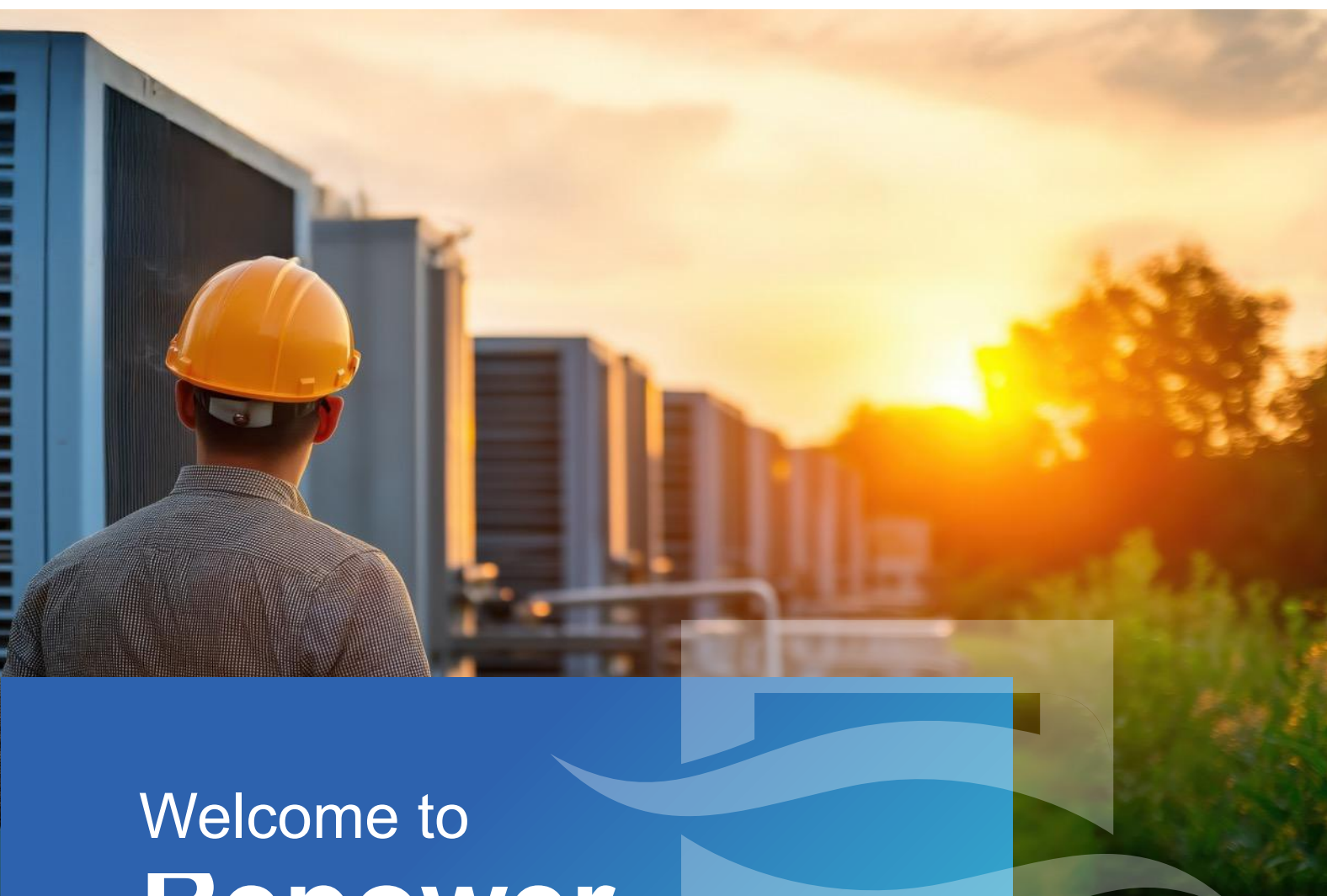




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Teachers' Guide

VET Study Programme

Decarbonised Heating and Cooling in Practice | EQF Level 4

A guide for teachers and trainers delivering the RePower Regions VET programme in colleges, training centres and workplace settings.

Programme	Decarbonised Heating and Cooling in Practice
Level	EQF Level 4
Modules	Seven
Audience	VET learners and apprentices in HVAC, building services and the wider construction ecosystem
Produced under	WP3, Task 3.4 — RePower Regions
Licence	CC BY 4.0
Version	Draft 1

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1. About this guide

This guide supports teachers and trainers delivering the RePower Regions VET programme at EQF Level 4. It does not teach the subject matter — it explains how the materials fit together, how long they take, where learners commonly struggle, and how to assess the practical work.

You do not need to be a specialist in district heating or heat pump design to deliver this programme. You do need to be comfortable supervising practical work and to have access to real buildings and, ideally, workplace contacts.

What you have been given

- Seven module presentations covering the full programme, produced at EQF Level 4.
- A set of open educational resources: video tutorials, planning tools, case studies and workplace projects.
- Knowledge checks built into each module, with answer keys.
- This guide.

How to read the module entries

Section 4 gives one page per module. Each has a suggested time, the focus of the module, teaching notes, a ‘watch for’ box covering the points learners most often get wrong, and the OERs that extend it.

Before you plan your delivery

The seven modules are a complete programme, but they are not a complete course on their own. The programme is designed so that roughly a third of learner time is spent on the workplace projects and practical resources rather than on the presentations.

If you deliver only the slides, learners will meet the content but will not practise the skills the programme is designed to build.

2. The programme at a glance

Seven modules, delivered in order. Each builds on the one before, and Modules 1 and 7 act as the opening and closing frame for the programme.

#	Module	Slides	Suggested time
1	What is the Decarbonised Heating & Cooling Transition?	28	3–4 hours
2	Energy Efficiency & Retrofit Practices	16	2–3 hours
3	Heat Pumps & Hybrid Systems in Practice	15	2–3 hours
4	Integrating with District & Renewable Heat	17	2–3 hours
5	Smart Controls & Digital Operation	16	2–3 hours
6	Compliance, Safety & Quality	16	2–3 hours
7	Project Delivery & Coordination	16	2–3 hours

Total taught time is approximately 16–22 hours. With the workplace projects and practical resources, allow 28–35 hours for the full programme.

Module 1 is longer than the others

Module 1 has 28 slides against 15–17 for the rest. It carries the conceptual framing for the whole programme: why the transition is happening, what the four pathways are, and how decisions get made. Everything after it assumes that framing.

Do not compress Module 1 to match the others. If anything, give it more time than the slide count suggests. Learners who leave Module 1 without a clear grasp of the four pathways will struggle from Module 3 onwards.

The four pathways

These are introduced in Module 1 and referred to throughout. They are the organising idea of the programme:

1. Energy efficiency first — reduce the energy needed before changing the heat source.
2. Heat pumps and electrification — use renewable electricity for heating and cooling.
3. District heating — use shared systems supplied by low-carbon or renewable energy.
4. Renewable heat — use solar thermal, geothermal or biomass where appropriate.

The programme's central message is that these are usually combined, not chosen between. Reinforce this every time the pathways come up.

3. Choosing a delivery model

The materials support four delivery patterns. Choose based on your learners and your access to real buildings, not on what is easiest to timetable.

Classroom-led

You present each module, pausing at the activity points. Knowledge checks run as whole-class discussion. Workplace projects are set as homework with a site the learner arranges.

Best for: full-time learners with little workplace access. Weakest on: the hands-on element the programme is designed around.

Flipped

Learners work through the module presentation and the linked video tutorials before class. Class time is spent on the planning tools, case study analysis and workplace project preparation.

Best for: learners with reliable device and internet access. This is the model the OER set is designed for.

Apprenticeship or day-release

Modules delivered in college sessions, workplace projects completed on the apprentice's actual site with their employer supervisor signing off.

Best for: apprentices. This is the strongest model for the programme and the one that best matches its purpose.

Self-paced online

Learners work through modules and knowledge checks independently. Workplace projects require a nominated supervisor.

Best for: mid-career learners already in work. Requires more support than it appears to — build in checkpoints.

Plan the workplace element first

Whichever model you choose, the workplace projects need a real site and a real supervisor. Arrange these before the programme starts, not when you reach them.

Learners without an employer can usually be placed with the college's own estates team, a local authority building, or a partner contractor. Start those conversations early.

4. Module-by-module guide

Module 1 — What is the Decarbonised Heating & Cooling Transition?	
Slides	28
Suggested time	3–4 hours
Focus	Why the transition is happening, what it means in practice, the four pathways, and what information is needed to choose between them.
Teaching notes	- Start with the key terms slide. Learners cannot follow the rest of the programme without decarbonisation, heating and cooling demand, heat pump, district heating, renewable energy and life cycle cost. - Spend proper time on the four pathways. Everything from Module 3 onwards assumes them. - The 'when to act, when to refer' slide is the most professionally useful content in the module. Treat it as a discussion, not a list — ask learners for examples from their own experience of each. - The scenario slide works well as a group exercise before the applied task. Thirty to forty minutes, groups of three. - The applied task becomes workplace project VET-13. Introduce it here even if learners complete it later.
Watch for	- Learners often treat the pathways as alternatives to choose between. The module says repeatedly that they are usually combined. Correct this every time it comes up. 'Efficiency first' is easily heard as 'efficiency only'. It means reduce demand before selecting a heat source, not instead of selecting one. - Some learners assume a heat pump is always the answer. The module deliberately does not say that.
OERs to use	VET-04 (retrofit video case study), VET-05 (Peta4 tutorial), VET-11 (DEEP real project data), VET-13 (workplace project)

Module 2 — Energy Efficiency & Retrofit Practices	
Slides	16
Suggested time	2–3 hours
Focus	Reducing demand through building fabric, ventilation, system optimisation and user behaviour.
Teaching notes	- This module delivers Pathway 1 in practical detail. Link back to Module 1 explicitly at the start. - Learners with site experience will have strong views here. Use that — ask what they have seen done well and badly. - The DEEP platform (VET-11) is the strongest pairing: learners compare measures against real payback data rather than taking cost claims on trust.
Watch for	- Fabric measures are easy to describe and expensive to deliver. Keep the discussion anchored in what is realistic for the buildings your learners actually work on. - User behaviour is often dismissed as trivial. The module treats it as one of four equal measures.
OERs to use	VET-03 (BUILD UP library), VET-04 (retrofit video case study), VET-11 (DEEP), VET-14 (workplace project)

Module 3 — Heat Pumps & Hybrid Systems in Practice	
Slides	15
Suggested time	2–3 hours
Focus	How heat pumps work, when they are suitable, and how hybrid systems provide efficient and reliable heating in existing buildings.
Teaching notes	- The module is built around four outcomes: understand how heat pumps work, recognise when they suit a building, apply good practice in selection and installation, and support efficiency and comfort. - The main parts of a heat pump system slide is the core of the module. Give learners time with it — heat source, compressor, heat exchangers, distribution, controls. - Emphasise that the system works as a whole. A correctly specified heat pump on an unsuitable distribution system will disappoint.
Watch for	- Learners frequently confuse the evaporator and condenser. Tie each to what it does rather than where it sits. - The relationship between flow temperature and efficiency is the single most important practical point. If learners take one thing from this module, it should be that lower flow temperature means better performance.
OERs to use	VET-03 (BUILD UP library), VET-09 (Construction Blueprint), VET-14 (workplace project)

Module 4 — Integrating with District & Renewable Heat	
Slides	17
Suggested time	2–3 hours
Focus	How district heating works, how buildings connect to it, and where renewable and recovered heat fit.
Teaching notes	- This is the module where the planning tools come into their own. THERMOS (VET-06) and Hotmaps (VET-07) let learners model their own town rather than read about someone else's. - Allow a full session for the tool work. Learners new to mapping software need time before they produce anything meaningful. - Pair the tool exercise with the THERMOS case study collection (VET-10) so learners can compare their result against a real project.
Watch for	- District heating is unfamiliar in some national contexts and completely normal in others. Check what your learners already assume. - Learners often think district heating is inherently low-carbon. It depends entirely on what is at the production end.
OERs to use	VET-01, VET-02 (THERMOS webinars and demo), VET-05 (Peta4), VET-06 (THERMOS tool), VET-07 (Hotmaps), VET-10 (case studies), VET-12 (Salaspils)

Module 5 — Smart Controls & Digital Operation	
Slides	16
Suggested time	2–3 hours
Focus	How controls, metering and monitoring data are used to operate systems efficiently and identify problems.

Teaching notes	- The practical skill here is reading data and judging whether it is plausible, not configuring systems. - Workplace project VET-14 sits directly on this module. Introduce it here. - If you have access to a building management system, even a simple one, use it. Twenty minutes with real trend data is worth more than an hour of slides.
Watch for	- Learners often assume that if a display is on, the system is working. The programme makes the opposite point repeatedly — check the whole measuring system, not the display. - Data without context means nothing. Always ask what the system was doing at the time of the reading.
OERs to use	VET-03 (BUILD UP library), VET-06, VET-07 (planning tools), VET-14 (workplace project)

Module 6 — Compliance, Safety & Quality

Slides	16
Suggested time	2–3 hours
Focus	Working safely and responsibly with heating and cooling systems, and meeting regulatory and quality requirements.
Teaching notes	- This module underpins the workplace projects. Deliver it before learners go on site if you can. - National regulations differ. Be explicit about which of the module's content is EU-level and which needs replacing with your national framework. See section 9. - The module closes on the wider contribution of safe, well-maintained systems to healthier buildings. Keep that framing — it lifts compliance above box-ticking.
Watch for	- Compliance is easily taught as a list of rules. The module frames it as protecting people, equipment and the environment. Hold that framing. - Learners sometimes see escalation as admitting failure. It is the opposite — recognising the limit of your role is a professional skill.
OERs to use	VET-03 (BUILD UP library), VET-14 (workplace project)

Module 7 — Project Delivery & Coordination

Slides	16
Suggested time	2–3 hours
Focus	How projects are delivered: roles, interfaces, evidence, communication and handover.
Teaching notes	- This module closes the programme and returns to Module 1's framing. Make that link explicit. - The content is about working with other people, which VET learners sometimes rate as less important than technical skill. Use real examples of projects that failed at an interface rather than at a technology. - Workplace project VET-15 suits this module as a closing piece, since it requires learners to approach a third party and gather information they cannot simply be given.
Watch for	- Learners underestimate how much project failure comes from communication rather than technical error. Make this concrete. - Evidence is often treated as paperwork done afterwards. The programme's position is that it is planned from the start.

5. Using the open educational resources

The programme is supported by a set of open educational resources in four categories. They are listed in full, with licences and links, in the RePower Regions VET OER Register.

Video tutorials

Use these before a session, not during it. They work as preparation so that class time can be spent on discussion and practical work. Most are available as downloadable PDF as well as video, which matters for learners with limited data.

Planning tools

THERMOS and Hotmaps are free, browser-based tools that let learners model real networks and run real calculations. They require a free registration.

Practical advice

Set up your own account and try the exercise yourself before the session. These tools are not difficult, but they are unfamiliar, and a teacher discovering the interface alongside the class loses the room.

Allow a full session the first time. Learners produce almost nothing in the first thirty minutes, then move quickly.

Case studies

Give learners a question before you give them the case. A case study read passively teaches little; the same case used to answer a specific question teaches a great deal.

Suggested framing questions: what problem was this project solving? What would have happened without it? What would you need to know to do this here?

Workplace projects

These carry the practical assessment and are covered in the next section.

6. Running the workplace projects

Three workplace projects run alongside the modules. Each requires a real site, a nominated supervisor and a signed sign-off sheet.

Project	Runs with	What the learner does
VET-13 Transition impact note	Modules 1 and 7	Surveys a real building, gathers data, recommends a pathway, writes a short note
VET-14 Interface and metering check	Modules 3, 5 and 6	Identifies a heat interface, records meter readings, judges whether they are plausible
VET-15 Surplus heat screening	Modules 1, 5 and 7	Screens a real local site as a potential heat source using a structured matrix

Arranging sites and supervisors

- Start arranging access before the programme begins. This is the most common reason the practical element fails.
- Apprentices should use their own workplace wherever possible.
- For learners without an employer, approach your own estates team, the local authority, a housing association or a partner contractor.
- Brief the supervisor on what the learner is and is not permitted to do. Send them the project document in advance.

Safety

Read before using VET-14

VET-14 places a learner in a plant room. The project is written as a visual and documentary check only — the learner looks and records, and does not open, operate, adjust or touch anything.

A competent supervisor must be present throughout. Hot surfaces and pressurised pipework are present in plant rooms.

Before you use this project, check the safety framing against your national regulations and your institution's own requirements. Site access rules differ between countries and between employers.

Make clear to learners that recording 'not able to check safely' is a correct answer, not a failure.

Marking the workplace projects

Each project has its own assessment criteria. Across all three, the qualities you are looking for are:

- Evidence over assertion. Does the conclusion rest on what the learner found, or on what they already believed?
- Honest gaps. Has the learner marked what they could not find out, rather than guessing?
- Knowing the limit of the role. Has the learner identified what needs specialist input?
- Communication. Could the building owner or supervisor actually use this?

A learner who reaches a cautious or negative conclusion and justifies it well has done better work than one who reaches a confident conclusion with thin evidence.

7. Assessment

The programme is assessed through knowledge checks and workplace projects. There is no final examination.

Knowledge checks

Each module ends with a short multiple-choice check with an answer key. These are formative. Use them to find out what has not landed, not to grade.

- Run them as discussion rather than silent completion where you can. The reasoning matters more than the answer.
- If most of a class gets a question wrong, that is a signal about the teaching, not about the learners.

Workplace projects

These carry the practical assessment. Each has criteria in its own document, plus a supervisor sign-off that must be completed before the work can be assessed.

Suggested overall weighting

Component	Weighting	Notes
Knowledge checks	0%	Formative only
VET-13 Transition impact note	40%	The fullest piece of written analysis
VET-14 Interface and metering check	30%	Practical observation and judgement
VET-15 Surplus heat screening	30%	Structured analysis and independent enquiry

Adjust to fit your own institution's assessment framework. The weighting above reflects the relative size of each task, not a requirement.

8. Accessibility and inclusion

The programme materials have been produced as editable text so that they can be read by screen readers, resized, reflowed on small screens and translated.

Practical points

- Share the module files in advance so learners can adjust text size, colour and spacing to suit them.
- Most video tutorials are also available as downloadable PDF. Offer both rather than assuming video.
- The planning tools are browser-based and need no installation, which helps learners using college equipment.
- Workplace projects require site access, which is not equally available to all learners. Plan alternative placements rather than disadvantaging those without an employer.
- If you adapt or add to the materials, keep text as text. Avoid putting content into images.

Language

The materials are produced in English and are being translated into partner languages. If you are delivering in another language, check whether a translated version exists before translating locally.

9. Adapting the programme to your national context

The programme is designed for use across several countries. Some content is EU-level and transfers directly; some needs local replacement.

Transfers directly	Needs local adaptation
The four pathways and the efficiency-first principle	National building regulations and energy requirements
How heat pumps, district heating and renewable heat work	National grant and funding schemes
Reading and judging metering data	Local district heating availability and network maturity
Project roles, interfaces and evidence	National safety and permit requirements for site access
The screening and decision methods	Typical construction types and climate
The EU policy framework and EPBD	National targets, plans and terminology

Where to start

1. Review Module 6 first. Compliance and safety content is the most nationally specific in the programme.
2. Check the examples in Modules 1 to 4. Where a building type or climate is unfamiliar to your learners, substitute a local equivalent.
3. Replace the policy references in Module 1 with your national targets and regulations alongside the EU framework.
4. Identify local case studies. One recognisable local project is worth several international ones.

You are permitted to adapt these

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