

## Certification Criteria

---

# EINSTEIN II ADVANCED TRAINING IN THERMAL ENERGY AUDITING

---

October 2012

Deliverable 2.4

IEE/09/702/S12.558239

EINSTEIN II

**EXPERT SYSTEM FOR AN INTELLIGENT SUPPLY OF THERMAL ENERGY IN  
INDUSTRY AND OTHER LARGE SCALE APPLICATIONS**

### Report Prepared by:

Eileen O'Leary  
Clean Technology Centre, Cork Institute of Technology  
53 Melbourn Road, Bishopstown, Cork, Ireland  
Ph: + 353 21 4344864 [www-ctc-cork.ie](http://www-ctc-cork.ie)

## Table of Contents

<b>1</b>	<b>Introduction.....</b>	<b>3</b>
<b>2</b>	<b>Certification Process.....</b>	<b>3</b>
2.1	Format of the Project Work.....	4
2.2	Tutorial Assistance.....	4
2.3	Certifiers.....	4
2.4	Certification Criteria .....	5
<b>2</b>	<b>Future Certification .....</b>	<b>5</b>
<b>Appendix 1</b>	<b>Training Course Content.....</b>	<b>6</b>
<b>Appendix 2</b>	<b>Certification Criteria .....</b>	<b>8</b>
<b>Appendix 3</b>	<b>Certificate .....</b>	<b>12</b>

## 1 Introduction

As part of the Intelligent Energy Europe funded project, EINSTEIN II, a series of training courses in thermal energy auditing was undertaken in 2011 and 2012.

Introductory four-day courses were held in 10 countries in the Spring of 2011, while two day advanced courses were carried out in the 10 countries during the Autumn of 2011. In addition, 4 introductory courses were held in 3 countries during 2012. The content for the introductory and advanced training courses are listed in Appendix 1, while the course material used is available for downloading on [www.einstein-energy.net/training-activities/training-materials](http://www.einstein-energy.net/training-activities/training-materials).

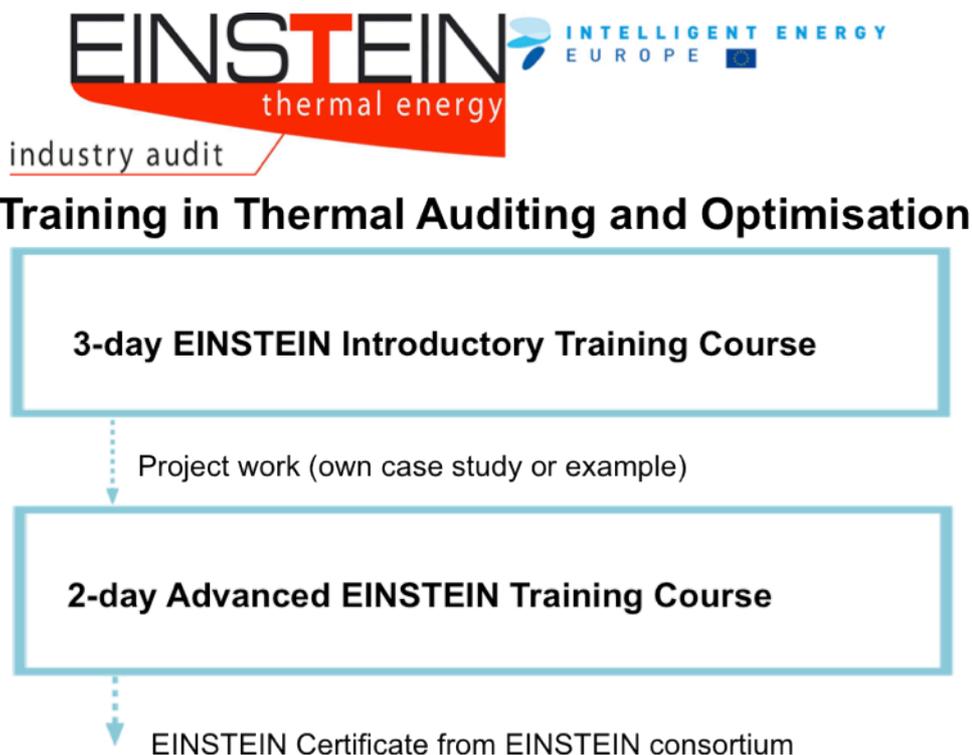
As part of the training courses, an option for certification has been provided to trainees. This document summarises the process and criteria used for certification.

## 2 Certification Process

In order to obtain certification as an EINSTEIN energy auditor, trainees must have:

- Attended the EINSTEIN introductory and advanced training courses (see content in Appendix 1), and,
- Successfully completed a project work.

Trainees' project works are evaluated against a set of criteria and, if successful, certified by one of the EINSTEIN II project consortium as EINSTEIN energy auditors. The following figure illustrates the process.



## 2.1 Format of the Project Work

The project work involves taking a case study and using the EINSTEIN methodology and software tool to model the existing process and design one or more alternative energy saving measures.

For the purposes of a project work, trainees can do one of the following:

- Use their own case study, for example from previous work carried out or using their own company or a client company. The case study should be checked by the tutor with respect to appropriateness (see Criterium 0: complexity of the case being analysed in the evaluation criteria: Annex 1).
- Use one of two fictitious cases: an industrial and a non-industrial case. The trainee could choose depending on their preference and area of expertise. The purpose of making these examples available was to account for trainees who would not have access to an actual example that they could use.

## 2.2 Tutorial Assistance

Assistance should be available to the trainees to deal with any queries they might have in developing their project work. This should be available both between the introductory and advanced training courses, as well as after the advanced courses, primarily in the form of e-mail contact.

## 2.3 Certifiers

Under the EINSTEIN II project, a technical team was trained in preparation for delivery of the training courses. This was done as part of a series of team building workshops, as well as additional in-house training within the participating partner organisations. The following are the members of the technical team:

<i>Persons</i>	<i>Organisation</i>	<i>Contact details</i>
Claudia Vannoni Hans Schweiger Cristina Ricart	EnergyXperts	EnergyXperts, Gerichtstr. 12-13, Aufg.2, 13347 Berlin, Germany <a href="mailto:hans.schweiger@energyxperts.net">hans.schweiger@energyxperts.net</a> phone: +49 (0) 30 4606 44 00
Christoph Brunner Bettina Muster-Slawitsch Jürgen Fluch Matthäus Hubmann	AEE INTEC	AEE - Institut für Nachhaltige Technologien, A-8200 Gleisdorf, Feldgasse 19, Austria <a href="mailto:c.brunner@aee.at">c.brunner@aee.at</a> phone: +43 (0)3112 5886-470
Alex Bertrand	CRP HENRI TUDOR	CRP HENRI TUDOR, 29, avenue John F. Kennedy, L-1855 Luxembourg-Kirchberg, Grand-Duchy of Luxembourg <a href="mailto:alexandre.bertrand@tudor.lu">alexandre.bertrand@tudor.lu</a> phone: 00352 42 59 91 6607
Eileen O'Leary	CIT	Clean Technology Centre, Cork Institute of Technology, Melbourn Building, 53 Melbourn

		Rd. Bishopstown, Cork, Ireland <a href="mailto:eileen.oleary@ctc-cork.ie">eileen.oleary@ctc-cork.ie</a> phone: 00353 21 4344864
--	--	--

It has been agreed by the consortium that these persons can carry out certification on behalf of the consortium.

## 2.4 Certification Criteria

The certification criteria have been developed by the EINSTEIN II project consortium. The criteria are in the format of an excel spreadsheet, a copy of which is attached in Appendix 2.

The certificate awarded to those trainees that meet the criteria is attached in Appendix 3. Successfully certified trainees can have their details published on: [www.einstein-energy.net/training-activities/auditorscertification](http://www.einstein-energy.net/training-activities/auditorscertification)

## 2 Future Certification

It has been agreed by the consortium that future EINSTEIN certification can continue to be carried out by the EINSTEIN II technical team members. This certification will be carried out in accordance with the procedure and criteria set out in this document.

## Appendix 1 Training Course Content

### EINSTEIN Introductory Training Course Content – 3 days

#### Day 1

Why EINSTEIN? Introduction and background to the EINSTEIN thermal auditing software tool
The EINSTEIN Tool - an overview of the software tool architecture, calculation modules, and main features <ul style="list-style-type: none"> <li>• Demonstration of the EINSTEIN software tool</li> </ul>
How to perform an EINSTEIN energy audit - general steps of the methodology
Energy Fundamentals and EINSTEIN's concepts - basic definitions and concepts used in EINSTEIN. <ul style="list-style-type: none"> <li>• Demonstration with the EINSTEIN software tool</li> </ul>
First steps with EINSTEIN - Key data to obtain; how to input data; consistency checking and the energy balance <ul style="list-style-type: none"> <li>• Demonstration with the EINSTEIN software tool</li> </ul>

#### Day 2

Practical example carried out by trainees on data entry and analysis of the resulting energy balances with EINSTEIN
Process optimisation and heat recovery in EINSTEIN – background and methodology, potential for heat recovery, design of a heat exchanger network <ul style="list-style-type: none"> <li>• Demonstration with the EINSTEIN software tool</li> </ul>
Heat and cold supply systems in EINSTEIN - background and methodology, manual and assisted design of alternative systems, energy performance simulation <ul style="list-style-type: none"> <li>• Demonstration with the EINSTEIN software tool</li> </ul>
Cost assessment in EINSTEIN - key economic parameters <ul style="list-style-type: none"> <li>• Demonstration with the EINSTEIN software tool</li> </ul>
Alternatives comparison in EINSTEIN and report preparation <ul style="list-style-type: none"> <li>• Demonstration with the EINSTEIN software tool</li> </ul>

#### Day 3

EINSTEIN recap
Practical example covering all elements of EINSTEIN <ul style="list-style-type: none"> <li>• Case study carried out by the trainees</li> </ul>
Presentation of results by trainees and evaluation/discussion
Fast assessment with EINSTEIN
Outlooks for future development
Feedback round

## **EINSTEIN Advanced Training Course – 2 days**

### *Day 1*

New features in tool
Process modelling and tricky things: <ul style="list-style-type: none"><li>- Open and closed pipes</li><li>- Black-box modelling</li><li>- Drying processes</li><li>- Thermal post-combustion</li><li>- Distillation processes</li><li>- Supply medium temperature</li><li>- Gradual increase in temperature</li></ul>
Cooling and heat pumps
Questions and problems faced with project works

### *Day 2*

Buildings: theory, tips and tricks for modelling in EINSTEIN
Guided case study building
Economic analysis: theory and tricks for using TCA module
Feedback round

## Appendix 2 Certification Criteria

Page 1 of 4

<b>Name of the trainee</b>			
<b>Training course (city, country)</b>			
<b>Name of the evaluator</b>			
<b>Overall objectives of trainee project work:</b>			
For the trainee to gain experience and familiarity with the EINSTEIN tool.			
For the trainee to show, using either one of the dummy examples or a project case of their own, that they can use the EINSTEIN tool, i.e. that they can enter the data on the example/project successfully, model the process appropriately, successfully resolve any conflicts in the consistency check, make and justify appropriate assumptions, either by themselves or via the consistency check, identify the most thermally relevant processes (if appropriate), and either automatically or manually design one or more alternatives.			
Where more than one alternative has been designed, the trainee shows that they can evaluate the alternatives and decide the most appropriate option.			
<b>General remarks evaluator</b>			
<b>All individual criteria above threshold ?</b>			FALSE
<b>Weighted average above threshold ?</b>			FALSE
<b>All formal criteria fulfilled ?</b>			FALSE
<b>GLOBAL EVALUATION: PROJECT WORK APPROVED ?</b>			FALSE
<b>Place, date</b>			
<b>Signature evaluator</b>			
<b>Formal criteria</b>			<b>yes/no</b>
F1	EINSTEIN xml - project delivered and working on V2.0 or later ?		
F2	Customised EINSTEIN full audit report, or equivalent, delivered ?		
F3	Audit report summary delivered ?		
F4	Assisted to the introductory course ? (or alternatively (a) to a EINSTEIN-I training course or (b) showed by a quality of the project work above average (threshold = 4) that she/he is familiar with the EINSTEIN methodology)		
F5	Assisted to the advanced training course ?		
<b>All formal criteria fulfilled ?</b>			FALSE

Aspect	Evaluators comments	Rating (give a mark between 1 and 5 *)	Threshold	Weight	rating x weight
			minimum to be achieved		
0 <i>Complexity of the case being analysed</i> The case studied is sufficiently complex in order to allow for an assessment of the following evaluation criteria.  As a general rule the following criteria should be used. Exceptions are possible if sufficiently justified (the evaluator should justify why).  Industrial studies should include at least 3 qualitatively different types of processes.  Building analysis should include several building zones with different heating / cooling demand profiles and/or either air handling units or additional processes (except building heating and cooling and sanitary hot water) being modeled.			3	Go/no-go condition	-
1 <i>Present state modelling: qualitative aspects (correct use of concepts: circulation/start-up/maintenance; batch/continuous processes; open/closed pipes)</i>  Trainee has successfully modelled the example/project (present state). The assumptions / simplifications for modelling are appropriate and are sufficiently described within the project report.			3	1	0
2 <i>Present state modelling: quantitative aspects</i> Trainee has successfully resolved any conflicts or missing data arising in the consistency check (standard level of analysis): delivered XML is free of conflicts or missing data.  Trainee has suitably explained and justified any assumptions (estimates) made by the trainee and/or generated automatically by the EINSTEIN consistency check.  Data are plausible. If values are "strange" with respect to common sense engineering knowledge (e.g. boiler efficiencies of 0,3, part load ratios of 0,01 etc.) those should be sufficiently explained.			2	1	0
<b>Notes</b> * 5: excellent; 4: good; 3: sufficient; 2: bad; 1: very bad					

Aspect	Evaluators comments	Rating (give a mark between 1 and 5 *)	Threshold	Weight	rating x weight
			minimum to be achieved		
<p>3 <i>Generation and quality of alternatives</i></p> <p>Trainee has designed a set of credible alternatives (minimum 2) using the EINSTEIN tool that mandatorily have to include the following options (wherever technically feasible, otherwise it has been justified why application is not possible):</p> <ul style="list-style-type: none"> <li>- discussion (at least qualitatively) of process optimisation potential</li> <li>- (optimisation of) heat recovery</li> <li>- cogeneration</li> </ul> <p>(or alternatively any other technology that offers a comparable or higher primary energy saving potential in the specific case)</p> <p>The exception to the above would be where a trainee has set out his/her project to evaluate specific option(s) for a process or company, and in the opinion of the evaluator, this is deemed acceptable. In this case the trainee should have demonstrated sufficiently by some other means that he/she is able to carry out a global analysis beyond the specific partial savings options.</p> <p>The description of the alternatives is sufficient (main technical data specified)</p> <p>Results are complete and reasonable (incl. economic parameters)</p>			3	2	0
<p>4 <i>Selection of best alternative:</i></p> <p>Trainee has provided a suitable description and evaluation or commentary on the finally selected alternative</p> <p>The trainee shows that he/she can evaluate the alternatives and decide the most appropriate option, based on an appropriate analysis of the environmental and economic parameters. The trainee explains explicitly his/her criteria for optimisation in order to choose a compromise between economic and environmental performance (e.g. company expectations on pay-back, IRR, ...)</p> <p>Trainee identifies the constraints/conditions for the validity of the proposed alternative and proposes what additional work would be needed to further develop the proposal.</p>			2	1	0
<p><b>Notes</b></p> <p>* 5: excellent; 4: good; 3: sufficient; 2: bad; 1: very bad</p>					

Aspect	Evaluators comments	Rating (give a mark between 1 and 5 *)	Threshold	Weight	rating x weight
			minimum to be achieved		
5 Originality of work: The alternative proposal selected as the one to be proposed to the company has been customised by the trainee (not just one of the auto-pilot / auto-design results).  If auto-design results are identical to the final solution adopted, it has been justified reasonably why this solution is optimum and no manual improvement / adjustment is possible / necessary			3	2	0
6 <i>Capacity of synthesis (summary report and EINSTEIN report)</i> Trainee is able to synthesize the most relevant data of present state energy consumption in the summary report: Trainee has identified the most thermally relevant processes (if more than 1 process); and suitably illustrated relevant energy demand (by equipment, process, etc.). Trainee is able to highlight and summarize the advantages / disadvantages of the possible options and to describe synthetically the finally adopted solution			2	1	0
<b>Total</b>		<b>0</b>		<b>8</b>	
<b>Weighted average</b>		<b>0</b>	<b>3</b>		

**Notes**

\* 5: excellent; 4: good; 3: sufficient; 2: bad; 1: very bad

## Appendix 3 Certificate



### Certification

This is to certify that

\_\_\_\_\_

is an EINSTEIN  
thermal energy auditor

The above named auditor has successfully completed training on the EINSTEIN Thermal Energy Audit Methodology and on the use of the EINSTEIN software tool and can now perform EINSTEIN thermal energy audits.

All required criteria have been fulfilled, namely successful completion of a project work to the satisfaction of the assessor, and attendance at the introductory and advanced EINSTEIN training courses.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Assessor name: \_\_\_\_\_

Organisation name: \_\_\_\_\_

Address: \_\_\_\_\_

The EINSTEIN methodology, tool, and training programme were developed with the support of the Intelligent Energy Europe Programme.

See [www.einstein-energy.net](http://www.einstein-energy.net) for a list of certified auditors and assessor organisations.