WINd – Upskilling technical workers from unsustainable energy sectors to boost employability in the fast-growing wind industry – 2023-1-PT01-KA220-VET-000156817

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D5.3.1: Blueprint for a micro-credentials scheme for transitioning energy workers

PROMEA

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Table of Contents

List of Acronyms

Acronym	Meaning
HSE	Health, Safety and Environment
PPE	Personal Protective Equipment
SCADA	Supervisory Control and Data Acquisition
EQF	European Qualifications Framework
ECVET	European Credit System for Vocational Education and Training
EDCI	Europass Digital Credentials Infrastructure
RPL	Recognition of Prior Learning
MCQ	Multiple Choice Question
OEM	Original Equipment Manufacturer
VET	Vocational Education and Training
LMS	Learning Management System
QA	Quality Assurance

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Introduction

This deliverable provides the Blueprint for a micro-credentials scheme developed under activity A5.3 of the WINd project, establishing the technical and procedural specifications required for a recognition system supporting the upskilling of transitioning energy workers. The Blueprint explains how the WINd theoretical online course can be used by VET providers to support workers moving into the wind-energy sector. It is based on the competency matrices developed in the project and on the structure of the WINd curriculum, which includes three Learning Units and 162 hours of theoretical training. The document outlines how VET providers can map the WINd content to learning outcomes, apply suitable assessment methods and issue digital micro-credentials using recognised formats. It also provides basic guidance on provider responsibilities, quality assurance and the steps involved in adopting the scheme. Overall, the Blueprint offers a proposal that VET centres can follow if they wish to incorporate the WINd theoretical course into their training offer.

1. Micro-Credential Framework Specifications

1.1 Target Occupations and Core Competency Requirements

The micro-credential scheme proposed within the WINd project is grounded in the competency matrices produced during the activity A2.1 Skills-matching analysis and job transition profiles, for three priority occupational groups: (i) Oil and Gas Technicians, (ii) Industrial Electricians, and (iii) Wind Turbine Technicians, including specialisations in corrective mechanical, hydraulic, and rotor maintenance. These matrices identify both the competencies that workers already possess and the additional wind energy specific competencies required for successful transition into wind sector roles.

Across all occupational groups, the matrices reveal consistent skills needs in the following domains:

- Technical knowledge of wind turbine systems (mechanical, electrical, hydraulic and rotor systems)
- Fault identification, diagnostics, and troubleshooting at varying levels of autonomy
- Preventive and corrective maintenance procedures, aligned with OEM standards and sectoral requirements

- Regulatory and compliance knowledge, including safety rules, operational regulations, and industry codes
- Use of tools, test instruments, and measurement equipment, adapted for turbine environments
- Interpretation of technical documentation, schematics, and digital monitoring outputs.
- Health and Safety (H&S) competencies, including working at height, rescue procedures, and risk mitigation
- Digital skills relevant to turbine monitoring and control systems (e.g., SCADA awareness).
- Responsibility and autonomy descriptors, mapped to EQF competence indicators as reflected in the matrices

The comparative analyses indicate that transitioning workers frequently bring strong foundational experience, particularly in mechanical and electrical tasks, while requiring targeted upskilling in wind-specific systems, safety frameworks, and advanced diagnostic capability. These insights form the baseline for defining micro-credential content and learning outcomes.

1.2 Subject Areas and Competency Domains

Drawing directly from the structure of the matrices, subject areas for the micro-credentials are clustered into four main competency domains, each representing the essential areas of proficiency required for wind sector employability:

A. Theoretical Technical Competence

Includes the ability to:

- Understand the function, structure and interaction of turbine components and subsystems
- Explain the principles behind mechanical, electrical, hydraulic and rotor-related systems
- Interpret diagrams, sensor data and operational parameters at a theoretical level
- Describe standard inspection and maintenance concepts without performing practical tasks

B. Safety and Regulatory Compliance

- Knowledge of sector-specific operational regulations
- Application of safety protocols (e.g., lock-out/tag-out, working at height, rescue readiness)

- Environmental compliance and risk prevention

C. Theoretical Understanding of Operational Processes

Includes the ability to:

- Understand the basic steps involved in task planning and preparation within wind-turbine operations
- Explain standard maintenance procedures and operational workflows at a conceptual level
- Describe how technical findings are typically documented and communicated in maintenance contexts
- Demonstrate knowledge of how work processes are organised and coordinated in wind-energy operations

D. Transversal and Digital Skills

- Digital literacy relevant to turbine control and monitoring systems
- Problem-solving, communication, and teamwork
- Ability to interpret technical manuals and digital instructions

These domains constitute the structural backbone of the micro-credential learning outcomes and ensure that each credential is linked to a competency profile.

1.3 Micro-Credential Structure and Metadata

Based on the competence matrices and the WINd scheme requirements, each micro-credential will follow a structure focused on theoretical knowledge. The structure should include:

- Title aligned with the theoretical domain covered in the WINd curriculum (e.g., Introduction to Wind Turbine Systems, Electrical Theory for Wind Turbines, Principles of Aerodynamics)
- Learning Outcomes (LOs) derived from the knowledge-based competencies in the matrices
- EQF Level, referenced primarily through knowledge descriptors
- Workload, expressed in learning hours
- Assessment method, limited to knowledge-based assessment formats such as multiple-choice tests, short written responses, or scenario-based questions

- Performance thresholds, defined as the minimum level of theoretical understanding required to demonstrate competence (e.g., ability to describe system functions, explain principles, interpret information)
- Digital Metadata compliant with EU micro-credential standards (e.g., EDCI, Open Badges), ensuring interoperability and portability

This structure supports consistency across VET providers and allows transparent and comparable issuance of theory-based micro-credentials.

1.4 Alignment with Qualification Standards and Occupational Pathways

The EQF mapping sheets included in the competency matrices developed under Activity A2.1 confirm that the knowledge-based competences identified in the WINd theoretical course correspond mainly to EQF levels 4–5, as defined through EQF knowledge descriptors. These references support the formulation of learning outcomes and the classification of the proposed micro-credentials within a structured progression of theoretical knowledge. The theoretical competences extracted from the matrices can complement existing VET qualification pathways in fields such as electrical, electromechanical or renewable-energy–related training programmes. They also provide knowledge relevant to occupational standards associated with wind-energy operations and maintenance, without replacing practical training or formal vocational certification. The micro-credential proposal remains compatible with European VET frameworks and can be used by VET providers to support learners who wish to build theoretical knowledge as part of a broader upskilling or transition pathway.

2. Assessment, Validation, and Quality Assurance

2.1 Requirements for Accredited Micro-Credential Providers

Providers delivering micro-credentials under the WINd project's proposed scheme are expected to demonstrate the capacity to assess and validate the theoretical knowledge and cognitive competences associated with wind turbine operation and maintenance. As the WINd course is designed as an online, theory-based training programme, micro-credential providers are not required to maintain access to physical laboratories, machinery or practical training environments. Instead, they must meet the following requirements:

- Ensure the delivery of the theoretical content aligned with the WINd online course, including the structured learning units, lesson objectives and EQF-referenced learning outcomes
- Demonstrate assessor competence in relevant wind-energy knowledge areas, with familiarity in turbine systems, maintenance concepts, safety frameworks, and the competency descriptors reflected in the matrices. Practical experience is not mandatory for theory-based assessment but is considered beneficial
- Implement standardised assessment procedures for evaluating theoretical understanding, using tools such as multiple-choice questions, knowledge tests, case-based reasoning tasks and scenario-based interpretation exercises
- Ensure integrity, reliability and fairness of assessment through clear scoring criteria, transparency of grading methods, documented processes, and traceable records. External moderation is recommended but not compulsory
- Align with relevant European quality frameworks, including EQAVET principles for continuous quality assurance and the European micro-credential framework regarding metadata, learning outcomes and documentation
- Provide appropriate learner support mechanisms, ensuring that participants can navigate the online material effectively and access clarification where needed

These requirements help ensure that all VET providers using the WINd theoretical content apply it in the same way, with fair and consistent assessment processes, so that the micro-credentials remain equally reliable and recognised across institutions and countries.

2.2 Assessment Methods and Pass Criteria

The assessment model for WINd micro-credentials is purposefully designed to evaluate knowledge-based and conceptual competences, reflecting the online, theory-focused nature of the training programme.

A. Knowledge-Based Assessment

This is the primary method used for all modules and includes:

- Multiple-choice questions (MCQs)
- Short-answer or structured questions
- Conceptual reasoning about faults, alarms or operational conditions

Pass criteria are set according to the learning outcomes and EQF descriptors identified in the competency matrices, ensuring that assessments reflect the expected cognitive level (EQF 4–6 depending on the module).

B. Scenario-Based Assessment

Where appropriate, learners may complete:

- case-based reasoning tasks (e.g., interpreting alarm patterns, turbine performance deviations)
- contextualised safety or operational decision-making scenarios
- simplified simulations of theoretical procedures

These tasks evaluate higher-order skills such as problem solving, judgement and application of theoretical knowledge to realistic situations.

C. Unit-Level Summative Assessment

Each Learning Unit concludes with a summative assessment composed of:

- a set of MCQs covering all lesson topics
- integrative questions linking concepts across lessons
- case studies where relevant

Learners must achieve a minimum passing threshold determined by the micro-credential provider, typically between 60–70%, with the requirement that essential safety-related questions must be answered correctly.

2.3 Examination Content and Delivery Formats

The examination content for all WINd micro-credentials is directly derived from the detailed lesson descriptions, learning outcomes and knowledge specifications provided in the WINd curriculum structure (162 hours of content). Given the theoretical nature of the training, assessments are delivered fully online.

Content Areas Include:

- Introduction to Wind Energy and Turbine Systems: meteorology, aerodynamics, civil works, HSE principles
- Theoretical Background: hydraulics, materials engineering, electrical engineering
- Maintenance Concepts: preventive and corrective maintenance theory, typical alarms, communication systems, component-level maintenance concepts (rotor, tower, generator, gearbox, yaw system, hydraulic circuits).

Delivery Formats

- Online proctored or non-proctored assessments via provider LMS (Learning Management System)
- Automated MCQs with immediate scoring
- Summative assessments at the end of each Learning Unit

2.4 Recognition of Prior Learning (RPL)

The WINd micro-credential scheme includes a Recognition of Prior Learning (RPL) process to ensure that learners do not repeat theoretical content they have already mastered. Since the WINd training programme is fully theoretical, the RPL procedure focuses exclusively on recognising existing theoretical knowledge that is relevant to the competences described in the competency matrices. This allows transitioning workers, such as Oil & Gas technicians or Industrial Electricians, to demonstrate that they already understand certain concepts included in the WINd curriculum.

Evidence accepted for RPL may include:

- previous theoretical training in electrical, mechanical, hydraulic or safety-related subjects
- documented understanding of safety principles or sector regulations
- certificates, coursework or modules completed in related programmes
- demonstrated conceptual understanding through portfolios or structured interviews.

RPL does not replace practical turbine maintenance competence, nor does it certify hands-on ability. However, when a learner can show that their previous knowledge matches the learning outcomes of a specific WINd theoretical module, they may be exempted from repeating that module. This ensures flexibility, respects the prior learning of experienced workers, and aligns the blueprint with European quality and recognition standards.

2.5 Quality Assurance Procedures

Quality assurance ensures that all VET providers deliver and assess the WINd theoretical micro-credentials in a fair, consistent and reliable way. Because the programme is fully online and theory-based, QA focuses on maintaining clear and uniform standards across providers. This includes:

- Using standardised marking criteria that match the WINd learning outcomes and EQF levels.
- Regularly reviewing MCQs and test items to ensure they are clear, relevant and at the right level of difficulty.
- Applying internal checks and optional external moderation to keep assessments consistent across providers.
- Updating the learning materials whenever there are changes in wind-energy technology or regulations.
- Monitoring learner results, completion rates and feedback to identify areas for improvement.
- Following EQAVET principles to ensure transparency, quality management and continuous improvement.
- Handling assessment data securely and in line with GDPR, protecting the integrity of digital records.

These measures ensure a transparent, consistent and high-quality system that supports the reliable delivery of theory-based micro-credentials across different VET contexts.

3. Development and Delivery Model

3.1 Micro-Credential Development Process

The development of the WINd micro-credential scheme is grounded in a structured methodology that translates the theoretical learning outcomes of the WINd curriculum into discrete, assessable credentials. As the WINd training programme is fully online and theory-based, the development process focuses on the formulation and validation of cognitive and conceptual competences rather than practical skills.

The process follows four steps:

- Competence Extraction: Competences are identified by reviewing the competency matrices for Oil & Gas Technicians, Industrial Electricians and Wind Turbine Technicians, focusing on the key theoretical knowledge, basic concepts, diagnostic thinking and safety principles required for the micro-credentials.
- Learning Outcome Definition: Each micro-credential is built around learning outcomes taken from the WINd curriculum (three Learning Units, 162 hours), ensuring alignment with EQF levels and consistent representation of theoretical knowledge.
- Module Structuring: The Learning Units and lessons are organised into coherent micro-credential modules, each representing a clearly defined theoretical domain (e.g. aerodynamics, electrical engineering fundamentals, hydraulic principles, maintenance theory or safety concepts).
- Integration of Assessment Elements: Assessments consist exclusively of knowledge-based and scenario-based tasks, including MCQs, interpretive questions and conceptual case analyses. These assessment methods validate theoretical understanding without requiring practical demonstration.

This approach ensures that micro-credentials authentically reflect the theoretical framework of the WINd curriculum and can be adopted by VET providers regardless of their access to physical training infrastructure.

3.2 Training Delivery Formats

The training delivery model for the WINd micro-credentials is fully aligned with the online, theory-based nature of the WINd course. All content is delivered digitally, and no practical workshops or hands-on turbine environments are required for learners or VET providers.

Online Asynchronous Delivery

- This is the primary delivery mode for all micro-credentials.
- Learners access structured online learning materials, including lecture notes and multimedia resources.
- Asynchronous delivery supports flexibility, enabling workers from different backgrounds to participate.

Online Synchronous or Facilitated Sessions (Optional)

- Providers may offer live online sessions to support understanding of complex topics (e.g., turbine control concepts, fault interpretation, aerodynamics or safety planning).
- These sessions are optional and serve to reinforce theoretical knowledge.

Scenario-Based and Conceptual Simulations

- The WINd training model allows the use of digital scenario simulations to develop conceptual understanding of operational situations.
- These simulations do not involve technical equipment but present realistic decision-making contexts (e.g. interpreting alarms, analysing weather conditions, or identifying theoretical maintenance sequences).

Assessment Delivery

- All assessments (MCQs, integrative questions) are delivered through the provider's LMS.
- Automated scoring can be applied where appropriate.

This fully digital delivery framework ensures that VET providers can adopt the WINd micro-credentials without the need for specialised technical facilities or equipment.

3.3 Digital Issuance, Format and Badge Design

The WINd micro-credentials should be issued in a digital format and designed to certify learners' theoretical knowledge and conceptual understanding of wind-energy systems. Each credential should include clear metadata, such as learning outcomes, workload, assessment method, EQF level, provider details and date of issue. It is recommended that the micro-credentials are delivered as digital badges using Open Badges or EDCI-compatible standards, with the badge information clearly indicating that the credential reflects theoretical competence only. A consistent WINd visual identity should be applied across all badges, with optional icons indicating

the relevant theoretical domain. Learners should be able to store and share their digital badges through EU platforms such as Europass, and employers should be able to verify them via embedded links. Adopting this digital approach would support transparency, portability and recognition across the European VET sector without implying any practical or hands-on competence.

3.4 Data, Verification and Interoperability

To ensure that WINd micro-credentials can be recognised across EU VET systems, the scheme incorporates robust data design and verification methods, aligned with EU digital credential frameworks.

Authentication and Verification

Digital credentials include:

- embedded verification links
- tamper-proof metadata
- issuer signature (digital seal)
- optional blockchain or decentralised ledger anchoring

Interoperability

The WINd micro-credential architecture is compatible with:

- EQF for learning outcome levels
- ECVET/ECTS equivalences based on workload
- ESCO skills taxonomy
- Europass Digital Credentials Infrastructure (EDCI)

This ensures compatibility with learning management systems, employer HR platforms, and national VET databases.

Data Protection

In compliance with GDPR:

- learner data is encrypted and stored securely
- only essential performance evidence is attached to the credential
- user consent governs evidence sharing

4. Implementation and Uptake Steps

4.1 Implementation Roadmap

The implementation of the WINd micro-credential scheme is intended for VET providers who may wish to integrate the WINd theoretical online course into their training offer. The roadmap outlines the key steps needed to adopt the course content and establish a corresponding micro-credential structure. Implementation is organised into four concise phases:

- Phase 1 – Preparation

VET providers define the micro-credential specifications (learning outcomes, workload, EQF level and assessment method) and map the WINd Learning Units to their own training structure. A Trainer's Guide developed by the project is available to support VET providers in delivering the WINd theoretical content. During this phase, providers also prepare their chosen digital issuing system (Open Badges or EDCI).

- Phase 2 – Pilot Testing

Selected theoretical modules (e.g., Introduction, Theoretical Background, Maintenance Theory) are tested with a small learner group. Providers deliver the content through the WINd online platform and conduct trial assessments (MCQs, scenario questions). Feedback from learners and instructors is used to refine content and assessment tools.

- Phase 3 – Full Deployment

Providers fully integrate the WINd theoretical materials into their training provision. The WINd platform is used only for delivering theoretical content (synchronous or asynchronous). Formal assessments and the issuing of micro-credentials are carried out by the VET provider, using their validated assessment systems and an Open Badge/EDCI-compatible environment.

- Phase 4 – Continuous Improvement

Providers periodically update modules to reflect technological and regulatory developments, expand the offer to additional learner profiles and occupations, and refine assessment and delivery based on performance data and feedback.

4.2 Stakeholder Roles

The implementation of the WINd micro-credential scheme involves two main stakeholder groups: VET providers and learners.

- VET Providers and Training Centres

VET providers may choose to integrate the WINd theoretical online course into their training offer. Their role includes:

- delivering the theoretical content through their own LMS
- conducting formal assessments using their validated systems
- issuing micro-credentials via an Open Badge or EDCI-compatible environment
- ensuring alignment with EQF and EQAVET quality principles

- Learners and Workers

Learners engage with the theoretical training across the WINd Learning Units, complete the associated assessments and use the awarded micro-credentials to support upskilling, mobility and career progression in the wind-energy sector.

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