: draft budget real estate, draft real estate plans

Most important stakeholders: board of executives, PHs, faculty board, facility managers
Restrictions: not taking decisions themselves
Most important instruments: literature of board of executives, advice of experts, summarising large analyses, cost key figures, space norms

Provider:

Mandate: advice on wishes of customers, provides external commands
Most important stakeholders: investors, external contractors, board of executives, staff, students
Restrictions: financial, laws
Most important instruments: cost key figures, budgets

Facilitator (Task 24):

Mandate: facilitation, stimulation, good practices, informing other institutions, bundling knowledge and expertise
Most important stakeholders: ICT managers, institution boards
Restrictions: no formal influence, no money, only informing and convincing
Most important instruments: bringing in possibilities, good practices

Decisionmaker:

Mandate: formulating policy, ambitions, taking care of implementation policy
Most important stakeholders: students, staff, society, partners
Restrictions: budget, law, social/intellectual capital
Most important instruments: people, funds, technology

As for the discussion on roles, mandates and interactions, we have witnessed interesting conversations between *End Users, Decisionmakers, Middle Actors, Providers, Experts*, Communication people and the '*Sustainability Conscience'*.

What became clear is that in general, communication and interaction can be improved (many of the participants do not often meet one another, and if they do, they don't discuss energy efficiency and conservation). The communication of the *Decisionmakers* towards the *End Users* (students and staff) needs improvement e.g. the commitment to sustainability is insufficiently translated into actionable advice for the real *End Users*. The interaction with *Experts* and researchers could be improved as well to explore what possibilities there are to start working with their ideas and advice.

A major issue is that the mandates of people simply fall short. People are selected, evaluated and rewarded based on their main tasks and how effectively they fulfil these tasks – not how energy-efficiently or sustainably they do this. This contributes to the gap there is between talking and doing. When it comes to it, nobody is responsible for sustainability and everyone focuses on their main tasks in a BAU way – which they are expected to do by the Board of Executives. In fact, the RUG certainly wants to be more or less sustainable, but does not wish to be the most sustainable university in the world.

The Stories

The participants each wrote a story about the opportunities, risks and benefits and the desired future around ICT and energy efficiency at the University. We use these stories to determine common agendas, issues and roles. The stories were combined into a storybook that was sent back to the participants.

The Happy Building

Once upon a time there was a building that was so heavily used by young students, that it had to be heated up 24 hours per day, almost every day. And then the students also wanted a wide range of services, even if they only were inside the building briefly. And did they turn off the lights as they went, or their computer off? No chance!
And so, the beautiful building became a big, fat energy guzzler. The guardians of the building watched this with sorrow: they wanted a sustainable building, a building they could be proud of. And they were also concerned about the large expense, increasing every year. One day, the energy bill was so high that they decided to take action.
They called everyone, from high to low, to participate in a joint action to make the building really energy efficient and sustainable. Of course, it was not easy to get so many people moving in the same direction, but it was motivating that everyone participated and was open to change.
The director of the building established a special project to find out what everyone really needed, and how these wishes could be met in a smart and efficient way.
Then, in no time, this clever project came with clear solutions. And though it took a little longer to implement these solutions, everyone eventually did what they could to improve durability. Since then, everyone lived happily ever after in a building that did everything everybody wanted, with little use of energy and for much less money.
Annette

THE OLD COMPUTER

Once upon a time there was a computer that was getting old, but still felt very important: not a day went by without someone using its programmes. But over time, many of its users did not bother to shut it off properly, when they finished their work. They found that it took too long to boot up again. So now the computer had to work over night as well, night after night. Of course it became even slower and the call for a younger model was getting louder and louder. Luckily, Procurer Pete came and said the old computer would be fine again, it just needed a few new parts. Done and said and the old computer lived up and muttered again cheerfully. Until Facility Fred came and saw that the computer was using far too much energy. It had to be quickly replaced for a new one. And finally a new computer was brought that worked faster and better and was far more energy efficient.
Since then, the users are completely satisfied again. The old computer was happy as well. Immediately when it was turned off for the last time, it started its second life and lived happily ever after.
Dries, facility management

A fabulous Indoor Climate

Once upon a time there was an old building with an old central heating system that needed an extensive renovation. Every day the people had to work in this warm stuffy building, without ventilation. The first thing they did in the morning was open the windows and keeping them open for fresh air. They felt a genuine regret about the enormous loss of heat, but they honestly did not know what else to do.

But in the end such bad indoor climate makes people sick and therefore the King announced that all buildings in the country had to be thoroughly refurbished. The people of our building started as well with plans to improve its performance: internal walls out, office garden in it, natural ventilation, even with a little cooling for some extra comfort… The ambitions for the building became bigger and bigger and the estimation of costs higher and higher. Until a young engineer pointed out that more technology would lead to more energy use, if there is no proper insulation. Thus, the motto became: "Insulate the outer shell and use only what you need." But then the accountants and had to make cost estimates and started asking questions, because tailored solutions imply more '' expensive '' control, compared to traditional techniques. And the outer shell? Well, that is another departments' responsibility....

But our people were very tenacious and maintained their motto until the College decided to agree to large façade maintenance and shade canopies on the façade to reduce nuisance and a demand-driven air conditioning system. More technology and less energy consumption. Since then, the people who work very pleased with the individual control and pleasant indoor climate and the use of energy only when needed. And using these new technologies also provided valuable additional data for the social sciences.
Walter

THE LITTLE GREEN MEN

Once upon a time there was a world where sustainability seemed to be incompatible with being necessary, useful, cost-effective and fun. This world was divided into little green men and 'others'. Every day the little green men thought that the problem was that the others did not understand the importance of sustainability. The others thought that the little green men tried to impose their private choices. Until one day, one green man thought that sustainability could be really handy too. Then the people went looking for convenient solutions that were more durable than traditional solutions. But when the policy devil appeared, he called "that, we have already decided" or "those capabilities we already have." Satisfied, he sat down and let things take their course. The stones were safely on the shore.

Until finally, the penny dropped with the others and they all went to see what really happened and they laid down their sustainable ideas in the flowing river. Convenient and useful stood on the stone in the river. And since then flowed consultations between the green men and the other people through a sustainable river along green banks.
Ronald

The Accelerator and the Angry Ghost

There was once a University that had become the largest University in the country. All staff and students were happy to use as little energy as possible. Waste was almost non-existent. Every day the management, staff and students worked hard to keep their Uni this sustainable. And of course, everyone was happy. On a bad day it turned out not everyone was pleased... The old Ubbit ghost began to stir. It had discovered scary shortcomings. Was there enough energy saved? Ubbit did more and more stirring, haunting the people and spreading scary stories about a future without a college for the kids. People began to complain to the University and there were fewer and fewer students.
Fortunately, soon a green saviour turned up with new ideas. He motivated people, devised solutions for efficient use of space and cool PCs. People began to see how it could be better.
And so the University was eventually sustainable and energy use went down. And ever since then, the University was forever green and happy.
Dick, Manager Sustainability

The most sustainable University in the world

There was once a University that had existed for 400 years and it wanted to survive indefinitely.
Each day staff, students and partners ventured to this ancient institution to make use of the facilities.
But one day the University saw that energy usage did not happen in the most sustainable way. A super team was called in to help: the GREEN OFFICE!

By listening to the people of the Green Office users can now better realise that sustainability is a theme to be reckoned with. Soon, the super-team found that not enough action was taken to work in a much more sustainable way. They went to work even harder. Until, finally, everyone was more motivated to take an active role and the University to be CO_2 neutral. Since then everyone was proud that the University can continue to exist forever without leaving a large footprint.
Leander

How Cooperation made everything better

There once was a young University lecturer with a passion for the innovation of education. But every day he worked in a workplace that was little inspiring and evoking little creativity: a workplace of 20 years ago!
His lectures had to take place in an outdated class room, followed by a seminar in a 10 year old practical room. But one day the lecturer was invited to give lectures in the 'Energicad Europe': a new sustainable 5 star building.

Being in this building, both the University lecturer and his students became so inspired that they jointly made efforts to renew education, introduce new educational methods and new IT solutions. At first the different users of the building of the University Groningen and the Hanze School, did not work together, bringing their own individual IT environment to the new building. Nothing, no cooperation. This resulted in an expensive and far from the best solution for education. But then the board intervened and decided the two colleges of Groningen and Hanze University should be energy efficient and share their IT infrastructure. Since then, the quality, the society and the cumulative impact of education in the new building of Groningen and Hanze University all have much more space and facilities at much lower costs.
Tjeerd__

The Most Sustainable University in the World

Once upon a time a University wanted to become the most sustainable in the world. Within the University there were sustainability managers, ICT managers, facility managers, researchers and start-ups who worked to achieve this goal! However, this goal was not so important for decisionmakers and investors.
A lot of energy was wasted and end-users were not satisfied with their working environment.
They were frustrated to see that this situation was harming the environment very much.
Decisionmakers and investors realised that they needed to make their employees more satisfied and they decided to change this. They became fully committed to make their buildings energy neutral and provide healthy and productive environment for their employees.
System changers could work on improving sustainability to provide the most energy-efficient, healthy and productive office space for all the employees. The employees were so satisfied that they tripled their productivity. The University started having budget issues as so much was invested in these improvements. But finally, the results and additional benefits started to pay off. Not only did they became most sustainable University, but also the top-10 Uni in the world. Many more students came and the government rewarded the University with significantly more funds. The University continued to progress every year showing excellence in research and education, as well as sustainability.
Fariz

Tailoring does…

There was once a University in the north of the country.
Every day, employees and students were hard at work without thinking about their energy consumption. But, one day leadership decided that the staff and students had to comply with efficient energy solutions. Supply and demand was now brought together perfectly and energy consumption went down drastically. But the staff and students were unhappy. They were directed to a different place of work every day, and then became dominated by ICT.
Until the experts in the field of energy joined. They had new intelligent IT solutions that were implemented and tailored to the acceptance of staff and students. The effect was enormous. Since then, the University's more sustainable with happy staff and students.
Ellen

…and Money does NOT make you HAPPY

Once upon a time there was an organisation that had an innovation fund for greening ICT in higher education. The project manager was looking forward to the results because he wanted to improve the buildings of the organisation. In order to succeed, he organised a meeting with a broad group of stakeholders, building managers, IT specialists, business, facility managers. But then, when everyone sat together, cooperation proved a true multi-stakeholder issue. Everyone had their own position. And the project manager had (officially) only a limited mandate and became isolated, like in an ivory tower. So follow-up of the proposals proved difficult, if not impossible. Because no budget - no mandate – it was too far from his daily job activities and the project manager did not care for greening.
Luckily there came a saviour in the form of a researcher that had started his own business! He had (only) to ensure that his knowledge and expertise in this area could also be supported financially. At the beginning it was a challenge, but when several institutions finally saw the importance and value - both in financial and social terms, he saw his start-up grow. The project manager was no longer locked up in the ivory tower and could see the entire field of greening ICT in Higher Education. Since then, the Universities and colleges in the UK became a global leader in the field of smart, comfortable and sustainable buildings.
Gerard

HAPPY STUDENT

Once there was a city very close to here, and a student studying who was happy and free. Every day he was again looking for a place to study comfortably ... A place where a computer was available, where a comfortable temperature and good ventilation: A place where he could sit and study just fine!

But one day the student noticed that it often happened that computers were kept on despite no students being present. In addition, many places were 'claimed' as occupied, when no students were present. This ensured that the student couldn't find easy places to study, and the University had an unnecessarily high power consumption.
But then he got a genius idea! With the help of a small sensor activity could be measured. This data could be used to regulate and to control the work station 'activity 'climate'. The computer could also be turned off if there was no activity for half an hour. Once the University finally introduced his plan, the student lived happily ever after, and graduated of course ;-).
Dennis

What can we learn from the stories ?

In general, that we will always have to go through setbacks, but eventually tenacity, effort and money will pay off. Cooperation is crucial for success: everyone needs to change in order to achieve the common goal.

Further lessons:

- The “happy building” story demonstrates in particular that user needs such as warm spaces, are subject to change. It is necessary to be explicit about what is needed and when.
- The “old computer” story shows that upgrading existing products should always be considered before renewing.
- The “indoor climate” story explains that there are laws that we must adhere to, that technology is not everything, passive solutions such as insulation, are also important and that it goes beyond cost. It is also especially nice that pilot projects were used for research purposes.
- In “little green men” we saw that people who want to be truly sustainable are often set apart from other people. Policies and measures often work against them and it takes a long time before the awareness and sense of urgency are mainstream.
- The “angry ghost” story showed there will always be disgruntled people who want to be heard. It is important to give them the opportunity to express their frustrations and understand why and how decisions are made and work.
- The “most sustainable University in the world” was a beautiful demonstration of the aim and ambition of the Green Office, while we can also see the frustrations and lack of awareness.
- The “Collaboration” story shows how enforced collaboration can lead to administrative and practical problems, but if properly coordinated, it can lead to beautiful solutions.
- The “happy student” story shows that people need to have their own space and be in control. It helps to consult them, and take their existing wishes and practices into account.

Second round of interviews after the first workshop analysis

Many participants regarded the current situation as one of collective irresponsibility and lack of integrated collaboration. So the question was how to get to a situation of collective responsibility? In view of the project’s limited power to change structures at the RUG, the suggestion we made is to just do it and prove that it works and hope that that will trigger discussion among those who do have the power to change structures.

After the workshop, we therefore asked the participants to choose concrete actions that they would like to continue with, based on the workshop discussions. They could choose one or more options from the following list (or add their own idea).

Actions:

- Coupling ICT and schedules
- Addressing the heating in the buildings in the weekends
- Develop communication strategy aimed at staff and students
- Develop ambassador's role and make it happen in practice
- Organise a talk with the Board of Executives to discuss questions 1, 2 and 3
- Address the issues pointed out at the Sustainability Tables at the RUG
- Something entirely different, namely…….

And we asked the participants to explain for each chosen action:

- What will be your role?
- With whom will you collaborate?
- What instruments do you have at your disposal?
- What will be in it for whom?
- When will you take this on?
- How to make this intervention as visible as possible?

The final question relates to the underlying aim of making the lack of appropriate mandates and resources visible to the RUG and the Board of Executives, specifically. Nine participants (all participants listed in Table 1, with the exception of numbers 1, 2, 5, 12 and 14) filled in their preferred actions to take up. Having asked the participants about their ideas on continuing on concrete activities, we got feedback through completed interview templates and via brief phone interviews held with all of them (except the head of CIT who no long works in that position and one of the two participating demand managers). An extensive table (in Dutch) shows all feedback filled into the templates. Below, we point out some of the clarifying remarks given by the respondents. Most of them made explicitly clear that they were eager to have a further meeting to continue to work out these options.

1. Coupling schedules to heating and lighting, using ICT

According to the demand manager, to make this coupling possible, demand managers need to collaborate with the ICT and the Educational Support and Innovation department (ESI - which addressed ICT and education). ESI makes the schedules, digital exams, online environments like blackboards etc. One of the demand managers indicated that he does have the resources to have a project proposal written for this project and he could find finance for this. The result would be an integrated system in which people can easily view online information and their agenda. As people would have to start using it, results would become clear quickly and can be made visible, particularly to show the positive results (in terms of energy conservation). The facility manager indicated that she could be of help in coupling people since she works with both sides (ICT and the ESI). The head of Employment, Environment and Sustainability (AMD) indicated that the software needed to make these couplings already exist. The Real Estate and Investments department will need to make such couplings for the new buildings and Facility Management will have to enable and facilitate it all, according to the head of AMD. The student assessor indicated that Google Calendar is not used by a lot of students (although the service desk is encouraging them to do so). However, staff members are using it, and that may also have potential in contributing to a more efficient heating and energy reductions. The behavioural researcher indicated that it is crucial to properly design and evaluate the coupling of ICT and schedules, and also to learn about the social aspects of this. Both the people from the distributed systems group and the ones who make the schedules need to collaborate. At this moment, the challenges appear to be technical, rather than social. Of course, when the scheme is introduced to everyone, it needs to be made visible and communicated well.

2. Heating (and lighting) in the buildings during the weekend

Most buildings are heated during the whole weekend, while nobody uses them. The University wants to have the buildings accessible to staff so that they can work on the weekend, if they want to. A huge supply of energy is often not met by any demand, which is an outright waste of energy. The Facility Manager questioned whether we needed to heat whole buildings, especially in the evening, when all buildings are open until 10pm. Why not heat the buildings only partially in the evening, instead of the whole building? The Facility Manager indicated that she has direct influence on the heating systems. Together with building management systems, there is no attention for how to change the heating systems in such a way that they make better use of information on usage patterns. If, for instance, it is known that after a certain hour, no use is made of a particular building, it would be good to turn off the heating remotely. There is thus a need to acquire more detailed user information on these issues.

People from the Distributed Systems Group already cooperate with Facility Management and they have a good cooperation and would like to continue it. Those that work at the Distributed Systems Group, have done pilots with the use of controllers and sensors. In one of the buildings the heating is controlled at room level, with controllers and sensors installed in the rooms. When there is enough heat or there are no people in a room, the heating simply stops. With this price-winning solution (smart heating system with a combination of control - hard and software - including dashboards to inform and give feedback to users at various levels) 20 - 30% energy savings were realised, according to the researchers of the Distributed Systems Group. At the moment the system is going to be implemented in several buildings, so this is a solution that is already in the making for more buildings. However, the spin-off start-up that resulted from the development and piloting of this solution, has not yet been invited by the University to implement their solution in all buildings. In combination with the dashboard, this approach is regarded as contributing to awareness-building for the people working in the building as well. And it will show the RUGs commitment to sustainability and to undertaking action. Management dashboards give more detailed insights into energy consumption. Facility managers can also access this information and can watch real-time consumption information. Against this view of using micro-level monitoring of real-time data in combination with sensors and controllers, as is the view of the Energy Manager of the Groningen University. We spoke to him during the first interview round (he did not want to join the workshop because he did not feel it would be worth the effort; in his perspective, there is too much talking and too little action at the RUG). During this call he indicated that real time micro-level energy consumption monitoring is not possible with the current (new) system of energy monitoring. In addition, he questioned the added value, as such a system is not flexible enough to deal with the ongoing changes that take place within buildings and rooms. He said he would prefer more simple and straightforward measures, like insulation of the older buildings or heating only part of the buildings during the weekends (and only one room within each of those buildings, in case people want to come and work there).

3. Develop communication strategy aimed at staff and students

Almost all respondents remarked that it is crucial to make the results of interventions visible. Sharing and making results visible can be done using the information screens – and this would have to be done in such a way that it keeps on being exciting and surprising, according to the Facility Manager. These information screens were mentioned by several people. There are screens integrated in buildings which make it possible to communicate results in the form of infographics and which show the electricity generation from the solar panels. More feedback visualisation can be done, according to the student liaison from the Green Office. However, different channels are needed for different target groups – e.g. it is expected that for staff, these infographics work well, while students can be better targeted through social media (e.g. Facebook). Consumption is graphically displayed using dashboards. It can be both public and on management boards. The public one is most prominently placed at entrance, so every building user can see what they consume. This creates awareness for people working in the building and shows that the organisation is actively interested in sustainability.

The idea of the Distributed Systems Groups' respondent was to also use these management dashboards to give more insights into consumption, and to let Facility Managers access real time consumption information. When such specific information is given, this gives options for

specific solutions for energy conservation. The head of AMD also pointed out that success needs to be communicated and made visible. Good communication is necessary for all interventions, so that people become aware and start to see the usefulness of sustainability and energy conservation, and more specifically, that they see it reducing their impact on the environment. Results can e.g. be based on the a spreadsheet showing Environmental Performance Indicators that show the consumption and waste patterns and volumes – these indicators can help to show reductions in consumption volumes. The Green Office Student indicated that they could start immediately with elaborating a strategy to target staff and students. However, they would need a project leader, someone more senior taking the lead. There are so many units at the RUG that ideas often get stuck somewhere in between units.

4. Develop an ambassador's role and make it happen in practice

Providing information in order to have people reduce their energy consumption is something that the head of AMD can contribute to (being in the position of a spider-in-the-web). SURFsara can support the ambassadors in their role by providing formats, knowledge and expertise that can be used for communication activities and that can be useful for ambassadors. SURFsara has connections with the Special Interest Group in ICT and Sustainability, in which a few hundred people from the higher educational sector participate with their knowledge and expertise. This SIG group is interested and participation in this group by the RUG can help to exchange knowledge and get useful input. SURFsara's role as a *Middle Actor* can furthermore be of help in communicating RUG results to the outside world, supporting their ambassador's role towards other higher educational organisations. SURFsara has useful networks and channels that can be used to disseminate RUG results. The Student Assessor indicated that before shaping ambassadors, it is important to first think about your focus, approach, messaging, etc. Positive attention to making the RUGs role in sustainability more visible including to the outside world, would need to be taken. For the students, ambassadors could initiate more awareness and improve their thinking about sustainability – such that it may even encourage them to take initiative themselves during or after their study at the RUG.

5. Organise a talk with the Board of Executives to discuss the top three questions

The Facility Manager did not see a role for her in actually reaching out to the Board of Executives. The Real Estate Manager remarked that currently, sustainable solutions are wiped off the table because of budgetary considerations. It is therefore crucial to realise the importance to take any technical measures and standards into consideration early in the process, and to make different choices clear so that short-term financial considerations are not the only ones that define the eventual solutions. In addition, there is the following issue with the old buildings of the University: these are hardly equipped with any modern technologies. So when they are renovated, the energy consumption of the buildings often go up due to the installation of technologies that were not there before. Thus, renewable energy and making buildings more energy efficient does not always result in a lower energy bill. Which is a message that is hard to swallow for the Board of Executives. Improved knowledge and understanding would need to be created first. Policies could help to set out and clarify certain choices and standards in favour of sustainability so that this ROI/payback-times thinking is no longer dominating all decisionmaking. Such policies can also address options for technical standardisation.

6. Address the issues pointed out at the RUG Sustainability Tables

The reports resulting from the sustainability tables are insufficiently disseminated and advertised. Moreover, they hardly play a role in the internal organisation or externally. Little is done with it, according to the Student Assessor. So there lies definite room for improvement.

7. Other issues….

- *Using existing contact moments*: The demand manager indicated that things can be taken up much more easily because various people have regular meetings (e.g. the Demand Managers of the faculties. Currently, energy saving options which are the focus in the workshops, are usually not brought up or discussed during such meetings. That could change…

- *Need for leadership*: The behavioural researcher pointed out the importance to have a 'block leader' – a leader that takes people along and encourages others to also do their bit. This resonates with the remark from the Green Office Student that a lack of leadership across units and department makes it difficult for the Green Office to start developing a strategy – even for this office that is invested with the responsibility to encourage sustainability.

The Higher Education and Sustainability Conference

The real-life Intervention was presented in The Netherlands during the *National Day of Sustainability in Higher Education*, May 20 in 2016. It was presented as an alternative for decennia of 'Carrot, Stick, and Sweat' to achieve sustainability policy goals. The carrot being the reward for the hard work, the stick is symbolic of the change needed and the sweat symbolises the hard work towards fostering change. The results in Groningen, especially the need for a holistic approach were presented and discussed with the audience.

Talk with the board of directors

In July, the expert team had a visit to the Executive Board (Mr Jan de Jeu).
We gave a presentation of all the ideas, and explained the challenges. Unfortunately, this conversation did not have the result we hoped for, namely explicit support for at least one of the ideas and recognition of necessity to go beyond the 'low hanging fruit' - or to make investments that maybe not earn itself back but will have a firm result for energy and CO_2 reduction on the long term. After this disappointing outcome, the team needed time to recover and determine the way forward. Fortunately, the meeting with the international network of behaviour experts of Task 24 took place shortly afterwards.

IEA workshop at BEHAVE 2016:

The Green Office University of Groningen workshop part

The BEHAVE conference in Coimbra took place shortly after the meeting with the Board of Directors of the University of Groningen. An international Task 24 workshop was run as part of the conference and over 70 behaviour change experts from all over the world came together to discuss three countries' case studies: the Netherlands' ICT in higher education; New Zealand's 'Powering Tomorrow's Neighbourhoods'; and Sweden's green leases in commercial office buildings.

The minutes for the meeting and all presentations can be found here. After an introduction of the state of affairs, the workshop used the *Behaviour Changer Framework* to delve into all three case studies: all participants chose a role and produced a story; after group discussions, a new story was developed, which written by all stakeholders together.

The Dutch story on ICT in higher education – before the BCF

Once Upon a time…
The passionate energy efficiency girls from Task 24 were sad. They needed to convince the *Decisionmakers* at the University of Groningen to empower the *Green Office* to empower *End Users* of ICT, the students and staff of the University.
Every day…
They tried to be convincing but nothing much happened. The *Decisionmakers* were not really interested, and there was not enough communication.
But one day…
The *Green Office* created a workshop with *Providers*, staff (academics and other *Experts*) and *Middle Actors* such as the facility managers, cleaning crew, and ICT staff. In this workshop they made up ideas, suggestions and reasons to convince the *Decisionmakers* – talking up innovation, going beyond what every University does, appealing to the Return of Investment, applying research funding, being a leader, computer-based communication, systems for engagement, student groups, inviting experts from other Universities, identifying waste energy and more.
Because of that…

The Decisionmakers were convinced and agreed to more steps.

And ever since then…

There is an ongoing dialogue between all *Behaviour Changers* with a focus on long-term sustainability, including transport, food, etc thus expanding the green impact.

The Dutch story on ICT in higher education – after the BCF

Once Upon a time…

There was a dysfunctional organisation facing the need to balance the academic goals of the University with sustainable goals which were perceived to be divergent from their core mandate.

Every day…

The *Green Office* struggled to meet the needs of the Board of Directors and the other stakeholders but their interests were so different that they kept failing to gain engagement and funding.

But one day…

A common vision and roadmap was created, identifying each *Behaviour Changers'* interests and goals. This resulted in a task force and multi-stakeholder coalition.

Because of that…

The best solutions were able to be identified for all *Behaviour Changers*. In other words, process was created where interests were negotiated in a way that was experienced as fair and or balanced by everyone.

And ever since then…

Energy efficiency activities were followed through with relative ease, and everyone worked comfortably and sustainably, happily ever after.

Preliminary conclusions and subsequent steps

Based on the feedback and brief telephone interviews, the preliminary conclusions and related suggestions for further steps are as follows:

- The ideas regarding actions that would contribute to energy conservation and energy efficiency are considered useful and actionable by the important *Behaviour Changers* at the RUG. We received their feedback and suggestions regarding their own respective roles and suggestions for first steps to be taken regarding all the actions.
- One respondent set out how he could actually use some resources to investigate and implement one of the actions (coupling ICT to schedules). In addition, he pointed out that during various existing contact moments (e.g. between Demand Managers), energy efficiency and conservation could be discussed on a regular basis, something that does not happen now. However, he did not specify whom he regards as being responsible for ensuring that this actually happens.
- Another respondent said he would very much like to set up a communication strategy targeting students and staff, but that overall leadership would be needed to actually initiate this.
- Most respondents indicated the need for leadership. Many *Behaviour Changers* want to take up an active role but they do not want to be responsible for the full action (at this point). Moreover, when solutions are not straightforward but imply choices that need to be made, it becomes even harder to start any action without someone taking the lead.
- And choices will need to be made, preferably based on different ideas regarding the types of solutions which would be best. For instance, there are different ideas regarding the ICT that can be used to couple schedules to heating and lighting. Also, as we already noted in the first round of interviews, there are different ideas regarding the reduction of heating in the buildings during weekends. On the one hand, there is the idea of a non-tech straightforward approach by appointing a few rooms only (e.g. one room per building) that will be heated and lighted (rather than the whole building) during weekends for those who want to work at the RUG. On the other hand, ideas have been developed (and piloted) that entail a much more detailed monitoring of energy

consumption coupled to ICT so that heating (and lighting etc.) can be turned on or off in response to actual presence of staff or students. Where differences of opinion regarding solutions exist, more discussions (or negotiations) are needed first – raising the question as to who would be the right actor to initiate this discussion.

- A recurring issue that was also discussed at the workshop and during preceding interviews is the focus on payback times and ROI by the Board of Executives that dominates all decision-making. This would need to be discussed with the Board to see their response and to see to what extent and how they would like to address the leadership problem.

A second workshop to discuss these and other issues was not deemed to be useful until the problem of ownership and leadership was addressed. Therefore, the project team tried to have a discussion with a Member of the Board to report on the potential for change (based on the commitment shown by the participants), and to discuss responsibility and leadership, and to discuss the issue of structural embedding of sustainability in policy. After that meeting, a following stakeholder workshop was intended to draw out a concrete roadmap listing actions and responsibilities.

Remaining activities in the Groningen Case:
Second workshop: towards a roadmap for practical implementation?
Third workshop: discussing with a wider set of *Behaviour Changers*
Overall analysis of the Groningen case, final report.

These activities were not concluded in the Netherlands.

Annex E – Conclusions from the case studies

The analysis of the two case studies on using ICT to save energy in higher education (in Cambridge and Utrecht Universities, see Cobben 2017) has shown that the implementation of the five conditions of the *Collective Impact Approach* (Kania and Kramer 2011) is an essential factor in the success of a project. Based on these case studies, the following recommendations can improve future higher education projects.

1. Shared knowledge base

It is important that all stakeholders have a certain knowledge base concerning energy conservation measures and keep on learning and sharing their knowledge during a project's life time. According to Geels and Raven (2006), circulation of knowledge is important as it stimulates local knowledge generation and formulation of generic patterns. Knowledge circulation inside faculties creates a possibility to experiment on a local scale. Lessons learned can be implemented University-wide and are thus more generally applicable. it is believed that the circulation of knowledge will stimulate knowledge diffusion and also the development of generic lessons that can be implemented in comparable projects. As every single University faculty and facility has their own knowledge and lessons, it is of high importance that all actors are involved.

2. Participation of all actors

It is recommended to develop *mutually reinforcing activities* in order to create a collective impact. Participation of all actors will create a differentiated field of actors in which every actor can excel at what they are good at. Collaboration can redevelop standard systems in such a way that they work for specific situations, but the lessons learned can work for comparable projects as well. A lack of expectations and vision in policy can create tensions between *Behaviour Changers*. Expectations and values need to be communicated clearly and early to all *Behaviour Changers*. In order to be able to communicate expectations and values, clear and concrete policy targets with respect to sustainability in ICT need to be set. When these targets are communicated to all *Behaviour Changers*, everyone knows what to expect and what others expect from them.

3. Systematic communication

It is recommended to have *continuous communication* aimed at building trust, assuring mutual objectives and developing common goal (Kania and Kramer, 2011). It is important that expectations and visions are clear and have been collaboratively derived, where possible. Collaboration and an open dialogue will create knowledge among actors of what the expectations are other *Behaviour Changers* might have. Spreading the word to *End Users* via videos, posters and flyers is also assumed to create more knowledge about expectations (Orzanna et al., 2014).

4. Participation in an Ongoing Development of the Common Agenda

The *common agenda* is crucial as a guideline to all stakeholders. It can prevent tensions between actors and duplication of actions. Therefore, it is recommended to develop a common agenda up front in behaviour change projects in order to get everyone pointed in the same direction. A common agenda is important to create a common understanding of the problem and solution in order to make sure all actors agree on taking the same road to the final destination (Kania and Kramer, 2011).

5. Participation of Shared Measurement Systems

Next to a common agenda and mutually reinforcing activities, *shared measurement systems* are also an essential factor for a successful collective impact. It is important that everyone feels responsible to invest money, people and resources in a common agenda towards sustainability. It is known that if people are, for example, punished for not being sustainable and rewarded for being (more) sustainable, the incentive for sustainability increases: people start to feel more responsible as being sustainable becomes ''their problem''. For example, the *Electricity Incentivisation Scheme* at the University of Cambridge created an external pressure for the

stimulation of responsibility. This polluter-pays principle system resulted in a situation where all faculties were judged equally on their energy usage. Equality is created as everyone is judged on the same baseline. Actors can hold each other accountable and track each other's progress and can compare their results (Kania and Kramer, 2011). Based on the combination of knowledge from theory and practice it is thus recommended to develop a shared measurement system in order to make sure that all actors are judged on the same criteria, creating aligned efforts (ibid).

6. Enable a Backbone Organisation

The last recommendation based on the Collective Impact Approach is the importance of having a *backbone organisation* in projects. When bureaucratic organisations usually start projects, it is quite difficult to appoint a suitable organisation that could fulfil the role of backbone organisation. The University of Cambridge is the perfect example that the backbone principle can work at hierarchical organisations, but the definition of backbone has to be refined. At the University of Cambridge the backbone organisation did have the power and resources to execute the project, but they did not develop a *common agenda* themselves: this was done by the Board of Executives. Still, it fulfilled the role of connecting various faculties and other important actors. It also facilitates and coordinates the execution of the *Carbon Management Plan*. Therefore, it is recommended to have an organ that fulfils at least some important characteristics of the backbone organisation that is able to connect the different actors. The *Green Offices*, found at many Universities, could be enabled to fulfil this role.

To summarise: it is important to fulfil the five criteria for Collective Impact of Kania and Kramer (2011) in order to create a collective impact: a shared measurement system, mutually reinforcing activities, a backbone organisation, continuous communication and a common agenda.

Next to the recommendations based on the Collective Impact Approach, some general recommendations can be given that can be used to solve barriers for existing and future cases:

- Divide Responsibilities and appoint *Behaviour Changers*

Responsibility among staff and students could be stimulated by the use of a relevant *Behaviour Changer*. This person can help to make sure Universities are (intrinsically) motivated. It could help to appoint dedicated persons that **supervise ICT energy consumption, implement energy conservation programs and function as contact person regarding ICT energy use. These persons, which are described in the Collective impact Approach as champions, can stimulate and help other persons to understand why it is important to save energy and how it can be done. Thus it is recommended to use the *Behaviour Changer Framework* in order to analyse how all *Behaviour Changers*, ranging from the *Experts* to the *Decisionmakers* can change the behaviour of *End Users,* together.** The integration of *Behaviour Changers* creates more trust among employees, stimulating them to become intrinsically-motivated and engaged in energy-saving projects.

- Stick, Carrot and Competition

The *Electricity Incentivisation Scheme* is based on the polluter-pays principle. As explained, faculties going over the predefined baseline of energy usage have to pay penalties whereas faculties staying below the baseline receive money. The money can be spent on further energy-saving projects, but is sometimes also used to create a community feeling, e.g. by organising a tea party for staff (University of Cambridge, 2016)[1]. The *Electricity Incentivisation Scheme* case is thus a perfect example of implementation of the polluter-pays principle, and its ability to decrease energy usage in ICT. This principle creates incentives for people or faculties to invest in energy conservation measures on the one hand, but also creates both internal cohesion (inside faculties) and competition (between faculties).

The competition element is an effective tool to stimulate desired behaviours. As all faculties have insights into the performance of others, the natural response is that everyone wants to be the best. Not only on faculty level, but also inside faculties, competition games have started that create and maintain attention. For example, in some faculties, competition is happening between

labs to have the highest energy savings (University of Cambridge, 2016)[4]. Therefore, it is recommended to introduce a competitive element in energy savings in order to stimulate complete faculties to save energy.

- Provide Resources

Not every faculty has the resources available for investments in energy saving. The University of Cambridge started the *Energy and Carbon Reduction Programme* faculty which is a /funding site for energy saving projects. The *Energy and Carbon Reduction Programme* not only provides money, but also does several other things like developing communities for employees to take action within their working environment. The invested money is often invested in sensors for tracking energy usage, renewable and low carbon technologies, renovation of existing buildings or integration of new technologies into new buildings (University of Cambridge, 2016)[1]. At the moment large amounts of energy are saved at the University of Cambridge, thus it is recommended for comparable projects to set up funding funds that can help faculties with investments in energy-saving solutions.

- Adapt Job Descriptions to clarify Energy Savings as a Mandate

The last recommendation aims at the job descriptions of employees. It was seen in the Utrecht case that people tend to ''ignore'' energy conservation measures as they feel that it adds extra workload to their jobs that are already full. When sustainability coordinators were appointed at the University of Utrecht, suddenly energy conservation policy became an important agenda point for the two coordinators, as it was their mandate. Therefore, it is important that sustainability becomes integrated in the job description of employees in order to take away the feeling that sustainability is an additional, unwanted thing to do.

Timeline of the ICT in higher education case study in NL

September 2015 – Jan 2016:

We had some initial preparatory talks with SURFsara (the national ICT provider for Higher Education sector) and RVO (the Dutch Energy Agency) to learn more about these issues and to discuss our approach. It was soon decided that SURFsara would contact several universities – the selection of which was based on the expectation of their interest in participating. Meanwhile, we also decided to undertake several case studies - at least one Dutch and one European case - after a quick scan of relevant cases. The aim of these case studies was to get a better understanding of the HE sector and energy efficiency and saving issues in the HE sector in the Netherlands.

Jan 2016 – July 2016:

Selection of the case study and top issue: **ICT at the University of Groningen**
Interviews with all relevant stakeholders at the University involved in energy efficiency, energy conservation, end-use and decisionmaking.
Analysis of interviews
Workshops with (the same) relevant stakeholders involved
Evaluation of workshop feedback from participating stakeholders
Analysis of outcomes, reporting back to all participants
Inventory among the participating *Behaviour Changers* to indicate which energy-saving initiatives they would like to continue, followed by brief (phone) interviews

July 2016 – 2017:

July 2016: Face-to-face interview with member of the Board of Executives at Groningen University to discuss the main findings so far
September 2016: next workshop to elaborate concrete energy-saving actions with the stakeholders, followed by an evaluation among participating stakeholders
Development of roadmap and co-design of a behavioural intervention as chosen in the workshop

October/November: broader dissemination workshop inviting other Higher Education organisations to share experiences and knowledge

2017:

NDDHO 2017: Nederlandse Dag voor Duurzaamheid in het Hoger onderwijs (Sustainability Day for Higher Education in the Netherlands)

(A yearly event organized by **SURFsara, GreenIT Amsterdam**, and Higher Educational institutes of the Netherlands.

Duneworks had a small table session inviting GOs to address the challenge of how to ensure continuity in efforts of student networks like Green Offices when we know that students joined those networks for ¾ - 1 years? The table discussion changed topic when the representative of the **GO Groningen** joined in. A year ago he joined our first workshop and we have had several skype calls afterwards. So he took the opportunity to tell us that our support has worked out quite well for the GO Groningen and that it has helped him in considering next steps, realising that you need to take small steps at a time, build a network, ensure that you are being heard, recognised and subsequently engaged by other 'Behaviour Changers'. One thing that has for instance changed is that the GO is now involved in all procurement activities (which is a good first step towards having influence on the decisions made there). It shows that the GO RUG is recognized as a partner by other 'Behaviour Changers' at the RUG.

Three students (**Wageningen University; Eindhoven University**) also joined this informal session where we discussed how to start making more sustainable (use of) ICT can become a focal point for GOs, so that they can mobilise staff and students who then subsequently help to exert pressure on the Board of Directors. The most important thing that we from our point stressed was that the students from GOs should not take up these challenges on their own, but rather start engaging with people at their universities that have knowledge, influence, interest, so that a network of Behaviour Changers can be built and so that the students do not get the feeling that they have to start everything on their own (which is impossible and undermines motivation).

Report Green Offices Workshop Working session ICT and e-waste

Utrecht, 30th of March 2017

Attendance: 9 students from student networks targeting sustainability; Duneworks (2 persons), **SurfSara** (2 persons)

On the 30th of March the first Green Offices Workshop was held on ICT and e-waste to support Green Offices in their efforts to make the ICT on their universities and HBO's more sustainable. The workshop was organised by Student voor Morgen, SurfSara and DuneWorks. The aim was to explore how student networks that target sustainability improvements at higher educational institutes are able and willing to address the topic of ICT, energy and sustainability at their own respective universities and how they can work together in this. Representatives from "Student voor Morgen" as well as Green Offices from **TU Delft, VU Amsterdam, University of Amsterdam, Leiden**, and **Groningen** were present to learn about the different ways one can green the chain of buying in, using and discarding ICT as well. During the workshop the following questions were addressed:

- Where are we now?
- Where do we want to go?
- How to make this change?
- How to collaborate and exchange between green offices and experts in the future?

Firstly, the partners gathered expressed their expectations and hopes for the outcomes of the collaboration. Some were curious about the ideas and ambitions of partners and wanted to find ways to create awareness on ICT and greening ICT in higher education. There was a lot of willingness to learn from each other and to get inspired. Some wanted to know how to get started, while others were wondering how they could take their plans further. The eventual goal is to get more institutions involved.

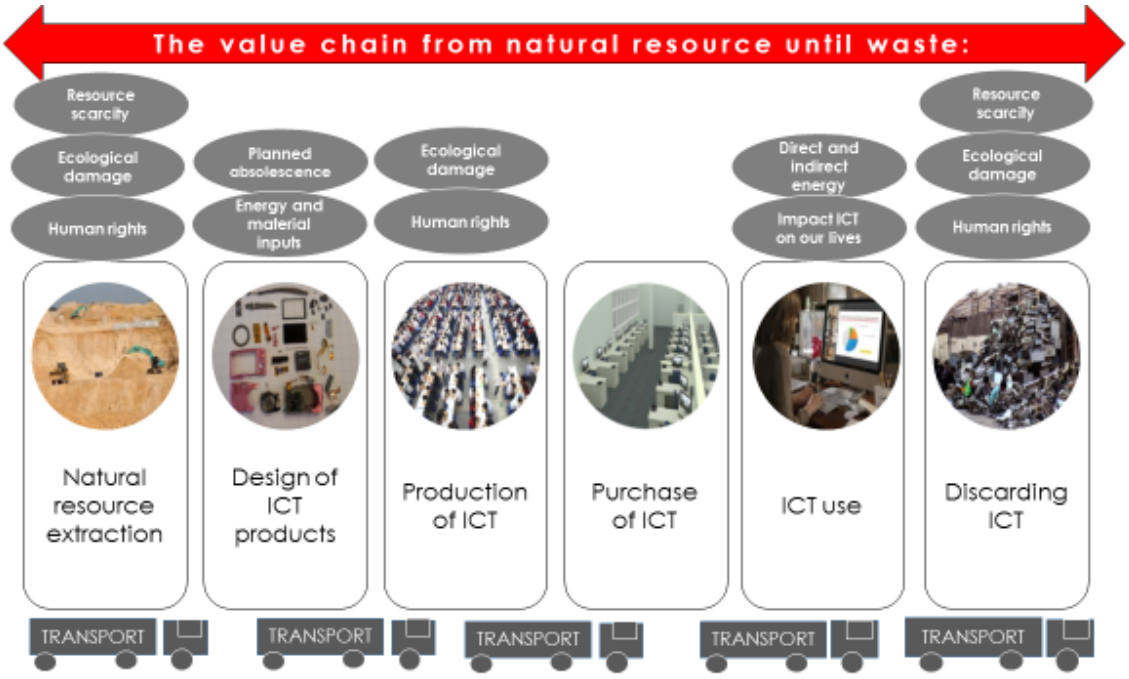

Figure 1 The bigger picture of ICT and sustainabilty

As part of answering the question 'Where are we now?' presentations were given by DuneWorks, SurfSara, Timmy, Dieu and RUG. Sylvia from DuneWorks gave a visual oversight of

the bigger picture of ICT and sustainability. How is it produced, how is it used and where does it go when it is being discarded? On all of these levels the chain can be made more sustainable by the choices that institutions make. One of the findings is that sustainable ICT makes more impact than energy saving. SURF teaches us that a large percentage of energy is used by data centres. These are often too old, too cold and too empty. It is therefore more sustainable to have new servers after a few years and to keep your phone for a longer period of time. Reading emails, replying them and forwarding them is less sustainable than everyone thought. Thirdly, Timmy discusses e-waste. He tells us that it is not always clear how much e-waste is going out and that reuse is better than recycling. By sharing best practices, institutions can be motivated to act. However, often ICT is not a top priority for institutions.

After the presentations, it was time for a brainstorm. Where do we want to go? A lot of Green Offices are still wondering how to get started. Some of the questions they have, were:

- Where can we really have an impact?
- With which concrete inventions in the areas of ICT procurement, use, discarding?
- How to start the conversation with e.g. people from the ICT department and other 'behaviour changers'?
- How to get others to move along with us?
- How to make students and staff more aware?
- How to develop a strategy?

Surf suggests to fill in their growth model to learn about the baseline situation as a point of departure, after which you can then determine your focus and formulate the steps you are going to take in order to get there.

Suggestions from Duneworks emphasised that it is important to realise for these students that it is not *their* job to find answers to all these questions. Instead they need to try and bring together various people from e.g. ICT, facilities management, procurement, etc. to get them to help in finding out what has already been done or is being planned for the near future; the interventions that people agree on easily; the sort of interventions are most feasible on the short -, medium- and longer term. It is important to mobilise the 'Behaviour Changers' next to the bottom-up mobilisation of staff and students

These themes have been discussed in the workshops. It is clear there is a need for concrete steps. For example, to motivate or activate people, it can be useful to start a pilot to have something concrete to show. A necessary first step is, however, to talk to managers and employees at the ICT department. Formulate a vision and tell people why you want this. Gather people around you who care about the subject, for example teachers and Behaviour Changers, and work together. To make a structural impact it is important to have ambassadors that promote green ICT and involve people. Organise a meeting with all those people that are interested.

At the end of the day it is important to decide on how we are going to take this further. One idea that came up is to set up a Manifesto that gives expression to the goals and aims of GOs in the area of making ICT more sustainable, as one way to ensure continuity of the collaboration. This continuity is a huge challenge as students usually joining a GO for one year and then are replaced. A second idea to ensure that knowledge does not disappear is to share all the documents online in google drive. A third solution is that every GO writes a year plan wherein it discusses ICT. The GO in Groningen will set up a document with best practices, so other GOs can add their practices. The topics that will be discussed in the future are: making a change in GOs and in institutions and making people more aware of the impact of ICT. New meetings have been planned at the end of the session. Some of them involve all the partners, but there are also some partners that like to meet in smaller groups. The GO's agree that meetings can be shorter in the future, but that we needed to get some common ground today.

A follow up was organised to take place on June 20th (skype) and that from there on, regular meetings will be held to further build commitment, develop ideas, exchange experiences and ensure continued attention and effort for improved sustainability and ICT in higher education.

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IEA Demand Side Management Energy Technology Initiative

The Demand-Side Management (DSM) Energy Technology Initiative is one of more than 40 Co-operative Energy Technology Initiatives within the framework of the International Energy Agency (IEA). The Demand-Side Management (DSM) Energy Technology Initiative, which was initiated in 1993, deals with a variety of strategies to reduce energy demand. The following member countries and sponsors have been working to identify and promote opportunities for DSM:

Austria	Norway
Belgium	Spain
Canada	
Finland	Sweden
India	Switzerland
Ireland	
Italy	United Kingdom
Republic of Korea	United States
Netherlands	ECI (sponsor)
New Zealand	RAP (sponsor)

Programme Vision: Demand side activities should be active elements and the first choice in all energy policy decisions designed to create more reliable and more sustainable energy systems
Programme Mission: Deliver to its stakeholders, materials that are readily applicable for them in crafting and implementing policies and measures. The Programme should also deliver technology and applications that either facilitate operations of energy systems or facilitate necessary market transformations

The DSM Energy Technology Initiative's work is organized into two clusters:
The load shape cluster, and The load level cluster. The 'load shape" cluster will include Tasks that seek to impact the shape of the load curve over very short (minutes-hours-day) to longer (days-week-season) time periods. Work within this cluster primarily increases the reliability of systems. The "load level" will include Tasks that seek to shift the load curve to lower demand levels or shift between loads from one energy system to another. Work within this cluster primarily targets the reduction of emissions.

A total of 24 projects or "Tasks" have been initiated since the beginning of the DSM Programme. The overall program is monitored by an Executive Committee consisting of representatives from each contracting party to the DSM Energy Technology Initiative. The leadership and management of the individual Tasks are the responsibility of Operating Agents. These Tasks and their respective

Operating Agents are:
Task 1 International Database on Demand-Side Management & Evaluation Guidebook on the Impact of DSM and EE for Kyoto's GHG Targets – *Completed* Harry Vreuls, NOVEM, the Netherlands

Task 2 Communications Technologies for Demand-Side Management – *Completed*
Richard Formby, EA Technology, United Kingdom

Task 3 Cooperative Procurement of Innovative Technologies for Demand-Side Management – *Completed*
Hans Westling, Promandat AB, Sweden

Task 4 Development of Improved Methods for Integrating Demand-Side Management into Resource Planning – *Completed* Grayson Heffner, EPRI, United States

Task 5 Techniques for Implementation of Demand-Side Management Technology in the Marketplace – *Completed* Juan Comas, FECSA, Spain

Task 6 DSM and Energy Efficiency in Changing Electricity Business Environments – *Completed*
David Crossley, Energy Futures, Australia Pty. Ltd., Australia

Task 7 International Collaboration on Market Transformation – *Completed* Verney Ryan, BRE, UK

Task 8 Demand-Side Bidding in a Competitive Electricity Market – *Completed*
Linda Hull, EA Technology Ltd, United Kingdom

Task 9 The Role of Municipalities in a Liberalised System – *Completed* Martin Cahn, Energie Cites, France

Task 10 Performance Contracting – *Completed* Hans Westling, Promandat AB, Sweden

Task 11 Time of Use Pricing and Energy Use for Demand Management Delivery- *Completed*
Richard Formby, EA Technology Ltd, United Kingdom

Task 12 Energy Standards - To be determined

Task 13 Demand Response Resources - *Completed* Ross Malme, RETX, United States

Task 14 White Certificates – *Completed* Antonio Capozza, CESI, Italy

Task 15 Network-Driven DSM - *Completed* David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 16 Competitive Energy Services Jan W. Bleyl, Graz Energy Agency, Austria / Seppo Silvonen/Pertti Koski, Motiva, Finland

Task 17 Integration of Demand Side Management, Distributed Generation, Renewable Energy Sources and Energy Storages Seppo Kärkkäinen, Elektraflex Oy, Finland

Task 18 Demand Side Management and Climate Change - *Completed*
David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 19 Micro Demand Response and Energy Saving - *Completed* Linda Hull, EA Technology Ltd, UK

Task 20 Branding of Energy Efficiency - *Completed*
Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 21 Standardisation of Energy Savings Calculations – *Completed* Harry Vreuls, SenterNovem, Netherlands

Task 22 Energy Efficiency Portfolio Standards – *Completed* Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 23 The Role of Customers in Delivering Effective Smart Grids - *Completed*
Linda Hull, EA Technology Ltd, United Kingdom

Task 24 Phase 1: Closing the Loop: Behaviour Change in DSM – From theory to practice
Dr Sea Rotmann, SEA – Sustainable Energy Advice Ltd, New Zealand and Dr Ruth Mourik, Duneworks, Netherlands – *Completed*

Task 24 Phase 2: Behaviour Change in DSM - Helping the Behaviour Changers
Dr Sea Rotmann, SEA – Sustainable Energy Advice Ltd, New Zealand

Task 25 Business Models for a more Effective Market Uptake of DSM Energy Services
Ruth Mourik, DuneWorks, The Netherlands

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Also, visit the IEA DSM website: http://www.ieadsm.org