TE PŪ NGAO, TE PŪ WARO
CARBON AND ENERGY PROFESSIONALS NEW ZEALAND
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CEP1006: Fuel Switching "Self-directed" Online Training

Prerequisites

None

Recommended prior learning/experience

A general understanding of energy and fuel types and typical equipment and systems is a commercial and/or industrial facility would be helpful knowledge for this training.

The efficiency first and energy efficiency trainings contain helpful background information, and if they are going to be viewed, should be viewed before this session.

This module will also touch on policy, carbon markets, low carbon transport, future trends, emissions considerations, and could be considered in tandem with almost all of the other training modules in one way or another.

Description

This training module on "Fuel Switching" will cover the aspects of decarbonising a system or process by changing the fuel or energy source. For example, converting a coal boiler to an electric or biomass boiler. It will consider all of the major sectors of the New Zealand economy-wide emissions and discuss the fuel switching opportunities for major sectors such as buildings, industry, process heat, and transportation (at a high level).

Position and pathway

This module has an associated assessment which takes the form of an online examination. Success in the associated assessment is an element of CEP's Certified Professional in Energy and Certified Professional in Carbon professional qualifications.

Delivery mode

The training module consists of thirteen (13) videos, twelve (12) progression quizzes and one (1) completion quiz. The progression quizzes serve as gatekeeper steps, requiring successful completion before participants can advance to the next lesson.

Hours

This module is split into 13 lessons and total 3 hours of viewing. Students will be required to undertake 12 quizzes, which should take around 5 minutes each.

Learning outcomes

By the end of the course, students should understand the following topics at a high level:

1. Introduction to Fuel Switching
2. Fossil Fuels Commonly Used in NZ
3. Why Fuel Switching Matters in NZ
4. Low Carbon Fuels Available in NZ
5. Fuel Switching to Electricity-Based Systems
6. Fuel Switching to Biomass Options
7. Fuel Switching using Geothermal Heat
8. Fuel Switching using Hybrid Solutions
9. Fuel Switching Buildings and Homes
10. Fuel Switching of Process Heat Systems
11. Fuel Switching of Transport Sector (from NZ Context)
12. Emerging Fuel Switching Technologies
13. Case Studies and Lessons Learned

Module Structure and Progression

Lesson Outlines	
Lesson 1	**Introduction to Fuel Switching**
	Video duration: 20 minutes approximately. Content relates to learning outcomes 1: • Understanding the Concept and Importance of Fuel Switching (what is fuel switching) • Benefits of Transitioning to Sustainable Energy Sources • Overview of Fuel Switching Strategies • Role of Fuel Switching in Mitigating Climate Change • Future Trends and Opportunities in Fuel Switching
Progression Quiz 1	
Lesson 2	**Fossil Fuels Commonly Used in NZ**
	Video duration: 10 minutes approximately. Content relates to learning outcomes 2: • Overview of Fossil Fuel Consumption Patterns in New Zealand • Dominant Fossil Fuel Sources and Usage Trends

	• Challenges in Transitioning Away from Fossil Fuels
Progression Quiz 2	
Lesson 3	**Why Fuel Switching Matters in NZ**
	Video duration: 10 minutes approximately. Content relates to learning outcomes 3: • NZ's Commitment to Sustainable Energy Transition • Role of Fuel Switching in Achieving Climate and Energy Goals • Opportunities and Challenges for Fuel Switching in the NZ Context • Economic Benefits of Fuel Switching for NZ Businesses • Social Implications of Fuel Switching for Communities • Policy Framework and Incentives Supporting Fuel Switching Initiatives in NZ
Progression Quiz 3	
Lesson 4	**Low Carbon Fuels Available in NZ**
	Video duration: 20 minutes approximately. Content relates to learning outcomes 4: • Overview of Low Carbon Fuel Options in NZ • Sustainable Alternatives to Fossil Fuels: Electricity, Biomass, Biofuels, Biogas, Geothermal • Assessing the Viability and Accessibility of Low Carbon Fuels • Technological Advances Enhancing the Viability of Low Carbon Fuels
Progression Quiz 4	
Lesson 5	**Fuel Switching to Electricity-Based Systems**
	Video duration: 20 minutes approximately. Content relates to learning outcomes 5: • Types of Electricity-Based Systems – common types and an overview of novel systems • Benefits and Challenges of Switching to Electric Systems • Demand Response Opportunity Overview • Practical Steps for Fuel Switching Using Electricity-Based Systems
Progression Quiz 5	

Lesson 6	**Fuel Switching to Biomass**
	Video duration: 15 minutes approximately. Content relates to learning outcomes 6: • Types of Biomass Fuels: Wood, Agricultural Residues, Bioenergy Crops • Environmental and Economic Benefits of Biomass Fuel Switching • Disadvantages of Biomass for Energy Generation • Practical Steps for Fuel Switching Using Biomass-Based Systems
Progression Quiz 6	
Lesson 7	**Fuel Switching using Geothermal**
	Video duration: 5 minutes approximately. Content relates to learning outcomes 6: • Fuel Switching of Process Heat Using Geothermal Energy • Practical Considerations of Geothermal Heat for Fuel Switching
Progression Quiz 7	
Lesson 8	**Fuel Switching using Hybrid Solutions**
	Video duration: 5 minutes approximately Content relates to learning outcome 6: • Types of Hybrid Fuel Switching Solutions • Benefits of Hybrid Solutions • Hybrid Solution Examples
Progression Quiz 8	
Lesson 9	**Fuel Switching Buildings and Homes**
	Video duration: 15 minutes approximately Content relates to learning outcome 6: • Fossil Fuel Use in Buildings • Heating Systems in Buildings • Fuel Switching Options for Buildings • Electrification of Kitchens • Electrification of Laundries

Progression Quiz 9	
Lesson 10	**Fuel Switching of Process Heat Systems**
	Video duration: 10 minutes approximately Content relates to learning outcome 6: • Industrial Process Heat Systems • Challenges and Opportunities in Process Heat Fuel Switching • Options for Process Heat Fuel Switching
Progression Quiz 10	
Lesson 11	**Fuel Switching of Transport Sector (overview)**
	Video duration: 5 minutes approximately Content relates to learning outcome 6: • Overview of transport decarbonisation training
Progression Quiz 11	
Lesson 12	**Emerging Fuel Switching Technologies**
	Video duration: 15 minutes approximately Content relates to learning outcome 6: • Overview of Emerging Technologies for Fuel Switching • Limitations of Hydrogen Fuel Switching • Description of Emerging Biomass Technologies
Progression Quiz 12	
Lesson 13	**Case Studies and Lessons Learnt**
	Video duration: 10 minutes approximately Content relates to learning outcome 6: • Showcase of Successful Fuel Switching Projects in NZ and Globally • Lessons Learned and Key Takeaways from Implementation
Completion Quiz (Sections 1, 2)	**CEP1006: Fule Switching**

Assessment

This training module does not have a formal assessment. CEP runs a credential, assessed by examination for **CEP1006: Fuel Switching**, which operates independently of this training module. Completion of this module is not a pre-requisite for the formal assessment.

Completion

The module will be considered completed and a digital “Completion” certificate will be available when the student has achieved a score of 75% or above in the Completion Quiz.