Belfast (Colin) 'City-zen Roadshow' REPORT

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NEW URBAN ENERGY

Belfast (Colin) Roadshow REPORT

DELIVERABLE D9.13

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5	Alliander	LIAN	NL
6	HESPUL Association	HESP	FR
7	The Queens University of Belfast	QUB	UK
8	Th!nk E	THNK	BE
9	KEMA Nederland BV	KEMA	NL
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11	Stichting Waternet	WAT	NL
12	Greenspread Projects BV (subject to reservation, provided acceptance by EU)	GREE	NL
13	Sanquin (subject to reservation, provided acceptance by EU)	SANQ	NL
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20	Compagnie de Chauffage Intercommunale de l' Agglomeration Grenobloise	CCIA	FR
21	Gaz Electricite de Grenoble	GEG	FR
22	SAS ATOS Worldgrid	ATOS	FR
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ABSTRACT

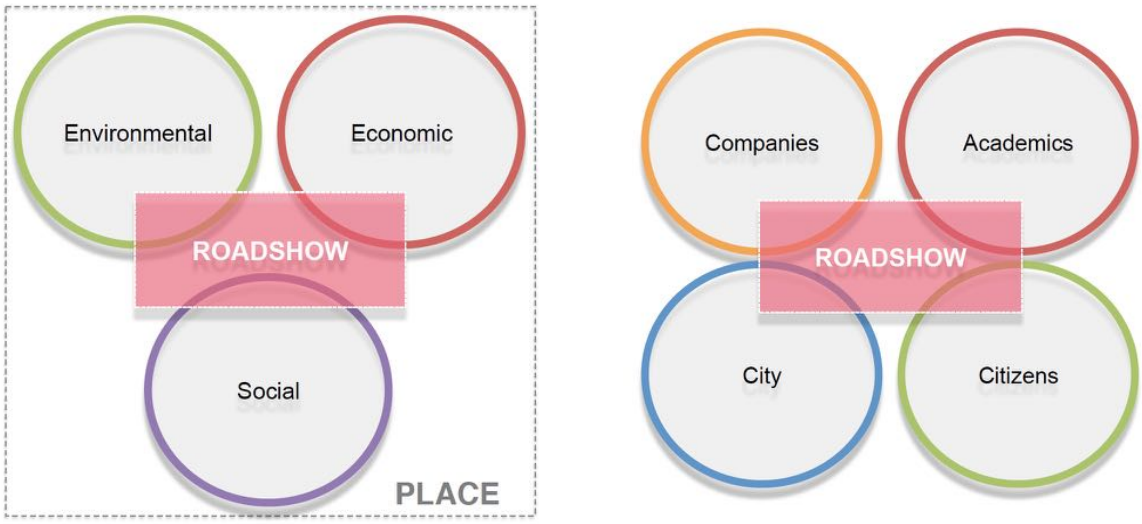
The City-zen Roadshow travels with a team of internationally recognized experts, in the field of energy planning and design to help develop a sustainable agenda for cities and their neighbourhoods. It will visit 8 cities in total over a 4-year period who are seeking expert guidance on how to become more sustainable and wish to move towards energy neutrality invite the Roadshow. The overall aim of the Roadshow team, known as 'Roadies', is to work closely with people from the hosting city, whether they be city leaders, energy planners, local architect, professionals, academics, students and of course the citizens themselves. The Roadshow will spend 5 days in each hosting city to deliver energy and urban design workshops in which all local stakeholders are welcome and encouraged to join and to take ownership of the final outcomes. Outcomes that will allow the cities recourses, both people and energy, to be directed effectively, by highlighting the energy challenges and potentials to be found in their neighbourhoods, and to finally present a sustainable city vision.

The following report will describe the activities and outcomes of the Roadshow that took place in Belfast between the 18th & 22nd of January, in specifically in the neighbourhood of Colin (West Belfast).

TABLE OF CONTENTS

CHAPTER 1 – Introduction

This report will describe the Belfast Roadshow, the methods undertaken, and the 'City Vision' that resultant. A Roadshow brings various city stakeholders to work closely with international experts in the field of sustainability in order to jointly propose a sustainable vision (*Fig 1*). City engagement is an exciting, but challenging prospect. Many questions arise at the beginning of this Roadshow journey, it is far from an exact science to get to a meaningful vision. Any vision must have the power to inspire and potentially be advanced and realised beyond any Roadshow visit. So, who are 'the City'? What are the city's sustainable expectations and current position? What is the energy demand, current and future? Where are the urban challenges, are they purely energetic, spatial or a combination of both? Does 'the City' even realize or accept they have challenges, despite its willingness to be sustainable and to collaborate?



(a) *(b)*

Fig. 1. *(a) The Roadshow investigates Environmental, Economic and Social aspects of each Roadshow city to develop a 'City Vision' that is specifically tailored to respond to place. (b) The Roadshow team brings together all stakeholders, it facilitates this 5-Day event to propose a sustainable 'City Vision' that is 'owned' by the City itself.*

To answer these, and many other questions, the Roadshow team began a process of identifying the cities that need and want our advice. This process of first contact will be described in CHAPTER 2. This primarily describes an educational workshop studio that occurs in the months leading upto the Roadshow, known as the SWAT Studio. This section also describes a Roadshow 'Test' that took place in Amsterdam in which SWAT students collaborated with the Roadshow team and an audience of invited City-zen consortium members. This workshop gives the opportunity for an extended and detail discussion with city leaders and actors. CHAPTER 3 describes the '5-Day' methodology on a day-to-day 'themed' basis facilitating an evolution of a vision in which expert input is delivered at key points throughout the five days. CHAPTER 4 will visually communicate what activities and input took place during the Roadshow. A Roadshow is not intended to be a one-way street of information and

ideas; the Roadies openly invite 'the City' to present current and future design proposals and energy strategies. They go out of the studio to see various initiatives and to meet with their members. The final outcomes of the Roadshow are graphically presented in CHAPTER 5, this describes design strategies and detail proposals that are qualitatively spatial and quantitatively energy focused, both combine to make the vision itself.

The Roadshow travels to cities selected for having diverse climates, urban typologies, economies and cultural backgrounds. As the Roadshow moves from 'City-to-city' it is important that the way a Roadshow is put together is evaluated from early preparation to final vision and beyond. This is a unique opportunity to shape the method into a higher effective and dynamic means of citizen engagement and empowerment on a European scale.

1.1. ROADSHOW AIMS

Roadshow 'Aims':

- The City-zen Roadshow travels the length and breadth of Europe to define sustainable visions for cities, its neighbourhoods & citizens.
- In total 8 cities will be visited over the next 4 years, each Roadshow consisting of a 5-day event in which a Roadshow Methodology/format will be implemented. The experiences of each Roadshow will advance the Methodology, which in itself will be a deliverable that can be used on all cities in the future to help define a city's sustainable vision.
- That the sustainable 'city vision' helped defined by the Roadshow Methodology comes from, and fully belongs to, the city itself. City vision ownership is critical, as a city vision developed exclusively by the Roadshow team, and not by the multidisciplinary city stakeholders, would physically and metaphorically leave with the Roadshow as it moves onto the next city.

1.2. GOALS

- To engage with citizens in each host city. Once specific sites/zones are earmarked for city and Roadshow intervention the community leaders and associations belonging and active in those areas will be invited to participate with the projects and tasks of the 5-day event.
- To identify, reach and collaborate with city 'decision makers'. To exchange knowledge with all parties and to involve students in the process, both in pre-Roadshow preparation (SWAT Studio, Energy data WP4).
- To build a network of Roadshow host cities and scientific community.

General goals:

- **Contribute to Lighthouse idea**, to convince the audience that the demonstration is innovative and contributes to the sustainability targets. (EC Objective).
- To promote City-zen as a leading project in the EU. (Consortium-wide Objective).
- Engage with the audience through follow-up activities. (consortium-wide, ASC Objective)

1.3. TARGET AUDIENCE

City-zens:

- The most important target group is citizens in neighbourhoods of the host City. Citizens are defined by the Roadshow as community leaders/influencers & decision-makers.

Business & industry:

- Industry is encouraged to co-visit the cities during the Roadshow.

Students:

- The Roadshow and pre-Roadshow (SWAT Student Studio) will engage with students from the academic institutions from the hosting cities. 600 students across the EU by visiting local universities during the Roadshows (Deliverable).

Housing Corporations:

- The Roadshow offers possibilities for direct contact, knowledge and experience exchange, between the City-zen team and EU- colleagues.

Cities:

- Potential new cities and past Roadshow cities. This could occur through invitation to 'final day' Roadshow city vision presentations. This potential network being a catalyst for further reaching/wider community of European cities.

Decision makers:

- Target a face-to-face experience and knowledge exchange of another 450 decision makers (together with field visit and serious role playing game) (Deliverable).

CHAPTER 2 – FIRST CONTACT: Pre-Roadshow Preparation (SWAT Studio)

2.1. WHAT IS SWAT?

SWAT is a student workshop where Building Technology students from the Delft University of Technology develop and propose in groups innovative, sustainable and contextually responsive urban design interventions. It is the precursor to the Roadshow. It forges pre-Roadshow relationships with key city stakeholders, investigates project sites, and prepares timetables and studio venues.

A sustainable urban design workshop was successfully completed in Belfast by TU Delft's 'SWAT Studio, Roadshow specialists and staff and students from Queens University Belfast (QUB). Developed as a precursor to the Belfast Roadshow in January 2016, the SWAT Studio made positive connections with Belfast's stakeholders, academics and Sustainable Development Managers from the Belfast City Council. Preparations and input for the Roadshow would also be bolstered by the 2-week 'onsite' workshop visit.

A key ambition of the workshop is to demonstrate that, through building interventions at all scales ranging from façade, building, street, neighbourhood and district, that sustainable lifestyles are possible within existing cities. The final design outcomes of the 2-week event will be presented to city stakeholders, local municipality leaders and other invited guests.

AIMS:

- Engages with Roadshow City in advance of Roadshow (typically 1.5 months before DAY 1 of Roadshow.
- To produce technological responses of merit informed by urban context.
- To visually demonstrate that CF&S are mutually dependent specialisms capable of generating sustainable city form at all scales and latitudes.
- To demonstrate that sustainable lifestyles are possible within existing cities.

2.2. SWAT IN BELFAST (& AMSTERDAM) 14/09/15 – 25/09/15

SWAT landed in Belfast and worked in collaboration with both Queens University Belfast (QUB) and Belfast City Council (*Figs 2 & 3*). A parallel studio also took place during the same period in Amsterdam at the Institute for Advanced Metropolitan Solutions (AMS), this would be the 'Test' Roadshow for the forthcoming Belfast Roadshow (*Fig 4*). Both studios begin a process of design intervention and innovation at various city scales. Both parallel events would promote and explain the Roadshow from within the City-zen consortia and what would become the 'First' Roadshow city – Belfast.

Fig. 2. *Selection of SWAT Workshop design proposals outlining future visions for Belfast.*

Fig. 3a. *SWAT Studio on location at Queens University Belfast and in the Botanic Avenue area of Belfast. Lower images show the students presenting their final design to the Botanic neighbourhood during a community event. Local journalists and TV documented the students work. The relationship that SWAT made with the local community over the 2-week work exemplifies SWAT and would later inspire the Roadshow, whose aims and intentions are identical.*

Fig. 3b. *Community leaders, families and local councillors attended the event, continuing the discussion of how the community would like to see itself sustainably grow into the future. A fun and productive day was had by all. The international students from TU Delft made friends with the local inhabitants who had brought them into their community for 2 weeks.*

Fig. 4. *The City-zen Amsterdam 'Field-Trip' visits the Roadshow 'Test' at AMS. The audience later offering feedback and advice to the student following their presentations.*

CHAPTER 3 – The Roadshow '5-Day' Methodology

3.1. FIVE DAYS

Figures 5 to 8 graphically illustrates the 5-day Roadshow that took place over January 2016 in Belfast. As can be seen under the 'Pre-Roadshow Analysis', the SWAT Studio began months prior to the Roadshow start. Both the SWAT and the Roadshow were designed to be intensive events that optimized 'time', 'communication & explanation', 'local city participation' and 'outcomes'. Components (lectures, site excursions, design workshops and mini-masterclasses) within the 5-Day were timed at key points within the week in order to derive key sustainable propositions and to evaluate them. The outputs, which were synchronised with specific Roadies specialisms in energy and urban design, were both qualitatively spatial and quantitatively energy focused, and combined to form the City Vision on the final day (Day 5).

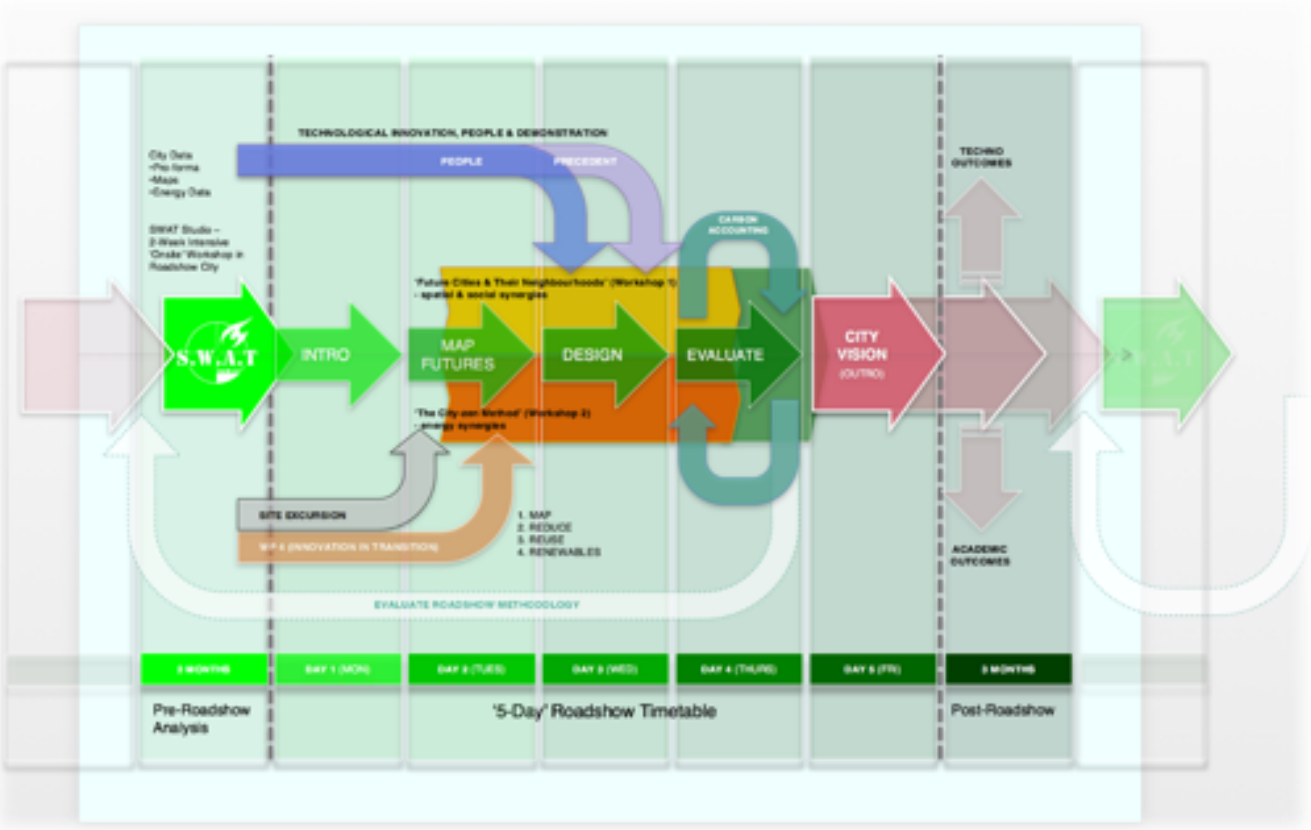


Fig. 5. *The Colin (Belfast) Roadshow 5-day schedule. The outcomes of the SWAT Studio being the starting point of the Roadshow.*

Fig. 6. *The Colin (Belfast) Roadshow 5-day Timetable. The 'Technical Tradeshow' and the 'Future Technologies' Lecture timetabled for Days 2 & 3 respectively were cancelled. All other components of the Roadshow would be successfully completed.*

Fig. 7. *Introductory 'Pitches' on DAY 1, Venue: The Colin Community Hub, the HQ base of the Roadshow for the 5-Days. 'Pecha Kucha' presentations by the Roadies inform the Roadshow audience of what will take place over the next 5-Days. Belfast stakeholders also contributed on the day with presentations that outlined Belfast's past, present and future aspirations. This would be critical input that helped identify the environmental and political context, a key contributor being Clare J McKeown, the Sustainable Development Manager, Health and Environmental Services, Belfast City Council (Far right image).*

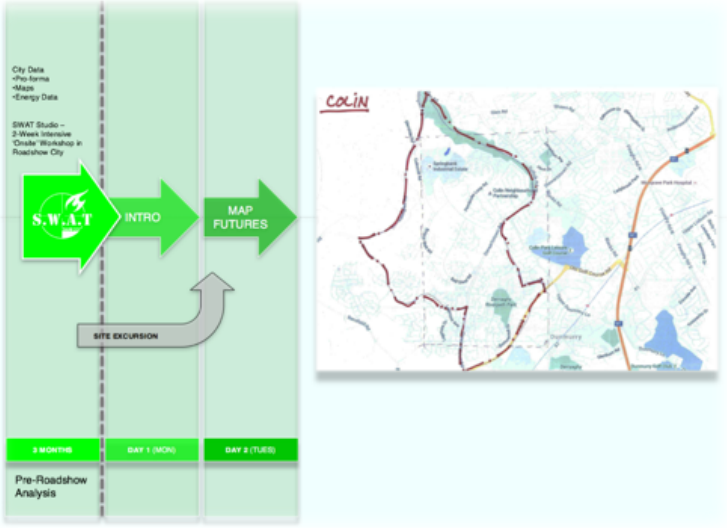


Fig. 8. *The Site Excursion (DAY 2). The neighbourhood of Colin is highlighted to show the boundaries of the project area. Middle image shows the Colin Community Hub, kindly donated by the Community group to the Roadshow. The HUB was to be the home of the Roadshow for 4 Days. The lower images showing the Roadies preparing for the excursions, two groups (representing Workshops 1 & 2) going out into the community for the first time together to identify the challenges and the steps needed to resolve them sustainably.*

CHAPTER 4 – Daily Activities & Roadies 'Out & About'

4.1. DAILY ACTIVITIES

Architects, councillors, various action groups/committees the general public visited the Roadshow HQ at the 'Colin Community Hub' each day. The 5-Day programme was devised in such a way to encourage participants to 'drop-in' and 'drop-out' so that the Roadshow workshops and mini-masterclasses could fit into their professional and family schedules, a strategy that would increase city involvement and bolster involvement later in the week.

Fig. 9. *The Roadshow would seek to engage with all demographic groups and urban initiatives in the hosting city of Belfast. The top left image shows James Hennessy from the Strategic Investment Board visiting the Roadshow and presenting urban schemes the Colin area. The upper centre and right images depict a selection of developmental sketches and plans produced during the Roadshow each day to progress the city vision at the spatial and social scale. The Lower image shows the Roadshow visiting St Colm's High School in Colin on DAY 4. St Colm's High School became the Roadshow base on DAY 4, the Roadies having the opportunity to demonstrate to the students how cities can be more energy efficient. The students became active participants the project and contributed with sketches that would be included in the final City Vision presented on DAY 5.*

4.2. 'ROADIES' OUT & ABOUT

The Roadshow met with the Colin Neighbourhood Partnerships 'Colin Allotments' project to discuss the ideas and objectives of local food production and how this can be beneficial for social integration and a healthy lifestyle. The energy and dedication of the people who run the project would be an inspiration for the Roadies in terms of design themes and personal motivation.

Fig 10. *The Roadshow meets The Colin Neighbourhood Partnership 'Colin Allotments' on DAY 2 of the excursion. A showcase at the heart of the Colin community, the Colin Allotments has plans to extend. The main Building at the centre of the allotments (constructed from recycled shipping containers) would later host the final presentation of the Roadshow City Vision on DAY 5, a fitting venue that epitomized the progressive and social spirit of the local community and the Roadshow.*

CHAPTER 5 – WORKSHOPS & MINI-MASTERCLASSES: Aims, Methodology, Scope & Roadie Reflections

5.1. INTRODUCTION

Through multidisciplinary group working and interactive sessions, the Belfast Roadshow would both engage citizens with innovative technologies and their application, with a wider aim of facilitating the development of a sustainable city strategy plan. 'Drop in' sessions allowed participants to become familiar with practical technologies and their applications, as well as their strategic implications during the design making process. Travelling with the Roadshow is an experienced team of internationally renowned sustainability experts, whose specialisms will combine with multidisciplinary stakeholder groups and students from each hosting city (*Fig 10*).

Fig 10. *The Roadshow team, known as the 'Roadies'.*

The Roadshow used 2 contextually dependent approaches, which manifested themselves into 2 parallel workshops, one focusing on energy synergies, the other being a creative design project that responded to spatial & social questions. These approaches would overlap during each day to develop a holistic 'City Vision', 'owned' by the city. Specialists in the field of Carbon Accounting and evaluation would supplement the workshops at key intervals throughout the 5-Days with 'Mini-Masterclasses'.

Students from Queens University Belfast, who successfully participated in the Belfast 'SWAT Studio' in September 2015 would act as 'facilitators' for each workshop. Facilitators would support the workshop with visualizations and calculations. This Chapter will summarize each Workshop & Mini-Masterclass that took place over the 5-Days.

5.2. WORKSHOP 1: 'FUTURE CITIES & THEIR NEIGHBORHOODS' - SPATIAL & SOCIAL SYNERGIES

Introduction

Workshop 1 would run throughout the 5-Days in Belfast, it's daily aim being to inspire people to imagine a more sustainable future, one that embraces the best of new technology in a way that is life-enhancing. The workshop would encourage free-thinking open-ended discussions about how things should be.
The workshop engaged stakeholders with new ideas for how we will live in the future. It would imagine new life-styles and then develop strategies to achieve these that open up possibilities for communities to change the way they live. The workshop began with an envisioning session about the future, and quickly moved onto designing the infrastructure necessary to achieve these visions. Once the infrastructure was developed a phased strategy would be proposed to achieve these goals.

1. Task 'Aim' & 'Objectives'

The design part of the Roadshow has clear objectives in that it aims to kick-start carbon descent through the development of a series of options for the neighborhood. In the first 'Test' Roadshow in Amsterdam, there was too much separation between the urban design and the energy design teams (Workshop 2). In Belfast they worked more closely to create better, and more joined up thinking.

2. Methodology

The workshop had a clear timetable, which had a reasonable ethos, however the structure and flexibility of the workshop could be adapted to deal with issues that may occur. This will be responded to in time for the next Roadshow in Izmir (Turkey). The ecological footprinting work conducted during the 'Mini-Masterclass 2 - Carbon Accounting Explained' event was particularly beneficial in that it set up the discourse. For future Roadshows it maybe an advantage to put more energies into this before the Roadshow arrives, so that starting point can be clearly made. Workshop 1 would then be able to use the foot printing to test scenarios as it goes along.

3. Scope & Limitations

The scope was holistic and arguably over challenging for a typical consultancy team to resolve, however the Roadshow team offered a service that is unmatched currently.

4. Workshop Outcomes

The last day consultation was excellent and feedback has been good. Since the workshop, Prof. Greg Keeffe (Workshop Leader) has presented the work to the Colin Neighborhood Partnership who were incredibly enthused. They welcomed the alternative view of where they might go, which had a much wider remit and longer timescale than the work of consultants. Prof. Keeffe (Professor of Sustainable Architecture and Director of Research at Queens University School of Architecture) is continuing to liaise and work with the Colin Neighbourhood Partnership.
On the 29th January 2016 Prof. Keeffe met with the Chief Planner of Belfast City Council to discuss the design as model for all neighborhoods in Belfast. Furthermore, a meeting with in the Chief Executive of the Council in which the City Vision will be presented has been arranged for April 2016. A meeting with the Strategic Investment Board Urban Villages programme, which is a Government body, to look at procurement for the scheme has also been planned. A summary of outcomes will be graphically described in Chapter 6 'The City Vision'.

5. Roadie Reflections

A summary of reflections from Workshop 1 that will benefit the future Roadshows:

- To complete the ecological foot printing pre-Roadshow visit in order to set the context more quickly.
- To recruit at least 6 student 'facilitators' from the hosting city, preferably from the SWAT Studio.
- To include the 'Trade-show' and 'Serious game' events into future Roadshows.
  Both events did not take place at the Belfast Roadshow. The format and content of each event is yet to be proposed by the Leaders of each component. It would be beneficial for future Roadshows that Partners of other work-packages, namely the Industrial partners, be more directly involved with the 'Trade-show' element of the Roadshow. A previous concern was how many consumers would be present at a Roadshow to benefit from such a 'Trade-show', however, considering the type and scale of equipment the City-zen project is advocating, i.e. smart grids, inter-seasonable stores, large scale ground source heat pumps, deep renovation technologies, the customer is actually either 'the city' or the neighborhood itself, not an individual householders, thus the 'Trade-show' need only be attended by a few key people. Other ideas would be to continue with a 'Future Technologies' Lecture, a component that also was scheduled but was not delivered. It is the intention to deliver a 'Future Technologies' Lecture in the following Roadshow on DAY 1 in Izmir in order to set the energy opportunities regarding technology.
- A Social event for the team and stakeholders to attend in the evening of DAY 1 or 2. This would help build connections and relationships with the hosting city at the commencement of the Roadshow.

5.3. WORKSHOP 2: 'THE CITY-ZEN METHOD'

Introduction

The aim of Workshop 2 was to make an Energy Master Plan for the neighborhood of Colin; to identify existing and implementable sustainable interventions and actions that lead the area to a high level of sustainability. The objectives were to map demand and sustainable energy potentials for the area, analyze the region on social, political and economic climate, select potential suitable measures and find fitting locations and timelines to integrate them. The format of the workshop was an interactive workshop that ran for the full 5 Days with specialists, local authorities and students.

1. Task 'Aim' & 'Objectives'

The goal of the energy part of the Roadshow team was to define suitable energy interventions that fit the neighbourhood or city. These would be based an understanding of local energy potentials, the social, economic and politic circumstances.
A major challenge in Colin was to transcend the difficult post-conflict and social deprivation context in order to arrive at both socio-economic improvements and new energy conservation and generation strategies.

2. Methodology
In work package 4 (WP 4) of the City-zen project, a general urban energy transition methodology is being developed this is based upon previously established methodological frameworks such as energy potential mapping, carbon accounting, multimodal system analysis and integrated urban

planning concepts. A shortened version of this methodology was applied within workshop 2 allowing the WP4 methodology to benefit from Roadshow experiences.

3. Scope & Limitations

Social deprivation and post-conflict tensions that continue to define much of the daily life conditions in and around Colin affected the accessibility to local stakeholders to some degree. Economic means are limited and administrative procedures are heavy and complex. Within this context, the scope was to propose positive development scenarios that reconcile energy concerns with urban and socio-economic uplifting.

4. Workshop Outcomes

The outcomes of workshop 2 would be 10 future energy scenario outlines for different Colin neighbourhoods. Energy efficiency measures (building retrofit) would be being combined with renewable energy provision and storage in a mutually coherent strategy. Each combination of energy measures was quantified and dimensioned for the specific location; starting from initial energy demand and CO2 emissions (step 0), and ending with full zero-energy systems. The scenarios are finally connected with a vision of integrated sustainable urban development. All scenarios will be graphically illustrated in Chapter 6 'The City Vision'.

The final 'City Vision' would go onto to explain 10 scenarios, this opening up horizons for future (sustainable) developments in Colin, but possibly also for the wider Belfast context. From the positive reactions received it can be concluded that these ideas will be advanced by further study and possible implementation. As described previously Prof. Keeffe will take on the follow-up of the City Vision in close collaboration with actors in Belfast.

5. Roadie Reflections

The technological outcomes will become part of a catalogue of urban energy measures that will be an essential component of the framework and the City-zen methodology.
Together with the forthcoming Roadshow in Izmir, and the many following Roadshow cities, valuable insights and information will be produced and used for academic outcome (papers etc…).
As yet no official and budgeted city 'follow-up' is scheduled as part of the Roadshow methodology.

5.4. MINI-MASTERCLASS 2 – 'CARBON ACCOUNTING EXPLAINED'

Introduction

This Mini-Masterclass set out a general approach for estimating the potential effects of measures to be implemented in urban districts, in terms of carbon footprint mitigation and compensation. The study focused on building technologies, mobility, green assets and citizen behavior. After a short introduction on the objective of carbon footprint mitigation and compensation, including the long-term goal of carbon neutrality, measures for district retrofitting would be discussed and the proposed solutions assessed.

1. Task 'Aim' & 'Objectives'

The 'carbon accounting' task aims to provide evidence of the current state of urban districts in terms of environmental (un)sustainability based on reliable measures. The main objective is to measure

how far neighbourhoods are from the condition of sustainability. Selected indicators, among others, are:

1. The Carbon Footprint (i.e. greenhouse gas emission due to energy use, mobility and waste management of households) given in kg CO_2-eq.
2. The Ecological Footprint (i.e. comprehensive surface of earth ecosystems needed to support the local population) given in global hectares. In particular, the carbon footprint is assessed to perform a predicted evaluation of carbon footprint mitigation/compensation scenarios.

2. Methodology

After introducing concepts and units of carbon accounting, a catalogue of sustainable measures was briefly presented and discussed, including renewable technologies, at both the building and the neighbourhood scale, and other integrated measures concerning mobility, waste management, green assets. This catalogue is to be further edited and integrated during future Roadshows as part of the WP4 methodological framework/roadmap. Data was collected on the Colin neighbourhood in order to perform a simplified assessment of both the carbon and ecological footprint per household and then extended to the whole district and the energy retrofitting scenarios.

3. Scope & Limitations

The scope of the carbon accounting is to provide a quantitative evaluation of the energy retrofitting scenarios and to contribute to decision making. In Belfast, data was to be collected per household (energy labels were available on line) considering that the Colin district is a residential area mostly composed of similar detached houses. This homogeneity allowed the households to serve as functional units. Future Roadshow's will focus on neighbourhoods with different classes of buildings and urban functions and less availability of data. This will require a more flexible approach, starting from a set of (not just one) functional units, such as different classes of households and other not residential functions.

4. Workshop Outcomes

The following outcomes were achieved:

- Carbon footprint assessment per household i.e. 5.92 t CO_2-eq/yr due to 93% energy, 3% mobility, 3% waste management.
- Ecological footprint assessment per household i.e. 1.51gha due to energy, mobility and waste.
- Ecological footprint of the whole Colin district i.e. 13,951gha (almost 9259 households and 24,800 inhab.) equivalent to a 6.7km ray circle.
- Carbon mitigation/compensation scenarios were addressed by an ex-ante evaluation and properly designed to achieve a zero energy/carbon neutral condition.

The carbon accounting task provided a quantitative evaluation, besides qualitative, of the energy retrofitting scenarios and contribute to support decisions. The catalogue of urban energy retrofitting measures is part of the methodological framework to be developed in WP4 as a reference roadmap for interventions in urban neighbourhoods.

5. Roadie Reflections

Once Roadshow tested, outcomes from the simplified accounting methodology can potentially be subject matter for scientific papers and the 'Book of inspiration'. The requirement to perform quick,

simplified, but reliable assessment, and to finally communicate those scenarios to a local community is an ambitious but worthy challenge. Roadshow outcomes should serve as a template for wider dissemination. The City Vision of one Roadshow city, becoming the point of departure for the next Roadshow city in terms of expectation, commitment and requirement.

CHAPTER 6 – THE CITY VISION

6.1. FINAL PRESENTATION AT 'COLIN ALLOTMENTS'

The final day of the Colin (Belfast) Roadshow took place in the Colin Neighbourhood Partnership 'Colin Allotments' building. A fitting venue located at the edge of the Colin Neighbourhood. The final 'City Vision' presentation was presented to a diverse audience comprising of Belfast's academic leaders, professionals, students, members of the Sustainable Development team at Belfast City Council, Councilors, community leaders from Colin and wider Belfast and Colin's own citizens.

Fig 7. *The Final 'City Vision' event (DAY 5) at The Colin Neighbourhood Partnership 'Colin Allotments' building. The venue normally serves as a community educational facility for local food production and preparation. The photograph here shows the passionately in-depth discussion that took place between the city stakeholders and Roadies following the final presentations.*

The 'City Vision' would take the form of three overlapping presentations. The first presentation went onto outline the objectives of the City-zen project generally, and specifically the ambitions and format of the Roadshow. The second presentation described the results of Workshop 1. The content would be qualitative in nature and included urban planning intervention proposals at the neighborhood scale, spatial and social strategies and a methodological urban design blueprint, entitled 'The 9 Laws of Colin', which summarized contextual, programmatic and sustainable guidelines for sustainable urban intervention. The third and final presentation would be more quantitative focused on energy strategies, energy scenarios and carbon footprinting evaluations. The

'City Vision' would be well received by the audience, and the catalyst for in-depth debate between all the stakeholders and Roadshow team. Members of the Roadshow team will follow-up the 'City Vision' post-Roadshow. In addition, arrangements have been made to present the City-zen Roadshow 'City Vision' to the Strategic Investment Board Urban Villages programme, which is a Government body, to look at procurement for the scheme.

6.2. CITY VISION (THE PRESENTATION)

The following 'City Vision' presentation was delivered at the Colin Neighbourhood Partnership (Colin Allotments) on the 22nd January 2016.

CITY-zen
New urban energy

Co-funded by the European Union's Seventh Programme for research, technological development and demonstration

CITYZEN INVOLVEMENT

The goal is to **motivate** and **empower end-users** to a long term energy saving attitude via:

- serious games
- an energy savings challenge
- monitoring their own energy
- retrofitting houses
- usage of district heat and cold sources
- using an electrical car to store energy
- using home batteries to increase self consumption of solar power
- **Roadshow**

‘The Colin Sustainable Vision’

‘The COLIN Roadshow’ - Belfast

Presented
by
Dr Craig Lee Martin (TU Delft)

THE COLIN SUSTAINABLE VISION

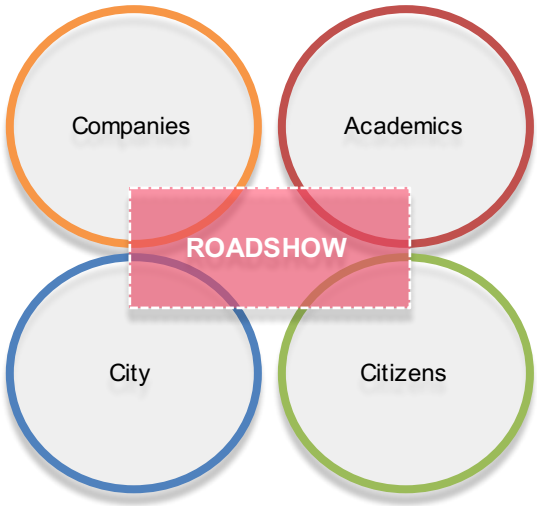
BACKGROUND

- Context for roadshow: The Trias Energetica

THE COLIN SUSTAINABLE VISION

BACKGROUND

- Context for roadshow:



THE COLIN SUSTAINABLE VISION

BACKGROUND

- Roadshow activities & events over the 5 Day programme include:

  Energy Mapping

  Design workshops

  Mini-Masterclasses

  Future Innovation Technology lectures

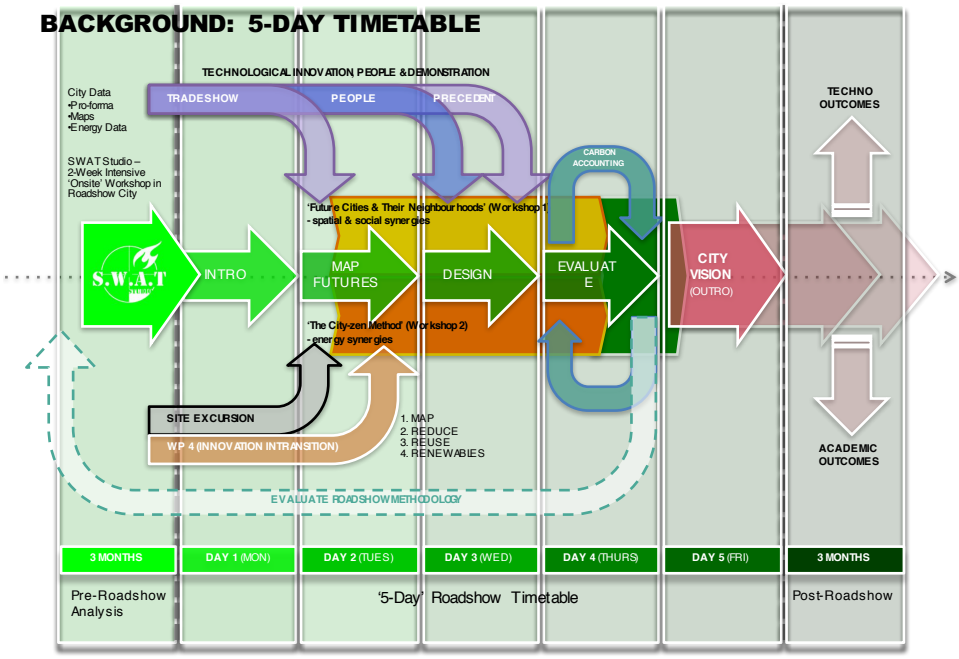
  Tradeshows

  Carbon Accounting

  Serious Gaming

  ITS NOT A COMMUNITY CONSULTATION SESSION!

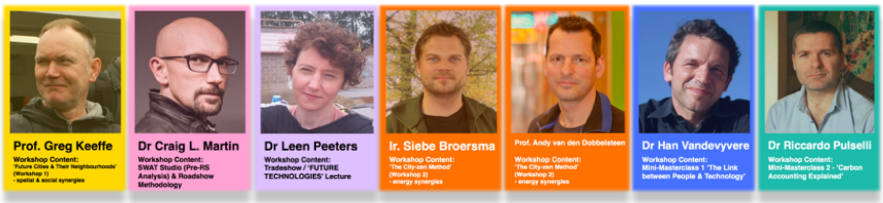
BACKGROUND: 5-DAY TIMETABLE



THE COLIN SUSTAINABLE VISION

THE 'ROADIES':

- Travelling with the Roadshow is an experienced team of internationally renowned sustainability experts, whose specialisms will combine with multidisciplinary stakeholder groups and students from each hosting city.



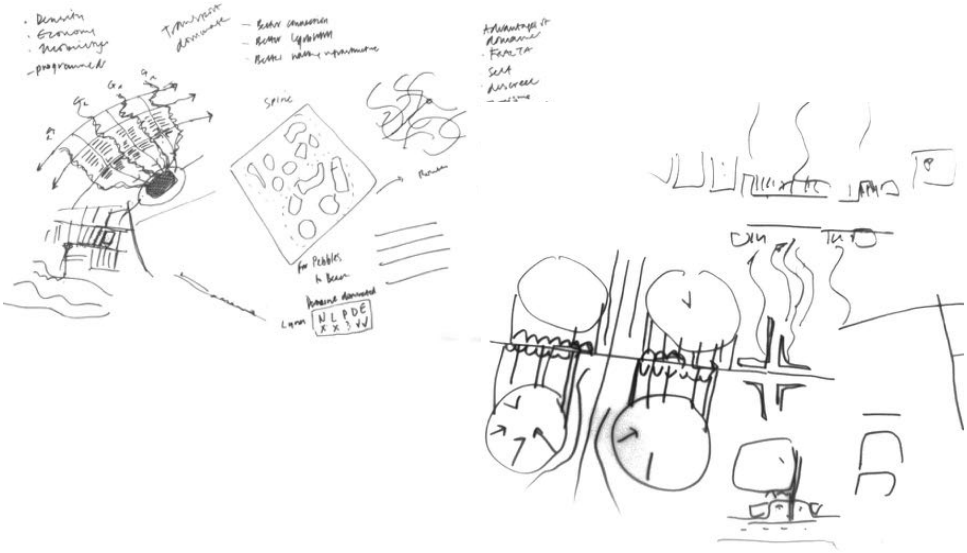
THE COLIN SUSTAINABLE VISION

THE COLIN SUSTAINABLE VISION

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

DEVELOPMENT WORK:



THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

DEVELOPMENT WORK:

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

DEVELOPMENT WORK: KEY PRECEDENT (LYTHAM)

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

DEVELOPMENT WORK: KEY PRECEDENT

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

DEVELOPMENT WORK: KEY PRECEDENT

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

DEVELOPMENT WORK: KEY PRECEDENT

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

DEVELOPMENT WORK: KEY PRECEDENT

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

DEVELOPMENT WORK: KEY PRECEDENT (HARWORTH)

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

DEVELOPMENT WORK: KEY PRECEDENT (KIRKHAM)

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

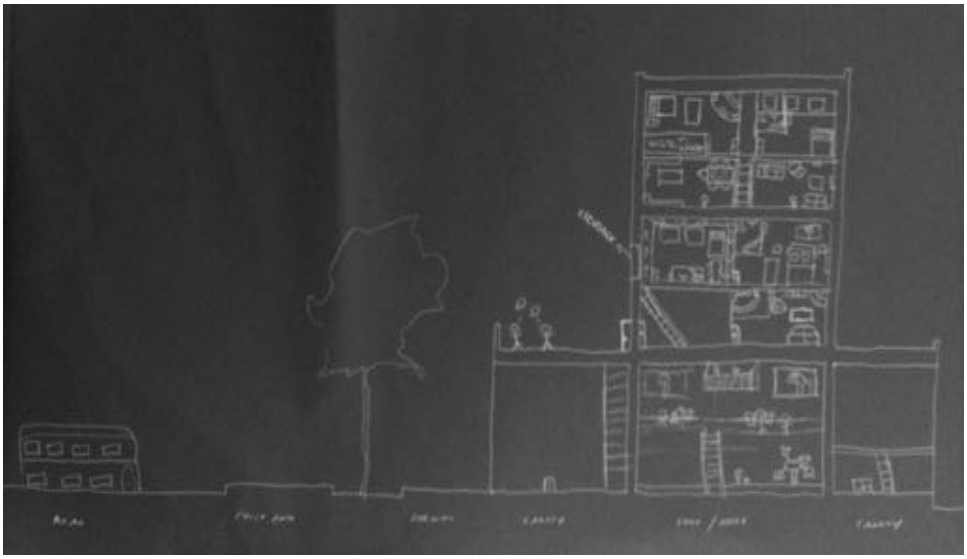
THE 9 'LAWS' OF COLIN:

1. DO NOT NEGOTIATE WITH PAST ERRORS – BUILD A NEW FUTURE 2. CREATE OPPORTUNITY – TAKE RISKS! 3. WHEN TOO COMPLICATED? PLACE RENEWABLE INFRA-STRUCTURE	CONTEXT
4. CONSOLIDATE URBANITY – BE PART OF A CITY … 5. GREEN SPACE IS NOT ALWAYS GOOD, SURROUND IT! 6. SUCCESSFUL STREETS ARE SLOW, CULTIVATE CONGESTION!	PROGRAMME
7. RESPOND TO ENVIRONMENT 8. ENCOURAGE GOOD BEHAVIOUR 9. LOCAL NOT GLOBAL!	SUSTAINABILITY

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

ST COLMS SCHOOL:



THE COLIN SUSTAINABLE VISION

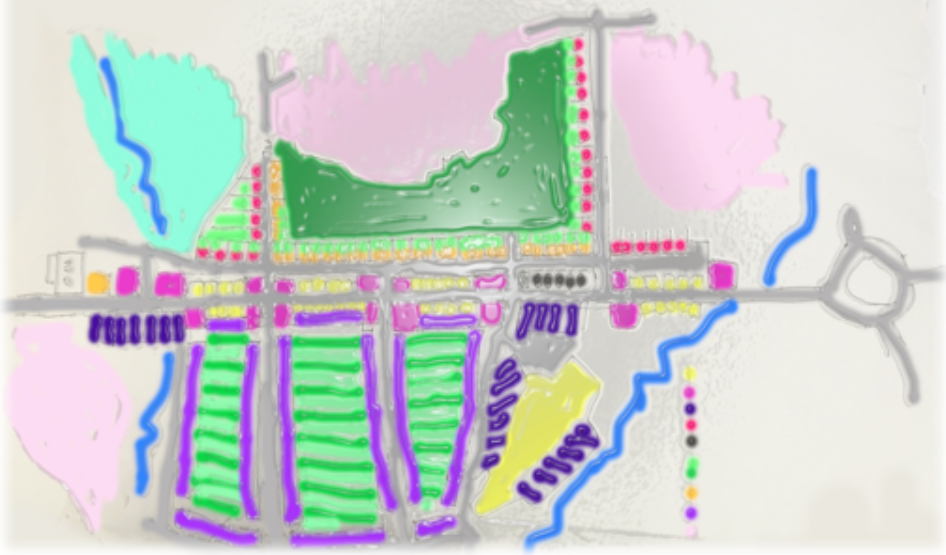
'Future Cities & Their Neighbourhoods' (Workshop 1):

ST COLMS SCHOOL:

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

THE 9 'LAWS' OF COLIN: SITE INTERPRETED



THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

STRATEGY

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

SECTION PROPOSAL

proposed colin town centre section

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

STREET SECTION

THE COLIN SUSTAINABLE VISION

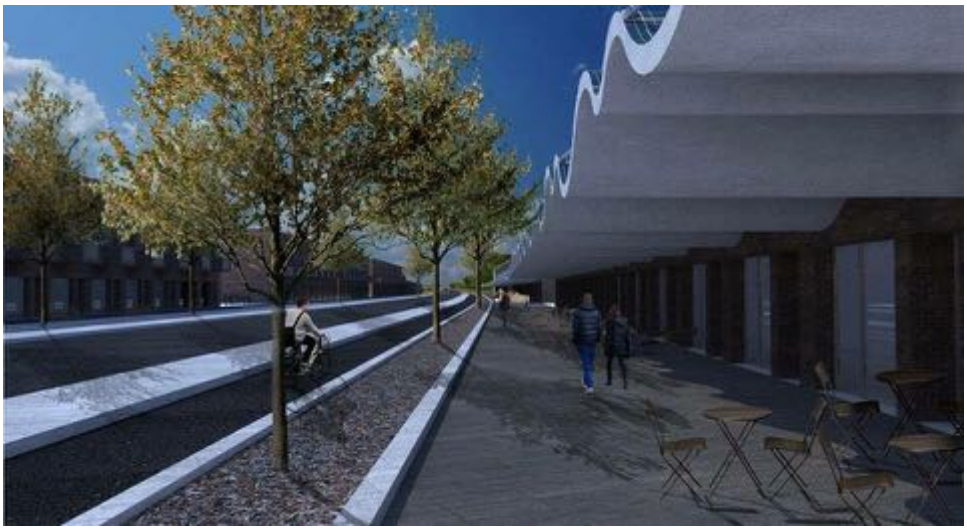
'Future Cities & Their Neighbourhoods' (Workshop 1):

URBAN FARM SECTION

THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

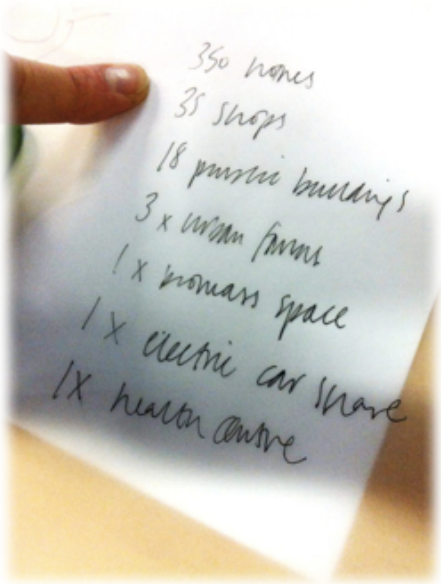
3D VISUALISATION



THE COLIN SUSTAINABLE VISION

'Future Cities & Their Neighbourhoods' (Workshop 1):

THE NUMBERS:



CITY-zen New urban energy

Universiteit van Amsterdam

alliander

vito vision on technology

aeb amsterdam

Westpoort Warmte

Ville de Grenoble

Atos Worldgrid

DNV·GL

GEG

Compagnie de chauffage le confort durable, tout simplement

SRB

C-L Clicks + Links

Universitatis Scaldiana MCCXXXX

DAIKIN

GREENSPREAD

HESPUL

waternet

cea

Th!nk E

SIEMENS

Queen's University Belfast

TU Delft Technische Universiteit Delft

THE CITY zen

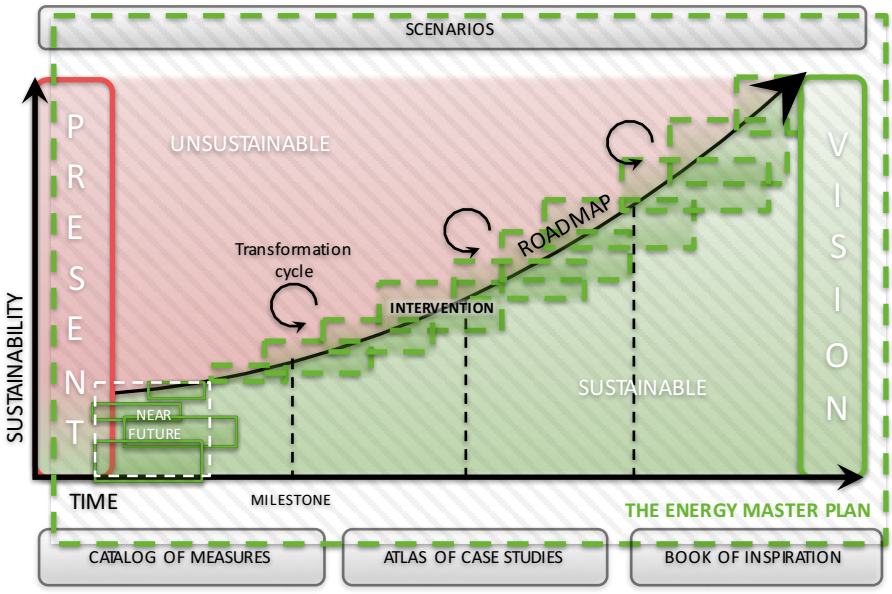
ROADSHOW
COLIN ENERGY SCENARIOS

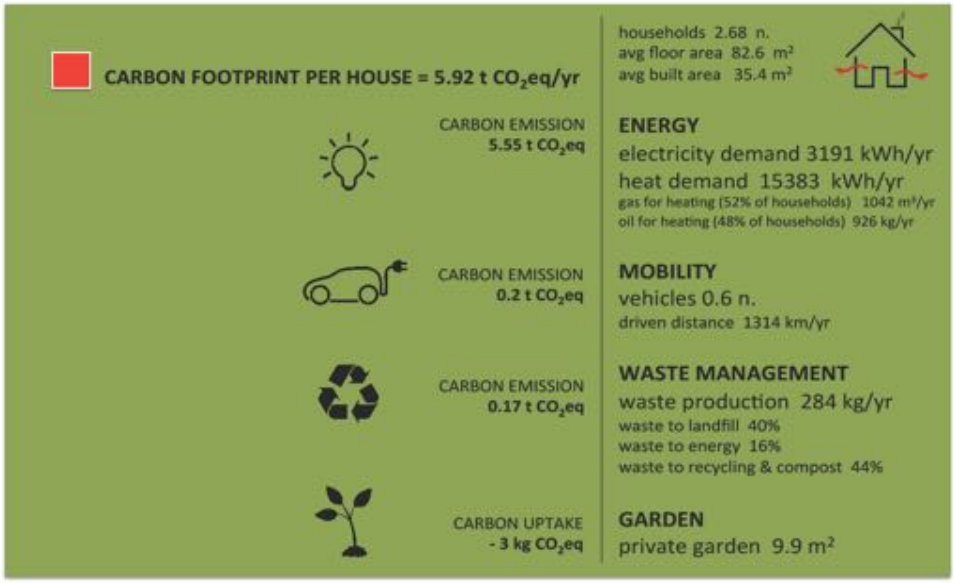
Siebe Broersma, Riccardo Pulselli, Han Vandevyvere, Kirstin O' Regan, Aimee McAvoy, Cathal Crumley, Brendan Holbeach

Colin, Belfast, 22.01.2016

Co-funded by the European Union's Seventh Programme for research, technological development and demonstration

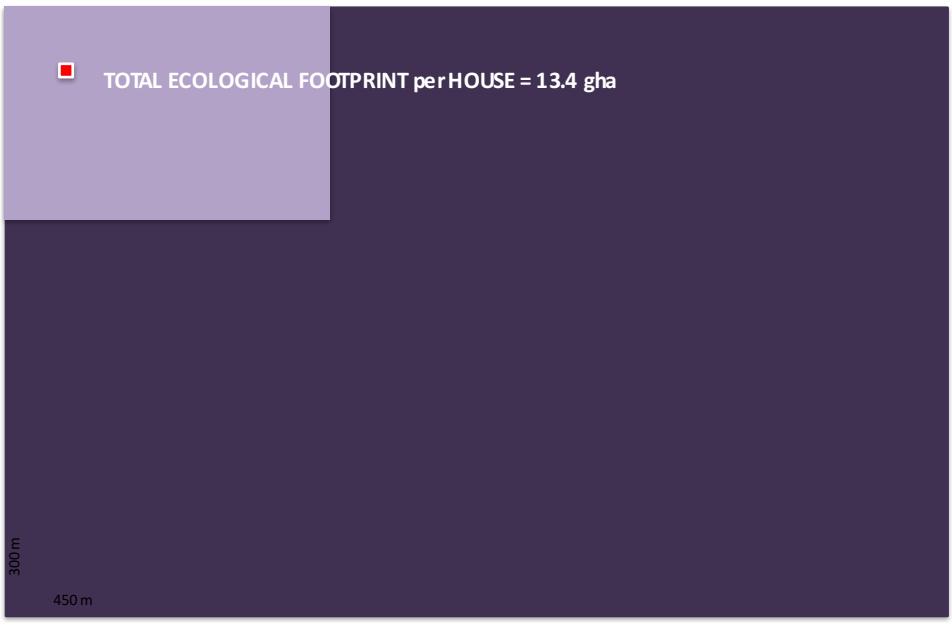
ENERGY MASTER PLAN FRAMEWORK





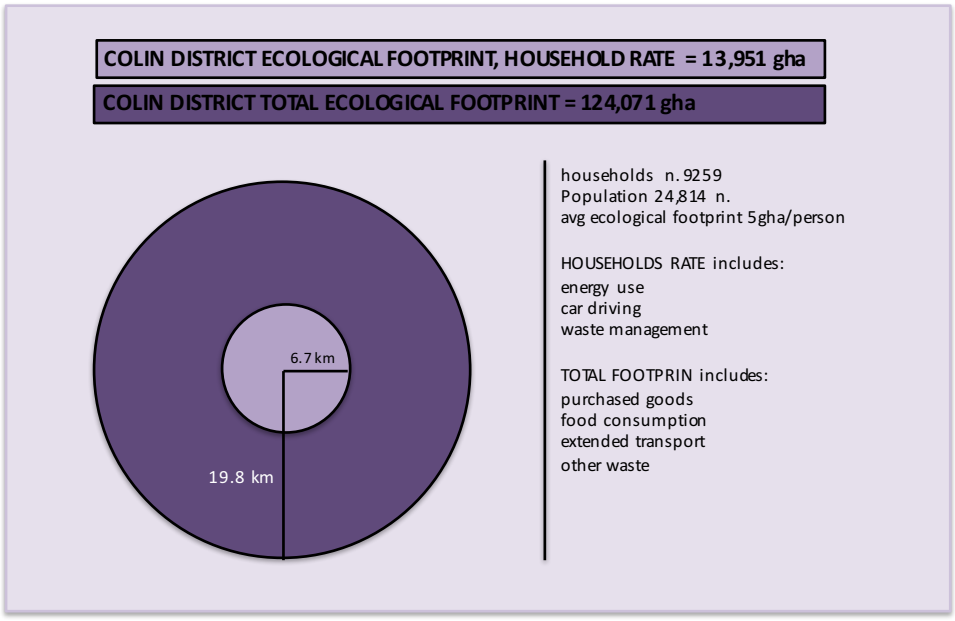
CARBON FOOTPRINT PER HOUSE
includes energy use, car driving and waste management

ECOLOGICAL FOOTPRINT PER HOUSE
includes energy use, car driving and waste management



TOTAL ECOLOGICAL FOOTPRINT per HOUSEHOLD

avg. ecological footprint per capita: 5 gha/person; 2.7 people/household

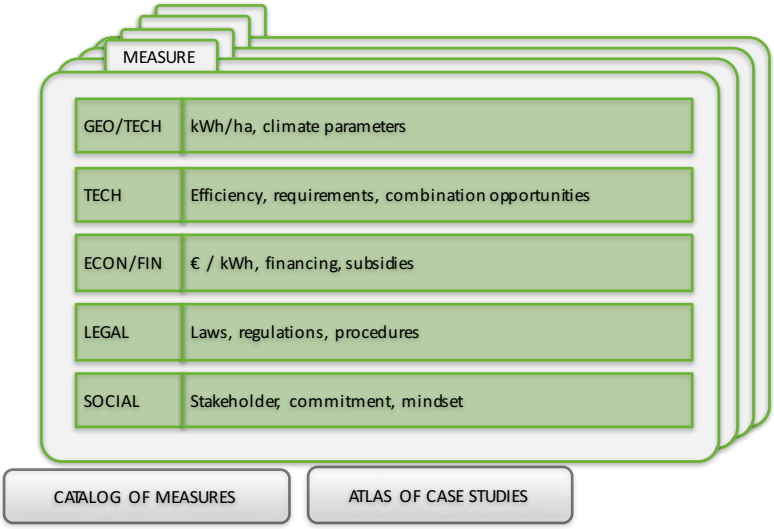


COLIN DISTRICT ECOLOGICAL FOOTPRINT

avg ecological footprint 5 gha per person

MEASURES

From the catalogue of measures (single techniques, measures, combination of technologies)
From the atlas of case studies (built examples)



MEASURES

List of potentially suitable energy measures

Energy Efficiency

- Insulation;
  - roof
  - high performance windows
  - Wall
  - Floor
- Air tightness
- Installation efficiency
  - upgrade heating installation
  - efficient mechanical ventilation/ ventilation with heat recovery
- Add greenhouse
- Demolition & reconstruction
- Urban densification with higher building compactness
- Smart grid (electric – demand side management)

MEASURES

List of potentially suitable energy provision measures

- PV on roofs (facades); road-side PV; PV power plant
- Solar thermal on roofs; Solar thermal plant; Road solar collector
- Large wind turbine; Micro wind turbine
- Biomass
  - individual biomass boiler
  - local heat network + central boiler/ CHP
  - local heat network + bio digester + CHP
- Heat pump individual (incl buffer),
  - on air
  - ground loop heat exchanger (horizontal)
  - ground loop heat exchanger (vertical)
- Collective heat pump + heat network
  - ground loop heat exchanger (horizontal)
  - ground loop heat exchanger (vertical)
  - H/C storage in aquifer; in ground; watertank
- Waste heat utilization
- Smart grid (electric)

MEASURES

List of non-technical measures

- Behavioural change
- Subsidies
- Local energy company (e.g. cooperative)
- Smart financing scemes

SUITABLE ENERGY SYSTEMS

Combined energy measures:

Scheme 1: Basic short term individual improvement (standard home renovation) + long term scenario development

- Basic insulation + high performance individual condensing gas boiler
  - Insulation;
    - roof
    - high performance windows
    - insulating existing cavity of walls
    - improving air tightness
  - Installation efficiency
    - upgrade heating installation: individual condensing boiler
    - basic mechanical ventilation
  - Optional:
    - PV-roof
    - Solar thermal boiler
- Next phase planning
  - organise LT stepwise transition to high energy performance
  - organise corresponding financial planning
  - at the neighbourhood scale: (1) plan urban **densification** on empty spaces where appropriate and (2) plan **replacement** of worst performing patrimony (demolition and reconstruction on site or elsewhere). Approach prevents dislocating people expect to new and better housing.

Sustainable Urban Density Developments


Bottière-Chênaie, Nantes, France


Hannover Kronsberg, Habitat


Anemoon Project, Tienen


Hannover Kronsberg, Habitat


Oncyer Strasse, Düsseldorf, Germany

SUITABLE ENERGY SYSTEMS

Calculations scheme 1.

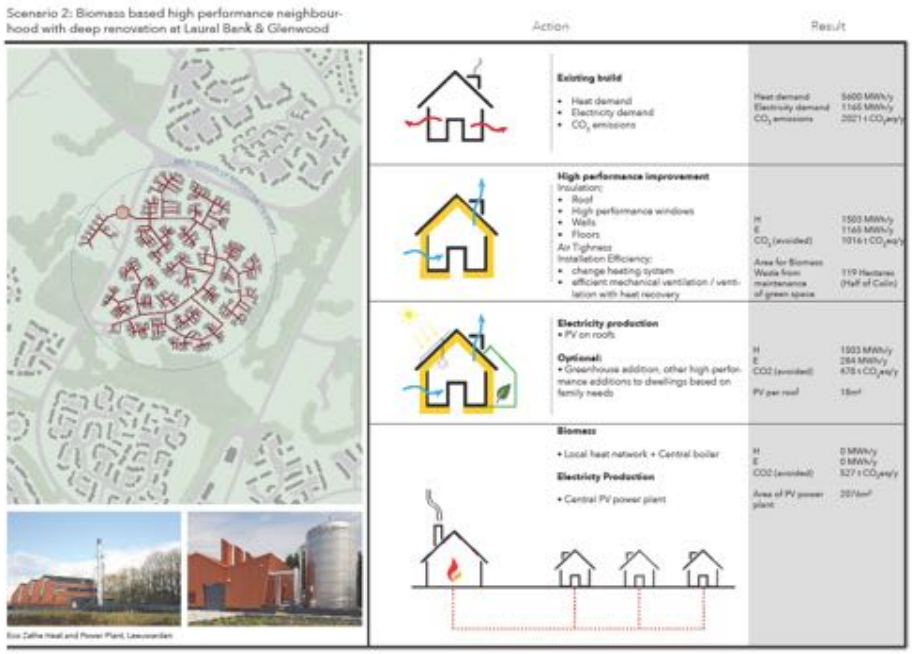
1. Basic retrofit + densification and replacement			energy demand	energy saved	CO2 emmision	avoided CO2
Woodside area			(MWh/y)	(MWh/y)	(t CO2eq/y)	(t CO2eq/y)
0 N houses	273					
heat demand	4200105	kWh	4200		1042	
electricity demand	873600	kWh	874		474	
Total:			**5074**		**1516**	
1 heat demand after retrofit	120	kWh/m2				
heat demand neighbourhood	2705976	kWh/y	2706	1494		371
2 N old houses	200					
N new houses	146					
electricity demand	640000	kWh	640	234		127
heat demand	1982400	kWh	1982	2218		550
3 N old houses	100					
N new houses	346					
electricity demand	320000	kWh	320	320		174
heat demand	991200	kWh	991	991		246
4 N old houses	0					
N new houses	546					
electricity demand	0	kWh	0	320		174
heat demand	0	kWh	0	991		246

SUITABLE ENERGY SYSTEMS

Combined energy measures:

Scheme 2: Biomass based high performance neighbourhood with deep renovation and PV

- High performance improvement
  - insulation;
    - roof
    - high performance windows
    - walls
    - floors
  - optional: greenhouse addition, other high performance additions to dwellings based on family needs
  - air tightness
  - installation efficiency
    - change heating system
    - efficient mechanical ventilation / ventilation with heat recovery
- Biomass
  - local heat network + central boiler
- PV
  - PV on roof tops
  - central small PV power plant



SUITABLE ENERGY SYSTEMS

Calculations scheme 2.

2. High performance retrofit & biomass heat network & PV			energy demand	energy saved	CO2 emmision	avoided CO2
Lauralbankstreet & Glenwood			(MWh/y)	(MWh/y)	(t CO2eq/y)	(t CO2eq/y)
0 N houses	364					
heat demand	5600140	kWh	5600		1389	
electricity demand	1164800	kWh	1165		632	
Total:			**6765**		**2021**	
1 A-label heat demand	50	kWh/m2				
heat demand	1503320	kWh	1503	4097		1016
2 harvestable woody biomass per hectare	12667	kWh/ha				
hectare needed to heat the area	119	ha	0	1503		373
3 avg solar insolation	876	kWh/m2hor-y				
avg solar insolation	912	kWh/m2-30deg-y				
avg PV system efficiency	15%					
projected hor surface area buildings	12878	m2				
avg hor surf area per house	35,4	m2				
av available part for solar production	50%					
available surface per house	17,7	m2				
annual elctricity production on roofs	880855	kWh	284	881		478
stil needed electricity	283945	kWh				
PV power plant	2076	m2	0	284		154

SUITABLE ENERGY SYSTEMS

Combined energy measures:

Scheme 3A: Heat pump based high performance individual with deep renovation (horizontal collectors)

- High performance improvement
  - insulation;
    - roof
    - high performance windows
    - walls
    - floors
  - optional: greenhouse addition, other high performance additions to dwellings based on family needs
  - air tightness
  - installation efficiency
    - change heating system
    - efficient mechanical ventilation / ventilation with heat recovery
- Heat pump
  - individual HP + buffer (e.g. 200 l)
  - horizontal heat exchanger
- PV on roofs

Note: PV is added to become fully energy neutral

SUITABLE ENERGY SYSTEMS

Calculations scheme 3A.

3A. high perf retrofit individual with deep renovation (horizontal collectors)			energy demand	energy saved	CO2 emmision	avoided CO2
Glenkeen			(MWh/y)	(MWh/y)	(t CO2eq/y)	(t CO2eq/y)
0 N houses	106					
heat demand	1630810	kWh	1631		404	
electricity demand	339200	kWh	339		184	
Total:			**1970**		**589**	
1 A-label heat demand	50	kWh/m2				
heat demand	437780	kWh	438	1193		296
2 Indiv heat pump with hor heat exchangers	4	C.O.P.				
heat demand	0	kWh	0			
new electricity demand for heat pump	109445		109	328		81
total electricity demand	448645		449			
3 avg solar insolation	912	kWh/m2-30deg-y				
avg PV system efficiency	15%					
available surface per house	30,0	m2				
annual elctricity production on roofs	435024	kWh	14	435		236
stil needed electricity/ excess energy	13621	kWh	14			

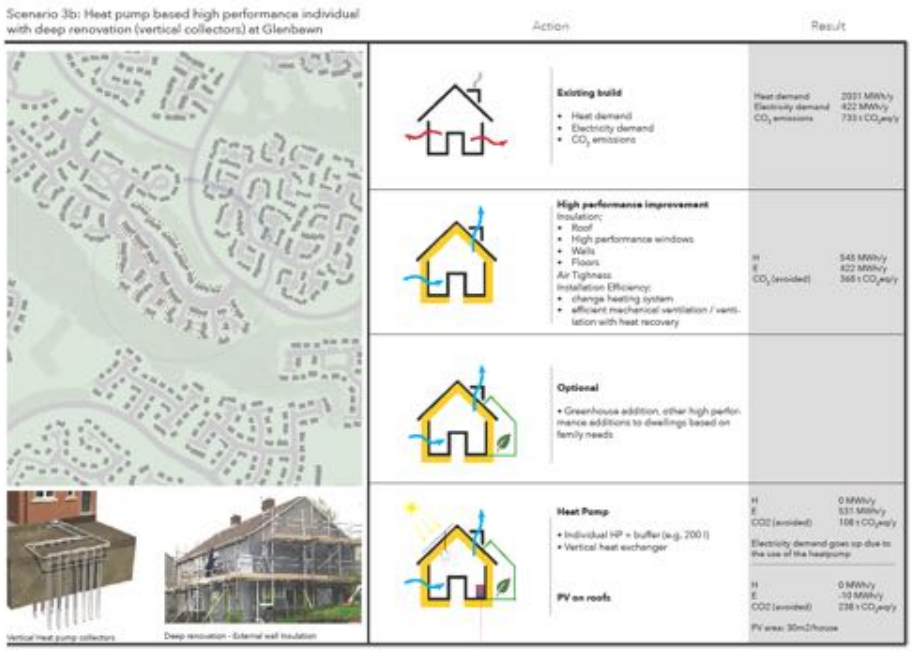
SUITABLE ENERGY SYSTEMS

Combined energy measures:

Scheme 3B: Heat pump based high performance individual with deep renovation (vertical collectors)

- High performance improvement
  - insulation;
    - roof
    - high performance windows
    - walls
    - floors
  - optional: greenhouse addition, other high performance additions to dwellings based on family needs
  - air tightness
  - installation efficiency
    - change heating system
    - efficient mechanical ventilation / ventilation with heat recovery
- Heat pump
  - individual HP + buffer (e.g. 200 l)
  - vertical heat exchanger
- PV on roofs

Note: PV is added to become fully energy neutral



SUITABLE ENERGY SYSTEMS

Calculations scheme 3B.

3B. high perf retrofit individual with deep renovation (vertical collectors)			energy demand	energy saved	CO2 emmision	avoided CO2
Glenkeen			(MWh/y)	(MWh/y)	(t CO2eq/y)	(t CO2eq/y)
0 N houses	132					
heat demand	2030820	kWh	2031		504	
electricity demand	422400	kWh	422		229	
Total:			**2453**		**733**	
1 A-label heat demand	50	kWh/m2				
heat demand	545160	kWh	545	1486		368
2 Indiv heat pump with hor heat exchangers	5	C.O.P.				
heat demand	0	kWh	0			
new electricity demand for heat pump	109032		109	436		108
total electricity demand	531432		531			
3 avg solar insolation	912	kWh/m2-30deg-y				
avg PV system efficiency	15%					
available surface per house	30,0	m2				
annual elctricity production on roofs	541728	kWh	-10	542		294
stil needed electricity/ excess energy	-10296	kWh	-10			

SUITABLE ENERGY SYSTEMS

Combined energy measures:

Scheme 3C: Heat pump based high performance individual with deep renovation (air to water)

- High performance improvement
  - insulation;
    - roof
    - high performance windows
    - walls
    - floors
  - optional: greenhouse addition, other high performance additions to dwellings based on family needs
  - air tightness
  - installation efficiency
    - change heating system
    - efficient mechanical ventilation / ventilation with heat recovery
- Heat pump
  - individual HP + buffer (e.g. 200 l)
  - air to water
- PV on roofs

Note: PV is added to become fully energy neutral

SUITABLE ENERGY SYSTEMS

Combined energy measures:

Scheme 4: central solar thermal power plant with seasonal high temperature buffer

- Basic insulation
  - Insulation;
    - roof
    - high performance windows
    - insulating existing cavity of walls
    - improving air tightness
  - Installation efficiency
    - changing heating system
    - basic mechanical ventilation
- Collective central solar thermal power plant
- Local heat network
- Collective heat pumps
- PV on roofs

Note 1: may not be feasible without deep building renovation
Note 2: PV is add to become fully energy neutral

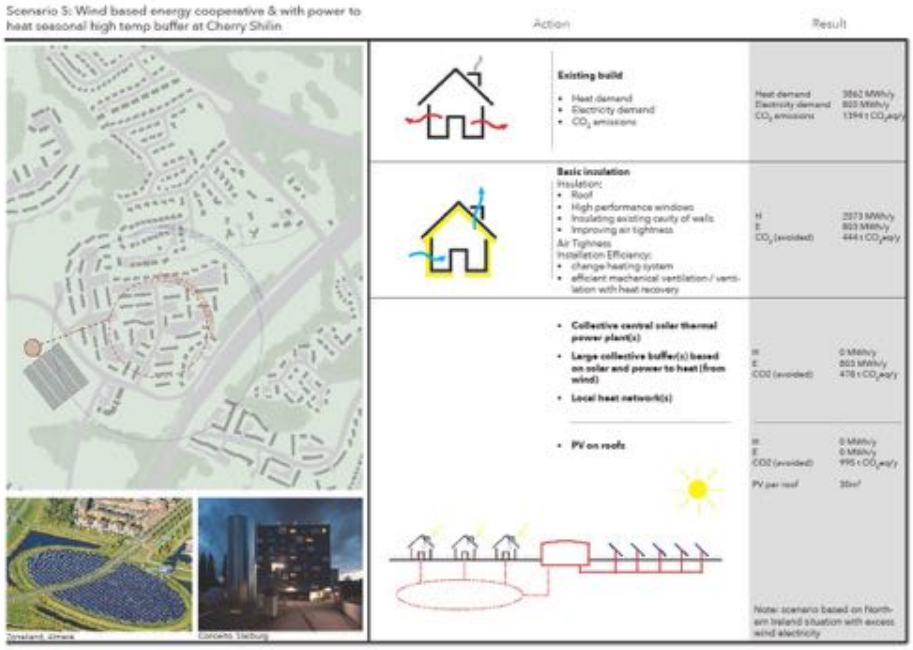
SUITABLE ENERGY SYSTEMS

Combined energy measures:

Scheme 5: Wind based energy cooperative & with power to heat seasonal high temp buffer + PV on roofs

- Basic insulation
  - Insulation;
    - roof
    - high performance windows
    - insulating existing cavity of walls
    - improving air tightness
  - Installation efficiency
    - changing heating system
    - basic mechanical ventilation
- Collective central solar thermal power plant(s)
- Large collective buffer(s)
- Power to heat (from wind)
- Local heat network(s)
- PV on roofs

Note: scenario based on Northern Ireland situation with excess wind electricity



SUITABLE ENERGY SYSTEMS

Calculations scheme 5

5. Solar thermal powered heat network + wind excess and PV electricity			energy demand	energy saved	CO2 emmision	avoided CO2
Cherry Shilin			(MWh/y)	(MWh/y)	(t CO2eq/y)	(t CO2eq/y)
0 N houses	251					
heat demand	3861635	kWh	3862		958	
electricity demand	803200	kWh	803		436	
Total:			**4665**		**1394**	
1 heat demand after retrofit	100	kWh/m2				
heat demand neighbourhood	2073260	kWh/y	2073	1788		444
2 solar thermal production	2500	kWh/4.3m2				
solar thermal production	581	kWh/m2				
amount of power to heat from wind	33%					
amount of heat from solar collectors	67%					
system efficiency solar collectors and buffer	50%					
electricity into heat from wind turbines	684176	kWh/y	1389	684		344
heat produced by solar collectors	2778168	kWh/y	705	0		175
area of solar collectors	4778	m2				
area of solar collectors per house	19	m2				
storage buffer per household	12	m3				
total storage	3012	m3				
3 avg solar insolation	912	kWh/m2-30deg-y				
avg PV system efficiency	15%					
available surface per house	30,0	m2				
annual electricity production on roofs	1030104	kWh	0	-227		995

SUITABLE ENERGY SYSTEMS

Combined energy measures:

Scheme 6a: Maximum PV + wind with individual seasonal heat buffers

- Basic insulation
  - Insulation;
    - roof
    - high performance windows
    - insulating existing cavity of walls
    - improving air tightness
  - Installation efficiency
    - changing heating system
    - basic mechanical ventilation
- Maximum rooftop PV + PV farms
- Individual seasonal buffers and/or V2G storage
- Individual heat pumps (see other schemes)

Note 1: scenario based on Northern Ireland situation with excess wind electricity
Note 2: may not be feasible without deep building renovation
Note 3: batteries not required as grid can take variations

SUITABLE ENERGY SYSTEMS

Combined energy measures:

Scheme 6b: Maximum PV + wind with collective seasonal heat buffers

- Basic insulation
  - Insulation;
    - roof
    - high performance windows
    - insulating existing cavity of walls
    - improving air tightness
  - Installation efficiency
    - changing heating system
    - basic mechanical ventilation
- Maximum rooftop PV + PV farms
- Collective seasonal buffers (may be supplemented with solar thermal)
- Combination of individual and collective heat pumps (see other schemes)

Note 1: scenario based on Northern Ireland situation with excess wind electricity
Note 2: may not be feasible without deep building renovation
Note 3: batteries not required as grid can take variations

SUITABLE ENERGY SYSTEMS

Combined energy measures:

Scheme 7: Deep geothermal + district heating + urban densification

- Basic insulation
  - Insulation;
    - roof
    - high performance windows
    - insulating existing cavity of walls
    - improving air tightness
  - Installation efficiency
    - upgrade heating installation: individual condensing boiler
    - basic mechanical ventilation
- Single deep geothermal CHP plant for Colin or Colin+
- Local heat network
- Urban densification both for housing needs and for increasing local heat demand nearby plant

DEFINE ROADMAP

Towards a roadmap

- Design 1 or more future visions with technical interventions that meet the final goals
- Back-casting: put the technical interventions on a timeline
- What are drivers and barriers to reach the targets?
- Define non-technical actions that deal with the barriers.