City-zen: New Urban Energy

Nicosia 'City-zen Roadshow' REPORT

Martin, C.L.; van den Dobbelsteen, A.A.J.F.; Pulselli, Riccardo; Vandevyvere, Han; Keeffe, Greg; Jenkins, A.J.; Campbell, Emma

Publication date
2019

Document Version
Final published version

Citation (APA)
Martin, C. L., van den Dobbelsteen, A. A. J. F., Pulselli, R., Vandevyvere, H., Keeffe, G., Jenkins, A. J., & Campbell, E. (2019). *City-zen: New Urban Energy: Nicosia 'City-zen Roadshow' REPORT*. European Commission.

NEW URBAN ENERGY

Nicosia Roadshow REPORT

DELIVERABLE D9.13

This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 608702.

PROJECT INFORMATION

Project Acronym and Full title	City-zen, a balanced approach to the city of the future
Call Identifier	FP7-ENERGY-SMARTCITIES-2013
Grant Agreement	n° 608702
Funding Scheme	Collaborative Project
Project Duration	60 months
Starting Date	01/03/2014

MAIN COORDINATOR

Name	Marjolein Bot
Organization	Amsterdam Smart City
Phone	+31 6 40 2222 17
E-mail	marjolein@amsterdamsmartcity.com

CONSORTIUM PARTNERS

N° DoW	Organization	Acronym	Country
1	Vlaamse instelling voor technologisch onderzoek	VITO	BE
2	Stichting Amsterdamse Economic Board	AIM	NL
3	Universiteit van Amsterdam	UVA	NL
4	Westpoort Warmte B.V.	WPW	NL
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
10	Technische Universiteit Delft	TUD	NL
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
14	AEB Exploitatie BV	AEBE	NL
15	Daikin Airconditioning Netherlands B.V.	DAIK	NL
16	Siemens Nederland NV	SIEM	NL
17	Universita'degli Studi di Siena	UNIS	IT
18	Ville de Grenoble	MUNG	FR
19	Commissariat a l'Energie Atomique et aux Energies Alternatives	CEA	FR
20	Compagnie de Chauffage Intercommunale de l' Agglomeration Grenobloise	CCIA	FR

21	Gaz Electricite de Grenoble	GEG	FR
22	SAS ATOS Worldgrid	ATOS	FR
23	Clicks and Links Ltd&L	C&L	UK
24	Grenoble-Alpes Métropole	METRO	FR

DELIVERABLE INFORMATION

Number	D 9.13
Title	Roadshow with 'On-site' Advice & Summary Report
Lead organization	TUD
Author	Prof. Dr. Craig Lee Martin (TUD)
Contributors	Prof. Greg Keeffe (QUB); Dr. Andy Jenkins (QUB); Prof. Dr. Andy van den Dobbelsteen (TUD); Dr. Riccardo Pulselli (UNIS); Dr. Han Vandevyvere (VITO); Anneleen Vanderlinden (Th!nk-e); Achille Hannoset (Th!nk-e).
Reviewers	Prof. Dr. Andy van den Dobbelsteen (Delft University of Technology); Riccardo Pulselli (University of Siena).
Nature	R – Report
Dissemination level	PU – Public;
Delivery Date	M12-M60 (01/11/2019)

VERSION HISTORY

Version	Date	Author/Reviewer	Description
1.0		Prof. Dr. Craig Lee Martin	Final version

ACKNOWLEDGEMENTS

The Nicosia Roadshow would not have been possible without the commitments and passion of three individuals. Phidias Pilides (Former President, Cyprus Chamber of Commerce and Industry), Fikri Toros (Republican Turkish Party) and Dr. Markella Menikou (Head of Architecture, University of Nicosia). Three highly influential stakeholders that came together across political and geographical boundaries to begin a process within the only divided city in Europe, to co-create a shared sustainable city vision for Nicosia.

The Roadshow team would like to take this opportunity to highlight the impactful contributions of the Dutch Embassy in Cyprus. A special mention must go to Marios Touvanas (Policy Officer, Dutch Embassy). Marios' daily efforts during the preparation period in the months leading up to the Roadshow were vital for success. Marios' unique knowledge of Nicosia and its ongoing efforts to become sustainable gave greater reach to the project. In addition, the roles that Ambassador Nathalie Jaarsma and Mark Rutger (Deputy Head of Mission at Embassy) took were pivotal in encouraging all stakeholders to participate to connect with their wider networks. The Roadshow networking event held at the Ambassador's Residence on the second day of the Roadshow was an outstanding effort and is sure to influence sustainability stakeholder initiatives in the future.

Special thanks must go to the University of Nicosia and their Department of Architecture (ARC) for hosting TU Delft's SWAT Studio for two weeks in February and the later Roadshow. The collaborations made between students, staff and alumni gave a strong foundation for the later Roadshow. For this we thank Dr. Markella Menikou for giving her time, commitment, knowledge and extensive network during some challenging periods during the preparations. Further we appreciate the hospitality given by Nicosia's 'Home for Cooperation' for being exactly that, 'a home' to the Roadshow in those days within the UN buffer zone in May 2019. The venues for the Nicosia Roadshow were selected to optimise participation. They were also unique and challenging in nature being located in the UN Buffer itself. This didn't come without many challenges. Challenges that were made extremely worthwhile and easier thanks to the United Nations Peacekeeping Force in Cyprus (UNFICYP) who donated rooms within their Ledra Palace HQ for the Roadshow design studios and the Go2zero serious game. Further, the final event would be extremely well hosted by director and founder Rita Severis the Centre of Visual Arts and Research (CVAR). Final thanks must go to Prof. Panikkos Poutziouris (Rector, UCLan Cyprus) for showing the team such hospitality during a field trip to the Buffer zone. Prof. Poutziouris' extensive insight of the island history, customs and etiquette helped tremendously in the strategic planning of the Roadshow.

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 10 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. The overall aim of the Roadshow team is to work closely with people from the hosting city, whether they be city leaders, energy planners, local architect, professionals, academics, students and citizens. The Roadshow spends 5 days in each hosting city to deliver energy and urban design fun-shops 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 resources, 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 City-zen Nicosia Roadshow that took place in Cyprus between the 8th to 15th of May 2019.

TABLE OF CONTENTS

CHAPTER 1 – Introduction

1.1. CITY-ZEN ROADSHOW AND SWAT STUDIO

The Roadshow travels with a team of internationally recognized experts in the field of architectural design and energy planning to co-create a sustainable 'City Vision' with city stakeholders. It will visit 10 cities that are seeking expert guidance on how to become zero energy and carbon neutral over a 4-year period. The project has already successfully collaborated with Belfast, Izmir, Dubrovnik, Menorca, Sevilla, Roeselare and Preston. The overall aim of the project team, is to work closely with people from each hosting city, whether they be city leaders, neighbourhood associations, energy planners, architects, academics, students and of course most significantly the citizens themselves. The project consists of a 5-day event model, a culmination of a 3-month preparation including an educational design studio (the SWAT Studio) that promotes the Roadshow whilst building relationships and trust between all contributing partners. Local stakeholders are welcomed and encouraged to join and to take ownership of the process and the final outcomes. Outcomes that will allow the city's resources, people, knowledge and renewable energy potential to be directed effectively over a realisable timescale that will meet their energy transition. The process starts by identifying a neighbourhood's urban lifestyle and energy challenges. Then, on the final day of the event model, a definitive sustainable 'City Vision' is presented to the city, which responds to all scales of their built and natural environment.

(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.

The following describes the underlying approach undertaken in Nicosia and specifically in the project neighbourhood of Nicosia old town, surrounded by the bastion walls. It will include an explanation of the Sustainable 'City Vision' that resulted. City engagement is an exciting and thought-provoking prospect. Many questions arise at the beginning of the journey. Making first contact with a prospective project location, conducting preparations, explanations and agreements is far from an exact science. The method of achieving this successfully has evolved city-by-city and is arguably as valuable as the sustainable solutions that result. There can be many political, cultural and language obstacles that must be overcome. The outcomes have the power to inspire and potentially be realised post-project. The first questions are:

- Who is 'the City'?
- What are the city's sustainable expectations and aspirations?
- What is the current and future calculated energy demand?
- Where are the urban challenges and potentials?
- Are they purely energetic, spatial & social, administrative or a combination of all?
- Does the 'City' even realize or accept they have challenges, despite its desire to be sustainable?

To answer these questions and many more, the project team began the process of identifying the cities that need, and more importantly want to collaboration or co-create with the expert team. First contact begins with an educational architecture design workshop studio (known as the SWAT Studio). This takes place in the months prior to the Roadshow. Developed and led by TU Delft under Prof. Dr. Craig Lee Martin, the student-focused event facilitates an extended and detailed discussion with city stakeholders. The later 'expert' Roadshow event model then follows and is conducted over a 5-day period based on 'themes' that guide the evolution of the vision. Here, expert global input is delivered at key points. Each event is constructed to relate to individual citizen experiences and knowledge, giving confidence in the processes that are extended to relate to streets, neighbourhoods, districts, city and in some circumstances the region or island. The project is not intended to be a one-way stream of information and ideas, instead the process aims to activate, convince, openly invite and encourage 'the City' to be part of the process at any level that they feel comfortable with. The method includes going out of the studio and into the wider community. To engage with various initiatives, to meet and talk with their members, no matter their age or background or expertise. The project leader selects cities that have diverse climates, urban typologies, economies and cultural backgrounds to ensure that the project develops a highly adaptable and compact, yet replicable, approach whatever the city and its circumstances.

1.2. AIMS

The aim is to develop an event model capable of implementation in all cities, in order to co-create, with citizens from all backgrounds, a city's sustainable vision. Proposals developed exclusively by the project team, and not by the city stakeholders themselves, would physically and metaphorically leave with the Roadshow. Hence, a home-grown solution is key. A legacy must remain in which all participatory groups continue to exchange knowledge and speak with a common voice, making any future research bids (beyond the scope of the City-zen project) coherent, effective and impactful. The project wishes to extend its agenda by strengthening connections and bringing together a global family of project cities. Where experiences can be shared together with collaborative research bid proposals across the European community.

The most important target group are inhabitants of the neighbourhood, city and wider hinterland of the hosting city. Companies and start-ups in the field of technology and sustainability are encouraged to be active participants during the project. A key objective is to reach 600 students across the EU by visiting local universities, colleges and secondary schools. Students are the future.

1.3. OBJECTIVES

1.3.1 Student Engagement

It has been a mutually beneficial approach to combine the energy and enthusiasm of building technology 'SWAT Studio' Masters students with the stakeholders and students from the hosting city. Close relationships that were forged of the SWAT Studio with the hosting city lay the foundation on which to build the intensive 5-day City-zen Roadshow. Promotion, active participation and dissemination contribute significantly to overall success. Consequently, the Roadshow and SWAT student workshop leader encourages interested groups such as municipalities, neighbourhood associations and universities to grasp the opportunity to do so. Taking the time to discuss what is expected and dispel any reservations or doubts that may arise, the Roadshow will not criticize a city's perceived lack of sustainability. Roadshow team specialists are aware of many complex global and local level challenges that must be overcome together for a renewable energy transition to take place.

The Nicosia SWAT Studio, in this case a collaboration between TU Delft and the University of Nicosia, has identical project aims as the professional 'expert' Roadshow. It too develops and proposes technologically innovative and sustainability-driven urban interventions. A key ambition of the design 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 City-zen Roadshow having a similar approach in its effort to make zero-carbon cities.

The outputs of the SWAT Studio would be presented to a stakeholder audience on day one of the Roadshow. An audience compromising many individuals and companies who had collaborated previously with the SWAT and now would join with the opening of the Roadshow.

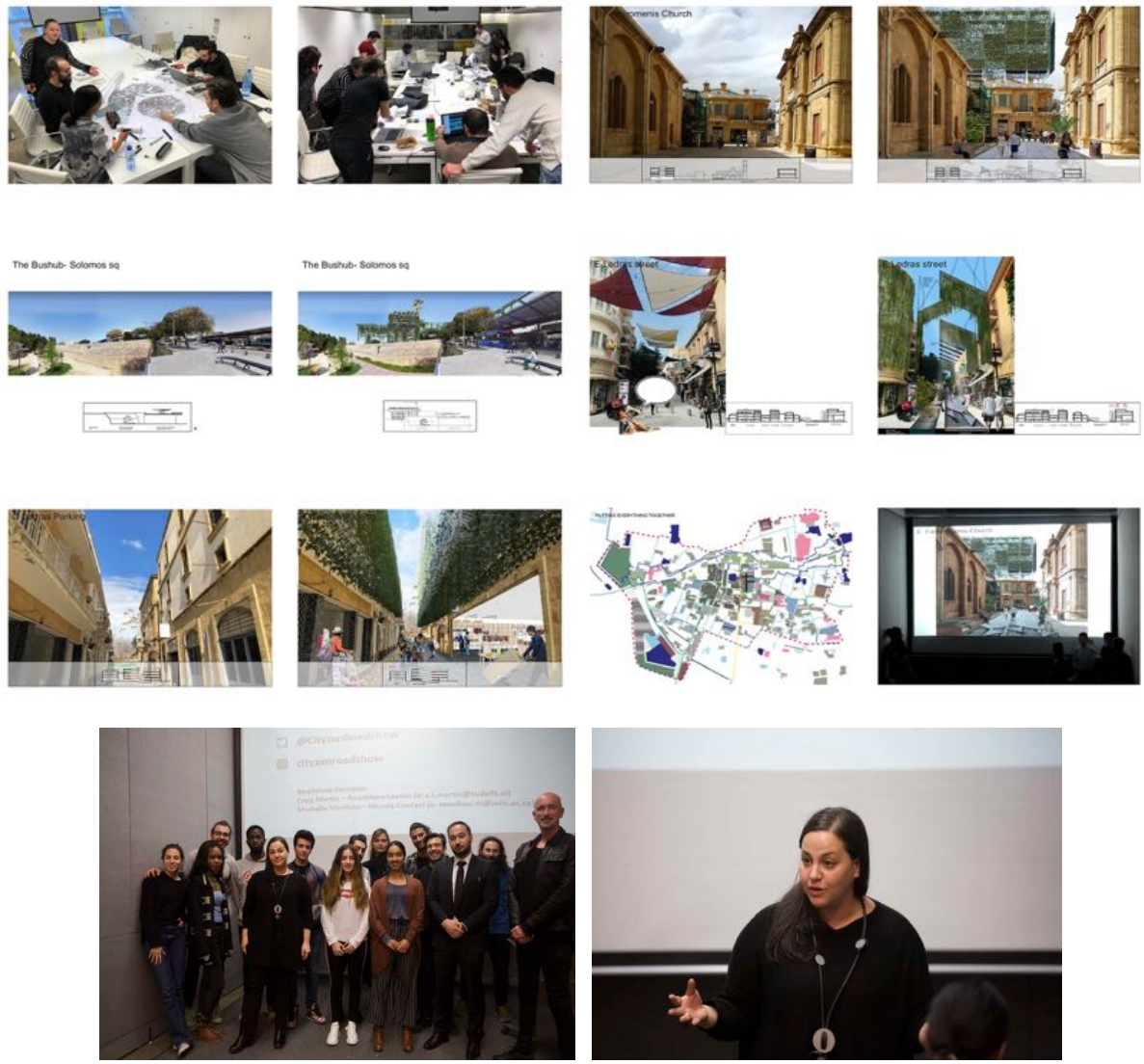


Fig 2. Selected photographs and outcomes of the Nicosia 'SWAT Studio' (2-week 'Intervention' period - 18th to 28th February 2019), a MSc's Building Technology 'Onsite' design studio (TU Delft, The Netherlands) that took place 3 months prior to the start of the Nicosia Roadshow. During the SWAT Studio, the aims and objectives of the City-zen Nicosia Roadshow would be disseminated at public SWAT presentations/Final reviews and on local media streams through various articles. Student design proposals and associated renders, drawings and models would be used to prompt discussions with stakeholders and communicate the expert aims of the upcoming Roadshow. The neighbourhoods selected for design consideration during the SWAT Studio would also be used for the Roadshow. For Nicosia, two neighbourhoods would be used on either side of the UN Buffer zone. For the Roadshow, the UN Buffer zone would also be an area for proposed intervention.

1.3.2 Process

In Nicosia, the process of Roadshow preparation, as described previously, began 2 months prior to the project start with a collaborative Master's level Building Technology and architecture student workshop. Both the workshop and the Roadshow itself were developed to be fun and yet 'intensive'. Components such as seminars, walking tours, design fun-shops and mini-masterclasses within the 9-day period were strategically timed and citizen focused. The outputs, synchronised with specific project team specialisms in energy and urban design. Outputs were qualitatively

spatial and quantitatively energy focused, combining to form the Sustainable City Vision on the final day of the Roadshow on Wednesday 15th May 2019.

1.3.3 Daily Activities

Daily activities would involve citizens, architects, municipality staff, PhD students, academics and energy consultant's visiting the projects studio base at the Home for Cooperation and the United Nations Peacekeeper base at the Ledra Palace. The 9-day programme was devised in such a way to encourage participants to 'drop-in' and 'drop-out' so that the project fun-shop activities and mini-masterclasses could fit into their professional and family schedules. This is a strategy that would increase stakeholder involvement dramatically. The overall programme can be seen in Figure 3.

Fig 3. City-zen Nicosia Roadshow Flyer. This 9-day timetable was used to promote the events on social media such as Facebook and Twitter, specifically to networks that would benefit from the Roadshow in Nicosia. The image used for the background is accredited to the Nicosia SWAT Studio (University of Nicosia & TU Delft).

The first stakeholder event took place on the opening morning. Here residents of Nicosia, both North and South, joined the Roadshow team on a walk that would take them around the project site. Figure 4 shows the route that the collaborative group followed. The route was strategic in that it passed key zones and landmarks in the North and South. Along the way, Anita Michail, an expert historical and cultural guide, gave further insights and facts about the environment the team was walking through.

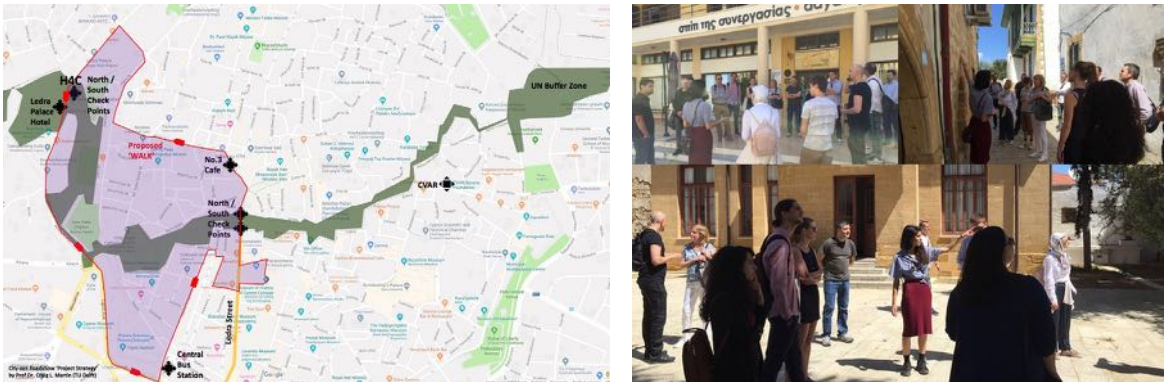


Fig 4. City-zen Nicosia Roadshow 'Walk'. The route would take the team through the UN Buffer zone twice in order for the Roadshow team to get a full understanding the of context implication, challenges and potentials.

'Pecha Kucha' style presentations (meaning 'chit-chat' in Japanese) would be the chosen format of all presentations given by partnering stakeholders and the Roadshow team. This allowed an exchange of concise and fast-paced two-way information flows facilitating a multiple-involvement event. A strategy giving both Roadshow 'ownership' to the stakeholders of Nicosia, and communicated coherently so that participants would know what to expect through the 9 days. The following stakeholder groups contributed to the Roadshow with Pecha Kucha presentation on the first day of the Roadshow. Each outlining past, present and future aspirations for their city:

- Anthi Charalambous (Head of Energy & Environment Division at Cyprus Employers & Industrialists Federation - OEB). Presentation entitled 'Business for Climate'.
- Marios Theristis (FOSS Research Centre for Sustainable Energy). Presentation entitled 'PV Technology in Cyprus'.
- Chariton Lazarides and Pantelis Panteli (Students at University of Nicosia / TU Delft). Presentation entitled 'SWAT Nicosia Studio – Collaborative Sustainability Design Studio'.
- Fiona Mullen & Stelios Hadjiloizou. Presentation entitled 'Famagusta Ecocity Project'.
- Chara Georgiadou (Global Shapers Nicosia). Presentation entitled 'Communal Gardens'.
- Maria Achilleos & Myrto Skouroupathi (Cyprus Energy Agency). Presentation entitled 'Nicosia: Energy Transition from global to local level'.
- Constantinos Constantinou (CAB's Co-Director). Presentation entitled 'Cyclists Across Barriers'.

This co-creative method aims to foster an intensive working environment, yet one, allowing adequate flexibility to ensure maximum stakeholder participation at whatever level they feel comfortable. It must be respected and appreciated that all stakeholders are likely to have full-

time jobs and a family life beyond any project, their attendance is self-financed. Therefore, a role of the Roadshow leader is to strike a balance between stakeholder commitments and availabilities. Discussions involve conveying the urgency of being part of the process, but not to an extent that distances prospective attendees. During the Nicosia SWAT Studio, many face-to-face preparations and negotiations took place with stakeholders at their convenience. Various visual descriptors would be shown to communicate what is expected during the Roadshow. Images taken during the previous Roadshows in Belfast, Izmir, Dubrovnik, Menorca, Sevilla, Roeselare and Preston would be highly effective in translating what was to come in Nicosia. Coloured marker pens, rolls of tracing paper, laptops and notebooks are the tools of choice for the project participants.

Roadshow activities have the same aim: energy neutrality. However, each component is enjoyably diverse and offers new perspectives and skills on how to attain it. Whilst two parallel fun-shops ran continually over the week, participants sign up to play the Go2Zero Serious Game. Nicosia's stakeholders from both sides of the divided city 'role played' within the UN Controlled Buffer, having fun whilst experiencing the cause and effect of energy strategy decisions made at the regional, neighbourhood and family household level.

Fig 5. Nicosia citizens, getting into the game and having 'energetic' role-playing fun whilst learning the implications of energy choices at the large commercial and domestic level. Venue: Ledra Palace, United Nations Peacekeeping Force in Cyprus (UNFICYP), UN Buffer zone.

Preparations for the Nicosia Roadshow began 3 months before the first day of the Roadshow. In consideration of the political sensitivities in the region, several embassies were personally contacted by the Roadshow leader to make them aware of the Roadshow visit in order to gain their support, participation, insights and past experiences. The German, Italian, British High Commission and the Dutch Embassy were contacted. The Roadshow strategy was to make the buffer zone the studio base. This would be logistically practical in that the site was in close proximity. Another reason being one of strategy, such a location being symbolic in that it demonstrated the projects intentions to gain support from all Nicosia citizens and key city decision makers. This message of Roadshow intention in the region and the overall aims of sustainability would be conveyed to the embassies securing their support. Following more detailed discussions with the Dutch Embassy on how Nicosia could gain most from the Roadshow it was decided that key stakeholders would be invited on Roadshow day 2 for a 'City-zen Roadshow Networking Event' (Fig 5). The theme being urban sustainability and the outcomes of the Roadshows completed.

Fig 6. The 'City-zen Roadshow Networking Event' hosted at the Netherlands Ambassador's Residence on Thursday 9th May. A speech by Ambassador Nathalie Jaarsma began the proceedings, to be followed by speeches of encouragement by Mr Phidias Pilides (Former President CCCI) and Mr Fikri Toros (Republican Turkish Party). From the Roadshow team, Prof. Craig Martin described the Roadshow aims and its successes; Prof. Greg Keeffe presented the Sevilla Roadshow outcomes; Prof. Andy van den Dobbelsteen presented the film 'Energy Slaves' he produced.

This event would ensure that the project received wider dissemination and key involvement. The guest list for the 'City-zen Roadshow Networking Event' can be seen below:

Lefki Lambrou	Director Home for Cooperation
Dr. Markella Menikou	Head – School of Architecture, University of Nicosia
Fikri Toros	Republican Turkish Party
Phidias Pilides	Former President CCCI
Karin Varga	Goethe Institute
Prof. Panikkos Poutziouris	Rector - UCLan Cyprus
Leonidas Paschalides	Head Dept. of International & Public Relations, CCCI
Alexander Apostolides	Head Economic / EU, British High Commission
Tommaso Coniglio	Italian Embassy
Marina Vasilara	Civil Affairs Officer
Savvas Vlachos	Director Cyprus Energy Agency
Chara Georgiadou	Global Shapers Nicosia Hub / Union of Cypriot Municipalities
Marios Theristis	University of Cyprus, Centre for Sustainable Energy
Michalis Lambrinos	Public Works, Ministry of Transport
Anthi Charalambous	OEB Head Energy & Environment
Alexandros Charalambides	Director, Climate-KIC / CUT Sustainable Energy Laboratory
George Artopoulos	Cyprus Institute, STARC
Pembe Mentesh	EU Info Point, Team Leader & Communication Expert
Burak Doluay	UN SDGs Young Leader
Andreas Papacharalambous	Mayor of Strovolos
Giorgos Partasides	Renewables coordinator Ministry of Energy
Christos Maxoulis	Technical Chamber
Stelios Achniotis	President Technical Chamber
Theodoulos Mesimeris	Ministry of Agriculture, Environment Department
Alexis G. Michael	Electricity Authority
Constantinos	Cyclists Across Barriers
Theodoulos Makriyiannis	CYTA
Chrysses Nicolaides	Smart Cities Mediterranean
Miltiades Elliotis	Ministry of Interior (Technical Services)
Pavlos Michael	Cyfield
Harris Kannas	T.S.O. (National Energy Control Center)
Antigoni Michael	Tour Guide / UNDP
Georgia Vasila	Athienitis contractors
George Georghiou	Director Foss Research Centre for Sustainable Energy
Glafkos Constantinides	Technical Committee Cultural Heritage

Following on from the Networking Event at the Ambassadors residence, other networking opportunities would be investigated. One such initiative during the Nicosia Roadshow would be

the 9th International Design Week hosted by the Eastern Mediterranean University (EMU). By offering lectures and talks at University to support their Design Week, the Roadshow reached an even greater audience, and by doing so promoting the Roadshow, and disseminating the gained knowledge from over 4 years of Roadshows to prospective young professionals, students and academic staff from Northern Cyprus.

Fig 7. Networking Event - The 9th International EMU Design Week, 08 May 2019 "in|dependence" held at the Eastern Mediterranean University (EMU), Faculty of Architecture, 08-10 May 2019, Famagusta, North Cyprus. Sustainability seminars would be delivered by Prof. Greg Keeffe on 'Biomimetic Design' and by Prof. Dr. Martin on 'The Roadshow' at the EMU.

1.4. ROADSHOW AT A GLANCE

The following points list 18 keywords that best describe the story and ambitions of the City-zen Roadshow:

1. **ZERO ENERGY** Aims to develop and demonstrate Zero-Energy Cities with a central role for citizens.
2. **MOTIVATE & EMPOWER** End-users to a long-term energy saving attitude.
3. **CITIZENS** Placed in the heart of a creative process that develops designs, strategies, guidelines and timelines at all scales of their own cities built environment.
4. **NUMBERS** 4 Cities completed - 3 months prep / city - 5 days onsite / city - all citizens - 7 International sustainability experts - 6 Cities next.
5. **IMPACT** Healthy lifestyles, environmental comfort, building efficiency, independence from fossil fuel uncertainty. But most of all confidence that sustainability is for all who want it.
6. **TRUST** Citizen's need belief in the process, objectives and solutions, no matter how radical or unfamiliar. Students open the door!
7. **OWNERSHIP** Citizen's take ownership of their built environment without fear of hidden agendas, affiliations or political constraint.
8. **HOMEGROWN** The solutions stay with the people.
9. **WHO IS THE CITY?** Doesn't matter where the ideas come from, as long as they come and begin to be realized.
10. **DISRUPT** Project rocks the status quo to reach zero energy.
11. **GLOCAL** Specialist global expertise combined with local stakeholder energy and knowledge of context and lifestyle.
12. **GRAPHICAL** Use graphical descriptions to get your messages across.
13. **SACRIFICE?** It's not about losing, it's about what you gain. Replacing it with something better for your children and community.
14. **TIMETABLE TO SUIT** Schedule to fit stakeholders, not the other way around. Remember, stakeholders are not on the payroll, they have other daily priorities.
15. **INDIVIDUAL PERSPECTIVE** Make sure activities relate to the people and their experiences. These can be expanded later to other scales.
16. **COMPARISONS** To design what is possible is one thing, to show what has been realized or what can occur under the right circumstances is even better.
17. **HIGHLY VISUAL** Outcomes to be colourful representations of the future, before/after scenarios.
18. **BE INSPIRATIONAL** Encourage 'City Vision' participants to take the lead in the next step!

CHAPTER 2 – ROADSHOW COMPONENTS

Two parallel workshops continue throughout the project week. On arrival, stakeholders are guided to select one workshop, depending on their interests or specialisms, however migration to each is recommended in order to get a full overview of energy and urban strategies and their implementation. At the end of each day the workshops meet to summarise their findings and to agree on that evenings and the following day's objectives. As an example of how the project approaches each city, the following describes the journey and activities undertaken in Nicosia Old Town, North and South of the UN Buffer zone.

2.1. FUTURE NEIGHBOURHOODS (WORKSHOP 1 – DAY 1 TO 5)

Led by Prof. Greg Keeffe (Queens University Belfast, United Kingdom)

2.1.1 Aim & Objectives

The aim of the workshop was to develop strategies at a range of scales that allow a process-based adaptation of the city to carbon neutrality. The scales utilised were: the city, the neighbourhood, and the building. The city scale is important because city form is the basis for the behaviours engendered in the city. Here urban grain can encourage or discourage car usage, can allow safe routes for schoolchildren, and connect the inner city with the countryside. The neighbourhood scale allows us to visualise the commons – i.e. the things we share. This may be things such as smart grids, or other networks, but may also be spaces for meeting, playing or growing. Green networks are important too, not only allowing citizens to enjoy nature and travel free from traffic, but also that the softness helps to prevent flooding and adds eco-services to the city. Energy storage is most cost-effective at this scale too, as is car share. In addition, density is one of the key factors in making neighbourhoods function, and many behaviours are linked to this – such as car usage, local economy etc. The house or building scale is crucial, because here we see many of the technologies for neutrality being employed. Technologies such as PV cells, heat-pumps, shading devices, DHW production all have been developed to work at this scale.

2.1.2 Methodology

The workshop starts with an understanding of city form, historic and future growth, urban grain, climate, eco-system services and density. From these initial studies, an understanding of the city as a holistic super-organism is developed. This bioclimatic understanding allows new insights into current trajectories. Urban design is based on understanding urban trajectories and deflecting or manipulating them, to create new futures in a seamless way. Once a sustainable urban design strategy for the city is developed, we change to the neighbourhood and building scales to look at the issues this strategy creates at the smaller scales. More detail can be developed here, and the solutions become more technological. We then visualise the impact these technological insertions have on the built environment and the lifestyles of the residents.

2.1.3 Outcomes

The design outcomes are integrated in the presentation that was delivered at the Centre for Visual Arts and Research (CVAR), Nicosia Old Town on Wednesday 15th May 2019. The full presentation is illustrated in Chapter 3 'Sustainable City Vision'.

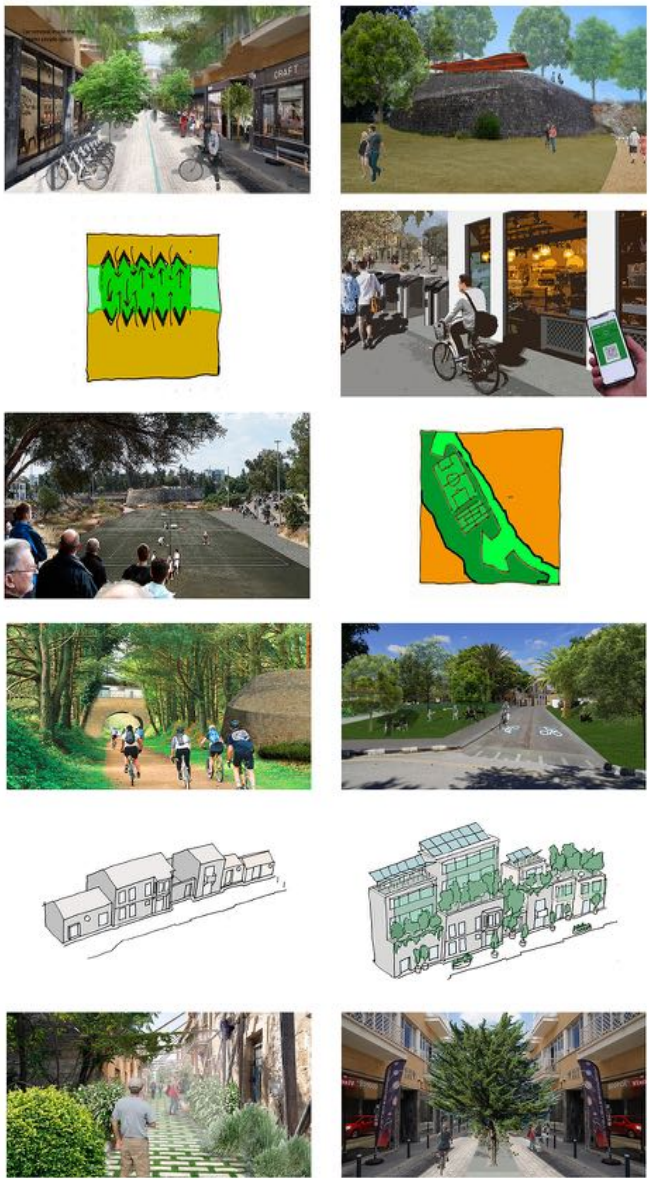


Fig 8. Selected images from the Future Neighbourhood workshop.

The studio looked to re-inventing the street and reclaiming territory from the car that currently dominates. It looked to a new community with increased density. Here, once the cars are removed from the landscape, the inner-city changes, people become a priority surrounded by a new green infrastructure. The Green Line Buffer zone becomes a positive green corridor that facilitates healthy and community functions. To enter this, a new 'seamless' check-in and out zone, where shared sports are located in-between the bastions. The new 'Bastion Park' has increased green and new infrastructure for energy, mobility, social gatherings. Activities that enable tourism and heritage to be valued and enjoyed. A sustainable city, needs densification, shade, which in turn increases intensity.

2.2. ENERGY TRANSITION (WORKSHOP 2 – DAY 1 TO 5)

Led by Prof. Dr. Andy van den Dobbelsteen (TU Delft, The Netherlands)

2.2.1 Background

The Energy Transition Approach developed for and during the roadshows has evolved in time and the results depend, amongst other factors, on the availability of data of energy use and other data. The energy transition workshop, also that of the Nicosia Roadshow, always starts with an analysis of the characteristics of the place under scrutiny by looking at the local climate, the technical features of buildings and the urban situation, as well as a quantitive assessment by means of Carbon Accounting and Energy Potential Mapping. This concerns the definition of current energy demands, carbon emissions and energy potentials. Next, scenarios are discussed and the most feasible one, fitting the future goals, is elaborated and calculated. As basis for effective energy interventions, the New Stepped Strategy is used: Reduce, Reuse, Produce. Different energy interventions are proposed throughout all scale levels, from the scale of single households to that of building blocks and streets, up to the neighbourhood and the whole city. Finally, the proposed future scenario for the municipality is assessed again by Carbon Accounting.

2.2.2 Outcomes

The design outcomes are integrated in the presentation that was delivered at the Centre for Visual Arts and Research (CVAR), Nicosia Old Town on Wednesday 15th May 2019. The full presentation is illustrated in Chapter 3 'Sustainable City Vision'.

The particular Venetian circular shape of the ancient city centre of Nicosia was made symbolic for the idea that the city should focus on solar energy, circular resource flows, a doughnut economy as well as becoming a connected city. The former run of the river now comprises the UN buffer zone, a divide that once can become a connecting part again, as described by the Future Neighbourhoods team. The main concept by the Energy Transition team encompassed the use of the city's bastion ring as connector for energy and water utilities, with the UN buffer zone as green park in the middle. The bastions would each get a new function in the circular system of the city, some as electricity storage, some as heat and cold storage, some as rainwater storage, place for waste water treatment and bio-digestion facility. Being connected with each other, the bastions would be feeding into the city's system, both north and south. They would therewith become the core elements of the city's 'reuse' strategy, helping to attune, exchange, cascade and store energy and other resources. A specific plan for the bastion as battery for heat, cold and electricity was elaborated and presented with the Sustainable City Vision.

For Nicosia, the Energy Transition team found that the traditional, vernacular way of building, which could still be found in many places within the city, north and south, actually is quite sustainable and energy efficient. Therefore, an important part of the proposed interventions related to re-introducing old bioclimatic principles in modern buildings, especially those that help to keep the city cool. These were combined with proposed energy-saving measures for individual buildings, introducing overhangs and sunshading, thermal insulation and shutters, tropical roofs with photovoltaics and also vertical, integrated PV. Proposals were made for integrating heritage PV on ramparts.
Also, the options for local energy communities were explored and deemed a feasible solution for Nicosia.

All in all, a final Carbon Accounting calculation that all solutions proposed by the Future Neighbourhoods team and Energy Transition team, focused on interventions in the urban structure, building design, mobility and behaviour, and especially the introduction of a lot of PV would lead to a reduction of carbon emissions by 97.5%, keeping the necessity of a forest the size of the inner city itself in order for it to become zero carbon, which could be partly solved by introducing a lot of green in the centre: in streets, on facades, on roofs.

2.3. CARBON ACCOUNTING

Led by Dr. Riccardo M. Pulselli (University of Siena, IT)

2.3.1 Carbon Footprint of Cyprus

As proxy for estimating the impact of human activities, the greenhouse gas inventory of Cyprus, developed by the *Department of Environment - Ministry of Agriculture, Rural Development and Environment*, has been taken as main reference, published on the "2018 7th National Communication and 3rd Biennial report under the UNFCCC of Cyprus". Since it refers to the Southern part of the island and does not take into account the area occupied by the *Turkish Republic of Northern Cyprus*, the impact of the full island has been estimated by proportioning based on the population: Cyprus: 1,197,152 people; South: 864,200 (72%).

The Carbon Footprint of Cyprus is 8,631,000 tons CO_2eq. Table cf.1 shows the contribution of different sectors of activities, including the carbon uptake by local ecosystems.

ELECTRICITY	91% heavy oil 3% PV 4% Wind 1% biomass	3197 kt CO_2-eq	37.0 %
HOUSING	51% Diesel oil 6% Kerosene 23% LPG 15% Biomass 6% Charcoal	570 kt CO_2-eq	6.6 %
TRANSPORT		1889 kt CO_2-eq	21.9 %
INDUSTRY		1901 kt CO_2-eq	22.0 %
AGRICULTURE		559 kt CO_2-eq	6.5 %
WASTE	79% landfilled 9% organic 12% recycled	466 kt CO_2-eq	5.4 %
WATER		49 kt CO_2-eq	0.6 %
CARBON UPTAKE		-168 kt CO_2-eq	1.9%

8631 kt CO_2eq

Table cf.1: Carbon Footprint of Cyprus. Source: 2018 7th National Communication and 3rd Biennial report under the UNFCCC of Cyprus.

Figure cf.1 shows a representation of the total Carbon Footprint in terms of virtual forestland that would be needed to compensate the emission through carbon sequestration. Given the total area of Cyprus of 9251 km^2, the virtual forestland is estimated 8860 km^2 that is almost the entire available land. The area of virtual forest has been estimated considering 1.35 kg CO_2eq/m^2 absorbed by a young (20 years old) forest with an intense rate of biomass growth; based on this coefficient the absorption by the existing forest of pine corresponds to just 12 km^2, less than 2% of the total emission. The map also shows the location of the four main urbanised areas in Cyprus, where most of the emission sources are located.

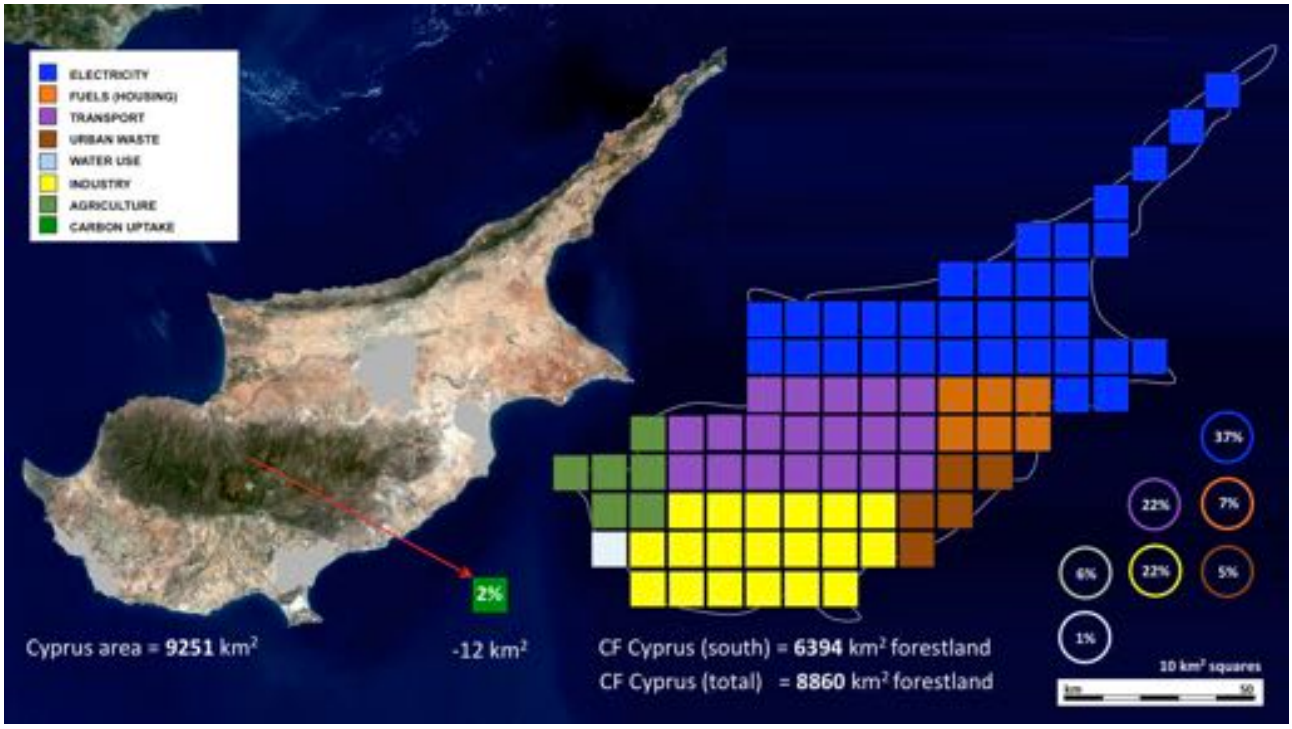


Figure cf.1: Representation of the virtual forestland, i.e. Carbon Footprint of Cyprus per activity sector and Carbon Uptake. Each square is 10 km^2.

2.3.2. Carbon Footprint of Nicosia.

A specific focus has been developed for the city of Nicosia. The procedure followed for the assessment of greenhouse gas emissions in Nicosia refers to Pulselli et al. (2018) *[Pulselli RM, Marchi M, Neri E, Marchettini N, Bastianoni S. "Carbon accounting framework for decarbonisation of European city neighbourhoods". Journal of Cleaner Production 208 (2018) 850-868],* including the Emission Factors (EF) used, e.g. electricity use, fuel combustion, driven km by car and other transport, waste management (disposal in landfill, incineration, organic composting, recycling), water depuration and distribution).

The EF, given in kg CO_2-eq /unit process, have been assessed on the bases of the 2006 IPCC guidelines except for the EF of electricity depending on the local primary sources and share of renewables. This has been estimated based on the national electricity grid mix (Cyprus Statistical Service: https://www.mof.gov.cy/mof/cystat/statistics.nsf/index_en/index_en?OpenDocument) as shown in Table cf.2 (the EF used are LCA based).

Table cf.2: Assessment of the Emission Factor of Electricity in Cyprus (2017), i.e. 0.712 kg CO_2eq/kWh.

electricity production TOT	**Value**	**UNIT**	**%**	**kg CO_2eq/kWh**	**kg CO_2eq**
Thermo-electricity production	4,569,154	MWh	91.3%	0.778	3,554,802
RES electricity production	435,015	MWh	8.7%	_	_
PV	172,013	MWh	3.4%	0.013	2,236
WIND	211,447	MWh	4.2%	0.010	2,114
BIOMASS	51,555	MWh	1.0%	0.028	1,444
	5,004,169	MWh	100.0%	**0.712**	3,560,596

Moreover, the Emission Factors of fuel mix per activity have been estimated based on current use of fuels, as shown in Tables cf.3, cf.4 and cf.5.

Space heating fuel mix in house	**Value**	**UNIT**	**%**	**kg/kWh**	**kg CO2eq**
Heating oil	3303	kWh	62.1%	0.281	928.97
Kerosene	407	kWh	7.7%	0.281	114.47
LPG	640	kWh	12.0%	0.263	168.12
Biomass	965	kWh	18.2%	0.114	110.00
Charcoal	0	kWh	0.0%	0.114	0.00
	5315	kWh	100.0%	**0.249**	1,321.55

Table cf.3: Assessment of the Emission Factor of fuel mix for space heating in houses, i.e. 0.249 kg CO_2eq/kWh.

Water heating fuel mix in house	**Value**	**UNIT**	**%**	**kg/kWh**	**kg CO2eq**
Heating oil	233	kWh	62.5%	0.281	65.53
Kerosene	23	kWh	6.2%	0.281	6.47
LPG	105	kWh	28.2%	0.263	27.58
Biomass	12	kWh	3.2%	0.114	1.37
Charcoal	0	kWh	0.0%	0.114	0.00
	373	kWh	100.0%	**0.271**	100.95

Table cf.4: Assessment of the Emission Factor of fuel mix for water heating in houses, i.e. 0.271 kg CO_2eq/kWh.

Cooking fuel mix in house	**Value**	**UNIT**	**%**	**kg/kWh**	**kg CO2eq**
Heating oil	0	kWh	0.0%	0.281	0.00
Kerosene	0	kWh	0.0%	0.281	0.00
LPG	861	kWh	66.1%	0.263	226.17
Biomass	47	kWh	3.6%	0.114	5.36
Charcoal	395	kWh	30.3%	0.114	45.02
	1303	kWh	100.0%	**0.212**	276.55

Table cf.5: Assessment of the Emission Factor of fuel mix for cooking in houses, i.e. 0.212 kg CO_2eq/kWh.

As first step in the procedure, in order to focus on the greenhouse gas emission of Nicosia, the impact of a typical household in Nicosia has been estimated, based on average data from the Cyprus Statistical Service. Table cf.6 shows general data on energy consumption for housing and mobility, water use and waste production of a typical house unit of 2.7 persons.

Table cf.6: Assessment of the Carbon Footprint of an average household in Nicosia, i.e. 12.37 t CO_2eq/yr.

The CF of the typical household in Nicosia is 12.37 t CO_2-eq/yr. This value corresponds to an equivalent quantity of CO_2 that is yearly absorbed by 0.97 hectares of a young forest. In other words, every single household in Nicosia should have a backyard forestland equivalent to 1.5 football fields.

As second step of the procedure, data have been scaled-up at the urban level based on number of households and population. The carbon accounting for the old city (the area within the ancient ring) is based on the profiling of the household, therefore it follows a bottom-up approach. The old city has a population of 35,000 people (approximate assumption based on available data on census unit from the "administrative division of Nicosia" Table at this link: https://en.wikipedia.org/wiki/Administrative_divisions_of_Nicosia; unavailable data in Northern areas have been estimated proportionally based on average density) living in 13,258 households (avg. 2.7 people/house) and a carbon footprint of about 164,000 t CO_2-eq/yr.

Figure cf.2 shows the virtual forestland needed to compensate the emission of Nicosia old city, i.e. 12,152 ha (without food). Considering the area of the ring is 153 ha, the forestland is 80 times bigger than the city itself.

Impacts of food consumption are also shown; since local diet is generally based on high consumption of meat, the impact of food corresponds to an increase of 41%. Anyhow, different scenarios for a more balanced diet (just 500 g meat per week: +27%) and for a balanced diet based on short production chains (local food: + 16%) have been also shown demonstrating that food attitudes of people can have relevant effects in terms of environmental impact mitigation. Colours in the map show the contribution of different sectors of activities.

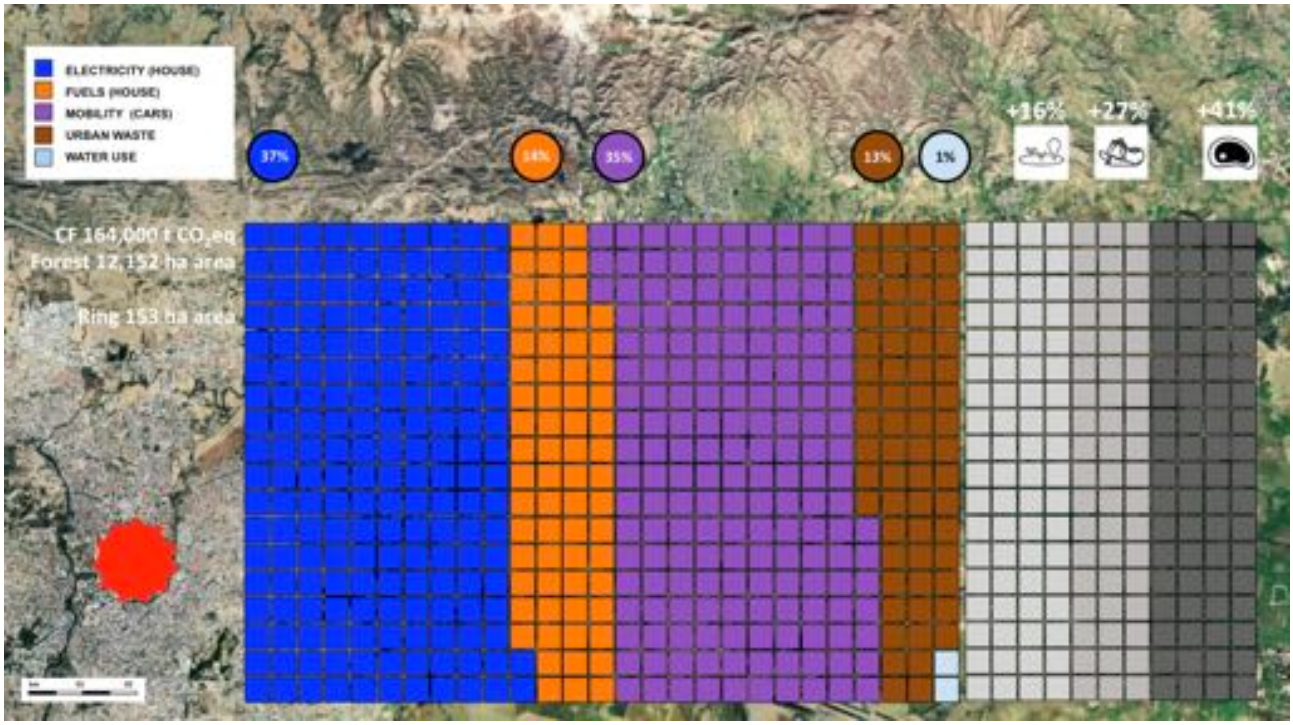


Figure cf.2. Virtual forestland needed to compensate the emission of Nicosia old city, i.e. 12,152 ha, including impact of food from +16% (balanced diet, local food) to +41% (meat lover diet). Each square is 25 ha.

The high impact of electricity is due to the high Emission Factor depending on fossil fuels (91%); the high impact of mobility depends on the high use of private cars (among the highest rate in Europe); the high impact of waste management depends on the high rate of landfilled waste (80%) and no differentiation of organic and other fractions.

2.3.3. Carbon mitigation accounting.

The CF of the old city of Nicosia (without food) is taken as the starting point to plan integrated measures and policies for energy retrofitting and decarbonisation. The visualisation of outcomes at the scale of the household and the city allows to quickly figure out an integrated vision combining technologies with other measures, such as campaigns of awareness raising to change citizens' behaviour. This aims to show how the designed measures as well as changes in individual behaviours can contribute to decrease the Carbon Footprint towards a zero-carbon community.

A combination of measures for energy transition has been proposed together with the technological partners of TU Delft. The scope is to figure out possible scenarios towards zero energy and carbon neutrality by 2050. In particular, the Carbon Accounting framework allowed for estimating the Carbon Footprint mitigation effects of the proposed measures concerning energy retrofitting and renewable energy generation, sustainable mobility, waste management and water use.

The assessment starts from the design of suitable solutions and the estimate of benefits in terms of energy saving or energy production. Based on the spatial representation of the impact of the city in terms of virtual forestland, the contribution of designed measures to decrease the impact towards a zero-carbon community is visualized by progressively subtracting squares (25 hectares each) of equivalent forestland from the initial Carbon Footprint.

One possible scenario of 14 measures scheduled for the old city of Nicosia follows, corresponding to the sequence shown in Figure cf.3 until the final goal of carbon neutrality. The left side of each image shows the level of penetration of the measure hypothesized (for example the % of households involved) and the estimate effect in terms of energy saving, renewable energy generation rate, decrease of waste production and water use. The selected measures that constitute the scenario follow:

#1 Energy saving through greenery and shading systems and behavioural changes of citizens e.g. use of LED lights;

#2 Energy saving through increased insulation and energy performances of building envelopes - Technological solutions at household/building scale

#3 Increased public transport - Behavioural change + infrastructural improvement;

#4 Biking-walking to work/school – Behavioural change + infrastructural improvement (e.g. cycling roads, electric bike sharing);

#5 Waste reduction/reuse and landfilled waste reduction - Behavioural change (differentiation by citizens) + infrastructural improvement (integrated waste management system);

#6 Water use reduction - Behavioural change at home + Technological solutions (e.g. rainwater harvesting for gardening);

#7 High Temperature heat supply - Technological solutions at household/building scale (HT single solar collectors);

#8 Medium Temperature heat supply - Technological solutions at household/building scale (shared MT solar collectors + heat pumps);

#9 Low Temperature heat supply - Technological solutions at household/building scale (LT aquifer storage + heat pumps);

#10 PV on roofs – Renewable electricity generation (estimated 52 GWh/yr electric generation on 174,000 m2 building roofs, corresponding to 66 GWh/yr total PV potential).

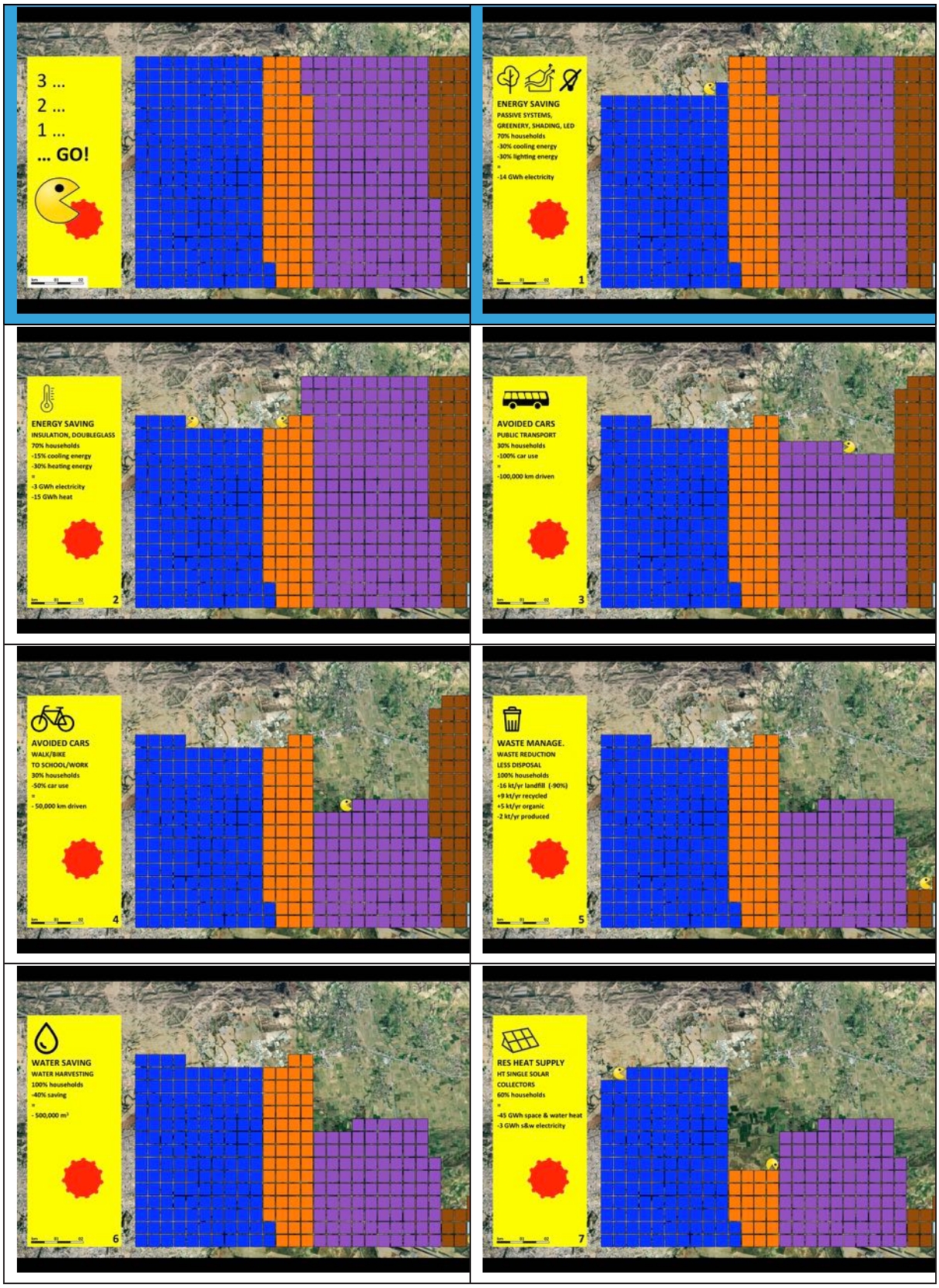
#11 Vertical PV on facades – Renewable electricity generation (estimated 8 GWh/yr electric generation).

#12 Transition to electric mobility - Technological solution + infrastructural improvement (estimated additional 32 GWh electricity demand for the full transition)

#13 Shared PV on canopies – Renewable electricity generation (estimated 32 GWh/yr electric generation on 107,000 m2 surface).

#14 Urban forestry – compensation of the remaining emission by 230 hectares forestland.

The Carbon Accounting framework, developed to be easily and quickly implemented, provides a reliable ex-ante evaluation of measures that can be designed and implemented at the scale of the city, neighbourhood, building or single household as well as individual citizen (behavioural change). It provides quantitative information and visual representations, to support design and raise awareness.


3 ...
2 ...
1 ...
... GO!
ENERGY SAVING
PASSIVE SYSTEMS,
GREENERY, SHADING, LED
70% households
-30% cooling energy
-30% lighting energy
=
-14 GWh electricity
1
ENERGY SAVING
INSULATION, DOUBLEGLASS
70% households
-15% cooling energy
-30% heating energy
=
-3 GWh electricity
-15 GWh heat
2
AVOIDED CARS
PUBLIC TRANSPORT
30% households
-100% car use
=
-100,000 km driven
3
AVOIDED CARS
WALK/BIKE
TO SCHOOL/WORK
30% households
-50% car use
=
- 50,000 km driven
4
WASTE MANAGE.
WASTE REDUCTION
LESS DISPOSAL
100% households
-16 kt/yr landfill (-90%)
+9 kt/yr recycled
+5 kt/yr organic
-2 kt/yr produced
5
WATER SAVING
WATER HARVESTING
100% households
-40% saving
=
- 500,000 m³
6
RES HEAT SUPPLY
HT SINGLE SOLAR
COLLECTORS
60% households
=
-45 GWh space & water heat
-3 GWh s&w electricity
7

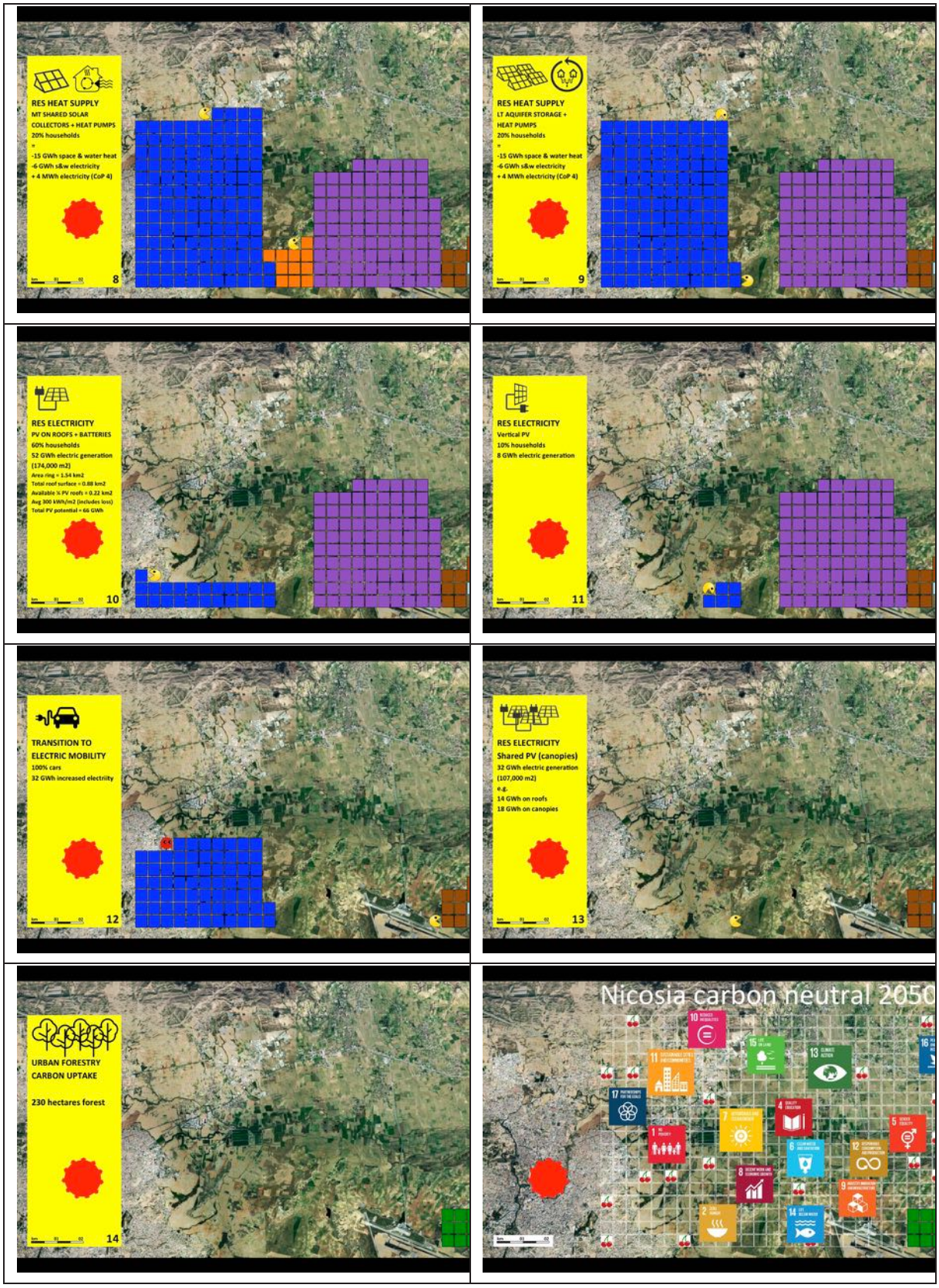


Figure cf.3. Sequence of Carbon Footprint mitigation measures to achieve the goal of carbon neutrality.

2.3.4. Conclusions

For increasing attractiveness, the graphic representation simulates the Pacman game where the Pacman eats squares of forestland due to energy saving, renewable energy production or other emissions avoided. As far as additional energy inputs are required, the ghost appears to add new squares such as, for example, when the use of heat pumps support the heating demand through renewable energy by using electricity (Pacman eats orange squares but new blue squares appear) or in case of a transition to electric mobility (Pacman eats purple squares but new blue squares appear). A consistent electricity generation from renewable sources can contribute to support the electricity demand and let the Pacman move forwards.

The carbon mitigation accounting and its representation through the Pacman game have been developed as a communication tool to allow a wide audience understand that, based on a collective and participative process, zero-carbon cities are an achievable goal to push forwards.

The last image shows the remaining forestland compared to the current Carbon Footprint. Referring to the metaphor of Pacman, a few cherries have appeared in the grid, some of which are replaced by the well known logos of the UN Sustainable Development Goals. Just like Pacman that eats cherries to gain scores, these represent the many opportunities throughout the pathway to a more sustainable Nicosia. Especially the activity of urban design, developed by the QUB team, shows potential benefits in terms of health, social equity, quality of life, in compliance with the UN recommendations, and demonstrates that sustainability does not concern with losses in our lifestyle but, in many regards, with gains and a more prosperous future.

A list of possible keywords and actions that have been hypothesized follows, showing possible interrelations with the UN Sustainable Development Goals.

# issues	Actions					
Sun city	Sunlight source	7	12	11		
Circular city	Circular economy	10	12	11		
Doughnut city	Economy within limits	8	10	12	11	
Co-developed city	Shared buffer zone, ex vital river	16	17	11		
Both side clearance	Airport pass (Cypriots)	10	16	11		
Facilitating tourism	Airport pass (tourists)	8	17	11		
Ring energy network	Energy generation + storage	7	8	11		
Energy community	Local consumer	1	12	17	11	
Citizen size	From car dominated to pedestrian. People first!	12	11			

Enhanced cultural heritage	Local identity/history; building value; UNESCO site					
Ecosystem services	sport + recreational + educational facilities (e.g. biodiversity)					
Ecosystem services	climate protection; lower hydrogeological risk					
Ecosystem services	food production (fruit trees); plant nursery; urban agriculture; autochthonous food					
Ecosystem services	light mobility (cycling route)					
Ecosystem services	green infrastructures (city as forest): shadow effect, UHIE mitigation					
Ecosystem services	Community services, safer and healthier for kids					
Connected work environment	new entrepreneurship					
Sustainable mobility	easier commuting					

Table cf.7. Correlations of planned design issues with the UN Sustainable Development Goals.

CHAPTER 3 – SUSTAINABLE CITY VISION

3.1. FINAL DAY PRESENTATION AT THE CVAR

The final day of the Nicosia Roadshow took place in the Centre for Visual Arts & Research on the 15th of May 2019. The final 'Sustainable City Vision' was presented to an audience comprising the Chamber of Commerce leaders, Ambassadors and Embassy policy officers, Members of the Parliaments, Council Department Heads, professionals, artists, energy consultants, academics, students and citizens from North and South Nicosia.

Fig 9. Scenes from the final presentation (Day 5) of the City-zen Nicosia Roadshow, CVAR, Nicosia Old Town. Team photo (May 2018).

The final day of the Nicosia Roadshow took the form of several integrated presentations. The first briefly outlined the overall objectives, ambitions, format and activities completed during the week. The second and third components composed the major body of the 'City Vision'. These being the 'Energy' workshop presentation, a complementary quantitative approach focused on energy strategies, scenarios and carbon offsetting measures at overlapping scales. The 'Future Neighbourhoods' workshop, more qualitative in nature, including urban planning intervention proposals at the façade, building and neighbourhood and city scale, together with spatial, social and guidelines. These elements would be brought together by urban observations instigated by the walking event and in-depth carbon investigations that graphically demonstrated how the city would reach zero-carbon by implementing the variously scaled interventions outlined earlier in the presentation.

The Roadshow continues to build upon previous experiences and looks forward to the final Roadshow, which is set to be Amersfoort in The Netherlands. The key to success has been to identify, reach and gain the trust of city inhabitants and 'decision makers'. To achieve this, an exchange of knowledge, experience and commitment continues to be crucial. The Roadshow will continue to develop and implement innovative methods that increase city engagement, awareness and understanding of the solutions needed to counter climate change, become carbon neutral and make cities happier and healthier places to live.

3.2. THE PRESENTATION

The Sustainable 'City Vision' presentation (Roadshow outcomes) presented at the Centre for Visual Arts and Research (CVAR), Nicosia Old Town, on Wednesday 15th of May 2019, can be seen hereafter.

City-zen Nicosia Roadshow May 8-15

Roadshow Team

Prof.Dr. Andy vd Dobbelsteen (TUD)
Achille Hannoset (Th!nk-e)
Dr. Andy Jenkins (QUB)
Prof. Greg Keeffe (QUB)
Prof.Dr. Craig L.Martin (TU Delft)
Dr. Markella Menikou (UoN)
Dr. Riccardo Pulselli (UoS)
Anneleen Vanderlinden (Th!nk-e)
Prof.Dr. Han Vandevyvere (EnergyVille/NTNU)
Maryam Al-Irhayim (UCLan)
Emma Campbell (QUB)
Sam van Hooff (TU Delft)
Rainer Townend (UCLan)
Alexis Postekkis (UoN Alumni)
Andreas Prokopiou (UoN Alumni)
Christos Xenofontos (UoN Alumni)

This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 608702

European Commission

CITY-zen New urban energy ROADSHOW

FUN-SHOP - WALK

To place Citizens in heart of process to create a healthier, happier and energy efficient city.

To openly invite Nicosia's stakeholders to come and get involved no matter what background and expertise.

CITY-zen New urban energy ROADSHOW

FUN-SHOP - TALK

Global experts combine with local stakeholder passion, knowledge and close familiarity of place to reach zero energy.

To ensure that solutions stay with the people who helped create them.

CITY-zen New urban energy ROADSHOW

FUN-SHOP - TALK (DUTCH EMBASSY/RESIDENCE)

Embassy of the Kingdom of the Netherlands

- Sustainability event at the residence of the Dutch Ambassador

CITY-zen New urban energy ROADSHOW

FUN-SHOP - Go2Zero

- Energy Transition role playing game

FUN-SHOP - Go2Zero

- Energy Transition role playing game

City-zen Roadshow Leader – Prof.Dr. Craig Martin

Nicosia, Cyprus, May 2019

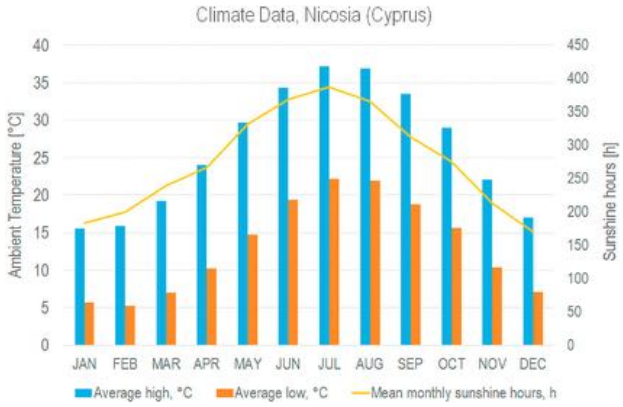
FUN-SHOPS – DESIGN (URBAN & ENERGY)

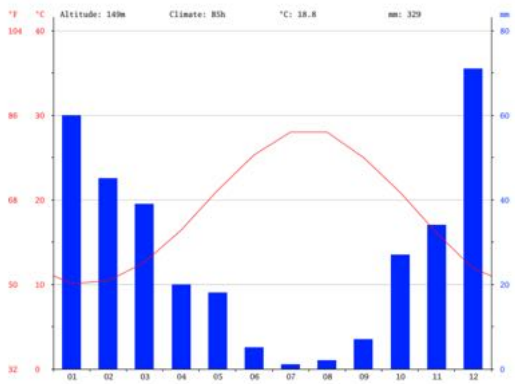
Studios for energy and urban design continued throughout the week in different locations.

Understanding the local circumstances

- **Climate** (Temperature, Sun, Wind, Rain)
- **Energy characteristics** (Energy demand, Energy mix, Infrastructures, Potentials)
- **Environmental footprint** (Resource use, Waste)
- **Challenges of Nicosia**

Climate: **temperatures and precipitation**



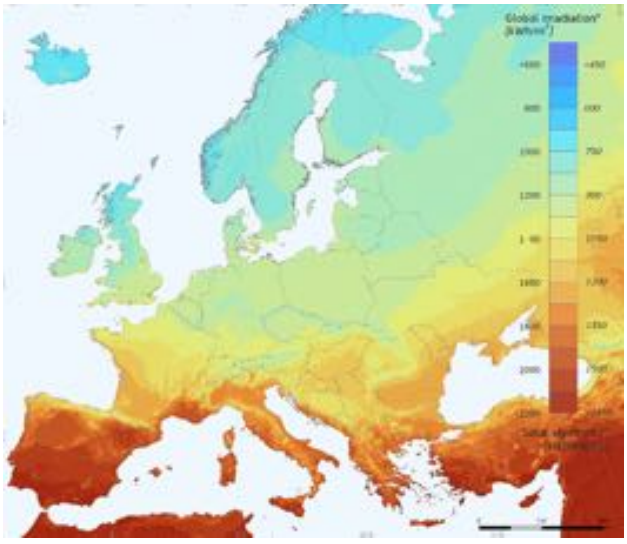


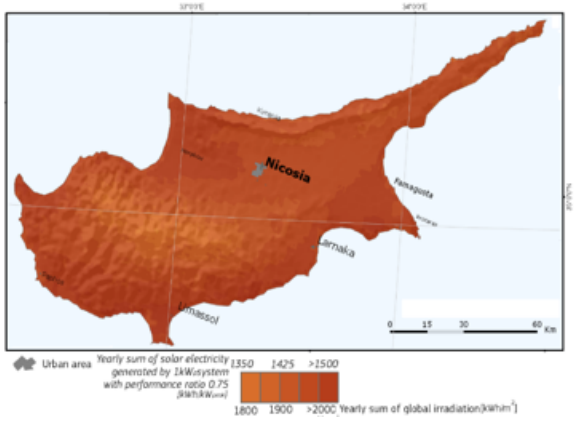
Even winter has high sunshine rates;
water stress to be addressed through seasonal buffering

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019

Climate: **solar intensity**





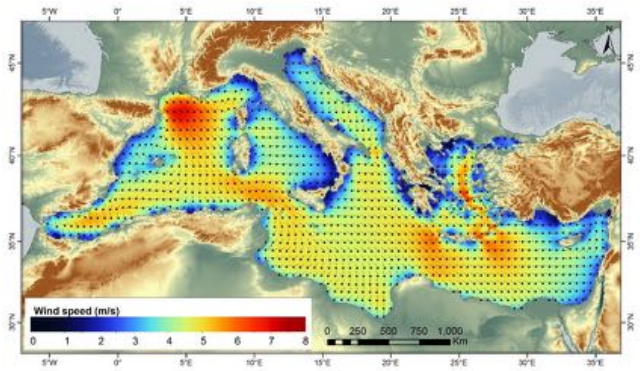
Solar 'best of Europe'

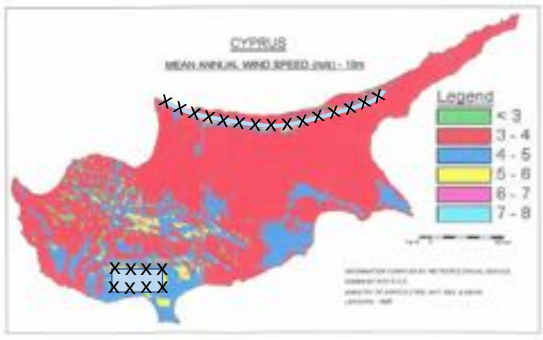
Source: FOSS Research Centre for Sustainable Energy University of Cyprus

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019

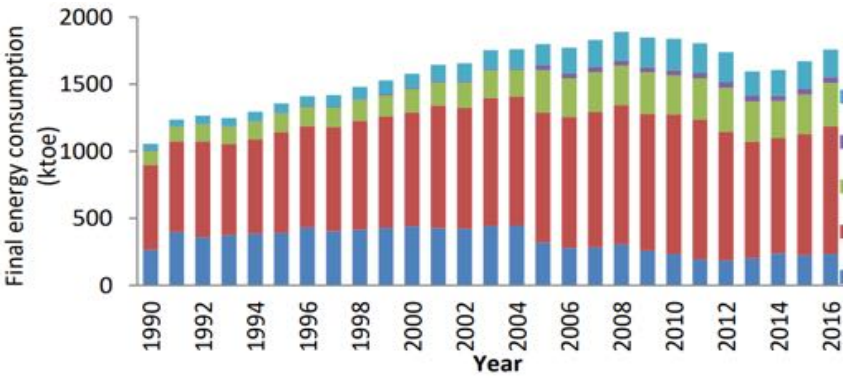
Climate: **wind characteristics**





Both offshore and onshore wind have a limited yet given potential
> only certain areas on land (cf. existing developments)

Energy characteristics: **final energy demand**



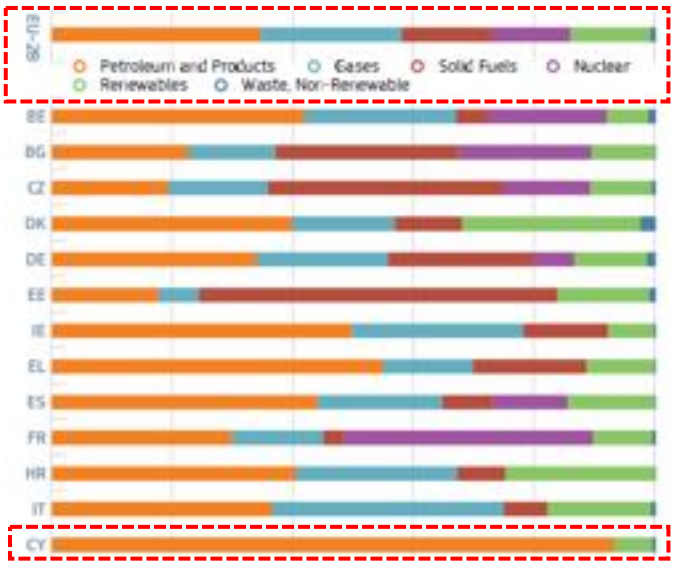
Source:

Cyprus Energy Agency

- Services
- Agriculture
- Residential
- Transport
- Industry

Energy-wise and otherwise, mobility is the number 1 issue to address

Energy characteristics: **energy mix**



Source:
Eurostat /
Cyprus Energy Agency

The island syndrome!
(Cf. Menorca)

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus, May 2019

Environmental footprint: **waste**

80% of waste goes to the landfill

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus, May 2019

Environmental footprint: **biocapacity**

COUNTRIES WITH BIOCAPACITY RESERVE *PERCENTAGE THAT BIOCAPACITY EXCEEDS ECOLOGICAL FOOTPRINT*	
French Guiana	3,860%
Guyana	2,490%
Suriname	2,310%
Gabon	818%
Congo	772%
Central African Republic	569%
Bolivia	428%
Uruguay	288%
Congo, Democratic Republic of	256%
Paraguay	220%
Eritrea	220%

COUNTRIES WITH BIOCAPACITY DEFICIT *PERCENTAGE THAT ECOLOGICAL FOOTPRINT EXCEEDS BIOCAPACITY*	
Singapore	10,000%
Bermuda	5,280%
Réunion	2,860%
Barbados	2,020%
Cayman Islands	1,790%
United Arab Emirates	1,730%
Israel	1,670%
Bahrain	1,550%
Saudi Arabia	1,330%
Cyprus	1,300%
Qatar	1,220%

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019

Environmental footprint: **biocapacity**

X **CYPRUS (1964)**

GDP PER PERSON -

POPULATION 578,627

Biocapacity per person **0.8** gha

Ecological Footprint per person **1.9** gha

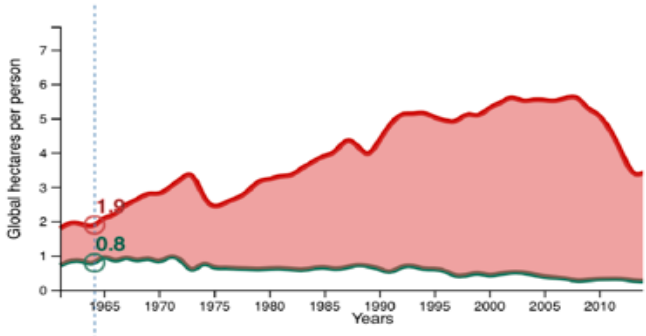
BIOCAPACITY RESERVE(+)/DEFICIT(-) **-1.1** gha

Ecological Footprint and Biocapacity From 1961 to 2014

Ecological Footprint per person

Biocapacity per person

Learn More

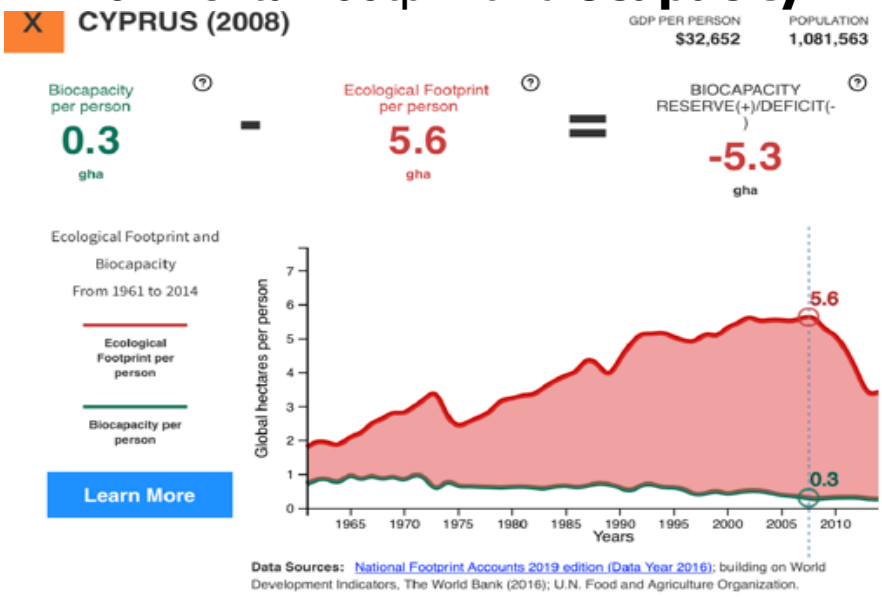


Data Sources: National Footprint Accounts 2019 edition (Data Year 2016); building on World Development Indicators, The World Bank (2016); U.N. Food and Agriculture Organization.

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019

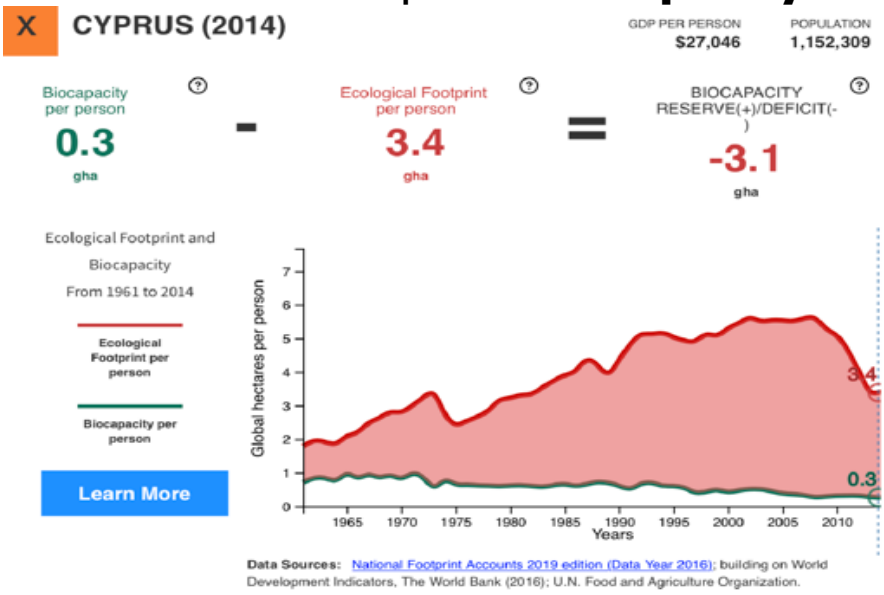
Environmental footprint: **biocapacity**



Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019

Environmental footprint: **biocapacity**



Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019

Environmental footprint: **biocapacity**

We need 13 Cypruses to meet the demand of the 2020 lifestyle

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019

System analysis

Old Nicosia is the more sustainable place

Suburban Nicosia is locked deeper into unsustainability:
fossil energy intensive, high-entropy environment

- **Chaotic form:**
  extensive mix of housing, enterprises and small industry, agriculture, shopping and leisure – a patchwork of 'non-places'
- **Resultantly difficult to service by soft modes:**
  walk, bike, public transport
- **Extreme dependence on car use**
  > high environmental & health impact, high congestion risk, high vulnerability for petrol price shocks
- **Suburbia is designed as a heat & petrol trap**

CITY-zen New urban energy ROADSHOW

System analysis

Suburbia is designed as a heat trap:

- **Widespread sealing of soil & multitude of asphalted parking lots, few green infrastructures > heat accumulation in the public domain, strong exposure of people to solar radiation, primary reflex to get into cooled car or cooled building**
- **Car parks uncovered > cars act as ovens pushing up the need for cooling, augmenting the waste heat exhaust from air-conditioning and thus creating a negative heat feedback loop**
- **Buildings & façades not designed as passive coolers** (sun shading, greening, high albedo surfaces) **> heat trap, need for cooling, negative waste heat feedback loop**
- **Lack of tree cover & water surfaces > no cooling effect of green-blue infrastructures**
- **With increasing summer temperatures all of this risks to yield a deadly lock-in with severe consequences to health & well-being, societal costs and risks of reverting to symptom remediation** (ever higher cooling loads accepted as the immediate solution – boiling frog syndrome)

Suburbia as a heat trap (north)

Suburbia as a heat trap (south)

Suburbia as a petrol trap

CITY zen
New urban energy
ROADSHOW

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019

The car as a constituent of non-places

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019

The car as a constituent of non-places

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019

System analysis

With climate change already happening,

You risk to cook yourself in petrol and concrete…
But solutions are at hand

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019


Not only a matter of tapping into the massive PV potential…


Old Nicosia is the more sustainable place

Traditional climate control strategies

Traditional climate control strategies


Traditional climate control strategies


Traditional climate control strategies


Traditional climate control strategies

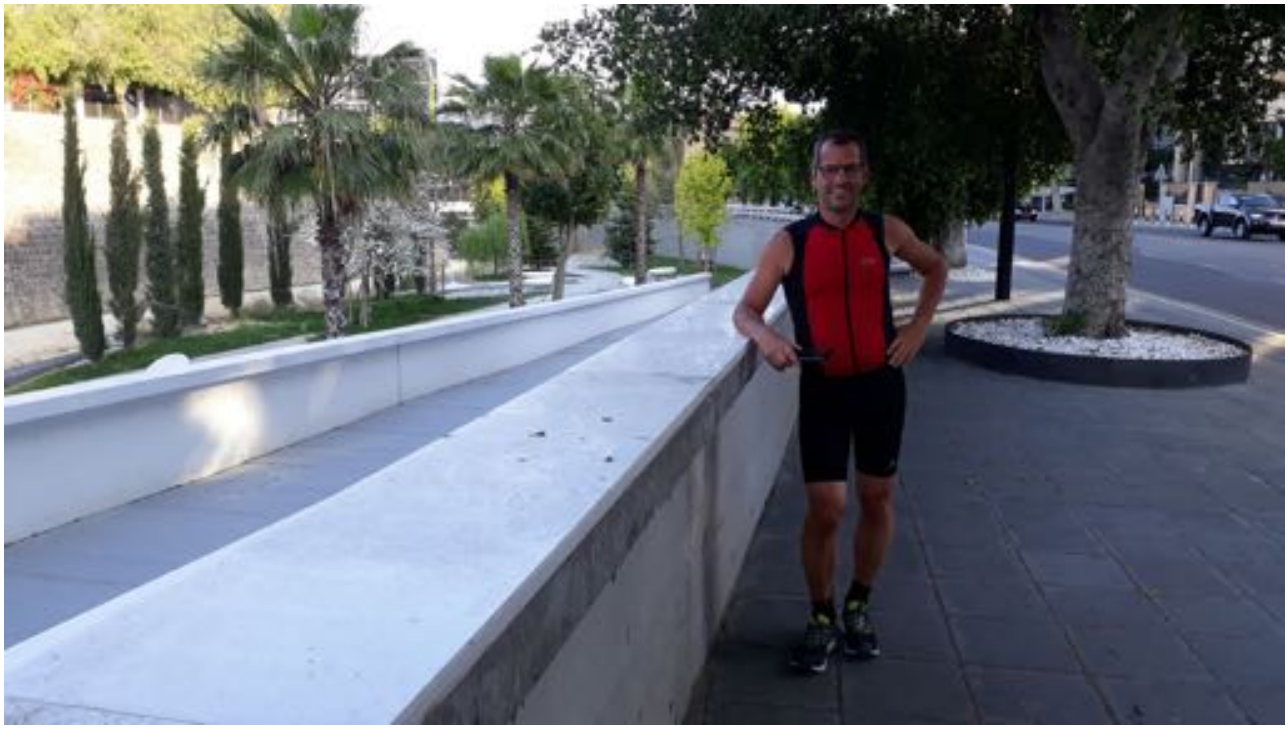

Traditional climate control strategies


Traditional climate control strategies


Traditional climate control strategies
Bank


Modern interpretation of climate control strategies


Modern interpretation of climate control strategies
FELLA
JEWELLERY-DIAM




Retrofit opportunities


Retrofit opportunities


Retrofit opportunities


Communal garden potential: ramparts


Places to live

Goodbye Car Empire, welcome Green Mobility

The space reserved for the pedestrian

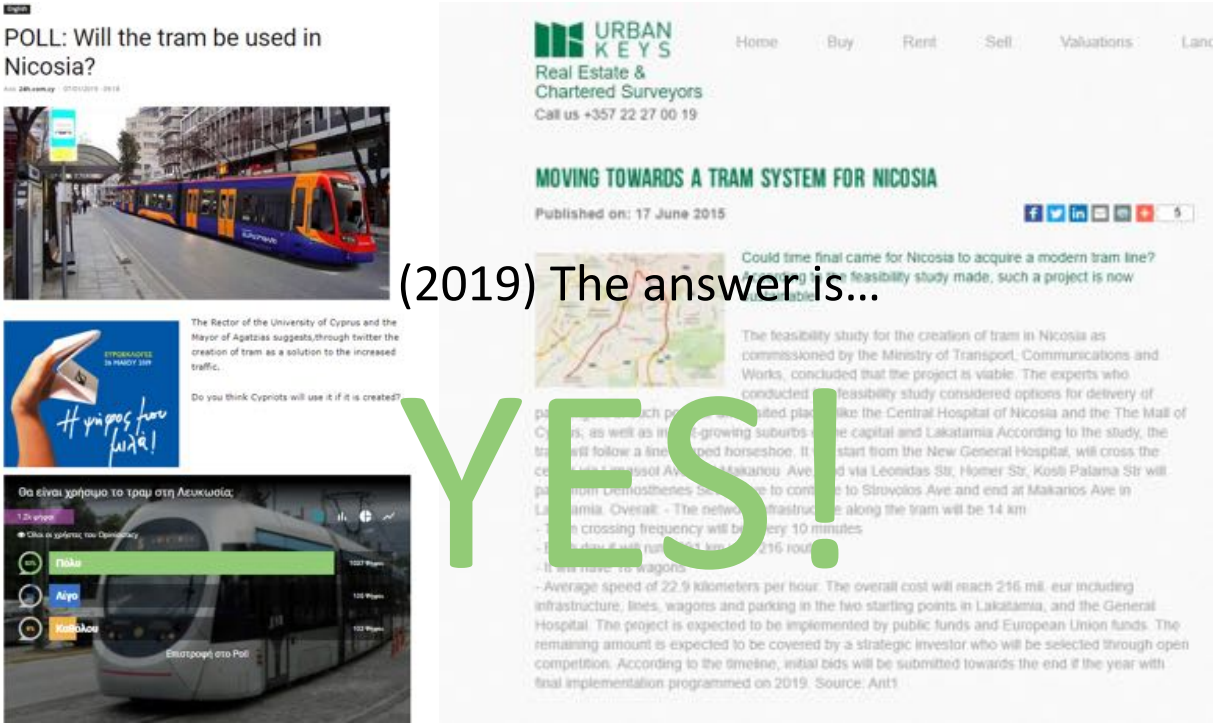
The space reserved for the pedestrian

Goodbye Car Empire, welcome Green Mobility

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

Nicosia, Cyprus, May 2019


vodafone
EMRE COLAK

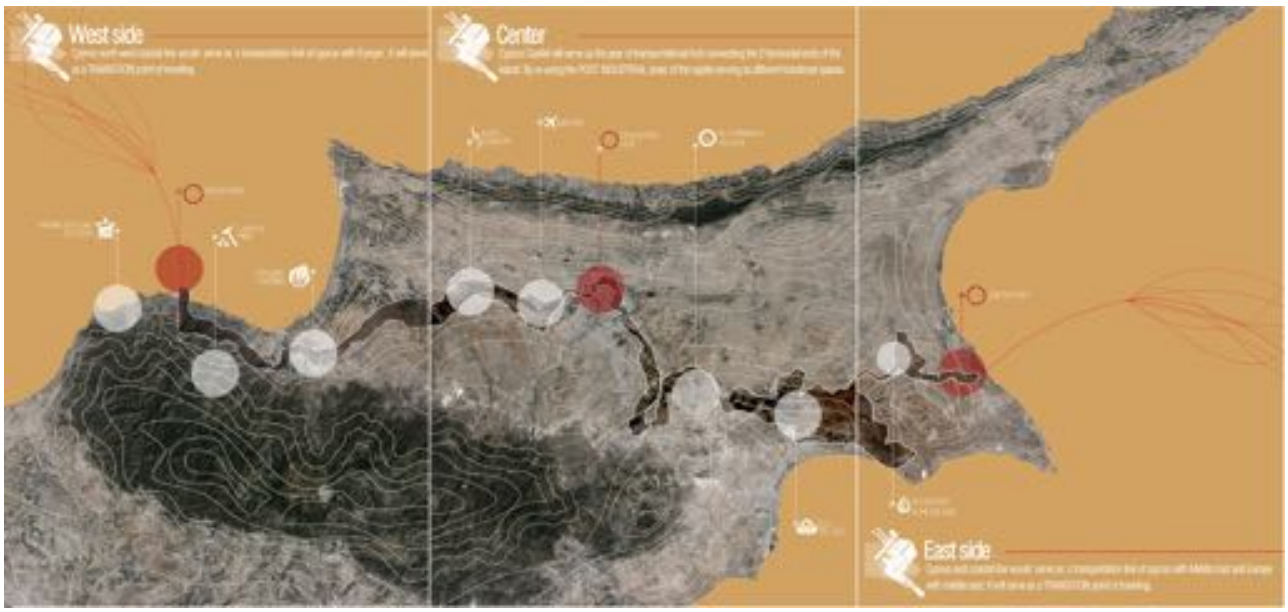


(2019) The answer is…

YES!

Ana

Cross-Cyprus tram/light rail proposal © Yiannis Paphitis



Sustainable mobility

Mobility is killing the island > modal shift & electrify

- **E-bikes, E-scooters/steps**
- **E-shuttles & E-buses, tramway**
- **HUMES (hubs for urban mobility and energy)**
- **E-vehicles private (not within rampart)**
- **Mobility as a Service (MaaS) – multimodal trips**

Sustainable mobility

Mobility as a Service (MaaS) – multimodal trips

Analysis: Prof Han Vandevyvere, EnergyVille / NTNU

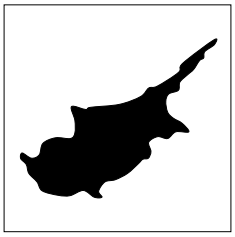
Nicosia, Cyprus, May 2019

CYPRUS GREENHOUSE GASES INVENTORY 2016

ELECTRICITY	91% heavy oil 3% PV 4% Wind 1% biomass	3197 kt CO_2-eq	37.0 %
HOUSING	51% Diesel oil 6% Kerosene 23% LPG 15% Biomass 6% Charcoal	570 kt CO_2-eq	6.6 %
TRANSPORT		1889 kt CO_2-eq	21.9 %
INDUSTRY		1901 kt CO_2-eq	22.0 %
AGRICULTURE		559 kt CO_2-eq	6.5 %
WASTE	79% landfilled 9% organic 12% recycled	466 kt CO_2-eq	5.4 %
WATER		49 kt CO_2-eq	0.6 %
CARBON UPTAKE		-168 kt CO_2-eq	1.9%

8631

kt CO_2eq



CYPRUS

Area: 9251

Citizens: 864,200

Population South: 72%

Population North: 28%

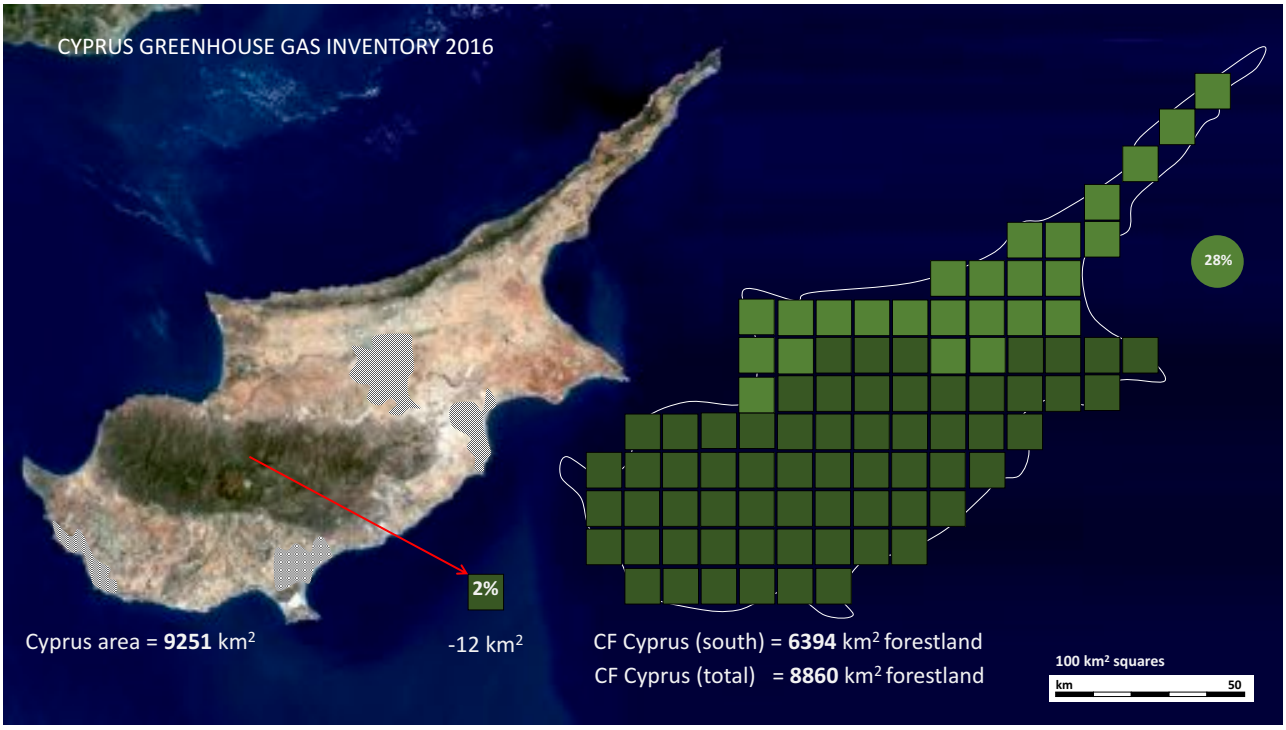
2018 7th National Communication and 3rd Biennial report under the UNFCCC of Cyprus

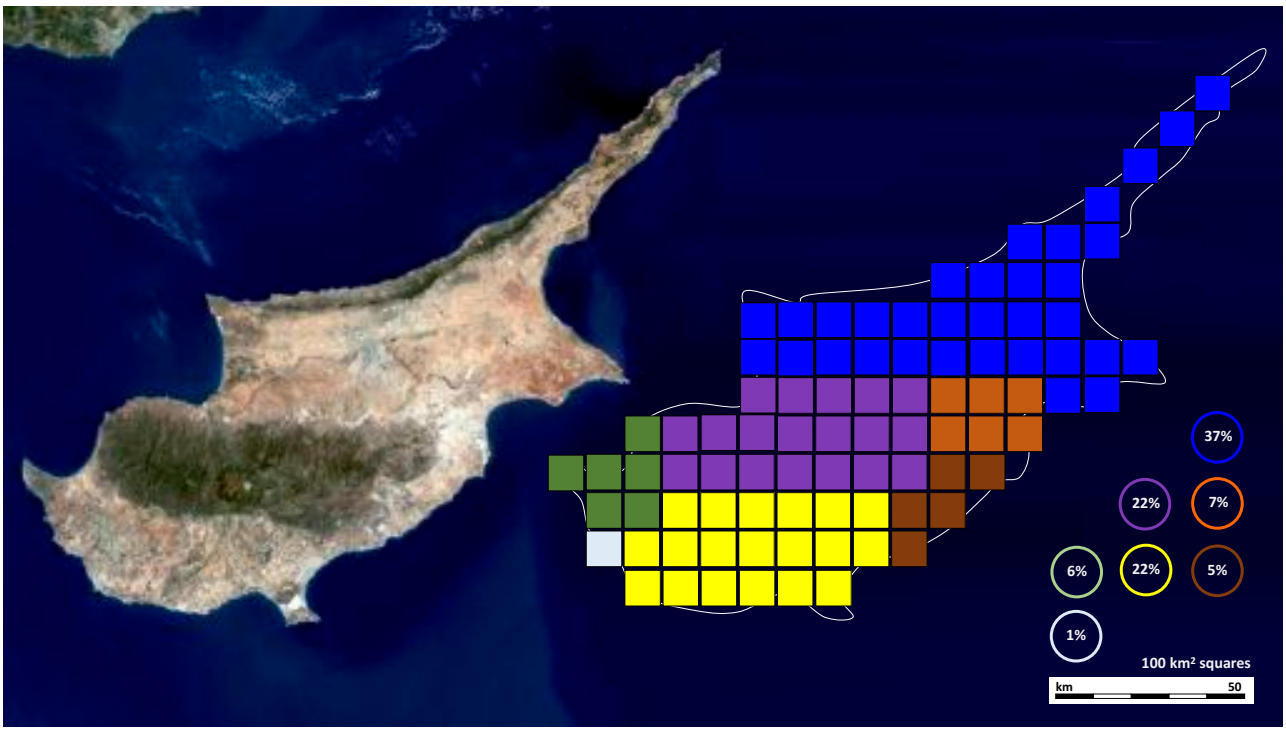
Department of Environment

Ministry of Agriculture, Rural Development and Environment

Analysis: Dr Riccardo Pulselli, INDACO2 / Universitá di Siena

Nicosia, Cyprus, May 2019


CYPRUS GREENHOUSE GAS INVENTORY 2016
28%
2%
Cyprus area = 9251 km²
-12 km²
CF Cyprus (south) = 6394 km² forestland
CF Cyprus (total) = 8860 km² forestland
100 km² squares
km
50


37%
22%
7%
6%
22%
5%
1%
100 km² squares
km
50

Household profiling in Cyprus

Electricity: 6500 kWh /yr	1150 space cooling 640 space heating 380 water heating 550 cooking 3780 appliances & light	4625 kg CO_2 eq	37 %	
Fuel mix: 7000 kWh /yr	5330 space heating 370 water heating 1300 cooking	1703 kg CO_2 eq	14 %	
Mobility: 26000 km /yr	16000 km/yr car 1.63 car/house	4383 kg CO_2 eq	35 %	
Waste: 1700 kg /house yr	79% landfilled 9% organic 12% recycled	1608 kg CO_2 eq	13 %	
Water: 94 m3 /house yr		55 kg CO_2 eq	0.4 %	

12.37

t CO_2eq

Household

2.7 citizens

Household 2009:
https://www.mof.gov.cy/mof/cystat/statistics.nsf/energy_environment_81main_en/energy_environment_81main_en?OpenForm&sub=1&sel=2

Carbon Footprint per household

Household

2.7 citizens

12.37 t CO_2 eq

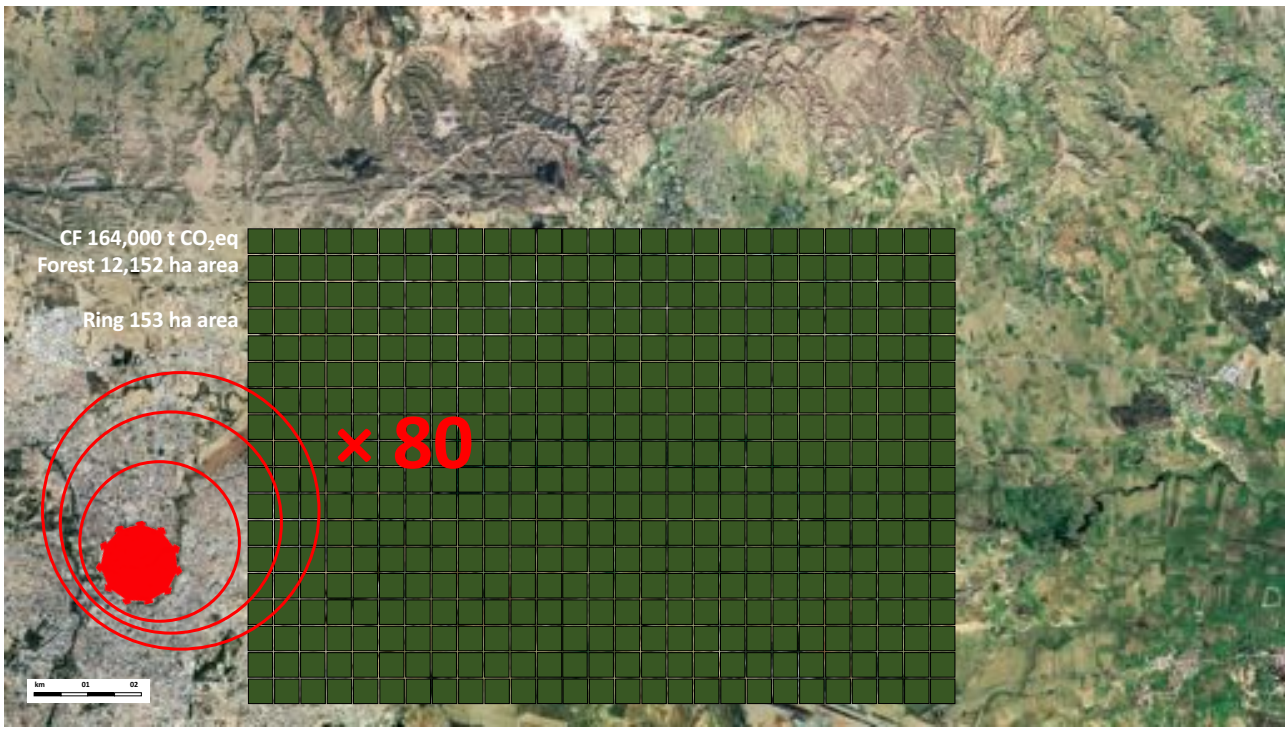
0.92 ha

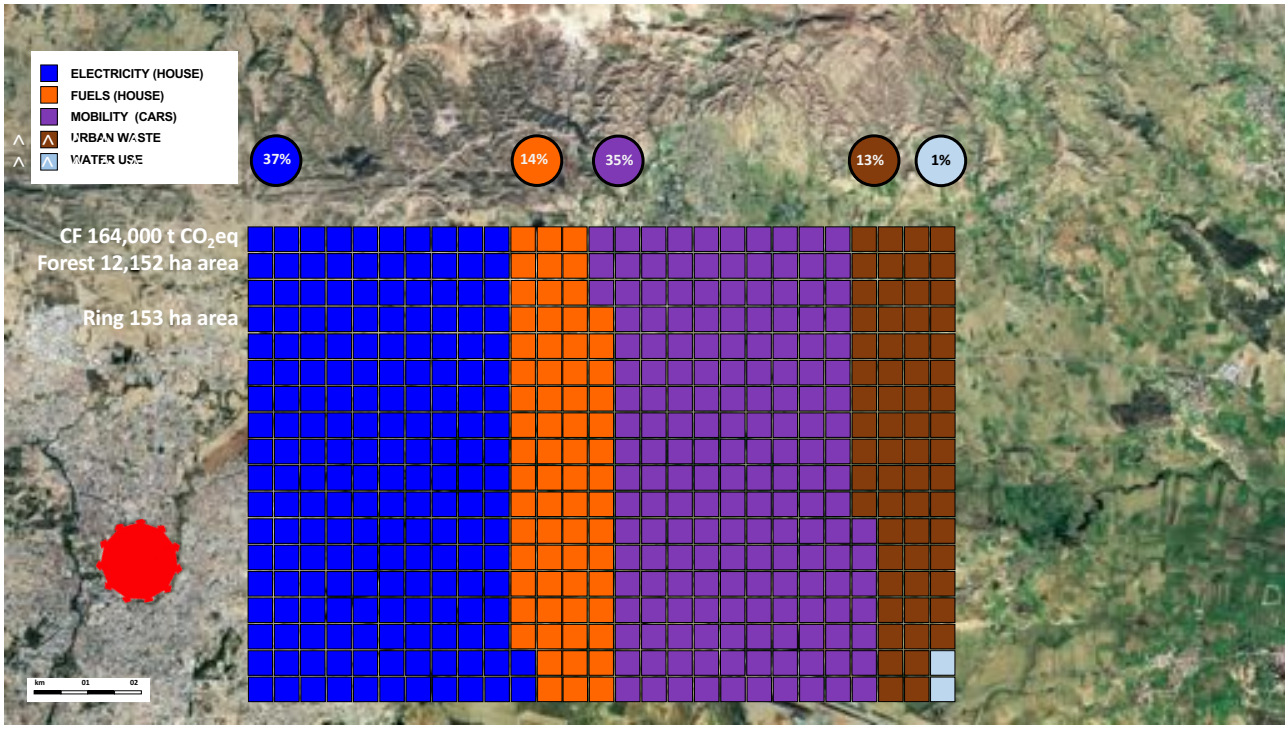
Virtual forestland

1.5 fields

Pulselli et al."Carbon accounting framework for decarbonisation of European city neighbourhoods". Journal of Cleaner Production 208 (2018) 850-868.


Population 35,000
Households 13,258


CF 164,000 t CO_2eq
Forest 12,152 ha area
Ring 153 ha area
× 80

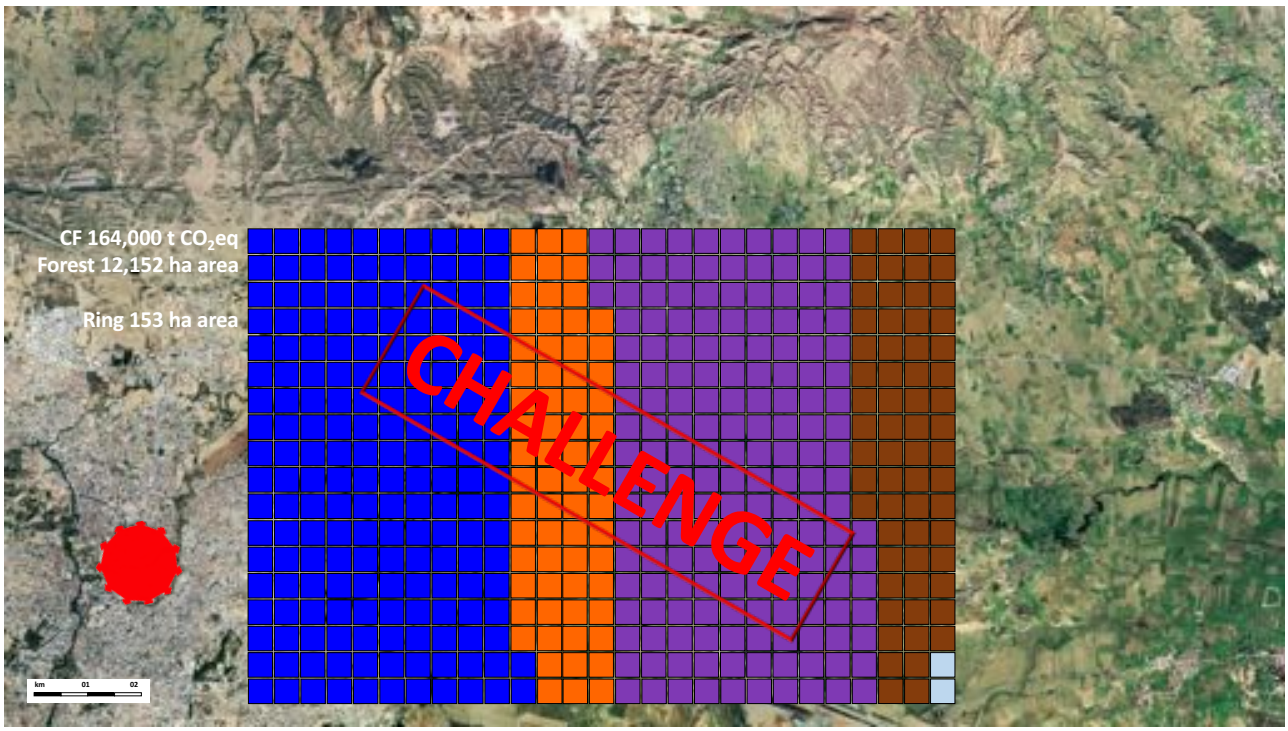

ELECTRICITY (HOUSE)
FUELS (HOUSE)
MOBILITY (CARS)
URBAN WASTE
WATER USE
37%
14%
35%
13%
1%
CF 164,000 t CO_2eq
Forest 12,152 ha area
Ring 153 ha area


What about food?
CF 164,000 t CO_2eq
Forest 12,152 ha area
Ring 153 ha area


+27%
What about food?
ADD CF 44,000 t CO_2eq
Forest 3280 ha area
Ring 153 ha area
× 21


+41%
What about food?
ADD CF 67,000 t CO_2eq
Forest 4982 ha area
Ring 153 ha area
× 32


+16%
What about food?
ADD CF 26,000 t CO_2eq
Forest 1944 ha area
Ring 153 ha area
× 12


CF 164,000 t CO_2eq
Forest 12,152 ha area
Ring 153 ha area
CHALLENGE

Nicosia Energy Strategy

- **Prof. Andy van den Dobbelsteen** – TU Delft, The Netherlands
- **Dr. Riccardo Pulselli** – INDACO2 / Universitá di Siena, Italy
- **Prof. Han Vandevyvere** – EnergyVille, Belgium / NTNU, Norway
- **Achille Hannoset** – Th!nkE, Belgium
- **Anneleen Vanderlinden** – Th!nkE, Belgium

With support of:

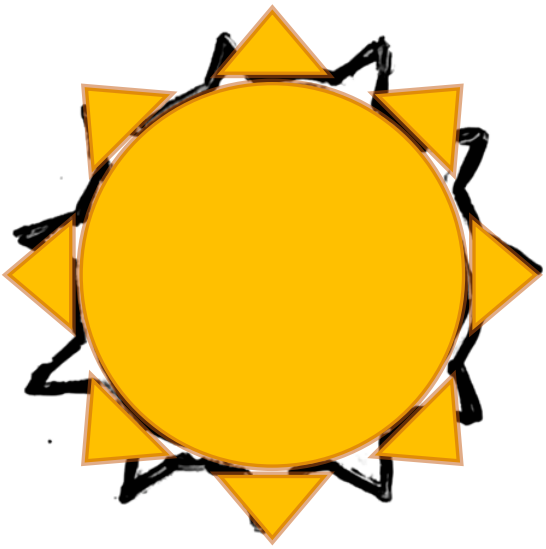
- **Sam van Hooff** – AMS / TU Delft, The Netherlands
- **Maryam Al-Irhayim** – UCLAN, Preston, UK
- **Rainer Townend** – UCLAN, Preston, UK
- **Christos Xenofontos** – UNIC, Nicosia
- **Andreas Prokopiou** – UNIC, Nicosia
- **Alexandros Postekkis** – UNIC, Nicosia

CITY zen
New urban energy
ROADSHOW

Nicosia, Cyprus, May 2019

A vision on the sustainable city

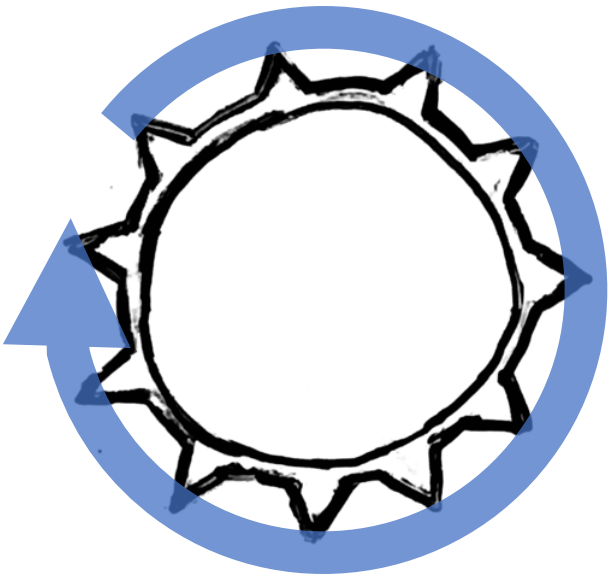
Nicosia, City of the Sun



Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

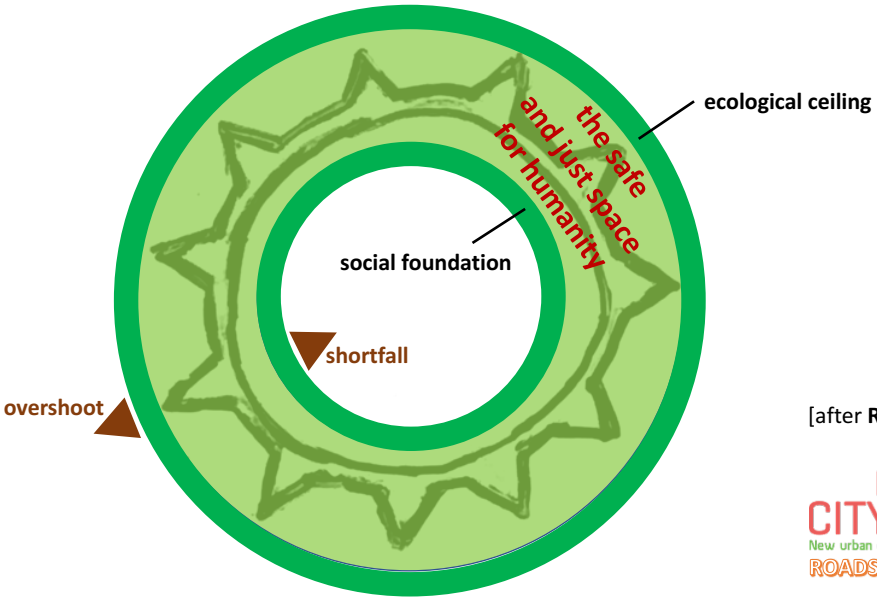
Nicosia, Circular City



Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

Nicosia, Doughnut Economy

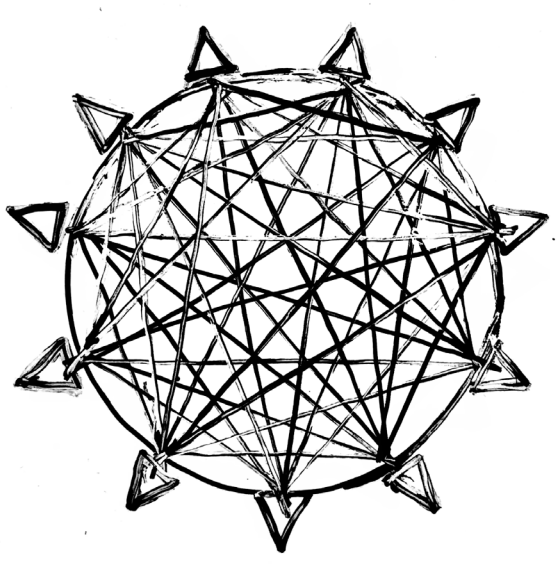


[after **Raworth, 2017**]

Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

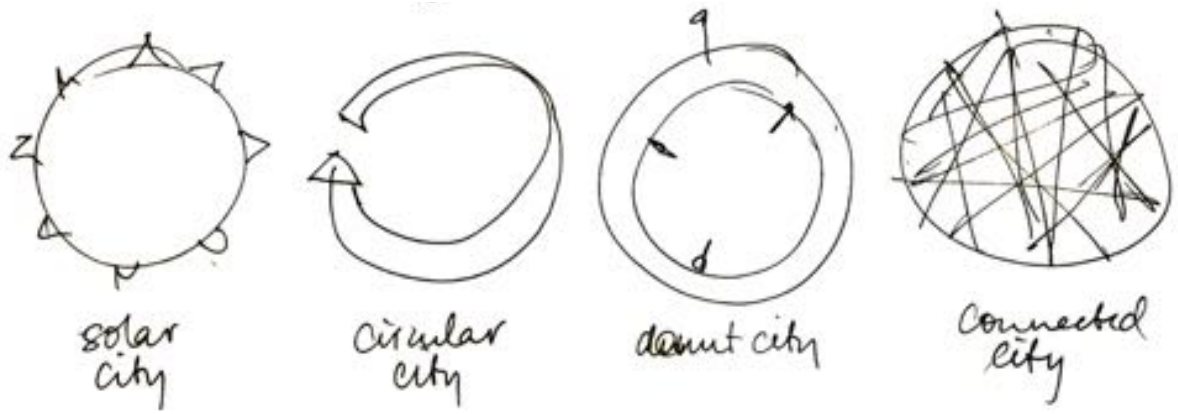
Nicosia, Connected City



Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

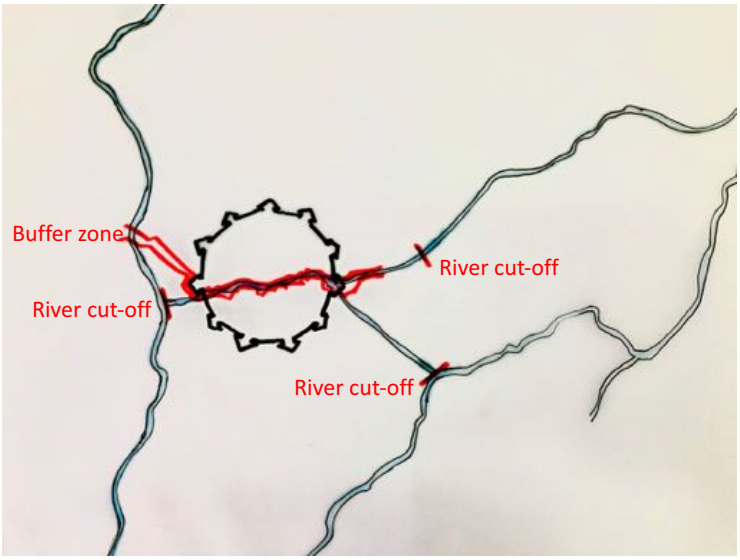
Nicosia, Cyprus, May 2019

Different strategies



Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

The river and connection lost



The ancient city of Lefkosia was situated on a **river** that ran right **through the centre**.

The Venetians built a **circular city wall** that blocked the old river course.

It became a **marshy waste dump**, which in turn became a **barrier** within the renaissance city.

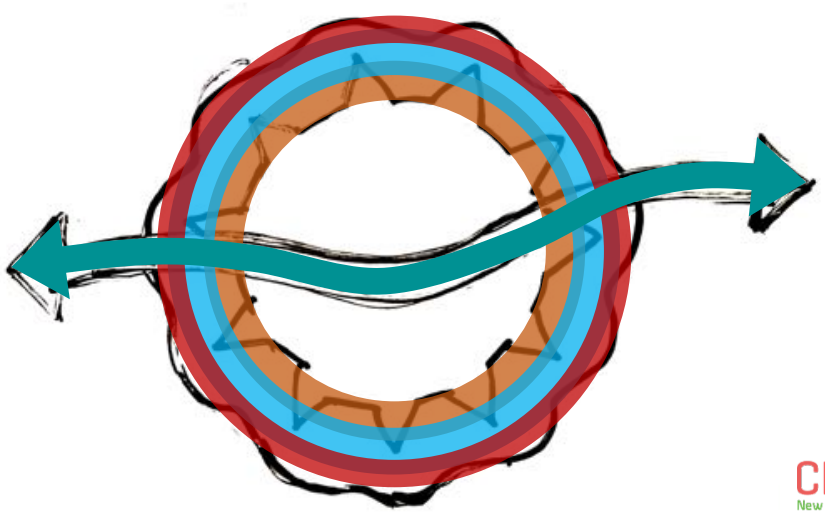
At present, the **UN buffer zone** runs exactly along this barrier that once was a vital river.

Proposing green-blue-red connectors for Nicosia

A top-touristic **UNESCO** world heritage city

A connecting green-blue **park zone**

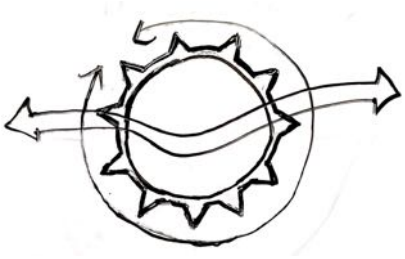
A connecting green-blue-red **city ring**



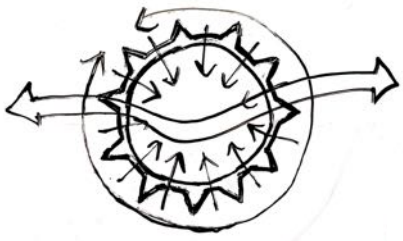
Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

Strategy for the communal energy system



Ring network for energy mains



Branches into the city

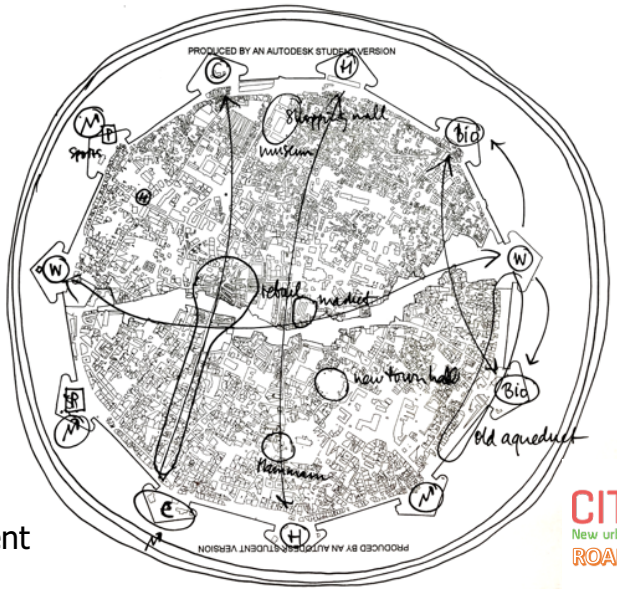
Energy storage in the batteries

Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

New energy utilities in the historic city ring

- **Ring networks around the city**
- **Storage facilities**
  - Electricity storage
  - Cold storage
  - Heat storage
  - Water storage
  - Waste water treatment
  - Bio-digestion
- **Strategic positioning**
  - Near logical demands
  - Helping circular management



CITY-zen New urban energy ROADSHOW

The energy plan

- **Electricity**
  - PV on individual homes, public buildings, large roofs, city walls
  - Use 3-4 battlements to store electricity (batteries, salt, salt water)
  - Connect these battlements to electric vehicle charging stations
- **Cold**
  - Deploy the underground aquifer (± 15ºC) for cooling
  - Use 1-2 battlements north and south to store cold
  - Use heat pump to exchange with hot storage
- **Heat**
  - Solar collectors for heat in all seasons
  - Use 1-2 battlements north and south to store MT heat (60ºC)
  - Use heat pump to exchange with cold storage

CITY-zen New urban energy ROADSHOW

From bastion battery to bastion battery

Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

The different solutions related to 'reusing' energy

- **Attune**
  - Energetic programming of urban and building functions
  - Apply peak shaving: smart use of electricity
- **Exchange**
  - Reuse waste heat from exhaust air, waste water, sewage etc.
  - Exchange excessive heat with places with heat shortage
- **Cascade**
  - Reuse waste heat at a lower temperature in a different function
- **Store**
  - Store energy, heat and electricity, diurnally and interseasonally

Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

Heat and cold storage plan

1. HT heat
- From individual solar collectors, all year round
- For hot water and heating of monumental buildings

2. MT heat
- From communal solar collectors and upgraded LT heat
- Stored in battlement battery (insulated mass, kept at MT)

3. LT heat
- From underground aquifer and sources of waste heat
- Stored in battlement battery, heat pump exchange with cold

4. Cold
- From aquifer and as electricity overproduction storage
- Stored in battlement battery, heat pump exchange with LT heat

HT: high-temperature
70°C and higher
challenged buildings, poorly insulated

MT: mid-temperature
40-70°C
recent buildings, better insulated

LT: low-temperature
25-40°C
highly efficient, well-insulated buildings

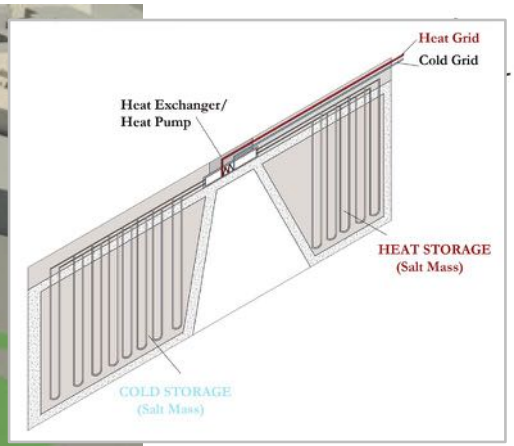
Cold
18°C and below

CITY zen
New urban energy
ROADSHOW

Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

Bastion heat and cold storage



CITY zen
New urban energy
ROADSHOW

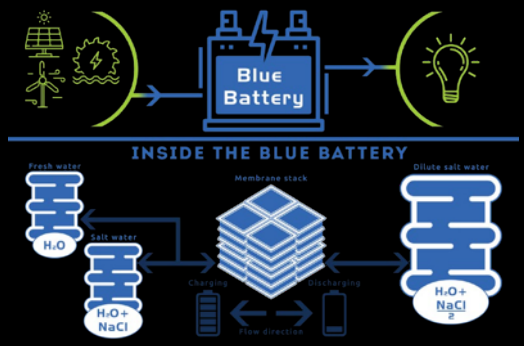
Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

Electricity storage plan

- **Large batteries**
  - Traditional (Li-ion) batteries
  - Salt water batteries ('blue' and 'green')
  - Water tower pump & turbine

- **'Programmatic storage'**
  - Additional cooling in fridges and freezers
  - Additional heating of bath houses, swimming pools, heat storage
  - Additional charging/discharging (e-bikes, e-vehicles, computers)
  - Solar Clock: switch equipment on when solar power is abundant

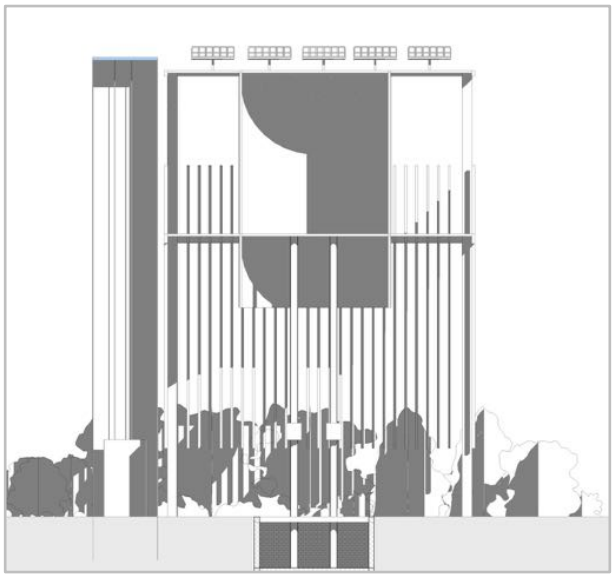


CITY zen
New urban energy
ROADSHOW

Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

Hydro-power water tower look-out



Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

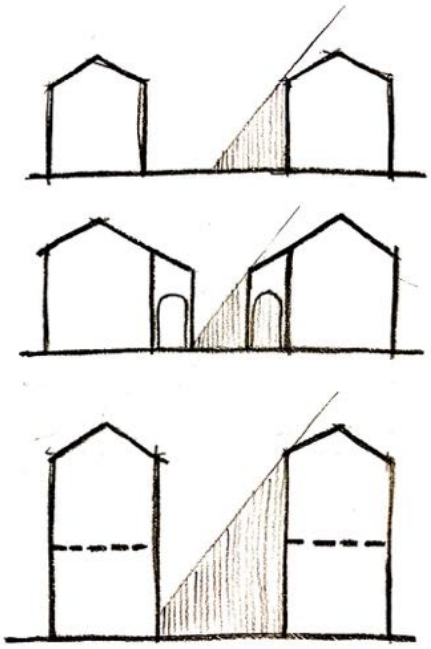
Bioclimatic principles for Nicosia

[drawings by Maryam Al-Hiryahim]

- Learn from local historic architecture
- Learn from buildings in warmer regions
- Use the local future climate smartly
- Use the geological features
- Use local materials

Energy strategy: Prof Andy van den Do elsteen, Delft University of Technology

Nicosia, Cyprus, May 2019



Passive measures

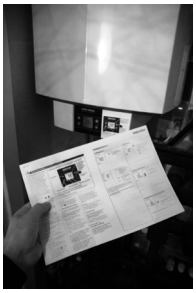
- **Narrower streets / higher buildings alongside**
- **Design to block / admit the sun** (awnings, louvres)
- **Create buffer spaces** (balconies, loggias, verandas)
- **Insulate the building envelope** (roof, façade, floor)
- **Use building mass / phase change materials**
- **Create thermal draft / wind-driven ventilation**
- **Use plants / fountains for evaporative cooling**

Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

Active energy saving measures

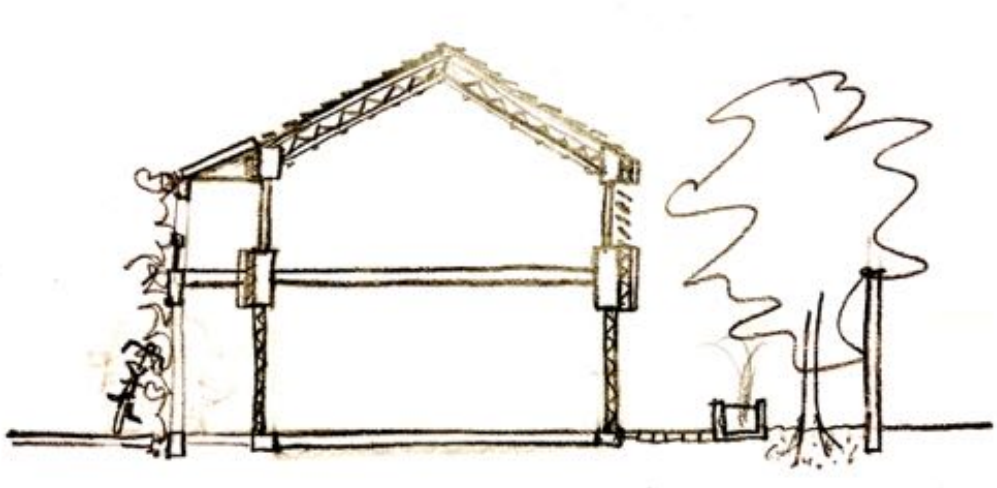
- **Low-temperature heating, high-temperature cooling**
  (underfloor/wall system, air system)
- **Energy-efficient lighting**
  (LEDs or e-saving fluorescent lighting)
- **Energy-efficient appliances**
  (washing machines, televisions, fridges, freezers, air-conditioners)



Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

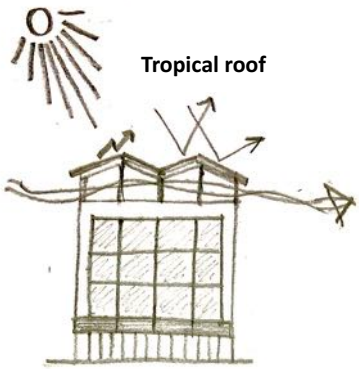
Energy retrofit



- Roof insulation
- Wall insulation
- Double-glazing
- Insulated doors
- Loggia
- Flowering climbers
- Garden tree
- Garden water
- Solar roof tiles
- Solar collector
- Bicycles

Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019



Nicosia, Cyprus, May 2019

Household retrofit + solar electricity panels

- **Retrofit investment a home: € 15,000**
  Thermal insulation, highly performant windows, new energy-efficient appliances and LED
- **Combined with 3 kW PV panels for € 3,900**
- **65% savings on energy bill**

→ **Payback time: 16 years**

Yearly cost for mobility for 1 family:

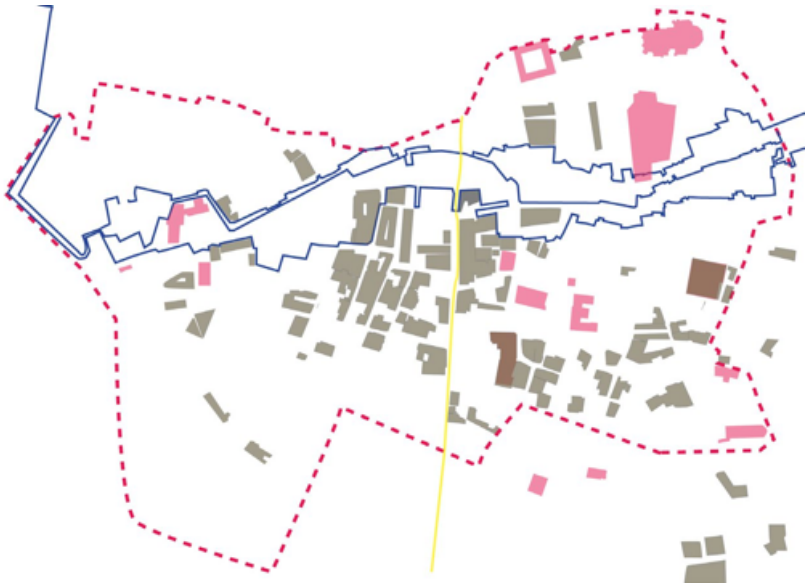
- **2 cars**: annual costs **€ 15,000**
- **1 car, 2 electric bikes, € 800 for public transport**
  → annual costs: **€ 9,400**
- **Annual savings: € 5,600!**

Immediate profit:
keep 1 car, sell 1 car (€ 500),
buy 2 electric bikes,
spend € 800 on public transport
→ annual costs only **€ 11,700**

Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

Flat roofs in our area: potential for solar panels



Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

This could be PV!

Solar art


These could be PV cloths


Heritage PV?


Ramparts in disarray


Solar potential of the ramparts


Traditional PV
Temporary, until Nicosia has sufficient solar power?


Heritage PV on the ramparts
Finding the right, historically acceptable solution

This could be done in a local energy company (LEC)

A community looking for

- **Energy independence**
- **Participation in the energy market**
- **Lower electricity prices**
- **Reduced CO_2 emissions**

They are involved in energy

- **Production**
- **Storage**
- **Distribution**
- **Sharing and trading**
- **Supply**
- **Aggregation**

6 years!

CITY-zen New urban energy ROADSHOW

Benefits

- **For citizens**

Involvement in the energy transition

Spread initial financial investment in smart technology and RE production

Energy independence

Local economic development

- **For society**

The uptake and integration of renewables

Enable cost-effective grid expansion or operation

Promote energy savings and electro-mobility

Proposal for Nicosia

- **Communities in Nicosia**

People living in apartment blocks

A group of local shops offices

- **Location of communal solar panels**

Buffer zone

The city wall

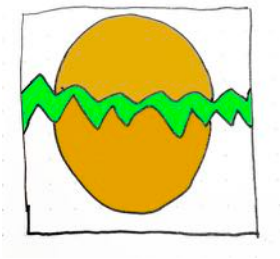
Rooftop of apartment blocks

Energy strategy: Prof Andy van den Dobbelsteen, Delft University of Technology

Nicosia, Cyprus, May 2019

Urban Design

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Problems

Division

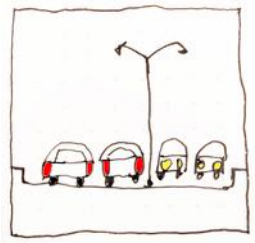
Not the biggest.....

CITY zen
New urban energy
ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Problems

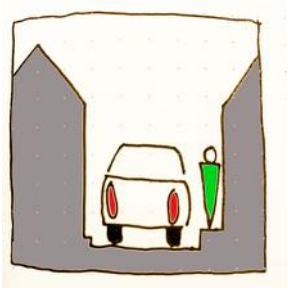
- Car usage
- Bigger…
- Heat island
- Climate change Sustainability

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



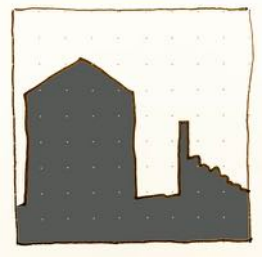
Problems

- People unfriendly space
- Car dominated…

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design



Problems

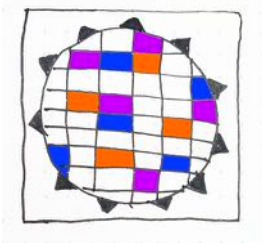
Heritage at risk

The possibilities are endless……

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design



Problems

No obvious centre public space in the city

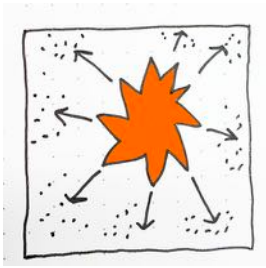
Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Problems compounded by

Suburban growth



Problems

Suburban growth

No transport infrastructure

Car-based transit

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

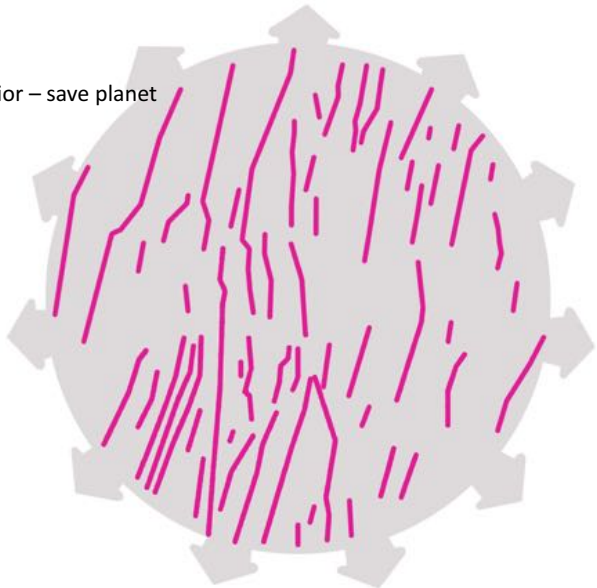
Urban Design

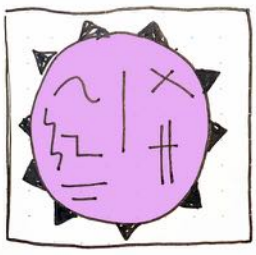
Key Premise

Change space – change behavior – save planet

Network issues

N-S





Network issues

Change space

Change behaviour

Save lives

Save planet

Urban design strategy: Prof Greg Keeff

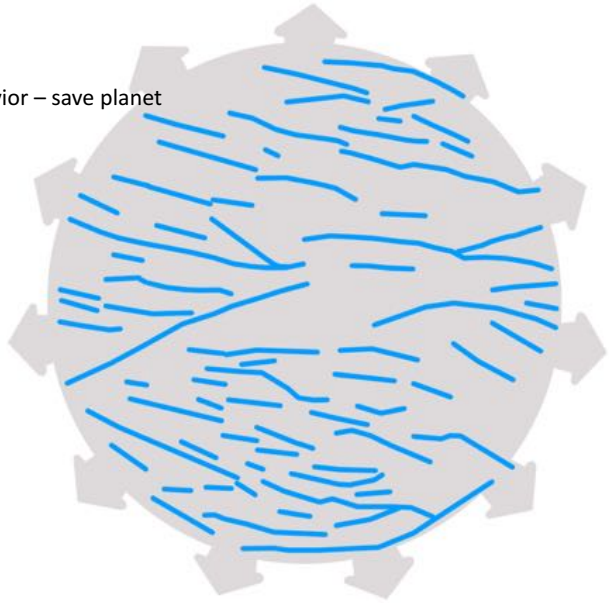
Nicosia, Cyprus. May 2019

Urban Design

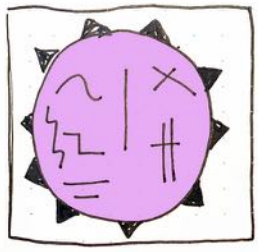
Key Premise

Change space – change behavior – save planet

Network issues
E-W



Urban design strategy: Prof Greg Keef



Network issues

Change space

Change behaviour

Save lives

Save planet

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

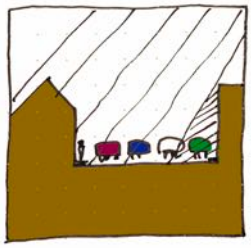
Urban Design

Key issues

Change space – change behavior – save planet

Get people out of the car…. 2000 deaths a year from circulatory problems….

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Get people out of the car

Change space

Change behaviour

Save lives

Save planet

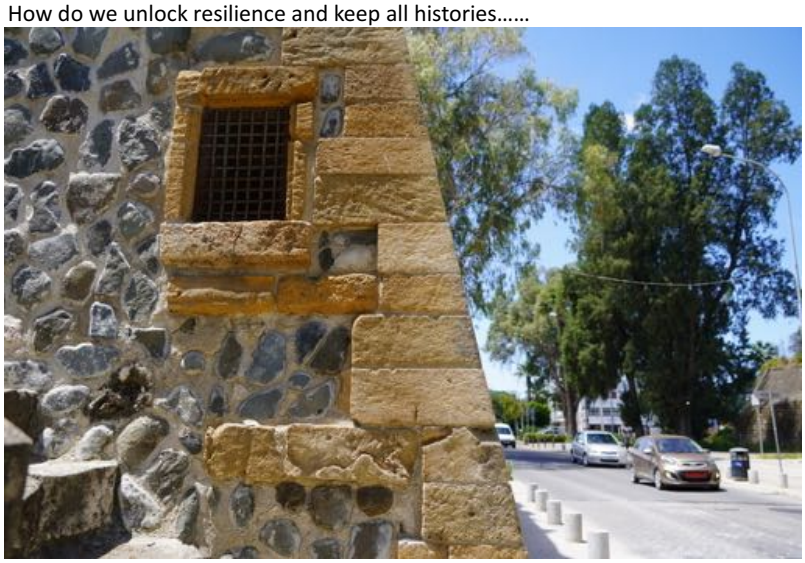
CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

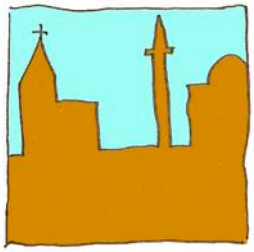
Urban Design

History to heritage

How do we unlock resilience and keep all histories……



Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



History to heritage

History

History

History

People

Local global

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

The Challenge

Invent something that you will actually do !

Affordable

Time-bound

Methodological and Emergent

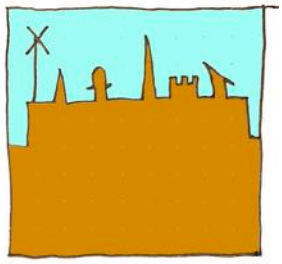
Politically acceptable

Understandable by all

Yet…….

Radical – because it's an emergency!!

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



The Challenge

Community buy-in

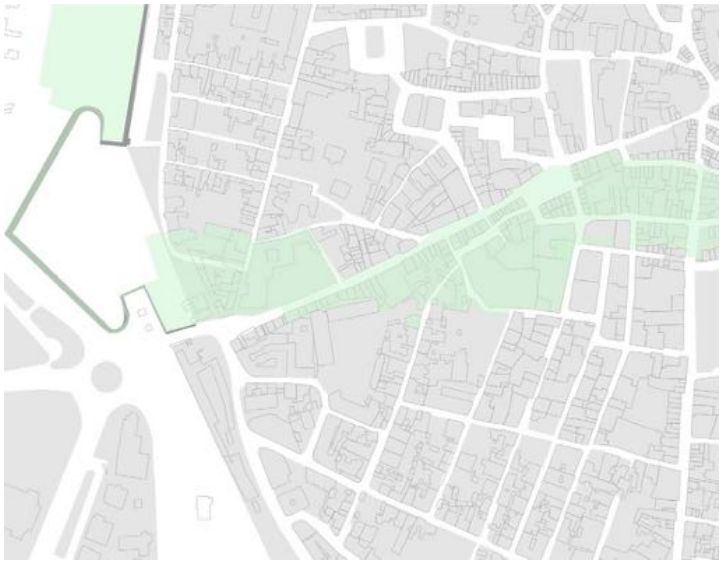
But radical change

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

Greenzone



Green zone analysis

Green zone

Geographically immense

Spatially invisible

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Greenzone

Green zone analysis

Green zone

Geographically immense

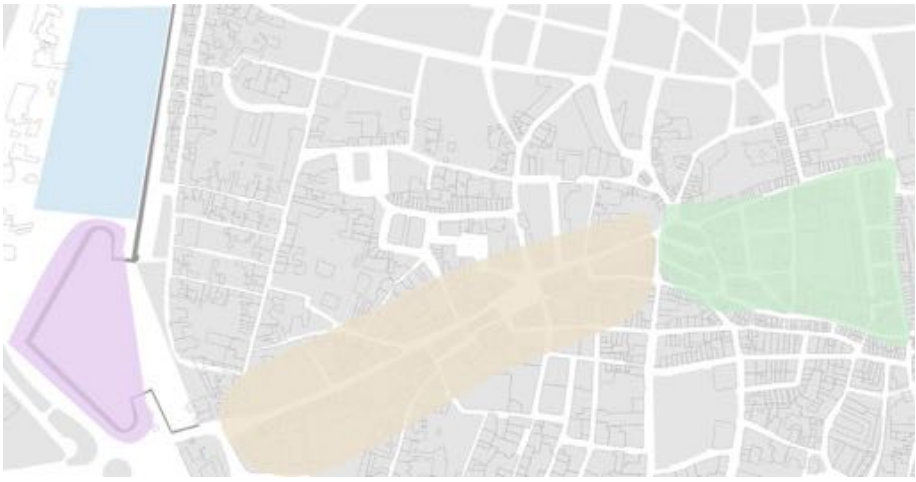
Spatially invisible

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

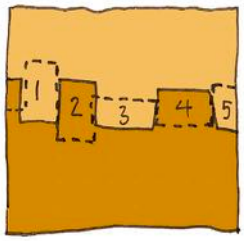
Nicosia, Cyprus. May 2019

Urban Design

Zoning the Greenzone



Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Peacemeal Green-zone

Green zone

To complex to remove wholly

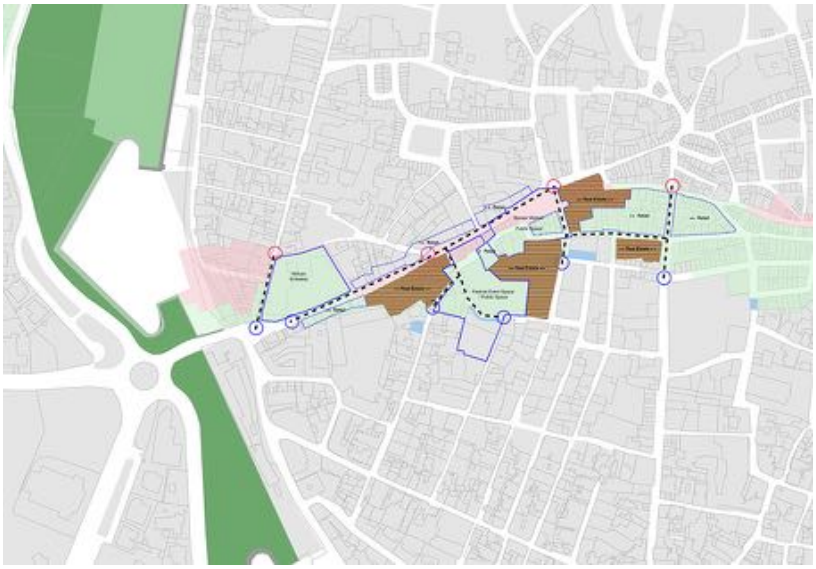
So do in bits.....

Benefit each side

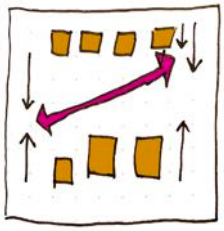
Nicosia, Cyprus. May 2019

Urban Design

Create a centre. Green Line changes



Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Create a shared Centre

New centre

One new gate

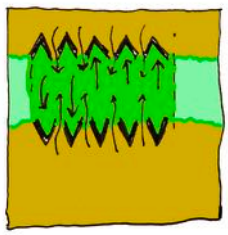
Neutral space

Co-developed

Nicosia, Cyprus. May 2019

Urban Design

Create a centre. Green Line changes. Airline pass



Create a centre

- Airport pass
- All cypriots
- Tourists pay in advance
- One side or both side clearance

CITY-zen New urban energy ROADSHOW

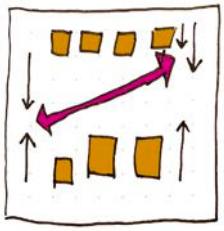
Urban desig

Nicosia, Cyprus. May 2019

Urban Design

Create a centre. Green Line changes

From



The Bazaar

- New centre
- One new gate
- Neutral space
- Co-developed

CITY-zen New urban energy ROADSHOW

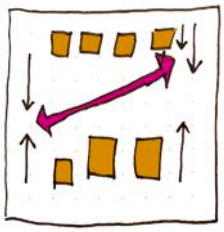
Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Create a centre. Green Line changes

To



The Bazaar

New centre

One new gate

Neutral space

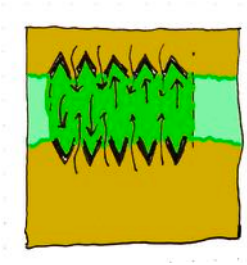
Co-developed

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Green line moves Central zone. Ledra Street westwards.



Green line detail

Check-in to zone

Airport gate… register in advance

Seamless check in and out

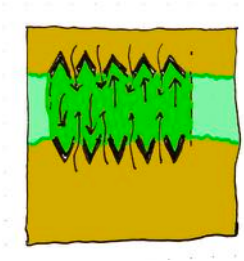
Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Green line moves Central zone. Ledra Street westwards.

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Green line detail

Check-in to zone

Airport gate… register in advance

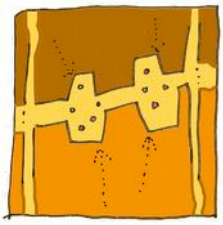
Seamless check in and out

Nicosia, Cyprus. May 2019

Urban Design

Green line moves
New streets, New square.

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



New shared centre

New streets

Shared heritage

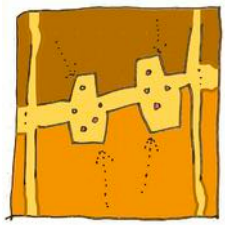
Nicosia, Cyprus. May 2019

Urban Design

Green line moves

New street

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



New shared centre

New streets

Global/Local infrastructure

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

Green line moves

New Sports place.

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

New shared centre

Shared sports in between the bastions….

Click in/Click out

CITY-zen New urban energy ROADSHOW

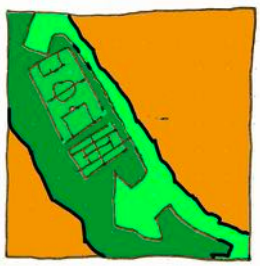
Nicosia, Cyprus. May 2019

Urban Design

Green line moves

New Sports place.

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



New shared centre

Shared sports in between the bastions….

Click in/click out

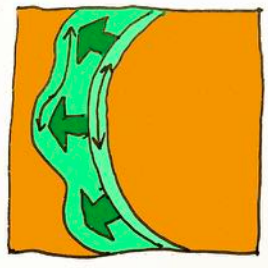
CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

The Green ring……

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



New green park

Sports

Cycle routes

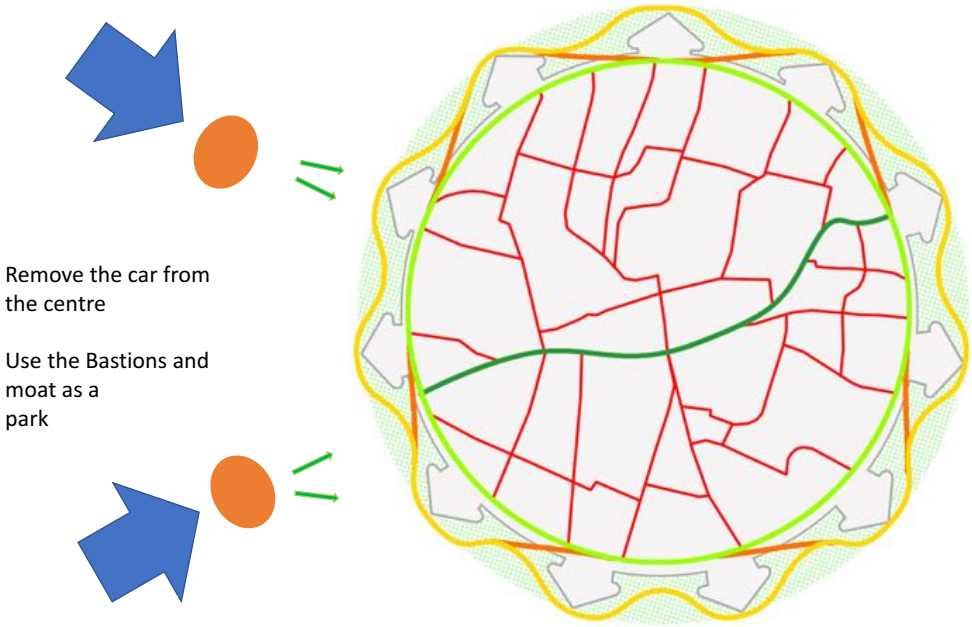
Tree nursery

Climate protection

CITY-zen New urban energy ROADSHOW

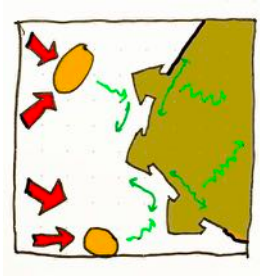
Nicosia, Cyprus. May 2019

Urban Design



Remove the car from the centre

Use the Bastions and moat as a park



Car removal

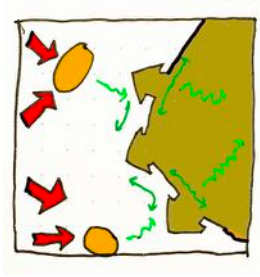
- reduced intensity
- Everyone exercises
- Shaded routes
- Lower temperatures

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Car removal Park and Ride (a bike) or walk



Car removal

- reduced intensity
- Everyone exercises
- Shaded routes
- Lower temperatures

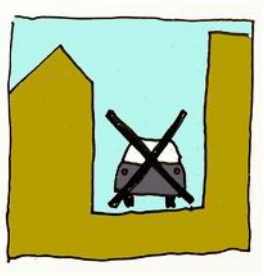
Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Car removal inside the ring

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Car removal

Inner city changes

People first

Green infrastructure

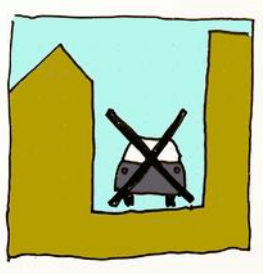
CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

Car removal inside the ring
Creates people space

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Car removal

Inner city changes

People first

Green infrastructure

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

The Bastion park

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

The Bastion Park

Increased green

New infrastructure

Energy/mobility/social

Tourist/heritage enabling

Nicosia, Cyprus. May 2019

Urban Design

The Bastion park

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

The Bastion Park

Increased green

New infrastructure

Energy/mobility/social

Tourist/heritage enabling

Nicosia, Cyprus. May 2019

Urban Design

The Bastion Park

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

The Bastions

Increased green

New infrastructure

Energy/mobility/social

Tourist/heritage enabling

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

City as forest

Hide the city in a forest

Hide a forest in the city…..

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

City as forest

Increased intensity

Community services

Increased density

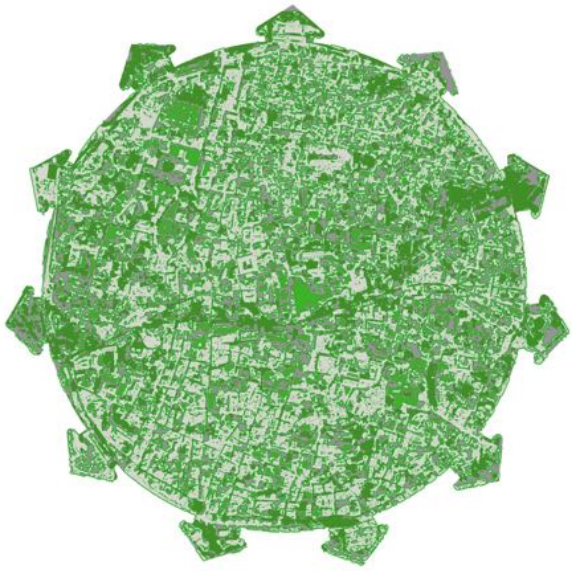
Reason to visit

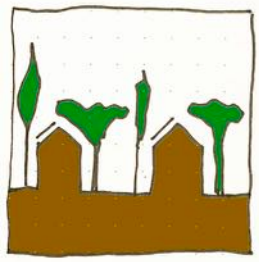
CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

Green the city





City as forest

Increased intensity

Community services

Increased density

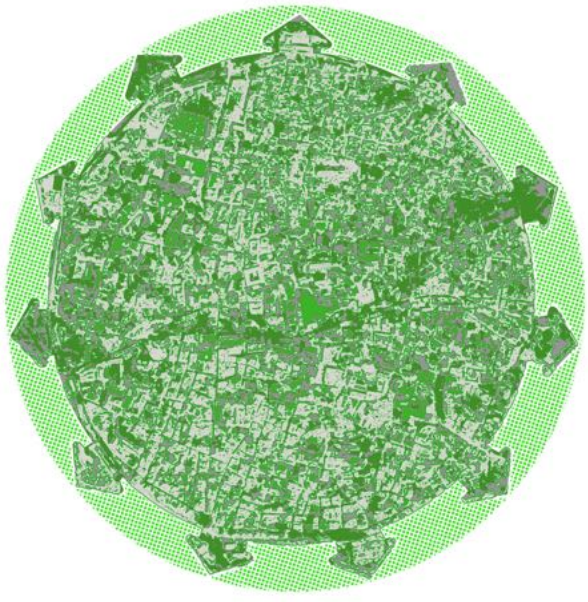
Reason to visit

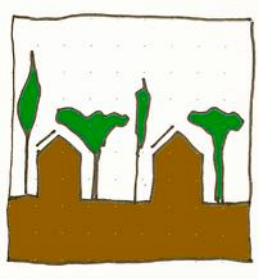
Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Green the Bastions





City as forest

Increased intensity

Community services

Increased density

Reason to visit

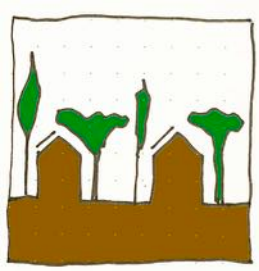
Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

City as forest

Hide the city in a forest –
Hide a forest in the city…..



City as forest

Increased intensity

Community services

Increased density

Reason to visit

CITY-zen New urban energy ROADSHOW

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

City as forest

Hide the city in a forest –

Hide a forest in the city…..

Greywater facades

City as forest

Increased intensity

Community services

Increased density

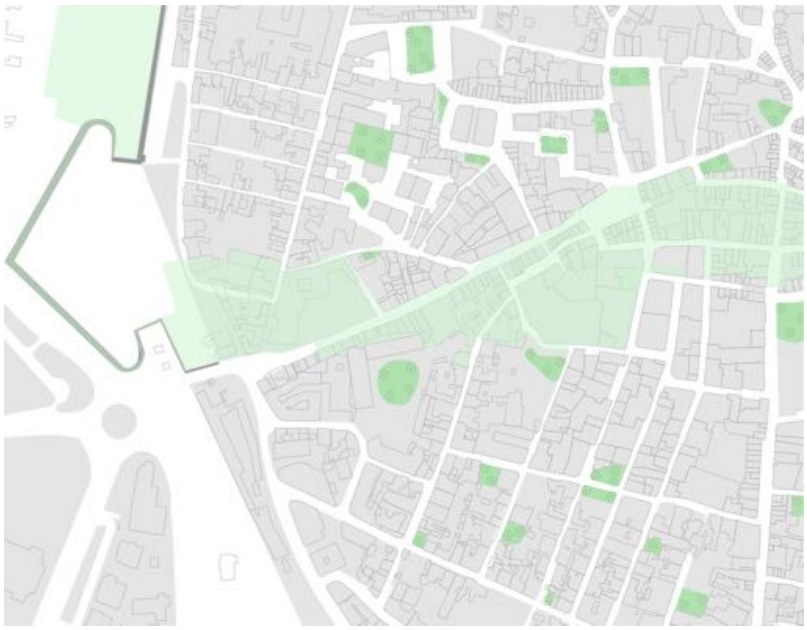
Reason to visit

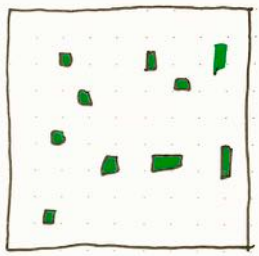
CITY-zen New urban energy ROADSHOW

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design





Pocket parks

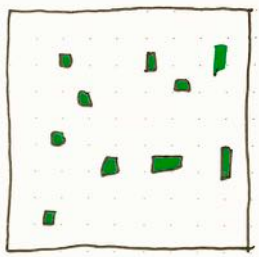
Re-purpose car-parks.

New 100m infrastructure that reduces heat island effect

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design



Pocket parks

Re-purpose car-parks.

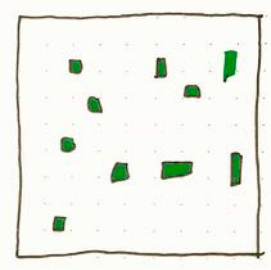
New 100m infrastructure that reduces heat island effect

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Pocket parks

Re-purpose car-parks.

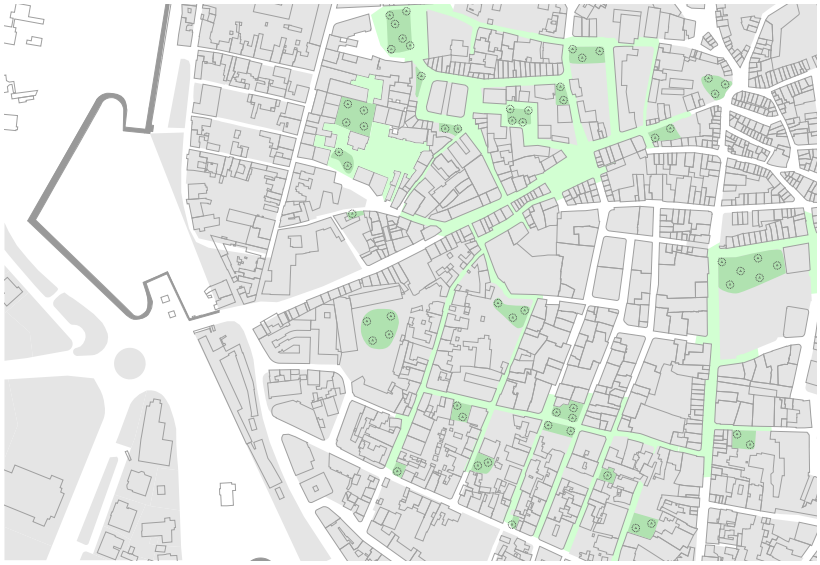
New 100m infrastructure that reduces heat island effect

CITY-zen New urban energy ROADSHOW

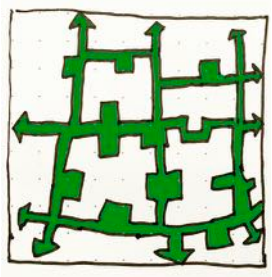
Nicosia, Cyprus. May 2019

Urban Design

Green network



Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Green Network

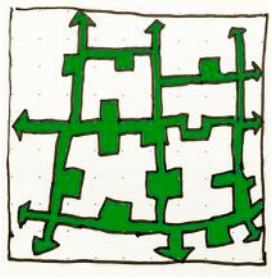
Connect inner-city Pocket parks.

Make shaded network of places to walk

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design



Green Network

Connect inner-city Pocket parks.

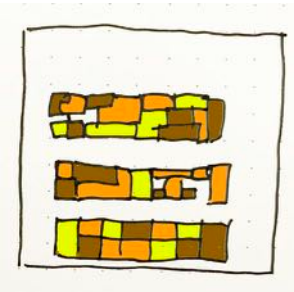
Make shaded network of places to walk

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Densification - south



Densification

Increased density

Increased intensity

More shade

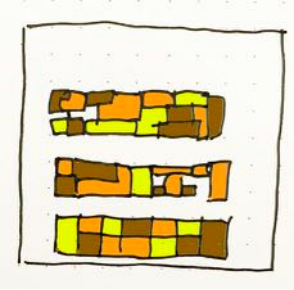
Better community services

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Densification + greening



Densification

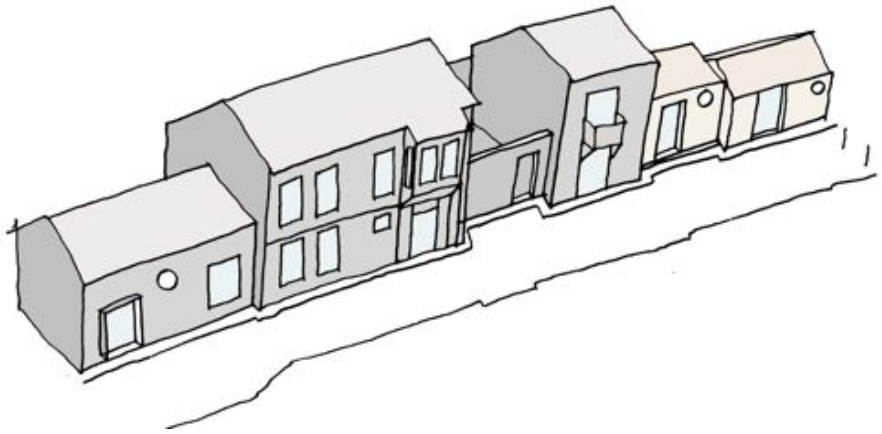
- Increased density
- Increased intensity
- More shade
- Better community services

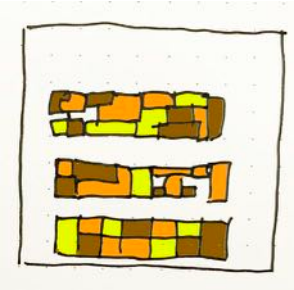
Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Densification North





Densification

- Increased density
- Increased intensity
- More shade
- Better community services

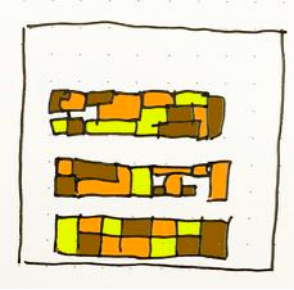
Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Densification and greening

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Densification

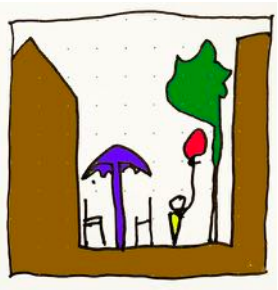
- Increased density
- Increased intensity
- More shade
- Better community services

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.



Re-invent the street

- Reclaim territory from the car
- New community
- Increased intensity

CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Re-invent the street

Reclaim territory from the car

New community

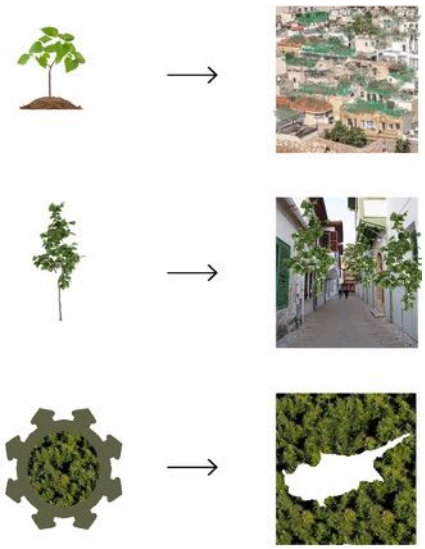
Increased intensity

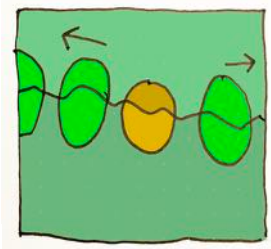
CITY-zen New urban energy ROADSHOW

Nicosia, Cyprus. May 2019

Urban Design

Climate sequestration… grow the forest in the city and plant it out……





Climate sequestration

World issue

Do your share

1.2 million trees per year for a century

100 cities……

CITY-zen New urban energy ROADSHOW

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Mustafa Ozan

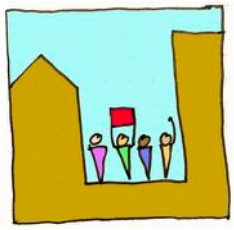
“Hi, I’m Mustafa,

I lived and worked within the walls of Nicosia all my life and run my own business creating hand crafted belts, and bags. The new co-community bazaar in the Green zone, has allowed me to connect better with more customers and especially tourists.

Since pedestrianisation and the electric car share facility I have found the city to be much safer for my children, I too feel so much healthier, and happier and I’ve found that I have met many new people and made new friends, as I no longer confine myself to my car.

The new car share at the city walls has allowed me to use different vehicles when I need them. I can now get a van when I need to collect materials and a campervan for the family trips at the weekend

I was sceptical at first but I feel the changes in the city have really improved my quality of life.”



Pen picture 1

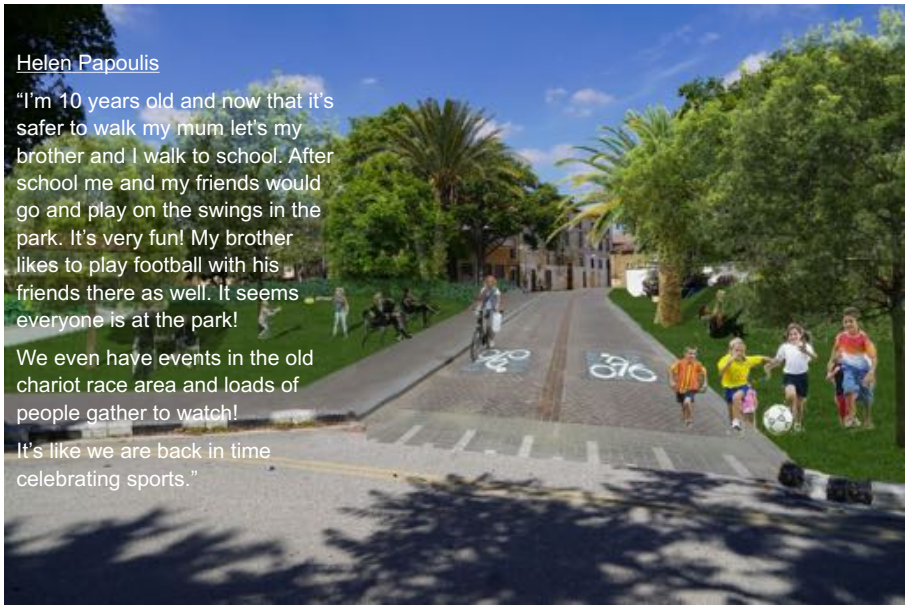
Keep it local

CITY-zen New urban energy ROADSHOW

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

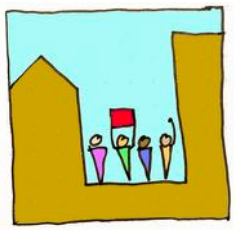


Helen Papoulis

“I’m 10 years old and now that it’s safer to walk my mum let's my brother and I walk to school. After school me and my friends would go and play on the swings in the park. It’s very fun! My brother likes to play football with his friends there as well. It seems everyone is at the park!

We even have events in the old chariot race area and loads of people gather to watch!

It’s like we are back in time celebrating sports.”



Pen picture 2

Kids deserve a better future

CITY-zen New urban energy ROADSHOW

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

Ela Sari

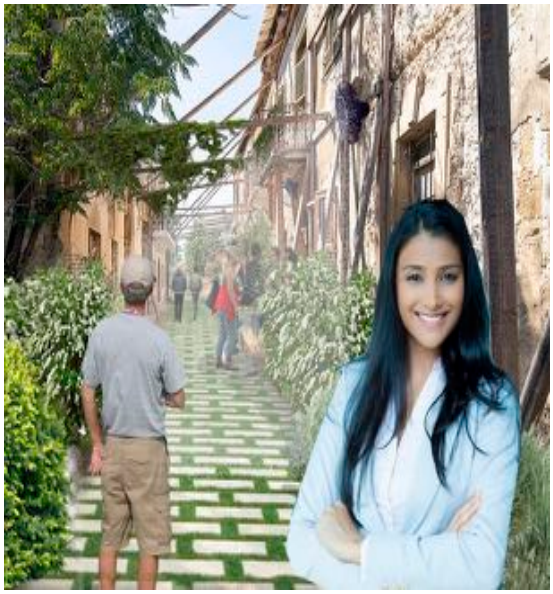
“Hello, my name is Ela,

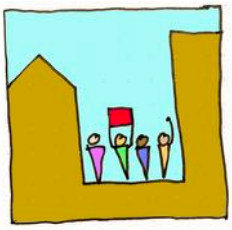
My family home is in the suburbs of Nicosia. I spend much of my time within the walls of the city as my children go to school there and I work as an architect in the walls.

I can take the kids after School to the Park. There’s more wildlife within the city walls now, and the city air also seems to be easier to breath and cleaner.

My new P.V. panels on my roof have drastically decreased are energy bills making it possible for us to now afford more meals out, and the ability to go do activities with the kids means a less stressful life. I feel the changes to Nicosia have really made mine and my children’s lives better.

I now cycle to work every day from outside the walls using the bike share and really enjoy it. We are now considering, when the kids are older ,moving into the walled city to get more out of the new streets and parks.”





Pen picture 3

Help the commuter

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

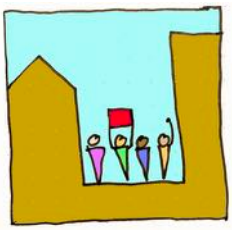
Alexandro Angelos

“I came to study from abroad at the University. I really enjoy the lifestyle and culture. I can now rent in the middle of the city and all the restored buildings make the experience very unique. There is nowhere else I would rather work!

The city has become a hub for new bands and up and coming artists. Every Friday evening there are usually performances in new public space that everyone comes to. The shared public spaces have allowed people from the north and south to mix and spend time together. This has increased trade and hand-crafted items within the walls.

I now cycle everywhere it’s a lovely way to see Nicosia and its historical features. Me and my friends have all stayed within the city to work and live after are study’s. Many more people want to live within Nicosia now and not many people are moving away to work elsewhere.

I would not move from my Nicosia now as it is as good as New York, London and Amsterdam if not better in my eyes and would recommend this city to anyone who asked.”



Pen picture 4

New entrepreneurship

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Nicosia, Cyprus. May 2019

Urban Design

More More More More…

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Queens
Prof Greg Keeffe
Dr Andy Jenkins
Ms Emma Campbell
TUDelft
Sam van Hooff
UCLAN
Ms Maryam Al-Irhayim
Rainer Townend

More History

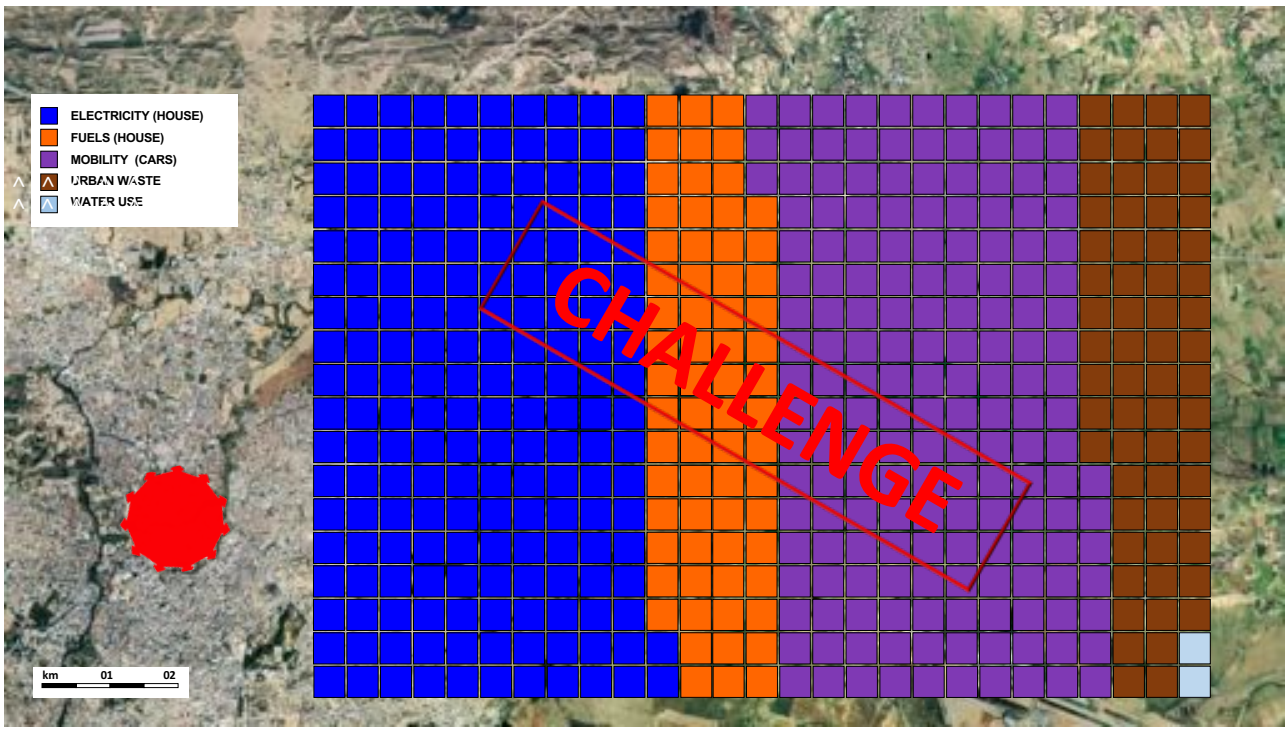
More Green

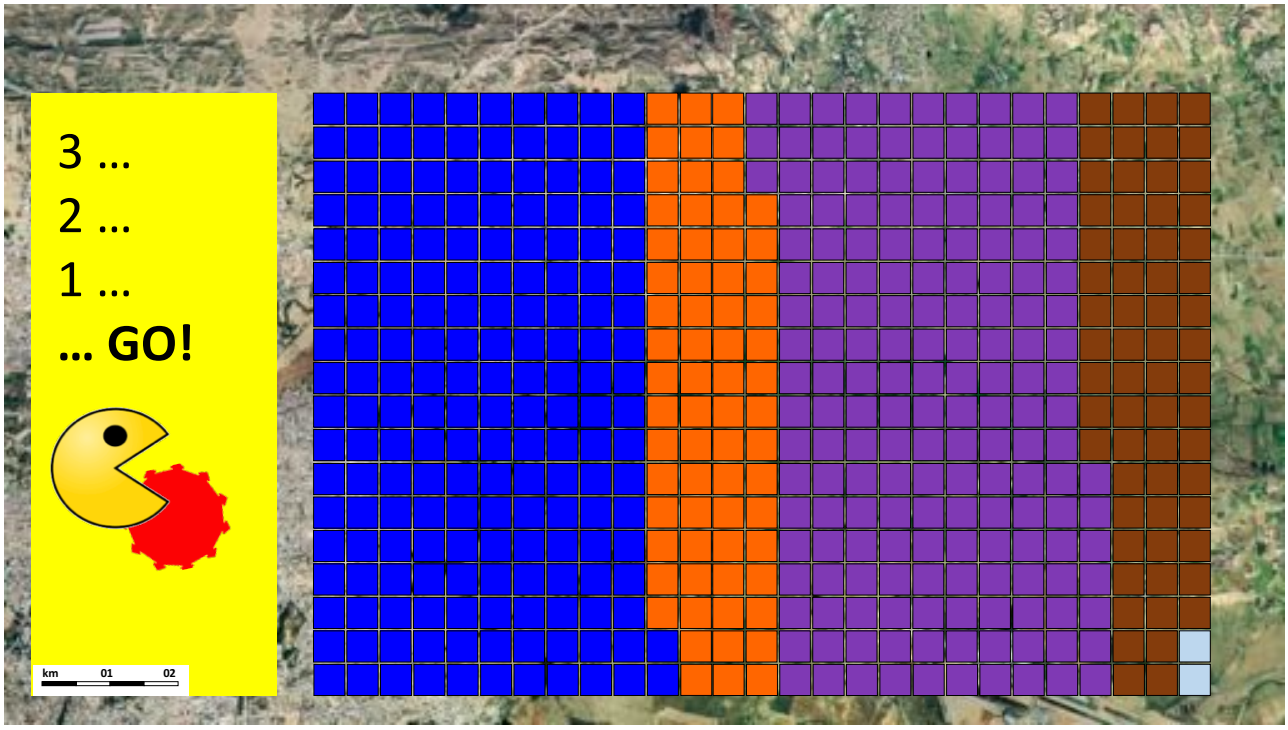
More renewables

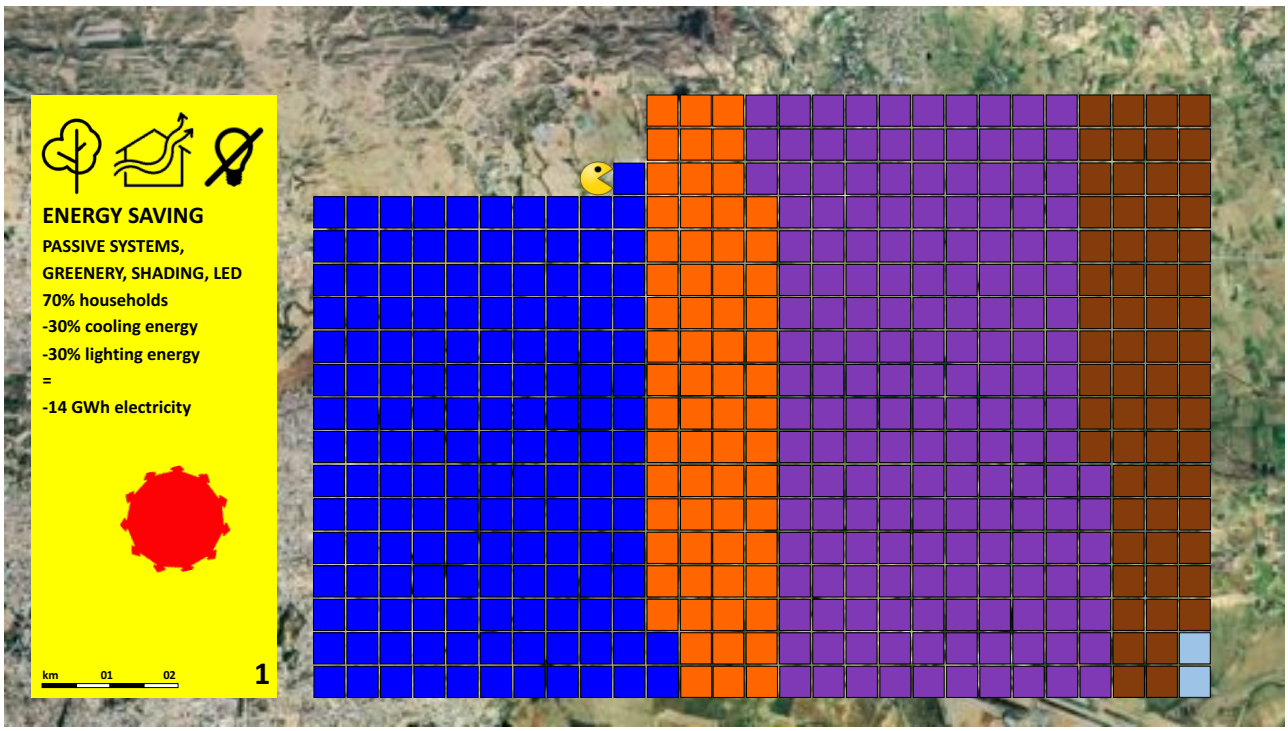
More Fun

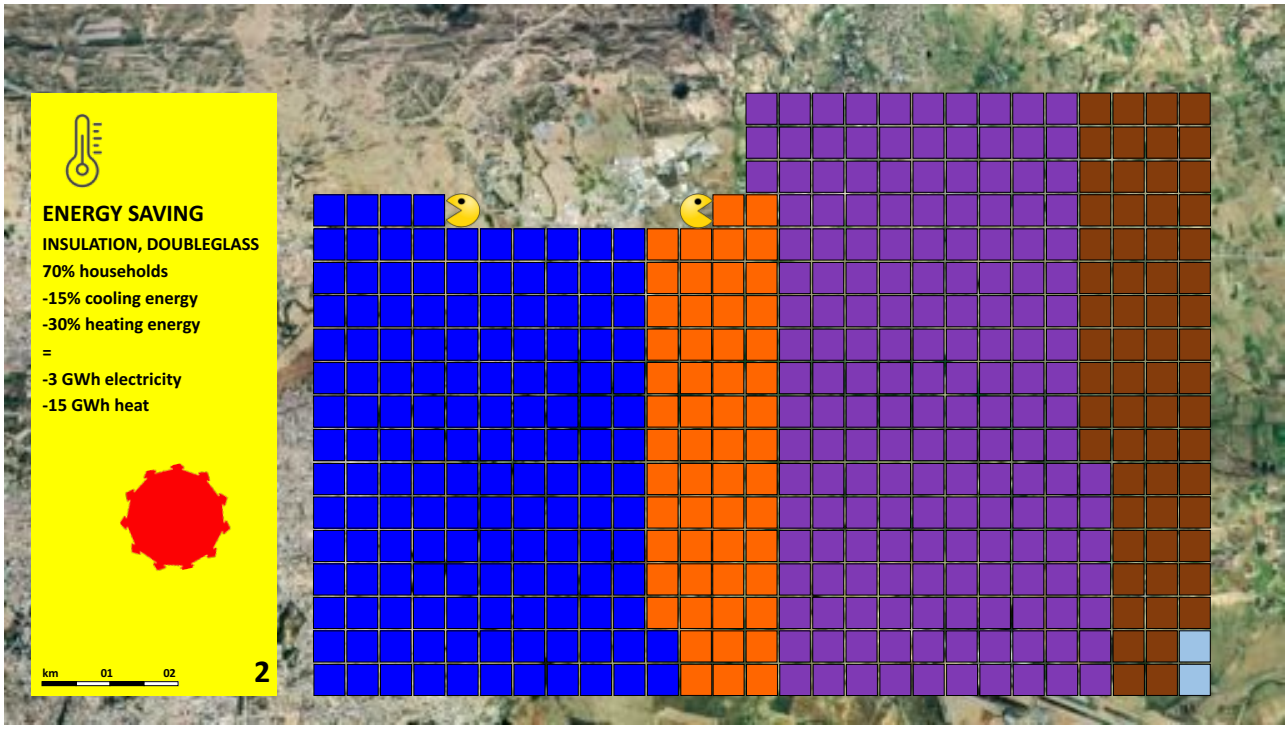
CITY-zen New urban energy ROADSHOW

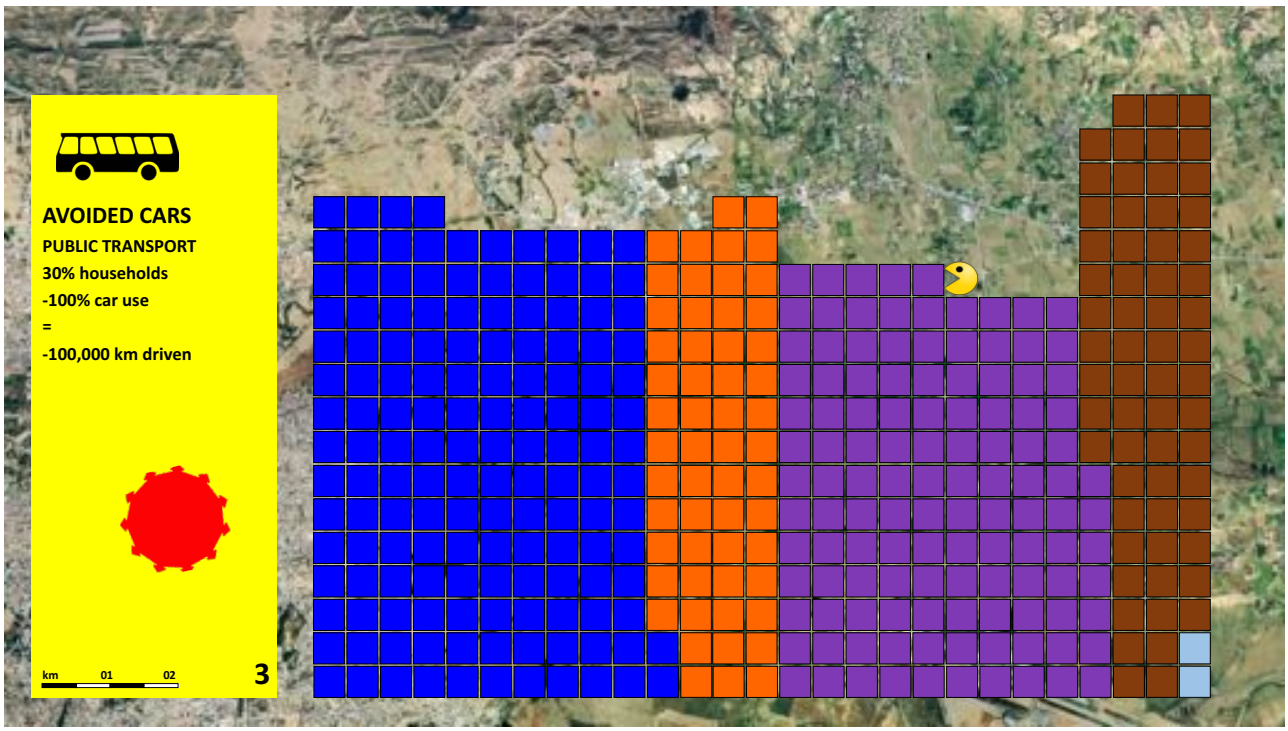
Nicosia, Cyprus. May 2019

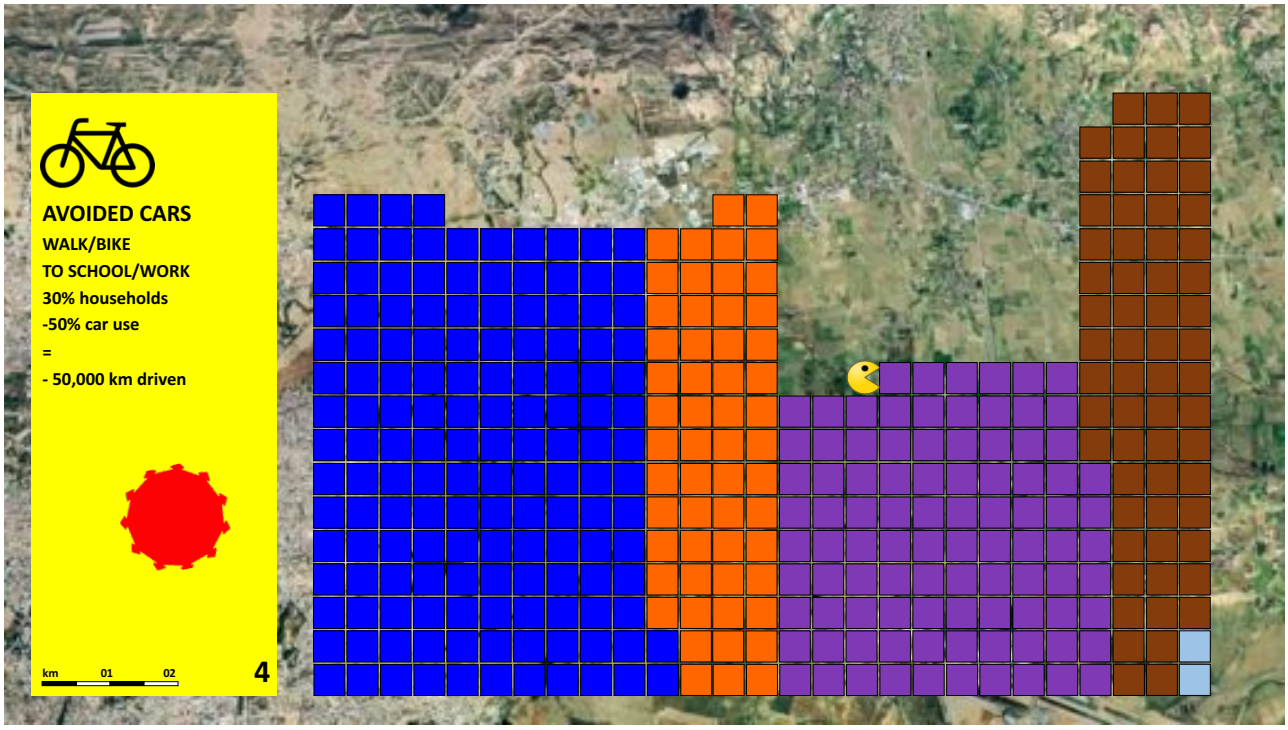


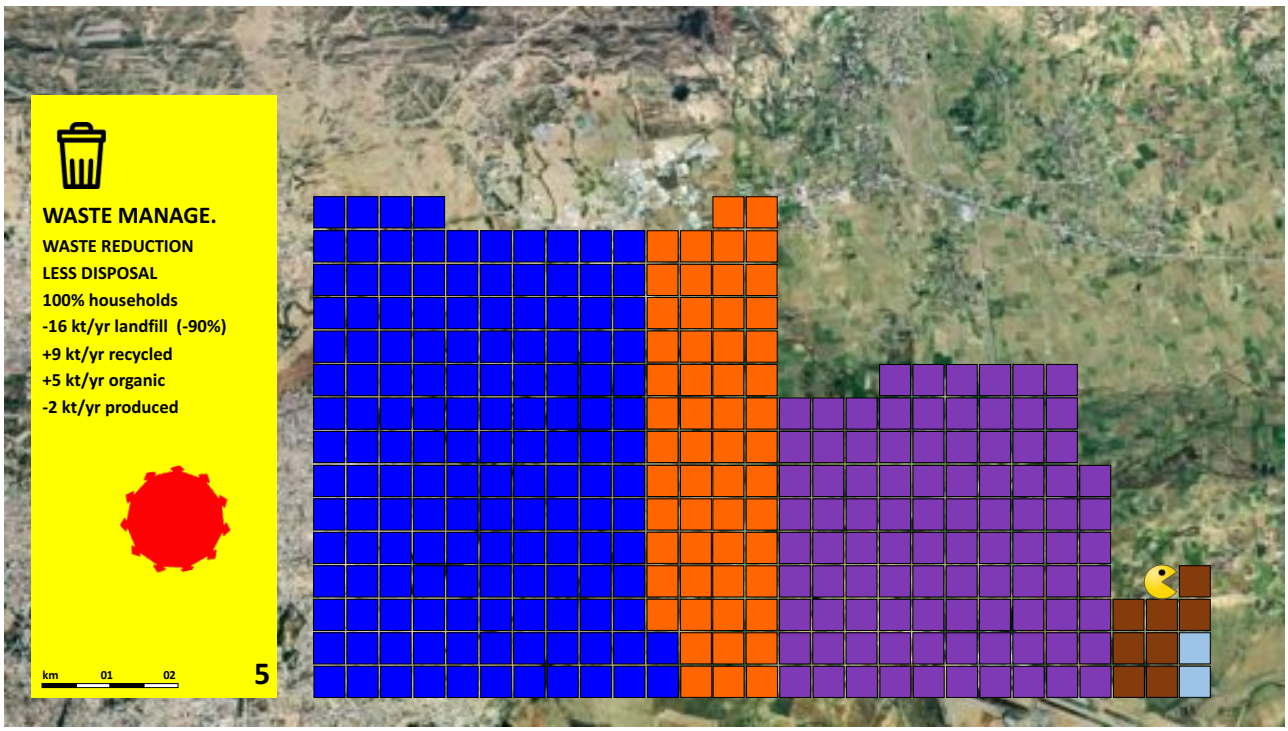

3 ...
2 ...
1 ...
... GO!
km 01 02

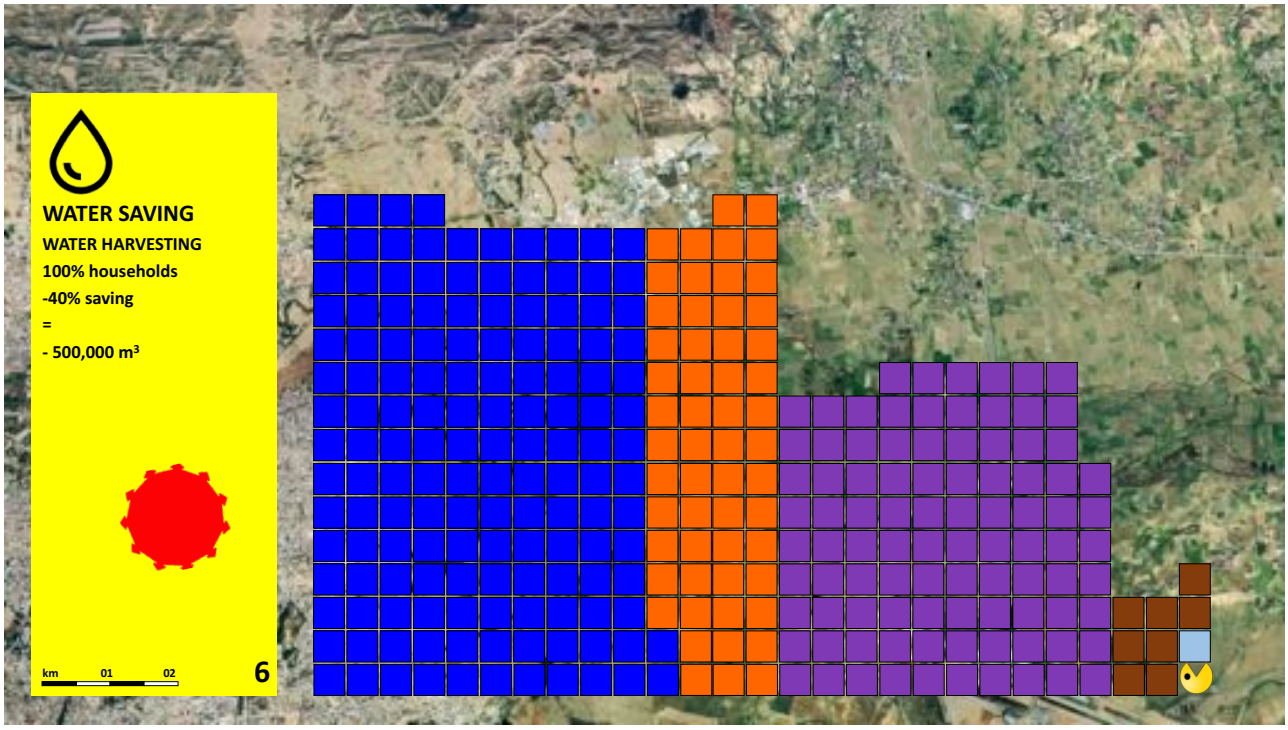

ENERGY SAVING
PASSIVE SYSTEMS,
GREENERY, SHADING, LED
70% households
-30% cooling energy
-30% lighting energy
=
-14 GWh electricity
km 01 02
1

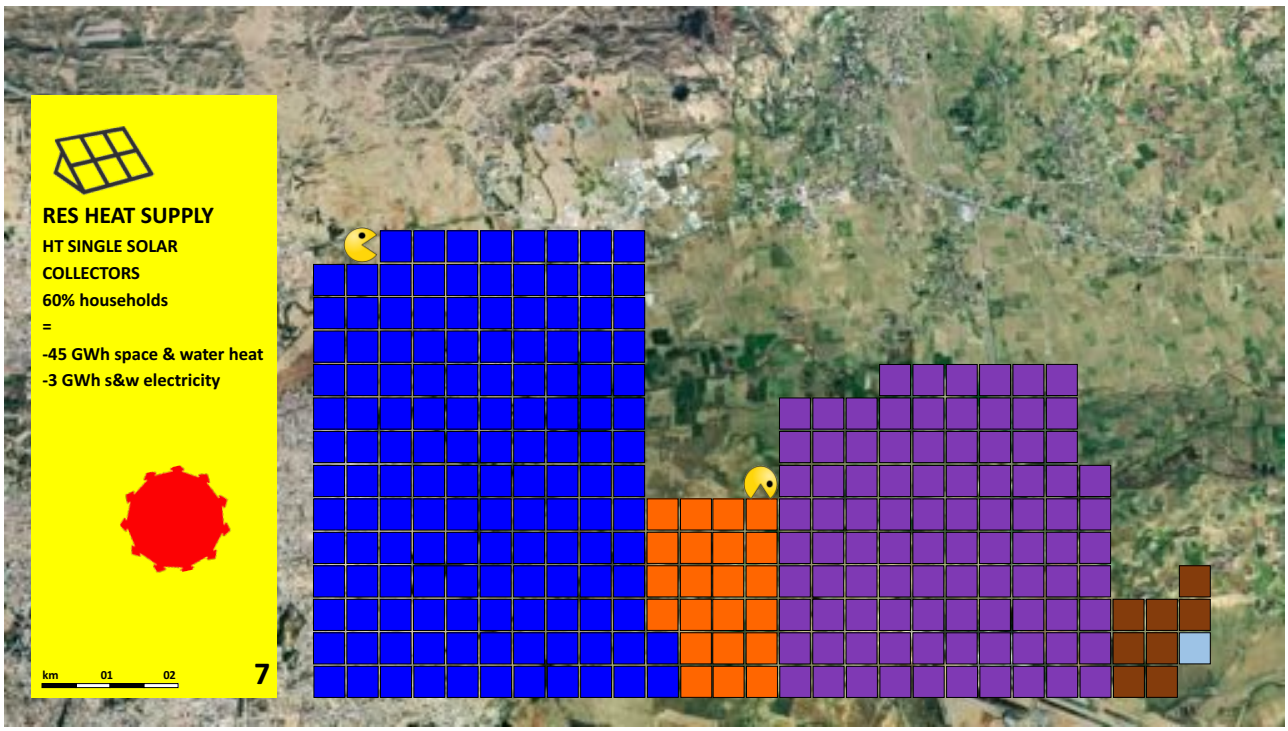

ENERGY SAVING
INSULATION, DOUBLEGLASS
70% households
-15% cooling energy
-30% heating energy
=
-3 GWh electricity
-15 GWh heat
km 01 02
2

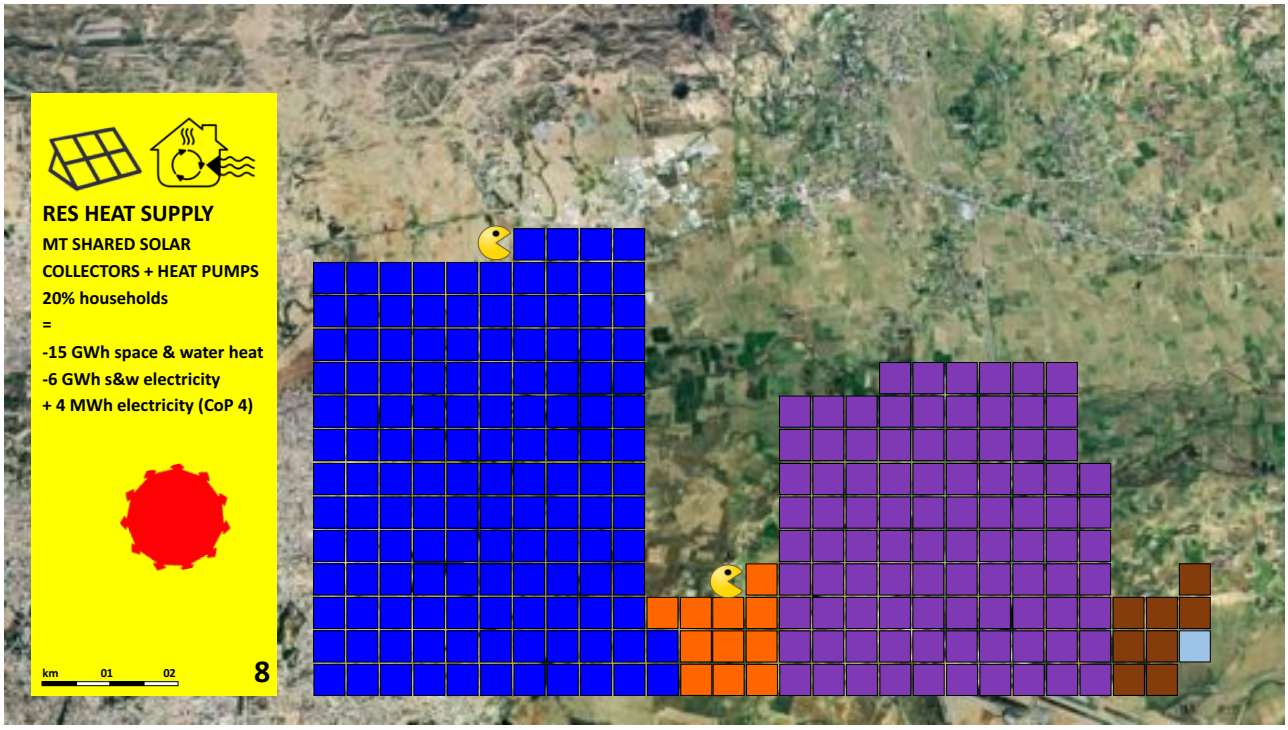

AVOIDED CARS
PUBLIC TRANSPORT
30% households
-100% car use
=
-100,000 km driven
km 01 02
3

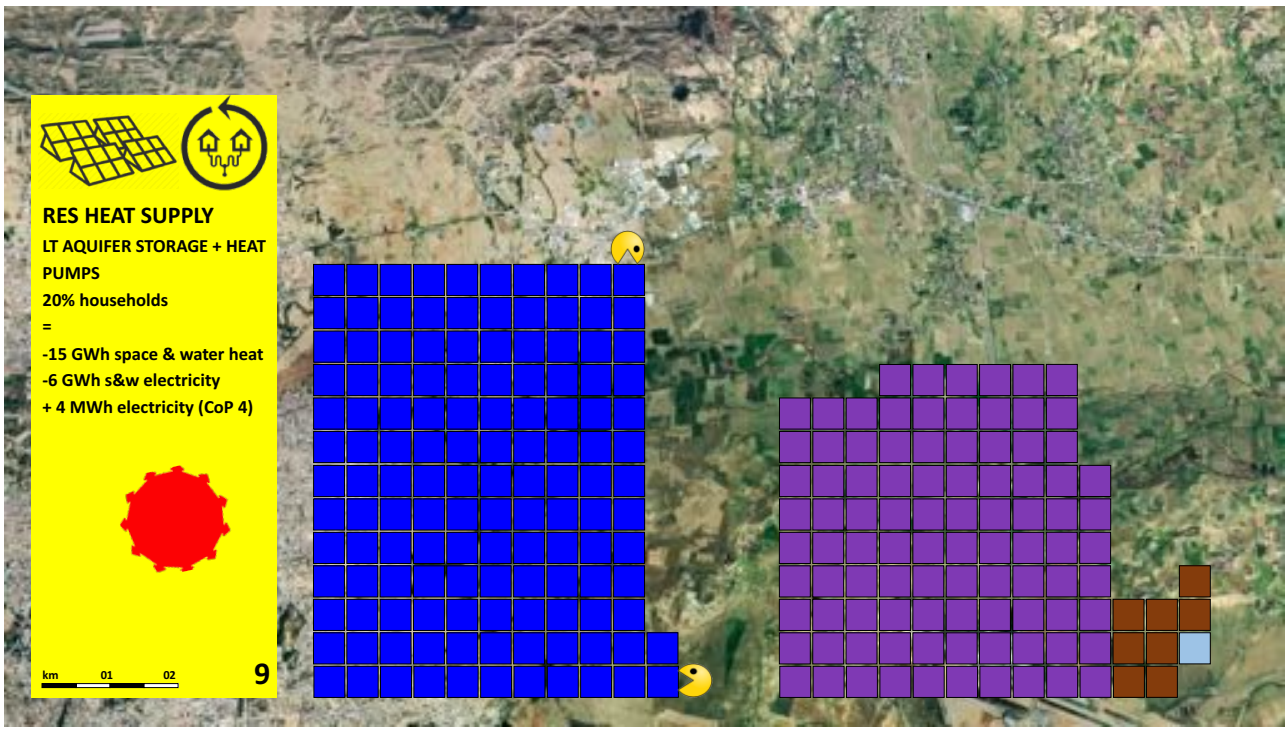

AVOIDED CARS
WALK/BIKE
TO SCHOOL/WORK
30% households
-50% car use
=
- 50,000 km driven
km 01 02
4

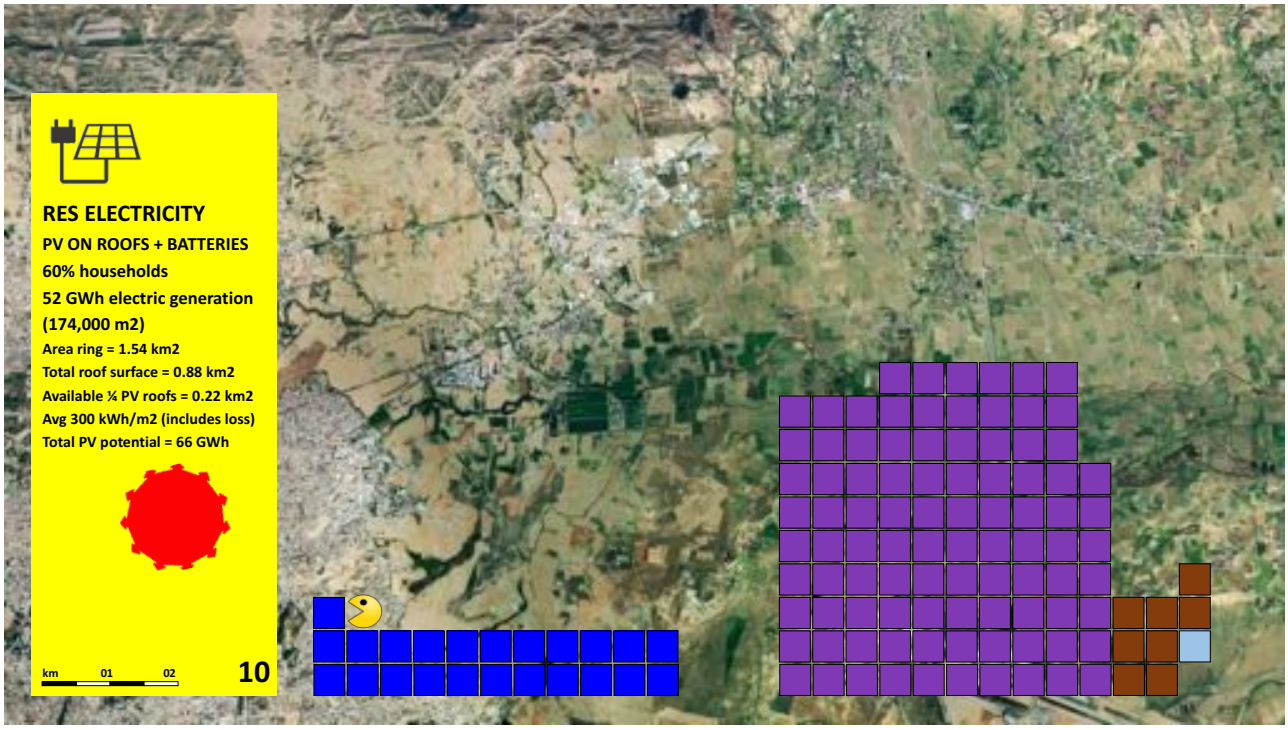

WASTE MANAGE.
WASTE REDUCTION
LESS DISPOSAL
100% households
-16 kt/yr landfill (-90%)
+9 kt/yr recycled
+5 kt/yr organic
-2 kt/yr produced
km 01 02
5

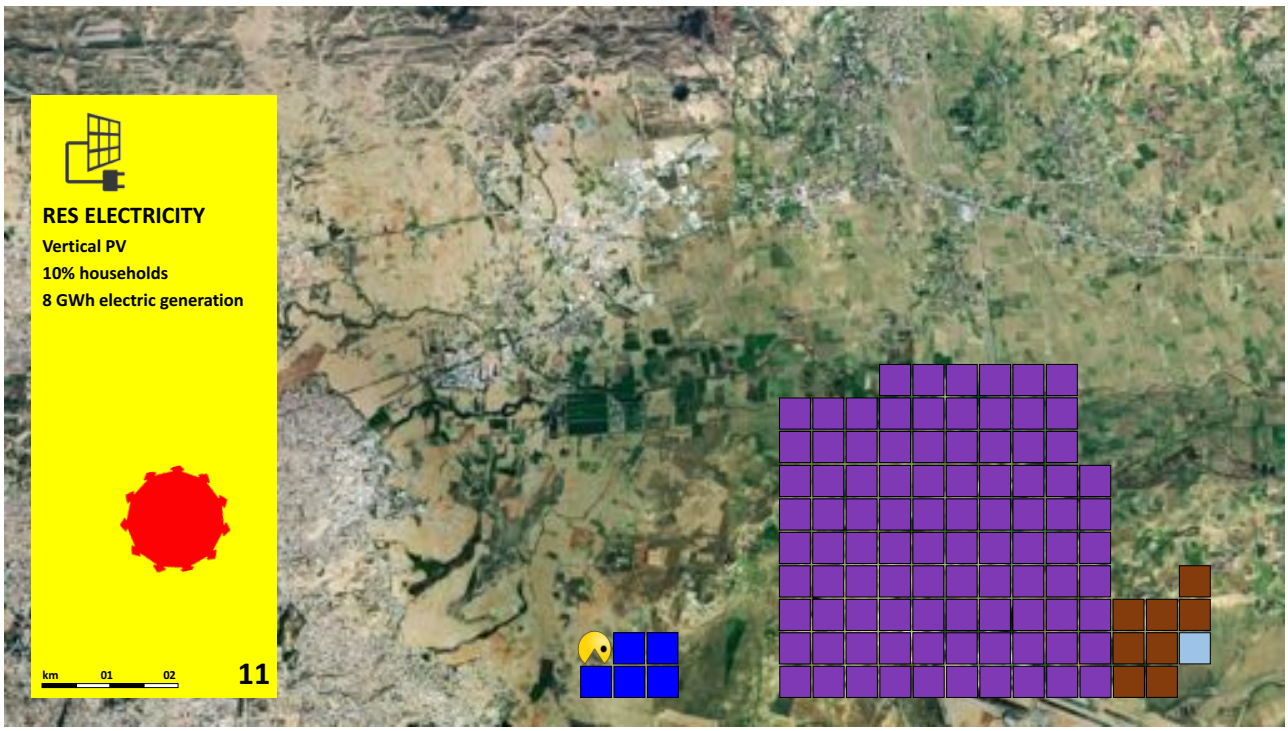

WATER SAVING
WATER HARVESTING
100% households
-40% saving
=
- 500,000 m³
km 01 02
6

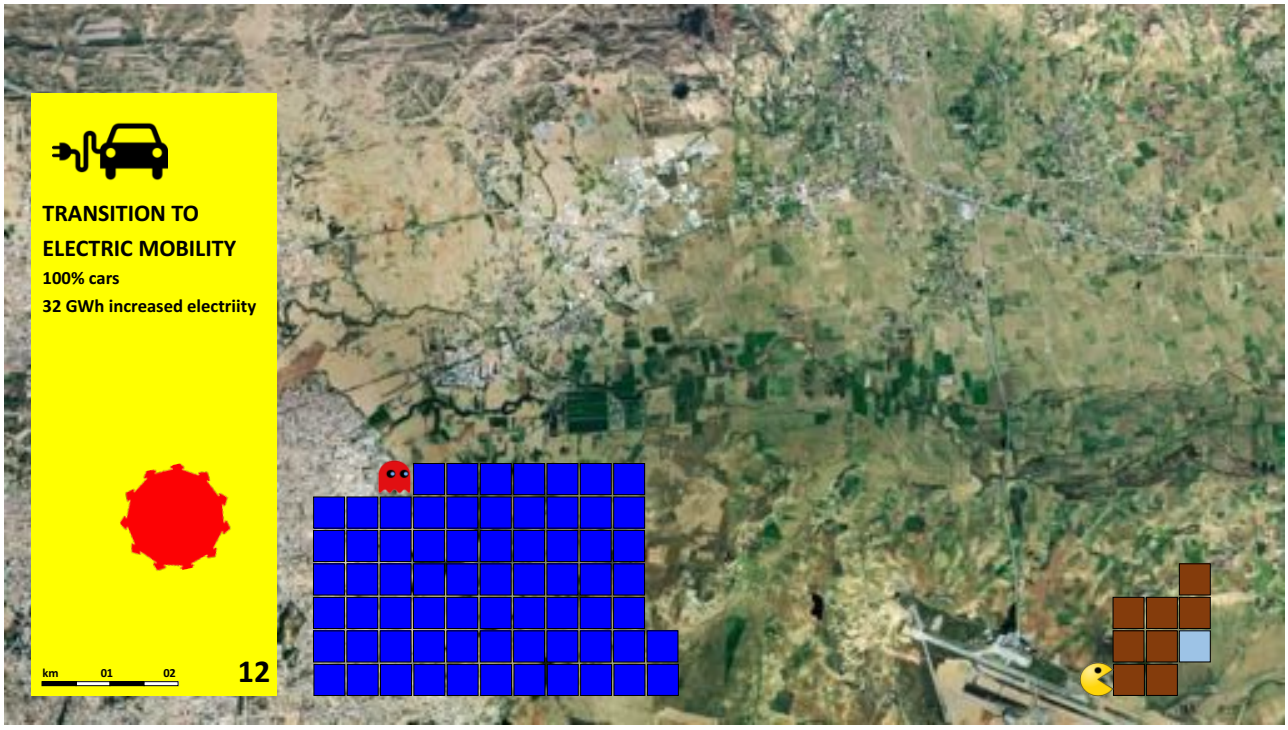

RES HEAT SUPPLY
HT SINGLE SOLAR
COLLECTORS
60% households
=
-45 GWh space & water heat
-3 GWh s&w electricity
km 01 02
7

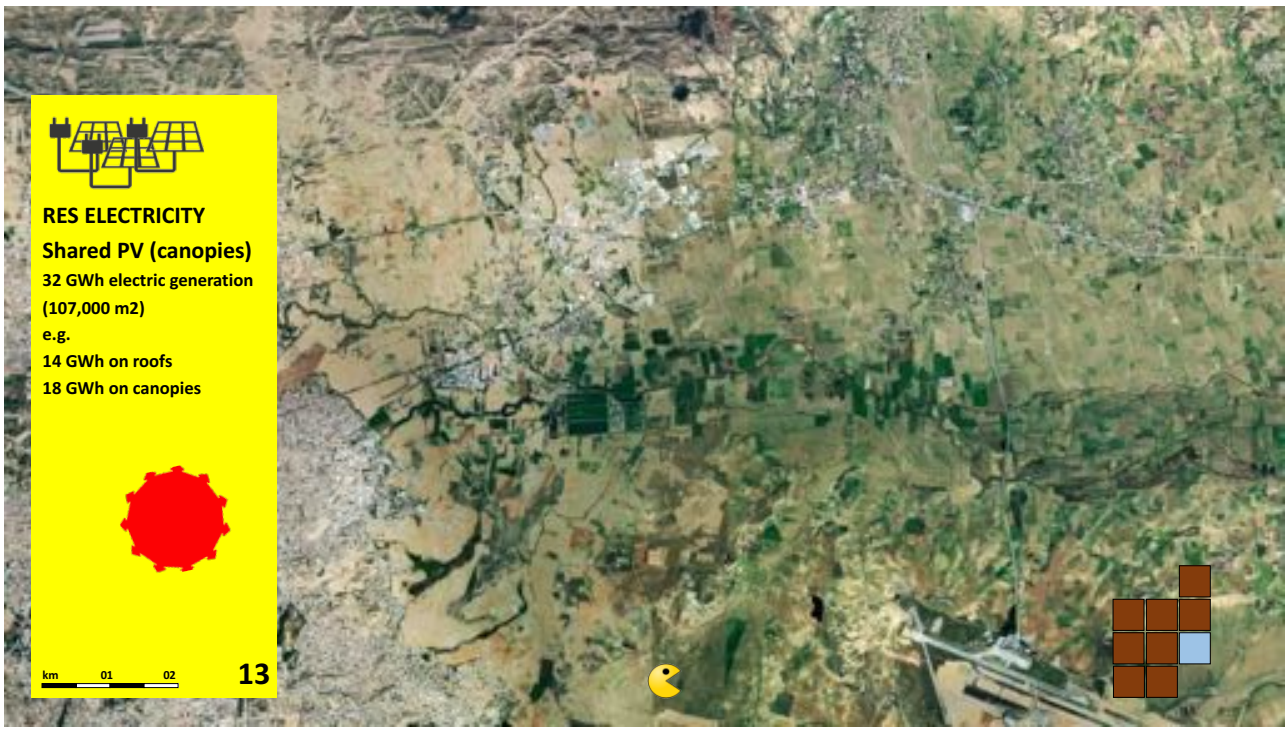

RES HEAT SUPPLY
MT SHARED SOLAR COLLECTORS + HEAT PUMPS
20% households
=
-15 GWh space & water heat
-6 GWh s&w electricity
+ 4 MWh electricity (CoP 4)
km 01 02
8


RES HEAT SUPPLY
LT AQUIFER STORAGE + HEAT PUMPS
20% households
=
-15 GWh space & water heat
-6 GWh s&w electricity
+ 4 MWh electricity (CoP 4)
km 01 02
9


RES ELECTRICITY
PV ON ROOFS + BATTERIES
60% households
52 GWh electric generation
(174,000 m2)
Area ring = 1.54 km2
Total roof surface = 0.88 km2
Available ¼ PV roofs = 0.22 km2
Avg 300 kWh/m2 (includes loss)
Total PV potential = 66 GWh
km 01 02
10


RES ELECTRICITY
Vertical PV
10% households
8 GWh electric generation
km 01 02
11


TRANSITION TO
ELECTRIC MOBILITY
100% cars
32 GWh increased electriity
km 01 02
12


RES ELECTRICITY
Shared PV (canopies)
32 GWh electric generation
(107,000 m2)
e.g.
14 GWh on roofs
18 GWh on canopies
km 01 02
13


URBAN FORESTRY
CARBON UPTAKE
230 hectares forest
km 01 02
14


Nicosia carbon neutral 2050!
10 REDUCED INEQUALITIES
15 LIFE ON LAND
13 CLIMATE ACTION
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
11 SUSTAINABLE CITIES AND COMMUNITIES
17 PARTNERSHIPS FOR THE GOALS
4 QUALITY EDUCATION
7 AFFORDABLE AND CLEAN ENERGY
5 GENDER EQUALITY
1 NO POVERTY
6 CLEAN WATER AND SANITATION
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
2 ZERO HUNGER
14 LIFE BELOW WATER
km 01 02

City-zen Nicosia Roadshow

Web: https:// www.cityzen-smartcity.eu/nl/home-nl/

@CityzenRoadshow

@CityzenRoadshow

cityzenroadshow

Roadshow Team

Prof.Dr. Andy vd Dobbelsteen (TUD)
Achille Hannoset (Th!nk-e)
Dr. Andy Jenkins (QUB)
Prof. Greg Keeffe (QUB)
Prof.Dr. Craig L.Martin (TU Delft)
Dr. Markella Menikou (UoN)
Dr. Riccardo Pulselli (UoS)
Anneleen Vanderlinden (Th!nk-e)
Prof.Dr. Han Vandevyvere (EnergyVille/NTNU)
Maryam Al-Irhayim (UCLan)
Emma Campbell (QUB)
Sam van Hooff (TU Delft)
Rainer Townend (UCLan)
Alexis Postekkis (UoN Alumni)
Andreas Prokopiou (UoN Alumni)
Christos Xenofontos (UoN Alumni)

Roadshow Contacts:
Craig Martin – Roadshow Leader (*e*: c.l.martin@tudelft.nl)
Markella Menikou – Nicosia Contact (e: menikou.m@unic.ac.cy)
Mario Touvanas – Embassy, Kingdom of the Netherlands (touvanas.marios@minbuza.nl)

This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 608702

City-zen Nicosia Roadshow

This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 608702

Nicosia, Cyprus, May 2019