A holistic and Scalable Solution for research, innovation and Education in Energy Transition

D5.5 ASSET Exploitation and Sustainability plans

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Executive Summary

The European energy strategy and its latest key targets for 2030 focus on sustainability and energy efficiency. Reducing CO2 emissions has become the highest environmental priority and in fact, is a cooperative work that involves all social agents.

Most of us want to reduce our carbon footprint, but sometimes we ask, how? In that regard, the European Union strategy focuses on "turning climate and environmental challenges into opportunities and making the transition just and inclusive for all"[1].

Sustainability and energy efficiency are the highest environmental priorities, at least with a medium-term horizon. We are now aware that a low-carbon and green future will be achieved with the involvement and cooperation of all societal actors. And for sure this can be possible through adequate training in energy-related topics. To contribute to the achievement of this fundamental objective ASSET project has created the energy transition academy; this represents an effective tool providing the knowledge, skills and competences needed to implement the clean energy transition and place a greener future for all of us.

ASSET has created the **energy transition academy** leveraging on two platforms: EMMA and (recently) on PANTERA-EIRIE. ASSET involves a learning community and offers a European ecosystem with educational services in energy transition, providing on top of this, flexible and on-demand services tailored to different people. ASSET offers an ecosystem full of educational services, which include: MOOCs, learning courses and unique energy transition educational content for different stakeholders. The educational innovative programmes will be available over time serving a wide community interested in energy-related topics.

The present document deals with the ASSET project exploitation and sustainability plan. It is the result of the work done by ASSET project partners in the context of WP5 "Dissemination, communication and sustainability" during M1-M24 (April 2019-April 2021). This deliverable is a final report delivered in M24 (April 2021). The document includes information and agreements of the consortium partners on:

(i) The market overview, ASSET offering, and its value proposition,
(ii) Key added value of ASSET project,
(iii) Exploitation approaches,
(iv) Sustainability mechanisms and plans.

The document includes the educational ASSET offering, the educational services offered and available to users, the business model, the SWOT analysis, the mechanisms we have used to create a community, and the exploitation plans of each partner. The document provides an overview of the different ASSET's components as well as how the services are placed on the EMMA Platform.

The report presents the ASSET offering and its available MOOCs, all actions done for the ASSET community, cooperation, and future plans. In addition, it presents the exploitation plans, routes for commercialization, and sustainability mechanisms in a complex Covid-19 context, and how we propose to continue beyond the project lifetime. We hope you enjoy the document as much as we have enjoyed the ASSET journey for the past two years.

[1] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

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List of Acronyms

Abbreviation / acronym	Description
AI	Artificial Intelligence
AR	Augmented Reality
ARI	Atos Research & Innovation
BM	Business model
CAGR	Compound annual growth rate
CROM	Center for research on Microgrids
CDDL	Common Development and Distribution License
D	Deliverable
DoA	Description of Action
EC	European Commission
EU	European Union
EMMA	European Multiple MOOC Aggregator
CFP	Centre for Permanent Learning / Centro de Formación Permanente UPV
HE	Higher education
H2020	Horizon 2020
MOOC	Massive Open Online Course
RIE	Research, Innovation and Education
KSC	Knowledge Skills and Competencies
IAM	Identity and access management
IATA	International Air Transport Association
IoT	Internet of Things
IPR	Intellectual Property Rights
JRC	Joint Research Centre
KPIs	Key Performance Indicators
OER	Open Educational Resource
LMS	learning management systems
LS	Logical Soft
MR	Mixed Reality

Abbreviation / acronym	Description
MoU	Memorandum of Understanding
PANTERA	PAN European Technology Energy Research Approach
PBL	problem-based learning
NGO	Non-governmental organisations
R&D	Research & Development
SMB	Small and midsize business
TRL	Technological Readiness Level
UPV	Universitat Politecnica de Valencia
WHO	World Health Organization
WG	Working Groups
WOMM	Word-of-mouth marketing
WP	Work Package
VR	Virtual Reality

1. Introduction

The ASSET work package 5 (WP5): "Dissemination, Communication & Sustainability" organized, besides the dissemination activities, information on the business, individual, and combined exploitation plans.

This deliverable is the final version of the exploitation and sustainability plans and includes:

- the market overview of educational online platforms,
- the ASSET offering and value proposition, the list of assets and technical innovation/value-added,
- the exploitation assets,
- the sustainability strategy,
- and the final exploitation plans of all partners.

The process of shaping this deliverable was based on a combination of standard business strategy tools, such as business model canvas, value proposition, and in-presence or online exploitation workshops. The materials presented in this document were elaborated on with the active participation and contribution of all partners.

1.1 Purpose and scope

The purpose of the document is to provide an overview of the ASSET ecosystem and offering, the exploitation plans, and how consortium members compromise to make the ASSET ecosystem and offering sustainable over time.

It reports all our activities to ensure ASSET sustainability after the project lifetime. At the same time, we have succeeded in creating the ASSET community, which enriches the sustainability path towards having a stable ecosystem. The document addresses not only the current needs but also the foreseen situation given the online platforms needed in the academic scenario (considering the post-Covid-19 era).

Also, this deliverable reports on some collaboration activities, but it does not address dissemination activities, which are reported in another document (D5.4 "ASSET Dissemination and communication activities report", also delivered at M24).

1.2 Structure of the deliverable

The content of this deliverable is structured in nine sections as follows:

- Section 1: Introduction,
- Section 2: Market overview (revising online educational trends),
- Section 3: ASSET offering,
- Section 4: ASSET business strategy, including services and assets,
- Section 5: Sustainability strategy,
- Section 6: ASSET community,
- Section 7: Conclusion,
- Section 8: References,
- Annexes.

1.3 Relation to other work packages and tasks

The WP5 "Dissemination, Communication & Sustainability" is **related to the WP4 "Programs delivery and piloting"** because it deals with the ASSET offering and content delivery (the courses and content as such.) Therefore, all the activities presented in this document were enriched and of course aligned with WP4 outcomes (and more concretely with D4.4 and D4.5).

During the project lifetime, there has been coordination among the partners leading the sustainability-related tasks in WP4 and WP5 (AAU and Atos respectively) to align activities and to monitor especially the outcomes of all the questionnaires, for example, to understand academic and industrial needs. The present deliverable has different inputs and is aligned with the report "D4.4: Evaluation of ASSET educational proposition - v1" delivered at M18 by AAU and with "D4.5 Evaluation of ASSET educational proposition – final", delivered at the same time of this document (M24) by AAU.

1.4 Methodology

During the ASSET project execution (M1-M24, April 2019- April 2021), the exploitation team in WP5 led by Atos has followed an Atos Innovation hub methodology that we have used in different projects intending to understand the needs and define the project value and its sustainability options. This proven methodology has been acquired through many years of experience in EU projects and has demonstrated good results in terms of impact performance and business development.

As shown in the figure below, the Innovation hub methodology is split into two main phases: the initial one is an "analytical" phase (M1-M12) and the second one is a "strategic" phase (M13-M24), which is composed of actions towards the creation of a sustainability plan.

The following figure shows the overview of the Atos Innovation hub methodology adapted to the ASSET project.

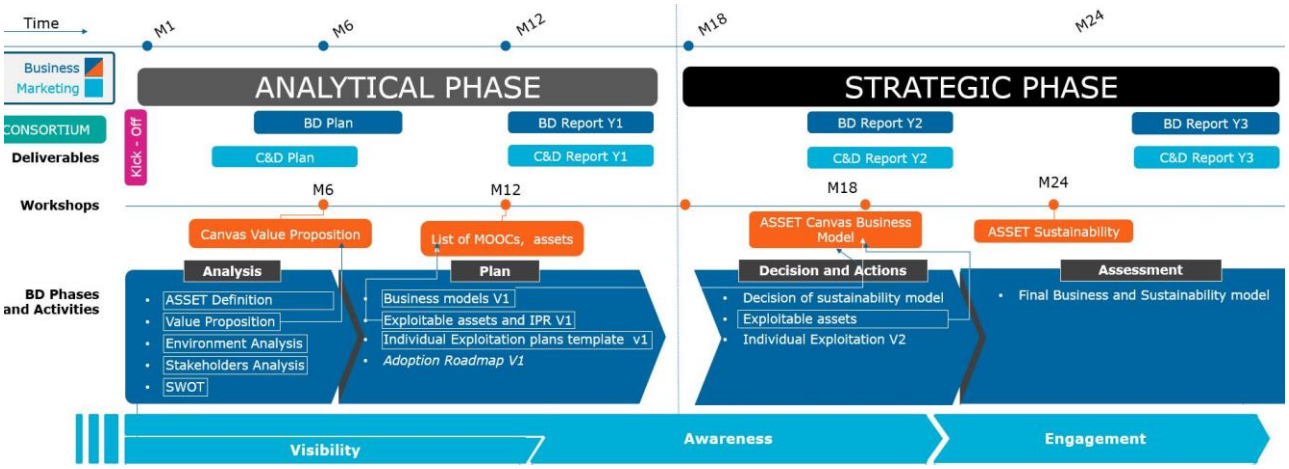

Figure 1: Overview - Atos Innovation and exploitation methodology for ASSET

In the next figures, we "zoom" the images with the different phases and provide an overview of the activities that we have carried out. As said, we split the work into two mains phases: Analytical and Strategic phases, which are presented more in detail below.

Analytical phase

The first phase is called the **Analytical phase**, and as its name indicates the focus is on more analytic work that was carried out during the **first half of ASSET implementation** (M1-M12) (April 2019 – April 2020). During that phase, we defined the sustainability plan, analysed the educational market trends, identified **the competitors and stakeholders, and defined the ASSET value.**

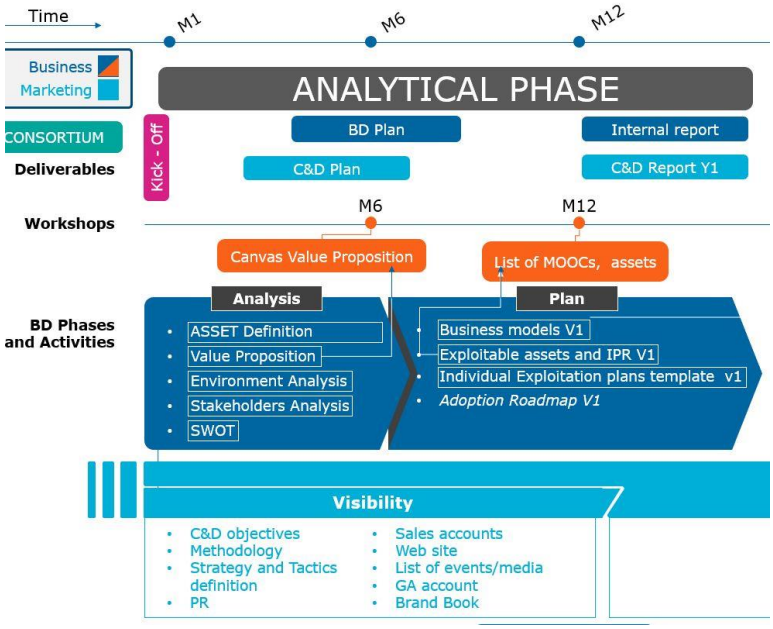

Figure 2. Overview - Atos Innovation and exploitation methodology: ASSET Analytical phase

The proposition of the project (and later for different stakeholders such as researchers, cooperatives, policy makers, NGOs, students, etc.)**, gathered the initial list of exploitable assets, depicted initial business models and IPR management of MOOCs, learning graph tools, etc.** Then, through different in-presence workshops and iterations with the partners, we elaborated the preliminary ideas on the sustainability models.

Strategic phase

In the second period of the ASSET project implementation, we focused on the **Strategic phase**, which lasted from M13-M24 (May 2020 - April 2021) and we performed the second round of activities, with the maturation of the previously mentioned elements.

The exploitation team worked on reviewing the initial plan and **put in place all actions to define the ASSET sustainability strategy.**

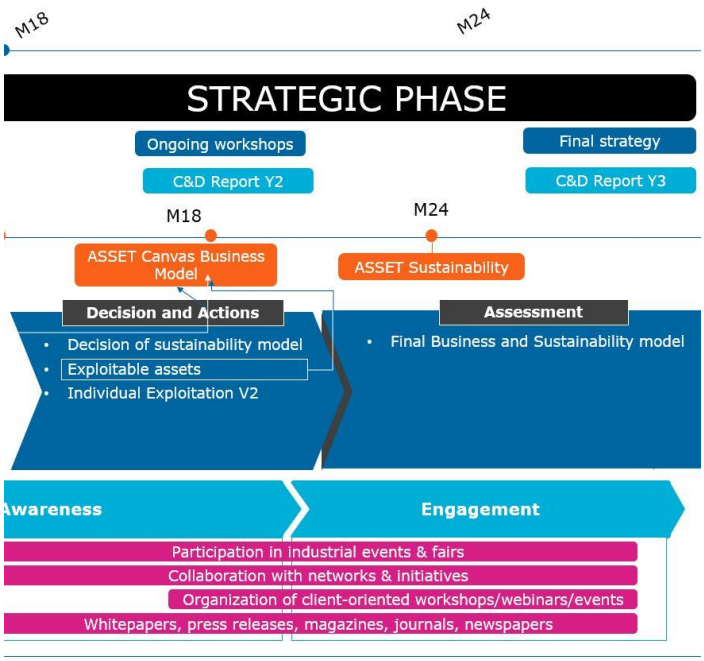

Figure 3. Atos Innovation and exploitation methodology: ASSET Strategic phase

That included the definition of the different business model options and validation of proposed business models, the ASSET added value vs. competitors, SWOT analysis, IPR management strategy, energy transition academy final offering, final value proposition per stakeholders, the sustainability plans, and the discussion and agreement for the signature of a Memorandum of Understanding (MoU). In this final document, we present the outcomes of our analysis based on this methodology and the followed steps.

2. Market overview

Massive open online courses (MOOCs) are courses with the option of free and open registration in a publicly shared platform with open-ended groups. MOOCs are the final stage in distance education, as they offer public educational resources to students all around the world. They are designed to be scalable to large online masses, with free participation, and without formal requirements, providing the opportunity to learn through hundreds of public and private universities or organizations for millions of individuals around the world.

The Covid-19 pandemic transformed the growth of various industries; numerous industries will show promising growth opportunities. The global massive open online course (MOOC) market was valued at USD 6845.4 million in 2020 and it is expected to reach USD 18925.18 million by 2026, with an estimated Compound Annual Growth Rate (CAGR) of 18.13% during the period from 2021 to 2026[2].

According to another research "Markets and markets[3]", the global MOOC market size is expected to grow from USD 3.9 billion in **2018 to USD 20.8 billion by 2023**, at a CAGR of 40.1% during the forecast period. Also, according to other analysts, the education consulting market size has the potential to grow by USD 287.08 million during 2020-2024, and the market's growth momentum will accelerate during the forecasted period. All these researches reinforce that MOOCs are the new future of learning and will constitute a major share of the education and training industry.

2.1 Energy learning components and learning programs

The global online education market is projected to witness a CAGR of 9.23% during the forecast period to reach a total market size of USD 319 billion in 2025, increasing from USD 187 billion in 2019[4]. Increasing penetration of the internet in many regions across the globe is a major factor driving market growth. The growing adoption of cloud-based solutions coupled with huge investments by major market players towards enhancing the security and reliability of cloud-based education platforms is further increasing its adoption among the end-users. The presence of a large number of service and content providers in the market is bringing huge volumes of educational content online. Declining hosting costs and the growing need for accessing educational content are further fuelling the adoption of this technology, thus augmenting the market growth. Advancements in the field of Artificial Intelligence (AI) and the rapid growth of the Internet of Things (IoT) will continue to enhance the user experience on these online education platforms, which is anticipated to spur market growth throughout the forecast period.

Academic institutions hold a significant market share

Increased effectiveness of animated learning along with flexibility in learning are some other factors contributing to the growth of online education by academic institutions. Lack of competent staff in various schools and colleges across the developing nations is also resulting in the adoption of online education by the students. Support and funds from the governments are other major drivers for the growth of this industry.

By type, the global online education market is segmented as online education by academic institutions and by the corporate sector. With the increasing number of students in academic institutions and the regular need to up skill and provide industry-relevant training to the staff, the academic institutions, as well as corporates, need to come up with the options that allow individuals to learn anytime from anywhere. With the increasing number of students and higher cost-effectiveness of online education, many educational institutes are integrating face-to-face learning with online learning at all levels of

[2] https://www.mordorintelligence.com/industry-reports/massive-open-online-course-mooc-market
[3] https://www.marketsandmarkets.com/Market-Reports/massive-open-online-course-market-237288995.html
[4] https://www.researchandmarkets.com/reports/4986759/global-online-education-market-forecasts-from

education. For instance, Berkeley University of California recently partnered with edX to offer 8 courses online for no cost, which was earlier limited to the few who got admissions in the institute.

Colleges and universities across the globe are frequently providing new MOOCs as well as distance learning courses. An upsurge in tuition fees and high interest in education loans in both developed and developing countries has raised the cost of getting campus education, which is continuously shifting the trend towards online learning solutions, thus, positively impacting the demand for learning management systems (LMS) across this universities and colleges. In July 2017, the George Washington University launched Talent@GW--Learning, a new LMS that allows users to register for in-person training and to access online training and professional development materials such as videos and guides in one place[5].

E-learning programs take priority over traditional learning methods because of their potential to minimize training costs depending on the overall curriculum and factors such as off-shoring, model delivery, and content selection, as well as LMS. The global e-learning market size was USD 171 Billion in 2019 and is expected to grow at a CAGR of 10.85% from 2019 to 2025. In comparison to traditional methods, e-learning often provides additional qualitative advantages in the form of learning anytime anywhere, access to worldwide mentoring tools for optimal skill growth, and administration as well as control of the training calendar from various locations.

This research provides the empirical analysis of the demand outlook for e-learning, along with emerging developments and potential forecasts to assess the imminent pockets of investment. The research will also cover the impact of the Covid-19 pandemic.

2.2 Trends influencing the global e-learning market size

Increased adoption of e-learning in corporate and academic set-ups, constructive government policies to encourage e-learning in emerging markets, advances in technology in smart education & e-learning, increase in the number of mobile learning applications, are some of the major factors that are expected to increase the e-learning market size.

Mobile learning, micro learning, social learning, and corporate MOOCs are the latest trends that raise industry revenues for e-learning. The rising demand from various end-user industries, such as healthcare, to train their employees drives the growth of the e-learning market size.

E-learning is a gamification leveraging technique that easily collates the tracking progress of students and improves their interactions with educators and other students. Besides, gamification is increasing e-learning popularity due to the need for systems such as LMS and analytics. These systems are generally used to understand and upgrade the learning process. This increasing incorporation of gamified learning into the e-learning system is expected to increase the e-learning market size.

Cloud-based e-learning platforms offer significant reductions in costs, allowing users to access information over the Internet, removing the need for heavy software applications to be downloaded. This adoption of the cloud-based model is expected to increase the e-learning market size during the forecast period.

On the global e-learning market[6], the corporate training sector provides an excellent investment opportunity for vendors. Large businesses can be early adopters in mature markets as their training programs and content cover compliance, IT management, and industry-related courses. Most companies concentrate on facilitating collaboration and information transfer between remote teams,

[5] https://www.prnewswire.com/in/news-releases/e-learning-market-size-is-expected-to-grow-at-a-cagr-of-10-85-by-2025-valuates-reports-819658695.html

[6] https://www.gminsights.com/industry-analysis/elearning-market-size

improving functional skills, exchanging cross-domain expertise, and training for entry-level workers and newcomers.

Furthermore, due to the recent outbreak of the Covid-19 pandemic, most of the education programs have been shifted online, and there has been an increase in the number of users who have started to pursue an additional degree to enhance their knowledge. This has, in turn, impacted the e-learning market, and a steep rise is expected.

2.3 Global Market Insights

According to Globalnewswire, the E-learning market size surpassed USD **200 billion in 2019 and is anticipated to grow at over 8% CAGR between 2020 and 2026[7].** The advent of several new technologies, such as cloud computing and AI coupled with increasing internet penetration across the globe will drive market growth. Rapid cloud adoption provides flexibility in content storage, sharing, and access to both learners and content providers.

Virtual classroom to drive market growth in the wake of the novel coronavirus pandemic

The virtual classroom technology in the e-learning market is expected to grow at a CAGR of 11% during the forecast timespan. A virtual classroom is a digital environment that enables live interaction between a tutor and a learner. Video conferencing and the online whiteboard for real-time collaboration are the most common tools used in a digital teaching space. Synchronous and collaborative virtual classes allow active participation of students, creating an environment similar to a physical classroom.

The technique is gaining traction with an increasing number of corporate and academic sectors deploying it for enhanced training sessions. Multilateral organizations and world bodies, such as World Health Organization (WHO) and G20, are also deploying e-learning modes to teach healthcare professionals. The International Air Transport Association (IATA) developed a one-day e-learning course on Contractual Obligations during COVID-19 to provide knowledge about contractual clauses and their interpretation for aviation professionals in the context of the current world economic crisis.

Moreover, the European e-learning market will witness significant growth due to advanced infrastructure in the region. Also, according to Technavio's report[8], Europe is poised to grow by **USD 24 billion during 2020-2024**, at **a CAGR of over 12%** during the forecast period and the market **will have a positive impact due to the spread of Covid-19.** As shown in the figure below:

[7] https://www.globenewswire.com/en/news-release/2021/04/06/2205170/0/en/Growing-at-14-6-CAGR-The-Global-E-learning-Market-Size-Will-Exceed-a-Value-of-374-3-Billion-by-2026.html#:~:text=%5B225%2B%20Pages%20Research%20Report%5D,USD%20374.3%20Billion%20by%202026.

[8] https://www.businesswire.com/news/home/20200819005422/en/COVID-19-Impact-Recovery-Analysis-E-learning-Market-in-Europe-2020-2024-Growing-Emphasis-on-Personalized-Learning-to-boost-the-Market-Growth-Technavio

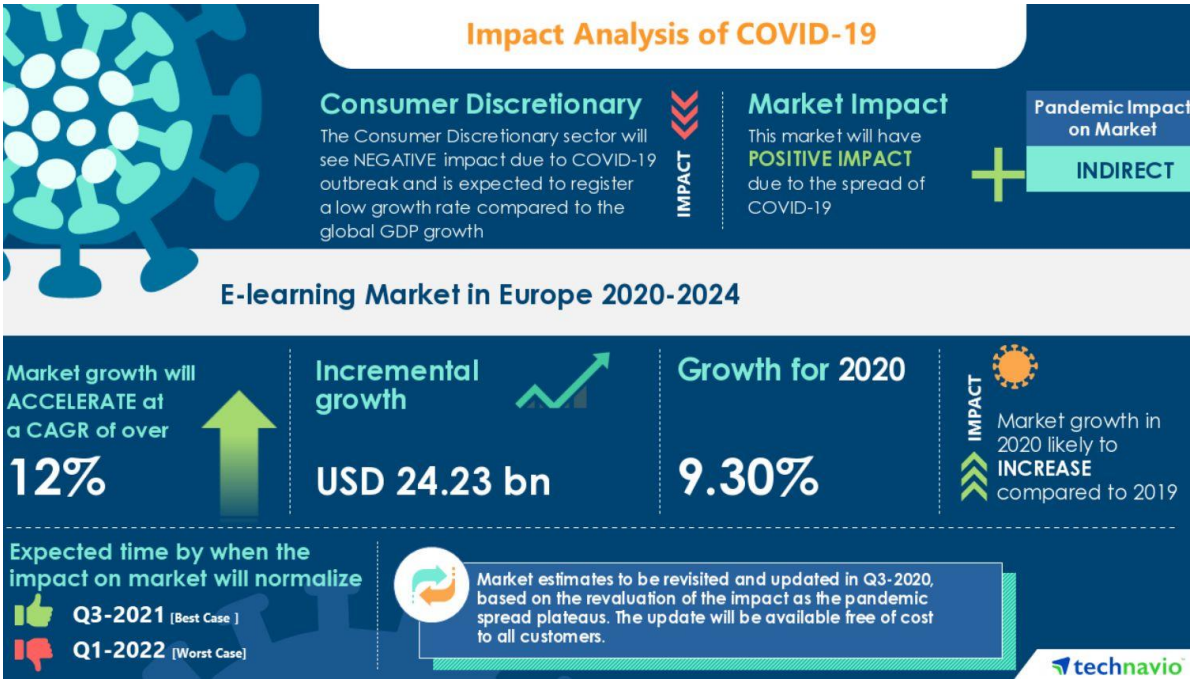

Figure 4. Europe e-learning market increases and Covid-19 spread affect

In 2019, Europe had more than 35% of the market revenue share and will witness a steady growth until 2026 due to developed telecom infrastructure coupled with the adoption of the latest technologies across corporate and education sectors. Strong network connectivity is the primary requirement for an enhanced online learning experience. The deployment of 5G technology will facilitate seamless training and learning in a digital environment for employees and students.

Italy, Spain, and France are amongst the worst-hit markets due to the coronavirus pandemic. Government organizations across these countries are encouraging the use of advanced digital learning techniques to maintain social distancing to curb the virus spread. Corporates operating in the European market are expected to train both new and existing employees using e-learning solutions.

Similar scenarios were observed in other member states targeted by the ASSET consortium. For example, in Greece, according to recent surveys [9] the following conclusions are drawn:

- Internet access in Greek households is universal as 90% have access to the Internet through a fixed telephony connection; however, 78% state that they are internet users.
- Overall, 80% of respondents said they are aware of using electronic internet access devices such as tablets / iPad and PC.
- Almost everyone states to own a mobile phone, with 62% having a smartphone.
- Both the use of the Internet and the use of computers are directly related to the respondent's age and education, while it does not differ in terms of gender and geographical area of permanent residence. At younger generations, internet use penetration is universal while it decreases at older ages, with the largest decrease being observed in people over 65 years and in those between 55-64 years.
- On average, internet users use 2.5 different devices to access them. The most popular means of internet access is the smartphone, followed by the laptop. Tablets show relatively low penetration. While the penetration rate is double-digit, smart TV is also indicated.

In the whole population, the most frequent actions carried out through the Internet are the search for information (49.8%), communication by electronic messages (43.6%), and communication by e-mail (42.3%). In the actions that are considered more advanced, such as the processing of transactions with banks/public, there are ratings both in their realization and their frequency by the whole population.

E-learning is the process of acquiring knowledge through electronic technologies and resources. A rise in the number of internet users has increased the market demand for sophisticated online learning courses. According to the Office for National Statistics, nearly all adults in the age group of 16 to 44 years in the UK were recent internet users (99%) in 2019. The availability of enhanced network connectivity coupled with the convenience offered by on-demand courses will drive the market size.

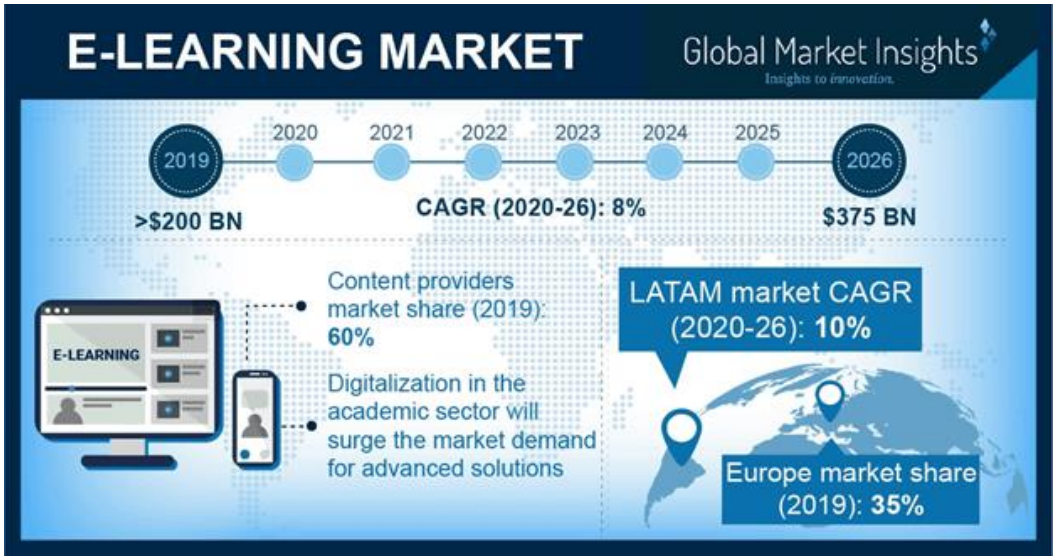

Figure 5. E-learning market trends 2020-2025

Online Education Market will reach US$ 350 Billion by 2025, globally, due to the introduction of flexible learning technologies in the corporate and education sectors[9].

The advanced AI-driven platform is also playing a significant role in the growth of this market globally. Online education provides flexibility for the learner to learn from anywhere, anytime, as most of the online education devices are portable. The corporate learning market is segmented into small and midsize businesses (SMBs) and large institutions. SMBs have limited financial resources, so the online learning method is more cost-effective as it allows multiple employees to be trained in a less cost-intensive way.

The United States is a leader in the global online education market due to the introduction of e-learning courses and distance learning programs. Several educational institutions are focusing on augmented reality-based learning. China is another major market for this marketplace. The Indian online education market has shown remarkable growth in the past couple of years. It is anticipated that this growth will also continue during the forecasting period. India's online market is expected to grow due to cost-effective education, availability of quality education, government's digital initiatives, smartphone user base, and Internet penetration.

2.3.1 Online educational market overview

The online education **market is witnessing an uprise** with the different surveys only differing in the absolute numbers of growth they forecast. Indicative examples include:

- Research and Markets report[10] states that “the global online education market is projected to witness a CAGR of 9.23% during the forecast period to reach a total market size of USD 319.167 billion in 2025”. The growth is attributed to: a) the increasing penetration of the internet in many regions across the globe, b) the growing adoption of cloud-based solutions coupled with

[9]https://www.businesswire.com/news/home/20191218005467/en/350-Billion-Online-Education-Market-Global-Forecast-to-2025-by-End-User-Learning-Mode-Self-Paced-Instructor-Led-Technology-Country-Company---ResearchAndMarkets.co

[10] https://www.researchandmarkets.com/reports/4986759/global-online-education-market-forecasts-from

huge investments by major market players, c) the presence of a large number of service and content providers in the market and d) the advancements in the field of AI and rapid growth of the IoT which contribute in the enhancement of the user experience on these online education platforms.

- According to Fortune Business Insights[11], the global higher education market size is projected to exhibit a CAGR of 10.2% and reach 2.3 billion USD by 2027 attributing the growth to the role of education to economic development and national wealth. One restraining factor considered in this report is the limited funding and the higher tuition fees that may limit the number of enrolments.

Different criteria to distinguish segments of the market can be embraced:

By type, the global online education market is segmented **as online education by academic institutions and by the corporate sector.** With the increasing number of students in academic institutions and the regular need to up skill and provide industry-relevant training to the staff, the academic institutions as well as a corporate need to come up with the options that allow individuals to learn anytime from anywhere, thus securing a life-long up-skilling and re-skilling. With the increasing number of students and the cost-effectiveness of online education, many educational institutes are integrating face-to-face learning with online learning at all levels of education. Colleges and universities across the globe are frequently providing new MOOCs as well as distance learning courses.

By region: the online education market share of each region exhibits strong fluctuation as this is highly driven by the availability of network infrastructures and the economic structure. As such, developing countries show an increasing share in the online education market.

For Europe, another different report from Technavio[12] states that the e-learning market size is expected to grow by UDS 28.36 bn and record a CAGR of 13% during 2020-2024, as shown in the figure below. Graphical research[13] has published the following forecast: Europe's e-learning market growth was estimated to be around USD 75 billion in 2019 and is expected to grow at a CAGR of 8% from 2020 to 2026.

Figure 6. E-learning market 2020-2024

The e-learning market in Europe is highly dependent on cultural factors, smartphone penetration, internet connectivity, and learning methods. Various European countries pose different consumption patterns due to a variety of educational methods. Scandinavian countries spend a lot on the adoption

[11] https://www.fortunebusinessinsights.com/higher-education-market-104503

[12] https://www.technavio.com/report/e-learning-market-size-in-europe-industry-analysis

[13] https://www.graphicalresearch.com/industry-insights/1424/europe-e-learning-market

of online learning courses and are major exporters of e-learning solutions. The industry in the UK accounts for the majority share due to the high emphasis on digitized education methods, presence of major European universities, and strong demand for these solutions from corporate and professionals.

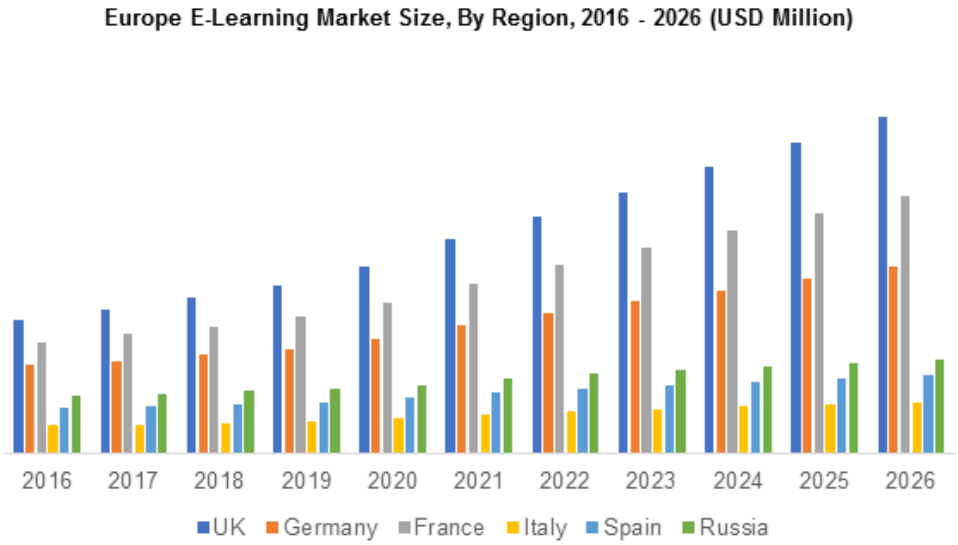

Figure 7. European E-learning market size 2016-2026 projection

2.3.2 Education market trends

Many reports describe the current (post-2020) market trends and provide a list of them. There is also a set of reports providing marketing consulting for educational actors. All reports converge to consider as **top trends: technology (in all its perspective), soft skills, rapid change of the economy/jobs, personalization, growth mindset**.

To obtain a better and more accurate understanding, few reports are referenced in this section. According to EHL[14], the top five trends in education are:

1. **Technological trends in teaching and learning:** By the fall of 2017, there were over 6.5 million students enrolled in some distance learning opportunities at a degree-granting postsecondary institution. The growth of technological capabilities means that a variety of media and learning-support tools now exist to help students receive a high-quality education through the Internet.
2. **Soft skills training:** According to the Future of Jobs report, some of the most important skills in the workplace include critical thinking, problem-solving, people management, and creativity.
3. **Student trend- decreasing attention spans:** As the prevalence of technology has grown, attention spans have also changed for students. A study conducted by Microsoft looked at the attention spans overall between 2000, which was the dawn of the mobile revolution, and 2015. They found that *attention spans decreased by an incredible 4 seconds*-- from 12 seconds to 8. The changes in attention span can also be used as an excellent way to differentiate between the different generations. *Millennials*, for example, who have largely grown up with this technology at their fingertips, have distinct characteristics from *Gen X and Boomers* who came before them. To keep the attention of Millennials, *the content presented to them must have excellent visuals and dialogue along with an interesting storyline that will hold their attention*.
4. **Facilitating learning versus teaching:** With a wealth of information at their fingertips, students today have the tools they need to uncover a tremendous amount of facts and knowledge independently. In this environment, many students value less a top-down delivery method.

[14] https://hospitalityinsights.ehl.edu/2020-education-trends

Instead, teachers now function more in a facilitative role. This can present some *challenges for teachers, who must work on their own soft skills of leadership and problem-solving.* They must learn how to foster conversations and create an environment that values teamwork.

5. **Life-long learning trend:** Each industrial revolution has changed the nature of work and jobs in astounding ways. The current 4th Industrial Revolution may impact an incredible 50% of jobs as tremendous technological progress leads to changes in how people do their jobs. Professionals who want to remain competitive in their environment will need to *constantly re-skill themselves*. This requires institutions to create a self-development mindset in their students as well as their faculty and staff. The schools that learn how to master these skills, however, have the chance to remain connected with their alumni throughout their careers.

According to another report[15] identifying the top four trends for 2020 onwards, these are:

1. (Live) Video
2. Memorable Experiences
3. Personalized Content with effective personalization requiring the most relevant content to a specific member of our target audience
4. Influencer Marketing: it is a form of word-of-mouth marketing (WOMM) but with a bonus for your efforts.

Focusing on the higher education industry (which implements online learning next to face-to-face learning), according to the Deloitte Higher Education leadership team[16], the *higher education industry* should consider the following four areas:

1. Cloud Readiness
2. Strategic Risk Management: Rapid change will introduce new risks as well as changes to existing risks that can lead to crises. Institutions must be prepared to view these crises as normal so that leaders are better equipped to deal with risk-related challenges.
3. Identity and Access Management: Cyber risk management is required to manage access across many devices. Identity and access management (IAM) capabilities have to be enhanced to support the new demands of technology.
4. Mergers and Acquisitions: With growing financial challenges, institutions should consider partnerships, mergers, or consolidations while they are still operational. These options will allow institutions to make it through times of financial uncertainty and obtain solutions that are in the best interest of the students, community, and faculty.

According to Guide to Research[17], the top ten Online Education Trends for 2020/2021 are:

1. **Higher Education Institutions Expand Their Online Learning Programs**: Flexibility and convenience are two of the most important deciding factors students use when choosing between online learning and traditional classroom instruction. In the Online College Students 2019 survey conducted by Learning House, among 1500 registered online students, 63% of respondents said that they enrolled in an online program because it was the best fit for their work and life responsibilities, 34% stated it was their preferred method of learning, and only 3% said it was because they could only find their program online (Bhutani, 2019). The same survey also revealed that 67% of students that enrolled in an online course lived within 50 miles from the college or university where they were studying. This figure increased from 42% five years ago. This is an interesting data point as we can surmise that more local schools are offering online courses that enable students to stay within their communities.
2. **MOOCs Partner with Educational Institutions to Focus on Micro-credentials**: Beyond being a marketplace for free or low-cost online programs that can supplement one's course work in a

[15] https://blog.hubspot.com/marketing/4-education-marketing-trends-to-keep-an-eye-on-in-2017

[16] https://digitalmarketinginstitute.com/blog/what-is-the-global-market-trends-in-higher-education

[17] https://www.guide2research.com/research/online-education-trends

university, MOOCs can also provide more value to the learner through stackable micro-credentials. Udacity has already partnered with AT&T and Google, for instance, to deliver sophisticated nano degree programs. The European MOOC Consortium, on the other hand, works with higher education institutions in developing the Common Microcredential Framework and other innovations in online education in the region. As of 2019, technology and business subjects have the largest chunk of micro-credential offerings at 40.2% and 33.2%, respectively (Shah, 2020). With governments worldwide—from European countries to New Zealand, Australia, and developing economies like Vietnam, the Philippines, and Cambodia (Jackman, 2019; Redmond, 2019; Spencer, 2019)— encouraging the use and availability of micro-credentials, we can expect MOOCs to continue to focus their efforts and resources to meet this demand.

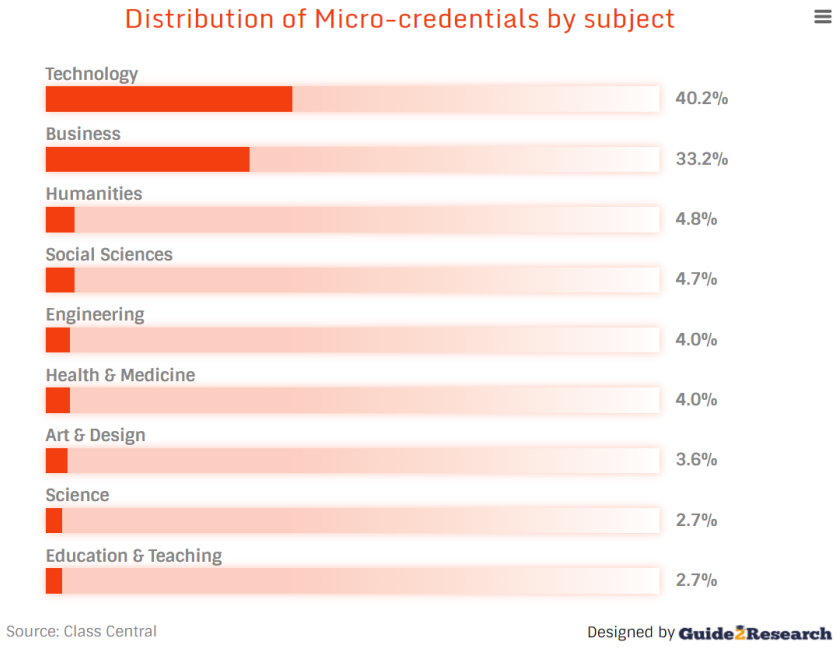

Figure 8. Student type of credentials

3. **Learners Empowered through Mobile Learning and Microlearning**: Modern learners are overwhelmed and distracted, but fortunately, they are also motivated to learn. They adopt a "self-serve" learning approach where they can be empowered to take learning into their own hands (Greany, 2018). Over 60% of learners also prefer personalized, timely content and more than 56% learn on-demand.
4. **AI Provides Personalized Learning Pathways**: AI's practical application has been seen in other industries, like manufacturing and healthcare. In education, its growth is estimated to reach USD 6 billion by 2024 (Bhutani, 2019) with China and the US leading global AI education investments (Lexalytics, 2019).
5. **Learning Analytics Help Enhance Learning Outcomes**: The education industry worldwide is lagging behind other industries when it comes to adopting big data technology with only 17% implementing it in 2019; however, 74% did indicate that they may use it in the future (Statista, 2019). This is where learning analytics comes in. Several colleges and universities have been using learning analytics to understand and optimize learning outcomes.
6. **Video-based Learning Expands to Maximize the Impact of Mobile Learning**: Video is a versatile medium for delivering mobile learning, and learners seem to favour it among other social media platforms. In a study by Pearson**, 67% of millennials, and 82% of GenZ** reported YouTube as their preferred learning platform (Pearson, 2018).
7. **5G Stimulates Immersive Learning Experiences**: South Korea, China, and the United States have been leading developments in 5G technology. Though we have yet to see the

technology's full deployment, we can expect that once the infrastructure is set, it will impact online education, particularly immersive learning experiences, such as VR, AR, and MR.

8. **OER Continues to Gain Widespread Adoption**: College students spent about USD 1,290 on books and supplies during the academic year of 2018-2019. As the cost of higher education and textbooks for students becomes increasingly expensive, we can expect Open Educational Resource (OER) to continue to gain widespread adoption. Already, US educators have expressed an increasing preference for digital learning materials over printed content, and their students also have the same growing acceptance (Seaman & Seaman, 2018; UNESCO, 2019). Indeed, not all OERs are digital, but the increasing acceptance of faculty and students of digital learning materials leads us to include OER as an online education trend that will become mainstream in the future (UNESCO, 2019).
9. **Gamification and Serious Games Gain Momentum in the Academia**: So far, we have seen how advancements in technology have been a major contributor to the shift to online education. However, we believe that in-classroom sessions will not fully become obsolete. Instead, teachers will find ways to effectively leverage technology to complement—not substitute—the intimacy and immediacy of face-to-face lessons. This approach is evident in the use of gaming technology to increase learner engagement.
10. **Technology-Powered Tools Become the Future of Assessment**: While we have discussed various trends on delivery methods for online education, we would be remiss if we did not include how learning might be assessed in the future. Technology-powered assessment tools are set to become the future of assessment. These tools can provide immediate feedback, increase efficiency and reduce teacher's workloads, and integrate formative and summative assessments, among others [14](Sutherland, 2012).

2.3.1 Competitor analysis

Table 1. Competitor analysis

Name	Objective	Prices	Library	Accreditation	Coverage
SKILLSHARE	Skillshare is one of the most popular online learning platforms. It has a massive collection of over 20,000 classes.	Premium Membership (includes unlimited access to 20,000+ classes) - $15/month or $99/year Free Membership (includes unlimited access to 2,000+ classes) - free	20,000+ classes	No	Worldwide and topics: Thrive (Lifestyle, Productivity), Build (Business Analytics, Freelance & Entrepreneurship, Leadership & Management, Marketing), and Create (Animation, Film & Video, Graphic Design, Music, Creative Writing, Photography, Web Development, and more).
LinkedIn Learning WITH Lynda.com CONTENT	LinkedIn Learning has a single monthly subscription fee that gives you access to all the content on the platform. The courses consist of bite-sized modules that help absorb information better. LinkedIn Learning allows you to download any course for offline viewing, which is found to be very convenient.	Premium Subscription (includes unlimited access to all courses) - $29,99/month or $299,88/year	16,000+ courses	No	Web Development, Software Programming, Economics, and Business Management
Udemy	Udemy is another popular online learning platform. It has a huge library of over	Individual Courses - from $9 to $200 each	150,000+ courses	Yes	13 different categories: Finance & Accounting, Development, Business,

	150,000 courses, which makes it the best one when it comes to content.				Marketing, IT & Software, Office Productivity, Music, Personal Development, Teaching & Academics, Design, Lifestyle, Photography, Health & Fitness. The courses are offered for all levels: beginner, intermediate, and advanced. Courses are available not only in English but also in Russian, Japanese, Chinese, Portuguese, German, Spanish, etc.
MASTERCLASS MasterClass	The masterClass is an online learning platform that everyone is talking about. What makes it different is that the courses are taught by world-famous experts and celebrities. You can learn acting from Natalie Portman, filmmaking from Martin Scorsese, singing from Christina Aguilera, cooking from Gordon Ramsay, writing from Dan Brown, etc.	Unlimited Subscription (includes access to all classes) - $180/year	80+ classes	No	Film & TV, Culinary Arts, Writing, Music & Entertainment, Sports & Games, Business, Photography, & Fashion, Business, Politics & Society, Lifestyle, and Science & Technology. MasterClass does not offer certificates of completion
edX®	edX is one of the best providers of college-level online courses. The company was founded by Harvard and MIT, and the quality of courses is top-notch. All the	Verified Track Courses - from $50 to $300 each Audit Track Courses - free	2,500+ classes	No	Biology & Life Sciences, Architecture, Chemistry, Art & Culture, Electronics, Education & Teacher Training,

	courses on edX, except for professional education courses, can be taken for free.				Medicine, Food & Nutrition, Physics, Science, Music, Law, History, Language, and Environmental Studies
coursera	Coursera is a global online learning platform that offers anyone, anywhere, access to online courses and degrees from leading universities and companies.	Coursera Plus Subscription (includes unlimited access to most courses, Specializations, and Professional Certificates) - $399/year Individual Courses - from $29 to $99 each Specializations - from $39 to $79 per month Professional Certificates - from $49 each Online Degree Courses - from $15 to $25,000 each Audit Option – free.	4,300+ courses	Yes	Arts and Humanities, Business, Computer Science, Data Science, Information Technology, Health, Math and Logic, Personal Development. Each course takes 4-6 weeks to complete.
UDACITY	Udacity is widely known for its Nanodegree programs. A Nanodegree is a skill and project-based learning program. Each Nanodegree consists of a series of courses on topics like Artificial Intelligence, Coding, Robotics, Mobile	Nanodegree Programs - $399/month Single Courses - free	200+ courses 40+ Nanodegree programs	Yes	Nanodegree consists of a series of courses on topics like Artificial Intelligence, Coding, Robotics, Mobile

	Programming, Business, and Data Science. Most programs can be completed in 3-6 months. Udacity offers one-on-one technical mentorship to all Nanodegree students.				Programming, Business, and Data Science
Future Learn	Futurelearn.org is an online education platform that offers hundreds of courses from the world's leading universities. The majority of courses can be audited for free, but access to course tests and a Statement of Participation or Certificate of Achievement becomes available only after an upgrade to a paid course.	Unlimited Subscription (includes access to 600+ courses) - $249,99/month Premium Courses - from $75 to $400 each Audit Option – Free Microcredentials - from $579 to $1549	800+ courses 21 Microcredentials	No	Change Management, Cyber Security Operations (Cisco CCNA), Data Science: Data-Driven Decision Making, Digital Photography: Creating a Professional Portfolio, Impact of Trauma on Mental Health, Online Teaching: Creating Courses for Adult Learners, Sports Coaching, Teacher Training: Embedding Mental Health in the Curriculum, Veterinary Practitioners and the Food Supply Chain.
FUN	FUN-MOOC was launched by the French Ministry of Higher Education and Research in October 2013, this initiative aims to federate online course projects from French universities and schools to give them international visibility.	Courses for free	547 courses	No	Education, law, economy, development, information technology, languages, management, chemistry, science, history, literature, geography, physics, programming,

					international relations, sport
Federica Web Learning Università di Napoli Federico II	Federica Web Learning is the University Centre for Innovation, Experimentation, and Diffusion of Multimedia Learning at the University of Naples Federico II and a national platform offering MOOCs for professional development as well higher education (HE).	Courses for free	300 courses	No	Social sciences, humanities, engineering, science, health and medicine, business, economy, programming, mathematics, development, education, art, data science
miríada X	MiríadaXC is the first Ibero-American MOOCs platform to pledge to promote open knowledge in the regional scope of higher education.	Premium from 20 € up to 2000 €	565 courses	No	Agrarian, Arts and Humanities, Engineering, Social sciences, Education, Investigation, Pedagogy, ONG, University,
EMMA EUROPEAN MULTIPLE MOOC AGGREGATOR ASSET	EMMA is an EU-funded project providing access to multidisciplinary courses. It offers to EU projects an open, innovative environment to run MOOCs as research and project activities dissemination. The platform is hosting the ASSET offer in Energy Transition. Availability of learning analytics and monitoring services.	Courses for free until end of 2021 Certificate ranges: 80€ - 210€ from year 2022 onwards	2000+ courses From different universities: RWTH, UNINA, UNIWA, UPV	Yes	Energy transition, Business, Digital culture, Education, Environment, Arts and Humanities, Computer Science, Data Science, Information Technology, health, Features MOOCs, and others.

2.3.2 Positioning of ASSET

A more in-depth analysis of the competitors of the ASSET-EMMA combination highlighted a very important difference. ASSET, also thanks to the support of the EMMA platform team, has perfectly calibrated the complexity of the lessons to a varied but well-defined target. Furthermore, the modularity of the lessons and the possibility of constructing one's own study plan responded to most of the learner's needs.

Each ASSET course was built respecting the guidelines and technical requirements (framing, audio-video quality, script, modularity) of EMMA. EMMA provides a system to deliver free and open courses - in multilingual mode - produced by European universities and cultural institutions to help preserve and promote Europe's cultural, educational, and linguistic wealth. **In 2020, over 80,000 people visited the EMMA platform, generating over 125,000 sessions.**

ASSET is a learning community and offers a European ecosystem with educational services in energy transition, providing on top of this, flexible and on-demand services tailored to each target group. From a short search carried out on the www.mooc-list.com search engine, it emerged that only a few other institutions/projects have offered courses on Energy Transition for free. In particular, the FUN-MOOCs, Coursera, FutureLearn, Iversity platforms offered some free courses. All the other platforms offered courses with a price between 64 and 110 euros. The duration and the hours/week commitment required to pass the Energy Transition courses on the other platforms fully correspond to the ASSET format. In the future, the courses offered can be also placed on other available platforms.

Taking into consideration the specificity of the EMMA platform within the European scenario (EMMA is still the only one offering automatic translation services, learning analytics for both teacher and students, and courses targeting European projects such as H2020 and Erasmus+), EMMA seems well-positioned on the educational market and a great candidate to future educational offers in energy transition field.

3. ASSET offering

ASSET is a learning ecosystem that offers adequate training for the different stakeholders. In fact, ASSET has different goals. The first is to create a sustainable and scalable ecosystem that brings together the following stakeholders:

a. Companies from the energy sector,
b. Universities and training actors,
c. Authorities and policy makers,
d. Society at large.

The second goal is to deliver the framework and means for the continuous collaborative definition of the knowledge-competencies-skills. Specifically, the skills **required for the energy transition and continuous resource** pooling to efficiently educate and train large numbers of people in diverse and interdisciplinary topics and carry out research and innovation activities.

The general ASSET goals are split into the following specific objectives:

- Attract and engage different actors to the ASSET community, such as universities; research centres and training actors; students and new employees; companies from the energy sector; policy makers; authorities; public administrations and market regulators; societal actors and energy citizens;
- Define a conceptual framework to facilitate and significantly accelerate the creation of new learning modules and update the currently available programmes;
- Foster interdisciplinary disciplines in research, promoting innovation in education services;
- Strengthen collaborations between academia and industry;
- Support trainers to cultivate new talents in the new generation of engineers;
- Develop innovative programmes to educate students, trainers, employers, employees, and citizens.

ASSET offerings have been validated through the project lifetime by different companies, thousands of students and the society at large to ensure its sustainability.

Nowadays ASSET has built a stable learning community & ecosystem that offers educational services in energy transition that are:

- **Free** to access;
- **Open** to anyone, students and general public;
- **Global** supporting all learning opportunities in energy transition;
- **Easy** to use, with an interphase simple and intuitive
- **Educational services** not only in universities but vocational training programmes, industry, policy makers, etc.;
- **Flexible** and **on-demand** adapted to each target group considering a multi-disciplinary perspective;
- All MOOCs are available on https://platform.europeanmoocs.eu/

In sum, ASSET offers an ecosystem with **3 services**, a set of adequate training/learning units which are:

- Educational programmes
- Sustainable community
- Educational innovation: MOOCs, learning courses, etc.

3.1 ASSET ecosystem

ASSET is a learning ecosystem that offers training towards filling the needs of students, universities, social actors, policy makers, etc., by providing training in energy transition related topics.

ASSET partners have the capacity to engage with potential customers through their dissemination channels, which is crucial to provide customized advice and support. The idea was to collaborate with the partners involved in the implementation to provide full coverage of hosting, course authoring, translation and transcription, monitoring based on learning analytics and evaluation services, as well as associated consulting services.

The ASSET project created a list of courses related to the energy transition. Currently, the ASSET offer consists of **22 courses,** which are expected to gradually **increase over time.** An incredible source of knowledge written from authoritative and reliable sources.

Beyond the natural implementation of the project or beyond the purpose of the project in a strict sense, ASSET has given and can give much more. The **developed community**, thanks also to its **interdisciplinary nature**, has given new ideas for reflection on issues that are generally approached in an extremely sectorial way. This way of working is likely one of the greatest results of the ASSET project also in consideration of the fact that thanks to the platforms used, the **new network will remain** standing and operational for a long time to come.

Thanks to the project, new stakeholders have been identified. They were incredibly attentive to the developments of the project, proactive, and in favour of disseminating the ASSET project and the obtained results. The strong synergy with the stakeholders was only possible thanks to teamwork by the partners, who worked together both in their identification and in stimulating them to collaborate, make contributions and talk about ASSET to their networks.

In sum, we have achieved the following stable results:

- Establishment of the ASSET community
- Setting up of a user-friendly platform
- Development of a knowledge database (MOOCs courses)
- Continuous improvement of learning offer in Energy transition related matters
- A good energy focus (as we have entered the BRIDGE initiative and its ecosystem of projects)
- Established a fruitful cooperation with PANTERA and its EIRIE platform
- Continuous cooperation with other energy-related projects
- Good engagement of all stakeholders.

Concerning the learning components and learning programs related to the energy transition, the ASSET project made in part use of the EMMA platform and part use of the ASSET website. In fact, one of the ASSET missions was to provide access to inclusive and cross-cultural online learning about energy transition and offer support to the monitoring and enhancement of learning processes.

22 MOOCs have been published on the EMMA platform that addresses the issue of the energy transition in a holistic and multidisciplinary way. The video courses have been particularly appreciated by the learners. In fact, in the statistical surveys we carried out, learning through MOOCs has always been rewarded, also thanks to the direct relationship that teachers have been able to establish through the tools available within the EMMA platform.

The learning programs implemented in the video courses according to the "course, lessons, unit" structure allowed a modular and easy-to-follow form of learning. It is no coincidence, therefore, that many of those who have obtained the certificates have done so by reaching 100% of the lessons followed and the tests passed.

3.2 Value proposition

The ASSET Value proposition is:

- ASSET is a **learning ecosystem** that offers adequate training to **different stakeholders**.
- ASSET is filling the different **needs of students, universities, social actors, policy makers, etc. by offering them training in energy transition related topics.**
- ASSET aims to **fill the gap** between current **educational offers and the actual KSCs needs of the labour market.**
- ASSET offers demand-based tools, content, programmes to bridge the gap between the companies training needs and academia actual learning offer.
- ASSET gives a **multi-disciplinary perspective** by offering adapted training to the different stakeholders.

ASSET, as a multisided platform, creates added value for all stakeholders by:

- Facilitating the exchange of educational content and services. New universities and educational institutions can start to sell their MOOCs with low investment, saving especially on advertising and reaching a wider community, which is already created. For instance, EMMA students currently are 80K and the EIRIE platform also has a growing number. Also, students have the convenience to purchase MOOCs from home, more safely and cheaply.
- The transaction platform creates value by benefiting both students and content providers (MOOCs creators). And, as for the platform itself, it does not have to produce or store the MOOCs. A content platform offers a digital environment to the users/students, who at the same time could become content generators, for example by providing inputs for improving the platform offering (as now it is possible to place a demand for a course or need).

3.3 Value proposition for each stakeholder

3.3.1 Universities, research centres, training actors

ASSET offers the possibility to:

- Share high-quality learning materials;
- Accelerate programme creation in hot energy-relevant topics (also including societal and entrepreneurial aspects);
- Use the *learning graph tool* to easily create interdisciplinary courses;
- Create synergies with other universities (e.g. by sharing open access resources and through the remote use of labs);
- Give visibility to innovative education/training offer (e.g. courses, masters, labs activities, summer schools);
- Connect with industry to foster mobility mechanisms (e.g. enabling internship opportunities, but also inviting companies' experts as lecturers);
- Create on-demand educational and training courses for companies through the use of the ASSET marketplace.

Universities, research centres, training actors

- Exploit ASSET tools, community and materials to easily build interdisciplinary courses
- Connect with industry and engage in mobility support to increase the value of the programmes offered to students

3.3.2 Policy makers, authorities, public administrations, market regulations

ASSET offers concrete support to:

- Raising citizens awareness on energy transition topics;
- Developing effective policies for the educational and training sector, ensuring the match between RIE needs and offer;
- Receive consultancy and ad-hoc training programmes from universities.

Policy makers, authorities, public administrations, market regulators

- Increase awareness of students and all citizens on energy policies and planning
- Reflect on societal impacts from the perspective of citizenship

3.3.3 Societal actors (NGOs, consumer associations)

ASSET offers concrete support to:

- Raising citizens awareness on energy transition topics;
- Increase the competencies and skills of their members and associates;
- Receive consultancy and ad-hoc training programmes from universities;
- Give visibility of their advocacy, raising awareness and training activities within the ASSET Community.

Societal actors
(NGOs, consumers' associations, professional associations, trade unions, industrial associations, chambers of commerce)

- Increase social awareness about energy transition
- Increase the competences and skills of their members and associates to play an active role in the energy transition

3.3.4 Energy industrial and private sector

ASSET offers the possibility to:

- Find appropriate programmes to quickly up-skill personnel in technological, innovation, and business subjects in different formats (short programmes, MOOCs, lab training);
- Request tailored on-demand educational programmes to the ASSET academic and training actors through the ASSET marketplace;
- Express education/training needs directly to the universities, in order to allow them to appropriately shape their educational offer;
- Connect with universities (through mobility support, invited lectures to be given by industry representatives, provide examples of operational problems) so that new engineers and energy experts own the necessary skills and competencies.

Companies from the energy sector

- Find appropriate programmes to quickly up skill personnel in technological, innovation and business subjects in different formats (short programmes, MOOCs, lab training)
- Connect with universities (through mobility support, invited lectures to be given by industry representatives, provide examples of operational problems) so that new engineers and energy experts are well prepared for the energy reality

3.3.5 Students

ASSET offers concrete support to:

- Acquire highly wanted competences and interdisciplinary knowledge in the energy sector through ASSET short programmes, MOOCs, and other services;
- Upgrade skills to improve the current position through high-quality materials inspired from real-life industrial operations;
- Connect with industry through mobility support mechanisms.

Students (university) and new employees

- Upgrade skills to improve the current position through high quality materials inspired from real life industrial operations
- Connect with education and labour market

3.3.6 Energy citizens

ASSET offers concrete support to:

- Learn how to be actively involved in the energy transition (e.g. by joining an energy community, becoming a prosumer, or exploring new job opportunities);
- Acquire new competencies and skills related to the energy transition;
- Learn how to benefit from innovative energy-services;
- Become more aware of the potential social and economic impacts generated by individual and collective actions.

Energy citizens (individuals as potential energy citizens, prosumers, renewable energy communities-REC, rescoops, rescoop federations)

- Learn how to be energy efficient and how to benefit from innovative energy-services
- Learn how to be actively involved in the energy transition
- Become aware of the potential social and economic impacts generated by individual and collective actions

4. ASSET business strategy

Having analysed the market, the ASSET offering, and the value proposition, we now can examine the business strategy for the project. Before continuation, it is important to mention that the ASSET partners have signed a Memorandum of Understanding (MoU) that regulates the following presented scenarios at an initial level and more profound agreements will be set in place as needed upon partners demand or under bi-lateral agreements.

The MoU is a document that describes the broad outlines of an agreement that all ASSET parties have reached. MoUs communicate the mutually accepted expectations of all the parties involved in a negotiation and outline specific points of the ASSET maintenance ecosystem & understanding for sustainability. It names the partners, and **describes the project on which they are agreeing, defines its scope, and details each ASSET partner's roles and responsibilities.**

So, having reference to our legal aspects, now we present a section that will explain the ASSET business strategy and the model canvas. It is important to mention that the consortium sees "ASSET as a whole" with some of its component/tools as "optional", for example, the learning graph tools. ASSET can be expressed in many ways since it can satisfy the needs of academic profiles, different communities, policy makers, societal actors, industry, etc. We have already defined the project value proposition regarding each of the main stakeholders. Now let us look at the overall project business models by using the well-known "Business Canvas" tool (see figure below). This tool helps to sort the following entities: Partners, Activities, Resources, Value propositions, Customer relationships, Channels, Customer segments, Cost structure, Revenue structure.

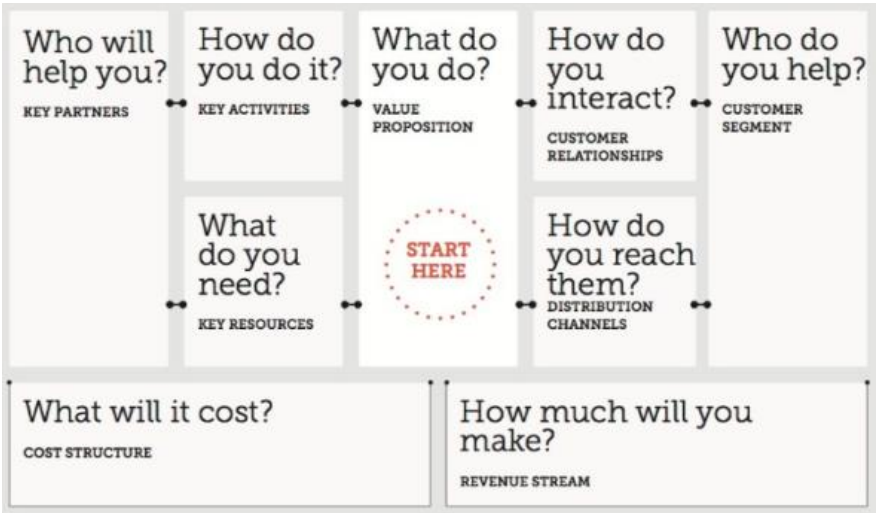

Figure 9: Business Model Canvas tool to examine the value proposition (Source: The DIY Toolkit).

4.1 ASSET business analysis

The business model CANVAS consists of four basic categories:

1. The 1st category consists of the infrastructure and the network of partners that are necessary in order to create value and to maintain a good customer relationship.
2. The 2nd category is the value and the services that the product offers, representing a substantial value to the customer, and for which is willing to pay (in the case of MOOCs).
3. The 3rd category is the relationship that the product creates and maintains with the customer in order to satisfy him (the educational offering).
4. The 4th category consists of the financial aspects, which are the cost structure and revenue streams.

The task of business modelling is not a static process, but an iterative process strongly dependent and driven by management decisions and revisions of whether the current approaches meet the demands.

Below is presented the actual version of the business model Canvas for ASSET.

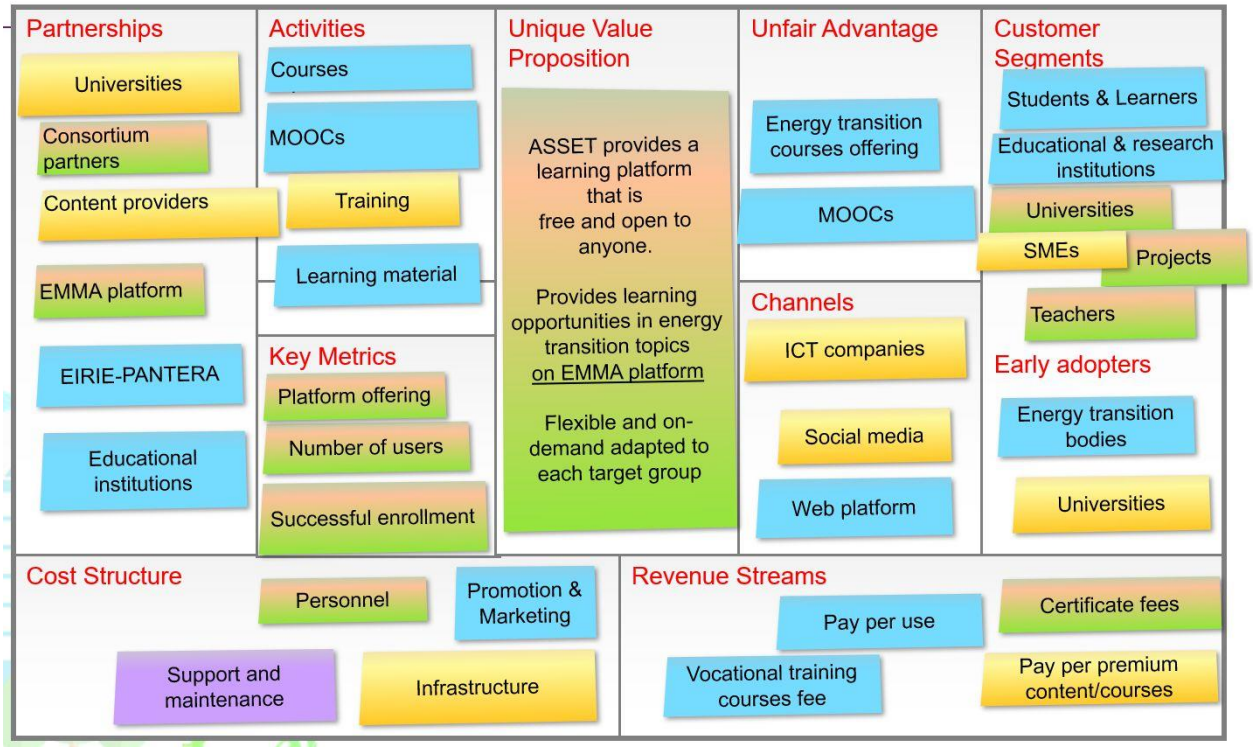

Figure 10. ASSET business canvas

Key partners

The key partners of ASSET project are:

- Universities, consortium partners
- Educational institutions
- EMMA & EIRIE-PANTERA platform maintainers
- Cooperating partners

Key Activities

The key activities addressed in ASSET project are:

- Educational offering
- MOOCs
- Learning graph, courses, new educational content, etc.
- Value-added educational courses

Key metrics

The key metrics of ASSET project are:

- Platform offering (number of MOOCs)
- Number of students
- Success & enrolment rates

Value proposition

ASSET is a learning ecosystem that offers adequate training on Energy Transition to the different stakeholders based on the EMMA and EIRIE-PANTERA platforms. ASSET is free and open to anyone. It is flexible and its offering can be adapted on-demand to each customer group.

Customer relationship

Customers can find support throughout ASSET site web, which contains:

- MOOCs
- Learning content, the learning graph tool, train the trainers
- Courses on energy transition
- Marketplace to place enquiries

Channels

Various channels have been and will be considered for the ASSET platform promotion:

- Website https://www.energytransition.academy/courses and EMMA platform by clicking here https://platform.europeanmoocs.eu/course
- Social media (Twitter, LinkedIn & YouTube)
- Presentation on scientific conferences and events of educational programmes and options
- EIRIE-PANTERA and EMMA platforms.

Users

ASSET courses provide information and courses for energy transition topics; the main stakeholders are:

- Universities, researchers, training actors, students, energy citizens
- Policy makers, authorities, public administration
- Societal actors (i.e. NGOs, consumer associations, etc.)

Cost structure

The main costs in the ASSET project are occasioned by:

- Content providers
- Manpower, mainly teachers (project members)
- IT infrastructure

In sum, ASSET is filling the different needs of students, universities, social actors, policy makers, etc. to offer them training in energy transition topics. ASSET fills the gap between current educational offers and the actual needs of the labour market.

It is innovative because it offers demand-based tools, content, programmes to bridge the gap between the companies and academic training needs based on a multi-disciplinary perspective by offering adapted training to the different stakeholders.

4.2 ASSET business models

ASSET reaching the market defines its business model in a twofold way:

- Multisided platform **(BM#1)**: ASSET offers MOOCs educational services and academic certificates
- Knowledge transfer **(BM#2)**: ASSET offers services for training (e.g. to teachers).

4.2.1 Multisided platform

This business model named “multisided platform” combines two or more distinct groups of customers, facilitating their interaction to a mutually desirable outcome (training or reception and settlement or even having new skills to labour market integration, etc.). The platform is of value to each group of customers as the platform must attract and serve all groups simultaneously to create value for its users (in our case students).

In simple words, multisided platforms’ value proposition as ASSET is to be the matchmaker: between the different stakeholders and the learning programme providers. The flow can be seen in the following picture, where the different partners offer their content, the community is alive and the students access the content, courses, MOOCs etc. The figure below shows the interaction among the ASSET actors:

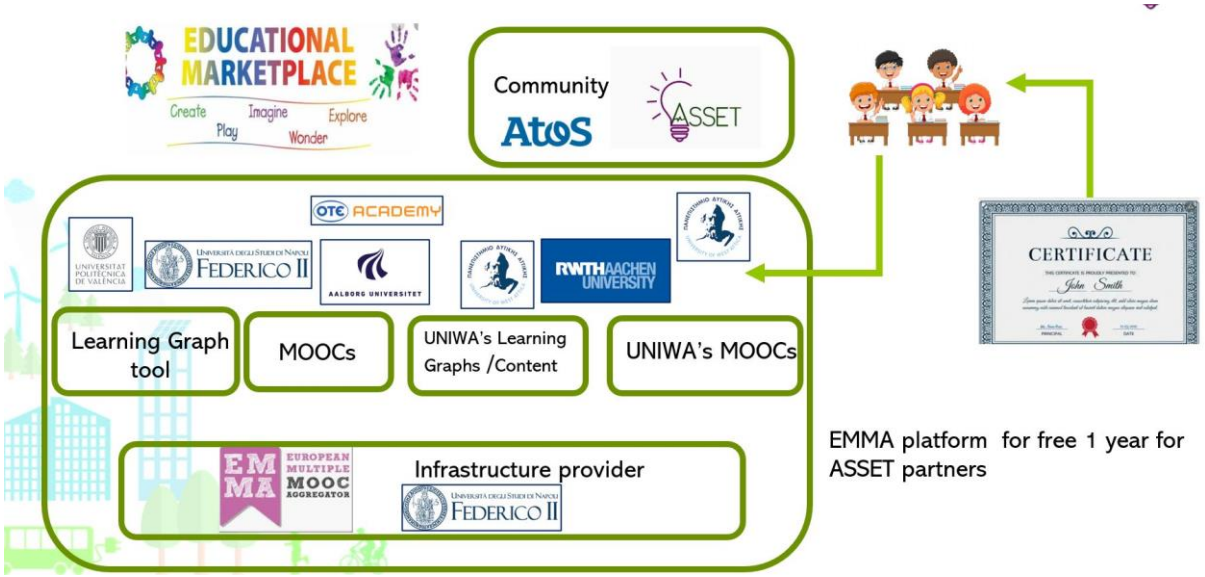

Figure 11: Business Model for ASSET offering courses to students /BM#1

At the same time, it is ensured that the EMMA platform will continue offering the MOOCs courses for free at least for one year (during 2021) available to all students, citizens, and professionals without costs.

All ASSET partners agree at the same time to provide the content in a free manner. Similarly, the learning graphs and materials of all ASSET programmes will be available through the learning graph tool for at least one year (2021) for free.

4.2.2 Knowledge Transference

The knowledge transference deals directly with actions like **courses, training, consulting,** etc., and then charges a fee based on this offering. Some examples could be **training courses or even train the trainers options**; these could be organized by the academic partners.

In the second case, for example, UNIWA plans to develop two courses that lead to certificates (based on two MOOCs of ASSET) and charge for the certificate. OTEA also intends to charge for the courses it will offer through EMMA and train more trainers thanks to the material already created and add new material. The following image explains the flow for this scenario:

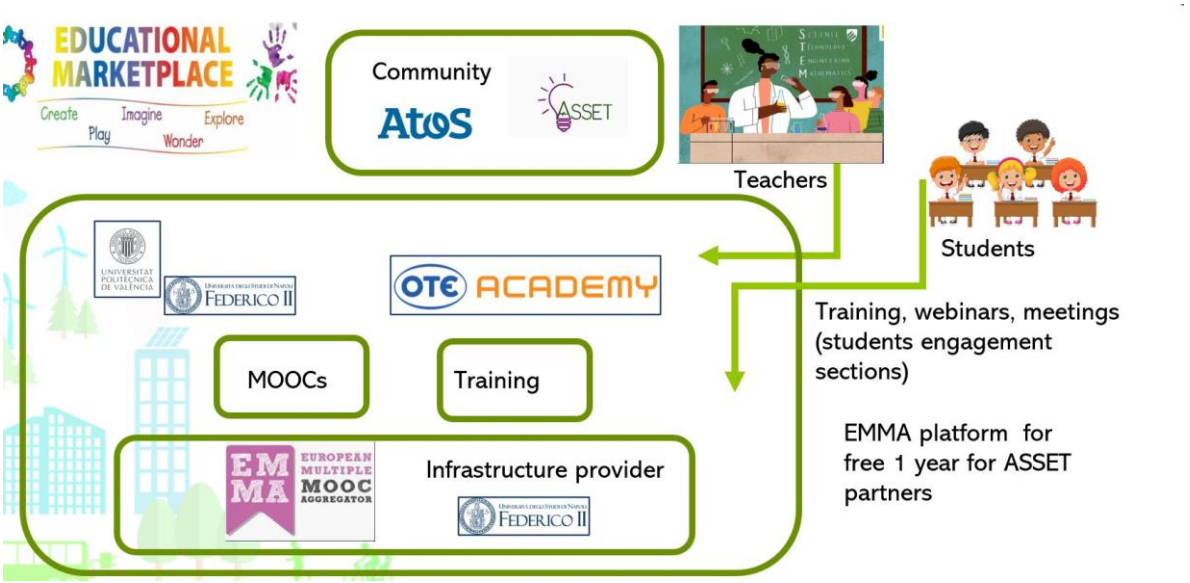

Figure 12: Business Model for ASSET offering – knowledge transference/BM#2

The knowledge will be shared through courses, publications, conferences, and formal or informal exchange, and then the knowledge acquired, could be later used to boost the competitiveness of different institutions such as the European industry, academic institutions, or other organisations.

4.2.3 Validation of Proposed Business Models

In order to demonstrate the viability of the previously analysed business models, it is necessary to validate them in the context of each partner. Therefore, and for this reason, some specific questions were included in the business questionnaire for gathering business requirements done within the scope of WP5 and during exploitation workshop meetings. Questions were focused on the expectations of the different stakeholders regarding project results. This is the process and how each partner has elected a potential business model where they can provide value.

The table below shows the partner name and the two proposed/agreed business models: **multisided platforms and knowledge transference.**

Table 2. Validation of business models

Partner Name	Multisided platform	Knowledge transference
ATOS	X	X
UNINA	X	X
RWTH		X
OTEA	X	X
AAU		X
UWA	X	X
UPV		X
LS		X
ÈNOSTRA		X
ECOPOWER		X

Marketing strategy

For supporting this activity and ensuring the revenue streams the marketing strategy and support of the consortium will be organised taking into account the capabilities and current position of each member of the consortium. In the marketing campaigns, the messages that will be used will be drawn from the value proposition presented in chapter 3 above. The target groups and market channels that will be used per partner are described in the sequel:

- UNIWA and the other academic partners will advertise ASSET and all its offerings through announcements in its website and social media as well as in several workshops/conference and events its representatives attend.
- OTEA will intensify its activities to advertise ASSET as now ASSET community and offerings are mature. It will do so targeting mainly its current customer base and actors mainly in Greece.
- ATOS and LS will maintain the community and use the social networks for supporting actions.
- UNINA will advertise the educational offer provided and available in the EMMA platform through the EMMA related communication channels.

4.2.4 The ASSET partners roles

The following table provides a description of all the roles that partners may take in ASSET. It is important to note that the list (composed of four different tables and categories) is the preliminary list of potential roles. More roles could be assigned to partners (instead of just the minimum needed to run the services). Example of types of roles are MOOC provider, infrastructure provider, technology provider, content provider, etc.

The main four categories identified for our case are **Infrastructure provider, Service provider, Education and MOOCs provider, and Educational content consumers.**

The following four tables show the different types of roles, the name, and what the partner role would be in a future commercial scenario.

Infrastructure provider

Table 3. Role of ASSET partners: infrastructure provider

Nº	Type of Role	Description	What they do
1.	Technology provider	Offers IT services	Software development, maintenance, etc.
2.	Infrastructure provider	Maintains the platform	Maintains, manages the platform

Service provider

Table 4. Role of ASSET partners as service providers

Nº	Type of Role	Description	What they do
1.	Content providers	Providers of educational content	An organisation or professional that provides content (registers content to the learning graph tool) and makes it available to other programme designers. As ASSET is not only providing MOOCs, organisations or someone interested can offer any kind of content that can be part of another programme.
2.	Educational programme provider	Delivery of educational programmes	An organisation or professional that prepares an educational programme and makes it available through the ASSET marketplace.

Educational MOOCs provider

Table 5. Role of ASSET partners: MOOCs provider

Nº	Type of Role	Description	What they do
1.	MOOC providers	Providers of educational content via MOOCs	Offers the courses online and provides the content to the platform.
2.	MOOC and certificate providers	Providers of MOOCs with certification possibility	An organization offering courses and can issue certificate students.
3.	MOOC aggregators	Aggregators of educational content	An organization that aggregates ASSET MOOCs and offers the content from other content providers (but does not create the content).

Educational content consumers

Table 6. Role of ASSET partners: content consumer

Nº	Type of Role	Description	What they do
1.	Educational content consumers	Citizens, professionals, students consuming courses	Citizens, professionals/students and companies looking for educational programmes and consuming them.
2.	Educational programme resources consumer	Professors/tutors accessing learning material	A professor or tutor that uses the learning graph tool to find learning resources to re-use in a new programme.
3.	Educational content re-user	Reuses ASSET MOOCs or content in ASSET Learning graph	An organisation or professional that prepares her/his course by reusing the content of ASSET MOOCs or the content in ASSET Learning graph.
4.	Educational programme re-user	Reuses ASSET MOOCs	An organisation or professional that develops her/his course by reusing the programme of ASSET MOOCs.

4.2.5 Role of ASSET partners

For simplicity purpose in the following table, we have included just the three main roles that the partners will take in the near future: infrastructure provider, service provider considering that it is included all: MOOC aggregator, Educational programme resources consumer, and in additional roles we reflect on the educational content consumer.

Table 7: Role of ASSET partners

Partner No	Acronym	Infrastructure provider	Service provider	Education and MOOCs provider	Additional roles
1	ATOS	Yes	Yes (i.e. learning graph tool)	No	Community maintenance

2	UNINA	Yes	Yes	Yes	Platform maintenance
3	RWTH	No	Yes	Yes	Programme provider, Content provider
4	OTEA	Yes	Yes (Marketplace)	Yes	Programme provider, Content provider
5	AAU	No	Yes	Yes	No
6	UWA		Service provider (learning graph tool)	Yes (four MOOCs)	Programme provider, Content provider
7	UPV	No	Yes	Yes	
8	LS	No	Yes	Yes (two MOOCs)	Content provider (learning graph tool)
9	ÈNOSTRA	No	No	No	Educational content consumers
10	ECOPOWER	No	No	No	No
11	EASE	No	Acts as knowledge and information exchange platform for EASE members	No	

Finally, before closing our business analysis we must provide a project SWOT.

4.2.6 SWOT

Let us now analyse the ASSET offering from another perspective: the **SWOT Analysis**. The analysis was part of the planning exploitation process which was done iteratively starting very early in the project during the initial workshops. Below, we present the final SWOT.

In fact, SWOT is an acronym of **Strengths**, **Weaknesses**, **Opportunities,** and **Threats,** where both internal and external aspects of a business are analysed. The internal aspects are the ones related to our own project so it can be modified, totally opposite to the external ones, which are related to the market. This kind of analysis is quite simple to perform, although it should be reviewed from time to time to proactively respond to the changing environment. Also, the idea of this analysis is to convert the weaknesses into strengths and the threats into opportunities.

The ASSET SWOT is depicted below:

Strengths	Weakness
•Consortium •Multidisciplinary group •ASSET stable community •Cooperation industry & academia •Combining different actors and sectors •MOOCs access/offering •Stakeholder engagement •EMMA & EIRIE-PANTERA platforms	•Different interests •Only six countries •Lot of competition with free courses •Risks to mitigate
Opportunities	**Threats**
•Energy ecosystem •EMMA platform access •Education online hype (MOOCs, etc) •Accessible material for everyone •Need for new skills •Climate change momentum •Energy transition for young generation	•Skills in energy transition and future work and needs are being build (not defined yet) •Similar platforms and offerings •Not reaching enough impact •Learning online/adaptive system go faster than our courses •Covid-19 and uncertainty, no investments

Figure 13. ASSET SWOT

Strengths

The identified internal attributes of ASSET that will help to maintain results over time are:

- The consortium and the multidisciplinary group of people, and cooperation between the industry and academia to identify the energy transition needs.
- The cooperation of the different actors and sectors is stable and allowed to have an ASSET stable community.
- The MOOCs access, offering available and already provided content.
- The stakeholders are already engaged.
- As we are not the only ones offering online courses, we acknowledge that we are not the only ones with this kind of offer but we are at the same time in a very good position at EU level as we rely on the well-known EMMA & EIRIE-PANTERA platforms.

Opportunities

- Creating the energy ecosystem by offering courses in EMMA Platform and now a good momentum for online training (due to Covid-19)
- Accessible material for everyone
- The need for new profiles and training for energy-related topics (i.e. Hydrogen as energy vector)
- Climate change momentum and young generation concern.

Weaknesses

- Different interests among the partners and representation of only six EU countries
- A lot of competition with free courses and similar offerings, so we need to position.
- Risks to mitigate over time with the differentiation of content.

Threats

- Skills in energy transition and future work and needs are being built (not defined yet) and the new professionals and needs are under work (also STEAM subjects, greener future, gender aspects related to energy poverty, etc.).
- Similar platforms and offerings are all over and may be cheaper than our offering.
- Not reaching enough impact over time, so investments are needed over it.
- Learning online/adaptive systems go faster than in our courses.
- The current situation with Covid-19 presents a certain level of uncertainty and so there are fewer investments from the private sector.

In conclusion, in the presented SWOT analysis, the main strengths we see is that there is an opportunity for the product we offer and good momentum in the market for this kind of educational services; at the same time, we see the ASSET community as an opportunity to continue gaining students and users.

5. Sustainability strategy

Sustainability is closely related to exploitation, but they tackle different faces of the same issue. On one hand, sustainability refers to the long-term availability of the project results as well as their progress, availability, etc., to make them usable. On the other hand, exploitation refers to the use/exploitation of those results offered to the targeted participants and meeting the stakeholder's needs (as shown in the value proposition section).

In general terms we have agreed to continue having the following results available:

- All courses, MOOCs, and university programmes will be maintained beyond the project lifetime (they are at the following link https://www.energytransition.academy/courses);
- All courses will be available for free for 1 year, until 2022, and we have agreed that those will be offered free of charge for students who want to enrol in the course and do not pursue the certificate;
- All available courses will be kept over time at least for 5 years and some based on an agreement between the course owner and UNINA;
- Students will have the option to pay per certificate. The purchasing of the certificate is optional for students. They can decide if they want to have the final certification or not;
- The ASSET community, the website, and offers, tools, etc. will be maintained for 5 years;
- Up to today, the ASSET learning offer is also already available in the EIRIE platform that has funding for the next 7 years with different funding programmes;
- The ASSET partners have signed a Memorandum of Understanding (MoU) to agree on the legal terms of the future exploitation of courses and content.

A good sustainability strategy combines the individual efforts of results' owners who plan the roadmap, determines the timeline, and identifies the potential barriers to progress towards the results. In the upcoming tables of the following section, it is shown, for the target TRL, the roadmap to progress MOOCs and all the sustainability steps. Therefore, with respect to the outcomes of the project, we plan to maintain the following assets.

5.1 ASSET exploitable assets and sustainability strategy

This is the final approach to the sustainability of the **main ASSET components.**

Table 8. ASSET marketplace

1 – ASSET Marketplace			
Leader	**License**	**TRL** (at the end of the project)	**Target TRL**
OTEA	GPL version 3	7	8

Roadmap to progress the asset	• After and until the end of ASSET: search for EC funding opportunities or alternative funding from selling training options.
	• After ASSET project:
	  ○ promote the platform among potential teachers, students and relevant stakeholders, e.g., in conferences and through seminars
	  ○ promote platform usage among research colleagues and students		

Period that will be available	5 years		

Revenue	Marketplace with courses
Risks / Barriers	The main risk is the potential competitors who have a stable offering that are offering similar online courses.

Table 9. Train the trainers MOOC

2 – MOOC for Train the Trainers			
Leader	**License**	**TRL** (at the end of the project)	**Target TRL**
OTEA	Creative Commons	7	8
Roadmap to progress the asset	• After ASSET project: ○ promote the course among potential teachers and professors		
Period that will be available	3-5 years		
Revenue	Charge per courses		
Risks / Barriers	The main barrier is that not all tutors are aware of the EMMA platform. So, a significant effort in marketing will be needed.		

Table 10. Learning graph tool

3 – Learning Graph tool			
Leader	**License**	**TRL** (at the end of the project)	**Target TRL**
UNIWA, UWA, AAU, RWTH, UPV, OTEA, ATOS	GPL version 3	9	9
Roadmap to progress the asset	After ASSET project: • Improve the learning graph tool based on the feedback from the users and preparation for support of artificial intelligence sector. • For this development, we will seek funding from EC or national sources or even own resources. • Promote the platform among academic actors in Greece and the EU through workshops and face-to-face meetings. • Test and use of the tool, evolve the tool and use it (potentially) in different projects, update the scope of the tool and capacity, • Test and use of the component in different options/MOOCs/tools		
Period that will be available	3-5 years		
Revenue	We do not anticipate obtaining profits (as we are a public university). Nevertheless, being recognised in Greece and EU level is an important and tangible “revenue” for us.		
Risks / Barriers	The main risk is that our users do not easily recognise the value of the tool. For this reason, we will organise workshops to show them and help them experience the value.		

Table 11. UNIWA's Learning Graphs and Programmes' Content

4 – UNIWA's Learning Graphs and Programmes' Content			
Leader	**License**	**TRL** (at the end of the project)	**Target TRL**
UNIWA	CC BY-SA 4.0	7	8
Roadmap to progress the asset	After the project ends: • The learning graphs will be maintained and improved based on the feedback regularly received by our students.		
Period that will be available	1 year free, then (up to 5 years) paid.		
Revenues	Charge fees to (selected) programmes to generate revenues most likely through the lifelong learning institute of the University of West Attica.		
Risks / Barriers	The topic becomes obsolete after four years. In this case, we will withdraw the programme and create new ones.		

Table 12. UNIWA's MOOCs

5 – UNIWA's MOOCs			
Leader	**License**	**TRL** (at the end of the project)	**Target TRL**
UNIWA	CC BY-SA 4.0	7	8
Roadmap to progress the asset	After the project ends: • UNIWA will exploit H5P technology of EMMA platform to make the course more attractive • Will issue the MOOCs in two rounds every year.		
Period that will be available	5 years		
Revenues	From the four MOOCs the UNIWA has prepared, two of them will be open to the public permanently and two will be charged. The ones that will be charged are: eco-design and new materials for solar cells.		
Risks / Barriers	The risk is that topic becomes obsolete after four years. In this case, we will withdraw the programme and create new ones.		

Table 13. Logical soft MOOCs

6 – **LS's MOOCs**			
Leader	**License**	**TRL** (at the end of the project)	**Target TRL**
LS (ENEA)	CDDL	7	8
Roadmap to progress the asset	After the project ends: LS will exploit H5P technology of EMMA platform to make the course more attractive.		
Period that will be available	2 - 3 years.		
Revenues	From the two MOOCs prepared by LS, one of them will be open to the public and another one (Economics of energy sources and the optimal integration of renewables and energy conservation measures) will be charged. The issue of a certificate for both MOOCs will be charged with a fee.		
Risks / Barriers	The content could become obsolete after three years. In this case, we would withdraw the programme and create new ones.		

Table 14. MOOCs

7 – MOOCs			
Leader	**License**	**TRL** (at the end of the project)	**Target TRL**
UNINA	CC BY-SA 4.0	9	9
Roadmap to progress the asset	After the project ends: • Courses (MOOCs) on energy transition to be improved, customized and transformed in an eAcademy. • Plan to incorporate more actions to maintain and evolve all courses/MOOCs.		
Period that will be available	The initial idea is 3 years, depending on the availability of the EMMA platform		
Revenue	Pay per use, fee to students, issue certificate with a fee		
Risks / Barriers	• Other offerings may be more appealing • There are many platforms, mainly country-level. EMMA is the only one with a European Brand.		

Table 15. ASSET community

8 – ASSET community			
Owner	**License**	**TRL** (at the end of the project)	**Target TRL**
All	Not applicable	9	9

Roadmap to progress the asset	• Maintain the community of users, knowledge base (database) • Continue the networking to maintain the community (5 years) • Offer the MOOCs over time, have people using the platform beyond the project ends • EIRIE - PANTERA (search engine and navigate options) • Community members data (ENOSTRA will be available and compromises to accept new members and have a shared email with Atos) • Atos responsible of the infrastructure maintenance • Social networks will be maintained over time by ENOSTRA, LS and Atos • All will seek to identify business opportunities (consortium members together with key stakeholders)
Period that will be available	1 year, extended to 5 years / 7 years thanks to PANTERA
Revenue	Not a source of revenue, but word-of-mouth and gain prestige will be our revenue desired.
Risks / Barriers	• Other communities may be more appealing than ASSET. • To avoid and mitigate this risk the idea is to engage all in the BRIDGE and EIRIE-PANTERA ecosystems and leverage on EMMA current community of users.

The target audience considering stakeholders we have described in the value proposition section of the ASSET project will be engaged over time through targeted events, networking activities, and other different engagement and dissemination activities and will form a truly cohesive and engaged ASSET community, which will become an important exploitation asset itself.

The consortium members will keep the engagement with this community live after the project's completion to further exchange ideas, validate concepts, and establish new partnerships and initiatives. The findings published in the ASSET outcomes will enable consortium members together with key stakeholders to identify business opportunities as well to extend the knowledge about the research, innovation, and educational capacities for the energy transition.

Regarding the next steps, the information provided in the previous tables brings these findings:

Roadmap to progress the assets mentioned before:

- All partners have explicitly expressed their interest in maintaining and evolving their results.
- All of them have elaborated plans to progress the TRL reached at the end of the project towards a marketable TRL beyond the project.
- The individual roadmaps to progress the assets will be supported by the global sustainability strategy where both EMMA Platform and EIRIE-PANTERA platform are at the core of our strategy.
    - The consortium could seek further funding opportunities to sustain and exploit further ASSET results by applying to new Horizon Europe work programmes, such as HORIZON-CL5-2021-D3-01-02: Sustainability and educational aspects for renewable energy and renewable fuel technologies.

Maintenance

- All partners agree to maintain the MOOCs, courses and tools/website and the platform such as EMMA. The platform will be maintained and evolved over time, so that more courses can be placed.
- The educational offering and courses will be also available upon demand.
- The educational offering will be evolved as there are new requirements of energy transition topics (and thanks to new funding opportunities).
- The educational offering will be also maintained in the EIRIE-PANTERA platform.

Time-to-market:

We consider that all the exploitable assets that were already delivered are already in the "market". The steps to pursue refer to attracting users rather than improving the "service". But all the services (content) are already ready to use for students (TRL 9).

Revenue

- The partners have agreed to place the MOOCs available without charge for at least 1 year, and the EMMA platform extensively to 5 years.
- Some partners have agreed to charge a fee per issued certificate (in the case of students request for a certificate, being always optional).

Barriers/Risks:

The groups of barriers/risks are related to courses that over time may seem obsolete, given the velocity of the educational markets and energy-related topics. Legislation also changes in EU and worldwide must be monitored (to not lay behind in terms of content). We consider that for the exploitable assets identified the offering is highly welcomed by the community.

5.2 Sustainability questionnaire

ASSET consortium was devoted to creating (and now to maintain) the community. As said, we have been working to engage other people inside and outside the consortium in order to make this happen. At the same time, the exploitation team **conducted a survey to gather information from all partners. The intentions and survey outcomes are the basis for the present sustainability plan.** So, let us revise all those sustainability intentions and our compromise with all the information provided before to ensure it is sustainable over time.

The first step was to review all the aspects of the plan, by analysing the questionnaire's results and the intentions set by partners.

To obtain insights from ASSET partners on some sustainability objectives, we designed our own questionnaire with nine questions about sustainability and two for rating the cooperation activities in the project (one for external cooperation and one for internal). We obtained responses from all eleven partners.

In the first question, 82% of the responders answered that they are willing to maintain the components after the project ends followed by 9% that will maintain those if they get the corresponding financial resources. Another partner answered that "maybe" it would do so, and this accounts for 9%. The figure below shows the question about maintaining the assets and components:

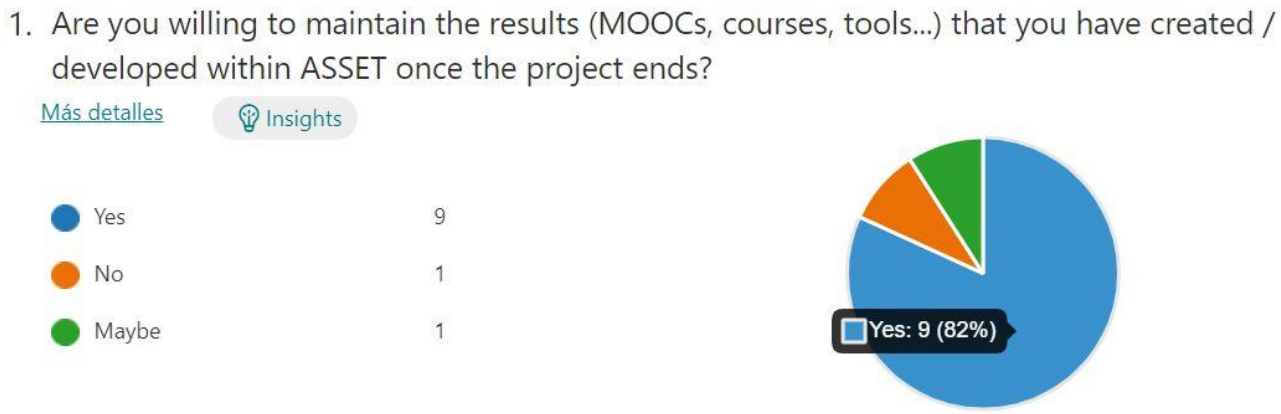

Figure 14. ASSET willingness to maintain/evolve results

In the case of the evolution of components and assets, **73% of respondents are in favour of evolving their educational content.** Followed by an 18% who answered maybe and 9% who answered no. So, we can conclude that sustainability is ensured thanks to the compromise of most partners, as 73% represents 8 different institutions.

Figure 15. ASSET maintenance and evolution

For the question "if there is no financing to maintain and evolve the project results, is your organization willing to dedicate money to its maintenance?", the partners who answered "maybe" is the 55%.

Moreover, we see a balance between the intentions that are linked to money investments and intentions for continuation/support of the ASSET ecosystem. Even if partners are not able to allocate investments, they are willing to dedicate in-kind-efforts and on best intentions efforts to maintain the project outcomes. There is 45% of respondents who are in favour of being part of the ASSET community support team and 64% who are willing to participate in promotional activities of the ASSET ecosystem and community after the project ends.

Figure 16. ASSET community support and ecosystem

Some activities proposed for the SUPPORT TEAM for the ASSET community are: answering queries, support to the mailing list, the content provider (new courses, webinars, MOOCs, etc.). The partners willing to promote the ASSET ecosystem and community will do it through the following actions: publications, training, dissemination, workshops, and posts on social media channels to name a few.

Regarding the interest in jointly exploiting some assets of the project, some partners have indicated which partners and which assets and activities are eligible for joint exploitation. As stated before, the regulation of this type of activity will be done on a bi-lateral basis and it is initially regulated by the Memorandum of Understanding. So, some answers are here for future plans and consideration.

The idea will be to continue evolving the MOOCs and placing them freely available at the moment (no online intervention of the teacher is required at this point, and offering the courses with or without the certificate, in the case of the certificate there will be a cost assumed by the student).

Joint activities are possible with UNINA, for providing existing (and possibly new) MOOCs through the EMMA platform and in general with the whole consortium for supporting and maintaining the ASSET community. While not really planned at this stage and dependent on new sources of funding or even new request (in the enquire channel), joint exploitation of the developed courses and learning material with all the academic partners could be possible in the context of seminars or summer schools organized together, and for example by AAU.

ATOS will be willing to maintain the community. The website will be available for 5 years. The first year ATOS will ensure to answer all enquires and to respond to newcomers. Also, thanks to EIRIE-PANTERA platform the content will be available for more years.

The following partners foresee to continue placing new content based on bi-lateral agreements: UNIWA-UNINA for providing MOOC courses, also in the case of a three-party agreement among UNIWA-OTEA-ATOS using learning graph tool and marketplace. In the case of other universities (UNIWA, RWTH, UNINA, AAU, UPV) foresee new mobility agreements for allowing students to move around. In addition, EASE is not educational content provider, but it is ready to collaborate depending on mission, workload and resources and it will collaborate with both SMEs and academia.

In the future the idea is to find further funding resources, private or public, it would be great to keep running the project, so we need to keep a look on available funding options, through which we may sustain the project with dedicated resources.

Finally, we will exploit the ASSET Community (database of members and followers on social media channels) to disseminate news and information related to our activities in the energy transition field.

In conclusion, with less or more compromise and thanks to available resources, most partners are in favour of providing continuation to all MOOCs and services created under the ASSET umbrella.

6. ASSET community

Building an online community is hard. Online communities are based on two main forces: individuals willing to participate during their spare time because they find the project interesting or because the services provided by the project are appealing, and employers who want to push a project forward because it is core to their business. The former is already there, and we need to ensure that over time they have enough interest to be involved in a new learning course. The latter will only join the community if they find the project key to their business or because the content of the project is valuable for them, like having novel courses/MOOCs in interesting and relevant topics.

ASSET defined, implemented, and now follows a strategy for building a community to engage users and enrolling in MOOCs to ensure the exploitation of the project results are stable over time.

We have planned the community with four main blocks as shown in the figure below:

- Setting up our community
- Engage with people, Ambassadresses and Ambassadors
- Releases of courses, MOOCs, learning content, get feedback
- Maintain the ASSET community over time and celebrate!

Figure 17. ASSET community building planning

During the first period (M1-M13), and considering the methodology mentioned in section 1.4, we defined how to establish the ASSET community. We have done many activities around it, for example, placed a specific form on the website for people to register, invited ambassadors to join the ASSET community to spread the word with different actions (i.e. interviews, news, etc.) to explain outsiders the main ASSET goals. We have announced changes, news on the website and used common channels like LinkedIn, YouTube channel, Twitter account, and mailing list to support it. In this second period, we worked more towards the dissemination of courses, MOOCs and announced every new course all over our channels (M13-M24). We focused on maintaining and increasing the number of followers and community members in all senses.

During the project, we followed a good strategy for bringing people to the community with different carefully selected complementary actions, such as:

- Organisation of 3 ASSET roadshows in Milan, Madrid and Brussels/online (see D1.4 ASSET ecosystem report),
- Attending and presenting ASSET at events (presence and online - see D5.4 ASSET Dissemination and communication activities report. Final),
- Organised the final ASSET event on April 15th, 2021

- Maintained fresh offering for potential users and shown how ASSET can offer them good MOOCs to learn about energy transition,
- Maintaining a good cadence of MOOCs releases (adding new courses over time). In that way, users feel the product evolving to meet their needs and to be in line with advances in the state of the art of energy transition and market needs, or academic needs and practices (See D4.5 Evaluation of ASSET educational proposition – final),
- Sending periodic and thematic newsletters - in order to keep members and interested people updated on the project's activities and outcomes,
- Posting news on the ASSET project, but also news coming from similar projects related to energy transition topics, on ASSET social media channels (LinkedIn, Facebook, Twitter) to create synergies among the different stakeholders' networks,
- Selecting and appointing "ASSET Ambassadresses and Ambassadors", who are professionals active in the energy transition sectors and who supported the project by spreading the news about it within their professional networks, encouraging colleagues to join the ASSET Community and use their services (e.g. attending MOOCs or through interviews),
- Asking opinions to outsiders to take into account users' feedback, students, industry real needs (like for example all the activities are done in the context of WP4 and in the industry-academy moving mechanisms to evaluate impact, opportunities, trends, etc.),
- Placing news on the forum to engage different stakeholders,
- Build synergies with different stakeholders to better understand their needs and to make specific improvements of content for them,
- Encouraging users to ask questions publicly, add news in the forum, etc. This action creates a sense of community as some users start answering questions for other users and engaging in conversations,
- All activities were supported by a good communication strategy for the MOOCs and offers,
- Currently, in mid-April 2021, we have around **300 members belonging to the ASSET community**.

Let us revise now, in the following sections, specific areas where ASSET was promoted per different relevant type of institutions and EU stakeholders.

6.1.1 Research & Educators

One of the EASE' objectives is to advance education, collaboration, knowledge, and proven frameworks about the benefits of the energy system and specifically energy storage at the EU level and globally. Therefore, the Association strives to put more emphasis on educational materials that would bridge the skill gap in the clean energy transition by helping the members, close network, and relevant stakeholders to get necessary knowledge and information.

Thanks to its involvement in various European technology and policy initiatives such as ETIP SNET, Batteries Europe, and other energy storage-related platforms and alliances, EASE brings forward the importance of relevant energy learning components and material. It is concluded that job-related education and training of engineers is an important emphasis to ensure the development of skills and in-depth knowledge required for different roles to operate, plan and manage European energy systems.

Therefore, through the dissemination of ASSET offering and educational material, EASE put industrial members in direct contact with partner Universities and research centres, helping to shape the new programmes. In this way, new generation of young experts and engineers get up-to-date with research and innovation results and benefit from training materials.

6.1.2 Post-graduate student and offering

During the two years of the project's lifetime, ASSET has piloted five different types of mobility mechanisms including, lectures from the industry researchers, student internships, and Bachelor/Master and Ph.D. theses. Based on the pilot implementations, a comprehensive set of guidelines for future implementations are presented in detail in D1.4. The Centre for Permanent Learning (CFP) of the Universitat Politècnica de València is responsible for the management of all non-regulated training offered open to the general public. Through the CFP, UPV teachers can find all the necessary support to start their training activity, while students can register and participate in these activities. CFP will follow all the recommendations and blueprints determined through the ASSET pilot implementations.

The educational offer offered by UPV through the CFP is very broad, with more than 1.000 activities per year, including online training, in-company courses, and continuous enrolment courses. The training available through this centre is divided into:

- Specific training courses: short training activities that provide detailed knowledge on specific topics in different areas. For example, the course "Hydrogen as an energy v ector" was launched through the CFP as a blended specific training course in its 2nd edition (as the one offered in ASSET)
- Specific degrees: these are divided into Masters, specialisation diplomas, extension and university experts' diplomas. This type of training provides in-depth knowledge in a specific area and lasts between one and two years.
- Workshops and conferences.

One of the objectives of the CFP is to promote and collaborate with lecturers, departments, centres and other UPV bodies in the creation and development of training programmes, facilitating their dissemination and promotion in the socio-economic environment. Likewise, the CFP is open to society, trying to respond to its specific demands, being able to organise and promote the implementation of training courses, university diplomas and master's degrees through the specific demands of institutions and companies.

6.1.3 Policy Makers, Authorities, Societal actors and Professional Associations

Clean energy technologies, including energy storage, are key components of the sustainable energy system of the future. As energy storage technology accelerates, a highly skilled workforce along the whole value chain needs to be developed and strengthened. EASE is aware of such changes and challenges. During the events and policy actions, EASE brings together and gets voices from key players in energy to identify and pave the way for the development of the missing skills needed for a highly qualified workforce in energy storage. Europe will need a high skilled workforce from engineers to operators all along clean energy value chains: production, installation, operation, maintenance, etc.

EASE is contributing to this process and advocates for great educational platforms at the EU level to share the education and training possibilities on energy storage technologies all over Europe. EASE pushes education package and relevant initiatives that will strengthen the contribution of education and training to decarbonisation but also to the EU's recovery from the coronavirus crisis and help build a sustainable Europe.

EASE is also monitoring in setting out a vision of the European Education Area to be achieved by 2025, by voicing the Commission to propose new initiatives, more investment, and stronger cooperation of Member States to help all Europeans, of all ages, to benefit from the EU's rich education and training offer. In that sense, ASSET is contributing to this process of making education and training systems truly fit for decarbonisation age.

6.1.4 Cooperatives

Engaging citizens is one of the main challenges for policy makers in order to successfully tackle climate change effects and to implement a fair and inclusive energy transition process.

Nevertheless, citizens are often overwhelmed with technical and/or wrong information, without owning the necessary knowledge to appropriately understand the energy sector evolution and to give their contribution to the energy transition.

Energy cooperatives, like ENOSTRA and ECOPOWER, represent by definition a "community" and can act as a bridge between policy makers, research institutions, and business actors. Indeed, energy cooperatives gather citizens around a simple and common target: to enable them to self-produce and self-consume renewable energy.

But, at the same time, they work to raise awareness, through communication campaigns and dissemination events, and also promote and organize training activities for their members and for "energy citizens" in a large sense, to offer them reliable, simple and clear information.

Energy cooperatives make also lobby and advocacy activities, at national and local level as well as at the EU level, with the support of umbrella associations like REScoop.eu, in order to make citizens' voice heard in the European energy debate.

6.1.5 BRIDGE

BRIDGE https://www.h2020-bridge.eu/ is an EU initiative that aims at gathering the best outcomes and recommendations from the Horizon2020 projects, as the European Commission (EC) fosters cooperation/synergies. BRIDGE aims at fostering the exchange of information, experience, knowledge, and best practices among its members.

BRIDGE is a cooperation group involving 64 projects in the areas of Smart Grid, Energy Storage, Islands, and Digitalisation funded under the Horizon 2020 program. Overall, with its 64 projects, BRIDGE puts together **713 organisations from 38 countries.**

Their work is divided into different Working Groups (WG): Data Management, Business Models, Regulations and Customer engagement. We have presented our platform to the working group of Business models that has a task force that deals with sustainability and replicability of projects. We have presented ASSET to the BRIDGE family of projects and fostered networking activities with different stakeholders. We are confident these activities were fruitful, as this is also the “opening door” to reach all projects in BRIDGE. We have presented our project to BRIDGE management team and that helped us reach more people interested in our community.

Specifically, we have participated in a co-located event with all BRIDGE projects that are involved in the BRIDGE Task Force Scalability & Replicability meeting chaired by the FOSS-University of Cyprus. In this regard, ASSET presented the offering and plans during the meeting of March 9th 2021**.** We had the opportunity to present ASSET offering and goals, establishing good cooperation with BRIDGE members and its ecosystem.

6.1.6 PANTERA-EIRE

During the second year of the project, ASSET contacted the PANTERA project (https://pantera-platform.eu/) in order to seek collaboration opportunities. PANTERA is an EU project that will create a European Forum on energy-related issues. They are contributing to the energy transition and especially

to the EU energy targets. PANTERA will create a single point of reference for the Research & Innovation community such as policy makers, actors and experts active in the fields of smart grids, storage and local energy systems, via the EIRIE platform.

ASSET has set a unique strategy establishing fruitful cooperation with PANTERA **by publishing part of its marketplace with the complete learning offer of ASSET in the EIRE platform**. In this way, ASSET can contribute to the **establishment of a true Pan European energy community and make better energy-transition related courses** while ensuring everyone has access to them. PANTERA has already an R&I community open to all stakeholders and totally aligned with the ASSET community. Some of the benefits of joining PANTERA are peer-learning, networking with other EU projects and meeting new consortiums, participation in unique events, workshops, webinars, seek new business and research opportunities, etc.

People can become a member at the following link: https://pantera-platform.eu/european-interconnection-for-research-innovation-entrepreneurship-eirie/

Figure 18. PANTERA and ASSET cooperation

Overall, ASSET wants to contribute to the establishment of a true European energy community. The picture above shows the relevant news displayed on the ASSET website informing about the collaboration between the two projects[18].

[18] https://energytransition.academy/content/pantera-asset-tackle-together-energy-transition-challenges

7. Conclusion

The present deliverable offers ASSET project final exploitation and sustainability plans. The overall plans for having all the ASSET services available beyond the project have been covered throughout this document indicating our strategies.

The document explains the education market overview, presenting the market analysis, competitive analysis of new actors, and placing ASSET in the online educational MOOCs market. The document includes the market needs, ASSET value proposition, including the value proposition in general and per different stakeholders. It has presented the business model canvas, the assets (learning/MOOCs outcomes), sustainability and the final exploitation plans of the consortium members. The summary of the individual exploitation plans of all partners has also been updated using as a basis the list of expected outcomes of the project.

The sustainability strategy has been described and it is based on the ASSET ecosystem plans beyond the project timeline and ensured thanks to two main actors, the EU platforms EMMA and PANTERA-EIRIE. First of all, we have the EMMA platform https://platform.europeanmoocs.eu/ where ASSET courses will be available over time. Secondly, the ASSET offering is already placed in PAN European Technology Energy Research Approach, PANTERA-EIRIE platform as the learning offering has been replicated in that platform.

All services will be available at least for the next 5 years and based upon the demand of potential new students who will enrol in ASSET courses. At the same time, ASSET services will be maintained in PANTERA. During the next 7 years, this EU project will create a European Forum (with the support of JRC) on energy related issues. They are contributing to the energy transition and especially the EU energy targets. PANTERA will create a single point of reference for the Research & Innovation community such as policy makers, actors and experts active in the fields of smart grids, storage and local energy systems, via the EIRIE platform.

Moreover, we must mention that the ASSET partners have signed a Memorandum of Understanding, that regulates current and future offering and potential business scenarios. Also, they have agreed in continuing evolving the tools, MOOCs, learning graphs and services described. Few examples are UNIWA-UNINA will offer the same and new MOOC courses; UNIWA-OTEA-ATOS the learning graph tool and marketplace and UNIWA-RWTH-UNINA-AAU-UPV will seek mobility agreements.

At the moment of writing this report, we have **300 ASSET community members**, **22 courses** available as MOOCs, and plans for having a growing number for the ASSET MOOCs. There are over **1800 students enrolled in ASSET courses**. The number of learners who have gone beyond the registration is encouraging as many students are eager to get a certificate showing interest and involvement.

Also, the percentage of learners that have gained the EMMA certificate more than doubled compared to the first run. From the beginning of the ASSET project to April 2021, the EMMA platform had **121.587 visitors** and **861.161 pageviews** while ASSET courses had **14.149 visitors** and **64.543 page views.**

The ASSET offering is based on an online educational platform and its content has been already consumed and enjoyed by different stakeholders. The ASSET MOOCs, courses, and content are “up-and-running” and there are plans to maintain the offering thanks to EMMA and PANTERA-EIRIE platforms. These are key elements that will guarantee the sustainability and durability of our educational offering over time.

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9. Annexes

9.1 Tools and methodologies

The short description of the business analysis tools used for this report:

SWOT - is an acronym for strengths, weaknesses, opportunities, and threats analysis - and is a structured planning method that evaluates those four elements within our project.

Business Model Canvas - is a strategic management and lean template for developing new or documenting existing business models, the canvas allows users to describe, design, challenge, and pivot their own business model, and we have used in the context of the ASSET project. It is a visual chart with elements describing the value proposition, infrastructure, customers, and finances of a firm or a product. It assists firms in aligning their activities by illustrating potential trade-offs. The Business Model Canvas was initially proposed by Alexander Osterwalder.

Value Chain Analysis - is a set of activities and open questions for clarifying how ASSET can deliver a valuable product or services for the market and understanding the ecosystem and interactions.

9.2 Individual final Exploitation Plan

ASSET- Individual FINAL Exploitation Plan – questionnaire Individual Exploitation M1-M24. This sheet was provided for final path for exploitation linked to your institution goals within the project.

	QUESTIONS

8.1.3 PARTNER NAME

8.1.3.1 Overview

8.1.3.2 Current business model

8.1.3.3 ASSET business opportunity

8.1.3.4 What services can be offered by ASSET

Short description of key outcomes (asset, knowledge, component, etc.) to be exploited and the innovation potential/ Main features of the result/s

8.1.3.5 Potential addressable market & customers

- List here your markets/stakeholders

8.1.3.6 Timetable for exploitation

Approaching existing customers .....

8.1.3.7 Potential risks, barriers or limitations

8.1.3.8 IPR protection

Figure 19. Partner exploitation questionnaire template

9.3 Exploitable asset sheet

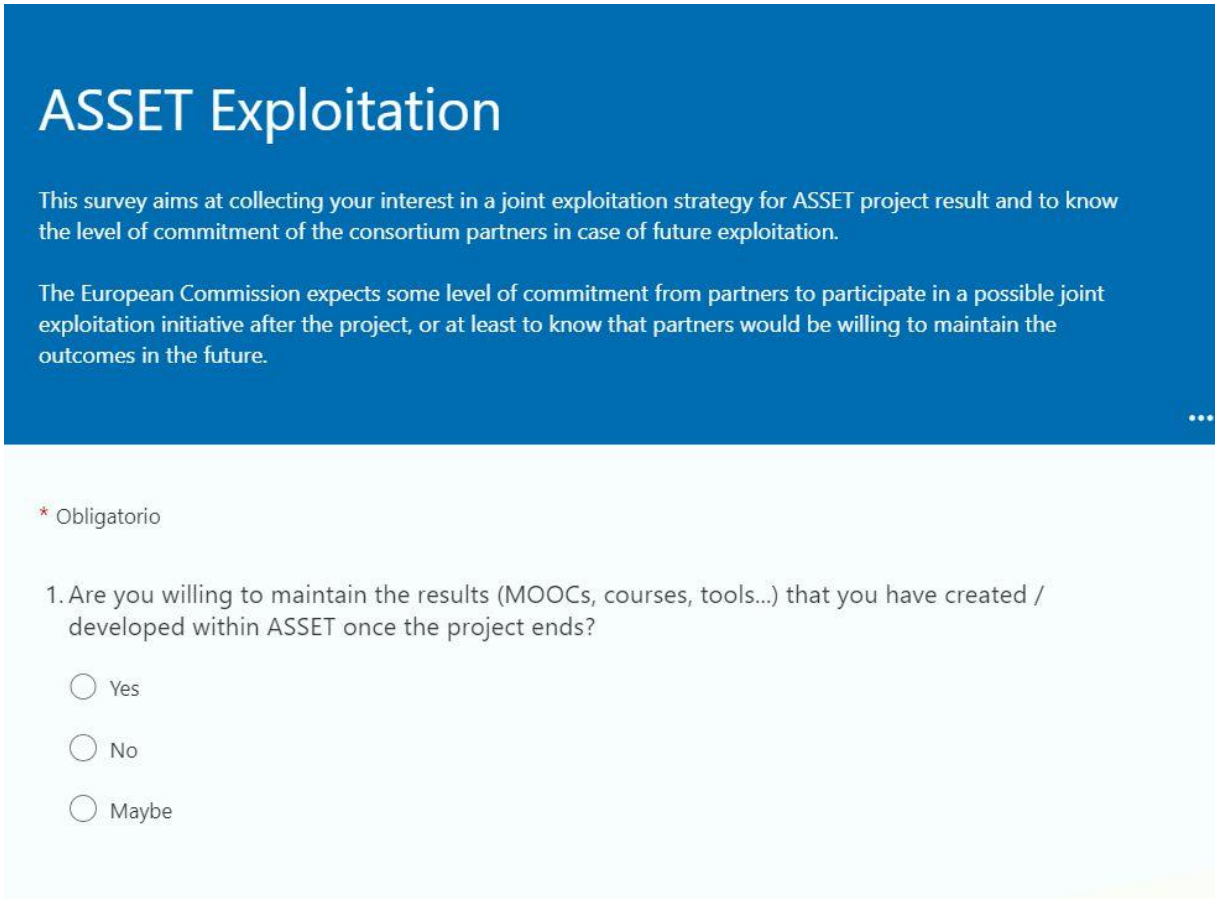
2 – name			
Leader	**License**	**TRL** (at the end of the project)	**Target TRL**
Partner name or names	Add license	Add nº	Add nº
Roadmap to progress the asset	• After ASSET project: o Explain strategy and plans		
Period that will be available	Add the number of years to be used the MOOCs, courses content – etc		
Revenue	Explain revenue streams, if any		
Risks / Barriers	Explain risks or barriers if any...		

Figure 20. Sample exploitable sheet

9.4 Sustainability and exploitation questionnaire

The ASSET form with questions was created with Microsoft form tool, answers were anonymous. A total of 11 respondents (all project partners) were asked to participate during January 2021 and the total number of responses are 100%. It is available in the following link

Below we find all the questions:



4. After the project, would you be willing to join the "ASSET community support team" to reply to requests or questions?

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ Sometimes
- ◯ Depending of new funding

5. Would you be willing to participate in promotional activities of ASSET ecosystem and community after the project ends?

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ If we get funding

8. Is there any partner/s of the project with whom you are interested in jointly exploiting some assets of the project?

   Please indicate which partner/s, which assets and the activities you plan to carry out for the joint exploitation

   Escriba su respuesta

9. Would you like to add any additional comment regarding ASSET Exploitation? Please, let me know your thoughts

   Escriba su respuesta

6. If you answered YES, in what type of activities are you willing to participate within the SUPPORT TEAM for the ASSET community? *

   - ◯ Content provider (New courses, webinars, MOOCs...)
   - ◯ Answering queries
   - ◯ Mailing list
   - ◯ Documents and content
   - ◯ No, I don't want to participate

7. If you answered YES before, what type of activities - you would be willing to participate to promote ASSET ecosystem and community (after the project ends)

   - ☐ Training
   - ☐ Dissemination
   - ☐ Workshops
   - ☐ Publications
   - ☐ Otras

8. Is there any partner/s of the project with whom you are interested in jointly exploiting some assets of the project?

   Please indicate which partner/s, which assets and the activities you plan to carry out for the joint exploitation

   Escriba su respuesta

9. Would you like to add any additional comment regarding ASSET Exploitation? Please, let me know your thoughts

   Escriba su respuesta

10. What is your overall experience in ASSET, can you please rate the level of cooperation among partners in this project? (internal evaluation)

    ☆ ☆ ☆ ☆ ☆

11. Could you please rate the level of cooperation with EXTERNAL stakeholders, i.e. projects, networking activities, training etc in this project?

    ☆ ☆ ☆ ☆ ☆

Enviar