
ELECTRIFYtoday
ELTO 24
Empower yourself
Create a sustainable tomorrow

ELECTRIFYtoday for accompanying lessons

Young people are the designers of the future of the energy transition. They expect modern methods of knowledge transfer in the field of electrical engineering. That is why "TechEducation - powered by Phoenix Contact" has developed a digital "serious game" together with the award-winning game developer "Paintbucket Games" from Berlin: "ELECTRIFYtoday". This computer game serves as an innovative, digital learning environment for trainees and STEM students. Young people are challenged to master the energy transition and transform the game world into an All Electric Society (AES) in which renewable energy is the primary energy source. The focus is on energy and resource efficiency. To achieve this, players must acquire knowledge from all energy sectors and understand the need for sector coupling. They collect technical knowledge from a wide range of topics such as e-mobility, smart buildings, wind and solar power. This makes "ELECTRIFYtoday" particularly useful in (technology) lessons and in the training of teachers and trainees. The knowledge acquired is put to the test in various mini-games and quizzes, and then the game world is expanded step by step to make it more sustainable, efficient and CO2-neutral. The first German-language version of the game for PC and mobile will be completed in April 2024. The software is free of charge.

ELECTRIFYtoday is suitable for use alongside lessons in STEM subjects and training courses in electrical engineering and mechatronics. The special opportunity here is to experience and understand the entire bandwidth of the energy transition and sector coupling across topics and subjects.

The content of ELECTRIFYtoday fits in with various training framework curricula for electrical engineering and mechatronics. The game focuses on experiencing and understanding the energy transition, the associated energy generation, distribution, storage and consumption. The focus is on sector coupling and the associated energy management with the associated technologies and core components. It is the experience of the "big picture" of a technological and socio-political transformation. This includes understanding the individual interrelationships, which is often not explicitly found in the individual learning fields but represents the application background of the training as a whole.

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Players can find learning stations and key topics:

All Electric Society as a sustainable vision of the future	Energy distribution & storage	Smart buildings & factories	Solar and wind power	E-mobility

Special emphasis is placed on the charging infrastructure. The game focuses on an AC charging station as an example of how to build a control cabinet. The aim is to explore this control cabinet according to the curriculum, read and understand the circuit diagram and finally assemble and commission it. Components are selected according to specifications, faults and hazards of a switchgear and controlgear assembly are analyzed and assessed. The centerpiece of the e-mobility learning station is a wiring exercise.

Technical specifications

ELECTRIFtoday is a so-called single player game. Each user therefore has their own game world. However, friendly players can be added to the friends list or groups using codes. In the rankings, players can then compete with their friends or other groups in terms of game progress.

ELECTRIFtoday has learning content that can be experienced in various learning stations and missions. Depending on the individual learning path, the game can take up to 15 hours to complete. The content of the game is constantly being expanded through changing content and new challenges, extending the playing time almost indefinitely.

ELECTRIFYtoday is an open world 3D game and can be played web-based on the computer, laptop, tablet and cell phone as an APP download for Android and Apple. It is designed as an online game. A graphics card is a technical requirement for a good gaming experience on computers.

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Elements of the didactic concept

ELECTRIFYtoday is based on a didactic concept with the following elements:

Target group: Apprentices and interested parties in the electrical sector with a focus on young people aged between 14 and 23
Learning objectives: Experiencing the energy transition and shaping an All Electric Society and shaping one's own (professional) role in a sustainable world
Subject content: Energy transition and sector coupling, their technologies, components and processes
Learning organization: Discovering, self-determined, playful and action-oriented learning with the option of collaboration in a learning network
Forms of learning/methods: Simulation and games with practical exercises, interactive and collaborative learning, group and project work
Media: Virtual world in conjunction with short elearnings, 3D animations, illustrations and videos
Learning paths: Diverse and individual
Learning control/evaluation: Quizzes, playful tasks with learning progress checks and evidence
Learning outcomes: In-depth understanding of the "big picture" of the energy transition, role identification in the All Electric Society and knowledge building in the various energy sectors, technologies and connection to (accompanying) teaching content in training, school education, beginning studies and further education
Communication: Accompanying forums, events (planned)
Support concepts: Help function, mentor function

The overarching learning objectives

Experience and understand the energy transition and sector coupling in the form of the transformation of a virtual small town into a world based on renewable energy. Introduction to various topics such as solar and wind power, energy storage and distribution, smart buildings and industries, e-mobility. Familiarization with key technologies and components. Accordingly, students should be familiar with the current challenges in times of climate change and the energy transition. Their interest should be aroused and the All Electric Society should be understood as a vision. They should receive an informative overview of various sectors and fields of action and be able to describe how they are linked.

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Overarching key questions

- What is the energy transition and what is the "All Electric Society"?
- How is energy generated, stored, distributed and consumed?
- What does sector coupling mean?
- Which (technological) fields of action are directly affected by the energy transition?
- -What impact will the energy transition have on our society?

Overarching learning content

Introduction to the idea of the so-called "All Electric Society" and the concept of sector coupling. Presentation and own influence on energy generation, distribution, storage and consumption through the game. Teaching the basics through specialized learning stations in various fields of activity. The focus of knowledge transfer in the first version of ELTO is on e-mobility. Here, a so-called deep dive is carried out in the field of AC charging infrastructure with a key task for wiring a charging station.

Learning objective: ENERGY

The learners should experience the linking of energy data, be shown the complex relationships and functions of different energy producers and consumers as well as the effects of environmental influences and thus gain knowledge and also understand the interplay through their own interaction and adaptations.

Key questions:

- How are energy production and consumption connected?
- How do external factors such as weather conditions or time of day influence energy generation?
- How consumption changes depending on the degree of utilization and use?

Learning content:

Continuous representation of energy generation in the game world, storage, distribution and consumption through a realistic energy simulation in the form of dashboards with different consumption situations.

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Learning objective: SOLAR POWER

The aim is to teach the basics of solar power and technology. Students should understand how sunlight is converted into electricity using solar cells and how this regeneratively generated electricity can be made usable for consumers. From DC power generation using photovoltaic systems and conversion to AC power with the help of inverters to the use and storage of surplus solar power, basic content is taught.

Key questions:

- What is solar power?
  What different types of solar cells and photovoltaic panels are there?
- Where and how can photovoltaic systems be used?
- What influence does the orientation of photovoltaic systems have on the system yield??

Learning content:

The basics of photovoltaics are taught and tested at learning stations. This includes the structure of a solar cell, the conversion of sunlight into energy, DC power generation and conversion to AC. The knowledge gained can later be used in the game to install photovoltaic systems. Players can find out how much electricity the systems produce and what proportion of this is consumed, stored or fed into the grid.

Learning objective: E-MOBILITY

History and basics of e-mobility and charging infrastructure

Key questions:

- What is e-mobility and how has it developed?
- What is the charging infrastructure?
- What are the differences between different types of charging?

Learning content:

Overview of the emergence of e-mobility and its development over the last 100 years.

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Deep Dive: Learning goal e-mobility - "AC charging station" control cabinet“

Learners should be able to recognize and identify the names and functions of the various components of the control cabinet, such as contactors, relays, fuses and cables. They should be able to identify the components in the virtual control cabinet and recognize their positions. Learners should understand the names and functions of the various components in the control cabinet, such as contactors, relays, fuses and cables. They should be able to identify the components in the virtual control cabinet and know their positions and be able to work with a circuit diagram. Learners should gain a comprehensive understanding of the different types of electrical terminals and connections, including how they work, in which applications they are best used, and their respective advantages and disadvantages. With this understanding, learners should be able to select the correct terminals and connections for specific applications, ensuring the safety and integrity of the connections. Learners should understand the relationships between the different components of the control cabinet and the impact of changes to one component on the overall functionality of the control cabinet. Learners should be able to carry out the necessary steps to install and commission the control cabinet and ensure that it functions properly and safely.

Key questions:

- What is an AC charging station?
- How does it work and what elements does it consist of?
- How do I read a circuit diagram?
- How do I wire a charging pole?
- How do I put a charging pole into operation?

Learning content:

AC charging station component knowledge, circuit diagrams, composition of an AC charging station, wiring and troubleshooting, and commissioning.

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Learning objective: BUILDING & INDUSTRY

Teaching the basics of the "smart buildings" and "smart factories" fields of action and their role in sector coupling. Initial insights into these topics with an outlook on potential expansion of learning fields in future development stages of the learning game.

Key questions:

- What are smart buildings?
- What is meant by "smart factory"?

Learning content:

Basic illustration of the structure and functioning of intelligent buildings and factories.

Learning objective: WIND POWER

Students learn how people used the power of the wind in the past and how it is used today to generate energy. In addition to the functioning and structure of a wind turbine generator, the focus of the knowledge transfer is on the various sensors that characterize modern wind turbines. Learners can get to know different sensors and recognize their benefits.

Key questions:

- How is electricity generated with a modern wind turbine generator?
- Which sensors are located on the rotor blade and what purpose do they serve?
- Why are lightning strikes detected by sensors?
- What role does wind power play in overall electricity generation in Germany?

Learning content:

The basics of wind turbine generators are taught. This includes how wind turbine generators work and how they are constructed. Knowledge about various sensors is also taught and tested. Trend topics such as ever larger wind turbine generators or offshore wind farms are also included in the course content.

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