



## 2. Education and Training

### Definition and objectives

Education and training for resource efficiency aims to build capacity on resource efficiency by education and training programmes. All approaches must ensure that the training participants are able to address environmental challenges from their own disciplinary perspective and their own level. More specifically, the design of education programmes and training courses should address the following objectives:

- └ Develop an understanding and problem solving capacities of a range of sustainability, environmental and resource efficiency concepts
- └ Encourage reflection on the effects of personal values and lifestyle choice; and
- └ Promote skills, concepts and methods for critical thinking and practical, effective action.

### Mode of operation

Education and training for resource efficiency is to be understood as a continuous task throughout the educational curriculum of people that ultimately induces life-long learning about opportunities for environmental protection and increases understanding of the economic benefits that can be achieved through resource efficiency measures. There exist different stages of education/training in which the issue of resource efficiency can be integrated:

Stage	Description
<b>Primary/ Secondary schooling</b>	Primary education plays a key role in shaping mindsets towards environmental protection and the efficient use of resources. During this phase individuals establish a value set that enables them to make informed choices in the future that can increase quality of life while protecting the environment and supporting resource efficiency. Basic techniques, including literacy and math, enable people to engage in continuous learning throughout their lives. Understanding basic ecological, scientific and social facts and relationships is a crucial prerequisite for acquiring further knowledge and capabilities for resource efficiency.
<b>Technical and Vocational</b>	The phase of technical and vocational education and training (TVET) plays a crucial role in providing knowledge, methods and tools to adolescents that help them to design and implement practical solutions on resource efficiency as they enter the world of work. <sup>1</sup> Through awareness raising on needs and challenges of resource efficiency among future professionals and providing students with latest techniques and tools to implement efficiency measures they become well equipped to develop solution oriented and pro-active resource efficiency activities.
<b>Higher Education</b>	Universities prepare future decision-makers of society for their entry into the labour market. Such preparation includes training of future teachers, who play an important role in providing education at both primary and secondary levels. Including the topic of resource efficiency in higher education is also relevant for students in engineering, management, economics and public administration amongst others.
<b>Life-long / on the job</b>	Education and training for resource efficiency are continuous processes that can be offered to employees and society at large at every stage of job career or life. For example, training measures can be applied to employees, so as to raise awareness at the workplace about resource efficiency potentials and solutions. Such an awareness raising on environmental issues and resource efficiency might further result in changes of personal consumption habits and life-style towards sustainability.

Table 1: Resource efficiency throughout the different stages of education and training

<sup>1</sup> [http://portal.unesco.org/education/en/ev.php-URL\\_ID=34374&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/education/en/ev.php-URL_ID=34374&URL_DO=DO_TOPIC&URL_SECTION=201.html)

There does not exist one single prescriptive model of how the concept of resource efficiency can be integrated into education and training. A number of mechanisms can be applied for the delivery of education and training. Basically, three main strategies can be followed to include the topic of resource efficiency into educational curricula: Specialisation, integration or mainstreaming. Which strategy to choose and how to combine strategies depends on the nature and capabilities of the educational system as well as on the desired overall objective to be achieved.

	Specialisation	Integration	Mainstreaming
Key Features	Creation of special careers devoted to resource efficiency and related topics	Integration of resource efficiency courses into standard curricula	Mainstreaming of resource efficiency into all activities covered by different curricula
Scope	Small - reaches only a fraction of people	Middle - depending if courses are obligatory or optional	High - reaches all students involved in the curriculum concerned
Benefits	Generates experts with in-depth knowledge and capabilities on resource efficiency	Generates experts with a 'traditional' disciplinary background	Resource efficiency gets linked to career's core issues, strong linkage to 'standard' curricula

Table 2: Comparison of different ways of integrating resource efficiency into education and training

The development of successful education and training measures for resource efficiency is a continuous process. The steps below present a development cycle:

Step	Issues to consider
<b>Initial check</b>	<ul style="list-style-type: none"> <li>■ The current status of the integration of resource efficiency in education and training activities, considering different thematic and disciplinary dimensions as well as the different options for providing education and training throughout educational careers.</li> <li>■ Knowledge and skills required to better integrate resource efficiency into education and training.</li> <li>■ Consulting main stakeholders (e.g. NGOs and companies) on their needs, perspectives and experiences.</li> <li>■ Analysis and identification of specific knowledge needs for resource efficiency that take into account the current and expected market demand for such specific knowledge.</li> <li>■ Physical, human and organisational resources to improve resource efficiency education and training (e.g. teaching material, teacher's preparedness, public and private funds, training facilities).</li> </ul>
<b>Plan activities</b>	<ul style="list-style-type: none"> <li>■ Prioritisation of issues and phases of curricula (also by consulting stakeholders) where resource efficiency topics are most valuably integrated.</li> <li>■ Set clear objectives for resource efficiency education, research and training activities.</li> <li>■ Options to implement objectives, allocate resources and responsibilities</li> <li>■ Partnerships to make efforts more effective.</li> </ul>
<b>Implement activities</b>	<ul style="list-style-type: none"> <li>■ When implementing agreed measures, people involved in implementation should be made aware of the objectives and justifications to create a common understanding of and motivation for resource efficiency. A common understanding of the objectives and concrete implementation activities is of high importance for successfully and coherently achieving progress to meet the set targets</li> <li>■ Measures to improve marketing and sales capabilities of educated and trained personnel should be included in educational and training activities. The aim is to provide 'add-on' knowledge on how to best offer and sell specific knowledge in the market after receiving the training / education.</li> </ul>
<b>Monitor and evaluate</b>	<ul style="list-style-type: none"> <li>■ Monitoring whether educational objectives are achieved can help to identify corrective actions.</li> <li>■ Best practice cases and key experiences can inspire further efforts for education and training.</li> </ul>

Table 3: Steps and issues to be considered regarding education and training for resource efficiency

## Strengths & weaknesses

Strengths	Weaknesses
<p><b>Long-term effectiveness</b> Education and training are an effective means of creating the capacities to foster long-term efforts of implementing resource-efficient systems of production and consumption.</p> <p><b>Innovation creation</b> Knowledge on implementation methods and tools for resource efficiency promote innovative production and management processes.</p> <p><b>Spill-over effects</b> Knowledge and skills created to foster resource efficiency can be useful in other areas, e.g. implementation skills, life-cycle thinking and project management.</p> <p><b>Reduce dependency on external skills</b> Building capacities in developing countries can help to achieve resource efficiency improvements autonomously, reducing expenditures for foreign knowledge and skills.</p>	<p><b>Need to qualify teachers and training providers</b> Teachers and trainers need to have profound knowledge on resource efficiency before education and training measures can be implemented.</p> <p><b>Weak educational systems</b> Introducing a relatively new topic such as resource efficiency can be challenging in countries that have a weak educational system, e.g. lacking proper vocational training.</p> <p><b>Available level of education and training</b> Missing basic skills (especially literacy) can make education and training ineffective.</p> <p><b>Incentive to participate</b> The incentive to participate in training and education for resource efficiency depends on the acceptance in the labour market and priorities set by employers.</p> <p><b>Public budget restraints</b> Education and training priorities often depend on the availability of public budgets, if this is very low, getting commitment for funding resource efficiency education and training might be difficult.</p>

Table 4: Strengths and weaknesses of education and training for resource efficiency

Integrating the topic of resource efficiency into educational curricula and vocational training careers can add additional costs to general education expenditures by governments. However, there exist a variety of options for cost sharing and mixed modes of financing. For example, government can engage the business sector to provide vocational and on-the-job learning. Furthermore, governments can obtain development cooperation support for integrating resource efficiency issues into education and vocational training. Setting specific objectives and adequate planning can help to control costs. The following table provides a generic overview on costs that can occur in the course of integrating resource efficiency in education and training:

Category	Description	Faced by
<b>Initial check</b>	Costs for background studies and stakeholder engagement to define educational agenda	Governments / Training Providers
<b>Activity planning</b>	Costs for setting up education and training programmes	Governments/ Training providers
<b>Implementation of activities</b>	Costs for human resources, premises, etc. to undertake trainings Costs for attending the training (materials, transport, lost work time)	Participants
<b>Monitoring and evaluation</b>	Costs for evaluating education and training results	Governments / Training Providers

Table 5: Costs associated with education and training

## Success factors

The following success factors contribute toward increasing the effectiveness of resource efficiency education and vocational training activities:

Success factor	Explanations
<b>Early involvement</b>	A preferred approach is that all students participate in an environmental and sustainability oriented unit early in the curriculum. This will carry the mindset through the rest of the course. It is important for students to understand whether and how their discipline interacts with the environment and sustainability.
<b>Flexibility</b>	Designing training and education with lifelong learning in mind can enable participants to find answers to the multitude of challenges they will encounter when implementing resource efficiency in practice.
<b>Customisation</b>	One-fits-all solutions may not suffice; hence, training contents should be customised and adapted to the challenges at hand, the participants' backgrounds, and the specific training situation. Special attention should be paid to cultural, social and economic characteristics of training participants.
<b>Interdisciplinary</b>	Resource efficiency is not only a technical problem, but needs to be addressed by involving a multitude of disciplines and applying various approaches. Training programmes should seek a co-evolution between technological and social knowledge, dealing also with issues like behavioural change and attitudes.
<b>Embeddedness</b>	Existing and already accepted educational institutions might be utilised rather than creating new ones. Partnerships between resource efficiency training providers and traditional institutions provide a form of integrating new topics into classical curricula and can increase the overall scope of resource efficiency training programmes.
<b>Student-centred and implementation oriented learning</b>	Student-centred learning involves resource-based teaching, enquiry and discovery learning, values clarification and analysis, problem-based learning, simulation games and role-play, and learning through community problem solving (UNESCP 2002).
<b>Address trade-offs</b>	Training and education should not be narrow-minded or offer 'easy fixes', but should show the multitude of challenges and barriers existing in real life situations and how these might be addressed. Resource efficiency as a concept provides an opportunity to show how solutions can be found that are sensitive to environmental and economic imperatives.

Table 6: Success factors of education and training for resource efficiency

## Key Literature and Case Studies

**UNESCO (2002):** *Education for Sustainability: From Rio to Johannesburg: Lessons learnt from a decade of commitment.*

**Aspen Institute, World Resources Institute:** *Beyond Grey Pinstripes: Preparing MBAs for social and environmental stewardship.* [www.beyondgreypinstripes.org](http://www.beyondgreypinstripes.org)

Name	Link
United Nations Decade of Education for Sustainable Development website:	<a href="http://portal.unesco.org/education/en/">http://portal.unesco.org/education/en/</a>
UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production – Training on SCP and environmental management systems	<a href="http://www.scp-centre.org">http://www.scp-centre.org</a>
Cleaner Production (CP) Activities and Trainings	<a href="http://www.uneptie.org/PC/cp/home.htm">http://www.uneptie.org/PC/cp/home.htm</a>