

INNOVATIVE COURSE OFFER

WHAT DO WE OFFER?

5 DAYS (30 academic hours) training course from lectures accredited by Tallinn University of Technology (TalTech) – CARBON NEUTRAL GEO-TECHNOLOGIES – LEVEL I

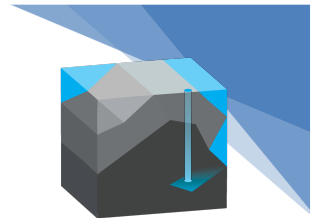
<https://shogenergy.eu/education>

OUR UNIQUE EXPERTISE

- >16 years of experience in CCUS (CO₂ Capture, Transport, Use and Geological Storage) EU and national projects
- Development and teaching of a unique educational program (TalTech-NGGO402, University of Warsaw)
- E-Learning Course of the ENOS Project: CO₂ Geological Storage
- Co-authors of the Short course and E-learning course for postgraduates: Circular economy in the extractive industry - principles and application, funded by ERASMUS+ project CIRCEXTIN
- Virtual AAPG EVENTS for Latin America and Caribbean Region. Lecture in Session 4a of a short course “Application of Oil and Gas Industry Skills to Subsurface Carbon Storage and the Carbon Trading Economy”, organized by U3 Explore on 22 September 2022. Dr.Kazbulat Shogenov & Dr.Alla Shogenova. Best practice in CCS project delivery: lessons learned. How to avoid common mistakes?
- Consulting and advising in CCUS technology and regulations (industry, ministries and parliament members of the Baltic and Nordic countries, energy agencies and policymakers, Heidelberg and Buzzy Cement, Eesti Energia, Gassnova, Global CCS Institute)
- Members and Board members of experts’ networks: BASRECCS, CO2GeoNet, ENeRG, COST Action Geothermal-DHC, COST Action CA21127 – TrANsMIT

LECTURERS

1. Dr.Alla Shogenova (Ph.D. in petrophysics, Senior researcher at TalTech, supervisor of Ph.D in CCUS, research director in SHOGenergy, Professor of the ENOS International Master Course on "CO₂ Geological Storage", Sapienza and Zagreb Universities)
2. Dr.Kazbulat Shogenov (Ph.D in CCUS, geophysics and petrophysics, researcher at TalTech, CEO & Founder of SHOGenergy, invited lecture in Middle East Technical University (METU) – lessons organized by AAPG (Turkish section) and SPE, supported by ERASMUS+ and Silesian Technical University.



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EDUCATIONAL PROGRAM

Please find in Annex-1

DATES AND PLACE

20-24.02.2023

According to the number of participants the training location will be chosen between the *TalTech auditorium* and the conference rooms of the *Nordic Hotel Forum* or *Viru Hotel* in Tallinn.

COSTS AND CONDITIONS

We consider 1-3 participants as a **VIP** option with the price of **5400€** per person and >4 participants as a **STANDARD** option with the price of **1800€** per person. The price consists of *education courses (5 days-24 academic hours)*, *testing, qualification certificate + 2 coffee breaks and lunch every day during the course*. The course Level I completion grants admission to the Level II course.

Hotel packages will be provided additionally

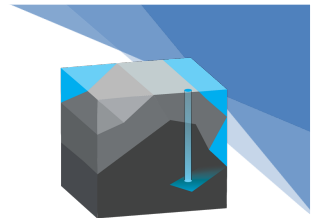
VIP option: Nordic Hotel Forum, Viru Hotel, Radisson Blu Hotel Olümpia/Collection Hotel or Swissotel Tallinn for 100-150€/day per person without and with breakfast, respectively

Standard option: 50-100€/day per person without and with breakfast, respectively

CONFIRMATION, INVOICE AND PAYMENT

After your confirmation is received to the email info@shogenergy.eu, the official invoice will be generated and send back. Please send your payment within 14 days of receiving the invoice. Your participation will be confirmed after the payment will be deposited to the bank account.

We also accept cash and cryptocurrencies. Please contact us for more details.



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ANNEX-1. EDUCATIONAL PROGRAM

CARBON NEUTRAL GEO-TECHNOLOGIES - LEVEL I (h-academic hours, 1 h=45 min)

DAY 1:

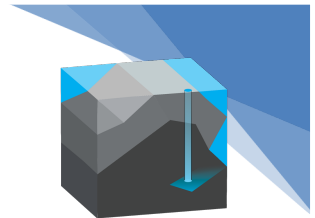
- Introduction. Technical comparison of Carbon-neutral technologies **(2 h)**
Introduction to climate change, sustainability and CCS.
Greenhouse gases and the greenhouse effect, anthropogenic CO₂ emissions.
Comparison of renewable energy, energy storage, fossil fuels with CCS and nuclear energy.
- Introduction to CCUS **(2 h)**
CO₂ sources and capture. Carbon budget. Fossil fuels and industry emissions.
Global CO₂ emissions: total and per Capita. European and regional CO₂ emissions.
Paris Climate Agreement 2015 and Global Fight to Zero. EU Emissions Trading System.
- CO₂ capture methods for the energy sector and industry **(2 h)**
Basics of post-combustion, pre-combustion and oxyfuel technologies for power plants.
Separation principles. Basics of capture technologies for industry (cement, steel and iron).
CO₂ compression. CO₂ captured versus avoided. Cost of CO₂ avoided.

DAY 2

- CO₂ transport and geological storage options **(2 h)**
CO₂ transport options (pipelines and ship transport).
Introduction to geology. Geological Storage sites.
Transport properties of fluids in rocks. CO₂ trapping mechanisms.
- Regional CO₂ storage capacity, worldwide overviews and regional modules (Europe, Baltic, Nordic, USA, Canada, etc.) **(2 h)**
Main principles of CO₂ storage site selection.
Depleted hydrocarbon fields. Deep saline formations, other options.
Methods of storage capacity estimation (overview).
World and regional storage capacity. Examples of storage projects.
- CO₂ storage risks and safety **(2 h)**
Health, Safety and Environmental risks with CO₂ storage (HSE). Local and Global Risks
CO₂ storage monitoring (targets, regulations, examples)

DAY 3

- Legal aspects **(2 h)**
Multilateral environmental agreements (London Protocol, OSPAR, HELCOM)
EU CCS Directive and EU ETS
International examples of CCS regulations. International Standards for CCS (ISO)
- Negative emission technologies **(2 h)**
Negative emission Technologies (NET)
Bioenergy with Carbon Capture and Sequestration – BECCS.
Direct Air Capture (DACCS)
- CCUS clusters **(2 h)**
The concept of CCUS clusters and hubs. CO₂ use options.
Advantages of CCUS clusters.
The best-known CCUS clusters in the world
Challenges and lessons learned



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DAY 4

- **CCS in basalts (2 h)**
 Location of basalts in the world. Mineral carbonation reaction in basalts.
 In-situ mineral carbonation in basalts: Iceland, CarbFix Project and Wallula Basalt Pilot Project in USA.
 Comparison of CO₂ geological storage and mineral carbonation technologies.
- **Underground circular use of CO₂ (CO₂-EOR). Part 1 (2 h)**
 Description of technology and processes
 Experience from US and Canada. Projects in operation.
 Retargeting of the oil and gas business into storage projects.
- **Underground circular use of CO₂ (Geothermal Energy recovery). Part 2 (2 h)**
 Introduction to Geothermal Energy
 CO₂-plume geothermal system
 CO₂-based geothermal heat mining for power production combined with CCS and EHR

DAY 5

- **Underground H₂ storage (2 h)**
 Introduction to H₂ energy production (energy storage option).
 Underground H₂ storage options: (salt caverns, saline aquifers, depleted oil and gas reservoirs)
 Hydrogen storage capacity and future prospects.
- **Synergy scenarios (2 h)**
 Possibilities for synergy of CO₂ and H₂ storage and geothermal energy recovery
 Examples of synergy scenarios
 Advantages of synergy scenarios and possible problems
- **Future prospects of carbon neutral geo-technologies and their role by 2070 (2 h)**
 CCUS in Clean Energy Transitions
 CCUS in the Sustainable Development Scenario
 Comparison of geo-technologies their role and costs by 2050 and 2070

5 days - 30 academic hours