SUSTAIN
Design Option Paper

SUpporting SMEs innovaTion in Adaptation to EU changINg standards

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This Design Options Paper was
prepared by the SUSTAIN project team.

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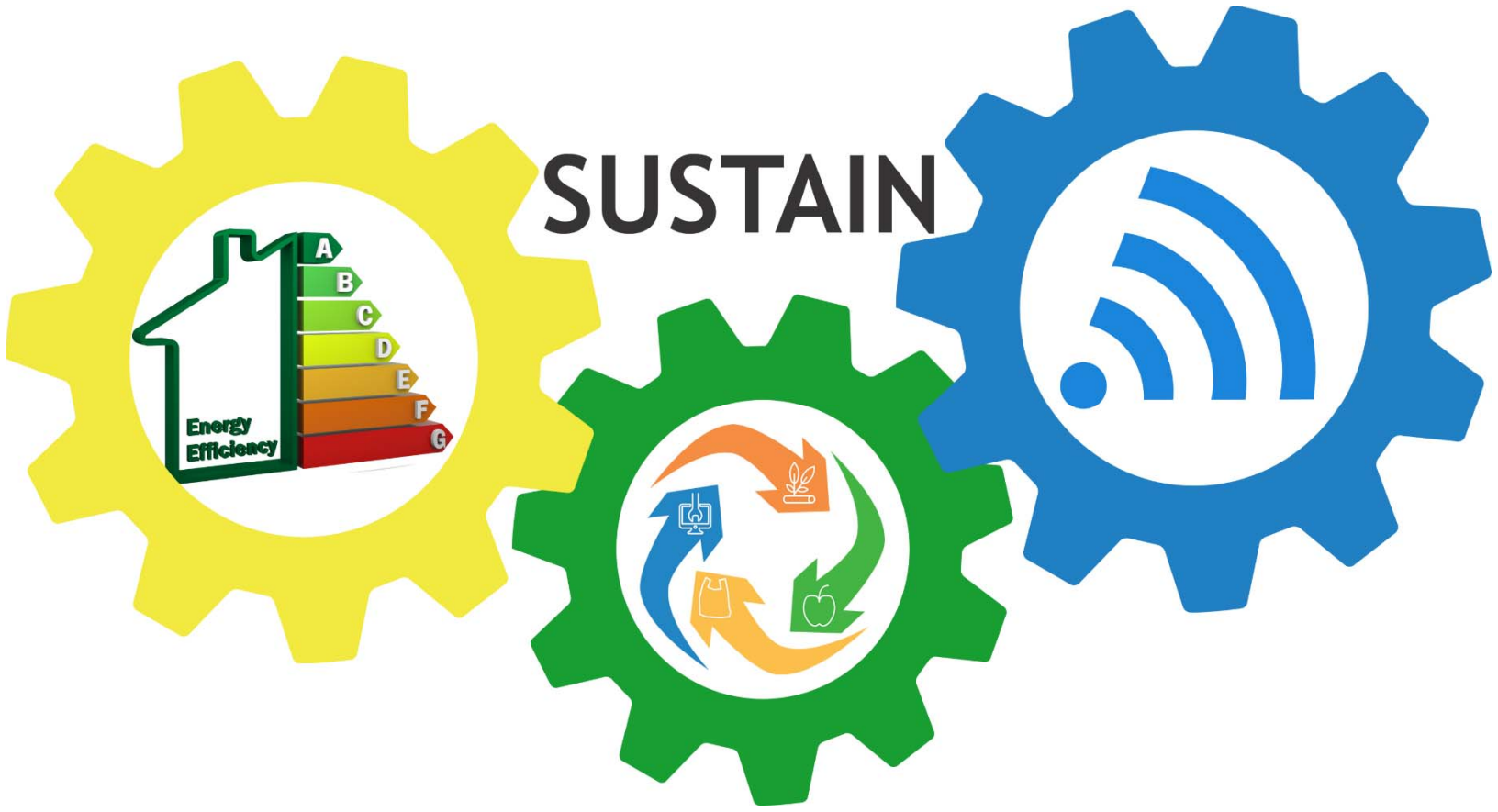
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Abbreviations

AI- Artificial intelligence

Accredia- The Italian national accreditation body

A.S.I.- Austrian Standards International

B2B- Business-to-business

BSO- Business support organization

CE- Circular economy

CEI- Italian Electrotechnical Committee

CEN- The European Committee for Standardization

CENELEC - The European Committee for Electrotechnical Standardization

DOP- Design Option Paper

EE- Energy efficiency

EFTA- The European Free Trade Association

EN- The European standards

EnMS- Energy Management System

ETSI- The European Telecommunications Standards Institute

EU- European Union

GHG-Greenhouse gas

ICT- Information and communication technology

IEC - International Electrotechnical Commission

IoT- Internet of things

ISBiH-The Institute for Standardization of Bosnia and Herzegovina

ISO- The International Organization for Standardization

MSP- Multi-Stakeholder Platform

NBS- National Standardization Body

ÖNORM- Austrian standards

PDCA- Plan - Do - Check – Act model

SBS- The Small Business Standards

SME - Small and medium sized enterprise

UNI- Italian Standardization Body

WKO- The Austrian Federal Economic Chamber

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1. Executive Summary

Project SUSTAIN aims to strengthen collaboration between the three innovation support agencies through peer learning, and raise their competences to support SMEs in adaptation to EU standards. This Design Option Paper (DOP) is a result of partners' collaboration to address how European SMEs can successfully adapt to EU standards, overcome barriers and difficulties related to process of using standards, and as a result, increase their competitiveness. The DOP should be viewed as a starting point for designing or reviewing a business support organization's (BSO) approach to support SMEs in standardization taking into account regional aspects and specific situation of the company. Peer learning partners developed the two-stage model supporting standardization of SMEs, consisting of the self-audit tool and standardization mechanism based on drivers, barriers and incentives to standardization. The model is based on theory of organizational change as a dynamic process characterized by continuous interaction between external and internal environment of the companies. The external and internal environment of companies produces various drivers and barriers that are key influences to changes that SMEs are undergoing. Incentives are complementary to drivers and barriers, acting to increase the impact of drivers while mitigating the impact of barriers. The model results in three types of outcomes: economic benefits for SMEs, customer benefits and environmental benefits. Special attention was dedicated to implementation of regional pilot actions including the following activities: development of self-audit tool in energy, circular economy and digitalization for SMEs; workshops tailored to needs of SMEs; knowledge exchange and transfer of best practices between project regions. Following the strategic priorities of European standardization, the partners focused on standards related to energy, circular economy and digitalization. Impact of the SUSTAIN project is evident in raising awareness and knowledge of SMEs on benefits of adoption and use of EU standards. Through peer learning activities, the project partners increased their knowledge and capacities to efficiently support SMEs on their path to adoption and use of EU standards.

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2. Introduction

The European Green Deal aims to make Europe the first climate-neutral continent by 2050, while increasing the competitiveness of the European industry, enabling sustainable use of resources and ensuring a just transition for the regions and workers involved. European new industrial strategy strives to make the EU a world leader in the circular economy and clean technologies, and to decarbonise energy-intensive industries. European standards have a major supportive role in pursuing of the European Commission objectives of smart, sustainable and inclusive growth, as they facilitate the implementation of relevant legislation by offering presumption of conformity to its essential requirements.

More than 21 million of micro, small and medium-sized enterprises were active in the EU in 2020.[1] The pre-pandemic performance of European SMEs was characterized by robust growth pattern, also notable throughout 2019. The pandemic had a major impact to SMEs on decreasing sales, operating at loss and supply chain disruptions throughout 2020 and 2021. SMEs are a crucial part of the European economy and have a critical role in growth and job creation, but their use of standards and involvement with standardization is typically low. Economic recovery following the Covid-19 pandemic is based on "green recovery" focused on decarbonization and energy transition. The new EU Strategy on Standardization[2] underlines the ability to develop international standards for digital products, processes and services as essential for the EU's competitiveness within global context.

Standards have important impact as a guarantee of a high level of quality, health and environmental safety to consumers and companies in global market. Well-functioning standardization system supports Europe to protect its advantage as a first mover and follow up on changes and opportunities in market development. Standards create a stable basis for investing in new technologies and digitalization of production processes. The priorities for European standardization for 2021 are focused on the development of European standards in support of the transitions towards climate neutrality, digital leadership and on strengthening the recovery and resilience of European industry.[3]

Energy transition will have an important effect on SMEs' operations. SMEs will be requested to engage in decarbonization activities, what is especially relevant for export-oriented SMEs. Improving energy efficiency, introducing appropriate energy management practices, use of

[1] Annual report on European SMEs, European Commission, 2020-2021.
[2] An EU Strategy on Standardisation: Setting global standards in support of a resilient, green and digital EU single market, COM(2022) 31 final
[3] Annual Union work programme for European standardization for 2021, (2020/C 437/02)

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renewable energy sources for own energy production can alleviate risks of electricity price spikes and support energy sustainability. Circular economy introduction gives a focus to reduction of waste, extension and optimization of product life cycle, recycling, recovery and sustainable product design. Circular economy as a renewable industrial system is oriented towards product design aiming not only to extend the products lifecycle to reduce pollution and waste generation, but also to reduce energy consumption, contribute to environmental protection and create green jobs. The estimation is that prevention of waste generation, introduction of ecological design and reuse of waste, could bring to EU businesses net savings of €600 billion or 8% of annual turnover.[4] Fourth industrial revolution refers to a further development stage involving digital transformation of the entire value chain process in manufacturing industry. This trend is still in early stage in some industrial sectors, but in others the transformation is already well under way. During the pandemic SMEs increased use of digital technologies, especially in terms of web-based selling and use of teleconferencing tools.[5] Digitization is driven by needs of individual industrial sectors to increase their performance but also by expectations of their clients and suppliers.

In this document we focus on areas of energy efficiency, circular economy and digitalization, following the strategic priorities of European standardization. Introducing standards contributes to competitiveness and innovativeness of SMEs, enabling companies an access to state-of-the-art technology; demonstrating the quality of products and services; bringing products onto the market because conformity to standards may be a mean to demonstrate conformity to legal requirements; provides success with products as they meet customers' wishes and are compatible with other products. There are substantial benefits for SMEs that are using standards supporting access to global markets. SMEs can use established standards in development of new products in order to reduce resources spent on research and development and improve their ability to innovate. SMEs can reach new customers and retain existing ones by proving they comply with the standards and demonstrating the quality of their products.

This Design Option Paper (DOP) is a result of joint effort of involved innovation support agencies to address how European SMEs can successfully adapt to EU standards, overcome barriers and difficulties related to process of using standards, and as a result, increase their competitiveness. This paper should be viewed as a starting point for designing or reviewing a business support organization's approach to support SMEs in standardization taking into account regional characteristics and particular situation of the company.

[4]Circular Economy Package: Questions & Answers, 2015
https://ec.europa.eu/commission/presscorner/detail/en/MEMO_15_6204
[5] Annual report on European SMEs, European Commission, 2020-2021.

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3. Terms and definitions

3.1 European and international standardization system

Standardization plays a fundamental role for many sectors as it provides prompt solutions to adapt to continuous market changes and improve competitiveness. The European Standards Bodies (CEN, CENELEC and ETSI) define a Standard as a document, established by consensus of all interested parties and approved by a recognized body that provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context[6].

A European Standard (EN) is implemented by the national CEN and CENELEC Members as a national standard, and thus is included in the standards catalogue of CEN and CENELEC's Members, the National Standardization Organizations from 34 countries. European standardisation system operates within an increasingly competitive global context.

The **European Committee for Standardization (CEN)** is one of three European Standardization Bodies (together with CENELEC and ETSI) that have been officially recognized by the European Union and by the European Free Trade Association (EFTA) as being responsible for developing and defining voluntary standards at European level. CEN's National Members are the National Standardization Bodies (NSBs) of the 27 European Union countries in addition with United Kingdom, the Republic of North Macedonia, Serbia, Turkey and three countries of the European Free Trade Association (Iceland, Norway and Switzerland). [7]

The **European Committee for Electrotechnical Standardization (CENELEC)** as an association brings together the National Electrotechnical Committees of 34 European countries. CENELEC is involved in preparation of voluntary standards in the electrotechnical field helping to facilitate trade between countries, establish new markets, reduce compliance costs and support the development of a Single European Market.[8]

The **European Telecommunications Standards Institute (ETSI)** is a recognized European standards body dealing with telecommunications, broadcasting and other electronic communications networks and services, involving more than 900 member organizations from over 60 countries.[9]

[6] https://www.cencenelec.eu/european-standardization/european-standards/
[7] https://www.cencenelec.eu/about-cen/
[8] https://www.cencenelec.eu/about-cenelec/
[9] https://www.etsi.org/about

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The **Small Business Standards (SBS)** represents a European non-profit association co-funded by the European Commission and EFTA Member States. It represents and defends SMEs' interests in the standardisation process at European and international levels. SBS aims at raising awareness of SMEs about the benefits of standards and at encouraging them to get involved in the standardisation process.[10] SBS was established to support the European Union's aspiration to make the standardisation system as inclusive, transparent and open as possible in line with the Regulation 1025/2012 on the European Standardisation System.

The **International Organization for Standardization (ISO)** is an independent, non-governmental international organization with a membership of 165 national standards bodies, bringing together through its members, experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges.[11]

Standard denotes a consensus-built, repeatable way of doing something. The development of a European Standard is guided by the principles of consensus, openness, transparency, national commitment and technical coherence. Standards are developed by bringing together all interested stakeholders such as regulators, producers and consumers of a particular material, product, process or service; on basis of consolidated results of science, technology and experiences, and aimed at the promotion of optimal benefits for communities. Standardization brings benefits for all involved parties through product safety and quality as well as lower transaction costs and prices. A well functioning standardization system provides opportunity for Europe to preserve its advantage and adapt to rapid changes in markets development. Standards offer to manufacturers a solid basis for investing in new technologies and introduction of digitalization to manufacturing process.

European standardization system is based on public-private partnership involving the Commission and the standardization community. This system is characterized by use of harmonized European standards that are developed or revised on basis of request by the Commission to apply Union harmonization legislation.[12] Upon adoption, the standard becomes a part of Union legislation. Standard, when applied, provides producers with presumption of conformity of their products with the requirements of EU legislation. This reduces costs of producers, allowing small and medium-sized enterprises to introduce products in compliance with EU legislation to the market without additional costs. European Standards must be appropriatelly transposed into national standards in all EU member states which have to

[10] https://www.sbs-sme.eu/who-are-we
[11] https://www.iso.org/about-us.html
[12] Annual Union work programme for European standardization for 2020, COM (2019) 486

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withdraw any conflicting national standard, as the EN prevails over any national standard. This provides the producers an easier access to the European market.

The new EU Strategy on Standardization[13] emphasizes the ability to develop international standards for digital products, processes and services as global benchmarks as essential for the EU's competitiveness within global context. In order for the EU's policy ambitions on a resilient, green and digital economy to accomplish, accompanying standards embeded in policy objectives should be usable, effective and useful along industrial value chains including SMEs.

Among strategic priorities for the European standardization system for 2020 are emphasized the artificial inteligence (AI), internet of things (IoT), cybersecurity, automated mobility, technologies reducing GHG emissions and transition to low-carbon economy. The priorities of European standardization for 2021 are focused on digital and green transition, as well as strengthening recovery and resilience of the European industry.[14]

The Directive 2009/125/EC on ecodesign and Regulation (EU) 2017/1369 on energy labelling contributed to substantial energy savings over the past decade by ensuring that more durable and long-lasting products are introducted to the European market. Ecodesign establishes minimum thresholds for products to comply with energy efficiency and material efficiency requirements. On the other hand, energy labels contributes to attracting consumers towards the most energy efficient products. In this context, the Commission will continue to request further development of standards in support of several product-specific ecodesign and energy labelling requirements as well as propose the development of standards to measure the energy performance of the specific product categories[15]. In terms of circular economy, European standardization will support the objectives of the European Green Deal regarding decarbonisation of transport, alternative fuel infrastructures, and recovery of the mobility ecosystem.

3.2 Regional standardization systems in project territories

This section presents to readers organization of standardization systems in three project regions: Austria, Italy and Bosnia and Herzegovina.

[13] An EU Strategy on Standardisation: Setting global standards in support of a resilient, green and digital EU single market, COM(2022) 31 final
[14] Annual Union work programme for European standardisation for 2021, (2020/C 437/02)
[15] Annual Union work programme for European standardization for 2020, pg.5 Actions 1-5

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3.3 Austria

There are three major actors that support SMEs in standardization processes in Austria: chambers for various industrial sectors, consulting companies and personal responsibility of the SME's manager. Almost every industrial sector has a specific chamber representation. These chambers provide information about new laws and changes occurring within the specific sectors. For instance, chambers provide legal advices to their members, organise public presentations and create sample contracts. For complex topics SMEs typically engage consulting company with expert knowledge on changes regarding laws/standards and related issues. At the bottom line, it is up to the responsible managers that SMEs' operations are conformable to the law and regulations. In the process of updating knowledge SMEs' managers are supported by the special sectoral journals to stay abreast of new legal requirements. Many perceive "standards" as regulations, undifferentiated whether they are laws, real ÖNORMEN[16] or standards published by other bodies. The exact definition of the term standard can be found in ÖVE/ÖNORM EN 45020: "Document drawn up with general approval and adopted by a recognised standardisation body, laying down, for general and recurring use, rules, guidelines or characteristics for activities or their results." In Austria participation to standardisation is voluntary and, according to NormG 2016, no participation fee may be charged for this participation. According to NormG 2016 and GO 2018 of the A.S.I., cooperation is open to all competent persons belonging to the interested parties - i.e. in particular companies and social partners.[17]

Austrian Standards International – Standardisation and Innovation (A.S.I.)

A.S.I. is a non-profit, non-governmental organization (association); founded in 1920. It provides an impartial platform for the creation of standards and specifications and is a gateway for Austrian experts to participate in international and European standardization (ISO and CEN).
Approximately 4,100 experts from companies, authorities, science, inspection bodies and non-governmental organisations participate in 150 national Technical Committees with about 260 Working Groups. They take part in the work of nearly 90 percent of ISO and CEN technical committees.
A.S.I. also provides direct access to the more than 23,000 Austrian standards (ÖNORM) including all European Standards (in English and German language), to all International Standards and to normative documents from all around the world. It provides tools for managing standards

[16] The acronym ÖNORM designates a national standard published by the Austrian Standards International and applicable to Austria.
[17] https://www.wko.at/service/innovation-technologie-digitalisierung/grundlagen-der-normung-in-oesterreich.html

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professionally, certification (of products, services and persons), seminars and courses as well as technical literature. Austrian Standards International is open to new approaches in standards development (e.g. co-creation and open innovation), to the subjects of the future (e.g. IoT, Industry 4.0 and blockchains) and to new co-operations and partnerships.[18]

Austrian Federal Economic Chamber (WKO)

The WKO is a public corporation. It coordinates the activities of the provincial chambers, the statutory interest groups of the commercial business community. The WKO represents the interests of Austrian companies at all levels of government. Government is required by the law to consult the chambers on proposed legislation and important regulations. A number of laws account for the chambers' participation in decision-making and administrative procedures. The WKO provides information and advice service for its members on topics of taxation, labour law, vocational training, sector-specific legislation, sector-wide advertising and market research.

3.4 Italy

In Italy the organisations in charge for the standardization activity are UNI, the Italian Standardization body, and CEI, the Italian Electrotechnical Committee. Both of them are called to study, define, share and establish technical standards, which are voluntary applications defined by Art. 2 of EU Regulation 1025/2012. These organisations operate their activities under the supervision of the Ministry of Economic Development in accordance with the Regulation (EU) 1025/2012 and Legislative Decree 223/2017.

Standards identify how to operate in order to perform quality and safety for a wide range of items, such as services, processes, products, materials, organisations, etc.

Technical standardization is one of the four pillars that represent the general framework for quality, security and competitiveness. The other three are metrology, conformity assessment and accreditation.

The Italian system is consistent with the European model based on the so called "New Approach" Directives. This approach, firstly developed in 1985, aimed at narrowing the contents of legislation to more general and principle requirements, leaving more specific and technical aspects to European harmonised standards. This led to the development of EU standardization policy and conformity assessment tools. In 2008, this approach was further enhanced thanks to

[18] https://www.iso.org/member/1529.html

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the New Legislative Framework, a package completing the conformity assessment, accreditation scheme, market surveillance, clarification on the CE marking, etc.

UNI Ente Italiano di Normazione (Italian Standardization Body)

UNI is a private association founded in 1921: in 2021 it celebrated 100 years of activity. Its mission is to develop technical standards in all the economic sectors (trade, industry, services) apart from the electrical and electrotechnical domains.
UNI represents a multi-stakeholder platform where a wide range of actors, such as private companies, research centres, public organisations etc, provide inputs to achieve shared technical views at national level. UNI represents Italy at the European standardization organisation (CEN) and the international (ISO).
UNI performs the following activities:

i. establishing technical standards (technical specifications and technical rules), codifying the state of the art of a product, service, process, profession;
ii. defining reference practices, intended as pre-standardization documents quickly elaborated in a restricted table:
iii. developing CEN Workshop Agreements, para-normative documents that intercept emerging issues at European level.

CEI Comitato Elettrotecnico Italiano (Italian Electrotechnical Committee)

CEI, being a non-profit private law association, is responsible at national level for technical standardization in the electrotechnical, electronic and telecommunications domains, with a direct participation – as representative of Italy - in the European standardization organization (CENELEC - Comité Européen de Normalization Electrotechnique) and international (IEC - International Electrotechnical Commission).
CEI, established in 1909, proposes, elaborates, publishes and disseminates technical standards that constitute the reference for the presumption of conformity to the "rule of the art" of products, processes, electrical systems and installations.
CEI coordinates and carries out the following activities (*extract from the CEI Statute*):

- develop, publish, promote and disseminate the technical standards in the electrotechnical, electronic and telecommunications sector for materials, appliances, machines, plants, processes and their programs, establishing the related quality and safety requirements;

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- provide for symbology, nomenclature, terminology and unification in the areas of competence;
- establish criteria, test methods and limits aimed at achieving adequate levels of safety, reliability and quality of products or processes, as well as to elaborate rules and procedures for tests and controls of compliance with technical standards; establish evaluation criteria for laboratories, manufacturers, individual operators, for the purpose of their accreditation by the competent bodies;
- study the problems of a scientific and technological nature related to the needs of use, operation, safety of products in the electrical, electronic and telecommunications sector, spreading their knowledge and national use;
- promoting and developing technical culture with various types of training and information activities, with complementary documentary and editorial initiatives, also through training courses, conferences, seminars and with the support of manuals, guides, application software and technical commentaries;
- promote and encourage certification activities;
- participate in the activities of international standardization organizations, making the harmonization of technical standards operational and deliberate on regulatory projects in order to fulfil the mandates received according to Community policies.

Within CEI, several Technical Committees are working to discuss, elaborate and validate regulatory documents such as standards and technical guides.

ACCREDIA

Accredia is the national accreditation body appointed by the Italian government in compliance with the application of the European Regulation 765/2008, attesting the competence, independence and impartiality of certification, inspection and verification bodies, as well as testing and calibration laboratories. Accredia is a recognized non-profit association under the vigilance of the Ministry of Economic Development.
Accredia is composed of three departments: Certification and Inspection, Testing Laboratories, Calibration Laboratories, and it carries out a surveillance activity of all accredited bodies that have to fulfil all the requirements of the standards to undertake conformity assessment activities.

It is worth mentioning the framework agreement between Unioncamere, which is the national union of chambers of commerce, and UNI: thanks to the agreement, a mutual and long-lasting cooperation between the two organisations has been implemented, in order to facilitate a continuous flow of information on standardization for the benefit of companies, SMEs, professionals, public administrations and all the actors interested in the field of voluntary

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standards. Chambers of commerce represent a physical access point to the 20.000 technical standards contained in the UNI catalogue (UNI, UNI ISO, UNI EN standards). They also jointly organize events, workshops and other initiatives aimed at spreading knowledge on standardization as an important step toward the increase of SMEs competitiveness.

3.5 Bosnia and Herzegovina

Standardisation system in Bosnia and Herzegovina is governed by the laws of Bosnia and Herzegovina and Republika Srpska. The Law on Standardisation of Bosnia and Herzegovina defines and establishes the competencies of the state and entity institutions responsible for standardisation. The same law stipulates equal participation of both entities in management of the Institute for Standardization, in the work of the Council for Standardization, as well as in the distribution and operation of technical committees. The Federation of Bosnia and Herzegovina has not chosen to enact laws and establish its institution for standardisation. Compliance of the interests of both entities in the area of standardization is done through the Council for Standardization. Members of the Council are nominated from a line of prominent experts from different branches of standardization. In exercising its competencies, the Council acts in accordance with the Law on Standardization of Bosnia and Herzegovina and other laws relating to the work of the Council. Bosnia and Herzegovina authorities have, under the Stabilization and Association Agreement between EU and BiH, undertaken the necessary measures to gradually achieve compliance with EU technical regulations and European standardization, metrology, accreditation and conformity assessment procedures. Essential prerequisites for eliminating technical barriers to trade and costs that demanding EU technical regulations impose to exporting companies from BiH are clearly defined applicable regulations, accompanying standards and their compliance with the EU regulations while ensuring high level of protection and security, life and health of people, plants and animals, protection of the environment and consumers, which is also the requirement of the CEFTA 2006 Agreement, but also the World Trade Organization (WTO). Competitiveness of BiH SMEs is directly related to their ability to produce and place on the market safe and quality products in compliance with applicable regulations. The availability of valid regulations on products and services and related standards represents a significant precondition for advancement of local economy, export growth and foreign investments, and more efficient consumer protection.

The **Institute for Standardization of Bosnia and Herzegovina (ISBiH)**, as a state scientific and professional institution, is responsible to: a) In the field of standardization: propose standardization strategy in Bosnia and Herzegovina, prepare and publish BiH standards, represent Bosnia and Herzegovina in international and other inter-state organizations for

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standardization, as well as to perform tasks arising from international agreements and membership in these organizations, participate in the preparation of technical regulations, develop and establish an information system on standards and other related documents, promote BiH standards, organize and conduct specialized training of personnel in the field of standardization and is engaged in publishing activity in the field of standardization; b) In the field of conformity assessment: participate in establishing and maintaining a system of certification and homologation in accordance with the European model, represent Bosnia and Herzegovina in European and international organizations for conformity assessment (EOTC and EUROLAB, etc.) until the establishment of associations of testing and calibration laboratories, and organize education in the area of conformity assessment.[19] Objectives of standardization in Bosnia and Herzegovina are as following: enhancing international trade by preventing or by removing barriers; increasing the level of safety of products and processes; protecting people's health and lives and protecting the environment; improving the quality of products, processes and services; improving the overall utilisation of work, materials and energy; improving production performance.

In order to improve the standardization aspects, the Institute for Standardization of BiH works on introduction of new technologies, i.e. improving the process of digital transformation. The standards management information system has been improved and one of the results achieved is online access to drafted BAS standards that are at the public hearing. During the public hearing before final approval, BAS standards are in the draft stage. The period of public discussion is the opportunity to involve interested parties that are not actively involved in the adoption of standards, and want to find out and comment on the content of certain BAS standard. Thus, by introducing an online access service to draft BAS standards at a public hearing, the Institute for Standardization of BiH has enabled all interested parties in Bosnia and Herzegovina, including small and medium-sized enterprises (SMEs), consumer associations, NGOs and other professional associations, to participate in the public debate.

ISBiH differentiates the following types of standards: a) Basic standard that has a wide-ranging coverage or contains general provisions for one particular field. A basic standard may function as a standard for direct application or as a basis for other standards; b) Terminology standard that is concerned with terms, usually accompanied by their definitions and, sometimes by explanatory notes, illustrations, examples, etc.; c) Testing standard concerned with test methods, sometimes supplemented with other provisions related to testing, such as sampling, use of statistical methods, sequence of tests; d) Product standard that specifies requirements to be fulfilled by a product or a group of products, to establish its fitness for purpose; e) Process standard that

[19] https://isbih.gov.ba/en/p/zakonska-osnova-i-nadleznosti

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specifies requirements to be fulfilled by a process, to establish its fitness for purpose; f) Service standard that specifies requirements to be fulfilled by a service to establish its fitness for purpose; g) Interface standard specifies requirements concerned with the compatibility of products or systems at their points of interconnection; h) Standard on data to be provided contains a list of characteristics for which values or other data are to be stated for specifying the product, process or service.

The **Republika Srpska Institute for standardization and metrology** is a governing organization within the Ministry of Economy and Entrepreneurship of Republika Srpska, responsible for the areas of standardization, metrology and control of products from precious metals, as well as for the product compliance activities on the territory of the Republika Srpska. The Institute performs professional and administrative activities according to the legislation of Republika Srpska and Bosnia and Herzegovina and good European and international practices in the field of standardization and metrology. The Institute provides assistance in implementation of standards, provides information and educates stakeholders in the field of standardization.

The **Commission for Standardization of Republika Srpska** is the subject of standardization in Republika Srpska, whose work is funded by the RS Institute for Standardization and Metrology. The Commission performs the following tasks: a) regulates preparation, adoption and publication of Republika Srpska standards (SRS standards), b) proposes the establishment of permanent and temporary professional bodies for standardization in Republika Srpska and Bosnia and Herzegovina, c) defines programs and work plans in the field of standardization in Republika Srpska and follows their realization, d) cooperates with the Council for Standardization of Bosnia and Herzegovina and other professional working bodies of the Institute for Standardization of Bosnia and Herzegovina, e) performs other tasks in the field of standardization in accordance with the law.

The Institute for Standardization of Bosnia and Herzegovina has introduced some initiatives to promote the benefits of standards and standardisation to SMEs, mainly promotional campaigns and trainings on irregular basis. Financial support for implementing standards is provided at the entity level. Federation of Bosnia and Herzegovina (FBiH) supports the implementation of international quality standards through annual grants. Republika Srpska offers funds for standardization in specific sectors, such as metal and wood processing.

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4. Energy efficiency and standards

With the introduction of the European Commission's Green Deal policy programme in 2019, the EU has set to drive energy transition. Climate action has become the number one priority for the Union, with the goal of becoming the first climate-neutral continent by 2050. The energy transition is a long-term structural transformation of the current conventional energy system based on the use of fossil fuels, to a new system based on production from renewable energy sources, electrification of transport and heating systems and increasing energy efficiency (EE) throughout the energy production/transmission/distribution/consumption chain. In addition to the impact on companies in the electricity and energy sectors, the transition will have an impact on energy users; SMEs and citizens that will ultimately bear the transition costs. Energy transition will have its effects on SMEs' operations. SMEs will be required to engage in decarbonization of their operations, which is especially relevant for SMEs that are export oriented.

The deficit in supply of natural gas to Europe and an enormous increase in its price has reflected to dramatic increase of electricity prices across the region. Dramatic rise of prices in a short time for SMEs as commercial users stimulates SMEs' interest for decarbonisation - improving energy efficiency, introducing energy management and producing electricity for own consumption, to mitigate the risk of electricity price spikes. It is necessary to establish infrastructure of institutions and organisations that will provide the necessary support for successful implementation of decarbonization of SMEs' operations. Decarbonization represents an opportunity not only to improve energy efficiency and use of renewable energy, but for introduction of more efficient management of production and business processes, as well as increase of productivity and competitiveness of SME. Decarbonization becomes an imperative for SMEs exporting to the EU, and an important aspect and all companies operating along the value chains of products exported to the EU.

Energy efficiency represents an important element of energy and environmental policy. Improving energy efficiency means reduction in energy losses without losing comfort, standard of living and/or economic activity, and can be achieved in the field of energy production and/or in the field of energy consumption. Energy efficiency implies use of less energy to get the same or better level of energy services.

The European Union adopted in 2006 the Directive 2006/32/EC on energy end-use efficiency and energy services regulating the use of energy in industry, which requires the development of energy efficiency related standards. Based on the Directive 2006/32/EC, the European Committee for Standardisation adopted in 2009 the standard EN 16001:2009 Energy Management Systems. This standard specifies requirements for establishing, implementing, maintaining and improving an energy management system. The adoption of EN 16001:2009 contributes to the setting up of a continuous improvement process leading to cost reductions,

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strengthening of competitiveness and continual improvement of energy use and business performance. The standard is intended for all types and sizes of organizations, and can be used independently or integrated with any other management system such as those for quality, environment and occupational health and safety management.

The ISO's Project Committee 242 Energy Management adopted a proposal for ISO 50001:2011 Energy management systems standard. This international standard specifies energy management system requirements upon which an organization can develop and implement an energy policy, establish objectives, targets, and action plans which take into account legal requirements and information related to significant energy use.

Energy management standards are based on the Plan - Do - Check - Act (PDCA) continual improvement model and incorporate energy management into everyday organizational practices. The PDCA model can be outlined as four basic steps[20] (Figure 1.):

I. Plan: conduct the energy review and establish the baseline, energy performance indicators (EnPIs), objectives, targets and action plans necessary to deliver results that will improve energy performance in accordance with the organization's energy policy;
II. Do: implement the energy management action plans;
III. Check: monitor and measure processes and the key characteristics of operations that determine energy performance against the energy policy and objectives, and report the results;
IV. Act: take actions to continually improve energy performance and the energy management system.

The PDCA cycle brings a framework for the continuous improvement of processes or systems. It creates a dynamic model - the results of one cycle forms the basis for the next one. This structure enables an organization to continuously reassess and optimise the current energy consumption and gradually reduce costs.

The basic steps of energy management system are energy policy, energy planning, implementation and operation, checking (monitoring measurement and analysis as well as internal audit of the EnMS), eventual corrective and preventive actions, management review closing the cycle of continual energy management improvements (Figure 2).

Organizations have reported the following benefits from implementation of energy management standards: energy cost savings, reduced greenhouse-gas emissions, reduced carbon footprint, increased energy awareness among staff, greater knowledge of equipment efficiencies, informed decision-making processes. Energy management systems support improvement of energy

[20] https://www.iso.org/obp/ui/#iso:std:iso:50001:ed-1:v1:en:fig:1

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efficiency in companies and organisations by enabling exploitation of achieved energy saving potential. The resulting cost reductions help to strengthen the SME's competitiveness.

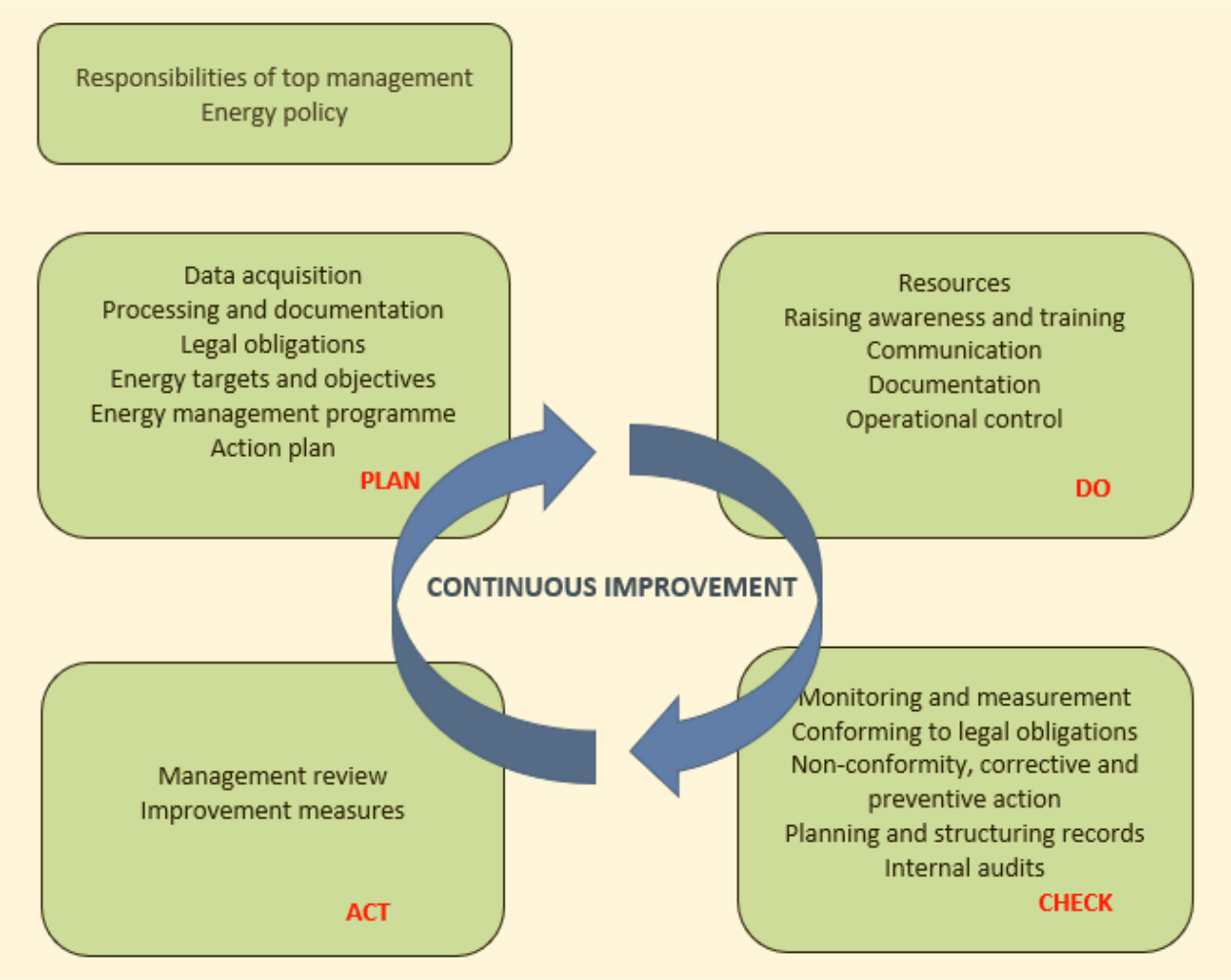

Figure 1 PDCA cycle[21]

Standards in relation to energy conservation are beneficial for organizations, as they provide a framework of requirements to implement more efficient use of energy, fix related targets and objectives to meet the energy policies, use data to better understand and make decisions about energy use.

[21] DIN EN 16001: Energy Management Systems in Practice, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), June 2010

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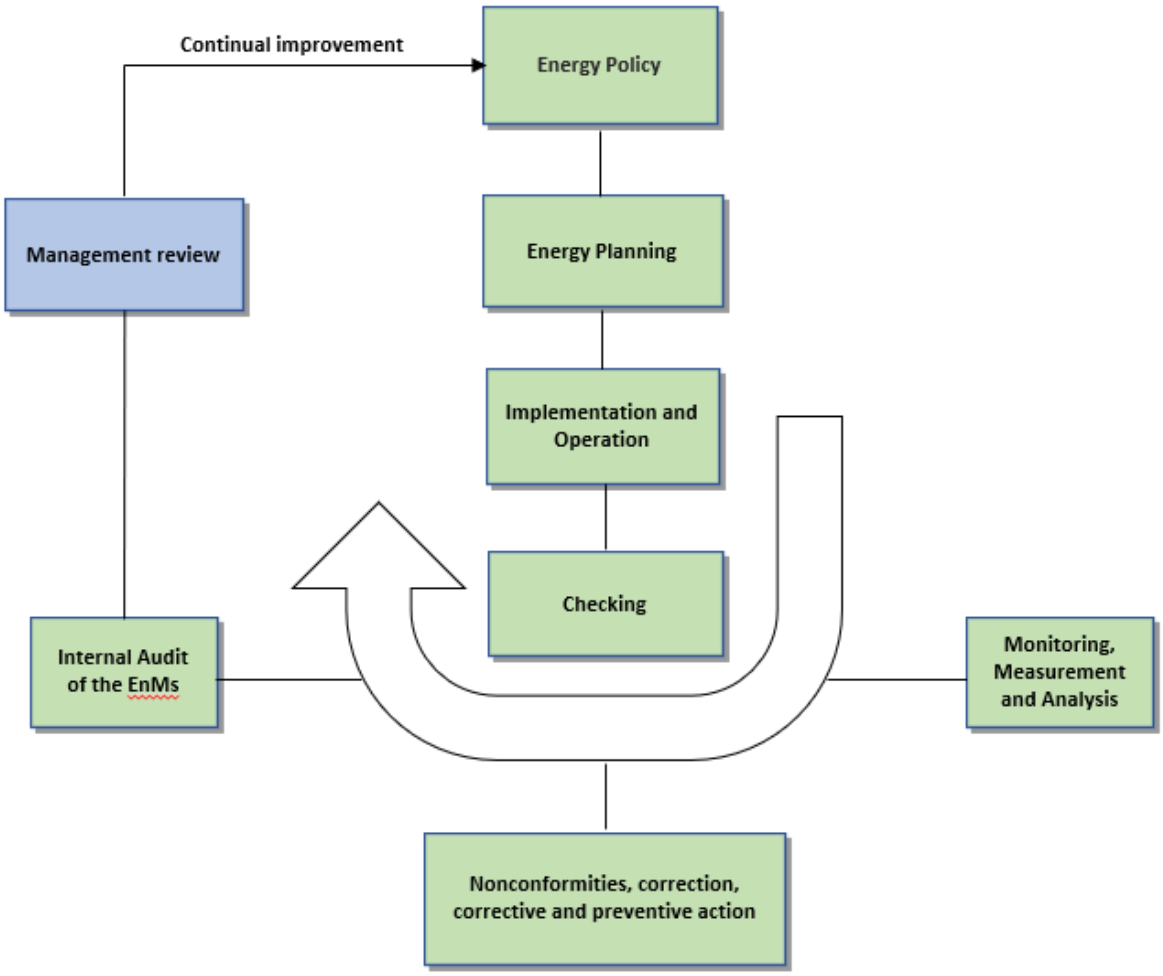

Figure 2 Energy management system model

The EU energy labelling and eco-design legislation supports improvement of energy efficiency of products on the EU market. Eco-design legislation establishes the common EU minimum standards to eliminate the least performing products of the market. The energy labels provide an indication of the energy efficiency and other key characteristics of products allowing consumers to save money on energy bills and contribute to reducing greenhouse gas emissions. The EU legislation for energy labels and eco-design has been estimated to bring energy savings of approximately 230 million tonnes of oil equivalent (Mtoe) by 2030. This means an average saving of up to €285 per year for a household energy bills. Energy efficiency measures have been estimated to bring €66 billion of additional revenue for European companies[22]. In 2019 the

[22] https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/about_en#Energylabels

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energy label was recognised by 93% of consumers and 79% considered it when buying energy efficient products. [23] Thus, producers are motivated to place their energy-labelled products in the highest available category in comparison to competition. SMEs will face increased pressure from partners along their supply chain to produce or provide products which meet sustainability requirements.

5. Circular economy and standards

To achieve the goal of climate neutrality by 2050, the circular economy should be seen as a further approach to be pursued alongside the energy efficiency. In this way, resources that are only available in limited quantities can be used efficiently and sparingly or even reused. The circular economy notion needs to be clearly defined in order to address the barriers and opportunities in relation to SMEs and standardisation pertaining circular economy. The linear economy as a one-way production model has been the norm that dominated global manufacturing since the onset of industrial revolution. The linear economy is depicted by the Ellen MacArthur Foundation[24] as a "take-make-dispose" system, where "take" stands for extraction, "make" for production and "dispose" for the disposal of finite resources. In contrast to the traditional notion of linear economy, the circular economy model advocates a return to nature and reuse of what has already been exploited. The main benefits of this model are economic savings, new jobs, resources and energy savings and contribution to climate change mitigation.

The circular economy as a concept has been known since the 1980s. Since then the term has grown in importance and new definitions have emerged. The Ellen MacArthur Foundation describes the circular economy as "a system solution framework that addresses global challenges such as climate change, biodiversity loss, waste and pollution[25]. It is based on the three important principles: eliminating waste and pollution, circulating products and materials (to their highest value), and regenerating nature. The circular economy seeks to gradually separate economic activity from the consumption of limited resources, with the ultimate goal of achieving a zero-waste economy. The circular economy is a production and consumption model which includes sharing, reuse, repair, restoration and recycling of existing materials and products, keeping their value at the highest levels as long as it is possible.

[23] Special Eurobarometer 492, 2019
[24] Ellen MacArthur Foundation, Towards a circular economy: Business rationale for an accelerated transition, 2015.
[25] Ellen MacArthur Foundation, Finding a common language — the circular economy glossary, available at https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/glossary

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The European Commission in 2015 adopted the first circular economy action plan including measures to support Europe's transition towards a circular economy, increase competitiveness, foster sustainable economic growth and generate new jobs. In 2019 the Commission adopted the European Green Deal as a set of policy initiatives aiming to make the European Union climate neutral in 2050. In 2020 the Commission adopted the new circular economy action plan as one of the main building blocks of the European Green Deal. The new action plan calls for initiatives along the entire life cycle of products. It focuses on product design aspects, promotes circular economy, sustainable consumption, prevention of waste and preservation of resources used in the EU economy for as long as possible.

The circular economy can be divided into five phases in the context of the product lifecycle:[26] materials input, design, production process, consumption and end-of-life (EoL) resource management. The circular economy approach combines the end-of-life product and material phase with the material input phase to minimise the number of products and materials that end up as waste and the need for raw materials for new production. The Figure 3. shows four-levels framework has been introduced for supporting measurement of the CE adoption. The four outlined levels are the processes to monitor, the actions involved, the requirements to be measured, and finally the implementation levels of circular economy. In this paper we focus on the micro level involving SMEs and their transition to circular economy approach by adoption of related standards.

Table 1. shows benefits for SMEs from implementation of circular economy principles. Circular economy currently represents the most adequate way to combat the disparity between lack of resources and growing population demanding new products. There are multiple global trends that are crucial for launching activities to restructure the economy on the principles of low-carbon circularity, primarily in the European Union (EU), but also in the Western Balkans.

These trends are ranging from volatility and increase in prices of raw materials, increased use and depleting of resources, unstable global supply chains, uneven distribution of critical raw materials, introduction of new standards, transition of risks from business related to climate, energy transition to new demand by customers.

[26] Measuring circular economy strategies through index methods: A critical analysis, Valerio Elia et al., Journal of Cleaner Production, Volume 142, Part 4, 20 January 2017, Pages 2741-2751.

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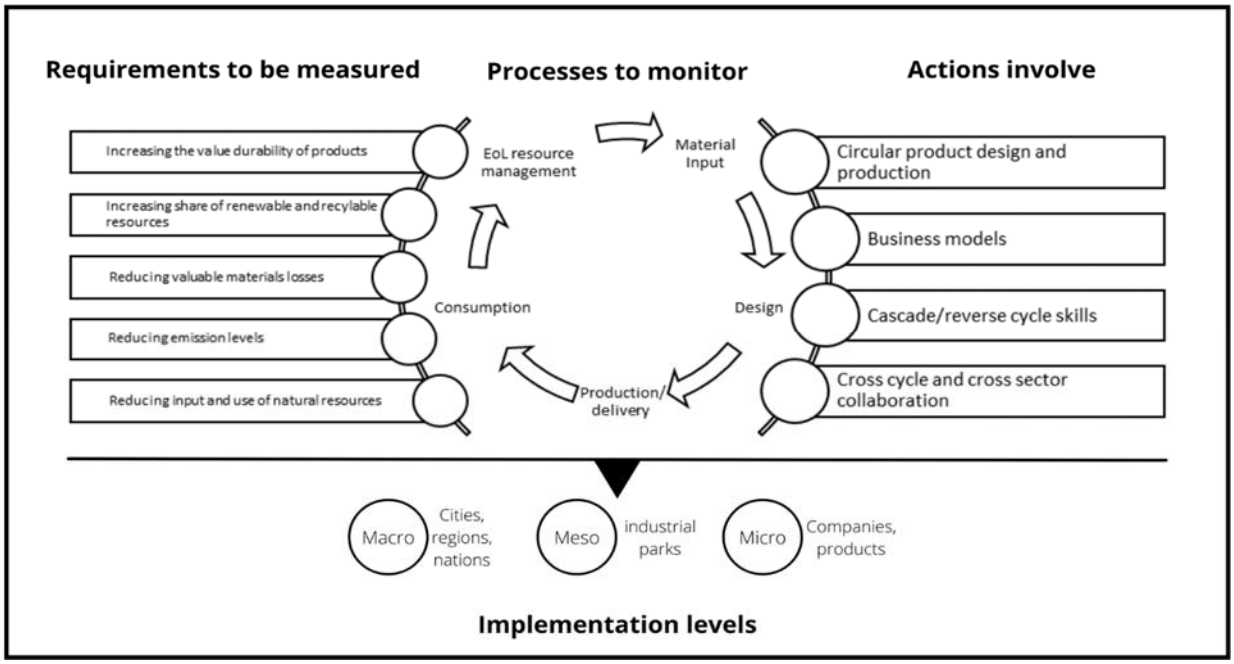

Figure 3 Circular economy framework[27]

By reselling and recovering components, the company can significantly reduce costs of materials. The application of the principle of "making the product lasts" reduces the warranty costs of the product.	Business models that take into account return of products at the end of the life cycle to the manufacturer, require a new relationship with customers, where "consumers" become "users", what provides new insight into the needs of customers in order to better personalize services and products.	Durable, modular or reusable products and their parts allow companies to extend shorter product lifecycles, and provide highly customized solutions while maintaining low product portfolio complexity.
Reduced material costs and risks related to guarantees	Improved interactions and loyalty of customers	Less complex product with life cycle that can be extended

Table 1. Benefits for SMEs from circular economy approach[28]

Circular economy approach can alleviate negative effects and support positive effects of all mentioned trends. Emergence of new global trends is causing companies to turn to circular economy transition. Circular business operations contribute to shrinking companies' environmental footprint, reducing materials' waste, and more efficient use of expensive resources. However, creating a sustainable circular business model is a challenging process. It

[27] Measuring circular economy strategies through index methods: A critical analysis, Valerio Elia et al., Journal of Cleaner Production, Volume 142, Part 4, 20 January 2017, Pages 2741-2751.

[28] Ellen MacArthur Foundation, Towards a circular economy: Business rationale for an accelerated transition, 2015.

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depends on a variety of factors, most importantly company's capabilities and resources and the constraints on its operations. The shift from a linear economy to a circular economy involves a lot of effort. Especially SMEs have a hard time, as it takes a lot of resources, both human and financial, to go through this change and to adhere to standards that are always changing over time. Circular economy in business practice brings emphasis on the reuse of products, components and materials, processing, renovation, repair, upgrading, as well as the exploitation of renewable energy through the product value chain and the cycle from "cradle to cradle". "Cradle to cradle" phrase is implying that the model is sustainable and considerate of life and future generations – from the cradle or birth of a generation to the next, opposite the "cradle to the grave" or death within the same generation.

Transition to circular economy requires changes along the entire value chain, from efficient resource management, product design, new business and market models, new ways of transforming waste into resources to new models of consumer behaviour. Circular economy approach is specifically focused on characteristics of products and ecological design that represents systemic integration of environmental aspects into product design aiming to improve its ecological performance during the entire product lifecycle. Eco-design approach encourages companies to develop products that are durable, easy to repair, disassembly and recycle.

The European Commission invited European standardization organizations to develop standards to support this transformation. The focus is on development of standards that address material efficiency aspects in the design of energy-related products. Material efficiency considers the conservation of materials by making products more durable, resource-efficient and facilitates the reuse/recycling of parts and/or materials at the end of life.[29] From previous focus on ensuring the energy efficiency of products, attention is now shifting towards material use and preservation. Standards related to circular economy provide important advantages for SMEs and bring substantial opportunities for innovation. SMEs benefit from possible cost reductions in production or procurement, but also new business models can emerge from the shift to circular economy with the help of standards.

[29] https://www.iec.ch/blog/european-standards-circular-economy

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6. Digitalization and standards

World is in the middle of a unique revolution which is changing the paradigms of our ways of living in a broader sense, including how industry design, plan, produce, sell, and people work, buy, study, etc. These technologies can be and will be applied to a wide range of areas, from health to mobility, from education to manufacturing and agriculture, and so on.

As for industrial production, the Industry 4.0 is based on vertical networking of smart production systems, horizontal integration, engineering along the whole product life cycle, and the massive use of exponential technologies[30]. One of its main characteristics is given by the interoperability, the interconnections among systems, the continuous exchange of information among machines, objects, environment.

Digital transformation follows a fast-changing pattern: the focus is shifted on technological sectors, such as artificial intelligence, robotics, cybersecurity, but future edge technologies are also emerging as progress is strongly accelerating in these domains.

Companies need to adapt to digital revolution and adopt technological solutions to change their businesses accordingly.

The standardization framework can play an important role to accelerate the uptake of digital technologies by companies. Standards can help them in the digitalization process, by supporting compatibility and interoperability between products and processes, and facilitating the flow of information among economic operators and machines or devices.

Actually, standards are key-factors for high-tech sectors, such as Internet of Things (ioT), Artificial Intelligence (AI), robotics, big data and are particularly important for industrial research and innovation uptake[31].

At the same time, digitalization also calls for a change in standardization, which is traditionally focused on physical goods from traditional industries. Moreover, as digital business is developing standards which are independent from the traditional standardization setting, there is a need to innovate standardization systems in order to be more responsive to the changing environment.

EU identifies five ICT standardisation priorities[32]:

- Cloud computing, as it supports new digital services by providing the massive data storage and computational power that European digitisation needs;
- Internet of Things: besides its industrial innovation value, it has the potential to help address many societal challenges such as for instance climate change, resource and energy efficiency, ageing, etc

[30] "Industry 4.0. Challenges and solutions for the digital transformation and use of exponential technologies", Deloitte, 2015.

[31] "Standards and the digitalisation of EU industry", European Parliamentary Research Service, March 2019.

[32] "ICT Standardisation Priorities for the Digital Single Market", COM(2016) 176 final

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- 5 G Communication network which will be the main global infrastructure for communication;
- Cybersecurity, as people and businesses will need to rely on a very high quality of security standards for new products, technologies, services.
- Data as an efficient sharing and exchange of data on all the domains (research, business, health, etc) is of outmost importance for social and economic growth.

The EU set up a European Multi-Stakeholder Platform (MSP) on ICT Standardisation, aimed at identifying potential future ICT standardisation needs in support of European legislation, policies and public procurement; advising on technical specifications for public procurements, developed by global ICT standards-developing organisations as well as on cooperation between ICT standards-setting organisations[33].
Further on, the MSP cooperates with European Commission for the drafting of the Rolling Plan for ICT Standardization, a document providing a multi-annual overview of the needs for ICT standardisation activities in support of the EU policy activities.

Emerging digital technologies where the EU standardization activity (CEN and CENELEC) is working are[34]:

- Artificial Intelligence
- Blockchain and Distributed Ledger Technologies
- Digital skills

The focus on digital skills is strategic, as the lack of qualified ICT and digital competences and workers is a critical factor limiting the capacity of companies to change and adopt digital innovation within their processes.

[33] Commission Decision of 28 November 2011 Setting up the European multi-stakeholder platform on ICT standardisation (2011/C 349/04)
[34] "Digital in Standards", CEN and CENELEC, 2021.

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7. The SUSTAIN model and approach

The previous chapters have been focusing to establish an overview for a reader to develop a clear perspective on the areas of energy efficiency, circular economy and digitalization and the standardization aspects. This chapter is focused to explaining the SUSTAIN model that has been proposed by the partnership. The model aims to address how European SMEs can successfully adapt to EU standards, overcome barriers related to process of adopting standards, and as a result, increase their competitiveness. The model itself is not exclusive and infinite. Rather, it provides a suggestion on how to approach the support to SMEs in the process of standardization, but it needs to be regarded critically in terms of realizing its potential for specific situations as well as in terms of recognizing the regional/local aspects that can influence its implementation.

SMEs gained an important role in European economy, with enterprises employing fewer than 250 persons representing 99% of all enterprises. Prior to the Covid-19 crisis, SMEs have created around 85% of new jobs and provided two-thirds of the total private sector employment in the EU.[35] During 2020, slightly more than 21 million of micro, small and medium-sized SMEs were active in the EU, accounting for 99.8% of all enterprises in the non-financial business sector.[36] The emergence of the Covid-19 crisis brought an abrupt effect to performance of large number of SMEs causing economic decline and overturning the gains made by the EU SME sector over the past decade. Numerous SMEs have struggled for survival due to fall in customer demand and revenues, as well as supply chain disruptions. SME's priorities shifted from growing business to finding new customers, managing business costs and finding new revenue streams.

The new EU Strategy on Standardization[37] emphasizes that SMEs are important drivers of innovation and users of standards in EU. However, their access to standard development processes and to standards needs to be improved.

In the midst of the current crisis, standards have an important economic impact as a well-functioning standardization system supports Europe to protect it advantage as a first mover and keep step with challenges and opportunities created by market changes. Standards play a critical role by providing SMEs a stable basis for investments in innovative technologies. The priorities for European standardization for 2021 are focused on the development of European standards

[35] Annual report on European SMEs, European Commission, 2017-2018.
[36] Annual report on European SMEs, European Commission, 2020-2021.
[37] An EU Strategy on Standardisation: Setting global standards in support of a resilient, green and digital EU single market, COM(2022) 31 final

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supporting the transitions towards climate neutrality and digital leadership and on strengthening the recovery and resilience of European industry. [38]

Adoption of standards contributes to competitiveness and innovativeness of SMEs, enabling companies an access to state-of-the-art technology; demonstrating the quality of products and services; bringing products onto the market because conformity to standards may be a mean to demonstrate conformity to legal requirements. Standards demonstrate the quality of the products as they meet customers' demand and are compatible with others' products. There are substantial benefits for SMEs that are using standards supporting access to global markets. SMEs can use established standards in the development of new products in order to reduce resources spent on research and development and improve their ability to innovate. SMEs can reach new customers by proving they comply with the standards and retain existing ones by demonstrating the quality of products. The potential benefits for SMEs from the standards significantly exceed the cost of adoption of standards.

The United Nations Economic Commission for Europe (UNECE) identified a number of barriers for European SMEs to implement standardization strategies, such as: lack of entrepreneurial, managerial and marketing skills; extensive bureaucracy; lack of accessibility to information and knowledge; difficulties in accessing financial resources; lack of accessibility to investment (e.g. technology equipment and know-how); non-conformity of standardization; lack of awareness on quality and mutual recognition schemes; product/service range and usage differences; language barriers and cultural differences; risks in selling abroad; competition of indigenous SMEs in foreign markets; inadequate behavior of multinational companies against domestic SMEs; lack of government supporting programs; complexity of trade documentation including packaging and labelling; lack of government incentives for internationalization of SMEs; inadequate intellectual property protection. [39] Standards can help define the market and are a way for SMEs to bridge the gap and allow them to compete with large companies on an equal basis. [40]

Standards play an important role for innovation.[41] By codifying information on the state of the art of a particular technology, they enable dissemination of knowledge, interoperability between new products and services and provide a platform for further innovation. Energy efficiency, circular economy and digitalization are areas with strong impact on SME's competitiveness and application of innovative solutions and processes. Encouraging SMEs to take advantage of new

[38] Annual Union work programme for European standardisation for 2021, European Commission
[39] Importance of standardization for SMEs, Nistor F., Cătălin C. Popa, "Mircea cel Batran" Naval Academy Scientific Bulletin, Volume XIII – 2010
[40] Joint Initiative on Standardisation: responding to a changing marketplace, published on 13.06.2016
[41] Europe 2020 Flagship Initiative Innovation Union, EC, Directorate-General for Research and Innovation, SEC (2010) 1161

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technologies and equipment that generate cost-effective energy efficiency represents a substantial challenge. SMEs should be empowered to better manage energy consumption, increase energy efficiency, reduce CO_2 emissions and exploit waste recycling strategies whenever possible. Digitalization is, especially in the context of Covid-19 crisis, driven by needs of individual sectors to increase their performance, but also by expectations of clients and suppliers. Digital transformation is reshaping business practices. Technological capabilities are constantly evolving and improving and in order to keep up companies must be agile and innovative as they integrate new digital technologies into their business practices.

The SUSTAIN model is built on the two main pillars:

- ✓ The first pillar is an extensive desktop research of existing literature and approaches published in studies and discussion papers, followed by interviews with SMEs from project regions. The research resulted in the development of self-audit tool in areas of energy efficiency, circular economy and digitalization dedicated to SMEs.
- ✓ The second pillar is the collection of good practices of SMEs adopting standards in the project regions. Project partners analyzed common barriers and drivers of standardization process in regional SMEs, searched for cases that can be regarded as best practices and looked for common aspects. The analysis resulted in selection of the most common barriers and drivers of standardization process. Barriers and drivers to standardization are of crucial importance to outline incentives for adaptation of SMEs to EU standards.

The analysis resulted in development of two stage model (Figure 4), encompassing self-audit tool and standardization mechanism based on drivers, barriers and incentives to standardization. The first stage is represented by analysis based on self-audit tool determining available capacities and resources for potential improvement of SMEs pertaining the three areas. The second stage is represented by standardization mechanism outlined through existing barriers, drivers and conceptualization of initiatives. The model is based on theory of organizational change as a dynamic process characterized by continuous interaction between the external and internal environment of the companies. [42] Both internal and external factors contribute to organizational change and typically are interrelated, as internal factors are often pushed to respond to adjustments of external factors. The external and internal environment of companies produces various drivers and barriers that are key influences to change in SMEs. Incentives are complementary to drivers and barriers, acting to increase the impact of drivers while alleviating the impact of barriers. It is important to understand the drivers and barriers to standardization

[42] Study on Incentives Driving Improvement of Environmental Performance of Companies, Ecorys, 2012.

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process in order propose appropriate incentive measures to induce standardization efforts by SMEs.

The model results in three types of outcomes: economic benefits for SMEs, customer benefits and environmental benefits. Economic benefits for SMEs are stemming from easier access to international markets due to standardization, equal opportunities to participate in trade, increased compatibility and safety characteristics of products and processes, improvement of production process and costs reduction, improved image and better reputation of company. Benefits for customers are stemming from increased product quality, safety and comfort characteristics, increased compatibility with other products. Environmental benefits are resulting from contribution of standardization to healthy and safe environment and products respecting principles of environmental protection throughout their lifecycle.

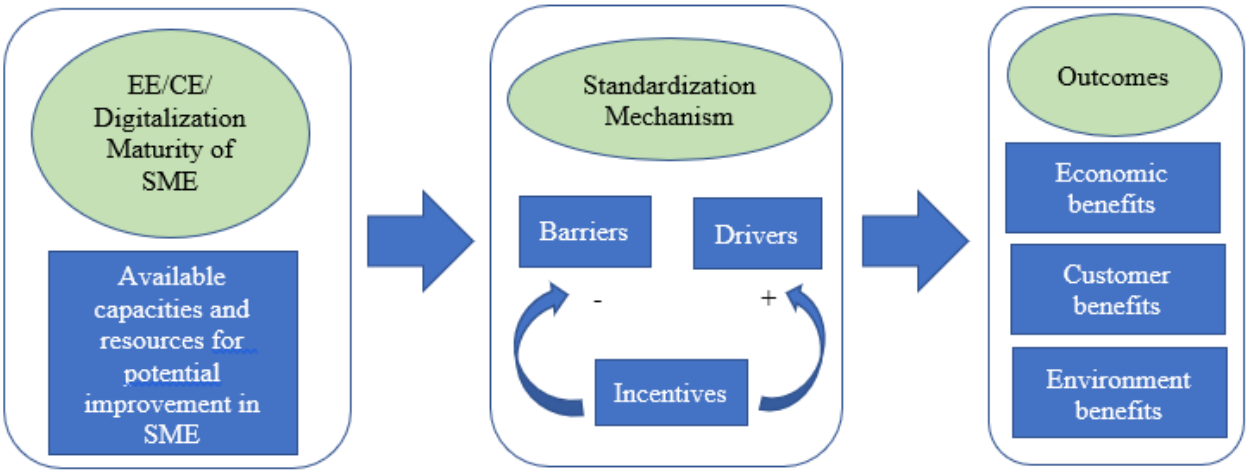

Figure 4 The SUSTAIN model

7.1 Self-audit tool

The purpose of the self-audit tool is to provide assessment of maturity and readiness for improvement of SMEs in respective areas. The tool is useful instrument for initial self-assessment of SMEs in terms of their state and potentials for improvements in energy efficiency, circular economy and digitalization. Development of self-audit tool took into consideration the following key factors in relation to above mentioned fields: strategic direction and organization of SME, availability of skilled workforce, availability of technical expertise, availability of training, access to specific improvement measures, access to information, market related drivers of improvement. Self-audit tool is developed in order to serve as an applicable tool for SMEs

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operating in various industrial sectors. Assessment of maturity is directly related to readiness of SMEs to adopt and adapt their processes to activities pertaining improvement of energy efficiency, circular economy and digitalization. The readiness to change can be defined as the ability to exploit future productivity and resource efficiency opportunities, alleviate risks and challenges, and be resilient and flexible in responding to unknown future uncertainties.

The tool is divided into three main sections assessing different areas: energy efficiency, circular economy, digitalization. Each section has specific segments of assessment. After selecting answer which suits the best to the specific SME situation, the radar diagram will update is separated section. Based on selected answers, recommendations for improvement are provided. In terms of the question structure, the assessment uses a rating method for each answer. The assessor needs to identify SME's maturity based on level-based questions, where level one represents the lowest degree of maturity and level four represents the highest degree of maturity.

The assessors should complete each maturity criteria based on their experiences and knowledge, and they are suggested to involve the appropriate managers in charge of each criteria to reduce the bias of an individual manager.

Assessment of maturity/ readiness in energy efficiency/ circular economy/ digitalization provides an important starting point for understanding the change processes that SMEs undertake to move toward an improvement in energy efficiency/ circular economy/ digitalization. The purpose of the assessment is to support SMEs in identification and understanding of gaps related to transition to more advanced state in respective areas. The gaps reflect the capabilities and resources that are missing in SME and the processes that would be needed to improve to more advanced state. Maturity assessment can help SMEs' managers and business support organizations to identify new opportunities related to the energy efficiency/ circular economy/ digitalization and grasp SME's capacities to exploit these opportunities. When the gaps are clarified, SMEs can consider to engage in transition to more advanced state of mentioned areas.

a. The assessment of energy efficiency

The assessment of energy efficiency is organized into five components including:

1. Assessment of energy policy in the company - management level of knowledge on laws, regulations, strategies and policies; energy efficiency and renewable energy use priority evaluation;

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2. Assessment of energy management in the company – frequency of review and monitoring of energy consumption; energy planning; role and responsibility for energy management;
3. Evaluation of energy communication in the company – energy related targets communication; energy reviews results and energy performance communication;
4. Assessment of energy information system - type of energy related information system; achieved energy savings reporting;
5. Assessment of energy efficiency improvement – implementation of energy related standards; implementation of energy audits; realization of energy efficiency improvement measures.

The assessment of energy efficiency integrates five components of importance for evaluation resulting in four different levels of maturity pertaining energy efficiency. Five components are selected based on desktop research, conducted interviews with companies and brainstorming process among project partners. Figures 5-9 in the Annex show the examples of maturity assessment for energy efficiency across different components. The assessment of energy efficiency demonstrates maturity of SME in terms of energy efficiency and readiness for energy efficiency improvements leading to better energy performance.

b. The assessment of circular economy

The assessment of circular economy is organized into five components including:

1. Assessment of circular economy in SME's strategy – awareness on circular economy aspects; commitment by management; identification of value across the product life cycle;
2. Assessment of circular economy innovation business model - communicating the value of offerings to the market; new revenue streams and financial models;
3. Assessment of circular economy in organization – envisioning business benefits from CE initiatives; processes and tools supporting CE implementation; investing in CE initiatives; training programmes for capacity building;
4. Assessment of circular economy in policy and market – influencing market readiness; co-developing circular solutions along value chain; influencing legislative frameworks;
5. Assessment of circular economy in product/service innovation – circular product/service systems; repairing products; using recycled/renewable/biodegradable materials in manufacturing process.

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The assessment integrates five components relevant for evaluation resulting in four different levels of maturity pertaining transition to circular economy. Five components are selected based on desktop research, conducted interviews with companies and brainstorming. Figures 10-14 in the Annex show the examples of maturity assessment for circular economy across different components. The assessment demonstrates maturity of SME in terms of circular economy and readiness for related improvements leading to application of business models respecting circular economy principles.

c. Assessment of digitalization

The assessment of digitalization is organized into five components including:

1. Assessment of digital marketing and communication in SME – digital marketing and communication strategy plan and implementation;
2. Assessment of knowledge and skills of employees – availability of trainings; involvement of employees in digitalization process;
3. Assessment of IT security, IT infrastructure and data management – implementation of IT security assessment; smart infrastructure; corporate standards around data acquisition and data infrastructure enabling data driven decisions;
4. Assessment of digital products/services and production process - development of digital products/services; overall equipment effectiveness utilization;
5. Assessment of digital logistics and supply chain – supply chain digital systems; e-commerce strategies.

The assessment of digitalization integrates five components of relevance for evaluation resulting in four different levels of maturity pertaining digitalization process. Five components are selected based on desktop research and brainstorming. Figures 15-19 in the Annex show the examples of maturity assessment pertaining digitalization process across different components. The assessment demonstrates maturity of SME in terms of digitalization and readiness for digitalization improvements.

d. Barriers, drivers and incentives to standardization

Adoption and implementation of related standards supports transition of SMEs towards more advanced state of energy efficiency/ circular economy/ digitalization. Barriers and drivers to standardization are of crucial importance to design incentives to adoption of standards by SMEs.

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Incentives at the same time empower drivers and reduce barriers by changing the weight of the drivers and barriers as applied to the decisions SMEs make.[43] Thus, SMEs can be motivated to improve standardization efforts through making the drivers more powerful, e.g. increasing the potential for financial gains, or improving opportunities for a better company image; and/or by reducing the barriers, for example by improving access to modern technology or providing adequate information. Incentives may support SMEs to increase standardization efforts in order to improve their performance.

Various barriers and drivers to standardization of SMEs are presented in the Tables 2 and 3. Barriers and drivers are divided based on regulatory, market/economic, organizational and technical aspects and drawn from interviews with SMEs conducted by partners in project regions. Incentives in the Table 4. are proposed as response to identified barriers and drivers.

SMEs should be supported and incentivised to overcome related barriers in order to obtain benefits from using standards. Business support organizations (e.g. chambers of commerce, innovation centres, agencies involved in development of SMEs) can act as important intermediaries in this process by providing a communication link between the standardization organizations at the national and international level, and the regional SMEs.

Table 2. Barriers to standardization of SMEs

	Barriers
Regulatory	Lack of government programs to support SMEs awareness and participation in standards application for circular economy, energy efficiency and digitalization
Market/Economic	Economic uncertainty; risks of selling abroad; complexity of trade documentation including packaging and labelling
	Lack of financial resources for investments (e.g. in technology and know-how)
Organizational capacities	Insufficient commitment at executive level
	Lack of access to information, awareness and knowledge on circular economy, energy efficiency and digitalization
	Lack of employees' participation and acceptance
	Corporate culture (organizational norms and structure, communication)
Technical	Lack of technical capacity to implement circular economy, energy efficiency and digitalization practices
	Lack of access to affordable modern technology and innovations

[43] Study on Incentives Driving Improvement of Environmental Performance of Companies, Ecorys, 2012.

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Table 3. Drivers to standardization of SMEs

	Drivers
Regulatory	Laws, By-Laws, Policies, Standards in line with EU Green Deal
Market/Economic	Introduction of trade barriers (e.g. carbon border adjustment mechanism); new market entry; increase of market share
	Demand by clients, customers and stakeholders
	Reduced costs of production with implementation of EE and digitalization
	Reduced costs of inputs due to circular economy principles introduction
	Shorter time to market from development to final product
Organizational capacities	Increased possibilities for partnerships and networking
	Corporate image, reputation and brand loyalty
Technical	New ideas; innovation reach; access to advanced technologies
	Technical compatibility, increased quality and better technical performance of products/services

Table 4. Incentives to standardization of SMEs

	Incentives
Regulatory	Government national/regional support programmes for standardization in circular economy, energy efficiency and digitalization
Market/Economic	Supporting SMEs' access to networking and internationalization opportunities (e.g. attendance to fairs, networking with potential clients/investors, organization of B2B matchmaking events, providing info on regional offer to international partners)
	Financing for research and development activities in SMEs
	Financial support for investments in new technologies and processes
	Voucher schemes providing access to standardization support services
Organizational capacities	Initiatives for raising awareness of SMEs to potentials and benefits of standardization in circular economy, energy efficiency and digitalization
	Trainings for staff capacity building, increase of knowledge and skills
	Provision of expert support for standardization process in circular economy, energy efficiency and digitalization
Technical	Provision of access to new technologies and innovations
	Financing for research and development activities of public and private R&D organizations

Regulatory incentives

The ability of SMEs to absorb, adapt and disseminate state of the art technology and participate in global value chains depends on investments in quality infrastructure institutions and

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mechanisms[44]. Participation in global value chains increases importance of technical regulations and standards beyond the EU market. Considering the quality infrastructure systems and procedures required to facilitate SMEs access to the EU Single Market, the role of supporting programs and incentives by government or state agencies is especially relevant.[45] Governments can induce the growth and competitiveness of SMEs by fostering the use of standards in circular economy, energy efficiency and digitalization. Regular and targeted programmes to support SMEs' awareness and participation in standards applications create benefits to standardization process. Despite that trade volume has doubled over the last 10 years, the openness of the Western Balkan economies to trade remains low given their size, level of development and geographical location.[46] Western Balkan economies need to provide the necessary structures and fulfil their obligations regarding the free movement of goods within the framework of EU accession process. Before joining the EU, Western Balkan governments should make sure to align their product legislation with the EU acquis and transpose European standards into the national ones. Potential support to SMEs range from general programs for increasing competitiveness to targeted programs and long-term financing schemes based on SMEs' needs when exporting to the EU Single Market.

Market/economic incentives

Financial sustainability is important preconditions for introducing innovations into business operations. Often high initial costs of investing in new technology or business reorganization appears insufficiently profitable in the short term, what negatively affects investments. Introduction of standardization in areas of energy efficiency, circular economy or digitalization in most of cases requires certain changes in technology and/or organization of business, what can result in significant costs. Market disruptions that affect supply chains globally (e.g. financial crises, corona virus pandemic, traffic jams through the Suez Canal) result in rapid changes in prices, create economic uncertainty and increase risks of internationalization. Compliance with technical regulations and standards is a prerequisite for increasing export and industrial upscaling. Intermediary organizations can act as mediators supporting SMEs' access to networking and internationalization opportunities. Intermediary organizations could provide

[44] The politics of productivity improvement: Quality infrastructure and the middle-income trap, Doner. R. 2016, Thammasat Economic Journal, Vol. 34/1.

[45] SME Policy Index: Western Balkans and Turkey, Assessing the Implementation of the Small Business Act for Europe,2019, https://www.oecd-ilibrary.org/sites/68ad55d4-en/index.html?itemId=/content/component/68ad55d4-en

[46] The Western Balkans in Transition: Diagnosing the Constraints on the Path to a Sustainable Market Economy, 2018. Sanfey, P. and J. Milatovic, European Bank for Reconstruction and Development, 2018.

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assistance through provision of support to SMEs for attendance to fairs abroad, networking with potential clients/investors, organization of B2B matchmaking events, providing information on regional offer to international partners. Funding to SMEs could be directly provided as financing of research and development activities in SMEs, financial support for investments in new technologies and processes, or through voucher schemes allowing access to standardization support from relevant consulting organizations.

Organizational incentives

The barriers encountered by SMEs in benefiting from standards application are to certain extent related to the general characteristics of SMEs such as their size, and to the way in which most SMEs are managed. Small enterprises typically have a structural lack of strategic resources. Their management is heavily involved in the daily operational activities, and there is no time or money available for activities that are not directly related to primary operation. Thus, management of small enterprises may lack time, capacities or money to make an informed decision on standardization. Lack of awareness on standards could be remedied by initiatives focused to raising of awareness, knowledge and improvement of communication with SMEs regarding standardization process. Specific education and training initiatives could be organized by business support organizations targeting implementation of particular standards and undertaking certification activities. Intermediary organization could design initiatives providing experts actively supporting process of standardization in circular economy, energy efficiency and digitalization.

Technical incentives

Technical barriers relate to the equipment, life cycle of materials and products and encompass technical factors that interfere with the process of standardization. Technologies can be developed internally in the company as a part of innovation processes if the company is motivated and has sufficient resources. Furthermore, state-funded research and development programmes can provide important boost to technological innovation. Institutional conditions established by policies can be crucial for the development of private sector innovation. Transfer of knowledge is necessary for development of new technologies. The contemporary philosophy focused on the development of new products and implementation of new technologies often does not consider the needs for accompanying development of technological and organizational capacities within organization. Intermediary organizations in this area can play a key role in supporting SMEs and providing access to new technologies and innovations. Projects financing

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research and development activities of public and private R&D organizations could increase opportunities for SMEs' access to innovations.

8. Regional experiences in project implementation

The SUSTAIN model is based on the project partners' observation and analysis of SMEs' experiences in adoption and implementation of EU and international standards, discussions that partners have engaged in with various stakeholders, SMEs, business support organizations, innovation agencies, business experts, entrepreneurs, and our own experiences in offering support to SMEs. We conducted desktop research of published studies and discussion papers and conducted interviews with regional SMEs. We also collected best practices of SMEs adopting standards in the project regions.

The Design Options Paper is aimed at disseminating the knowledge we have acquired to other innovation agencies that might be interested in this subject thereby encouraging them to apply our approach in designing incentives to standardization for SMEs.

The following chapter outlines regional experiences of project partners in implementation of pilot activities and collaboration with SMEs.

8.1 Banja Luka region, Republika Srpska, Bosnia and Herzegovina

The SUSTAIN lead partner, LIR Evolution, is based in Banja Luka region, part of North-Western Republika Srpska and a well-developed region of Bosnia and Herzegovina. Banja Luka is a recognizable centre in regional terms, but also a modern European city. It is the second largest city in Bosnia and Herzegovina and a home of the University of Banja Luka, as well as numerous state and entity institutions. The Republika Srpska Government and the National Assembly are based in Banja Luka. The Bosnia and Herzegovina State Agencies based in the City include the Indirect Taxation Authority, the Deposit Insurance Agency, as well as a branch of the Central Bank of Bosnia and Herzegovina. According to the 2013 census, Banja Luka has 185,053 inhabitants. It covers a surface of about 1.232 km². Small and medium-sized enterprises represent 99% of all companies registered in BiH. These business entities employ nearly 70 % of work force in BiH.[47] Out of the total number of business entities in Republika Srpska in 2020, about 27% or 9.544 operates in the City of Banja Luka. SMEs have special importance for countries in transition such

[47] Agency for Statistics of BiH, "Structural business statistics, preliminary results for 2019", (2020)

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as Bosnia and Herzegovina, as well as for Banja Luka region. This region offers an interesting case for supporting capacities development of regional SMEs that are largely export oriented, especially those operating in manufacturing and processing industries.

Regional SMEs face significant challenges when attempting to access international value chains. The most common challenge for internationalization of regional SMEs is raising the quality of their products to a satisfactory standard. Well-performing regional SMEs are showing interest for energy efficiency projects and for introduction of energy management procedures, including introduction of energy management related standards to their business. These SMEs are also demonstrating some interests in circular economy and digitalization improvements to a different extent depending on individual needs and sectoral specificities. Regional SMEs are dealing with multiple challenges regarding adoption and application of EU standards. Micro companies are less interested and motivated for this process, as they are less oriented towards export, operate with less human and material resources.

The aim of the regional pilot project is to analyse the situation regarding the standardization process, adoption of EU and international standards and related issues local and regional SMEs are facing. LIR Evolution team conducted interviews with eight local SMEs analysing their experiences and opinion regarding adoption of EU standards. SMEs during interviews have repeatedly emphasized they need a significant support in conducting analysis of international markets to identify export opportunities. In the framework of the pilot action implementation, we attempted to outline most frequent barriers and drivers to standardization that are relevant in our region. Regional SMEs argued that the main drivers for involvement in standardization process are the following:

- Compliance with local and international regulations;
- Meeting customer requirements for export;
- Contribution to technical compatibility of their products and processes;
- Improvement of the production process due to standardization;
- Reaching marketing advantage and better reputation;
- Entering new markets;
- Easier access to modern technologies and strengthening innovation capacities.

Analysis identified the following barriers to SMEs' standardization process in the areas of energy efficiency, circular economy and digitalization:

- Lack of established policies and governmental programs to support SMEs awareness and participation in implementation of standards in mentioned areas;
- Difficulties in identification of export opportunities and lack of networking possibilities;

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- Lack of access to information on standards in mentioned fields;
- Lack of technical capacities to implement practices in energy efficiency, circular economy and digitalization;
- Lack of access to affordable modern technology and innovations;
- Lack of financing opportunities;
- Outdated educational system that is not in alignment with requirements of the current market trends in respective areas.

Within the pilot project LIR Evolution conducted webinar on the topic of *Strengthening of business efficiency via energy efficiency, digitalization and circular economy*. The purpose of the webinar was to present the project SUSTAIN, developed self-audit tool, discuss advantages and barriers of adoption of EU standards, efficient energy management in industry, digital solution for energy management in industry and buildings, importance of circular economy principles for SMEs' business. The webinar discussed the following aspects: possibilities for energy savings in industry; purpose and application of energy efficiency related standards; application of digital solutions in energy management and practical examples; concept of circular economy, global issues and regional situation; circular products and eco-design; purpose and application of circular economy related standards. Webinar was dedicated to representatives of SMEs, entrepreneurs, development agencies and organizations offering support services to SMEs, aiming to increase their capacities and raise awareness in related fields. During the webinar self-audit tool was presented and SMEs were motivated to use it. Based on experiences of regional SMEs, the following advantages of implementation of standards are emphasized:

- Provide easier access to international markets;
- Support development by providing equal opportunities to participate in trade;
- Contribute to product safety and quality characteristics;
- Contribute to healthy and safe environment;
- Provide support to consumers in matters of quality, safety and comfort;
- Support exchange of advanced technology and innovations;
- Improvement of production process;
- Increase compatibility of their products and processes with others.

SMEs' experiences suggest that standardization gains more importance when markets are in crisis as customers are becoming more strict with their requirements in period when some kind of critical pressure is affecting the markets, such as current situation with Covid-19 and related unpredictable growth of prices of raw materials, products and services and insecurity of supply chains.

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SMEs in BiH have recognized importance of application of standards in various fields, depending on their core business. However, local SMEs in general need more support from relevant state institutions and business support organizations in terms of information on which standards should be met; proper application of the standards; possibilities to participate in the development of new standards; support to networking for finding partners abroad; exploration of export opportunities. Standardisation is more significant for medium-sized SMEs than for micro and small sized, as medium sized SMEs typically export more, have more international clients and customers requiring implementation of specific standards. Typically regional SMEs are urged to apply standards by some form of external pressure including regulatory requirements, as well as market pressure based on requests by customers.

In Republika Srpska, the SME Development Act and the RS SME Development Strategy for 2016-2020 projected support for SMEs to establish quality systems. In recent period funds for these purposes have not been approved. The new RS Strategy for Product and Service Quality Infrastructure for 2019 - 2023 creates opportunities to provide funding for SMEs applying quality related standards. In the Federation of Bosnia and Herzegovina, the Federal Ministry of Entrepreneurship and Crafts publishes annual public call to support SMEs for several projects including introduction of technical standards (e.g. ISO, HACCP standards, CE sign). The purpose of the call is to introduce a quality management system (ISO and HACCP standards) and ensure CE sign to increase competitiveness of regional SMEs.

8.2 Weiz region, Styria, Austria

Another project partner, the Weiz Energy and Innovation Centre, is based in the eastern Styrian district capital of Weiz, a constantly developing city with a focus on quality of life, energy and innovation and a history going back more than eight hundred years. As of 31.10.2020, the municipality of Weiz has 11,756 inhabitants (26,929 in the Kleinregion Weiz-Umland). Today, the municipality has a population density of 674 inhabitants per km2 on an area of 17.5 km2. The town of Weiz has also been addressing the issues of sustainability, green energy, environmental and climate protection for many years. That is why it has been a member of the e5 programme for energy-efficient municipalities since 2005. Among other things, Weiz is thus committed to implementing long-term environmental, sustainability and climate protection measures and evaluating their effectiveness. Only in this way was Weiz able to become the first municipality in Styria to achieve the highest possible rating of five "e "s in 2014 and to improve its rating even further since then.

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Small and medium-sized enterprises are a central component of the economy. Around 95% of all European companies are SMEs. In Austria - according to the EU criteria - even 99 percent of companies fall into this category. Even if the relationship between SMEs and standardisation sometimes appears ambivalent: standards have a special significance for SMEs, just as SMEs play an important role in standardisation.

- Standards give SMEs security:
  Those who follow standards, who adhere to standards, can be sure that their product or service corresponds to the current state of the art and is thus "marketable".
- Standards offer SMEs reliable know-how:
  Those who apply standards can draw on assured and recognised expertise, know the requirements for their products and services and can demonstrate reliability and safety with the help of standardised test procedures.
- Standards facilitate market access for SMEs:
  They create fair competitive conditions through uniform specifications - for large and small.

SMEs face many hurdles and problems in connection with standardisation processes and implementation of norms and standards at regional, national and international level. Here, too, the Weiz Energy and Innovation Centre, on behalf of the City of Weiz, is committed to helping SMEs in the longer term with SUSTAIN project and thus coming closer to the overarching goals of the region. In order to evaluate and target these problems, especially in the areas of "energy efficiency", "digitalisation" and "circular economy", nine small and medium-sized enterprises were asked how they deal with these problems and for what reasons they deal with them in the longer term. Due to the different sectors in which these companies operate, the answers varied, but the core message was largely the same; compliance with sector-specific and generally applicable standards and laws, use of marketing advantages, improvement of the products offered, optimisation of processes in the company, better use of innovation potential. However, in order to address these issues in a targeted manner and to proceed strategically, resources must also be mobilised for this purpose. The process involves high costs and risks that an SME cannot afford. The answers showed that some SMEs do not have the necessary knowledge and access to information to get involved in the standardisation process.

In addition, the Weiz Energy and Innovation Centre organised a workshop to which interested representatives of SMEs from the region were invited. During the workshop, the SUSTAIN project was presented, the objectives of the project and the benefits for SMEs to participate in the workshop. In addition, the participants were introduced to the "Self-Audit" tool developed by the project partners and encouraged to use it.

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In order to help SMEs to deal with the topic of standardisation, Austrian Standards International offers some opportunities and tools that are available for SMEs. Austrian Standards International offers training to SMEs in the form of seminars such as: "Production of recycled building materials". In addition, video materials are used to show examples of how successful companies manage their standards.[48]

The Austrian Standards International tool "effects 2.0" enables SMEs to manage their standards and regulations. Another tool in use is "meinNormenRadar" (my standards radar), which enables SMEs to know about all developments and changes in a standard at an early stage.

8.3 Emilia-Romagna, Italy

The Emilia-Romagna region is represented by 331 municipalities, one Metropolitan City (Bologna) and 8 provinces; inhabitants are around 4.5 millions.

The regional economic system is composed by 370 thousand companies in industry and services, distributed into the main sectors, such as manufacturing, automotive, agro-food, building, health and medical devices, and culture and creative sector. More than 90% of them are micro enterprises. These business sectors are increasingly addressed to international markets: Emilia-Romagna ranks first among Italian regions for export per capita**,** and regional exported goods represent 14% of the total national export[49].

On July 2014, the regional government approved a new law for the Promotion of Investments in Emilia-Romagna (Reg. Law n.14/2014) in order to attract investments and facilitate innovation.

The regional strategies are actually focused on the importance of Innovation as a fundamental leverage for sustainable growth and competitiveness, as it is described in the regional Smart Specialization Strategy (S3). The new S3 2021-2027 of the Emilia-Romagna Region[50]:

- Identifies regional priorities related to sustainability, digitization, social inclusion, well-being and quality of life, security, transformation of public administration;
- Confirms the previous 7 production systems of regional specialization: Agri-food, Building and construction, Mechatronics and motor engineering, Health and Wellness Industries, Cultural and Creative Industries, Energy and sustainable development, Innovation in services;

[48] www.austrian-standards.at/standards-managen
[49] https://www.investinemiliaromagna.eu/it/
[50] Strategia di ricerca e innovazione per la specializzazione intelligente 2021-2027, Regione Emilia-Romagna, 2021.

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- Highlights the tourism industry as an autonomous area which needs a specific attention due to the consequences of Covid-19;
- Identifies new sectors, Aerospace and critical infrastructures, with a high potential for development;
- Big Data and Artificial Intelligence are enabling transversal technologies with impact on the transformation process;
- Recognizes to the public administration a specific role as innovator.

Although specific data on standards uptake by regional companies are not easily available, we can consider that our region has always been focused on sustainable innovation, which is also at the core of standardization policies. The first monitoring report on the sustainability profile of companies in Emilia-Romagna[51] offers a relevant picture of the situation as it concerns the level of adoption of measures on corporate welfare and environmental sustainability (on the items "material", "water", "energy", "mobility", "waste", "other emissions", "plastics", eco-design"): the report highlights that, while the industry shows a general increasing positive attitude towards the adoption of measures taking into account there requirements, SMEs lag behind and need specific incentives and accompaniment measures.

For this reason, in Emilia-Romagna region we focused the pilot project on the promotion of the standardization framework as a strategic instrument for innovation. During the first step of the pilot we kept it general, so we did not focus on a specific domain to tackle. Actually, standardization fulfills many functions of interest also for SMEs, as it represents an opportunity to re-engineer their products, adopt innovative practices, qualify internal skills. Standardization is in fact a dynamic tool, which incorporates the evolution of the economic and social processes in which we operate.

As a first step the pilot action included a workshop, which offered a general overview and some case studies highlighting standards usefulness apart from certifications activities. In particular, Ms. Elena Mocchio, Innovation Division Responsible of UNI-Ente Italiano di Normazione (the national standardization body) presented an overview of UNI, the general functioning of the standardization activity, the different stages where companies can cover a proactive role. Ms. Giulia Bubbolini, COO of CISE, the agency of the Romagna Chamber of Commerce talked about their active involvement with standardization bodies and other key players in setting up standards for responsible innovation management. The webinar offered the chance to deepen the knowledge about the activity UNI is developing in the field of circular economy for the

[51] Report di monitoraggio sul profilo di sostenibilità delle imprese in Emilia-Romagna - Anno 2020, Regione Emilia-Romagna, 2021

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development of requirements, reference frameworks, guidelines and support tools relating to the implementation of circular economy projects. The Commission UNI/CT 057 Circular economy activated six working groups dealing with circular economy-related issues, among which principles, frameworks and management systems; guidelines for implementation and sectoral applications; circularity measurements.

The issue of Circularity Measurement captured the interest of the Union of Municipalities of Bassa Romagna, so that the pilot action was further developed through the presentation of a project proposal to be submitted within a regional call dealing with the implementation of territorial laboratories by the Union of Municipalities in collaboration with Romagna Tech.

The submitted proposal aims to develop a territorial laboratory to encourage the adoption of measurement systems of the circular economy in companies, as a first step to understand their meaning and develop positive actions to adapt their own production processes and business models to measurement standards. The proposal foresees the following activities: the first is addressed to activating knowledge on CE and on measuring the circularity of a company.

The second activity aims at understanding how much and where it is necessary to change organization and practices to start a path of circularity. The planned activities are as follows:

- collection of expressions of interest from a group of "pioneering" companies willing to experiment with tools to measure their degree of circularity, in collaboration with the associative world;
- application of the selected measurement tool on the identified companies;
- restitution of an improvement plan that will identify areas of intervention to improve the level of circularity of businesses.

The third phase intends to guarantee sustainability to the project, configuring a shared technical-organizational system that can be maintained at the end of the project.

We could realize the pilot action thanks to a regional call funding territorial laboratories for innovation and sustainability of the business sector, addressed to public administrations (Chambers of Commerce, Provinces and Metropolitan Cities, Municipalities and Unions of municipalities). The call supports territorial initiatives, consistent with the policies of the regional Act for work and the climate, dealing with more sustainable and circular production and consumption systems, processes of industrial symbiosis, the reduction of the impact of logistics and the development of new services available to communities.

We think that this kind of instrument is fundamental to offer business support organizations and other institutional stakeholders the right tool to design and implement positive strategies

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towards the adoption of innovative visions and attitudes, including standards approaches, by companies, SMEs in particular.

9. Recommendations

This chapter aims to provide insights on the various activities and incentives that could be provided in order to ensure that SMEs are actively involved in the standardisation process, and that they obtain full benefits from this process of involvement. In the midst of the quest by the European Commission for addressing uneven and untransparent representation of industrial interests and increasing the involvement of SMEs, civil society, users[52] and their access to standards, this design option paper addresses issues that SMEs are facing pertaining standardization. In order for SMEs to obtain full scale benefits from implementation of standards, they need to be supported by business support organizations providing intermediary role as a communication link between standardization bodies and regional SMEs. Support by BSOs can be especially valuable in overcoming of various standardization barriers and difficulties that SMEs are facing.

This chapter presents readers with the practices and potential incentives that we have recognized during our learning process and consider useful in the process of supporting SMEs' efforts to involve in standardization. These practices serve as a guiding steps for BSOs providing the foundations for further activities of supporting SMEs in standardization.

- ✓ **Programs for increasing competitiveness and financing schemes supporting standardization**

Awareness on SMEs' actual needs is a critical step for a BSO before taking active part in co-creation of the support environment for SMEs' standardization. SMEs need to be familiar with the potential benefits gained from understanding and applying standards, able to access and effectively use standards applicable to their business needs. In many cases SMEs' needs for standardization are based on requests by their international clients for exporting or on meeting regulatory requirements at the state level. Currently, SMEs are rarely involved in provision of

[52] An EU Strategy on Standardisation: Setting global standards in support of a resilient, green and digital EU single market, COM(2022) 31 final

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inputs and/or participation in the development of standards. Detailed survey of SMEs needs and consultations with SMEs from specific sectors are needed before designing any targeted programs for increasing competitiveness or financial schemes supporting standardization. This is specifically relevant for standards improving energy efficiency, circular economy and digitalization, that SMEs might be adopting in an attempt to decarbonize their operations. The programs for increasing competitiveness or financial schemes supporting standardization should be designed by taking into account existing barriers to standardization as well as drivers motivating standardization efforts of SMEs. There are several important aspects to consider when developing such programs:

- BSO needs to have the knowledge on legislation in different areas of expertise depending on the sector of SMEs they are working with,
- BSO should take into account the existing trends and future characteristics of business which also implicates the knowledge of trends in individual SME's sector. Thus, engagement of adequate skilled consultants that are constantly following the existing trends and making projections of future characteristics of business is important.

Example of related program was offered by the Ministry of Economy in Slovakia providing direct support to SMEs via a "de minimis" grant scheme covering activities in areas of R&D support, quality management and introduction of technical standards in production and services. The part of the program was specifically focused on the development and implementation of standards with SMEs receiving a grant covering 65% of the costs related to standardization.[53]

The "SME-wallet" scheme is a support program in Belgium offering to SMEs yearly subsidies of up to €15,000 as assistance for various business efficiency improvement measures, such as: training, business consulting and coaching, and technological research.

The Ministry of Economy, Labour and Entrepreneurship in Croatia implemented a programme of grants for business system certification. The main objectives aimed at were increasing the use of standards in SMEs and increasing the number of SMEs that are using total management system.[54]

✓ **Supporting SMEs' access to networking and internationalization opportunities**

Business support organizations can offer a wide range of services supporting SMEs access to internationalization, such as: attendance to fairs, networking with potential clients/ investors,

[53] Using standards to support growth, competitiveness and innovation, Guidebook Series How to support SME Policy from Structural Funds, European Commission, 2012.
[54] SMEs and standardisation in Europe, Enterprise and Industry, EIM Business & Policy Research, Ref. Ares (2014)75933 - 15/01/2014.

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organization of B2B matchmaking events, providing information on regional SMEs' offer to international partners, linking with larger economic agents in regional and international markets. During the interviews conducted within the framework of the SUSTAIN project, SMEs emphasized needs for further support in this area by dedicated BSOs or chambers of commerce as facilitators of SMEs' access to international markets. The SME's that are the most vulnerable to changes in market conditions are in principle those involved in activities at the bottom of the value chain, while SMEs involved in finalization of products have better opportunities to access international markets. Existing econometric studies have found that the use of international standards in a country increases both exports from and imports into that country, while the use of national standards in a country increases the exports from that country[55]. Thus, the use of European and international standards helps SME's entry to a wider European and international markets by supporting acceptance of its products and services abroad and contributing to company's image and reputation.

The export capacity of a SME depends on its ability to maintain or expand its position in international markets by supplying quality products on time and at competitive prices, thus being able to respond promptly to changes in demand. Export capacities of SMEs can be supported by building investment linkages with international partners, where BSOs can also can act as a part of public-private partnerships in order to support creation of a dynamic SME sector. Various type of economic agents can be linked through public-private partnerships to design specific tools motivating exporting. Such partnerships can have various forms including technology and innovation centers, research and testing laboratories, investment funds, incubators, scientific hubs etc.

Collaboration between regional BSOs on enhancement of internationalization opportunities is one of the least addressed issues in supporting regional business eco-systems, while at the same time it is very important. During discussion with stakeholders the importance of knowing people in the business support environment was particularly emphasized: collaborating with joint activities positively influences the impact that combined support services might have.

An example from Norway is established Eforum Standard Norge as a network of competence closely cooperating with national standards body. The network forum led to initiation of new standardization processes, as well as increased knowledge of SMEs on existing standards. The measure was successful in terms of visibility, content and delivery to SMEs.

[55] Using standards to support growth, competitiveness and innovation, Guidebook Series How to support SME Policy from Structural Funds, European Commission, 2012.

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- ✓ **Financing for research and development activities**

Business support organizations could have a supporting role in this area by offering co-financing of R&D activities based on a specific competition or innovation contest for start-ups/SMEs. Financial sustainability is an important prerequisite for developing innovation and building competitive advantage. Standards represent important tool for dissemination of R&D knowledge due to their consensus-based development and broad accessibility. Different types of financial support for investments in new technologies and processes are relevant, including voucher schemes for providing access to standardization support services. BSOs have the benefit of knowing local situation, having links with national innovation system and regional companies. However, in order to support R&D efforts BSOs need to provide an adequate level of specialized knowledge and/or consultancies including expert technical knowledge in specific sectors, information on technology availability and compatibility, networking that contributes to co-creation of regional innovation ecosystem as well. Current trend focused on rapid development and introduction of new technologies often neglects need for supporting development of technological and innovation capacities within SME. Role of business and innovation support organization can be critical in helping SMEs to build their innovation capacities.

- ✓ **Initiatives for awareness raising and capacity building of SMEs**

Interviewed SMEs suggested that often there is a lack of necessary knowledge, in-house capacities and access to information to get involved in standardization process pertaining energy efficiency, circular economy and digitalization. A BSO could provide a range of services including training programs, technical assistance pertaining standardization, coaching, consulting, awareness raising, building of capacities and skills of SMEs.

Awareness raising initiatives could range from media campaigns, publishing guidelines and user manuals, thematic conferences hosting presentations by representatives of standardization bodies, seminars and training events, publishing case studies on standardization best practices, promotion of standardization framework as a strategic instrument for innovation activities.

BSOs could also offer their services of assistance in the process of recruiting and introducing skilled workforce with specific knowledge needed in SMEs. BSOs could contribute to availability of skilled workforce to SMEs through participation in regional initiatives such as promotion of

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specific vocations, support to development of new vocational and training programs, employment matchmaking etc.

Related example from Czech Republic is sharing information on standardization by using a network of information points for SMEs to assure that relevant information can be assessed in the proximity of SMEs.

Ministry of SMEs in France in cooperation with the France national standards body initiated a package of measures supporting promotion and adaptation of standards to needs of SMEs.

In Hungary standardisation system is integrated with the education system as a close cooperation exists between the Hungarian national standards body and vocational educational and training system.

In Italy is established the framework agreement between national union of chambers of commerce and UNI supporting long term cooperation pertaining sharing information on standardization, joint organization of events, workshops and initiatives spreading knowledge on standards.

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10. About project partners

10.1 LIR Evolution

LIR Evolution (LIR) is a development, consulting, research and innovation agency, qualified to work on different aspects of sustainable development including local/regional development, business development, environmental protection and management, energy efficiency, renewable energy, waste management and circular economy. The organization is established by experienced members, that have long-term extensive experience in identification, design and implementation of integrated and development projects funded by EU and other financiers. LIR's references include more than 60 projects in above mentioned fields. LIR has 5 full-time employees and pool of over 20 associate experts. LIR's consultants have long-term experience in energy efficiency, renewable energy, waste management and environmental protection, agriculture, economic and business development. The knowledge they have in above fields corresponds to the EU standards. LIR Evolution has organised numerous international, national and local conferences, meetings, trainings and workshops, and has established a strong relationship with regional stakeholders, SMEs and citizens. LIR's staffs has extensive experience in EU projects implementation, administration, project and financial management, promotion and dissemination activities, organization of workshops, seminars, special events, as well as a large network of local and international stakeholders. LIR is accredited by the Republika Srpska Ministry for Scientific and Technological Development, Higher Education and Information Society as a scientific organization and association for innovation and technology development. Within its projects, LIR conducted wide spectrum of activities and implemented a number of pilot actions such as: energy audits and energy efficiency trainings for SMEs; energy-efficient reconstruction of building, installation of energy efficient thermal insulation and windows, installation of a low-enthalpy geothermal system; realization of small solar photovoltaic power plants (5-10kW). LIR designed and delivered various workshops and trainings aiming to educate stakeholders on topics of business development, ecosystem services, energy efficiency, circular economy, waste management and environmental protection, shared EU and local best practices, improved capacity of energy planning by local SMEs; transfer of best practices and pilot actions' results; developed reports on energy saving solutions; developed reports on local renewable energy sources potentials; developed report on renewable energy investment opportunities; published various promotional materials: posters, flyers, brochures, manual on energy efficiency improvement measures, layman reports on renewable energy sources exploitation, energy efficiency importance and environmental protection.

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Furthermore, LIR acted as a lead partner in H2020 INNO GREEN project and through the process of peer learning with project partners developed an innovative model for development of green entrepreneurship by SMEs.

LIR's profile has an excellent match with the objectives and activities of the SUSTAIN project, as it has accumulated experiences related to development and implementation of innovative programs for SMEs. LIR's team dedicates great attention to educational and promotional activities, work with stakeholders and target groups. LIR's extensive network of stakeholders provides an access to a number of SMEs, innovation agencies and business development entities, in country and abroad, allowing a strong base supporting the implementation of the SUSTAIN project. The region of North-Western Republika Srpska offered an interesting case for empowering standardization process in SMEs, as companies in the region are dealing with multiple challenges in this process.

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10.2 Weizer Energy & Innovation Centre

The Energy & Innovation Centre of Weiz (W.E.I.Z.) is a non-profit organisation. It is an IMPULSE CENTRE in the province of Styria. The focus of the W.E.I.Z. was set on "innovation" and "energy". As impulse centre of the region, the W.E.I.Z. has been involved in more than 60 regional and international projects as a project leader or partner towards the fields "energy, environment & sustainability", "market access & internationalization" as well as "know how transfer & networking". Moreover, the W.E.I.Z. is also a scientific R&D-organization dealing with sustainability issues. Within these projects the W.E.I.Z. has been in charge of raising awareness, developing new strategies and concepts, implementing feasibility studies and various trainings, mobilizing of institutional and market operators as local technical and business One-Stop-Shop (for enterprises, municipalities and private people). Being involved in several local pilot actions the W.E.I.Z. with its local cooperation partners has therefore won for example the Syrian Energy Globe 2010, the Austrian climate protection award 2010 and 2014. In the year 2011 the W.E.I.Z. has also aimed to become a STYRIAN ENERGY AGENCY. As regional impulse centre and local contact point, it also has a wide network and very good access to regional companies, especially SME, training organizations, sectorial agencies and other institutions, as well as municipalities and pubic administrations. The W.E.I.Z. has 9 employees. One main project the W.E.I.Z. is implementing is the COMET-project WoodC.A.R. (www.woodcar.eu). In the frame of this R&D-project (project budget: € 5 Mio.; funding: € 2,25 Mio. Cash & in-kind: €2,75) new knowledge is gained in terms of wood, as load-bearing and energy absorbing material. WoodC.A.R. (Wood - Computer Aided Research) established the knowledge and requisites for integrating wood in virtual engineering and industrial design process (e.g. vehicle design) in general and established needed knowledge base on the mechanical properties, the grading, the processing, the integration and the recycling of numerous wood species and wood composites in vehicle design. WoodC.A.R. evaluated and improved existing and developed advanced material models for use in computer aided engineering (CAE). State-of-the-art production, joining and bonding technologies are reviewed, analysed, evaluated and integrated in the virtual engineering process. Application cases, not only from the automotive sector, are selected. Based on meticulous specification sheets, the application cases are developed by applying the initial virtual engineering process. In continuous feedback-loops, the process is refined such that it is applicable in an industrial development process. Eventually, demonstrators will be built and tested, proofing the reliability of the virtual engineering process. 6 scientific organizations and 14 companies (including SME) work together in the frame of this cross-over project to gain common new knowledge.

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10.3 Romagna Tech

Romagna Tech is a not-for-profit Joint-Stock Consortium Company, accredited as Industrial Research Laboratory and Innovation Center within the “Rete Alta Tecnologia” (Hi-Tech Network) promoted by the Regional Government of Emilia-Romagna. The company operates as a Research and Technology Transfer Organization under EC Regulation 651/2014.

The mission of Romagna Tech is to promote and generate technological innovation processes thanks to a sound framework approach including:

- to work in close cooperation with knowledge centres and institution to foster the implementation of research findings;
- to promote the culture of innovation as a strategic asset for development;
- to support companies to develop technological solutions for their business;
- to provide start-ups with assistance to accelerate their growth.

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The shareholders of Romagna Tech are as follows:

- public and financial institutions, such as Municipalities and their Unions, Chambers of Commerce, banks and bank foundations;
- trade associations and services (large industries and SMEs, handcrafts companies, cooperatives);
- companies of the most relevant sectors (e.g. manufacturing, industrial automation, agrifood, ICT, etc).

Romagna Tech represents a territorial public-private partnership that can easily activate a wide range of potential stakeholders (private and public, technical and institutional) to work on common innovation projects. It operates on several sectors (energy efficiency, agrifood, digitalization and Industry 4.0, green manufacturing, mechanics, advanced materials) and it offers a broad range of competences, covering both the technical and managerial domains: sensor engineering, ICT, artificial intelligence, artificial vision, industry 4.0, intellectual property, fund-raising, business planning, communication, project management.

The company can rely on a high skilled team, composed by 17 people (10 graduated and 3 PhDs) on different disciplines and with at least 5 years of experience in supporting SMEs on innovation adoption. Males and females are equally represented.

Romagna Tech works according to three areas of intervention:

1. Romagna Tech Innovation Centre fosters interactions between research and businesses thanks to trainings, B2B and B2Research matching events, technical focus groups, etc.
2. Romagna Tech LAB is an Industrial Research Lab, specialized in ICT, Industry 4.0, platforms, where high performing innovative technological solutions are designed and developed for the benefit of companies and SMEs in particular.
3. Startup accelerator, where it provides a growth pattern for business, based on a business model including all the relevant feasibility check procedures. We run three incubators, promoted by local institutions: A) Torricelli Business Incubator in Faenza, aimed at fostering the growth of new business ideas and innovative start-ups thanks to an extensive offer of spaces, infrastructures, services, guidance and cooperation with other players within the Research and Innovation cluster; B) the U-Start business incubator in Bassa Romagna, created in 2003 to foster the development of new businesses in the advanced tertiary sector; C) CASA BUFALINI, a living lab promoted by Municipality of Cesena, focused on digital literacy of local communities and empowerment of the creative and cultural sector, by supporting startups and coworkers in these fields.

Romagna Tech is member of the seven regional S3 Clusters, namely:

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- GREENTECH, about renewable energies, climate change, circular economy;
- MECH on mechanics, motors, advanced and predictive manufacturing, artificial intelligence etc;
- AGRIFOOD on precision farming, sustainable production systems, food innovation and bio-based industries;
- INNOVATE on innovative models on ICT services;
- CREATE about creative and cultural industries, tourism, audiovisual etc. In particular, Romagna
- Tech coordinates the Cluster Value Chain ADDICT, focused on product customization and shelf
- Innovation;
- BUILD on building restoration, new building models and technologies, cultural heritage preservation;
- HEALTH dealing with innovation in medical devices, active ageing etc.

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Annex

Energy efficiency maturity assessment:

Figure 5. Self-audit tool segment: Assessment of energy policy in the company

1. Assessment of energy policy in the company

1.1 What is company's management level of knowledge on laws, regulations, strategies and policies regarding energy efficiency?

Question assesses degree of awareness and knowledge of management on energy efficiency legislation and policies.

○ Not informed ○ Basic Knowledge ◉ Moderate Knowledge ○ Advanced Knowledge

Recommendation:
Commitment by top management is a key starting point for improvement of energy efficiency in the company. People in charge of company should plan to fulfill existing and upcoming regulations (e.g. laws, bylaws, strategic documents related to energy efficiency, renewable energy and efficient cogeneration, energy classification of products, minimum requirements for energy performance of buildings, energy management and monitoring, energy auditing, emission limit values etc.) and address them in internal documentation related to energy use.

1.2 Is improvement of energy efficiency and use of renewable energy priority for the company?

Question assesses degree to which energy efficiency and use of renewable energy is priority for the company and management.

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Recommendation is to introduce energy goals to company's business plan and strategy what will contribute to more systematic approach to energy management. Management should dedicate more attention to energy use related investigation and try to answer to the following questions: How much energy does our firm use, and what does it cost? What impact does this spending have on key financial indicators such as cost of goods sold? Are we capitalizing on opportunities to use renewables? What is our carbon footprint and that of our suppliers? How does this align with customer, investor, and employee expectations, and how do we compare with competitors? Answers to these questions will reveal performance opportunities and gaps. Once goals are set, the team should create incentives for employees to prioritize sustainable energy use.

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Figure 6. Self-audit tool segment: Assessment of energy management in the company.

2. Assessment of energy management in the company

2.1 Is attention given to regular review and monitoring of energy consumption?

Review of energy consumption is carried-out through an analysis of energy available data for the company or installation. The energy review can be done through workshops with the relevant people from different departments of organization.

○ Not Started ○ Planning Initiatives ◉ Piloting Initiatives ○ High scale implemented

Recommendation:
In order to achieve the precise review of energy consumption, several people from different departments of the company should be involved (e.g. technical and financial department). It is important to involve experienced personnel with in-depth knowledge of the installation to be reviewed leading to appropriate analysis of energy use and consumption, identification of areas of significant energy use and opportunities for energy performance improvement. Review of energy consumption is important to: Understand the energy use of the organization by creating an overview of energy flows; Identify improvement opportunities and focus efforts toward critical areas; Ensure adequate overview and control (for example, registering unexpected changes or results); Predict the expected energy use for the next period; Measure and evaluate the effect of improvement activities and projects; Report on the energy performance and improve energy efficiency.

2.2 Is energy planning important and priority for the company?

Energy planning is important step for improvement of energy management and energy efficiency; e.g. Planning of energy spending for a period of time in order to be able to reveal gaps and inconsistencies in energy consumption.

○ Not Considered ○ Initial planning ◉ Piloting initiatives ○ High scale implemented

Recommendation:
In order to understand energy use and identify possibilities for energy savings in company, it is necessary to conduct systematic energy management. Systematic energy management means to monitor consumption, to analyze and interpret results of analysis in order to know, in every moment answers to the following questions: Where do we consume energy? How do we consume energy? Which energy sources and fuels do we consume? How much energy do we consume and how much does it cost us? Who is responsible for energy management? What can we do to decrease energy consumption while keeping needed level of service? Attention should be dedicated to regular energy planning, addressing energy consumption and conducting energy monitoring and reporting periodically.

2.3 Does energy manager have important role and clear responsibility?

An energy manager is responsible for assessing the energy usage of a company, organization, or building and identifying ways to make the organization more energy efficient.

○ No formal responsibility for energy management. ○ Energy management is a part time duty. ◉ Energy manager is appointed, but with unclear responsibilities. ○ Energy management function fully integrated into organizational structure with clear delegation of responsibility.

Recommendation:
It would be beneficial to involve both energy manager and energy management team to achieve better energy performance. Involvement of energy management team led by energy manager would gather different departments of company to become responsible for analyzing and improving energy management. The team would be actively involved in analysis of energy related issues and development of energy saving plan, implementation of planned measures and communication with other employees. The team should have regular periodical meetings to discuss energy aspects and plan further activities. It is important to keep the team motivated by providing them with feedback on achieved energy savings as a result of their activities. Energy management should be integrated with other management systems within organization.

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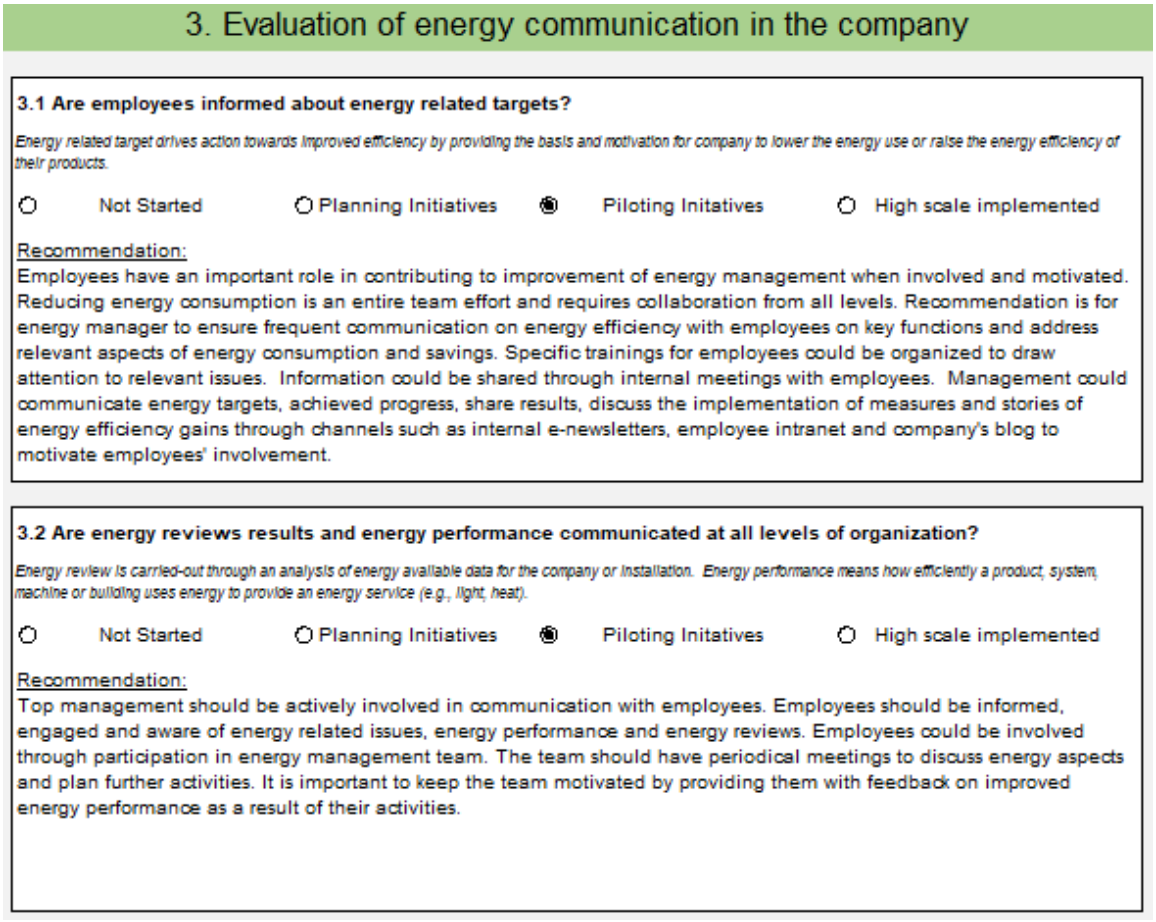
Figure 7. Self-audit tool segment: Evaluation of energy communication in the company.



3. Evaluation of energy communication in the company

3.1 Are employees informed about energy related targets?

Energy related target drives action towards improved efficiency by providing the basis and motivation for company to lower the energy use or raise the energy efficiency of their products.

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Employees have an important role in contributing to improvement of energy management when involved and motivated. Reducing energy consumption is an entire team effort and requires collaboration from all levels. Recommendation is for energy manager to ensure frequent communication on energy efficiency with employees on key functions and address relevant aspects of energy consumption and savings. Specific trainings for employees could be organized to draw attention to relevant issues. Information could be shared through internal meetings with employees. Management could communicate energy targets, achieved progress, share results, discuss the implementation of measures and stories of energy efficiency gains through channels such as internal e-newsletters, employee intranet and company's blog to motivate employees' involvement.

3.2 Are energy reviews results and energy performance communicated at all levels of organization?

Energy review is carried-out through an analysis of energy available data for the company or installation. Energy performance means how efficiently a product, system, machine or building uses energy to provide an energy service (e.g., light, heat).

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Top management should be actively involved in communication with employees. Employees should be informed, engaged and aware of energy related issues, energy performance and energy reviews. Employees could be involved through participation in energy management team. The team should have periodical meetings to discuss energy aspects and plan further activities. It is important to keep the team motivated by providing them with feedback on improved energy performance as a result of their activities.

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Figure 8. Self-audit tool segment: Assessment of energy information system.

4. Assessment of energy information system

4.1 Which type of energy related information system is available?

Energy information system provides information on energy monitoring, energy consumption issues and related energy aspects.

○ Information system on energy not introduced. Energy consumption is not part of accounting.	○ Energy accounting by monitoring and analysis of energy consumption based on bills on a monthly basis. Energy consumption monitored by looking into energy bills and following up on eventual increases of energy costs.	◉ Energy performance indicators defined for major energy sources and usage along with baseline and considered in cost accounting.	○ Digital monitoring system: Data on energy consumption are monitored and recorded in an online database by using digital sensors and meters/ Advanced system such as SCADA: supports automatically transfer of information and data to follow on energy consumption level (data archiving, online implementation, automatic remote monitoring in real time and alarming to potential issues)

Recommendation:
Introduction of a more complex monitoring process based on a digital monitoring system is recommended and relevant for larger companies with more complex energy systems. Data on energy consumption and thermal comfort are monitored and recorded in an online database. This is implemented by using several digital sensors and meters. The system is commonly monitoring all parameters in a time interval (e.g. 15 minutes), followed by transmission of parameters data via communication link to the database, where all data are processed and instantly available for the users. The energy manager can take a promptly action in any case of issue, such as unusually high consumption.

4.2 Are achieved energy savings reported and communicated to employees?

○ Not Started	○ Planning Initiatives	◉ Piloting Initatives	○ High scale implemented

Recommendation:
Employees should be frequently informed, engaged and aware of energy related issues and aspects. Employees could be involved through participation in energy management team. The team should have periodical meetings to discuss energy aspects and plan further activities. It is important to keep the team motivated by providing them with feedback on achieved energy savings as a result of their activities. Energy manager and energy management team should collaborate closely and regularly communicate in order to reach optimal solutions. It could be beneficial to collect ideas on energy savings from employees and provide prizes for the best solutions.

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Figure 9. Self-audit tool segment: Assessment of energy efficiency improvement.

5. Assessment of energy efficiency improvement

5.1 Is implementation of energy related standards important? (ISO 50001:2011, BS EN 16001:2009 etc.)

ISO 50001 - ENERGY MANAGEMENT SYSTEMS standard helps organizations to manage their energy performance, specifies requirements for establishing, implementing, maintaining, and improving energy management system.
BS EN 16001 standard specifies requirements for energy management system to enable organization to develop and implement policy and objectives which take into account legal requirements and information about significant energy aspects.

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
It is beneficial to apply energy management standard as it provides multiple benefits enabling organization to follow a systematic approach in continuous improvement of energy performance, including energy efficiency, energy use and consumption. It specifies requirements applicable to energy use and consumption, including measurement, documentation and reporting, design and procurement practices for equipment, systems, processes and personnel that contribute to energy performance. Energy management process in a company is not finalized by implementation of standard, single rehabilitation measure, a series of measures or one energy management cycle. It is a continuous process that will finalize in a long run when company becomes zero emission and energy independent self-sustained organization.

5.2 Is company conducting energy audits?

Energy audit is an established procedure that helps in the analysis of energy consumption in the system (e.g. company), and aims to establish how energy is consumed.

○ No energy audits ○ Ad hoc energy audits ◉ Regular preliminary energy audits. ○ Both preliminary and detailed energy audits implemented.

Recommendation:
Preliminary energy audit is sufficient for simple buildings, offices or small industrial processes where it is not necessary to do many measurements and inquiries as most of energy consumers are already known. Detailed energy audit is the most common form recommended for inspection of complex organizations containing accurate economic indicators for recommended energy efficiency measures. The total consumption of energy products according to all consumers is included whenever possible. Detailed energy audit constitutes relevant basis for decision making on investment in energy efficiency measures by the management of the organization. Following the implemented energy audit, collected data should be analyzed and calculation provided regarding financial aspects of identified energy efficiency improvement measures and their potential to check if the investment would result in energy savings and costs reduction.

5.3 Is company implementing measures for improvement of energy efficiency?

○ No implemented energy efficiency measures. ○ Implemented low cost energy efficiency measures. ◉ Investments in high cost energy efficiency measures are envisaged and planned. ○ Investments in high cost energy efficiency measures are implemented.

Recommendation:
Energy efficiency measures should be taken into consideration based on their feasibility and financial aspects. Following the implemented energy audit, collected data should be analyzed and calculation provided regarding financial aspects of identified energy efficiency improvement measures and their potential to check if the investment would result in energy savings and costs reduction. Financial calculations should encompass:
-Payback Period (Payback period in capital budgeting refers to the time required to recoup the funds expended in an investment, or to reach the break-even point);
-Net Present Value (NPV) is the value of all future cash flows (positive and negative) over the entire life of an investment discounted to the present moment. NPV is the difference between the present value of cash inflows and the present value of cash outflows over a period of time);

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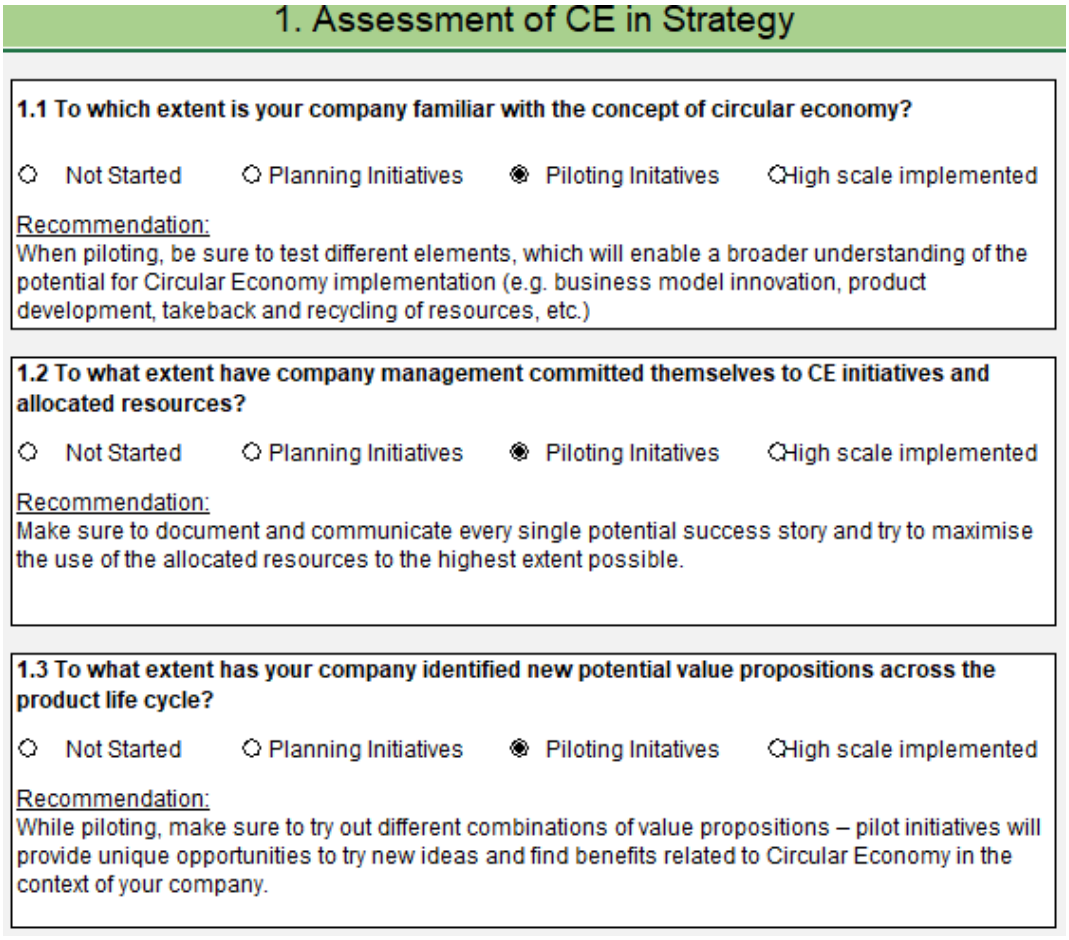
Circular economy maturity assessment:

Figure 10. Self-audit tool segment: Assessment of circular economy strategy.



1. Assessment of CE in Strategy

1.1 To which extent is your company familiar with the concept of circular economy?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
When piloting, be sure to test different elements, which will enable a broader understanding of the potential for Circular Economy implementation (e.g. business model innovation, product development, takeback and recycling of resources, etc.)

1.2 To what extent have company management committed themselves to CE initiatives and allocated resources?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Make sure to document and communicate every single potential success story and try to maximise the use of the allocated resources to the highest extent possible.

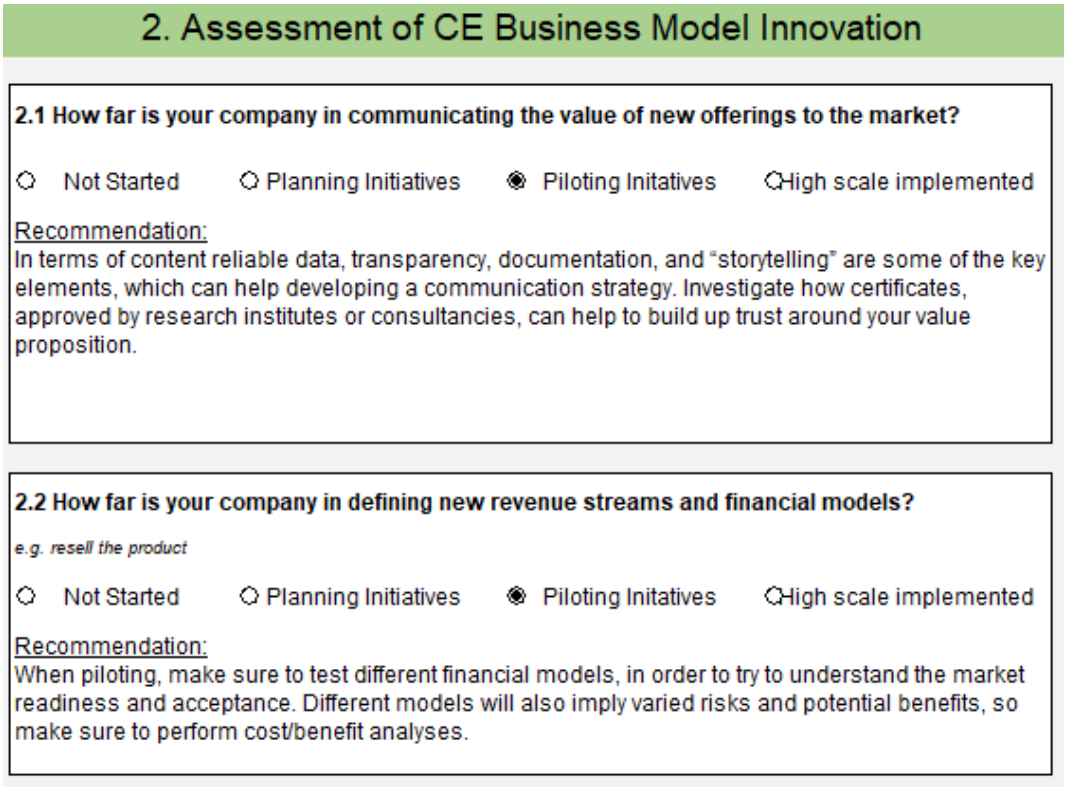
1.3 To what extent has your company identified new potential value propositions across the product life cycle?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
While piloting, make sure to try out different combinations of value propositions – pilot initiatives will provide unique opportunities to try new ideas and find benefits related to Circular Economy in the context of your company.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement No. 959275.

Figure 11.Self-audit tool segment: Assessment of CE business model.



2. Assessment of CE Business Model Innovation

2.1 How far is your company in communicating the value of new offerings to the market?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
In terms of content reliable data, transparency, documentation, and "storytelling" are some of the key elements, which can help developing a communication strategy. Investigate how certificates, approved by research institutes or consultancies, can help to build up trust around your value proposition.

2.2 How far is your company in defining new revenue streams and financial models?

e.g. resell the product

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
When piloting, make sure to test different financial models, in order to try to understand the market readiness and acceptance. Different models will also imply varied risks and potential benefits, so make sure to perform cost/benefit analyses.

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Figure 12. Self-audit tool segment: Assessment of CE in organization.Self-audit tool segment: Assessment of CE in organization.

3. Assessment of CE in Organisation

3.1 How far is your company in developing a clear business case (i.e. calculating the business benefits) for new initiatives based on Circular Economy?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
When piloting Circular Economy initiatives, ensure to define and measure the key business drivers - these are usually the ones linked with your strategy and long-term goals.

3.2 How far is your company in establishing processes (e.g. take-back processes) and tools (e.g. circularity assessments) to support the implementation of Circular Economy specifically?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
When piloting the use of processes and tools e.g. focusing on ideation, scenario planning, business model innovation or decision-making, select the ones that have a high synergy with the company's culture and current approaches. It will enable a smoother implementation process!

3.3 How far is your company in taking risks and investing in Circular Economy initiatives?

Question assesses degree to which your company is taking risks and invests in CE initiatives.

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Focus on exploring different measures of investment and risks, to ensure a comprehensive view. To mitigate identified potential risks, see if it is possible to share risk between value chain partners or users.

3.4 To what extent has your company developed training programs to enhance knowledge and skills regarding Circular Economy?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
While running the pilot initiative, make sure to identify the knowledge areas that are key for Circular Economy implementation (e.g. business innovation and strategy, new product development, setups for takeback and recycling of resources , etc.). The concept of Circular Economy can seem abstract, so make it relevant, small and experimental and apply a "learning-by-doing" approach.

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Figure 13. Self-audit tool segment: Assessment of policy and market.

4. Assessment of CE in Policy and Market

4.1 How far is your company in influencing the market readiness for second-life products?

e.g. remanufactured, reused or recycled products

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
During the pilot, make sure to test a number of incentives that can enhance the market potential and minimise the customers' resistance in acquiring/using second-life products, across a number of market segments. Engage in active discussion with key stakeholders to understand what their needs and potential barriers are, and take the opportunity to co-create solutions and ways to deliver the second-use products with them.

4.2 How far is your company in influencing the market readiness for new business models?

e.g. leasing instead of selling

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
During the pilot, make sure to test alternative business models to get a good understanding of the market readiness for them. Make sure to collect customers' perceptions, their potential resistance and wishes, so as to enable the refinement of the tested business models for their subsequent implementation and scale-up. Market segmentation across different regions can also be a good strategy, when measuring the market readiness.

4.3 How far is your company in co-developing new circular solutions with key stakeholders along the value chain?

Collaborate with partners with different perspectives and insights might bring up new ideas and lead to better implementation of products or business models, enhancing value of your circular strategy.

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Make sure to document new insights, which might have occurred by having co-developed solutions with one or more stakeholders, as well as experiences of driving the collaboration process. Documentation can work as reference later on, to engage new stakeholders and continuously ensure management support. Continue to explore what kind of knowledge or assets you need, to invent breakthrough Circular Economy systems and engage new stakeholders into the co-creation initiative.

4.4 How far is your company in influencing the sectorial, national and international legislative frameworks related to the implementation of Circular Economy initiatives?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Be actively engaged in sectorial, national and international networks and use them as channels to communicate regulatory barriers. Consider how you can raise a powerful joint voice, and through lobbying among key stakeholders and decision-makers, introduce or raise legal requirements.

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Figure 14.Self-audit tool segment: Assessment CE in product and service innovation.

5. Assessment of CE in Product & Service Innovation

5.1 To what extent is your company developing and delivering Product/Service-Systems?

e.g. services supporting the product use, subscriptions, sharing solutions, renting instead of owning

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Boost your pilot by exploring best practices for developing and delivering Product/Service-Systems. There are a number of tools available to support the development of alternative business models, ideation of new offerings, the calculation of the total cost of ownership, etc.

5.2 How far is your company in developing products and services considering extended lifetime?

e.g. design for maintenancem modularity, change of spare partes,…

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
During the pilot, check how to extend the lifetime of your products by observing different real-life use scenarios, such as downtime situations and how all the relevant stakeholders (e.g. user, repair service provider, seller) handle the product in their given context. Explore how you can optimise the design, or innovate new services to ensure the design is optimally used.

5.3 How far is your company in developing products and services that can be shared with other users?

e.g. car/bike sharing, sharing of clothing, sharing of equipment, facilities, machineries

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Carry out field observations and collect feedback from internal/external stakeholders in contact with your product at End-of-Life, so you can identify hurdles (e.g. difficult mechanisms to enable disassembly or assembly; unsuitable for transportation in relation to takeback; lack of integrated information regarding material handling; etc.) to overcome in your design.

5.4 How far is your company in repairing products so to extend their lifetime?

Does your company have for example a repair service, to extend the lifetime of your products?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Collect feedback on how well your product provides easy access for repair services, ensure proper product upgradeability and easy replacement of product components with short durability (e.g. electronics or moving parts). Evaluate how well the service providers for repair are able to handle the products at the chosen location (e.g. onsite on the customer's property or at a repair facility). Analyse the identified pros and cons of handling the repair, either in-house or as an outsourced service, handled by qualified and certified specialists.

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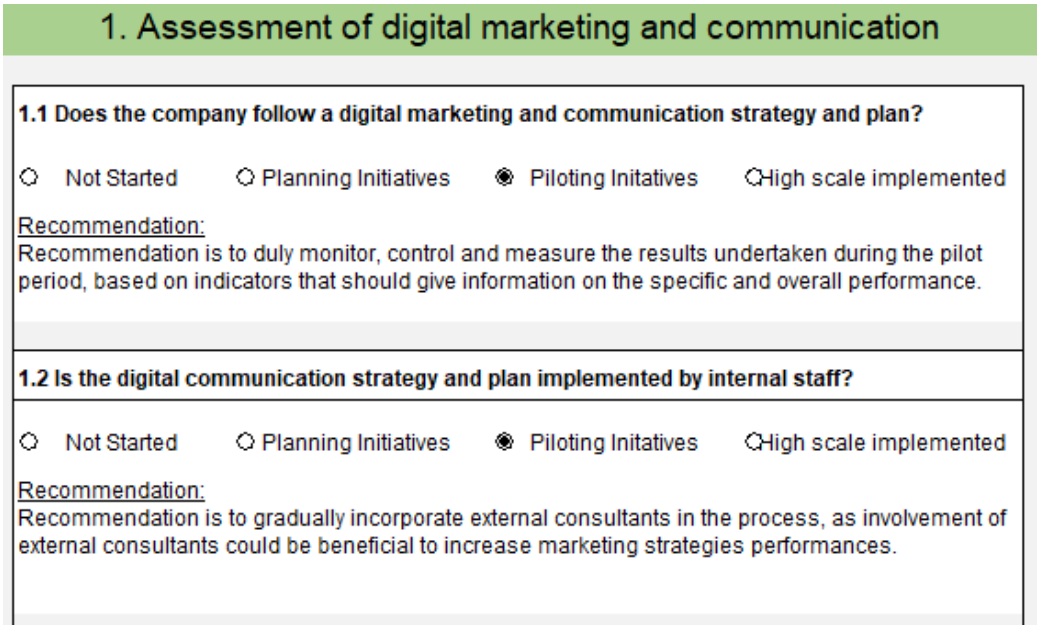
Digitalization maturity assessment:

Figure 15. Self-audit tool segment: Assessment of digital marketing and communication.



1. Assessment of digital marketing and communication

1.1 Does the company follow a digital marketing and communication strategy and plan?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

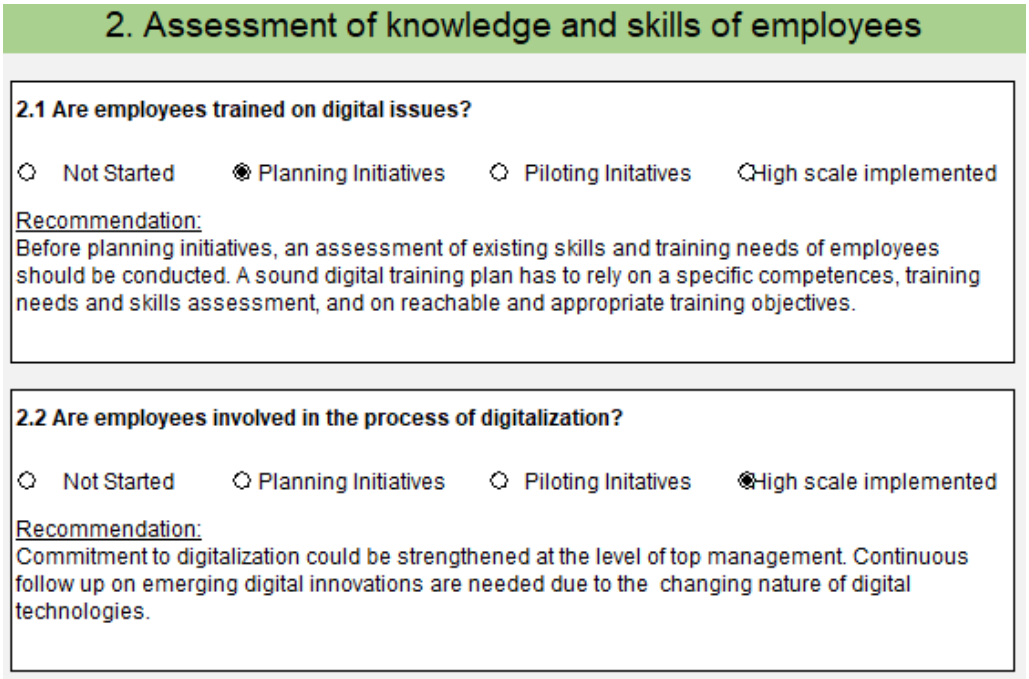
Recommendation:
Recommendation is to duly monitor, control and measure the results undertaken during the pilot period, based on indicators that should give information on the specific and overall performance.

1.2 Is the digital communication strategy and plan implemented by internal staff?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Recommendation is to gradually incorporate external consultants in the process, as involvement of external consultants could be beneficial to increase marketing strategies performances.

Figure 16. Self-audit tool segment: Assessment of knowledge and skills of employees. Self-audit tool segment: Assessment of knowledge and skills of employees.



2. Assessment of knowledge and skills of employees

2.1 Are employees trained on digital issues?

○ Not Started ◉ Planning Initiatives ○ Piloting Initatives ○ High scale implemented

Recommendation:
Before planning initiatives, an assessment of existing skills and training needs of employees should be conducted. A sound digital training plan has to rely on a specific competences, training needs and skills assessment, and on reachable and appropriate training objectives.

2.2 Are employees involved in the process of digitalization?

○ Not Started ○ Planning Initiatives ○ Piloting Initatives ◉ High scale implemented

Recommendation:
Commitment to digitalization could be strengthened at the level of top management. Continuous follow up on emerging digital innovations are needed due to the changing nature of digital technologies.

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Figure 17. Self-audit tool segment: Assessment of IT security, IT infrastructure and data management.

3. Assessment of IT security, IT infrastructure and data management

3.1 Has your company conducted IT security assessment?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Although IT security is a domain to be governed and possibly kept under control in its entirety, pilot initiatives must specifically concern the areas of greatest vulnerability and exposure of the company in order to limit the risk to which the company is exposed.

3.2 Does your company employ internal experts to conduct IT security assessment?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
The use of expertise outside the company can be very useful for a continuous update on an ever-changing issue such as that of IT security. In any case, internal staff must be actively involved in this process because they must always be aware of the policies adopted and follow them rigorously to avoid introducing potential vulnerabilities into the company.

3.3 Does your company own smart infrastructure that allows to collect real-time and historical data?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Pilot initiatives to collect data from a smart infrastructure must always be accompanied by applications capable of transforming raw data into valuable information that can be used in business processes, in particular in decision-making processes: only in this way, experimentation can provide feedback not only purely technical but with important repercussions on corporate strategies.

3.4 Has company defined corporate standards around data acquisition, data infrastructure and enabling data driven decisions?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
A company strategy integrated in data management must be developed gradually to allow all company personnel to seize the opportunities deriving from the active use of information and at the same time discourage the use of personal databases. Pilot initiatives must be developed starting from the company areas that are most ready to welcome their potential both from a technical and a strategic point of view.

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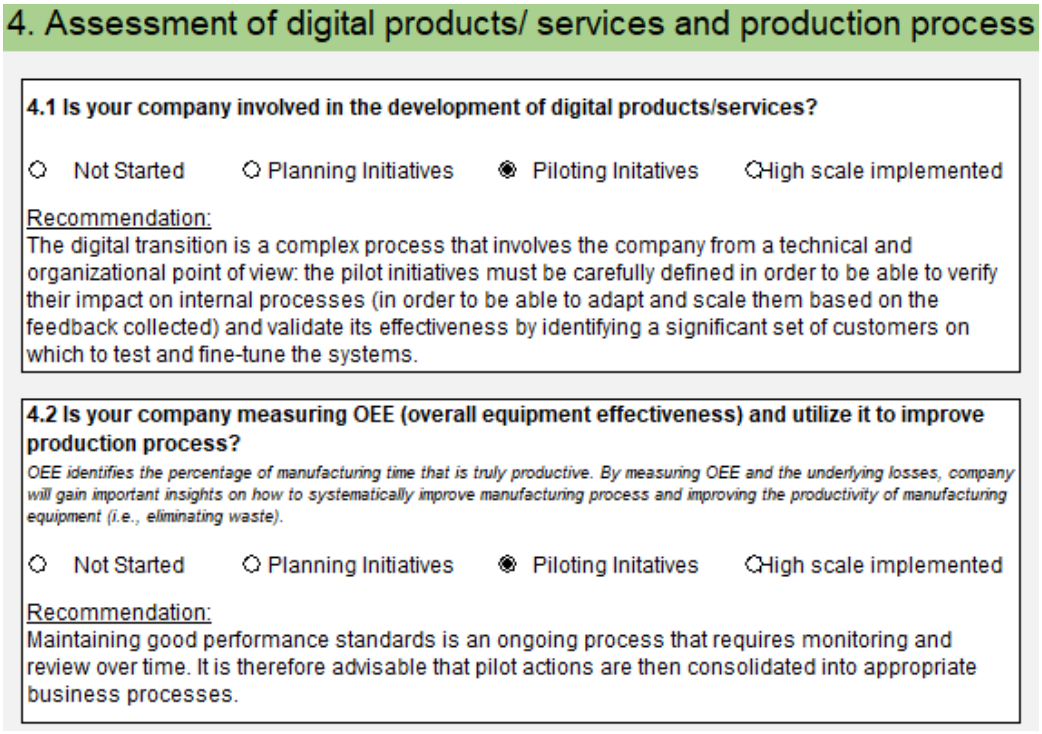
Figure 18. Self-audit tool segment: Assessment of digital products/services and production process.



4. Assessment of digital products/ services and production process

4.1 Is your company involved in the development of digital products/services?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
The digital transition is a complex process that involves the company from a technical and organizational point of view: the pilot initiatives must be carefully defined in order to be able to verify their impact on internal processes (in order to be able to adapt and scale them based on the feedback collected) and validate its effectiveness by identifying a significant set of customers on which to test and fine-tune the systems.

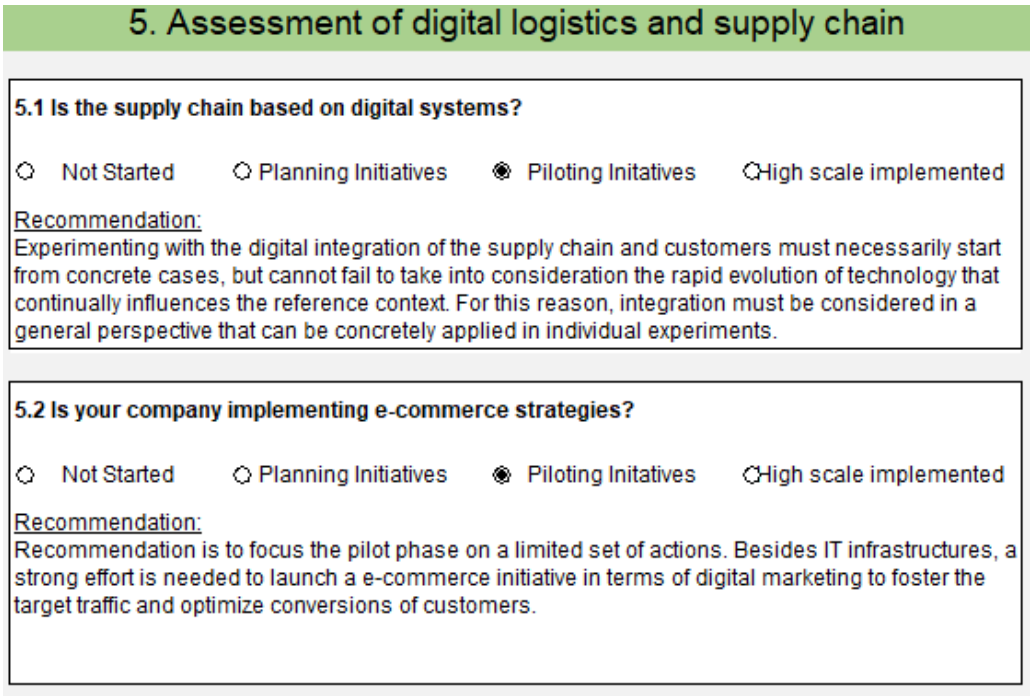
4.2 Is your company measuring OEE (overall equipment effectiveness) and utilize it to improve production process?

OEE identifies the percentage of manufacturing time that is truly productive. By measuring OEE and the underlying losses, company will gain important insights on how to systematically improve manufacturing process and improving the productivity of manufacturing equipment (i.e., eliminating waste).

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Maintaining good performance standards is an ongoing process that requires monitoring and review over time. It is therefore advisable that pilot actions are then consolidated into appropriate business processes.

Figure 19.Self-audit tool segment: Assessment of digital logistics and supply chain.



5. Assessment of digital logistics and supply chain

5.1 Is the supply chain based on digital systems?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Experimenting with the digital integration of the supply chain and customers must necessarily start from concrete cases, but cannot fail to take into consideration the rapid evolution of technology that continually influences the reference context. For this reason, integration must be considered in a general perspective that can be concretely applied in individual experiments.

5.2 Is your company implementing e-commerce strategies?

○ Not Started ○ Planning Initiatives ◉ Piloting Initatives ○ High scale implemented

Recommendation:
Recommendation is to focus the pilot phase on a limited set of actions. Besides IT infrastructures, a strong effort is needed to launch a e-commerce initiative in terms of digital marketing to foster the target traffic and optimize conversions of customers.

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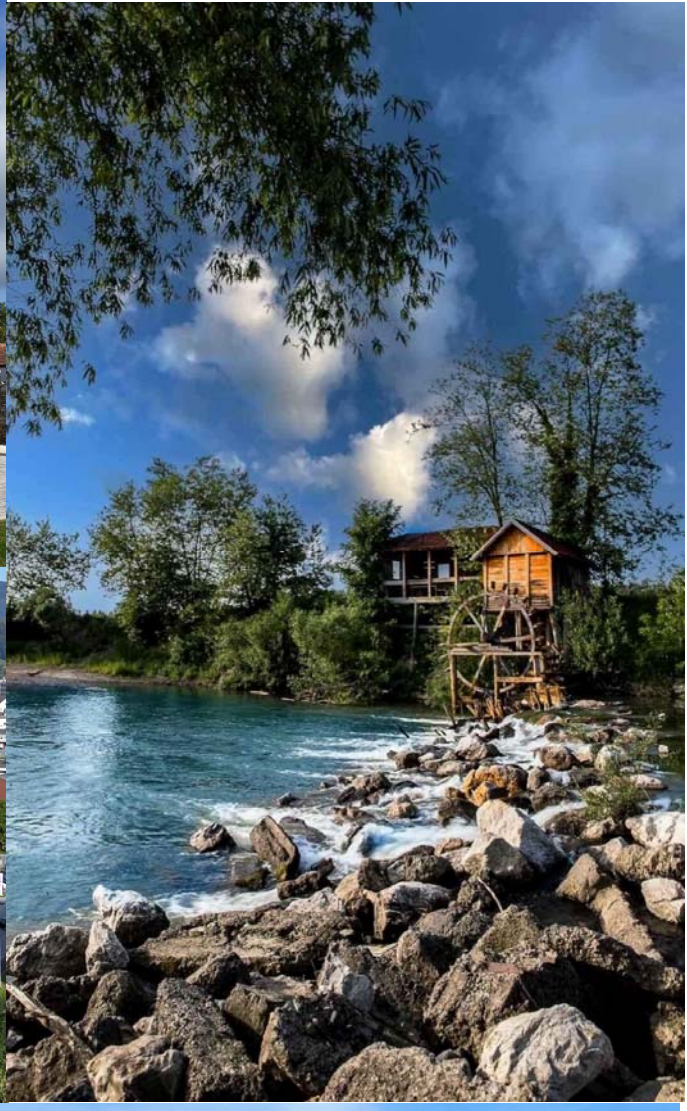


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