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PROJECT

RE/SOURCED Renewable Energy SOlutions for URban communities based on Circular Economy policies and Dc backbones

Leiedal Intermunicipal Association, Belgium

TOPIC

Circular economy

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UIA EXPERT

RE/SOURCED Journal 1

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This article presents the first UIA Journal for**R**enewable **E**nergy **SO**lutions for **UR**ban communities based on **C**ircular **E**conomy policies and **D**C backbones - RE/SOURCED. It looks back at the implementation over the past 18 months and assesses the project's challenges, successes and current standing.

Executive Summary

RE/SOURCED is a pioneering circular renewable energy project on a former coal fired power plant site in south west Flanders (Belgium). The powerplant was called Transfo.

RE/SOURCED is focused on generating renewable energy for users located within a local community. The project aims to create Transfo smart microgrid, a local smart grid that will provide users with access to the renewable energy that is produced there. In its original design and given the community-level focus, it was anticipated that users would be private citizens, public organisations, businesses or other legitimate user types.

The design of the grid is novel – it includes a DC backbone through which DC generated renewable electricity can be distributed (making it more efficient), a single inverter to covert DC to AC where appropriate and a single point

of connection to the public grid. There is a state of art energy management system for the smart microgrid. The proposal also includes a combined heat and power plant, (second-life) battery storage, pumped storage and flywheel.

RE/SOURCED is piloting the integration of a range of energy generation, distribution and storage sub-systems in one facility. This is the pioneering aspect of the proposal – it is ambitious.

Governance of the Transfo smart microgrid will be achieved through forming a co-operative enterprise. Membership will be open to all eligible users/residents.

It was anticipated that having businesses and private citizens within the same community of users might not be possible under Flemish law. It was proposed to use a regulatory sandbox for the project and, following extensive consultation at the design stage, this was concluded to be the best approach. In practice, the sandbox did not allow for businesses and citizens of a single system to be beneficiaries. The project implementation would potentially have stalled if this hurdle was not overcome.

After considerable and intensive reflection, consultation with regulatory and legal advisors, the partners have identified a Closed Distribution Network (CDN) as a possible compromise. This would allow renewable energy to be generated as originally proposed, but would limit the beneficiaries to businesses and municipal bodies. Private citizens could not be "active users" (within current legislative definitions).

Before embarking on the CDN delivery path, the lead partner has prepared an interpretative question for DG Energy of the European Commission setting out why a CDN would be suitable and seeking confirmation that its interpretation of the EU Energy Directive is correct in this regard. This question will be sent to DG Energy in December 2021. Getting clarification on this question will likely be of benefit to the many other municipal organisations attempting to take the lead in facilitating renewable energy production in local communities. It will also introduce, in a practical way, to DG Energy the challenges that current legislation poses for municipalities implementing community focused renewable energy projects. This is an issue for all member states so RE/SOURCED is leading the way in developing solutions.

The project is using public procurement to purchase sub-assemblies for the Transfo smart micro grid – the procurement covers systems and products that are highly technical in nature (requiring not just an understanding of the product's technical specifications, but also its operating conditions and the other generating technologies on the system). The procurement must also have circularity at its heart and suppliers are being asked specific circularity questions which some are finding difficult to answer. The partners are in the middle of the procurement process presently – there may be future recommendations arising for this learning.

Project Summary

RE/SOURCED is a 36 month project, commencing July 2020 and due to be completed by June 2023. Its total value is €5 million with €4 million being provided by the European Regional Development Fund (ERDF) and the balance of €1M by the project partners.

Before considering the way the project has helped to address the key challenges, it's worth providing a context to explain what the project is and what makes it novel.

We summarise its key attributes below - RE/SOURCED:

- Integrates different low carbon energy generation (heat and electricity) in one location
- Introduces a DC backbone, minimising the AC-DC conversion losses
- Creates an Energy Community for local users
- Supports wider urban regeneration of a post industrial area, called Transfo, through the formation of residential dwellings (including social housing), refurbished offices and a range of leisure amenities (see below)
- Creates a closed, private grid that distributes the renewal energy being generated
- Includes a node to the national (public) grid that allows excess energy to be exported and also energy to be imported when local generation is insufficient to meet the Transfo community's demand
- Includes heat generation and its distribution locally
- Creates a set of amenities for the local and regional communities (diving tank, escape room, micro-brewery) and an outdoor amenity space including a camp-site for use by local groups
- Creates a set of commercially beneficial amenities for the local and regional area through the re-purposing of the former generation building into offices that can be bought or leased by firms
- Creates a citizen engagement programme, targeting young people, families and professionals, designed to increase awareness of the importance of zero carbon energy and its value to society.

This project introduced a set of parallel innovations that genuinely break new ground:

- It has Circular principles at the heart of the design of the renewable energy generation system
- It combines multiple zero carbon energy generation and storage technologies into one system
- It introduces the concept of a private grid with gateway to the wider grid for two-way flow of electricity

- It creates an Energy Community of which local residents and businesses can be members.

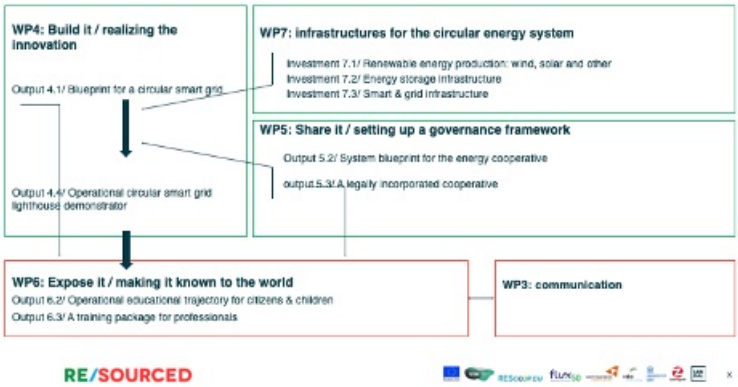
The core project group is well balanced:

Partner	Activity
Leiedal Intermunicipal Association (Lead)	Lead partner and an inter-municipal association that works across multiple local authorities
Zwevegem Municipality	Local municipality
Ghent University	University specialising in renewable energy system design
Province of West Flanders	Regional authority
Flux50	Business representative organisation
REScoop .eu	Community energy representation (pan-EU)
VITO - Flemish Institute for Technological Research	Technical Research and Technology Organisation

The project comprises seven Work Packages (WP), with implementation structured around four of these (shown in bold below):

- WP.1 - Preparation
- WP.2 - Project Management
- WP.3 - Communication
- WP.4 - Build it/realising the innovation
- WP.5 - Share it/setting up a governance framework
- WP.6 - Expose it/making it known to the world
- WP.7 - Infrastructure for the circular energy system.

The relationship between the "implementation" work packages is shown diagrammatically below



The project's target groups include:

- Owners and tenants, members of the energy cooperative: residents, companies and some operators of on-site attractions
- Daily visitors to Transfo, employees of companies
- Occasional visitors of Transfo.

Policy Context

RE/SOURCED supports five of the 11 investment priorities, also known as thematic objectives of the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund, namely:

- Strengthening research, technology development and innovation
- Supporting to shift towards a low carbon economy in all sectors
- Preserving and protecting the environment and promoting resource efficiency
- Promoting social inclusion, combating poverty and any discrimination

- Investing in education, training and vocational training for skills and lifelong learning.

In addition, RE/SOURCED contributes to national, regional and local policies:

- National (Belgium) – Inter-federal Energy Packed (IEP); National Energy and Climate Plan of Belgium 20 21–2030 (Draft) (NECP)
- Regional (Flanders) - Flemish Coalition Agreement (FCA);
- Local (Southwest Flanders) - Regional Pact (RP); Covenant of Mayors (CoM).

The project is a central fit with EU Directive 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU. It will be seen below that the project is testing the bounds of this Directive and potentially helping to make it more robust and supportive of spatial urban development projects that include a renewable energy element.

Separately, the project will contribute to the implementation of the EU Circular Economy Action Plan (CEAP – March 2020) which is one of the main building blocks of the European Green Deal proposals.

18 months in - Challenges

The Table below sets out the nature and intensity of the challenges experienced by the project to date. The assessment is framed using the 7 UIA strategic challenges.

Challenge	Observation
Challenge 1 - Leadership Challenge level 	The project fulfils a fundamental leadership contribution for UIA through implementing and testing unproven solutions through a genuinely participative approach. Achieving the goal of RE/SOURCED is relatively high risk - but the reward will deliver a proven model for local, district-level renewable energy generation using circular principles. There are three core leadership roles that the project fulfils: • Leadership by Leiedal of the partners to develop the new system through effective project management and implementation • Partners' Leadership - working together so that the technologies and systems work for end users in a way that is beneficial for their lives • Leadership by a public body in the identification, application and introduction of low carbon energy generation at a local level and in a way that engages and benefits the community - this role exemplifies the role that a public body can play to support an innovation that would be deemed too risky by a commercial operator but where the gains made are of benefit to the wider community • Leadership from the context of being a pioneer and "leading from the front" - Identifying and resolving hurdles that emerge, especially where these hurdles and the solutions found will be beneficial for other organisations and groups wishing to implement similar projects. Leadership can be seen by the way the project was assembled with direct contact to

organisations relevant for the creation of the Transfo smart microgrid for example VREG (Flemish Energy Markets Regulator), VEKA (Flemish Energy and Climate Agency responsible for energy policies), VLAIO (Flanders Innovation & Entrepreneurship Agency), Departement Omgeving (Flemish Environment Department for environmental policies) and Fluvius the DSO.

In addition, the project team also engaged thought leaders on circular economy and other aspects of carbon reduction (Gunther Pauli, author of Blue Economy, Jos Delbeke, DG of the Directorate-General for Climate Action). All of these inputs shaped the project design and enhanced its potential value.

Leadership is also evident in the way the project is pioneering and breaking new ground - by "leading from the front". In doing so it is encountering barriers and hurdles that must be overcome if its core aim of engaging citizens and businesses together to understand better energy conservation issues and how energy consumption can be reduced, while at the same time minimising the use of rare materials.

The original aim was to develop the project within a regulatory sandbox in Flanders. The sandbox was anticipated to allow the development of a novel approach to engaging all users - it would not be subject to normal regulatory constraints. The Leiedal team gained inputs from the relevant authorities when planning and designing the project that indicated the Flemish regulatory sandbox should be suitable. However, every sandbox has its limitations and when attempting to use the Flemish sandbox, the partners found the legislation to be too restrictive to allow the project to be implemented as originally designed.

The specific challenge is that current legislation prevents private citizens being included in a closed energy generation network that also includes commercial businesses. RE/SOURCED is a community initiative - a community that is based within a clearly defined geographic area and as such it might be expected and considered appropriate for the whole community to be engaged in designing and managing the way that the energy it produces is used and distributed. This has proven to be difficult to achieve as current regulations prevent implementation in this way.

From a leadership perspective and to attempt to overcome this challenge, Leiedal has invested considerable resources into trying to find a compromise that allows both private citizens and commercial organisations to be engaged in operating the new system and to benefit from the energy it produces. To date it has not found a solution but has identified a possible compromise approach. Before investing considerable effort (and potentially redesigning part of the system to accommodate the legislative challenges), it has taken time to prepare a detailed technical question for DG Energy. Raising the question in this way is a clear example of the project's leadership in this field - it is a pioneer and its careful, yet tenacious, approach should help to define a pathway for others to follow. And there are likely to be many organisations wishing to do so as the RE/SOURCED model is one that should have wide appeal. To prepare the interpretative question for DG Energy, the project team engaged specialist technical and legal resources while also investing a considerable amount of time speaking to the regulator and distribution service operator.

The interpretative question is to be submitted to DG Energy in December 2021.

Public procurement will be used throughout the project implementation process to acquire:

- Pumped storage generation
- Flywheel storage
- Battery storage
- Combined Heat and Power (CHP) plant
- Energy Management System (EMS)
- Solar panel arrays
- Small scale wind turbine
- Cabling and infrastructure
- Electric vehicle charging infrastructure.

RE/SOURCED has "designed-in" circularity to the Transfo smart microgrid system. However, introducing circularity requirements to tender documents is proving to be a challenge as many of those invited to supply do not have a detailed understanding of how circularity might be relevant to their systems. Specifically, while there has been significant progress both in understanding circularity and applying it to industrial procurement in other sectors, its adoption by the energy sector has been much slower.

Applying the public procurement process to the acquisition of these types of systems introduces other challenges. While some of these are relatively mature products, for example Solar Panels, the system into which they will operate at Transfo is novel. Therefore, the partners need to make sure that the configuration is optimised so as to get the best performance from the system. In this regard, the benefit of the partnership is being harnessed - for example expertise and specific project experience of the University of Ghent and VITO is being utilised to inform the technical aspects of the tenders and their structures.

Most of the items being procured are comparatively innovative. Effective procurement of these types of systems necessitates technical input from the provider. The team is using the public procurement process to set out its requirements in as much detail as possible. Public Procurement procedures are mostly designed to procure standardized products or services that are established in the market-place and that are therefore well defined. RE/SOURCED is different as its partners are procuring elements of a novel renewable energy generation system using with circularity principles at its core. Tenderers will not be familiar with the technical aspects of the end-use (their products will need to work with others on the system) and may not be familiar with specifying how their products contribute to circularity. There is a need for communication. As conventional public procurement process rules apply, this may elongate the procurement times and require more planning at the tender writing stage to ensure that the tender specifications lead to appropriate returns being received.

Future proofing is a key concern for the group. For example, the unit capacity of battery storage and solar panels is evolving. Panels bought now are likely to be superseded in terms of their production capacity within a few years, but Leiedal are specifying the Transfo smart microgrid system for a 20 year life. They want to "future-proof" the system as much as possible. If the generation capacity of the system increases significantly (for example through replacing old PV panels with more efficient new ones at some point in the future) that requires extra capacity in cabling and distribution systems. The partners wish to ensure that the optimum specification is agreed now that strikes an appropriate balance between cost and future expansion capacity.

Tenders are currently being prepared by the project group at Leiedal.

Challenge 3 - Organisational Arrangements

Challenge level

The Lead Partner, Leiedal is not a typical urban authority in that it is an inter-local association for regional development in South-West Flanders that aims to develop the region dynamically, sustainably and economically. Leiedal was founded on the initiative of the municipalities of the district of Kortrijk as an intermunicipal agency for spatial planning, economic expansion and reconversion. Thus, its role is to work across organisations, facilitating engagements and inputs from partners where necessary. Cross-departmental and cross-institutional working is at its heart - Leiedal is a very experienced in partnership and working across municipal "silos".

The RE/SOURCED partnership structure reflects Leiedal's partnership foundations. The partnership representation covers:

- Local and regional government engagement (Zwevegem Municipality and the Province of West Flanders)
- Technology and system specification experts (University of Ghent, VITO)
- Business representation feedback (Flux 50)
- Community representation feedback (REScoop .eu)

In addition, specialist resources from within Leiedal are also part of the team who have expert knowledge of the technical aspects of the project - notably the electrical engineering operating parameters of the closed grid.

Leiedal identified a broad range of relevant stakeholder groups to include when preparing the project application – these will be engaged more actively as the project takes shape:

- Flanders Heritage Agency, dealing with immovable cultural heritage
- Site architects, like Coussée ,Goris & Huyghe Architecten en Sileghem & Partners
- Oenanthe, operator of the adventurous sports at Transfo, including the Diving Tank
- Circus Brewery, a microbrewery
- Plong, operator of the escape room
- Transfo Labo, artist collective
- Blueberry Hills, future climbing hall
- 4 businesses, each taking up a floor of the New Transfo building
- Mevaco Building Group (private housing), Eigen Haard Social Housing Company
- VREG, the Flemish Regulator of the Electricity and Gas Market
- VEKA, the Flemish Energy and Climate Agency
- Fluvius, intermunicipality managing distribution grids and grid connections
- Adjacent neighbourhood and inhabitants of the region
- Natuurpunt, Belgiums largest nature conservation organisation.

Given the extensive consultation and stakeholder engagement that was conducted, this Challenge may seem relatively straightforward as RE/SOURCED is not dependent for its success on the effective cross-working of departmental structures within a municipality.

However, its situation is arguably more complicated in that it requires effective working of the seven members of the partnership when designing, procuring and implementing the project while at the same time engaging with relevant external stakeholders who have the power to influence (or stop!) the operation of the Transfo smart microgrid when constructed. It would be understandable if the partners were inwardly focused, ensuring that the physical and technological aspects of the project are delivered as set out in the application form (which from Challenge 2, it is clear that they are). However this would be a mistake. It is essential that as the project is being implemented, its future operational principles are tested with external organisations such as the regulator and distribution service operator who can each significantly influence how the microgrid operates.

These external tests and checks should be done early and often. It will be evident from the material presented earlier that this is the approach the partners have adopted. It helps to ensure that while problems may not be resolved in full, they can be identified early, discussed and compromises reached. And in cases where a compromise is not found, higher level clarifications can be sought as exemplified by the interpretive question being presented to DG Energy

Challenge 4 - Participative approach for co-implementation

The partners have assembled a broadly based partnership covering the tactical and societal aspects of the project that is supported by a group/meeting structure to maximise communication, assist with implementation and ensure progress is

maintained and to provide governance.

Meeting	Role	Meeting frequency
Steering Group	Strategic oversight and direction	1 p.a.
Project Management Team	Operational delivery	8 p.a.
Consortium Meeting	Technical issues and information exchange	4 p.a.
External Advisory Board	External experts (and DSO) on technical and strategic issues (circularity and energy systems)	1 p.a.

In addition, a Board of Users (as well as cooperative bodies) enables collaboration, ensures conflict management/resolution and facilitates accurate information sharing between users, owners and other stakeholders on the site. This is a key communications and consultation channel.

The Quality Supervision Board supervises the consistency of spatial planning, architectural, heritage elements, mobility, landscape and nature, materials, street furniture, wayfinding, etc. Plans relating to the overall physical space are presented to this group. For example it provided guidance to the density and layout of the solar panel array on the car-park roof.

The partners meet regularly through the different project management and review mechanisms - Project Management Team (PMT) meetings are held monthly. These meetings typically last two hours and are followed by an internal meeting with Leiedal project - the latter effectively acts as a cascade mechanism to project staff.

The project meetings are constructive, inclusive and focus on identifying project progress and areas of blockage. The management of these meetings is constantly reviewed and refined so as to be more effective. Actions, responsibilities, and progress are monitored and assessed at PMT meetings. The current governance structures are felt by Leiedal to be working well.

Consortium Meetings are held every three months. These complement the PMT meetings in that they allow partners to 'stand back" from the delivery process and to discuss cross-cutting issues.

Partners are clear of their targets and required outputs - these have been clearly specified in the project application form. The application form informed the development of a project Gantt chart that is updated and reviewed at PMTs.

The partnership harnesses the different elements of expertise across the group ranging from citizen engagement through to detailed electrical system modelling. Debates at the PMT and Consortium Meetings are open and inclusive. Municipal partners contribute to areas in which they have a specialism notably, citizen engagement and education.

Collaboration is at three levels:

- The project partners working together to deliver the proposal as set out in the UIA application
- The partners, led by Leiedal, working with regulatory bodies to ensure that legislative and regulatory issues are accommodated
- The partnership engaging with users regularly to get feedback on the system and their interactions with it. There is new residential housing, recreational amenities, a

microbrewery and other leisure amenities on the site. Shortly there will be serviced business units which will house new businesses, greatly expanding the user base. This will be achieved through engaging with the Board of Users of which all current and future users will be a part.

The range of organisations chosen for the partnership covers a breadth of perspectives and technical disciplines. The current organisational structure aims to ensure that relevant expertise, and market/user perspectives from different user groups, are harnessed and utilised to shape the implementation of the project to the best effect. To date, the partners' range of activities has proven valuable in addressing the emergent challenges.

In parallel, the project has supported regulatory stakeholder engagement. The national generator, energy regulator and DSO were engaged when designing the project and their feedback shaped its structure at that point in time. The project partners are continuing to undertake significant work on these issues during the implementation. They have identified specific areas where legislation and regulation is lagging contemporary uses of the renewable energy technology and system designs, specifically the involvement of the full range of end-users in shaping how energy, that is produced locally, can be utilised by all. They are also considering how excess production can be passed back to the grid. Current legislation in Flanders does not accommodate this easily. This challenge has slowed progress and the project partners have drafted a paper, that is about to be submitted to DG Energy, identifying the issues and seeking both clarification on how these might be resolved and offering potential solutions. In this way, RE/SOURCED is proactively contributing to the development of policy at member state and potentially EU levels.

The project has strong community/citizen engagement at its heart. One of its goals was to establish an Energy Community in which local users (residents and businesses) could engage and benefit from energy produced for the community and from any excess electricity being sold the grid. The Energy Community was to be organised through a co-operative. It was planned to use a regulatory sandbox but this did not prove appropriate. The partners have found that this arrangement is not yet possible in practice under current regulatory guidelines. Further work is being done to find solutions.

Challenge 5 - Monitoring & Evaluation

Challenge level

RE/SOURCED involves the creation of a local electricity smart grid that will host a range of renewable energy generation and storage technologies for the benefit of businesses and residents located at the Transfo site.

The project has six overarching objectives, namely to:

- promote renewable electricity generation through community-shared solutions.
- encourage energy efficiency in local communities
- increase circular economy policies in renewable energy initiatives
- improve the knowledge on (shared) renewable energy systems with users and citizens
- boost awareness and positive attitude of renewable energy professionals on circular economy policies in renewable energy projects.
- reduce GHG emissions

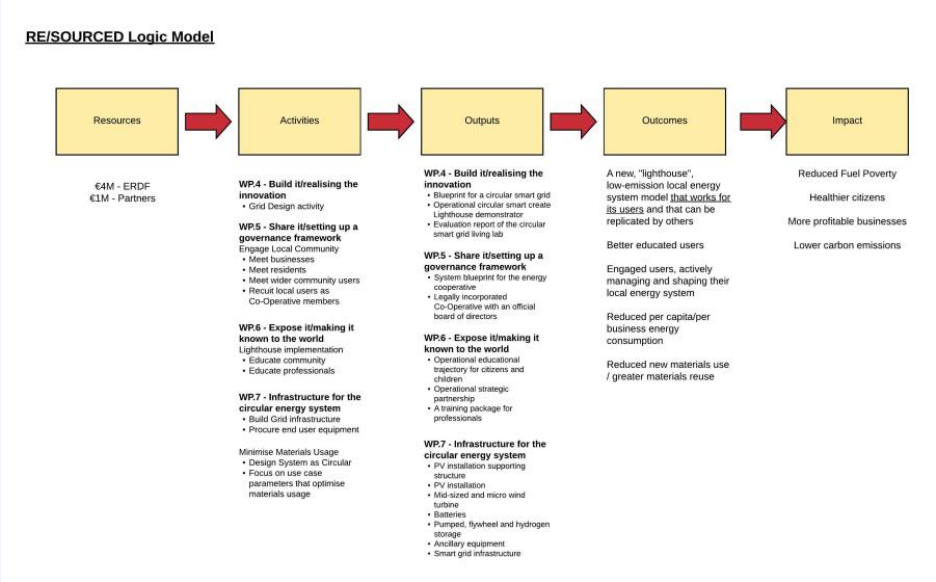
Achieving these objectives will deliver six main "results":

- Increased share of renewable energy through community-shared solutions
- Downscaled and rationalised renewable energy production and storage facilities, providing identical services for their users
- Reduced need for raw materials and a higher adoption of certified circular products in (shared) renewable energy systems
- Enriched insights of consumers and citizens on the benefits of (shared) renewable energy systems and awareness of available technologies
- More renewable energy professionals willing to introduce circular economy policies in renewable energy projects
- Fewer GHG emissions.

These objectives will be achieved and the results generated through:

- Creating the Transfo smart microgrid comprising a DC backbone and a range of renewable energy generation and storage devices that provide locally generated energy to residents and businesses located at the Transfo site
- Designing and building the Transfo Smart Grid, minimising material usage and optimising the life of components and materials used - this is a unique attribute of the RE/SOURCED project as it combines circular economy and renewable energy generation
- Engaging the local community - through the creation of an Energy Community manifesting itself as a cooperative business which will have local residents and businesses as its members
- Educating the community and professionals in areas of circular renewable energy production and distribution at a local level.

The Logic Model diagram below provides a framework showing the link between investment, activity, outputs, outcomes and impact.



The project has a range of monitoring procedures in place, linked to a project Gantt chart, to ensure that the activities and outputs (that will lead to the positive outcomes and impacts for both the project partners and the funders) will be delivered.

To date, given the capital and infrastructure build nature of the project, the focus has been on "activities". That said these activities have included a number of engagement procedures with target end-users and considerable effort has been invested to ensure that the design of the system meets both the renewable energy goals and the core circularity principles that underpin the project's fundamental raison d'etre.

The monitoring procedures fall into two principal groups. First, metrics will apply to key activities relating to the design and construction of the Transfo smart microgrid. These metrics will relate to designing the system, procuring and installing equipment and putting in place the necessary electrical infrastructure to enable the system to operate effectively. When making these procurements, partners can identify the proportion of materials reused in order to establish the extent to which the circularity principles have been met.

Second, measurement of energy usage is increasingly automatic. Modern electricity and heat distribution equipment and smart metering allows for data to be captured remotely in real time. This makes the assessment of energy efficiency, and household and business usage, much more straightforward. The Transfo smart microgrid system will include a system-wide Energy Management System (EMS) that is currently being procured. This captures data from all of the relevant system parts and and user types. In monitoring terms, this is the heart of the system. Partners ensured that the design and selection of the EMS will use an "open systems" architecture which will allow the data to be easily accessed and not held in a proprietary way by whoever is the manufacturer or operator of the EMS system. This decision was informed following a partners' workshop looking at the system specification in mid 2021.

Challenge 6

Challenge level

To deliver a successful project, the partners had a clear understanding of the target groups they wished and needed to engage when preparing the application. As the project is focusing on a clearly defined geographical area, the user groups were comparatively easy to identify:

(A) Transfo residents:

- residents of 44 residential family houses and apartments (about 100 people)
- residents of 24 social family houses and apartments (about 60 people)

(B) Transfo companies

- employees of four companies (each taking a floor of about 300 sqm of the New Transfo Building)
- employees and visitors of the microbrewery

(C) Transfo sports and leisure facilities:

- visitors to Transfo Diving facilities (baseline of 12,000 visitors in 2019)
- visitors to Transfo Climbing facilities (target number of 20,000 visitors/year)
- visitors to Transfo Adventerous Sports facilities (baseline of 13,000 visitors in 2019)
- visitors to Plong Escape Room
- visitors to Camping Transfo (baseline of ~ 125 stays in 2019)
- visitors to Transfo Labo Artist Collective

(D) Transfo MICE facilities

- visitors to events in the Turbine and Pump Halls (baseline of 5,700 visitors in 2019)
- visitors to events in the Party Hall (5,200 visitors/year)
- visitors to Voltage Outdoor Techno Festival (baseline of 7,000 visitors in 2019)
- visitors to other outdoor events (baseline of 8,000 visitors in 2019)

(E) Transfo educational and training circuit:

- Citizens from within the region (300,000 inhabitants) and from outside the region
- Schools
- Renewable Energy System (RES) installation professionals
- RES Businesses active in innovative solutions and products
- Local, regional, national policy makers from (outside) the region.

In addition to the specific stakeholder groups identified above, RE/SOURCED will engage adjoining neighborhoods. The local municipality, Zwevegem has organized a Board of Residents to allow for engagement of all residents in and around the Transfo site.

Appraising the system delivery at present, there are other stakeholder groups for whom the RE/SOURCED experience will be a value. Principal amongst these will be national and regional energy generators, energy regulators and DG Energy of the European Commission. The work of RE/SOURCED in implementing this groundbreaking project will enable key governmental and industry stakeholders to gain an insight into the challenges faced by projects of this kind and will provide a pathway for developing appropriate solutions for similar initiatives in the future. As mentioned above, the partners have shown significant leadership in attempting to overcome key legislative hurdles encountered to date - theirs are likely to be the first of many similar challenges that generators, DSOs and regulators face as more distributed, localised community energy systems are presented to them.

RE/SOURCED aims to create a new localised renewable energy generation and distribution system within the Transfo site. In addition, it wishes to encourage all users to engage in the management, operation and future development of the facility through membership of a Co-Operative. The partners see the whole community as being the relevant beneficiaries of the Transfo smart microgrid. However, this is proving difficult to achieve due to regulatory restraints. Regulations categorise local generators as being either commercial businesses or private residents/citizens - legislation does not provide for a mix. Discussions with the regulator when designing the project suggested that this restraint could be

accommodated by developing the project within a regulatory sandbox. However, following detailed and lengthy consultations with the relevant bodies and inputs from specialist technical and legal advisors, the sandbox mechanism has proven to be unsuitable - the challenge remains.

At the present time, partners are seeking guidance from DG Energy as they would like to maintain as much of the original inclusive community engagement goals as possible. It may be, in the short to medium term at least, that the full goal of engaging all end-users in a single entity that manages and benefits from the Transfo system will not be possible. However the system is being designed to allow for future changes in legislation that more accurately reflect changing social societal and technological advancements and the adoption of circularity principles when building energy systems of this kind.

Challenge 7 - Upscaling

Challenge level

Downscaling rather than upscaling may be the most appropriate development of the RE/SOURCED pilot. One of the benefits that RE/SOURCED offers is that it can support the public/national grid at peak times. It does this by ensuring its community uses locally generated energy during these periods - this reduces the load on the grid.

At other times, when the Transfo Smart Grid is generating excess electricity, it could, in principle, sell this excess to the public grid for use by non-Transfo communities. Thus, energy generation capacity in the public grid could be reduced. This concept of relying on own generation at peak national demand and selling excess to the grid is known as "peak shaving" - private generation effectively softens spikes in peak loads.

The extent to which private smart microgrids like Transfo can complement the national/public grid is not well understood. There are few real-life examples at an EU level. RE/SOURCED will help to fill this knowledge gap as it will create a live model that can be tested to show how such a system can operate in real-world conditions. It is possible that, rather than upscaling, RE/SOURCED concludes that smaller scale proposals might be more effective. Or indeed that the most effective systems are all those that are flexible - being capable of being scaled up when external demand is greatest and scaled down when demand is light.

By implementing RE/SOURCED, operational and technical assessments will allow the partners to establish the optimum scale of a closed grid network of this kind. The project application identified the potential to replicate a private grid to a level of the municipality or within the entire urban area. Both are realistic outcomes and will be closely monitored during the next 18 months by other cities.

There are other projects working on the optimum "territory scale" challenge presently. The URBACT project URB-EN PACT comprises eight partner cities and focuses on net zero energy territories. The cities are looking to become net zero by 2050 and recognise that there are optimal city boundaries that would apply. RE/SOURCED will provide clear insights for URB-EN PACT into what scale might be practical.

Project progress

The project is broadly running to plan. There have been some modest delays - the principal causes being largely outside the consortium's control:

- COVID-19 – has impacted the timescale for specifying and procuring infrastructure, the PV and battery storage elements of the project.
- Legislative hurdles – as outlined above, legislative limitations could have a potentially significant impact on the direction and scope of the project. Specifically, WP5 (the formation of the Co-operative) will be defined by the clarification provided by DG Energy to the interpretative question posed by the consortium. The design process for designing and creating the Co-operative will be tendered but its scope will be defined by DG Energy's response. This is delaying implementation of this WP and it may be that the scope of the tender will need to be revised to accommodate different scenarios.

Otherwise the tenders are progressing:

- The invitations to tender for the solar arrays and battery storage systems were issued at the end of 2021 and responses are being received in January 2022 (delivery December 2022)
- The tender for the wind turbine will be issued by early February 2022
- Tenders are being prepared for the solar panel mountings (roof of the parking area) and the renovation of premises for the battery installation – both need to be constructed by the end of 2022. This is a challenging timescale but achievable if events run smoothly and COVID-19 impacts on the labour market and supply chain are not encountered.

Conclusion

There is a (trite) saying amongst product development personnel that "pioneers are the ones lying face down in the sand with arrows in their backs". As RE/SOURCED is a pioneering renewable energy project, both from the technical aspects of the systems being used and through having circularity at its heart, it is unsurprising that it is encountering challenges along its route. However, its goal is a perfectly valid one – to generate renewable energy in a locality that can be used by the local community. This is likely to be a goal shared by many municipalities across the EU (and indeed, globally).

The challenge in focusing on a specific community is that the legislation may not allow municipalities to provide the renewable energy produced on site to all members of the community they wish to support. Current legislation differentiates between private citizens, municipal and commercial users. The Energy Directive has made gains in providing a framework for energy communities within which member states can work, but its adoption by member states is moving at different paces.

With RE/SOURCED, partners were faced with a significant and complex set of hurdles. RE/SOURCED wanted both private citizens and commercial organisations to be users of the renewable energy produced at Transfo. It also wanted to be able to "sell" excess energy to the public grid. This opened up a myriad to legislative issues, any of which could have stopped the project's progress. The "legislative sandbox" approach, which partners anticipated might accommodate businesses and citizens as users of a single system, proved unsuitable

The Lead Partner has invested significant resources, both in terms of staff time and through engaging legal expertise, to find an alternative route to implementation. This identified a Closed Distribution Network (CDN) legal construct as a possible compromise. This would allow renewable energy to be generated as originally proposed, but would limit the beneficiaries to businesses and municipal bodies. Private citizens could not be "active users" (within current legislative definitions).

Before embarking on the CDN delivery path, the lead partner has prepared an interpretative question for DG Energy of the European Commission setting out why a CDN would be suitable and seeking confirmation that its interpretation of the EU Energy Directive is correct. That question will be sent to DG Energy in December 2021.

RE/SOURCED is leading the way with this issue. Getting a clarification on this question will likely be of benefit to the many other municipal organisations attempting to take the lead in facilitating renewable energy production in local communities. It will also introduce, in a practical way, to DG Energy the challenges that current legislation poses for municipalities implementing community focused renewable energy projects. This is an issue for all member states so RE/SOURCED is leading the way in developing solutions.

From a practical and implementation standpoint, the project is using public procurement to purchase sub-assemblies for the Transfo smart micro grid – the procurement covers systems and products that are highly technical in nature (requiring not just an understanding by suppliers of their products' technical specifications, but also their operating conditions and the operating characteristics of other generating technologies on the Transfo system). The procurement must also have circularity at its heart and suppliers are being asked specific circularity questions which some are finding difficult to answer. The partners are in the middle of the procurement process presently – there may be future recommendations arising for this learning.

Circular economy

See on UIA website