

JRC SCIENCE FOR POLICY REPORT

Status report on the European credit system for vocational education and training (ECVET) and its implementation in the nuclear sector

Report concluding JRC activities in support of ECVET implementation

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Abstract

The report investigates the status of implementation of the European Credit System for Vocational Education and Training (ECVET) recommendation in Europe including the nuclear sector. It provides a summary of the findings from the point of view of EU Member States and EU nuclear fission training projects. Those findings may apply to other industrial sectors. Its target audience are nuclear training providers and Directorate Generals of the European Commission (EC): Joint Research Centre (JRC), Education Youth and Culture (EAC), Energy (ENER), Internal Market, Industry, Entrepreneurship and SMEs (GROW), Employment and Social Affairs and Inclusion (EMP).

Executive summary

The ECVET recommendation is one of the mobility and lifelong learning instruments for learners and workers. The present report's objective is to investigate the status of implementation of this recommendation in Europe including the nuclear sector. The report also points out the current challenges.

Main findings

In Europe, 17 countries¹ report that they have a credit system in initial vocational education and training (not necessarily ECVET) and seven that they use credits in some qualifications. Two countries² have credit systems that are ECVET compatible. Twelve countries³ do not have a system that allows accumulating and transferring learning outcomes of individuals. Of these, seven report no initiatives on ECVET implementation at system level. Finally 31 countries⁴ including all EU Member States have national ECVET contact points.

Despite challenges related to the implementation of the ECVET recommendation, the analysis of EU nuclear fission training projects revealed that one project successfully uses 'Continuous Professional Development credits' which contributed to setting up a common European qualification for medical physicists.

Key conclusions

The ECVET recommendation provides guidelines. Almost all EU Member States report that they implement some of the ECVET principles.

There are four principles:

1. Units of learning outcomes;
2. Transfer and accumulation of learning outcomes;
3. Learning agreement and personal transcript;
4. ECVET [credit] points.

Findings show that most of them are being implemented by Member States except for the ECVET [credit] points. Findings also show that based on the ECVET guidelines the medical physicists' community of practice set up two independent bodies including one accrediting board.

Related and future JRC work

Over the last years, by request of DG RTD and DG EMPL, the JRC has undertaken different activities to support the implementation of ECVET within nuclear education and training. They were focussed in two lines of work: the dissemination of the ECVET concepts and principles among the professional community involved in nuclear Education & Training (E&T); and the creation of a classification of jobs in nuclear power plants, i.e. the Nuclear Job Taxonomy (NJT). As a result, ECVET, the European Qualifications Framework (EQF) and other European initiatives related to education and lifelong learning are broadly known and used in projects linked to nuclear training. The NJT, together with the associated catalogue of competences, are tools available to help in the design of nuclear qualifications and training programmes. The present report concludes a long list of JRC activities carried out in support of ECVET implementation since 2009.

¹ Belgium-French Community, Denmark, Estonia, Finland, France, Iceland, Ireland, Luxembourg, Malta, Romania, Slovenia, Spain, Sweden, UK-England, UK-Northern Ireland, UK-Scotland, and UK-Wales

² Belgium-French Community and Malta

³ Belgium-Flemish Community, Cyprus, Germany, Greece, Hungary, Latvia, Liechtenstein, Netherlands, Poland, Portugal, Slovakia, and Switzerland

⁴ 28 EU Members States, Iceland, North Macedonia, and Turkey

In the future the JRC could participate as an observer or facilitator between stakeholders at the request of national competent institutions and other nuclear stakeholders. The JRC could support a community of interest.

1 Introduction

The ECVET recommendation aims at increasing the mobility and lifelong learning of learners and workers. The report's objective is to investigate the status of implementation of such recommendation in the nuclear sector in Europe and to provide a summary of the findings that may apply to other industrial sectors. Its target audience are nuclear training providers and EC Directorate Generals: Joint Research Centre (JRC), Education Youth and Culture (EAC), Energy (ENER), Internal Market, Industry, Entrepreneurship and SMEs (GROW), Employment, Social Affairs and Inclusion (EMP).

The methodology followed includes the analysis of EC legal documents which are the basis of ECVET and other European initiatives, the research for public documents with authoritative source (national reports), and the research for EU nuclear research project reports addressing the topic of ECVET. The relevant information is extracted and the findings on the implementation status are summarized in this report.

It is expected that readers have a deeper understanding of the ECVET recommendation and have a reference document that they can use to discuss ways to implement the recommendation with national decision makers. It is also expected that Directorate Generals seek the benefits of having a joint approach in the support they provide to Member States in the context of ECVET implementation and that other sectors of the industry and the ECTS community benefit respectively from the report's findings.

2 What is the ECVET recommendation?

2.1 ECVET, one of the EC instruments to achieve mobility and lifelong learning

2.1.1 ECVET in relation with the European Credit Transfer and Accumulation system (ECTS) and other recommendations

The recommendation establishing a European credit system for vocational education and training (ECVET)⁵ is not meant and should not be read on its own. There are several instruments aiming at more transparency in the EU that can increase the mobility of workers and learners across EU Member States. The objectives of mobility and lifelong learning can be achieved if all Member States follow the relevant recommendations.

2.1.1.1 The Erasmus regulation and its tool ECTS

Credits are often mentioned in the context of 'university credits' needed by students to accomplish a year abroad (Erasmus⁶). In that case the ECTS principles are applied. 60 ECTS credits are allocated to the learning outcomes and associated workload of an academic year.

The ECTS tool was originally set up in 1989 as a pilot scheme within the framework of the Erasmus programme in order to facilitate the recognition of abroad study periods [1]. It is now the credit system for higher education. ECTS gained popularity with the success of the Erasmus programme. One of the reasons that make ECTS familiar is that it is used in all Member States⁷. That has been reinforced by the fact that the Erasmus regulation is binding and directly applicable in all Member States. The EU countries have adopted ECTS by law for their higher education systems.

In 2006⁸ the Erasmus programme's objectives were complementary to activities in the field of lifelong learning⁹, however the Erasmus+ regulation of 11 December 2013¹⁰ encompasses education and training at all levels in a lifelong learning perspective, vocational education and training (Leonardo da Vinci) and adult learning (Grundtvig).¹¹ The Leonardo da Vinci programme addresses people learning in vocational education and training except at tertiary level, and people in the labour market. The Grundtvig programme aims at learners in adult education.

What is not included in the Erasmus regulation is the credit system for education beside higher education. In 2009 the European Parliament and the Council recommended that Member States establish a European Credit System for Vocational Education and Training (ECVET): "This Recommendation should facilitate the compatibility, comparability and complementarity of credit systems used in VET and the European Credit Transfer and Accumulation System ('ECTS'), which is used in the higher education sector, and thus should contribute to greater permeability between levels of education and training, in accordance with national legislation and practice."¹² ECVET does not address students but workers and learners.

Credit systems are multifarious. ECVET is complementary to ECTS that only applies to the higher-education/tertiary sector. Consequently, as the use of 'credits' is not restricted

⁵ Recommendation 2009/C 155/02

⁶ The Erasmus Programme is a European Union student exchange programme established in 1987

⁷ It is also used in non EU countries that are members of the Bologna process. For an up-to-date list, check <http://www.ehea.info/pid34250/members.html>

⁸ Decisions No 1719/2006/EC and 1720/2006/EC which were repealed by Regulation 1288/2013

⁹ The general objectives of the Programme shall complement the objectives pursued in other areas of the Community's activities, in particular in the field of lifelong learning, including vocational training and non-formal and informal learning, as well as in other fields, such as culture, sport and employment (art. 2.2 of Decision No 1719/2006/EC)

¹⁰ Regulation 1288/2013

¹¹ Article 1, para. 1.1, Regulation 1288/2013

¹² Recital 10, Recommendation 2009/C 155/02

to ECTS, it should be distinguished between ECTS and ECVET credits, also referred to as ECVET credit points or ECVET points.

2.1.1.2 The four key recommendations to achieve mobility and lifelong learning

The ECVET recommendation is one of the four key mobility and lifelong learning instruments.¹³ Such instruments are (in chronological order):

- Council Recommendation on the European Qualifications Framework for lifelong learning issued on 23 April 2008 and repealed by that of 22 May 2017 (2017/C 189/03) → EQF
- Recommendation of the European Parliament and of the Council of 18 June 2009 on the establishment of a European Quality Assurance Reference Framework for Vocational Education and Training (2009/C 155/01) → EQAVET
- Recommendation of the European Parliament and of the Council of 18 June 2009 on the establishment of a European Credit System for Vocational Education and Training (2009/C 155/02) → ECVET
- Council Recommendation of 20 December 2012 on the validation of non-formal and informal learning (2012/C 398/01)

The EQF recommendation is the cornerstone of the mobility and lifelong learning system in the EU. It aims at making peoples' qualifications more transparent, comparable and portable. Member States can use Annex II¹⁴ to reference their levels of qualifications to eight levels suggested and expressed as learning outcomes. (For instance Bachelor: level 5, Master: level 7, PhD: level 8). It makes it easier to compare all types and levels of qualifications across Europe (cf. Figure 1). Member States can also follow the criteria in Annex III¹⁵ to reference their national system of qualifications to that of the EU. Additionally Member States are supposed to promote links between credit systems and national qualifications frameworks.¹⁶

Since 2013 EQF is accepted as a reference point for developing national qualification frameworks in accordance with the national context.¹⁷ It has also been a source of inspiration worldwide as an increasing number of third countries seek closer links between their qualification frameworks and the EQF.¹⁸

Due to the EQAVET recommendation, Member States can use the quality assurance criteria listed in Annex 1¹⁹ and 2²⁰ as a reference in order to improve the quality of their vocational education and training systems (VET) as well as that of their VET providers. Relevant stakeholders, including social partners, and regional and local authorities should be involved into improving national quality systems. On the other hand, the European framework should support the EQF implementation (quality of learning outcomes certification), ECVET, and the validation of non-formal and informal learning.

The ECVET recommendation addresses individuals who aim at achieving a qualification. It expects that Member States reference their VET qualifications to all levels of the EQF and use a credit system for that purpose. That would facilitate the transfer and recognition of people's assessed learning outcomes. As a consequence, ECVET is intrinsically linked to EQF. Once Member States have referenced their VET qualifications to the eight EQF levels, they can choose to apply a credit system. Such system would help translate qualifications into credits and points, which would make them more transparent and portable.

¹³ There are other EU mobility instruments but they will not be discussed in this report

¹⁴ Descriptors defining levels in the European Qualifications Framework (EQF)

¹⁵ Criteria and procedures for referencing national qualifications frameworks or systems to the European Qualifications Framework (EQF)

¹⁶ Art. 4, Recommendation 2017/C 189/03

¹⁷ Recital 8, Recommendation 2017/C 189/03

¹⁸ Recital 19, Recommendation 2017/C 189/03

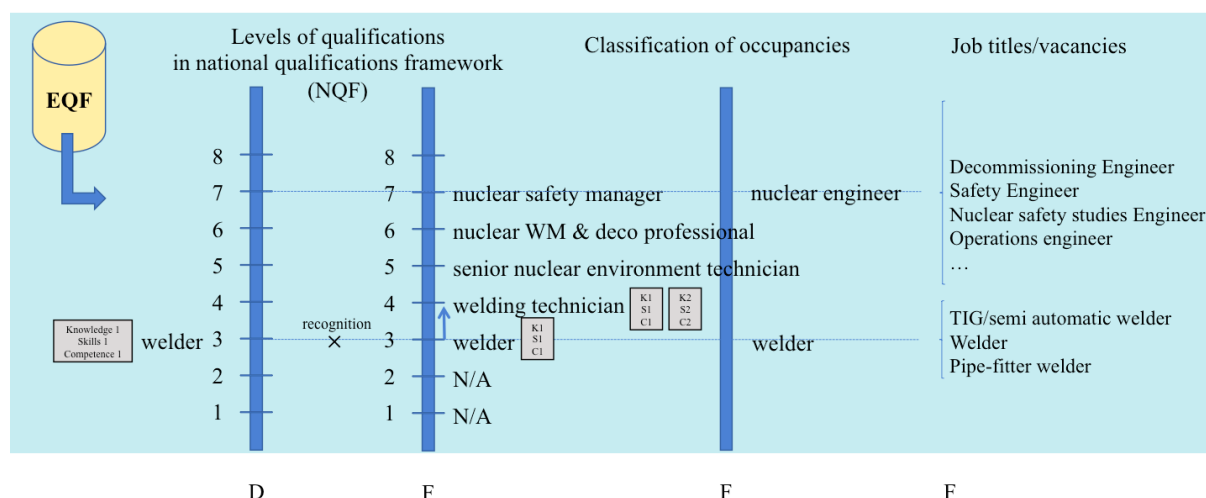
¹⁹ The European quality assurance reference framework: quality criteria and indicative descriptors

²⁰ A reference set of selected quality indicators for assessing quality in VET

As for the 'Validation of non-formal and informal learning recommendation', Member States should have in place arrangements by 2018 in order to validate non-formal and informal learning.^{21,22} Thanks to such arrangements people would be able to obtain a full qualification based exclusively on non-formal and informal learning experiences.

The EQAVET, ECVET and 'Validation of non-formal and informal learning recommendations' are linked to the EQF recommendation. For the purposes of this report, the fact that the ECVET recommendation is not a standalone instrument has to be kept in mind. More importantly it needs to be read and understood in correlation with the EQF recommendation.

Figure 1. Visualisation of the comparability of the European Qualifications Framework (EQF) between France (F) and Germany (D) – a nuclear example



Source: own elaboration

2.1.2 ECVET in relation with EU tools and initiatives

There are other EU tools and initiatives that support the goal to achieve mobility:

1. The EU Directive 2005/36/EC of 7 September 2005 on the recognition of professional qualifications from the European Parliament and Council which is implemented since 2007. Its scope is limited to regulated professions. For instance in the nuclear sector the following professions are regulated: X-ray technician, waste manager, Mechanical/electrical/chemical...engineer, and construction worker. The database of regulated professions is a helpful tool however the Internal Market website does not show a "nuclear sector" within the sectors list;²³
2. The European skills, competences, qualifications and occupations (ESCO) database which provides a classification of occupations, skills/competences, and qualifications (using EQF levels 1 to 8). ESCO is up and running: Greece, Estonia, Hungary and Lithuania already provided information;
3. The European job mobility portal from the European Employment Services (EURES). It is a cooperation network formed by public employment services where trade unions and employers' organisations also participate as partners. The objective of the EURES network is to facilitate the free movement of workers

²¹ Definitions are in Annex of Recommendation 2012/C 398/01

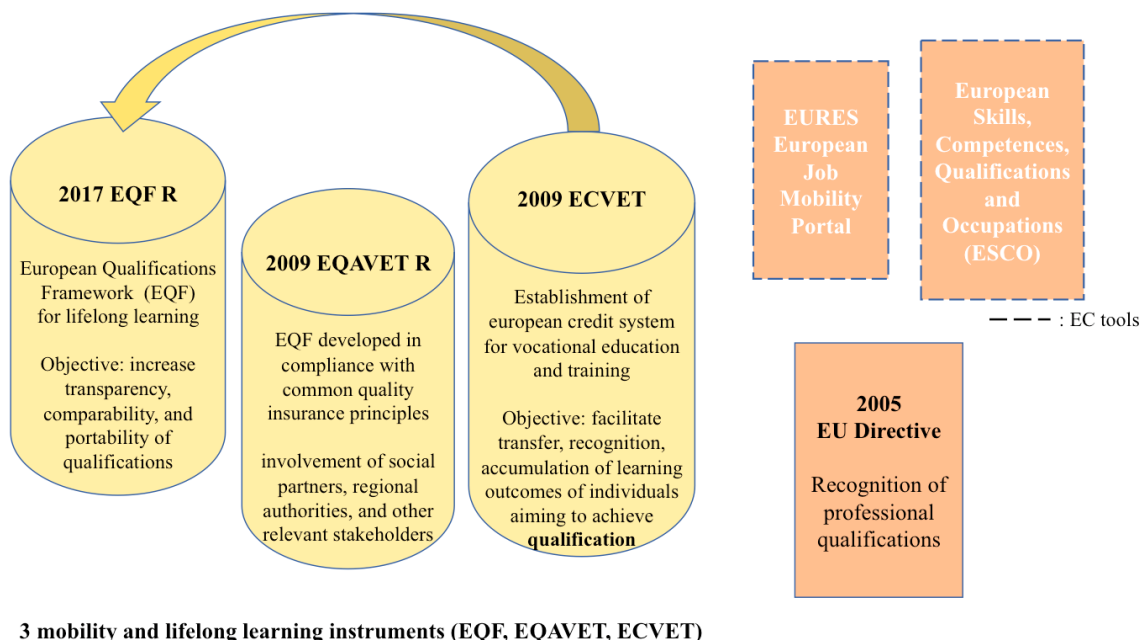
²² Article 1.1 of Council Recommendation 2012/C 398/01

²³ Free movement of professionals and database of regulated professions (<http://ec.europa.eu/growth/tools-databases/regprof/index.cfm?action=homepage>)

within the European Economic Area (EEA) (the 28 members of the European Union, plus Norway, Liechtenstein and Iceland) and Switzerland.

Such tools and initiatives (cf. Figure 2) should be used and implemented in combination with the ECVET recommendation in order to have more impact.

Figure 2. ECVET in relation with other EU instruments *Source: own elaboration*



2.1.3 Legal basis, objectives and scope of ECVET recommendation

2.1.3.1 Legal basis: EC Treaty, Title 11 Social Policy, Education, Vocational training and youth, Chapter 3, Art. 150

Going back to the roots of EU policies on Education and Vocational Training can shed light on the original Member States' intention.

In the Treaty of European Community, the European Vocational Training is the replica of Education. Both are related to social policy and youth. In both instances Member States did not intend to harmonize such policies in the EU: "The Council [whose members are government representatives] shall adopt measures..., excluding any harmonisation of the laws and regulations of the Member States."

Member States adopted the ECVET recommendation based on articles 149 and 150 of the EC Treaty. It is to be noted that the Treaty refers to Education and Vocational Training whereas derived instruments refer to Education and Vocational Education and Training (VET). The Treaty stresses that Vocational training policies should focus on young people.

TITLE XI

SOCIAL POLICY, EDUCATION, VOCATIONAL TRAINING AND YOUTH

CHAPTER 3

EDUCATION, VOCATIONAL TRAINING AND YOUTH

Article 149

1. The Community shall contribute to the development of quality education by encouraging cooperation between Member States and, if necessary, by supporting and supplementing their action, while fully respecting the responsibility of the Member States for the content of teaching and the organisation of education systems and their cultural and linguistic diversity. (...)

4. In order to contribute to the achievement of the objectives referred to in this Article, the Council:

- acting in accordance with the procedure referred to in Article 251, after consulting the Economic and Social Committee and the Committee of the Regions, shall adopt incentive measures, excluding any harmonisation of the laws and regulations of the Member States,

- acting by a qualified majority on a proposal from the Commission, shall adopt recommendations.

Article 150

1. The Community shall implement a vocational training policy which shall support and supplement the action of the Member States, while fully respecting the responsibility of the Member States for the content and organisation of vocational training.

2. Community action shall aim to:

- facilitate adaptation to industrial changes, in particular through vocational training and retraining,

- improve initial and continuing vocational training in order to facilitate vocational integration and reintegration into the labour market,

- facilitate access to vocational training and encourage mobility of instructors and trainees and particularly young people,

- stimulate cooperation on training between educational or training establishments and firms,

- develop exchanges of information and experience on issues common to the training systems of the Member States.

3. The Community and the Member States shall foster cooperation with third countries and the competent international organisations in the sphere of vocational training.

4. The Council, acting in accordance with the procedure referred to in Article 251 and after consulting the Economic and Social Committee and the Committee of the Regions, shall adopt measures to contribute to the achievement of the objectives referred to in this article, excluding any harmonisation of the laws and regulations of the Member States.

2.1.3.2 Objectives

The ECVET recommendation has clear objectives.

The purpose of this Recommendation is to create a European Credit System for Vocational Education and Training (ECVET) intended to facilitate the transfer, recognition and accumulation of assessed learning outcomes of individuals who are aiming to achieve a qualification.²⁴

It aims at increasing:

- Transparency of qualifications

ex: qualification of welder in country A is described in accordance with EQF reference levels. Potential employers have a good understanding of what are the welder's learning outcomes.

- Transnational mobility

²⁴ Recital 6, Recommendation 2009/C 155/02

ex: qualification of welder in country B is also described in accordance with EQF reference levels. Welder of country A understands what are the qualifications required for working as welder in country B.

- Portability across Member States

ex: country B can accept to recognize the qualification of welder of country A. It makes it easier for welder of country A to work in country B.

- Portability within Member States between various sectors of the economy

ex: welder in oil refinery can display clear learning outcomes if welder intends to work as welder in nuclear power plant. Learning outcomes become transferable.

The recommendation is composed of the recitals (1) to (7), the body (articles 1-6 and 1-4) as well as two annexes that are significant to understand what the ECVET recommendation is about. The first provides definitions (e.g. qualifications, learning outcomes, competent institution, and ECVET points). The second sets out ECVET principles and technical specifications.

There are four ECVET principles:

1. Units of learning outcomes;
2. Transfer and accumulation of learning outcomes;
3. Learning agreement and personal transcript;
4. ECVET [credit] points.

Such principles are extensively referred to by Member States, stakeholders and EU nuclear training projects.

The recommendation is not a standalone document. The credit system complements the EQF as Members States can apply credits to the qualifications that they have identified (with descriptors, units of learning outcomes) and referenced from 1 to 8 (cf. EQF reference levels).²⁵ The use of ECVET points [or credit points] aims at providing complementary information on a qualification and its components (units) in a numerical form. A unit's weight is based on its importance relative to the labour market, its complexity and the effort necessary to learn (cf. Table 1).

Table 1: Visualisation of units, weight, and ECVET points in EQF3 Qualification

3 Units of learning outcomes	Relative weight within unit	ECVET points
Knowledge, skills & responsibility A	1	6
Knowledge, skills & responsibility B	5	30
Knowledge, skills & responsibility C	4	24
Total over a year of formal full year VET		60

Source: own elaboration

²⁵ Recitals 7 and 8, Recommendation 2009/C 155/02

2.1.3.3 Scope, legal force

Member States can voluntarily decide to implement the credit system for VET. If they plan to use ECVET, they have to do so in accordance with their national laws and they should follow the EQAVET common principles of quality assurance.²⁶

The ECVET recommendation addresses all sectors of the economy including the nuclear sector. It is meant for workers and learners who are not students in general or higher education and who exclusively want to acquire a qualification (i.e. "the formal outcome of an assessment and validation process which is obtained when a competent institution determines that an individual has achieved learning outcomes to given standards"²⁷). The recommendation stresses that ECVET credit points should be compatible and comparable to the ECTS credits used in higher education.²⁸

Allocations of ECVET points are normally part of the design of qualifications and units. They are produced by the competent institution responsible for the design and maintenance of the qualification or specifically empowered for this task. In countries where there is already a national system of points, the relevant competent institutions establish arrangements for the conversion of national credit points to ECVET points.

The recommendation points out that ECVET does not imply any new entitlement for citizens to obtain the automatic recognition of either learning outcomes or points. It also does not replace national qualifications systems or national credit systems. It's not an aim of the ECVET system to require the harmonisation of qualifications systems.²⁹

2.1.4 ECVET in nuclear context

Traditionally, nuclear education has been irregularly distributed throughout the European education systems. There were large differences from country to country, both in the quantitative offer, as in its representation in the different education levels. In most countries, nuclear specialization has been exclusively present in the highest end of the educational system.

Since some decades the European nuclear energy sector faces the challenge of maintaining a sufficient competent workforce and producing the necessary scientific knowledge to ensure the safe operation of the facilities. Evolutions in the public opinion and in the political context have made careers in the nuclear sector less attractive and the related offer of education has consequently decreased. However, the public perception driving this trend does not correspond with the needs to respond to EU energy demands. Some countries keep relying on the construction of new nuclear facilities to satisfy their future low-carbon energy demand. In other countries the existing power plants still have decades of operation and decommissioning ahead of them.

In parallel, evolutions such as the increasing safety requirements and the shift of the demand towards decommissioning activities have changed the scenario of the most demanded skills.

Therefore, the appropriate staffing of nuclear facilities requires vocational education and training in order to bridge the gap between the regular education and the moving needs of the industry.

2.1.4.1 Who are the nuclear stakeholders in the implementation of the ECVET recommendation?

The nuclear stakeholders are the nuclear workers and nuclear trainees (apprentices), the governments (national competent authorities like the Ministries of Education, Employment and Social policies), the nuclear safety authorities, the social partners in the

²⁶ Recitals 7 and 8, Recommendation 2009/C 155/02

²⁷ Annex I Definitions (a), Recommendation 2009/C 155/02

²⁸ Recital 10, Recommendation 2009/C 155/02

²⁹ Recital 17, Recommendation 2009/C 155/02

nuclear sector, the competent nuclear education and training providers and their networks, the nuclear industry, the Commission DGs, the European Centre for the Development of Vocational Training (Cedefop), and the National contact points (EQF recommendation).

2.1.4.2 What can the nuclear sector expect from the ECVET recommendation?

Given the situation described in the previous paragraph, the nuclear energy sector has to rely much on postgraduate training and in-the-job learning to achieve the expertise necessary for its workforce.

The ECVET offers a number of tools designed to create modular and flexible learning pathways. Combined with the EQF, it promotes also the inclusion of a range of competences that often have a limited importance in academic education programmes, such as practical skills and individual attitudes.

Additionally, programmes and qualifications applying the ECVET principles are more transparent, facilitating the transfer of professionals and learners among different organizations and countries. Moreover, ECVET fosters the implementation of more job-oriented competences, including those non-strictly technical, but essential to maintain a strong safety culture and a strict adherence to the procedures.

The advantages of ECVET and EQF responding to the specific challenges of the nuclear sector are the following:

- Providing tools to formalise and recognise company courses, in-the-job training and informal learning;
- Better effectiveness of dedicated learning by aiming at specific job-oriented skills;
- Facilitating mobility by means of more transparent qualifications (use of learning outcomes and modular units);
- Increase employability, mobility and social integration of workers and learners in the nuclear sector.

3 Status of implementation of ECVET recommendation in the nuclear sector

3.1 Implementation reported by Member States

There is no official document (=information coming from national authorities) reporting on the implementation of the ECVET recommendation in the nuclear sector. There is however a large number of country reports and monitoring reports describing the status of VET implementation in EU Member States, all sectors confounded.

These reports are produced by the European Centre for the Development of Vocational Training (Cedefop), one of the EU's decentralised agencies. Cedefop was established by Council Regulation of 10 February 1975. It supports the development of European vocational education and training (VET) policies and contributes to their implementation. It assists the European Commission, EU Member States and the social partners to develop the appropriate European VET policies. In addition, Cedefop publishes up-to-date information on VET developments including country-specific reports, statistics and graphs.³⁰

Since 2010 Cedefop has been monitoring ECVET developments in relation to national VET qualification systems. It has produced five annual reports, the latest for the period 2013-2015 [2]. The 2015 findings are as follows:

(a) 17 countries³¹ report that they have a credit system (not necessarily ECVET) in Initial Vocational Education and Training (IVET); seven countries³² use credits in some qualifications;

(b) Two countries³³ report to have credit systems in IVET;

(c) Three countries³⁴ have credit systems; two of those³⁵ are ECVET compatible. Five countries³⁶ use credits in some qualifications;

(d) 12 countries³⁷ do not have a system that allows accumulating and transferring learning outcomes of individuals. Seven of them³⁸ report no initiatives on ECVET implementation at system level;

(e) 31 countries³⁹ have national ECVET contact points, many of which also act as contact points for National Qualifications Frameworks (NQF) and the European Quality assurance Reference Framework for Vocational Education and Training (EQAVET).

3.1.1 Member States report achievements in implementation of learning outcomes and other mobility instruments

In the ECVET country reports published by the Cedefop between 2016 and 2018, Member States report that implementation of learning outcomes is completed or ongoing (cf. Annex 1⁴⁰). The overlap between ECVET principles and EQF learning outcomes is confusing.

Council Recommendation of 22 May 2017 establishing the European Qualifications Framework is widely accepted as a reference point for developing national qualifications

³⁰ <http://www.cedefop.europa.eu/en/country-data/list>

³¹ Belgium-French Community, Denmark, Estonia, Finland, France, Iceland, Ireland, Luxembourg, Malta, Romania, Slovenia, Spain, Sweden, UK-England, UK-Northern Ireland, UK-Scotland, and UK-Wales

³² Austria, Bulgaria, Croatia, Czech Republic, Italy, Lithuania, and Norway

³³ Estonia and France

³⁴ Belgium-French Community, Denmark, and Malta

³⁵ Belgium-French Community and Malta

³⁶ Austria, Bulgaria, the Czech Republic, Lithuania and Norway

³⁷ Belgium-Flemish Community, Cyprus, Germany, Greece, Hungary, Latvia, Liechtenstein, Netherlands, Poland, Portugal, Slovakia, and Switzerland

³⁸ Belgium-Flemish Community, Germany, Greece, Hungary, Liechtenstein, Slovakia, and Switzerland

³⁹ 28 EU Members States, Iceland, North Macedonia, and Turkey

⁴⁰ Analysis of the latest Cedefop country reports (2016-2018) in the 28 EU Member States

frameworks. One of the recommendation's main features is the approach to learning outcomes.⁴¹ Such learning outcomes are also featured in the ECVET principles (annex II of ECVET recommendation) along ECVET [credit] points.

It is not easy to separate the development and implementation of ECVET principles from the developments of national qualification frameworks. Therefore it is not surprising that Member States stress the implementation of learning outcomes in their country reports on ECVET implementation.

3.1.2 Member States not showing use of ECVET credit for VET or continuing vocational training

Concerning the specific use of [credit] points, seventeen countries report that they have a credit system (not necessarily ECVET) in IVET, and two countries (Belgium-French Community and Malta) report having credit systems that are ECVET compatible. This information was reported in the Cedefop 2015 monitoring report. As a consequence there is currently no Member State that uses ECVET [credit] points. The report also shows that three Member States are ECVET sceptical:

- "The added value of ECVET is questioned by stakeholders" (Belgium)
- "Many stakeholders are sceptical over whether ECVET could be compatible with Germany's holistic approach" (Germany)
- "The ECVET feasibility study (2012)...stood back from using credit points" (Slovakia)

Looking individually at ECVET country reports published by the Cedefop between 2016 and 2018 (cf. Annex 2. Analysis of the latest Cedefop country reports in the 28 EU Member States), it can be concluded that:

- In five countries, ECVET [credit] points refer to ECTS credits only;⁴²
- In Finland and Bulgaria's report, some sentences are confusing and lead to believe that ECVET is fully implemented in the country.

Finland: "The ECVET system has been put into practice in Finland in 2014"; "The national qualification requirements have been based on a learning-outcomes approach since the early 1990s."

Bulgaria: "[Bulgaria's State educational standards] use the principles of the ECVET recommendation since 2015. It aims at linking units of learning outcomes with credits in VET".

What is meant in both examples is that the learning outcomes approach is being implemented, not the ECVET.

- In five countries⁴³, ECTS (not ECVET) is being used for vocational or adult education programmes: In Flanders there are adult education programmes EQF 5 that use ECTS credits. In France ECTS credits are used for vocational bachelor degrees. In Latvia ECTS credits are used in vocational programmes EQF 5. In Lithuania ECTS credits are used in tertiary VET. In the Netherlands ECTS points are used in postsecondary and tertiary VET (ISCED 5-7).
- One country uses a clear sentence about ECVET implementation: Cyprus. "The reformed curricula [since 2016/17] will be oriented towards learning outcomes and will be based on Learning Modules and ECVET units".

The report also displays one case where the country uses an appropriate sentence about the current status of ECVET implementation: Spain, where "The VET system has

⁴¹ Statements describing the knowledge or skills learners should acquire by the end of a particular course or programme, and helping learners understand why that knowledge and those skills will be useful to them.

⁴² Belgium, Croatia, Denmark, France, Slovenia

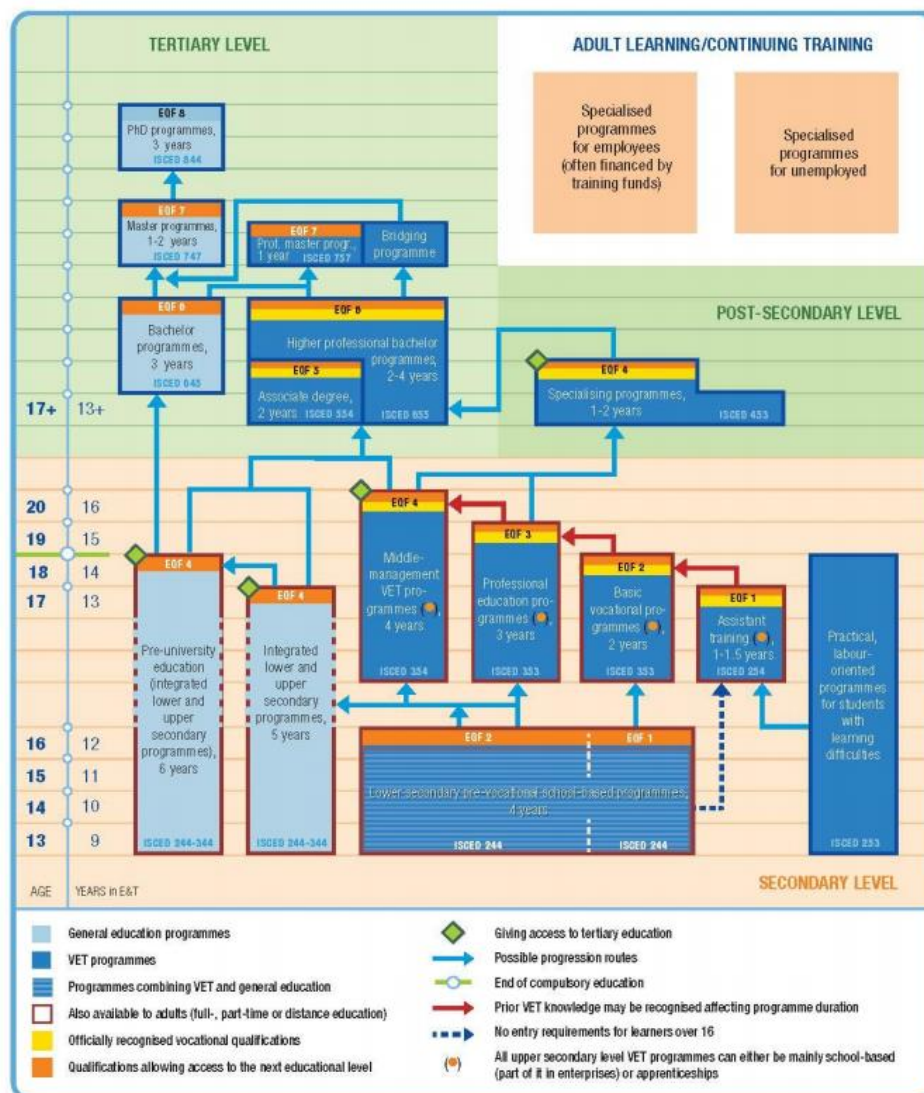
⁴³ Belgium-Flanders Community, France, Latvia, Lithuania, Netherlands

implemented all ECVET principles, except credit Points.” This statement reflects well the current situation in most Member States. It has to be distinguished between the implementation of learning outcomes and the implementation of [credit points]. Indeed there are four ECVET principles: Units of learning outcomes; Transfer and accumulation of learning outcomes; Learning agreement and personal transcript, and ECVET [credit] points.

3.1.3 Member States VET is present in the school system only

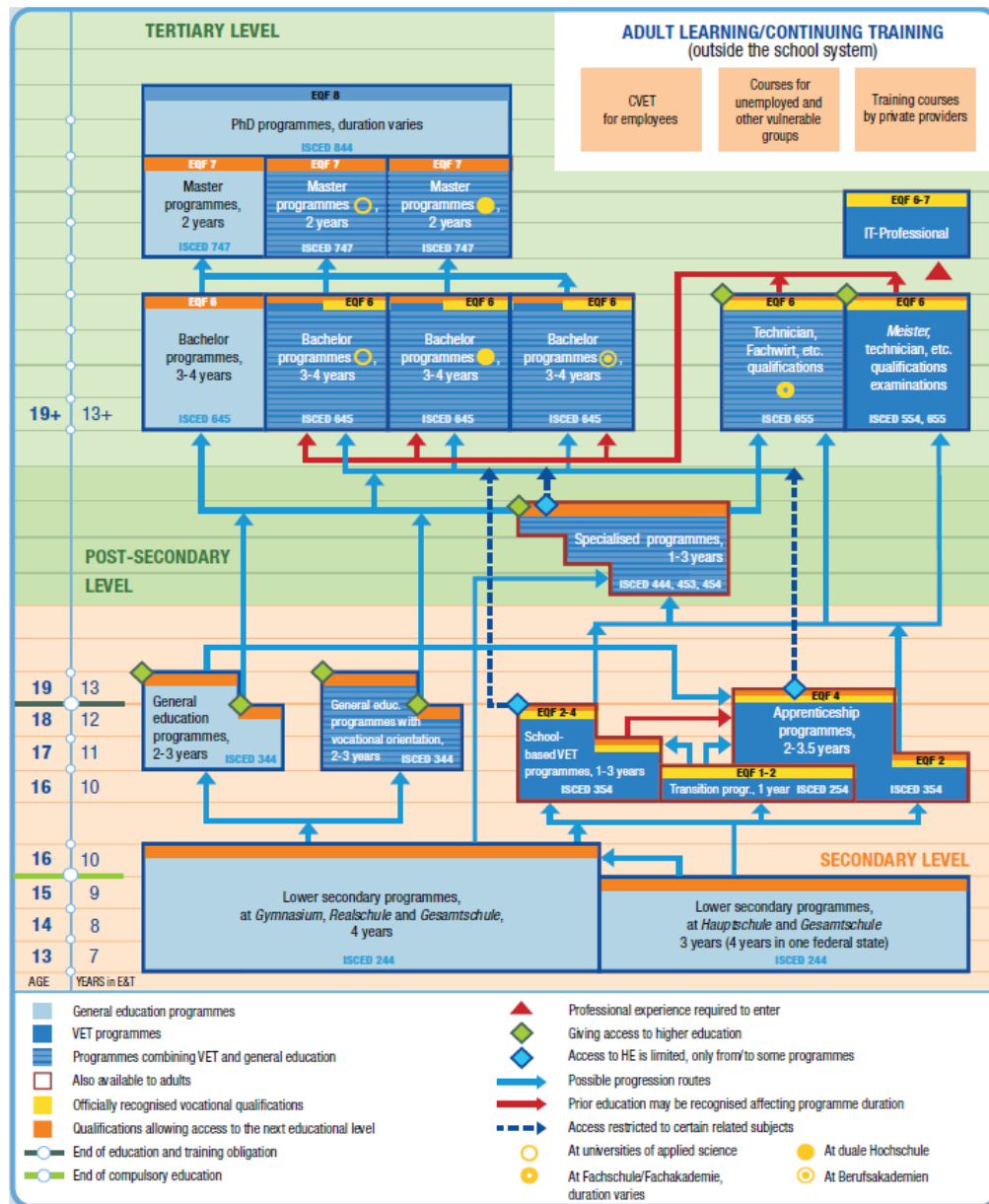
It is important to note that in country reports vocational and education training are present in the secondary level and tertiary level of education only. This reflects what Member States agreed upon in the EC Treaty according to which vocational training policies should focus on young people. Non-formal adult learning such as training for employees, community learning for adults, unemployed and vulnerable groups, and training courses by private providers are not described as VET in national reports (cf. Figure 3, 4, and 5 below). Therefore information on these other types of learning is not included in the country specific reports. This makes it difficult to report on the implementation of ECVET in the nuclear sector, especially for nuclear training delivered by private training providers and on-the-job training.

Figure 3. VET in the Dutch education and training system



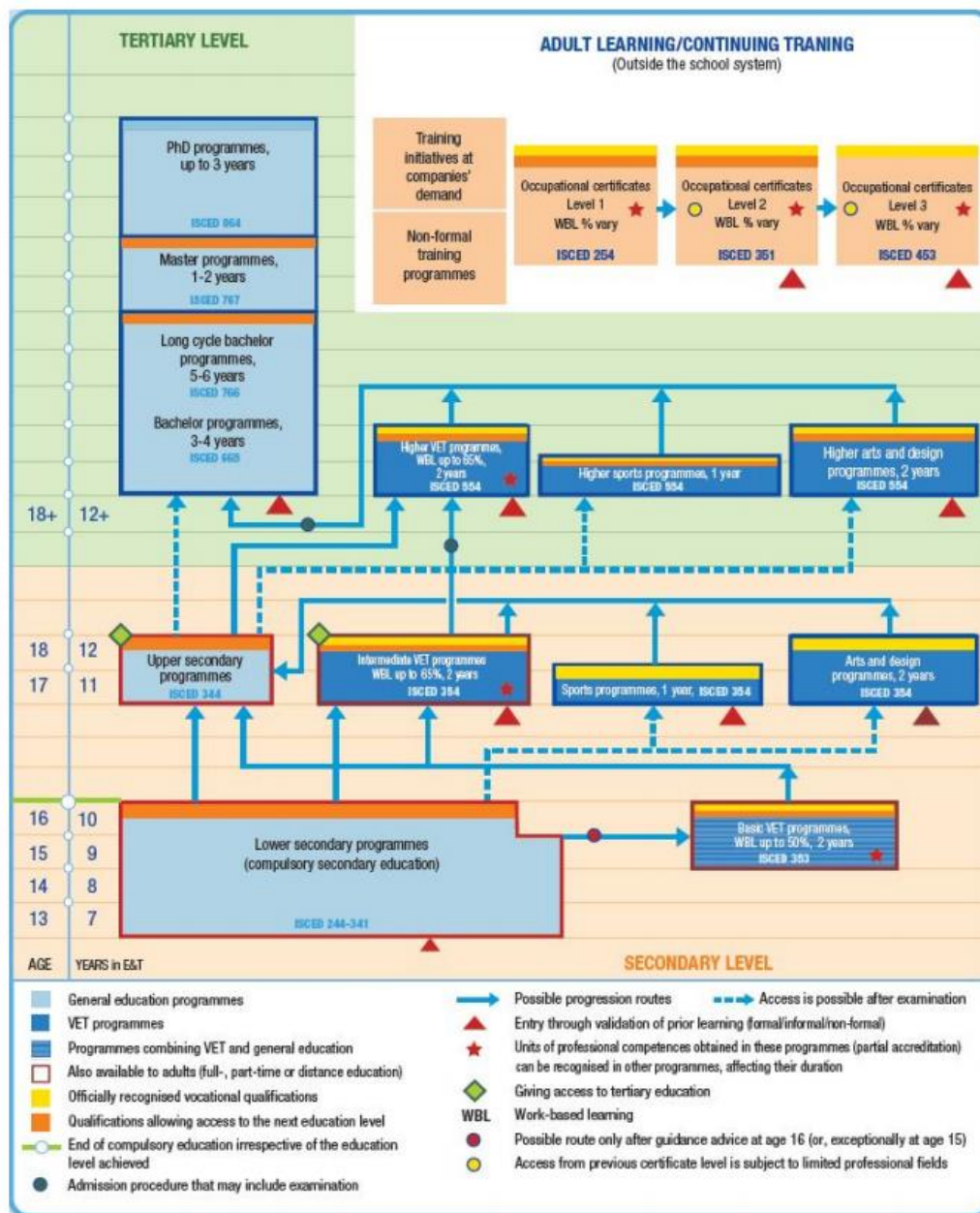
Source: Cedefop and ReferNet Netherlands

Figure 4. VET in the German education and training system



Source: Cedefop and ReferNet Germany

Figure 5. VET in the Spanish education system



Source: Cedefop and ReferNet Spain

3.2 Implementation viewed by European nuclear fission training projects

For this report the European nuclear fission training projects stand in for the twenty five projects from 2004 to 2020 funded by the Euratom Research Programme under the Euratom Fission Training Schemes (EFTS). They are listed in Annex 1.⁴⁴ Three of them are not concluded yet. Their ultimate goal was to develop a European passport for Continuous Professional Development, which relies on the principles:

- Common qualification criteria;
- Common mutual recognition system;

⁴⁴ Analysis of the latest Cedefop country reports (2016-2018) in the 28 EU Member States

- Facilitation of teacher, student and worker mobility across the EU by the implementation of ECVET.

3.2.1 Focus on EQF-EQAVET implementation and use of learning outcomes

A review of the ENEN+⁴⁵ report on "Existing vocational European fission training schemes and their accreditation"[3] shows that most of the projects make theoretical proposals on model training schemes. This means that discussion on the use of credits and potential accreditation remains only at the theoretical level. The Nushare⁴⁶ project for instance states that if ECVET was implemented by Member States, their suggested training would have 16 ECVET credits.

All the European nuclear fission projects report that most of the EQF and EQAVET recommendations as well as the use of learning outcomes are implemented at project level. They also provide or currently develop specific methodology for the use of ECVET in IVET and CVET.⁴⁷

3.2.2 One project shows use of credit

One of the projects described in the ENEN+ report stands out: the European Training and Education for Medical Physics Experts in Radiology (EUTEMPE-RX⁴⁸). Its main objective is to provide a model training scheme for eight EU countries⁴⁹ and Switzerland in order to allow medical physicists in diagnostic and interventional radiology (EQF level 7 in most Member States) to reach EQF level 8 and become Medical physics experts.

For that matter courses are developed through the European Network for Training and Education of Medical Physics Experts (EUTEMPE-net)⁵⁰ and the European Diploma of Medical Physics (EDMP), to which 'Continuous Professional Development credits' are allocated, has been created. Such courses are accredited by an independent body⁵¹ established by the project consortium together with the European federation of organisations for medical physics. In addition, another newly established board⁵² delivers European Certificates for Medical physics experts. Those experts are thus recognized by the relevant national competent authorities however their certificates will not replace national ones.

The EUTEMPE-RX project made it possible to set up a common European qualification for medical physicists which helps standardising training and expertise in Medical Physics across Europe. The project does not refer to ECVET [credit] points however the 'continuous professional development credits' are very close to them.

3.3 Implementation viewed by nuclear VET providers in ANNETTE project

The Advanced Networking for Nuclear Education and Training, and Transfer for Expertise (ANNETTE) EU project (2016-2020) aims at enhancing the Europe-wide efforts initiated in the past decades by 25 organisations belonging to academia, research centres, and industry from 12 EU Member States⁵³ in order to maintain and develop education and training in the different nuclear areas.⁵⁴

⁴⁵ European Nuclear Engineering Network Training Schemes

⁴⁶ Sharing Nuclear Safety Culture Competence

⁴⁷ Continuous vocational education and training

⁴⁸ <http://www.eutempe-rx.eu/>

⁴⁹ Belgium, Bulgaria, Germany, Greece, Italy, Netherlands, Spain, Switzerland, and UK

⁵⁰ <http://eutempe-net.eu/>

⁵¹ European Board for Accreditation in Medical Physics

⁵² Examination Board

⁵³ Belgium, Czech Republic, Finland, France, Germany, Italy, Netherlands, Romania, Slovenia, Spain, Sweden, and United Kingdom

⁵⁴ <https://www.annette.eu/>

The ANNETTE's report on the Application of the ECVET system in the nuclear field [4] analysed the results of a survey answered by 18 vocational training providers from 10 EU Member States⁵⁵ and Ukraine. The survey outcomes showed that:

- None of the nuclear VET providers fully implemented ECVET
- One of the nuclear training providers partially implemented ECVET
- 8 nuclear VET providers (44%) plan to implement ECVET, and
- 9 (50%) do not plan to implement ECVET.⁵⁶

The following aspects are deemed essential to implement ECVET, according to the VET training providers who did not implement ECVET:

- Commitment from all parties (interest and support) (13⁵⁷; 33%)
- Legislative and regulatory framework (recognition) (8; 21%)
- Learning outcomes approach (assessment, validation, recognition, units) (8; 21%)
- ECVET added value (5; 13%), and
- Qualification frameworks (3; 8%).

The report also provided a list of recommendations to be addressed in the future:

1. "Discuss and evaluate the nuclear job taxonomy of the European Human Resources Observatory for the nuclear Energy sector (EHRO-N) to strive for a similar approach in other nuclear domains (outside new build, operation and decommissioning) in the ANNETTE Project,
2. Evaluate the involvement of nuclear in the European classification of skills, competences, qualifications and occupations (ESCO) through e.g. EHRO-N,
3. Organise face-to-face meetings or workshops with major stakeholders to strive for a formalised commitment on the implementation of the ECVET system by e.g. voluntary self-commitment, white paper, statement document,
4. Reflect on the added value of the creation of ECVET contact points or ECVET committees per domain in nuclear,
5. Describe a clear methodology for the validation of learning outcomes, once they are assessed, and
6. Develop templates for memoranda of understanding, learning agreements and personal transcripts, with some good examples of nuclear profiles."

The ANNETTE project's members plan to implement recommendations 3 to 6 within ANNETTE before the project ends in 2020. Future developments should be monitored as they can be valuable to other nuclear training providers, not members of ANNETTE, as well as training providers in other fields.

3.4 Outcomes of JRC activities in support of ECVET implementation

Two factors have defined the activities of the EC and the JRC in support of ECVET implementation. Firstly, Education and vocational training is the Member States' competence. Harmonisation of national laws in the field of E&T is excluded at the EU level (EC Treaty, Title 11, Chapter 3, Art. 149-150). Secondly, ECVET does not replace national qualifications systems or national credit systems.

⁵⁵ Austria, Belgium, France, Germany, Greece, Hungary, Italy, Portugal, Sweden, and United Kingdom

⁵⁶ The report does not provide specific information on the respondents

⁵⁷ Number of training providers

The role of the Commission has been limited by Member States to:

- Facilitate testing, cooperation and mutual learning;
- Promote a European ECVET network involving relevant VET stakeholders and national competent institutions;
- Establish an ECVET user's group from within this network;
- Monitor the actions taken.⁵⁸

As a result, the European Commission has supported different initiatives to promote ECVET [5]:

ECVET Secretariat⁵⁹

- Network of national projects (NetECVET)
- National contact points
- ECVET pilot projects (2009 – 2012)
- Second generation of ECVET pilot-projects (2010 – 2013)
- ECVET Users' Group and Community of Practices

Since 2009, by request of DG RTD, the JRC has undertaken different activities aimed to support the implementation of ECVET within nuclear education and training (cf. Table 2). They were focussed in two lines of work: the dissemination of the ECVET concepts and principles among the professional community involved in nuclear E&T; and the creation of a classification of jobs in nuclear power plants, the Nuclear Job Taxonomy (NJT).

The dissemination activities consisted in:

- Dedicated seminars organised with the support of the ECVET secretariat;⁶⁰
- The publication of articles and reports.⁶¹

The preparation of the NJT was carried out mainly by the organization of six dedicated technical workshops, complemented with in-house work, voluntary individual contributions, and additional inputs provided by external consultants for specific tasks.

As a result of this work, ECVET, EQF and other European initiatives related to education and lifelong learning are broadly known and used in projects linked to nuclear training. The NJT, together with the associated catalogue of competences are tools made available to help in the design of qualifications and training programmes [6].⁶²

⁵⁸ Articles 1-4, Recommendation 2009/C 155/02

⁵⁹ <http://www.ecvet-secretariat.eu/fr>

⁶⁰ <https://ehron.jrc.ec.europa.eu/ecvet-introduction>

⁶¹ <https://ehron.jrc.ec.europa.eu/public-ecvet-documents>

⁶² [http://publications.jrc.ec.europa.eu/repository/bitstream/JRC110868/jrc110868_njt_final_\(2\)_1_\(2\).pdf](http://publications.jrc.ec.europa.eu/repository/bitstream/JRC110868/jrc110868_njt_final_(2)_1_(2).pdf)

Table 2. Chronology of JRC activities in support of ECVET implementation between 2011 and 2014⁶³

	Goal	2011	2012	2013	2014	Findings/Achievements
1	Scanning the human resource demands in the nuclear energy sector market		1 st EHRO-N survey			by 2020 there will be a shortage of nuclear experts – the deficit will be 50 % of the required staff numbers
2	The shift from knowledge based to competence based qualification standards	Workshop: Bergen, NL (Oct 2011)	Workshops: • Petten, NL (Feb 2012) • Thessaloniki, EL (Oct 2012)	Workshops: • Bergen, NL (May 2013) • Madrid, ES (Nov 2013)		<ul style="list-style-type: none"> • 155 jobs are described in this way • 140 job descriptions use this approach • 2200 new entries to the competence catalogue <i>The focus is on the design of nuclear qualifications at EQF Level 5 and above.</i>
3	Developing competence based qualification system for the nuclear energy sector			2 nd ECVET Seminar, Budapest, HU (Oct. 2013)		First exercise to design the NPP Operator qualifications
4	The development of mobility instruments for the nuclear energy sector				3 rd ECVET Seminar 2014: Pilot project to test ECVET implementation in the nuclear energy sector	Aspects covered by the pilot project
5	The qualification achievement process for the nuclear energy sector					Aspects covered by the pilot project
6	Supporting ECVET implementation in the nuclear energy sector		1 st ECVET Seminar, Brussels, BE (Sept. 2012)	2 nd ECVET Seminar, Budapest, HU (Oct. 2013)		

Source: Mihail Ceclan, Ulrik Von Estorff - European Commission, Joint Research Centre, Institute for Energy and Transport, EC ECVET Team: ECVET Magazine, No.20, June 2014, pages: 18-20

3.4.1 135 job profiles available to nuclear training providers to design qualifications

The NJT consists of 135 job profiles mainly defined in terms of job requirements in the fields of a) in new built power plants, b) Power plants in operation, and c) power plants in the state of decommissioning. These job requirements are divided into knowledge, skill and attitude items, and each of them is qualified with an EQF descriptor level. Other information included for the jobs is the functional and occupational classification, the description of roles and functions and the inclusion in an NPP life cycle phase.

The concise way to formulate each job requirement is dedicated to facilitate their inclusion in the formulation of learning outcomes. In the degree, in which the job profiles were the result of a multidisciplinary and multinational endeavour, the qualifications based on them should match at a great extend the competences required for real life jobs in a broad scope of organisational contexts.

3.4.2 ESCO database benefits from nuclear skills, competences, qualifications and occupations

The JRC was invited to contribute to the public consultation to define the occupations in the ESCO database. Several profiles related to the nuclear industry, as well as other energy sectors, were reviewed responding to two consecutive requests from DG EMPL. The JRC input was mostly focused on two aspects:

⁶³ The table does not include the: 2013 JRC policy reports Current use of ECVET in the nuclear industry sector of the EU-28, the 2013 JRC policy report Towards the implementation of the ECVET in the nuclear energy sector by Mihail Ceclan and César Chenel Ramos, nor the NJT related activities up to 2016

- A more concrete identification of some occupations, which were initially defined in very general terms, making it difficult to subsequently describe the relevant competences;
- A more consistent formulation of competences and skills, applying the learnings gained from preparation of the nuclear job taxonomy.

The ESCO classification cannot reflect the nuclear power plant occupations with the same detail as the nuclear job taxonomy. ESCO follows some criteria based on the number of employed people to create an item in the occupations lists. On the other hand, the formulation of competence and skills did not follow precisely the same analytical approach used during the preparation of the nuclear taxonomy. Nonetheless, after the input of the JRC, the following nuclear energy occupations were added:

- Nuclear engineer
- Nuclear reactor operator
- Nuclear technician
- Radiation protection technician
- Radiation protection officer

ESCO also adopted a differentiation between knowledge and skills/competences as separate items, which was not present during the preparatory stages.

In the last three years there was no further request from DG RTD or DG EMPL to carry out activities in support of ECVET implementation. However ECVET matters have been observed by JRC and the observations made are included in the present report which provides a picture of the ECVET implementation in EU Member States and in EU nuclear fission training projects to date.

4 Remarks

4.1 Potential advantages of ECVET recommendation

4.1.1 Transparency of qualifications

The European Commission provides extensive information and tools to understand qualifications frameworks and recognition of qualifications in the EU.⁶⁴ The use of ECVET, EQF, Europass, among other initiatives, aims to make the qualifications more transparent and comparable. One of the main instruments to achieve this transparency is the use of learning outcomes, which allows defining precisely the results of learning processes in terms that are meaningful for the job context. The learning outcomes are more focused on result-oriented capabilities rather than on conceptual knowledge. Complementary to this transparency are the quality assurance mechanisms contained in the EQAVET system.

4.1.2 Mobility

Mobility is among the main goals of the ECVET recommendation, supported by transparency and trust. Mobility provides benefits both for the labour market and for the learning achievements. The professionals with the right competences can move to wherever their competences are needed having recognised their competence acquired in other countries or sectors. For learners and training providers the possibility to share access to scarce learning resources such as singular facilities is significant.

4.2 Challenges of ECVET recommendation

4.2.1 Political

4.2.1.1 *Not binding on Member States*

Member States can voluntarily decide to implement the credit system for VET. The way they do it and the timeframe they choose to do it is completely up to them. It was the Member States' intention in the EC Treaty to exclude any harmonisation of the laws and regulations in the field of education, vocational training and youth in the EU. It was also the Member States' intention to agree on a recommendation in the field of ECVET. The fact that the ECVET recommendation is not binding on Member States makes it difficult to be implemented in the EU broadly and consistently.

4.2.1.2 *Implementation cannot be achieved without action taken by Decision-makers*

The ECVET recommendation has limitations. Its objective is to facilitate the transfer, recognition and accumulation of learning outcomes of individuals aiming to achieve a qualification. The recommendation provides a definition for qualification: "Formal outcome of an assessment and validation process which is obtained when a competent institution determines that an individual has achieved learning outcomes to given standards". In the EQF recommendation an almost identical definition is provided: A qualification is the "formal outcome of an assessment and validation process which is obtained when a competent authority determines that an individual has achieved learning

⁶⁴ Information and comparison of qualifications frameworks (<https://ec.europa.eu/ploteus/en/compare>), information on the EQF, NQF's ([https://ec.europa.eu/ploteus/search/site?f\[0\]=im_field_entity_type%3A97](https://ec.europa.eu/ploteus/search/site?f[0]=im_field_entity_type%3A97)), recognition of diplomas and qualifications (<https://ec.europa.eu/ploteus/en/recognition-qualifications>), information on learning opportunities ([https://ec.europa.eu/ploteus/search/site?f\[0\]=im_field_entity_type%3A96](https://ec.europa.eu/ploteus/search/site?f[0]=im_field_entity_type%3A96)), Free movement of professionals and database of regulated professions (<http://ec.europa.eu/growth/tools-databases/regprof/index.cfm?action=homepage>)

outcomes to given standards." In both instances national "competent institutions" and "competent authorities", i.e. which are recognized at the national level for the design and award of qualifications, play a key role. Consequently only competent institutions can award ECVET points if they are entitled to do so in their national qualifications systems. It is not clear in all Member States who these competent institutions are. Clarification of their identity at the national level would be a great step towards reaching full implementation of the ECVET recommendation [7].⁶⁵

It is interesting to note that despite the challenges of EQF and ECVET recommendations, the 'Information and Communication Technology (ICT) Community of Professionals' has established a common European framework for ICT professionals in all industry sectors. Since 2016 this framework has become a European standard (European Norm [EN 16234-1](#)). The European e-Competence Framework (e-CF) provides a reference of 40 competences as applied at the ICT workplace, using a common language for competences, skills, knowledge and proficiency levels that can be understood across Europe. It does not refer to credit points but it is the first sector-specific implementation of the EQF.⁶⁶

4.2.2 Conceptual

4.2.2.1 Different levels in EQF interpretation

The reference of the qualifications to the EQF levels and descriptors provides an objective indicator that allows comparability within the national systems and among national qualifications frameworks. However, due to the different approaches in Member States the equivalences are often not straightforward. Some countries apply greater granularity in their education systems, resulting in a large number of qualifications, for which equivalence is not easy to find in systems with fewer qualifications of wider scope. On the other hand, while most systems apply the same EQF level to all the modules in a qualification, some few assign different levels. Finally, similar programmes aiming to similar occupations may have a different EQF level in different countries.

4.2.2.2 Heterogeneous use of "ECVET principles"

ECVET is proposed as a set of tools that can be adopted on a voluntary and discretionary basis. This makes it flexible and adaptable to the different national frameworks, type of training providers and learning environments. It does not demand a thorough modification of the existing arrangements. For this reason, the way in which it should be implemented remains vague in many aspects, creating some confusion in users and stakeholders.

In addition, the proposal of a credit system without clarifying its equivalence or relationship with the already implemented ECTS increases this confusion.

4.2.3 Practical

The term 'vocational' has a close equivalent in most languages, but it is not always used with exactly the same meaning. In many countries, vocational education encompasses only programs up to EQF 4 or 5, while in others reaches courses of tertiary education.

The definition of learning outcomes provides obvious benefits, but is complex and laborious to implement. Especially for qualifications of higher level than those for most

⁶⁵ Part B Functions of ECVET competent institutions (<http://www.ecvet-secretariat.eu/en/system/files/documents/14/questions-answers-about-ecvet-21/04/2010.pdf>) shows that institutions that have the competence to design qualifications are normally competent for describing qualifications in terms of units of learning outcomes and in terms of ECVET points. Based on Annex A, those in charge of setting up a framework for the implementation of ECVET should clarify "who does what" with regard to ECVET in their systems.

⁶⁶ <http://www.ecompetences.eu/>

occupations in the nuclear sector it becomes a demanding challenge to comprise properly all the necessary contents.

Quality assurance of short trainings and courses is often unpractical, representing a disproportionate workload for the organisers. Moreover, the validation of trainings provided by non-regular providers is challenging.

4.2.3.1 Some VET providers use ECTS instead of ECVET

Not all European countries have tertiary education programmes in their systems that are labelled as vocational. But in those where this is the case, those programmes at 6-8 EQF level are already assimilated to the ECTS.

4.2.3.2 ECVET challenges for nuclear training providers outside of the school system

The nuclear energy industry employs mostly highly qualified staff. This means that most nuclear staff already holds a university diploma when recruited. Those diplomas are defined by courses and ECTS credits.

The achievement and recognition of skills in a non-formal, non-academic context would bring great benefits for employers and professionals. However, the implementation of ECVET at the higher EQF levels is severely hindered by the absence of permeability mechanisms between ECTS and ECVET systems. Although most nuclear training providers use learning outcomes it is difficult for them to reference their VET to the eight EQF levels and to make use of credit points.

In addition, according to ECVET implementation guides [8] [9] examples show ECVET credit points split in 60 over a full year of VET.⁶⁷ This reflects the use made of ECTS credits and provides compatibility, comparability and complementary between the two credit systems. It makes it however challenging for nuclear trainings that are outside of the school system or that are shorter than a year.

4.2.3.3 Investment into in-house nuclear training not favouring mobility

The nuclear industry typically makes a big effort in the training of its staff. This is especially applicable to big international companies, which employ a great part of the sector workforce. These actors might benefit of recognition and mobility instruments in some few cases, i.e. regulated occupations. But favouring mobility would also mean that they might lose the important resources spent in training. Therefore their interest in having validated and accredited the learning achieved by their employees, particularly when it is company-based, should be clarified.

4.2.3.4 Non-transferable competence

In all fields and occupations there are competence components that are specific of a job or of a job environment or context. This is applicable in a great extend to nuclear occupations. For staff working in nuclear power plants, much of their knowledge required is site specific and cannot be applied in another facility. Moreover, the nuclear regulated occupations are not the same from country to country, and the requirements also vary.

4.2.3.5 Variety of nuclear training providers

There is a large variety of nuclear training providers that are in the school system or outside of the school system (adult learning). Among providers there are also recognised competent institutions and non-recognised institutions. Knowing which institution has

⁶⁷ <http://www.ecvet-secretariat.eu/en/system/files/documents/16/ecvet-support-III.pdf>, <http://www.ecvet-secretariat.eu/en/system/files/documents/15/ecvet-mobility.pdf>

been recognised [accredited]⁶⁸ for assessing and validating VET in the nuclear sector would allow for more transparency at the national level. [10] It would clarify who are the relevant stakeholders that should be involved when ECVET implementation is discussed. Moreover that would be fully in line with the EQAVET recommendation.

A variety of nuclear training providers are represented in the European Nuclear Education Network (ENEN)⁶⁹ whose mission is the preservation and further development of expertise in the nuclear fields by higher E&T. ENEN is composed of members from the academy, research organizations, regulatory bodies, and the industry. It is a platform where various nuclear training providers can exchange information and discuss common challenges. It is also a platform where common solutions can be found.

The EU funded ENEN+ project for the period 2017-2020 focuses on four nuclear disciplines: nuclear reactor engineering and safety, waste management and geological disposal, radiation protection, and medical applications. It is composed of ENEN and 21 other European participants. They are expected to propose a voluntary accreditation system to be developed under the ENEN umbrella. This system could be applied to the existing sectors mentioned above (cf. four nuclear disciplines) whereas accreditation for the field of decommissioning will be tackled separately.⁷⁰ Future outcomes of ENEN+ (project to be completed in 2020) should be monitored and shared as they could benefit to other sectors.

⁶⁸ "process of quality assurance through which a programme of education or training is officially recognised and approved by the relevant legislative or professional authorities following assessment against predetermined standards"

⁶⁹ <http://www.enen.eu/>

⁷⁰ <http://www.enen.eu/en/projects/enenplus.html>

5 Conclusion

The EU Direction General for Education, Youth and Culture (DG EAC), and the European Centre for the Development of Vocational Training (Cedefop) are responsible for the implementation of the 2009 recommendation setting up a European Credit System for Vocational Education and Training (ECVET). Developments and trends in VET national policies are provided by local contact points dedicated to vocational training. They also share their knowledge about VET within Cedefop's European network of expertise on VET (ReferNet)⁷¹. This network plays an important role given that the benefits and challenges associated with the ECVET implementation might be common to multiple sectors which can learn from each other's experience.

The recent outcomes of the ReferNet made it possible to have an overview of the ECVET implementation status in Member States. In the ECVET recommendation, there are four principles: 1. The use of units of learning outcomes; 2. The transfer and accumulation of learning outcomes; 3. The learning agreement and personal transcript; and 4. ECVET [credit] points. Findings showed that most of the principles are being implemented by Member States, all sectors confounded, except for the ECVET [credit] points, and that a few countries expressed scepticism regarding the use of credits.

Findings also showed that there is a lack of information on the ECVET implementation in adult/lifelong learning since official documents show implementation in the school system only. It also seems that there is no official information specific to the nuclear sector. Nonetheless, the fact that Member States reported that they implement most ECVET principles reflects success. In addition, non-governmental information indicated positive results in the field of ECVET implementation in the nuclear sector. The analysis of EU nuclear fission training projects revealed that the project 'European Network for Training and Education of Medical Physics Experts' successfully uses 'Continuous Professional Development credits' and established an independent accrediting body which contributed to setting up a common European qualification for medical physicists between eight EU Member States and Switzerland.

Another community of practice, the 'Information and Communication Technology (ICT) Community of Professionals', was successful in establishing a common European framework for ICT professionals in all industry sectors which became a European standard. Given that the nuclear community of practice has already developed a classification of jobs in nuclear power plants, it could evolve into a common framework if the nuclear community decides to go beyond the suggested classification.

Over the last years, by request of DG RTD and DG EMPL, the JRC has undertaken different activities to support the implementation of ECVET within nuclear education and training. They were focussed in two lines of work: the dissemination of the ECVET concepts and principles among the professional community involved in nuclear E&T; and the creation of a classification of jobs in nuclear power plants, i.e. the nuclear job taxonomy. As a result, ECVET, the European Qualifications Framework (EQF) and other European initiatives related to education and lifelong learning are broadly known and used in projects linked to nuclear training. The Nuclear Job Taxonomy (NJT) and the associated catalogue of competences are tools available to help in the design of qualifications and training programmes.

The present report concludes a long list of JRC activities carried out in support of ECVET implementation since 2009. In the future, the JRC could participate as an observer or facilitator between stakeholders if requested by national competent institutions or other nuclear stakeholders. The JRC could support a community of interested parties and bring together different communities of practice. For instance, in 2017 six EU-level VET

⁷¹ ReferNet host annual partnership forums

associations⁷² and Cedefop set up the European community of learning providers which has decided to tackle the topic of learner's and workers' mobility in 2019. The JRC could assist nuclear VET stakeholders who want to network. This is important at a time where other communities regularly meet, exchange and learn from each other's experience.

⁷² European Forum of Technical and Vocational Education and Training (EfVET), European Association of Institutes for Vocational Training (EVBB), European Vocational Training Association (EVTA), European University Continuing Education Network (EUCEN), European Providers of Education and Training Network (EUproVET), and European Association of Institutions in Higher Education (EURASHE).

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Legislation (in order of appearance)

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Decision No **1720/2006/EC** of the European Parliament and of the Council of 15 November 2006 establishing an action programme in the field of lifelong learning; Official Journal of the European Union; L 327, 24.11.2006; pages 45 – 68.

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List of abbreviations and definitions

Cedefop	European Centre for the Development of Vocational Training
DG EAC	Direction General for Education, Youth and Culture
DG EMP	Direction General for Employment, Social Affairs and Inclusion
DG ENER	Direction General for Energy
DG GROW	Direction General for Internal Market, Industry, Entrepreneurship and SMEs
DG RTD	Direction General for Research
E&T	Education & Training
EC	European Commission
ECTS	European Credit Transfer and Accumulation system
ECVET	European Credit System for Vocational Education and Training
EDMP	European Diploma of Medical Physics
EEA	European Economic Area
EHRO-N	European Human Resources Observatory for the Nuclear Energy Sector
ENEN	European Nuclear Education Network
EQAVET	European Quality Assurance Reference Framework for Vocational Education and Training
EQF	European Qualifications Framework
ESCO	European Skills, Competences, Qualifications and Occupations
EURES	European Employment Service
EUTEMPE-net	European Network for Training and Education for Medical Physics Experts
EUTEMPE-RX	European Training and Education for Medical Physics in Radiology
ICT	Information and Communication Technology
IVET	Initial Vocational Education and Training
JRC	Joint Research Centre
NetECVET	Network of national projects for European Credit System for Vocational Education and Training

NJT	Nuclear Job Taxonomy
NQF	National Qualifications Framework
NUSHARE	Sharing Nuclear Safety Culture Competence
ReferNet	Cedefop's European network of expertise on VET
VET	Vocational Education and Training

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	ECVET	Credit	Accredit- (i)	Recogni- tion	EQF	Points	Learning outcomes	Comments
	Number of occurrences(ii) in report for which sentences' content was analysed							
Austria (2016)	1	3	3	0	3	1	3	ECVET is mentioned in the list of abbreviations but it does not appear elsewhere in the report "Credited" is mentioned in the context of recognition of non-formal and informal learning "Credit transfer" refers only to teachers' education ECTS points are for continuing education (ISCED 551/767), for postgraduates and non-higher education graduates The information in the country report indicates a full implementation of the learning outcomes
Belgium (2016)	1	8	4	19	7	1	2	The "Credit points" mentioned refer to ECTS (BEFL) "Credit transfer" and "credit award" are mentioned in the context of validation of informal and non-formal training In Flanders there are adult education programmes EQF 5 which use the ECTS credits (BEFR) "The division into the [Approved Learning Outcomes Units] was directly inspired following the recommendation on ECVET" (1) "The added value of ECVET is questioned by stakeholders" (2) In the francophone system the qualifications are structured in units of learning outcomes
Bulgaria (2018)	2	12	0	1	42	2	13	"Credit points" are mentioned only in the context of requirements for teachers' education "Credit", as well as accumulation and transfer mechanisms seem to be regulated, but the degree of implementation is unclear [State educational standards] "used the principles of the European credit system for vocational education and training (ECVET) recommendation since 2015. It aims at linking units of learning outcomes with credits in VET" (1)
Croatia (2016)	0	3	2	6	27	0	14	"Credits" appear to be only linked to ECTS The introduction of learning outcomes and units is ongoing
Cyprus (2016)	9	3	9	12	12	0	2	A paragraph describes the activities for the implementation of a credit system "The reformed curricula [since 2016/17] will be oriented towards learning outcomes and will be based on Learning Modules and ECVET units" (1)
Czech Republic (2016)	2	2	24	16	5	0	7	"Credit" appears only in notes referring to ECVET "The field groups [involved in the creation of qualifications] support continuous development of VET curricula and implementation of the European tools – ECVET" (1) The report provides extensive information on accreditation mechanisms
Denmark (2016)	0	2	3	1	2	1	0	"Credit transfer" is mentioned. Points only referred to ECTS (teachers' training)
Estonia (2017)	0	18	6	12	32	0	11	A credit system is in place. Credits are valued numerically based on the notional "study load"

								<i>"National curricula are based on learning outcomes"(1)</i>
Finland (2016)	4	7	2	15	2	10	3	Credit/competence points are used in VET qualifications <i>"The scope of the qualifications is 180 competence points (according to the ECVET system)" (1)</i> <i>"the ECVET system has been put into practice in Finland in 2014" (1)</i> <i>"The national qualification requirements have been based on a learning-outcomes approach since the early 1990s" (1)</i> Quality assurance or accreditation are not described in the country report
France (2016)	0	1	15	1	13	0	0	The Credits mentioned only refer to ECTS, for "vocational bachelor degrees" <i>"Current legislation and practice are supportive of the ECVET principles" (2)</i> Quality assurance is described in detail. Certain professional organizations manage their own qualifications, which can receive a state approval to become official diplomas or just be recognised within the industry sector The VET qualification structure is very granular: <i>"There are around 18000 identified qualifications. More than 10000 certifications are listed at the RNCP"</i> There is no reference in the report to the structure of the qualifications or the use of learning outcomes and units
Germany (2016)	1	9	4	10	10	0	1	Although "credit" is mentioned several times, it does not seem to refer to a modular system with numerical indicators. "ECVET" appears in the list of abbreviations but not in the text. <i>"Many stakeholders are sceptical over whether ECVET could be compatible with Germany's holistic approach" (2)</i>
Greece (2016)	14	15	8	13	19	5	21	<i>"credit points for existing vocational training programmes are being awarded on a pilot basis" (1)</i> <i>"Curricula can be developed in line with the European credit system for VET (ECVET)" (1)</i> <i>"Greece is now on a process of placing in each one of them the individual (named) qualifications expressed in learning outcomes" (1)</i>
Hungary (2016)	0	1	1	5	3	0	2	The Credits mentioned only refer to the transfer into bachelor programmes <i>"The programme in accordance with European Qualifications Framework (EQF) principles is structured based on the expected learning outcomes"(1)</i>
Ireland (2016)	0	0	0	5	53	0	3	<i>"ECVET tends to operate at provider level and for mobility experiences only" (2)</i>
Italy (2016)	0	6	22	8	14	3	1	Credit system seems in place both for secondary and post graduate higher education programmes There are several types apprenticeships schemes spanning EQF 3-8 There is accreditation at regional level for certain continuous education programmes <i>"VET and HE structures are compatible with ECVET principles" (2)</i>
Latvia (2016)	2	3	25	5	47	1	8	ECTS credit points are used in vocational programs at EQF 5 Learning outcomes are used to define qualifications <i>"NQF descriptors are based on learning outcomes" (1)</i> <i>"Since 2014, VIAA coordinates actions of four national experts nominated by MoES to promote the European credit system for VET (ECVET)"</i>
Lithuania (2016)	0	3	9	7	28	0	3	ECTS credits refer to tertiary VET Quality assurance and accreditation are referred <i>"The Lithuanian qualifications framework (LTQF) was developed based on a system of allocating learning outcomes to levels" (1)</i> <i>"A measure for the implementation of [...] ECVET is included in the Action Plan on</i>

								<i>VET development 2014-16" (2)</i>
Luxembourg (2016)	0	3	7	7	22	0	7	Learning domains and outcomes are organized in modules and credits (1) "A credit system, which includes the central elements of ECVET, has been in place since 2010" (2)
Malta (2016)	3	5	15	5	77	0	4	VET and lifelong learning programmes apply a numerical credit system "The ECVET is in line with the Malta qualifications framework" (2)
Netherlands (2016)	0	1	25	2	34	1	2	Only ECTS points are mentioned for postsecondary and tertiary VET (ISCED 5-7)
Poland (2016)	1	0	0	0	0	0	16	No mention to "credits" or "points". ECVET appears only among the references "No decision has yet been taken on use of ECVET credit points" (2)
Portugal (2016)	1	5	19	24	4	1	2	Credit points are mentioned as a transfer instrument between non-higher VET and general NQF "Different ECVET technical components for IVET and CVET are being tested" (2)
Romania (2016)	0	3	15	5	7	0	11	ECTS credit refer to VET teachers' education only "Credits are reflected in the legal framework for continuous VET The credit system for IVET [...] is compatible with ECVET" (2) "Specific methodology for the use of ECVET in IVET and CVET is under development" (2)
Slovakia (2016)	0	5	21	3	6	0	8	"Continuing training programmes offering credits must be approved by the accreditation board" (1) "The ECVET feasibility study (2012) [...] stood back from using credit points" (2)
Slovenia (2016)	0	1	5	20	2	0	5	The only mention to "credit" in the country report refers to ECTS "All IVET programmes are modularised [...] and their curricula are linked with credits" (2) "An advanced ECVET readiness has been reached (in 2010)" (2)
Spain (2016)	2	2	8	11	0	0	7	Credits are only mention for specific low-level certification "VET is based on learning outcomes with a strong focus on work-based learning, following ECVET guidelines" (1) "The VET system has implemented all ECVET principles, except credit Points" (2)
Sweden (2016)	2	16	0	2	3	2	1	There are specific credit systems for secondary and tertiary VET "[For upper secondary VET] The scope of the courses is defined by 'upper secondary credits' (gymnasiepoäng). In conformity with ECVET points, these credits are not related to time but indicate the scope of the studies or effort required" (1) "Learners can transfer credits (credit points), between IVET qualifications, from VET to general education and vice versa and from upper secondary school to adult education" (2)
United kingdom (2016)	8	28	27	16	31	0	5	There are differences among the educations systems but they all seem to use credit points in some way "The QCF, CQFW and SCQF describe levels, qualifications and units in terms of learning outcomes as well as credits and notional learning hours" (1)

Annex 1 Notes:

(i) Including "Accreditation" + "Accredit" + "Accredited"

(ii) Occurrences of the terms in indexes, references, notes and tables are counted but are not when part of URLs

Occurrences where the context indicates a different meaning of the term were not counted; for instance, (financial) credit or (percentage) points

Sources:

(1) VET in Europe - Country reports <http://www.cedefop.europa.eu/en/publications-and-resources/country-reports/vet-in-europe-country-reports>

(2) ECVET in Europe. Monitoring report 2015 (Annex I) http://www.cedefop.europa.eu/files/5556_en.pdf

General comments:

- EQF 5 programmes are referred to as "post-secondary non tertiary" in some countries, while in others they are considered as part of higher education
- EQF 5 programmes are mostly integrated in the ECTS
- In some countries there are courses at EQF 6 and above EQF 6 that are named vocational
- "Credit" is used to describe the certification of the achievement of a set of learning objectives, but is not always associated with a numerical value
- The term "accreditation" is used with different meanings: it is either applied to education or training programmes and to E&T providers; or as equivalent of the certification or recognition of learning outcomes and prior learning
- Accreditation of qualifications, programmes and/or training providers is mentioned in almost all country reports and in some cases there is a description of how it is managed. Therefore it is expected that all European countries have some type of quality assurance and accreditation in place, although the scope might vary (specially the degree in which continuing and company based learning are covered)

Annex 2. List of EU projects under European nuclear fission training schemes (EFST)

Project		Active	website
NEPTUNO	The Nuclear European Platform of Training and University Organisations	01/04-12/05	http://www.enen.eu/en/projects/for-nuclear-community/neptuno.html
ENEN II	European Nuclear Engineering Network Training Schemes		
ENEN III		05/09 - 04/12	http://www.enen-assoc.org/en/training/for-nuclear-community/enen-iii.html
ENEN+		10/17 - 09/20	
CINCH-I	Cooperation in Education in Nuclear Chemistry	02/10 - 01/13	https://www.cinch-project.eu/cinch2/index.html%3Fart=cinch_i.html
CHINCH-II		06/13 - 05/16	https://www.cinch-project.eu/cinch2/
MEET-CINCH	A Modular European Education and Training Concept In Nuclear and RadioCHemistry	06/17-05/20	https://www.cinch-project.eu/
PETRUS II	Towards an European training market and professional qualification in geological disposal	01/09 - 12/11	http://www.enen-assoc.org/en/training/for-nuclear-community/petrus-ii.html
PETRUS III		09/13 - 09/16	http://www.petrus3.eu
ELINDER	The European Learning Initiatives for Nuclear Decommissioning and Environmental Remediation	02/16 -	https://ec.europa.eu/jrc/en/training-programme/elinder
ENETRAP	European Network on Education and Training in Radiological Protection	04/05-03/07	http://enetrap.sckcen.be/
ENETRAP II		03/09 - 02/12	http://enetrap2.sckcen.be
ENETRAP III		06/14 - 05/18	http://enetrap3.sckcen.be
MEDRAPET	Medical Radiation Protection Education and Training	12/10 - 02/13	http://www.medrapet.eu
EUTEMPE-RX	EUropean Training and Education for Medical Physics Experts in Radiology	8/13-07/16	http://www.eutempe-rx.eu/
TRASNUSAFE	Training Schemes on Nuclear Safety Culture	11/10 - 10/14	http://trasnusafe.eu
NUSHARE	Sharing Nuclear Safety Culture Competence	01/13 - 12/16	http://www.nushare.eu
CORONA	Establishment of a Regional Centre of Competence for VVER Technology and Nuclear Applications		http://projectcorona.eu
CORONA II		09/15 - 09/18	http://corona2.eu
ECNET-EU-CHINA	Nuclear Education and Training Cooperation: mirror project to be financed by the Chinese	03/11-02/13	

	Atomic Energy Authority		
ENEN-RU	Strengthening of Cooperation and Exchange for Nuclear Education and Training	01/11 – 12/13	http://www.enen.eu/en/projects/for-nuclear-community/enenru.html
ENEN-RU II	between the European Union and the Russian Federation	07/14 – 06/17	http://www.enen.eu/en/projects/enenru2.html
EURECA	Cooperation between EU and Canada in Education, Training and Knowledge Management on Super-Critical Water Reactors	08/12 – 07/14	https://cordis.europa.eu/project/rcn/103595_en.html
GENTLE	Graduate and Executive Nuclear Training and Lifelong Education	01/13 – 12/16	http://gentelproject.eu
ANNETTE	Advanced Networking for Nuclear Education and Training and Transfer of Expertise	01/16 – 12/19	http://www.enen.eu/en/projects/annette.html

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