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Flexible open learning pathways mapping

Report number: D3.3

Report title: Flexible open learning pathways mapping for each stakeholder group

Report due date: M36 - 31/10/2025

Submission date: M36 – 31/10/2025

Dissemination level: Public

This project has received funding from the European Union's Horizon Programme for Research and Innovation (2021-2027) under grant agreement No 101075596. The sole responsibility for the content of this document lies with the EVERY1 project and does not necessarily reflect the opinion of the European Union.

REPORT INFORMATION

Report Number	D3.3
Report Title	Flexible open learning pathways mapping
Work Package Number	WP3
Work Package Title	WP3 Management & coordination, and impact evaluation
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Nature	Report
Dissemination Level	Public
Deliverable due Date	M36 – 31/10/2025
Draft Number	5

PROJECT CONTRACTUAL DETAILS

Project Title	Enable eEveryone's Engagemet in the eneRgY transitiON
Project Acronym	Every1
Grant Agreement No.	101075596
Project Start Date	01/11/2022
Project End Date	30/04/2026
Duration	42 months
Supplementary notes	

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ABSTRACT

This document reports on the task T3.3 entitled 'Designing flexible, equitable open learning pathways for informing, engaging, upskilling and reskilling stakeholders. This is the third of four tasks in work package WP3 'From knowledge gaps over learning paths to identifying training material needs', which concludes with the development of the online pathways tool. We describe: our approach to the task; how we worked through the challenges to produce a process for determining pathways; the ways in which we addressed the central themes of equity, and flexibility, whilst aiming to create pathways for informing, engaging, upskilling and reskilling stakeholders.

Accessibility is one key element within the project and central to the design of the Every1 website. To achieve this, we needed to remove as many barriers as possible that might prevent people from benefitting from this work. The designers of the website and the pathways tool made a particular contribution to our design of accessible pathways. We describe the importance of this input and how it enabled us to balance the desire not to overwhelm with the commitment to provide truly flexible pathways.

We explain the purpose of using learning design techniques and how the iterative nature of the process both persuaded and enabled us to move from considering academic levels of learning to circles of influence and how this ensures equity by keeping citizens at the centre of all the learning paths.

Finally, we set out our mixed pathways approach. This provides a combination of carefully constructed and curated pathways through the learning outcomes for each circle of influence, bitesize pathways for learning specific items, the option to select and work through carefully selected items, knowing how these contribute to learning, and finally, the ability to use a range of filters to select learning materials for bespoke learning paths.

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1. Introduction

In the EU the energy transition demands active participation from diverse stakeholders, requiring new skills and knowledge to navigate the rapidly evolving landscape. The Every1 project addresses this crucial need by designing flexible, equitable open learning pathways for informing, engaging, upskilling, and reskilling stakeholders involved in the adoption of digital technologies and energy flexibility products and services.

The Every1 Project is designed to deliver a lasting and impactful capacity-building program. At its heart are flexible learning pathways, which move beyond a 'one-size-fits-all' model to empower diverse stakeholders across the energy transition landscape.

These pathways were not developed in isolation. Instead, they were shaped through established learning design practices and grounded in earlier project activities. In WP1, we mapped the stakeholder landscape, capturing their knowledge and lived experiences through surveys and collaborations with pilot ecosystems. WP2 then identified additional key themes and considered relevant technologies and services.

In WP3, although tasks T3.1–T3.4 were formally ordered in documents, the project advanced most effectively when these tasks informed one another in parallel. Close coordination with WP4 was equally critical: WP4 relied on WP3's definition of learning gaps to determine which materials to develop, while WP3 drew on WP4's outputs to refine the pathways.

Building on this foundation, we defined the expertise and understanding required for successful pathway implementation. We then analysed each stakeholder group's knowledge gaps and capabilities, ensuring that the pathways directly addressed their needs. In short, these preparatory steps guaranteed that the learning pathways are tailor-made to empower stakeholders on their journey toward energy transition expertise.

The Every1 Project's open learning pathways, rooted in a commitment to stakeholder empowerment, aim to catalyse systemic transformation. By equipping stakeholders with the necessary knowledge and skills, the project fosters robust collaboration, knowledge-sharing networks, and mutual learning across the sector. Ultimately, this contributes to a more equitable and inclusive energy future—one in which all voices are heard and all communities benefit.

These pathways therefore serve as a critical instrument for enhancing individual capabilities and shaping a just, sustainable energy landscape for all.

Developing shared understandings was an important part of the work of WP3, as although all partners were experts in aspects of the energy transition in the EU, they were not familiar with creating learning materials for learning paths. Therefore, an important element within WP3 and WP4 was the need to ensure all partners knew how to contribute to this and achieve a shared set of expectations. This was achieved in WP3 through regular meetings, shared activities and workshops.

2. Definitions

The following terms are introduced to the project through this strand of activity. All other terms have been used throughout the project.

Accessibility – the removal of as many barriers as possible that might prevent someone from benefiting from this work.

Learning path or pathway – Generally, this is the description of an individual study journey, either as an offer, a plan, or of one being studied. It may contain one or many steps. Within this project, we consider each step to be composed of a specific learning material. The learning material may be in any form, including a course, book, game, report, or video, or a portion of an existing item.

Personas – these are detailed descriptions of fictional learners combining attributes from across the anticipated learner population. The result is that a small number of personas can be used to help in designing learning that supports all intended learners by enabling curriculum designers to keep them in focus

Learning outcomes – these are clearly understandable statements of what learners should expect to be enabled to develop through a learning path.

Educational aims - describe the overall purpose of a particular learning path. They give an indication of the topics, level, who the anticipated learners are and why they would want to study this path.

Throughout the project, we were very aware that the terminology we were using would not be accessible to all stakeholders. The Every1 website and pathways tool are where this becomes a critical and we determined we would avoid terms that would require additional explanation.

3. The Every1 project structure

The Enable eEveryone's Engagement in the eneRgY transitiON (Every1) project comprises 11 partner organisations and work is organised into 6 workstreams called work packages (WPs). Each WP is itself divided into tasks (Ts) and the planned outputs are called deliverables (Ds). The WPs are:

- WP1: Stakeholders and ecosystem characterisation
- WP2: Best practices, barriers and challenges on digitalisation and energy flexibility
- WP3: From knowledge gaps over learning paths to identifying training material needs
- WP4: Knowledge creation, capacity building, and training materials
- WP5: Maximizing Impact
- WP6: Management & coordination, and impact evaluation

This report is Deliverable 3 within WP3 (D3.3). The tasks and deliverables of WP3 are:

- T3.1: Identifying knowledge gaps, and capabilities for all stakeholders. The deliverable from this task is,
 - D3.1 – Scientific paper on stakeholders and knowledge gaps
- T3.2: Existing and emerging training material that could feature in the Every1 flexible open learning pathways. The deliverable from this task is,
 - D3.2 – Structured overview with assessment of existing capacity building materials

T3.3: Designing flexible, equitable open learning pathways for informing, engaging, upskilling and reskilling stakeholders. The deliverable from this task is,

D3.3 – Flexible open learning pathways mapping for each stakeholder group

T3.4: Tool to develop tailored flexible pathways. The deliverable from this task is,

D3.4 – Learning path design tool

The work of WP3 builds on that of WP1: Stakeholders and ecosystem characterisation, and of WP2: Best practices, barriers and challenges on digitalisation and energy flexibility and particularly on the following deliverables:

D1.1 Extended stakeholder and ecosystem mapping

D1.2 Structured overview of ecosystems

D2.1 Assessment of digital technologies, regulatory and market frameworks

D2.2 Enabling frameworks, technical requirements and acceptability criteria to procure digital technologies

Throughout this report we may use the work package, task and deliverable abbreviations as a concise way to refer to these items.

4. Approach

The aim of this project task was to design customised learning pathways for distinct stakeholder groups within Europe's energy transition landscape. These pathways are deliberately heterogeneous, encompassing a diverse array of educational formats to cater to varied learning approaches, time constraints, and resource availability. This multi-pronged approach leveraged existing high-quality training materials from established initiatives, integrating them with Every1's open-licensed modules. Additionally, vibrant peer-to-peer learning communities foster knowledge exchange and mutual support, while engaging multimedia formats (e.g., webinars, videos) cater to individual preferences. Beyond knowledge dissemination, the pathways prioritised actionable outcomes through targeted information campaigns and engaging materials that raise awareness and motivate stakeholder participation in the evolving energy transition.

This activity builds on the strong foundations established in earlier tasks to initiate a collaborative process of co-creating flexible, tailored learning pathways for distinct stakeholder groups. The work is guided by three core principles:

1. Pedagogical flexibility – recognising the diversity of learning approaches, time constraints, and resource availability.
2. Knowledge openness – promoting the dissemination of knowledge through open-licensed materials and nurturing vibrant communities of practice.
3. Equitable access – ensuring inclusivity and accessibility for all participants, with particular emphasis on amplifying and empowering marginalised voices within the energy transition discourse.

The design of learning pathways builds on a foundation of collective knowledge and lived experience fostered through close collaboration with diverse stakeholders. Pilot ecosystems, with their invaluable insights into everyday realities, guide the development of contextually relevant pathways. Direct engagement with stakeholder representatives ensured the learning journeys cater precisely to their specific needs and challenges. Furthermore, broader collaboration across the energy transition landscape built collective ownership. It harnessed the expertise of key stakeholders, illuminating a complex landscape of expertise and viewpoints that strengthen the pathways'

effectiveness. The collaborative approach fostered inclusive, adaptable learning journeys that can resonate with and empower stakeholders across the board.

Iteration is an important aspect within the learning design approach we adopted. This enables several, interconnecting strands of activity to progress and work together to improve the whole. In this report we describe how educational aims and learning outcomes were created alongside the production of learner personas and the addition of detail to the list of stakeholders. At the same time, the list of relevant topics was being refined. Throughout the project, there was ongoing discussion within the consortium and increasing co-creation activity. Each of these enriched the others and was improved by the interactions.

4.1. Accessibility

The project is committed to ensuring accessibility and this consideration is central to the design of learning pathways. It is also at the centre of the decision to keep pathways on the website as straightforward as possible whilst retaining and making fully available, the complete detail of learning material mappings, as this would allow for others to fully customise their learning pathways based on learner needs and context:

- **Contextual Relevance:** In addition to clearly stating learning outcomes and educational aims for three circles of influence (see later), pathways leverage bite-sized learning to overcome time and commitment barriers. They map resources based on three levels of expertise (Novice, Intermediate, Expert) to ensure the difficulty level is always appropriate.
- **Language and Localisation:** Accessibility is directly supported through the project's commitment to translating the Every1 produced core learning materials into a wide range of European languages. This addresses the critical barrier of local language access, which is essential for maximising equitable participation across the EU.

4.2. Co-creation

The Every1 project is explicitly designed around a collaborative, democratic model, where stakeholder feedback is sought and acted upon regularly. Co-creation is therefore central to the project's methodology, ensuring that the resulting learning materials and pathways reflect the needs, perspectives, and experiences of organisations and their end-users.

4.2.1. Co-creation Mechanisms

The process of co-creation is flexible and iterative, structured to provide a clear 'offer' to communities while remaining sensitive to their availability and capacity for involvement. The project engages in co-creation across three main elements: understanding stakeholders (knowledge gaps), designing learning pathways (WP3), and developing learning materials (WP4). The Every1 project ensured meaningful co-creation activities through:

1. **Flexible Involvement:** The level of collaborative involvement is negotiated with committed ecosystems. This approach, which aligns with the principles of the 'Ladder of Co-creation of Learning' (Charitonos, et al, 2021), ranges from:
 1. **Feedback and Validation:** Communities actively participating in testing and validation rounds (Cycle 1, 2, 3, 4, 5, etc.) via surveys, interviews, and workshops to critique content accuracy, format appropriateness, and relevance.

2. Co-development and Authorship: Engaging selected ecosystems in the direct creation and authoring of learning materials, such as providing input for case studies, contributing to secondary school course materials, or participating in webinars on current trends.
2. **Ecosystem Journeys:** Dedicated 'Ecosystem Journey' meetings were established to formally coordinate and align co-creation activities across different Work Packages (WPs). These meetings ensure that the engagement offer to committed ecosystems is coherent and prevents duplication of effort, fostering a sense of collective ownership and involvement in the project's outcomes.
3. **Grounding in Real-World Examples:** Collaboration is prioritised in the creation of materials like case studies, ensuring they are grounded in real-world examples. This process involves selecting suitable energy communities, gathering primary insights through consultation, and adapting the information to create engaging, informative, and practical learning materials. This grounds the project's theoretical work in the practical experiences of those actively involved in the energy transition.

4.3. Learning design

In order to define flexible open learning pathways, we combined the well established learning design elements of educational aims, a description of the subject area, learning outcomes, levels of study, and personas to achieve its deliverables (Wasson and Kirschner, 2020; Zagallo *et al.*, 2019)

. We briefly describe each of these elements and how we brought them together to produce learning pathways.

We can state the essential learning design principles we applied as:

- **knowing the learner:** Sometimes we do know the learner very well because they are close family or a friend. Mostly, we don't. In this project we are aiming to include every citizen within our group of learners and especially those at risk of being left behind.
- **knowing the subject:** We are dealing with a set of traditional subjects overlapping within the public space. Conventional subject frameworks do not have this focus. Therefore, we developed a list of relevant topics that were then reviewed by ecosystems through our co-creation activities.
- **knowing how to assist the learner to learn:** This involves understanding how the needs of the learner in respect of the topics are best met and lead to the definition of learning pathways.

Figure 1 shows the general relationship between the early work in WP1 and WP2 to the steps in the development of learning pathways and how activity progressed through several stages to lead to their construction. In the following sub-sections we outline the elements of the learning design approach that we adopted.

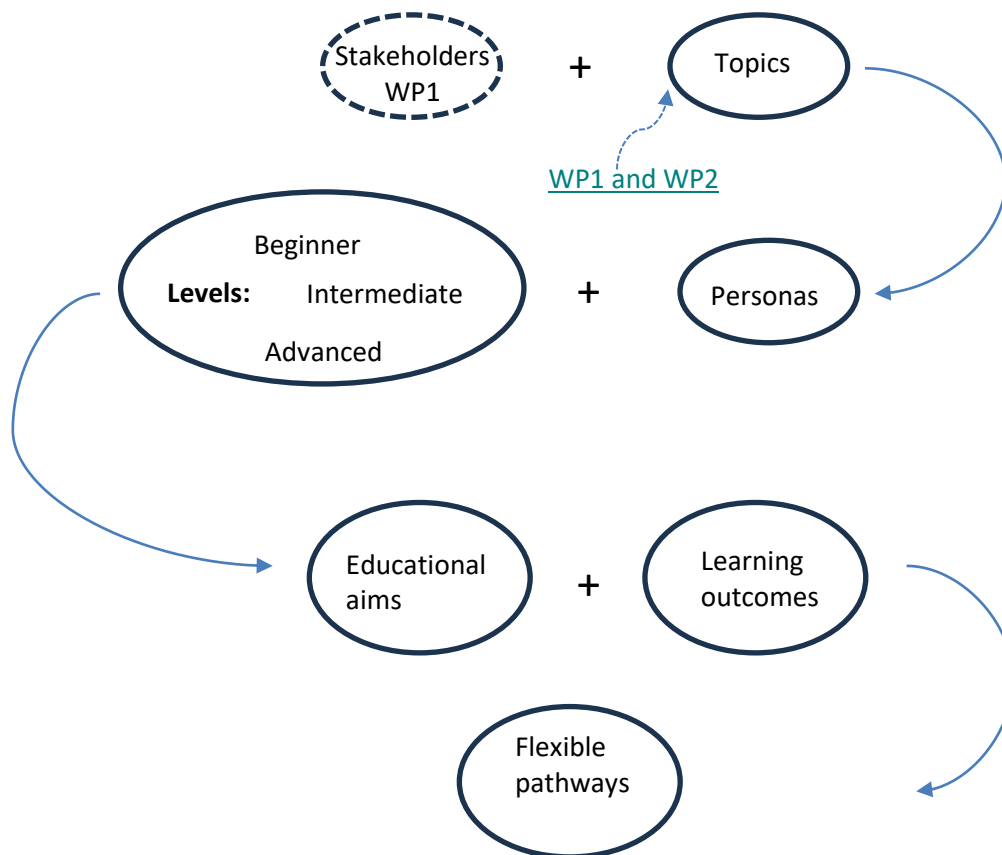


Figure 1, The overall flow of activity leading to flexible pathways and contribution from WP1 and WP2

4.4. Educational aims

These are developed alongside learning outcomes and describe the overall context of the learning. They indicate the level and purpose of, and who and how they would benefit from studying a particular learning path.

Educational aims accompany learning outcomes because learning outcomes can only be fully understood when we have these contextual details.

4.5. Learning outcomes

Learning outcomes have become a central feature of curriculum design across many countries and educational contexts. More accurately, they are referred to as intended learning outcomes, since we cannot predict with certainty what each learner will achieve; we can only articulate what has been planned.

The use of learning outcomes offers several advantages, including greater learner empowerment and the clearer communication of expectations. To remain effective, the number of outcomes for any learning path should be kept to a minimum, and their wording should be accessible to prospective learners.

Learning outcomes define the expected level of achievement at the end of study. They are first established at the outset of curriculum development and then refined iteratively as the curriculum and its learning pathways evolve.

Learning outcomes, therefore, relate to both the subject and learning needs and are what we use to map potential learning materials to the learning needs of stakeholder groups.

4.6. Levels

We can make the general statement that learning on any topic can be undertaken at different levels. As we consider potential learners for learning pathways on the digitalisation of energy in the EU, there is quite a distance between the level of a citizen for whom this is essentially all new and someone whose work is within the sector.

In order to set a starting point, we originally proposed three learning levels, beginner, intermediate, and advanced. The expectation was that the expertise within the Every1 project team would enable both stakeholder learning gaps and learning materials to be broadly categorised to one of these three levels. As with any learning design process, especially within a new learning space, all the learning design elements would be developed iteratively to converge on the best solution.

In terms of the potential learners the project is designing pathways to support, we found it easiest and most sensible to start at the beginner's level. This stakeholder group contains those people most likely to be left behind in the energy transition, is one the project has committed to supporting, and as stated above, is a group generally unfamiliar with the subject. However, they will likely have a general understanding of things like climate change, electricity, energy and budgeting, gained through their school education and subsequent life.

The diagram in Figure 2 below illustrates how we viewed the relationship between the three learning levels and all the expertise and knowledge that exists on the subject of the energy transition in the EU. It suggests an individual coming to the subject as a beginner, could follow a beginner's learning path and then would be able to return to the tool as an intermediate learner, to select a new learning path. Likewise, an intermediate learner could return as an advanced learner.

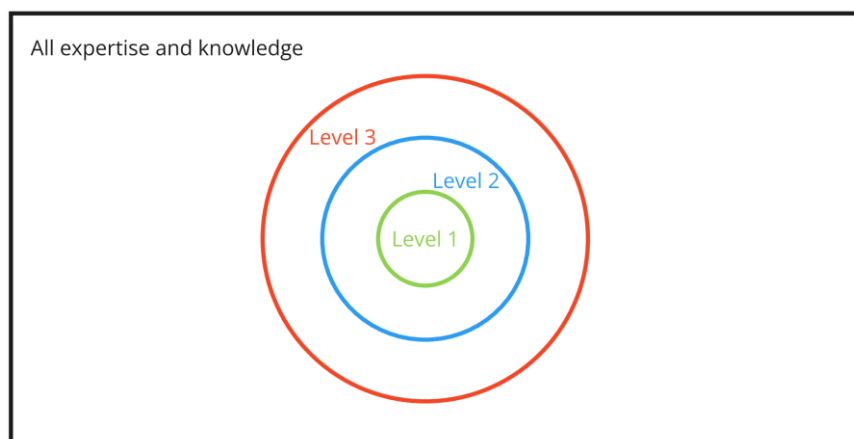


Figure 2, Venn diagram showing three levels of learning for the energy transition in the EU. Level 1 is beginner, Level 2 is intermediate, and Level 3 is advanced. As a beginner learns, they can move into intermediate level learning and then into advanced level.

4.7. Personas

It is important that the design of the Every1 learning pathways is fundamentally rooted in a deep understanding of the target audience, moving beyond general demographics to empathetic, data-driven profiling. We achieved this by using personas. Learner-centred teaching approaches emphasise designing content, materials, and assessments that respond to the diverse backgrounds, motivations, and needs of learners. Yet, understanding a learner base can be particularly challenging where it comprises such a varied group of individuals. Within the EU, culture, language and many other variables ensure this is a difficult task. Using personas addresses this challenge. These are a well-established user-experience (UX) design method (Quintana et al., 2017). Personas are fictional but research-informed representations of typical learners that encapsulate demographic, behavioural, and motivational characteristics in an accessible format. They help instructional designers anticipate learner needs, tailor content, and foster shared understanding among diverse stakeholders in course design (Goodwin, 2009).

The persona co-creation process began with a consortium-wide brainstorming session to identify the main learner groups for the project's educational resources, building on prior stakeholder mapping in WP1 and Deliverable 3.1. This process resulted in the development of 32 learner personas across two main levels of expertise. Level 1 personas represented beginner or general-knowledge learners, such as homeowners, tenants, small business owners, and energy-community members. Figure 3 below illustrates Level 1 personas developed in the project.

Level 2 personas represented stakeholders with more insight and influence in energy digitalisation—these included SMEs, Education and training institutions (informal programmes by organisations), media providers, local authorities (municipalities), EU level policymakers, energy community (leaders), social equity enablers (social welfare organisations, religious communities, disability / elderly associations). In developing Level 2 learning personas, we followed the same steps as for Level 1. An example of resulting Level 2 persona is provided in Figure 5 below.

The Level 3 group of advanced experts was envisaged (e.g. engineers, managers, regulators, and investors), the consortium decided not to fully develop it formally. The project's short, flexible learning materials were not designed to reach such highly specialised audiences whose expertise typically requires years of professional development. This did lead to the conclusion that individuals within Level 3 stakeholder organisations might need to consider what citizens would need to know about the energy transition, in order to design communications or support materials and this was a useful focus at this level.

In addition, this inspired a separate study outside of the project that demonstrates how a structured, multi-stakeholder persona-co-creation process, augmented by GenAI, can make large-scale, learner-centred course design more inclusive, evidence-based, and efficient. By combining expert insight with GenAI's generative capabilities, the Every1 project created the conditions for gaining an advanced understanding of how AI can assist educators in capturing real-world learner diversity while maintaining ethical and contextual integrity. The study, now published contributes valuable methodological innovation to everyone in the field of digital education, highlighting GenAI's potential as a responsible co-creator in scalable learning design (Rets et al., 2025).

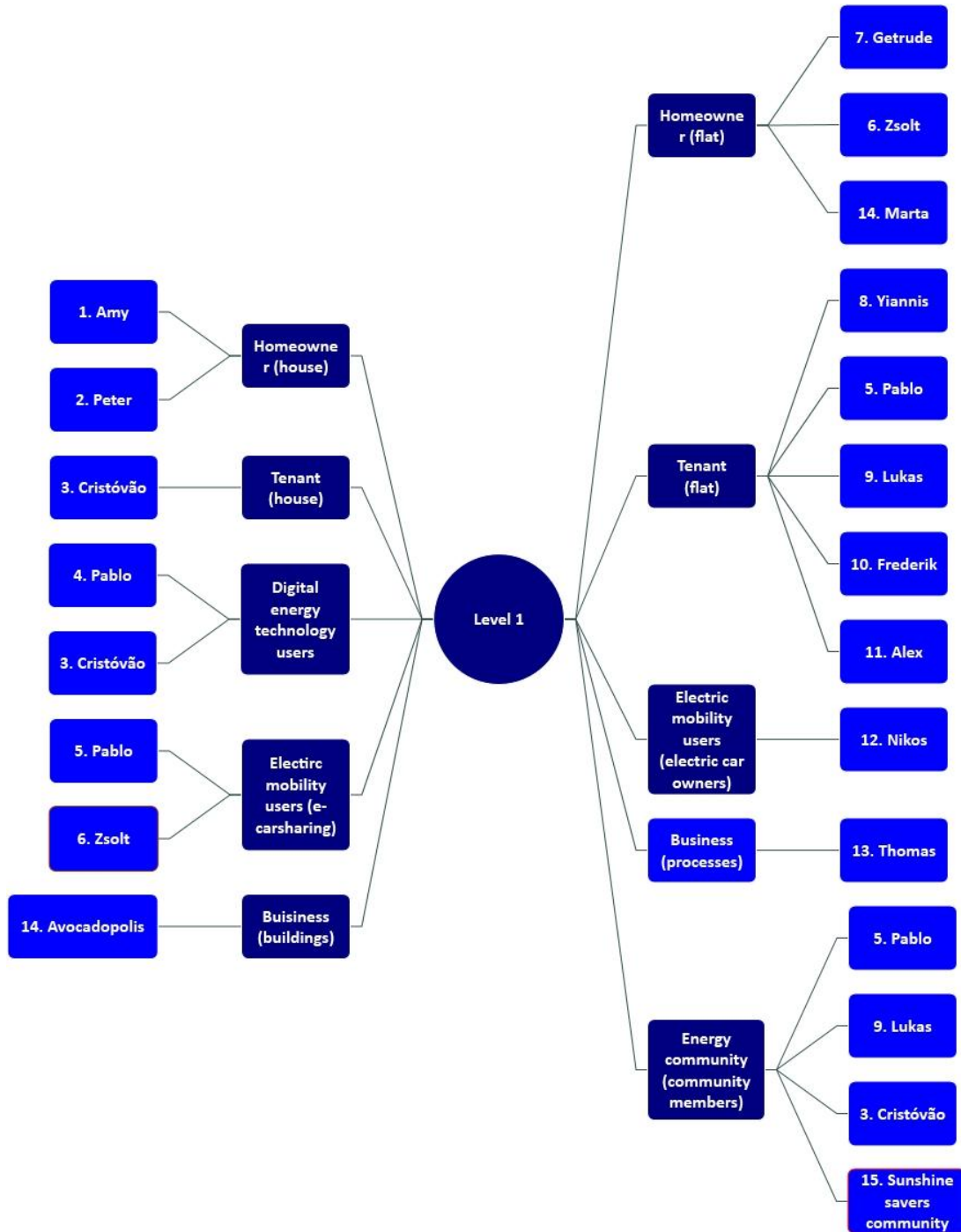


Figure 3, Level 1 learner personas developed in the Every1 project.



Marta	
Overall description <i>age, disability (if any), information about residency, people living in the same house, job, habits, device/access to internet, transportation, energy-related needs and preferences</i>	Marta is 48 years old and lives in Porto in a three-bedroom apartment built in 2001. She lives with her husband and three children, who are finishing high school. Marta has a bachelor's degree and works at a branch of a Portuguese bank, 1.5 km from her house. She goes to work by metro and uses the car on the weekends to go to the supermarket and meet friends and her family living in Penafiel (about 40 km from Porto, and a 30-minute drive). Marta is aware of global warming and has started some habits to reduce her carbon footprint due to their children. Marta and her husband will soon buy a house, and she would like to install a solar panel because her friends told her that it is a great way to save money and protect the environment. However, Marta did not start asking for quotes yet. She finds it essential to be up to date with the latest energy-related (global) news. Although she knows her household's energy expenditure, she is not an expert on what methods/solutions to use to make energy consumption more efficient.
Energy consumption (and frequency) <i>heating, air conditioning, hot water, washing, cooking, transportation, other</i>	Marta has a combi boiler (gas) for heating and hot water. The combi boiler provides hot water on demand. Marta opts not to set the heating to automatic, reserving it for freezing days. Instead, she prefers to use the fireplace in the living room to get warm. Similarly, Marta adopts a mindful approach with her appliances; she only activates items like the coffee machine or <u>TV</u> when necessary, promptly unplugging them afterwards. Marta recently acquired a dishwasher, and now she schedules the cleaning programs to start during off-peak hours to optimise efficiency. This conscious management also extends to the washing machine, which she uses every other day.
Associated stakeholders	Homeowner (flat)
Learning outcomes <i>Higher to lower priority from the person's perspective to transition to</i>	Higher priority <ul style="list-style-type: none"> • <u>Understand</u> your personal energy consumption patterns, including peak usage times and major

Figure 4, Example persona developed by one of the Every1 partners



Josephine/Social Equity Enabler	
<p>Overall description <i>(person and team, product/service, stakeholder needs and gaps)</i></p>	<p>Josephine (43) works for the Danish Red Cross as a local community engagement officer. The Danish Red Cross is one of the largest Social Welfare NGOs within Denmark, it is present in all parts of the country and has around 200 local branches as well as a national country office located within Copenhagen which Josephine is based at. A core part of <u>Josephine</u> ,and organisation as whole, work is to engage with local communities to relive social distress and make a humane difference based on the needs of the local communities. This involves working with socially and economically disadvantaged families (lately a key focus on fuel poverty), supporting the homeless, supporting pensioners and the elderly and helping refugees. The communities which Josephine works with are primarily located within suburbs west of Copenhagen a region, an historically deprived region, which has experienced increased energy poverty due to the burgeoning cost of energy. With this being the case the Danish Red Cross alongside the municipality are increasingly working with local communities to assist them in becoming energy efficient.</p>
<p>Activities</p>	<ul style="list-style-type: none"> • Project management for local communities • Organising events, seminars and activities i.e. mentoring schemes, family network meet ups, community wide events/fun days • Advocacy, raising the topic of energy poverty to policymakers and outlining the extent of the issue
<p>Associated stakeholders</p>	<p>Municipality, Local Government, Welfare Providers</p>
<p>Learning outcomes <i>Higher to lower priority from the persona's perspective to transition to digitalised energy</i></p>	<p>High Priority</p> <ul style="list-style-type: none"> • LO22 'Social and economic sustainability, energy poverty': <u>Understand</u> the principles of energy justice and social inclusion in the context of digital energy transition initiatives

Figure 5, Example Level 2 learning persona

4.8. Topics

In order to understand the range of topics required within the learning pathways we consulted other projects and the International Standard Classification of Education (ISCED) (<https://www.uis.unesco.org/en/methods-and-tools/isced>), finding that this did not contain anything that was clearly appropriate to a population undergoing an energy transition. Therefore, it was clear the project needed to set out the important topics to cover. Our analysis of the reports from WP1 and WP2 enabled the following hierarchy to be described. A simplified list of the topics is provided in

Table 1 below.

Table 1, Simplified summary version of EU energy digitalisation topics, without keywords and terms

I. Energy System

A. Demand Side

1 Residential

- a. Energy usage (incl. consumption patterns)
- b. Energy efficiency (incl. smart homes, appliances, automation)
- c. Data analytics for consumption and optimisation

2 Industrial/Commercial

- a. Electricity demand (incl. peak demand, forecasting)
- b. Demand response and management
- c. Data analytics for efficiency and grid support

3 Mobility

- b. Charging infrastructure (including planning)
- c. Vehicle 4 grid (V4G)

B. Supply Side

1 Generation

- a. Energy sources (renewables, conventional)
- b. Power plants and technologies (including domestic and local)
- c. Grid integration and management

2 Distribution and Transmission

- a. Electrical grid infrastructure and topology (architecture)
- b. Voltage levels and power quality
- c. Load management and distribution efficiency, including microgrids

C. Market and Regulation

- 1 Energy pricing and tariffs (peak/off-peak, etc.)
- 2 Grid flexibility and demand-side management
- 3 Stakeholders and market dynamics
- 4 Energy policies and regulation

II. Enabling Technologies

A. Data and Analytics

- 1 AI
- 2 Smart meters)
- 3 Sensors
- 3 Data space connectors
- 4 Remote sensing and GIS tools
- 5 Security and privacy of data

B. Communication and Connectivity

- 1 IoT devices and connectivity protocols
- 2 Wireless technologies (5G, future networks)
- 3 Data exchange and IoT applications

C. Innovations and Trends

- 1 Battery technology and energy storage;
- 2 Blockchain technology for energy trading
- 3 Price elasticity and market dynamics
- 4 Environmental sustainability and emission reduction
- 5 Eco-mobility and automated driving

III. Global Context

Sustainability and Social Responsibility

- 1 Environmental impact and greenhouse gases; environmental sustainability
- 2 Social and economic sustainability, energy poverty
- 3 Renewable energy and resource management

4.9. Linking personas to content

The learner personas developed in WP3 directly shaped the design and production of the WP4 Every1 learning materials. These personas provided an empirically grounded understanding of the project's diverse learner base, helping the consortium move beyond abstract notions of 'target audiences' to more nuanced, human-centred design decisions. Each persona encapsulated key learner characteristics such as motivations, digital skills, learning goals, and contextual challenges, which informed decisions on both the content and format of the learning resources.

At the planning stage of the WP4 materials development cycles, persona insights were used to map learning needs to specific material types and formats (e.g., online courses, games, case studies). Personas representing beginner learners (Level 1) encouraged the development of introductory, plain-language resources such as the *Digital Energy Essentials* suite, while more advanced personas (Level 2) informed the inclusion of technical and policy-oriented materials for professionals, SMEs, and municipalities. The envisioned Level 3 personas, co-created using GenAI, also guided early experimentation with more expert-facing resources, providing insight into how future iterations of Every1 or similar initiatives might reach specialised audiences.

The persona profiles also supported the application of Universal Design for Learning (UDL) principles throughout WP4. For example, UDL emphasises designing learning experiences that recognise and respond to learner diversity from the outset, rather than retrofitting inclusion later in the process. The persona work operationalised these principles by grounding them in concrete, research-informed representations of learners' lived realities across Europe's energy transition landscape.

In practical terms, personas provided a bridge between the co-creation work of WP3 and the agile, iterative production approach of WP4. They offered a common frame of reference for consortium partners involved in content creation, testing, and refinement, helping to align the pedagogical tone, inclusivity measures, and thematic priorities across all 80+ online and offline materials. For instance, the personas' documented barriers - such as limited time, varying technical familiarity, or differing motivational drivers - were used to tailor the progressive learning structure (introductory through advanced) and the tone of voice (friendly, inclusive, and accessible) applied consistently throughout the materials.

Ultimately, the learner personas ensured that Every1's capacity-building outputs were not only evidence-based but also relatable, representative, and responsive to Europe's diverse energy transition audiences. By integrating these personas into all stages of learning material development - from planning and authoring to user testing and translation - the project demonstrated how data-informed empathy and structured co-creation can make large-scale educational design both human-centred and scalable.

5. Constraints and drivers

The user experience experts developing the pathways tool provided strong guidance on the balance between providing complex highly flexible pathways that placed a large burden on users, with carefully considered curated pathways that did not overwhelm the user. This was a perceived constraint, based on experience, on how much effort and personal data individual users might be willing to provide before gaining any benefit from the learning materials.

A further constraint within the pathways tool and the website as a whole, was our use of terminology in these public facing environments. Throughout the project we have used specialist educational terms and terminology that would be familiar with those deeply involved in designing curriculum and the energy transition. Using any of these terms

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unnecessarily would tend to alienate those we wanted to support as these groups would be unfamiliar with them. Our solution was to adopt terminology familiar with those we designed the website for.

Another constraint that became apparent is that the Every1 consortium has no control over the ongoing availability of materials produced by others. Several of these disappeared from the internet during the project. Sometimes they become 'archived' and unavailable to the public. This has the potential to undermine pathways we recommend through the Every1 website. Therefore, we only include items within learning paths on the website we are confident will remain available.

There are several drivers to list here. The outputs from the first two work packages provided a strong basis for the development of learning pathways. WP1 provided an initial list of stakeholders that was further developed within this work package. The combined outputs from both work packages enabled the development of the list of topics that needed to be included within the learning environment.

In addition to requiring the definition of topics and the identification of the learning needs of stakeholders for defining pathways, these were also driven by the need to support the creation of the Every1 materials.

Committed ecosystems increasingly became strong drivers through co-creation. The demands on the people involved needed to be carefully managed, with strong coordination to ensure other needs, e.g. the review of Every1 learning materials could all be met without overload, i.e. kept within the constraint of the available resource of the committed ecosystems.

6. Pathways development

As already indicated, the interconnectedness of both the tasks within this work package and the other work packages within the project required careful coordination of work and sharing of information, with many ad hoc discussions between partners in addition to the regular project meetings. The strong sense of cooperation that exists within the project enables this. In this section we describe how we determined the learning paths.

Developing pathways involved bringing several different activities together. We use Figure 6 to illustrate how this was achieved and the centrality of learning outcomes. Full details around the creation of personas and knowledge gaps are provided in reports D3.1 Scientific paper on stakeholders and knowledge gaps and D3.2 Structured overview with assessment of existing capacity building materials. In this report we include the level of detail needed to demonstrate how these support the development of pathways.

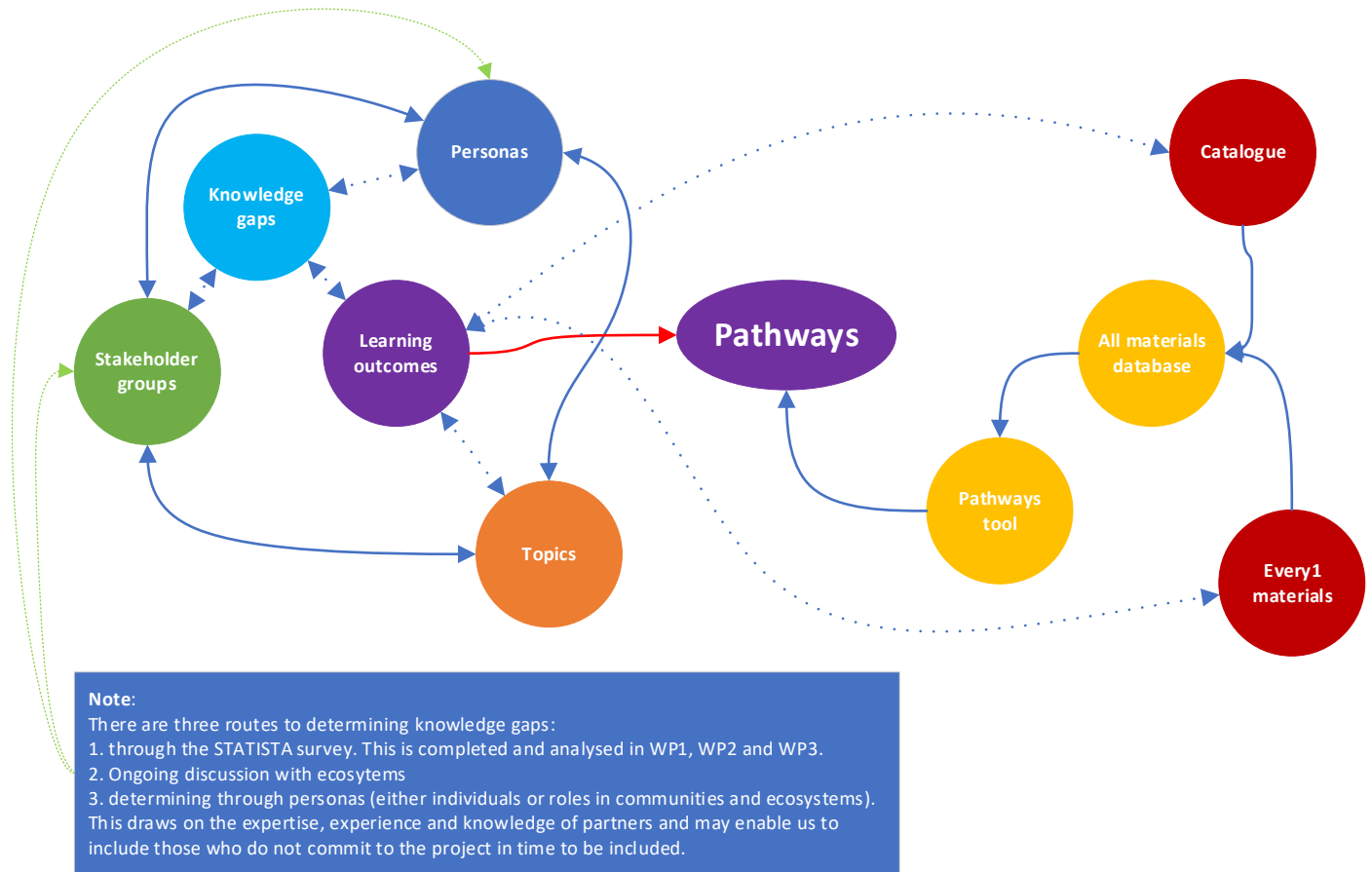


Figure 6, The relationship between project elements and the development of pathways. The text box explains how co-creation, and the initial STATISTA survey contribute.

Through this section we detail the important steps we took in creating pathways.

6.1. Stakeholders

Establishing a full list of potential stakeholders was the first priority. Bringing together a list of stakeholders extracted from the WP1 reports which were then grouped to indicate potential relationships between them. These are the groups identified as being engaged within the digitalisation of energy in Europe and therefore, those we should consider as potential learners. The final version of this list is included here as Figure 7.

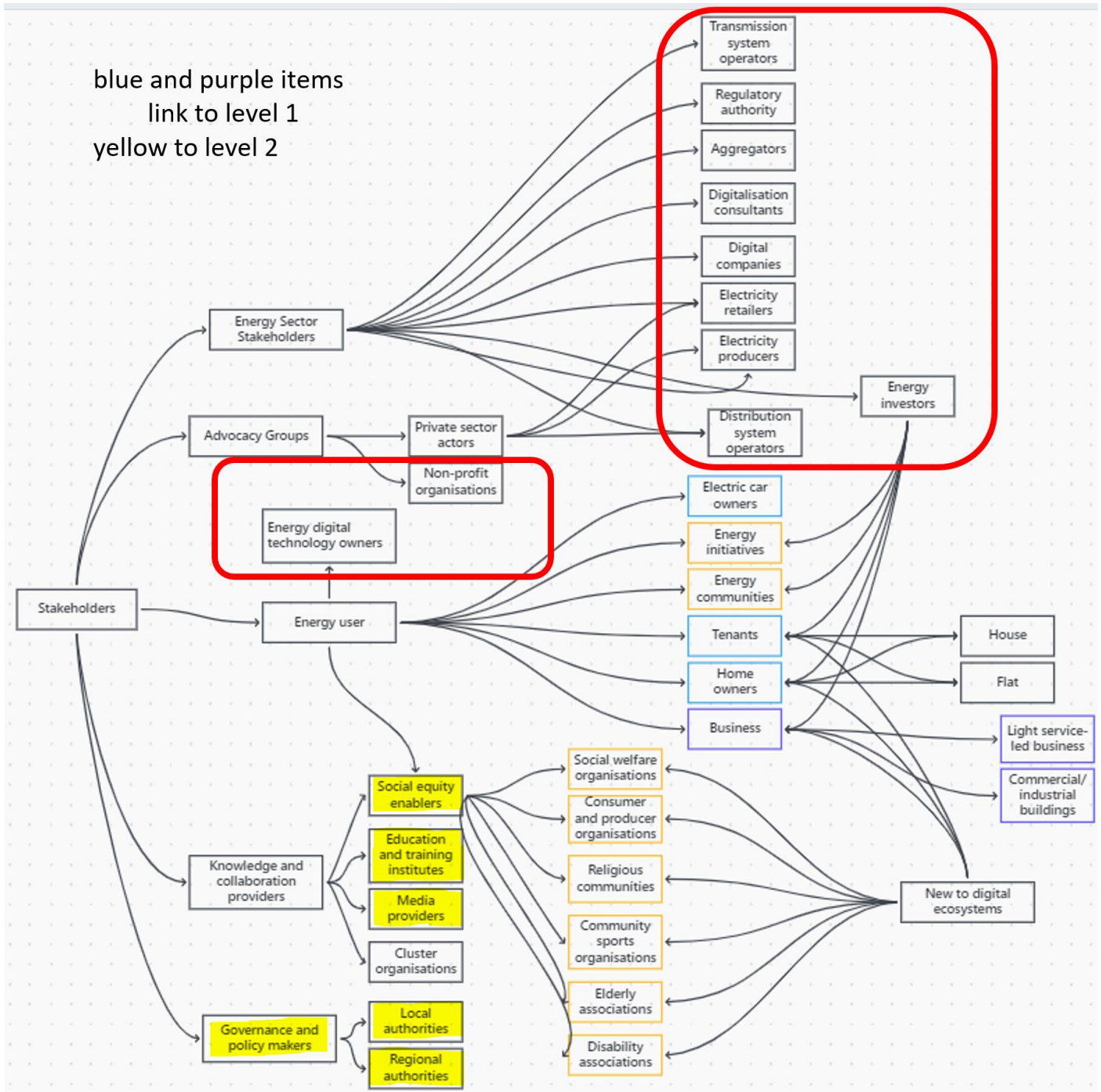


Figure 7, An organised list of stakeholders and the relationships between them and learning levels. Blue and purple items are linked to Level 1, yellow ones to Level2, and the remainder in red to Level 3.

The way in which we made this initial allocation of stakeholder groups to learning levels was straightforward and stemmed from the original decision to consider those most likely to miss out on the digital energy transition. These are our Level 1 learners: individuals who are responsible for using energy but know little about the subject or the choices they have. They may even run their own business but have little knowledge around energy digitalisation. Within this collection of Level 1 stakeholder groups are those who will not manage, for a range of reasons, to find and learn what they need to know without the assistance of others. We suggest that this Level 1 sub-group will be aided in the transition through the support of a variety of groups, some of which will themselves be new to the subject. This

Level 2 group will be looking for learning paths to both meet their needs but also the people they are set up to support. Finally, our Level 3 learners, marked in red, are those within the energy industry. These will have their own in-house expertise on all required aspects of the digital energy transition.

This categorisation of levels diverges from our original conception of learning levels being linked just to levels of difficulty as they would in any academic subject. They now also relate to what we might call circles of influence. The smallest circle being the individual, the next circle are those organisations that influence groups of individuals. The outer circle is for those that influence very much larger groups of individuals and organisations. This divergence with normal academic thinking makes sense when considering the practicalities of ensuring a whole population is supported through the digital energy transition.

6.2. Developing learning outcomes

Learning outcomes were developed from our understanding of learners' needs, primarily expressed through the personas we created and then refined through co-creation activities, and through the experience of reviewing learning materials. Considering and creating personas to cover the range of learners within each stakeholder group was a vital step in creating learning outcomes.

6.2.1. Level 1 learning outcomes

We will retain 'Level 1' as a descriptor for the remainder of this report but now consider it more as the first circle of influence; likewise for Levels 2 and 3.

Through describing the knowledge gaps of each Level 1 persona, their learning needs could be written and then rewritten as learning outcomes. The Level 1 list initially contained 21 learning outcomes. This was later carefully reduced to 13 following the materials mapping exercise and described in more detail in D3.2 Structured overview with assessment of existing capacity building materials. Table 2 below shows both the original and revised lists and the links to topics.

The wider context is provided by the Level 1 educational aim,

'To enable citizens and particularly those with low levels of computer literacy and energy literacy to engage with the digitalisation of the electricity supply within the European context.'

**Table 2, Level 1 topics and learning outcomes, both original and revised.
Black items are unchanged. Blue items are combined, and green items reworded.**

Group	no.	current	proposed
Energy usage	LO1	Understand your personal energy consumption patterns, including peak usage times and major uses	Understand your personal energy consumption patterns and how simple behavioural changes and energy-efficient practices might reduce consumption using the ideas of peak usage times and your major uses.
	LO2	Identify opportunities for reducing energy consumption through simple behavioural changes and energy-efficient practices	
	LO3	Understand the basic concept of dynamic pricing and demand response in energy markets	Understand the basic concept of dynamic pricing and demand response in energy markets
Energy efficiency	LO4	Evaluate in broad terms different energy-efficient appliances and systems	Evaluate in broad terms different energy-efficient appliances and systems and make informed decisions when purchasing or upgrading equipment, considering both cost and energy efficiency, based on your needs and potential savings.
	LO5	Make informed decisions when purchasing or upgrading equipment, considering both cost and energy efficiency, based on your needs and potential savings.	
	LO6	Understand how smart home features and automation can help you manage energy use effectively.	Understand how smart home features and automation can help you manage energy use effectively.
Mobility	LO7	Understand the environmental impact of different transportation options	Understand the environmental impact of different transportation options and the benefits of sustainable mobility choices, in particular electric vehicles.
	LO8	Explore sustainable mobility choices like electric vehicles	
	LO9	Identify charging infrastructure options and potential benefits of owning an electric vehicle.	Identify charging infrastructure options
Energy sources	LO10	Compare different energy sources (e.g., solar, gas) based on sustainability, cost, and reliability?	Understand the main differences between energy sources in terms of sustainability, cost, reliability, and limitations, and which sources are potentially available for your home.
	LO11	Consider exploring renewable energy options like solar power for your home (if applicable).	
	LO12	Understand the limitations of renewable energy sources	
Smart meters	LO13	Interpret data provided by smart meters to understand your energy use in real-time.	Interpret the reading on your smart meter to understand your energy use in real-time and gain insights from this on how you can adjust your behaviour to reduce consumption
	LO14	Identify opportunities to adjust your behaviour based on insights from smart meter data.	
	LO15	Participate in demand response programmes or other initiatives leveraging smart meter data.	Participate in demand response programmes or other initiatives leveraging smart meter data.
Security and privacy	LO16	Understand measures and policies taken to protect your energy data and ensure privacy.	You will be able to make informed decisions about sharing your energy use data with service providers in the knowledge there are policies to ensure these are protected and remain private
	LO17	Make informed choices about sharing data with energy providers or other actors.	
Environmental sustainability	LO18	Understand the role of individual choices in contributing to a cleaner energy future	You know how to engage in mindful energy consumption, understanding that your energy choices can contribute to a cleaner energy future with a lower environmental footprint
	LO19	Take action to reduce your environmental footprint through mindful energy consumption	
	LO20	Identify potential drawbacks of energy digitalisation	Identify potential drawbacks of energy digitalisation
Energy policies and regulations	LO21	Be aware of energy policies and EU legislations relevant to circumstances	Be aware of energy policies and EU legislations relevant to circumstances

6.2.2. Level 2 learning outcomes

Following the same process as used for Level 1 learning outcomes, partners created a comprehensive set of personas which were then used to identify knowledge gaps which were translated into 15 learning outcomes listed in Table 3. We again note that we are now considering Level 2 as the second circle of influence.

The Level 2 educational aim is:

‘These learning outcomes relate to pathways that will better prepare those working within the energy digitalisation sector to support individuals and groups through the energy transition, including those who might otherwise be left behind.’

Table 3, The original list of 15 Level 2 learning outcomes

Initial	Learning outcome and group	abbreviation
	Best practices	
1	Develop knowledge of project management to effectively manage energy projects, including budgeting, scheduling, and stakeholder communication.	Project management
2	Produce educational content and media campaigns that demystify complex energy concepts and showcase successful energy community projects	Creating educational content and media campaigns
3	Identify strategies for active participation and dialogue among audiences by creating opportunities for meaningful interaction and exchange of ideas on energy-related topics	Facilitating meaningful dialogue and interaction
4	Coordinate regional initiatives and partnerships to scale up community-led energy transition projects and best practices across regions	Regional initiatives coordination
	Best practices/Energy stakeholders and market dynamics	
5	Identify effective strategies for fostering collaboration and participatory decision-making skills among stakeholders through multi-stakeholder dialogues and engagement processes	Collaboration and participatory decision-making among stakeholders
	Building Energy management system	
6	Provide technical assistance and capacity-building support to help communities understand and navigate the planning, implementation, and evaluation of energy projects	Providing technical assistance and capacity-building support
	Demand-response management	
7	Demonstrate proficiency in energy auditing, including identifying energy efficiency opportunities.	Proficiency in energy auditing
	Enabling technologies	
8	Explore digital platforms and interactive tools for knowledge sharing and peer-to-peer learning	Exploring digital tools for peer learning
	Energy policies and regulations	
9	Identify supportive policy frameworks and funding mechanisms that incentivise collaborative energy planning and investment	Supportive policy frameworks and funding mechanisms
10	Take action to promote regional cooperation and solidarity in advancing the goals of EU energy initiatives	Regional cooperation and EU energy initiatives
	Social and economic sustainability, energy poverty	
11	Understand the principles of energy justice and social inclusion in the context of energy transition initiatives	Energy justice and social inclusion
12	Identify strategies to actively engage and empower underserved communities (e.g., low-income communities) in energy projects	Engaging underserved communities

13	Take action to promote equitable access to renewable energy resources and opportunities within communities	Promoting equitable access to energy resources
Sustainability and Social Responsibility		
14	Make informed choices about integrating energy transition topics into training programmes	Integrating energy transition topics into training programs
15	Demonstrate commitment to inclusive and sustainable energy transition by prioritising community engagement, social equity, and environmental sustainability in policy-making	Inclusive and sustainable energy transition

This list was then reduced through consultation amongst partners to the five learning outcomes listed in Table 4 below. It should be noted that whilst some of these link directly to the topics, some relate to ensuring others learn what they need to about the topics. The most obvious example of this is the new number 2 which is completely focused on these aspects.

Table 4, Final version of Level 2 learning outcomes and their relationship with the original list above

Level 2 learning outcome	From original numbers
1. Coordinate energy digitalisation awareness and implementation projects with communities and groups by effectively handling budgeting, scheduling, stakeholder engagement, regional collaboration, and providing technical support to communities.	1, 4, 5, 6
2. Design and implement educational campaigns, media content, and use digital tools to foster dialogue, peer learning, and engagement on energy-related topics.	2, 3, 8
3. Identify and promote policy frameworks and cooperative mechanisms that support collaborative energy planning, regional cooperation, and sustainable investment.	9, 10
4. Explain relevant aspects of energy auditing and leverage digital platforms and tools to identify and demonstrate energy efficiency opportunities and in ways that support peer learning.	7, 8
5. Promote social equity, energy justice, and inclusive participation by engaging underserved communities, ensuring equitable access to renewable energy, and integrating sustainability into energy transition policies and training programmes.	11, 12, 13, 14, 15

6.2.3. Level three learning outcomes

The development of Level 3 learning outcomes was approached in the same way as Levels 1 and 2. The educational aim was originally defined as ‘To equip experienced professionals in energy digitalisation with the expertise to apply, analyse, and evaluate cutting-edge digital tools and frameworks in the energy sector’. However, as we reviewed the contribution the Every1 project could make to this group, we revised this to:

‘To support those working in organisations delivering the energy transition in developing and delivering communications and learning to those supporting citizens in the transition’.

This fits with the notion of a third circle of influence. In this form, we would not expect to cover all the learning outcomes at this level.

The learning outcomes were defined as:

- 1) **Apply** digital tools to optimise energy management for self-consumption.
- 2) **Analyse** strategies for optimising energy consumption based on dynamic pricing models.
- 3) **Explain** how real-time data and intelligent grid management systems enable the integration of intermittent renewable energy sources into smart grids, using specific examples.
- 4) **Identify** relevant global and regional regulatory frameworks affecting energy digitalisation, including cybersecurity, data privacy, carbon taxes, and renewable energy incentives.
- 5) **Identify** cybersecurity strategies to protect digital energy systems from cyber threats and enhance infrastructure resilience, applying best practices in risk management.
- 6) **Utilise** energy data management and analytics tools to improve efficiency, transparency, and sustainability in decision-making processes.
- 7) **Assess** the financial viability of digital energy projects by calculating ROI, identifying risks, and comparing financial models for various energy digitalisation technologies.
- 8) **Develop** change management strategies to foster an innovation culture and support organizational adaptation to digitalisation.

6.2.4. Mapping the catalogue of learning materials against the learning outcomes

Looking back at Figure 7, the dotted link between the *Catalogue of Learning Materials* and *Learning Outcomes* highlights the need to identify which materials best support specific outcomes. This connection is essential for designing meaningful pathways through different collections of resources.

While the complete mapping will be made available via the project’s Zenodo space—which may be useful for some users—we anticipate that most will prefer curated pathways tailored to their needs. Developing these pathways is the central purpose of the project’s Pathways Tool.

Comprehensive details of the mapping exercise are provided in the project’s report: D3.2 Structured Overview with Assessment of Existing Capacity-Building Material

6.2.5. The final educational aims and learning outcomes

The learning design process led us to consider circles of influence in enabling EU citizens to fully participate in the energy transition rather than levels of achievement in understanding the topics. We would now redraw the diagram

in Figure 2 to reflect this as shown in Figure 8 below. An important feature of this diagram is that the citizen is kept at the centre.

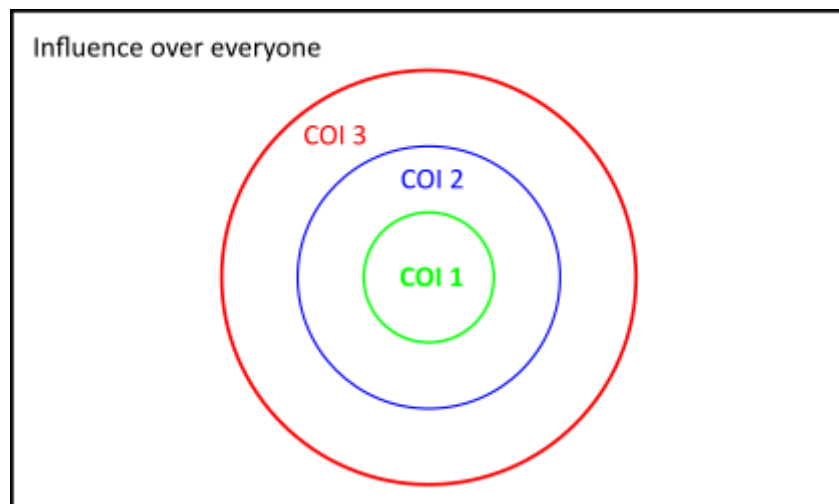


Figure 8, Venn diagram showing three circles of influence (COI): a reworking of Figure 2. The first circle of influence is the individual citizen (COI1). The second circle of influence contains the groups and organisations that directly support the individual (COI2). The third circle of influence contains the organisations leading the energy transition (COI3). Note that the citizen is at the centre of all of these.

7. Conceptualising pathways

The consortium's very first discussions around pathways considered the need to offer individuals the choice from more than one options of a learning experience taking them from one place to another in their knowledge and understanding of what they need to know to participate in the energy transition within the EU. Figure 9 below shows how we might make similar choices when embarking on a journey. In this example, there are three completely different journey experiences that have the same start and end points. Some travellers may opt for the cultural route; others may opt for speed; and some travellers may choose to take in the scenic route. We can translate these ideas into notions of learning journeys through our ideas of learners identifying where they are starting from in terms of knowledge and understanding, learning outcomes defining the end point to any journey, study time can vary according to study path, and the learning experience can be very different when learning from different kinds of material e.g. slides, technical document, or video.

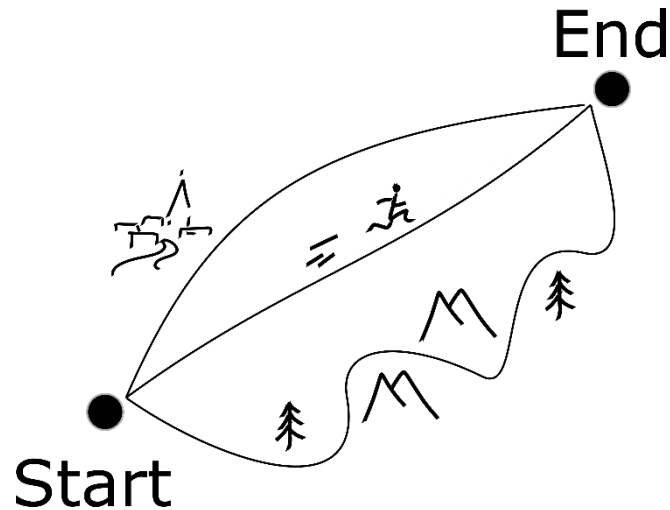
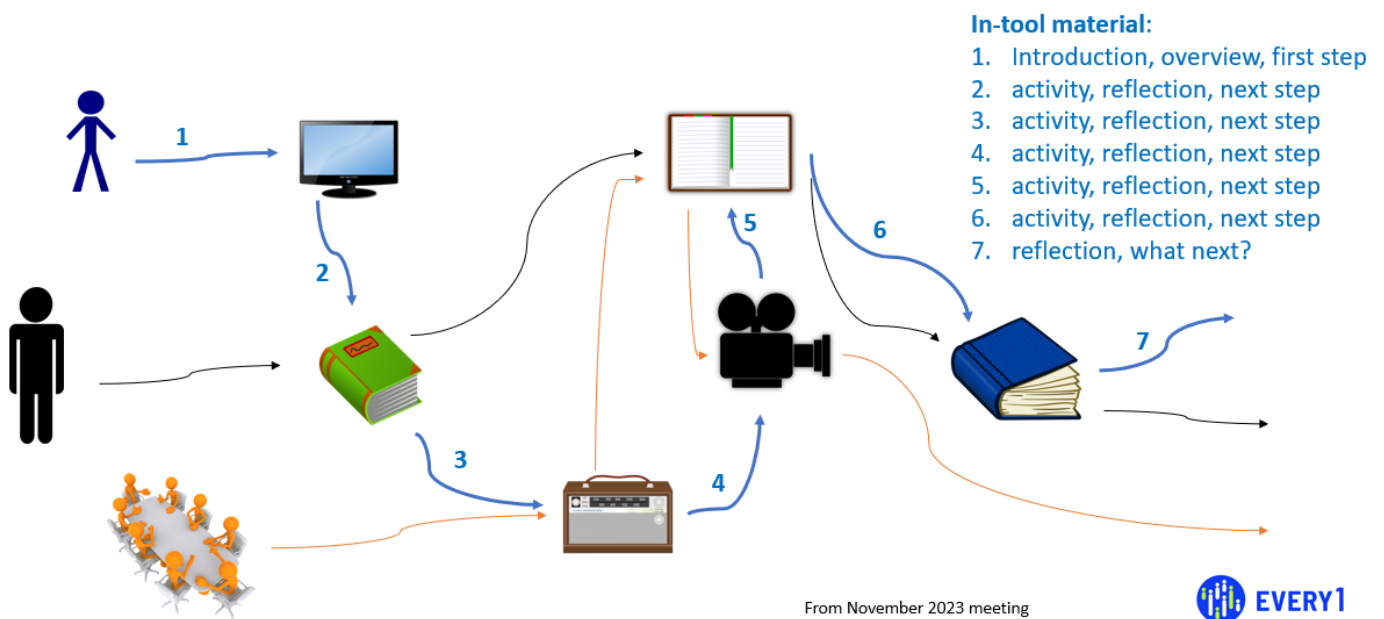


Figure 9, Example of choices that lead to a different journey experiences between the same two points. In this case the choices are: cultural, fastest route, scenic.

When, as a consortium, we considered this in greater detail, we used the following diagram, Figure 10, that has icons representing different types of media within our catalogue of learning materials with each item shown contributing to one or more learning outcomes and also potentially being involved in more than one learning pathway. The icons of people represent different learners and groups of learners. When viewed in this way, the potential for immense complexity becomes apparent as does the need to manage this.



From November 2023 meeting

Figure 10, Schematic for how learning materials could be connected into learning paths for different learners

We have now described how we obtained all the key elements required to contribute to pathways, except for one. This outstanding element is the mapping between learning outcomes and learning materials. This is described in detail in D3.2 Structured overview with assessment of existing capacity building materials and we therefore only include a brief summary of the approach here.

7.1. Mapping between learning outcomes and learning materials

This exercise involved partners looking through each learning material and making a judgement as to whether the material supports learners in developing each learning outcome. We considered the possibilities that a particular learning material might:

- not at all support the learner in developing the learning outcome
- contribute to the learner developing the learning outcome
- be sufficient for learner to completely develop the learning outcome
- be not only sufficient but go further in supporting the development of the learning outcome

Once this had been completed for each level, we then needed to work through the results to consider what learning pathways might exist.

The mapping exercise was readily achieved for Levels 1 and 2, where several pathways were identified. However, for Level 3 we found insufficient coverage within the available materials to support the full set of intended learning outcomes. On reflection, this was unsurprising: Level 3 aligns closely with the professional sphere of competencies in areas such as the digitalisation of energy and project management—domains that are typically addressed within business and professional training contexts.

It was therefore reasonable not to develop, for example, dedicated project management pathways, given the abundance of existing provision in this area. Moreover, it would be unrealistic to expect the Every1 Project to take responsibility for advancing participants' project management expertise. Attempting to do so could risk diverting attention and resources away from the project's core mission: creating tailored pathways that directly support capacity-building for the energy transition.

7.2. Example of initial definition of pathways

The Level 1 learning outcomes were the first to be mapped against the items in the catalogue of learning materials, created earlier in our work and reported in D3.3. Whilst we found that many learning materials made a contribution to one learning outcome, very few made a contribution to several. We considered the learning experience on learning paths where people were asked to switch between materials frequently, often completely changing learning platforms and often only working on a small portion of a particular material. It was clear this would not be a great experience and that it was likely to put many off completing their learning. Therefore, we agreed that it would be a positive step to offer learners carefully considered and constructed learning paths within the Every1 website whilst making the full dataset available on Zenodo for everyone to use should they wish to completely configure their own learning path.

Ultimately, the best balance between complexity of path and learning experience at Level 1 suggested to the project team that three sets of pathways through the level were possible:

1. Based on Every1 produced materials, these are up to date and designed specifically for the project
2. Alternative paths
3. With an energy community focus

The paths through the materials for the first of these groups are shown in Figure 11 below. This sets out several stages based on the choices that could be made. The first stage (row in the diagram) actually contains 4 half hour items: 1003, 1004, 1005, and 1006. These could be studied at different times but for the purposes here, we assume they are all studied together. We have called these the 'core' items but could also have labelled them as 'required'. The second

row shows that learners would have the choice between three different materials. One of these contains two items and has a high expected study time. If we were to retain this study option, we would need to clearly articulate why a learner would choose to spend eight times as much time studying as they needed to on other learning paths. This diagram shows there are 6 different groupings of these materials that would enable learners to achieve the learning outcomes but that there are many more ways of working through them.

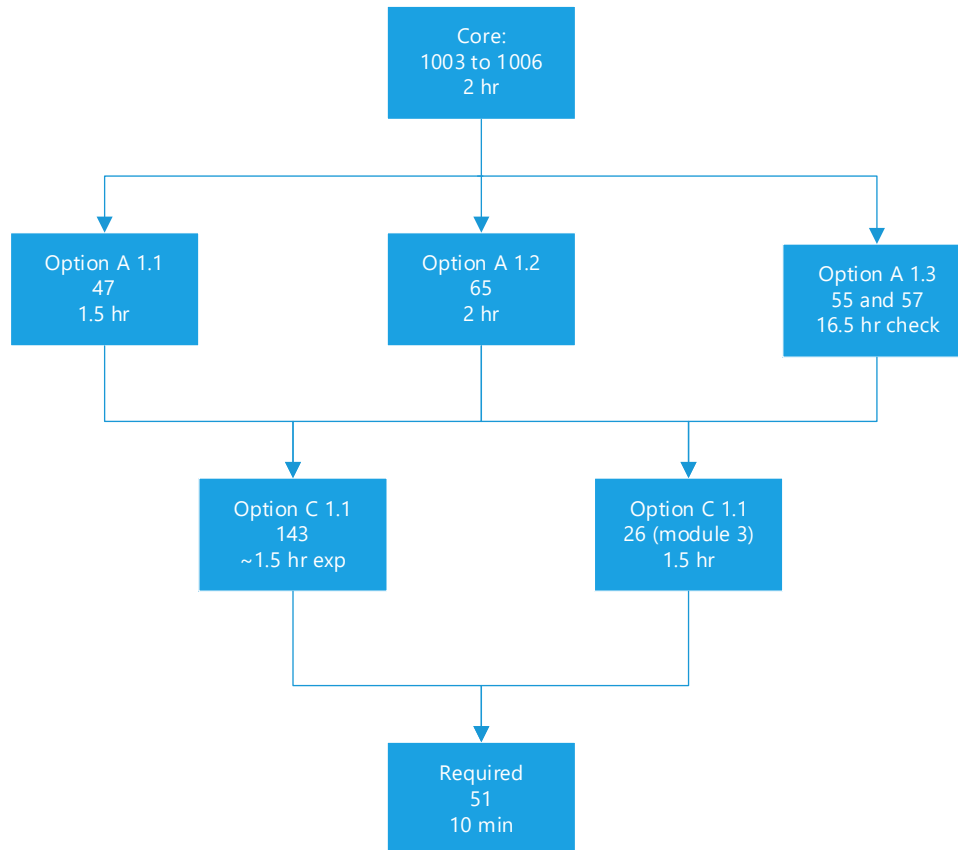


Figure 11, A sequenced arrangement of a group of learning materials from Level 1. These are all from first group of paths above. Each row shows the options within one stage of study. NB, there are 4 different materials in the first row which could be studied separately but we suggest studying together as one.

When we reflect on the number of ways of studying the items shown in Figure 11, we first note that whilst we have set the rows of the diagram out in one order, they could be arranged in different orders. Each location in the figure represents a single learning material, apart from two. Of these two, one contains 4 and the other, 2 learning materials. There are 6 study routes within the figure, each comprising either 7 or 8 learning materials. The number of ways of studying 7 items is 5040 and there are 40320 ways to study 8 items. Therefore, the total number of study paths through the learning items in Figure 11 is 100800. This is important and we will return to this later.

7.3. Level 1 pathways

After deliberation and as more Every1 produced materials had become available, the mappings revealed two distinct and complementary Level 1 paths that would serve these learners well: Beginners, and Building an energy community. The details of each of these paths are below in Table 5 and Table 6. In considering the materials, we determined the order of working through these is not critical but we recommend the order shown. For the beginner’s path, this begins

with Every1's Digital Energy Essentials (DEE) courses which are designed to be complementary but freestanding starting points on each of their themes, followed by the two short videos which build on these, and the three final items will highlight key points that everyone should keep in mind. For the communities building path, the community toolkit is the best place to begin study followed by the final two items.

7.4. Level 2 Pathways

We used the same approach to develop Level 2 pathways, with several pathways identified in a spreadsheet as shown for Level 1. However, when these were checked as this report was being written, it was clear that they were no longer viable. Currently one item remains that was originally identified from the project's catalogue of learning materials. This will be included as a bitesize path. We describe paths later in this report. Since the original review and mapping of materials, work has also been continuing in the development of Every1 materials. Therefore, whilst not in time to be included in this report, work on the Level 2 Pathways continues.

7.5. Level 3 Pathways

As already noted in this report, because this level overlaps with existing frameworks of learning in the professional sphere, we expect to make a small contribution to Level 3 pathways through the Every1 created materials. As these will target some Level 3 learning outcomes, rather than provide coverage of the complete level, they will be included as 'bitesize' learning paths.

7.6. Bitesize learning paths

The introduction of short learning paths that covered a topic or sub-topic within a Level arose out of the ongoing conversations with ecosystems and is one tangible benefit of co-creation. Also, of the iterative nature of the design process. These allow individuals to select specific knowledge that they want to acquire quickly. All of the bitesize paths produced are in response to the needs, both expressed by our partner ecosystems and perceived by the consortium members through this commitment to engage. Typically, these short learning paths consist of one or two carefully curated learning materials.

Two examples of these concise bite sized paths are:

- **Digitalisation and Sustainable Mobility:** This pathway links materials on Electric Vehicles, charging infrastructure, Vehicle-to-Grid (V2G) concepts, and eco-mobility trends. It enables learners to understand how digital technologies optimize electric vehicle adoption, reduce grid strain, and contribute to cleaner transportation systems.
- **The EU Policy Framework for the Digital Energy Transition:** Focused on regulation and market dynamics, this path uses materials like the 'EU Policy Framework for the Digital Energy Transition' to inform learners about key EU legislation, policies, and regulatory mechanisms driving the digital energy shift. It is particularly relevant for local authorities and cluster organisations seeking to understand the legal landscape.

Table 5, Supporting beginners (recommended for everyone unfamiliar with the digitalisation of energy).
 We recommend this order of study. The items in blue were in production at the time the path was constructed. The '2's indicate where the learning outcome is covered.

		Energy usage		Energy efficiency		Mobility		Energy sources	Smart meters	Security /privacy	Environmental sustainability		Energy policies and regulation	
	time (min)	LO01	LO02	LO03	LO04	LO05	LO06	LO07	LO08	LO09	LO10	LO11	LO12	LO13
Energy use (DEE course)	30	1	0	0	0	0	0	1	0	0	0	2	0	0
Smart devices and digital energy technology (DEE course)	30	0	0	0	2	0	0	0	2	0	0	1	0	2
Electricity Markets: Understanding Pricing and Tariffs (DEE course)	30	1	1	0	0	0	0	0	0	2	0	0	0	0
Electricity Markets: Demand Response (DEE course)	30	2	2	0	0	0	0	0	0	1	0	0	0	0
Introduction to the digital energy transition (video)	30	0	1	0	0	0	0	0	0	0	2	0	2	2
Digital Inclusion (video)	30	0	0	0	0	0	0	0	0	0	0	0	3	2
<i>Saving energy and making your business more energy efficient: 10 easy steps for SMEs</i>	90	0	0	2	0	0	0	2	0	2	0	2	0	3
<i>Energy myths busted</i>	90	0	0	0	0	3	3	0	0	0	0	0	0	0
<i>Cybersecurity/Myths Busted</i>	10	0	0	0	0	0	0	0	0	0	2	0	0	0

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Table 6, Building an energy community (for setting up or taking an active role in an energy community).
 We recommend this order of study. The blue items were in production when this pathway was created. The '2's indicate where the learning outcome is covered.

	time (min)	Energy usage		Energy efficiency		Mobility		Energy sources	Smart meters	Security /privacy	Environmental sustainability		Energy policies and regulation
		LO01	LO02	LO03	LO04	LO05	LO06	LO07	LO08	LO09	LO10	LO11	LO12
The Energy Community Tool (COOLkit)	120	2	0	2	2	0	0	2	2	2	2	2	3
<i>10 Easy Steps You Can Take Today! (House, Occupants)</i>	16	0	2	0	0	0	0	1	0	0	0	0	1
<i>Supporting transport decarbonisation in your municipality or local authority</i>	90	0	0	0	0	3	3	0	0	0	0	0	0

8. Conclusion

In designing equitable, flexible learning paths for EU stakeholders in the digital energy transition, the Every1 project created a description of the list of topics that could potentially be covered. From this, a detailed framework of topics was created and used as the basis for creating learning outcomes and educational aims. It was also a resource for the creation of the WP4 Every1 learning materials.

Our original assumption that the learning paths would relate to different levels of knowledge and understanding, like different academic qualifications, proved not to be the best way to organise these pathways. We learned this through the learning design process and consultation with stakeholders. Using an iterative learning design approach enabled this decision to be accommodated. Instead of levels of knowledge, we considered learning pathways would relate to stakeholders within three different circles of influence. In this way the citizen, including those most likely to miss out in the energy transition is kept at the centre of all the learning pathways.

At the start, we also presumed we would develop an interface where individuals create an account and work through a series of questions to create a profile and that this would drive the recommendation of learning paths. However, the development and co-creation process again revealed there was a better way to deliver the choice and flexibility within pathways without building in barriers likely to put off many of those we want to benefit from the project. Therefore, we planned that the Every1 website would offer straightforward access to carefully considered and constructed learning paths that would be readily accessible and meet the needs of the majority of learners. In presenting the full learning materials catalogue and all the learning outcome mapping work useful filters, we fully support complete flexibility for anyone who wants to explore the complete dataset. This decision for the project balanced the tension between the commitment to make learning as accessible as possible and that to provide complete flexibility.

The value of incorporating co-creation in the project is also underlined by the introduction of bitesize pathways that often use just two learning materials to provide learning as needed on several key topics and sub-topics, without covering all the learning outcomes for a circle of influence. This was particularly valuable for the third circle of influence, where attempting to cover all the learning outcomes would have taken us into professional training that is already well served.

The value of incorporating co-creation in the project is further demonstrated through the introduction of bitesize pathways. These often draw on just two learning materials to provide targeted learning on specific topics and sub-topics, without attempting to cover all the learning outcomes within a circle of influence. This approach proved particularly valuable for the third circle of influence, where covering every outcome would have required moving into areas of professional training—such as advanced project management—that are already well served by existing provision.

Building on this, we developed a mixed pathways approach. This offers:

- Curated pathways aligned with the learning outcomes for each circle of influence.
- Bitesize pathways for focused learning on specific items.
- The option to select and work through individual materials, with clear guidance on how each contributes to learning.
- A filtering function that enables users to create bespoke learning paths tailored to their needs on the full catalogue of learning materials.

This project has received funding from the European Union's Horizon Programme for Research and Innovation (2021-2027) under grant agreement No XXXX. The sole responsibility for the content of this document lies with the EVERY1 project and does not necessarily reflect the opinion of the European Union.

To maximise accessibility, these pathways are made available to all users without requiring sign-up or personal data, removing a barrier that might otherwise deter those who could benefit most.

As the project concludes, and the creation of all Every1 materials completed, the final versions of learning pathways will be incorporated into the website in line with the guidelines established through this work.

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