



# InnoEnergy Skills Institute

## Power Convertors and Efficiency in Battery Applications

Last revised: 2023 March

More and more battery applications are entering the market, leading to stronger requirements in terms of power converter performance and efficiency in order to be competitive. Power converters are essential components in electrical systems with batteries. They serve as an interface between systems of different voltage levels, convert between AC and DC, and enable charging and discharging of batteries.

This certification introduces you to the world of power conversion. Specifically, you will explore the basic principles of power conversion, and receive a brief overview of the various types of power converters. You will get acquainted with power conversion principles and efficiency measurements. You will also understand how to match the right type of converter to various real-world battery applications while assessing overall system performance with respect to energy efficiency. Finally, you will learn how to measure the capacity and energy efficiency of a USB power bank and explore a home storage system use case.

### Learning outcomes

Upon completion of the certification, learners will be able to:

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- Apply insights into the need for power conversion in future applications.
  - Identify the type of power converters required in a battery application.
  - Evaluate a given application in terms of component and system efficiency.
  - Take into account the energy losses of power converters and batteries in the assessment of overall system performance.
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### Certification structure

The certification is delivered fully online and is self-paced, making it easy for participants to learn without having to take time off work.

The certification consists of two courses and is structured as follows:

#### Course 1: Introduction to Power Electronic Converters

- Dive into the world of power conversion starting with an introduction to the basic principles of power conversion and the relation to the energy efficiency of the energy system.

#### Course 2: Power Conversion and Efficiency in Battery Systems

- Discover why power converters are needed for battery applications and how we can choose the right type for a specific application.

## Instructors

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The certification is led by experts from the EIT InnoEnergy ecosystem. Instructors on this certification are:

### Jolien Despeghele

PhD student in Electrical Engineering at KU Leuven/Energyville. She is a researcher on the project Energy Storage as a Disruptive Technology in the Energy System of the Future.

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## How will you learn?

This is an online certification and can be taken at your usual study location. The certification consists of two courses and is self-paced.

**Duration: 7 hours**

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## Is it right for you?

This certification is beneficial for engineers without a background in power electronics concerned about system efficiency in battery applications, but anyone with a non-engineering background working with battery applications interested in an overview of power converter needs and insights into the impact on system performance might find it useful.

**Prerequisites:** Basic understanding of electrical systems.

## Certificates of Achievement

We offer two pathways for issuing of certificates, **InnoEnergy Skills Institute Certificate** and **EDC (European Digital Credentials)**, each with its own unique set of benefits, allowing your organization

to choose the one that best suits the objectives. **The Achievement recognition will be awarded at a >75% course assessment pass rate.**

## InnoEnergy Skills Institute Certificates

### What is it?

The InnoEnergy Skills Institute serves as the certificate issuer, verifying learners' progress and achievements with the course material.

### What are the benefits?

InnoEnergy Skills Institute certificates are highly adaptable for recognizing various learning levels and achievements. We offer Participation, Completion, and Achievement certificates for learners who complete online courses through the Skills Institute platform.

### What that means for you?

You will receive a digital credential that you can store in your personal digital credential wallet. You can also add and share these credentials on your social media platforms. The authenticity of the credentials can be verified online by anyone seeking credential verification.

## European Digital Credentials (europass)

### What is it?

European Digital Credentials provide an online record of an individual's personal achievements and qualifications. Recognized by employers across the continent, InnoEnergy Skills Institute can issue European Digital Credentials, which learners can add to their European Digital Credentials wallet. For this type of credentials, we only offer Achievement certificates, awarded at a >75% course assessment pass rate.

### What are the benefits?

It allows learners to signal their skills and qualifications using the European Learning Model — a semantic standard that helps the recognition of qualifications and digital credentials across Europe. It also combats fraud, and greatly reduces administrative costs.

### What that means for you?

You can be confident in the authenticity of your credentials and showcase your skills in a way that is understood in the context of the European Learning Model. You'll also be able to access everything quickly and easily via your online European Digital Credentials wallet.

## Versioning

#	Version	Summary of Changes	Date
1	v1.1	Updated the formatting as per InnoEnergy Colour and Font styles	09-Dec-24