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Greening TVET in Viet Nam

SUSTAINABLE DEVELOPMENT, GREEN ECONOMY
AND THE ROLE OF GREENING TVET



Implemented by
giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

GDVT



Imprint

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8B Valley, Ton That Thuyet Street, Cau Giay District
Hanoi, Viet Nam
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Programme Reform of TVET in Viet Nam (GIZ)

Design:

WARENFORM, Berlin

Place and year of publication

Ha Noi, Viet Nam, March 2016

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List of Abbreviations

ASEAN	Association of Southeast Asian Nations
BMUB	Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit [German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety]
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung [German Federal Ministry for Economic Cooperation and Development]
CEDEFOP	European Centre for the Development of Vocational Training
CNG	Compressed natural gas
GDVT	General Directorate of Vocational Training
GGAP	National Action Plan on Green Growth
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
HVCT	Ho Chi Minh Vocational College of Technology
ICMP	Integrated Coastal Management Programme/ISO
ILO	International Labour Organization
MoLISA	Ministry of Labour, Invalids and Social Affairs
NIVT	National Research Institute for Vocational Training
OECD	Organization for Economic Cooperation and Development
PV	Photovoltaic
SA	Social Accountability
SECO	Swiss State Secretariat for Economic Affairs
SME	Small and medium-sized enterprise
TVET	Technical and Vocational Education and Training
UN	United Nations
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESO-UNEVOC	International Centre for Technical and Vocational Education and Training
UNIDO	United Nations Industrial Development Organization
VGBC	Vietnam Green Building Council
VGGS	National Green Growth Strategy
VNCPC	Viet Nam National Cleaner Production Centre
WCED	United Nations World Commission on Environment and Development



Introduction

Since the United Nations Conference for the Environment and Development in Rio de Janeiro, Brazil, in 1992, sustainable development is accepted as the key guiding principle for global action. In this context, also Viet Nam is orienting its strategies and policies towards sustainable development.

Technical and vocational education and training (TVET) is the master key for sustainable development and one of the priority areas of Viet Nam's government to achieve the National Green Growth Strategy for the period 2011 to 2020 with vision to 2050 (VGGS) and the National Action Plan on Green Growth (GGAP) for the period 2014 to 2020. In the context of a greening economy and society, TVET shall not only provide workers with skills needed to be able to work well at the workplace. Additionally TVET shall promote knowledge and competences necessary to face current and future social, economic and ecological challenges and to contribute to a sustainable development of our country.

The parties cooperating to implement the Vietnamese-German "Programme Reform of TVET in Viet Nam", namely the General Directorate of Vocational Training (GDVT) of MoLISA and Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) are aware of the importance of sustainable development and TVET's key role for a greening economy. Thus, Greening TVET and particularly "integrating environmental knowledge and skills into existing curricula as well as the development of skills profiles for relevant environmental occupations" has been identified as a priority area for action in this programme.

This brochure was developed in cooperation between GIZ and the National Institute for Vocational Training (NIVT), which serves as the ground for further activities on Greening TVET in Viet Nam. The Greening TVET Brochure is the result of a close cooperation of an editorial team headed by Dr. Klaus-Dieter Mertineit and a research team of NIVT, namely Nguyen Quang Viet, Dang Thi Huyen, Michael Buechele and Mai Phuong Bang, Nguyen Thi Ngoc Dung, Pham Huynh Duc and others.

We sincerely hope that this publication will provide insights into the concept, good practices, practical examples and the implementation of Greening TVET in an international context in general and in Viet Nam in particular as well as information useful for policy makers to generate suitable concepts and procedure for greening TVET and thus improving the quality of TVET.

In the first part, the focus is on Viet Nam's commitment to sustainable development and selected economic sectors relevant for greening as well as the role TVET has to play in order to contribute to this transformation process. This may be interesting particularly for members of ministries, authorities, chamber organisations and trade associations. TVET experts and practitioners on the other hand may be more interested in concepts on how to integrate green skills requirements into the TVET system and particularly in TVET institutions. These topics are covered in the second part of this publication.

During the compilation process, mistakes and defects might happen. Therefore, we sincerely appreciate the comments and feedback from readers to continuously improving this brochure.

The Editorial Committee

Viet Nam is orienting its strategies and policies towards sustainable development.

TVET is a master key to achieve the goals of the VGGS and the GGAP.

Greening TVET is a priority area for action in the Vietnamese-German "Programme Reform of TVET".

The brochure was developed in cooperation between GIZ and NIVT.

The publication introduces the concept of Green TVET.

There are different focal topics in the two parts of the publication.

Feedback is appreciated.

PART I:

**SUSTAINABLE DEVELOPMENT,
GREEN ECONOMY AND THE IMPORTANCE OF
GREENING TVET**

1 Viet Nam – Committed to Sustainable Development

The Vietnamese economy has developed fast over the past two decades. According to the classification of the World Bank, Viet Nam has now reached the status of a “lower middle income country”. This development was largely initiated by liberalization effects and foreign direct investment as a result of the national reform and modernization process (“Doi Moi”) which started in 1986 and the regional and global integration of the country.

The Vietnamese economy has developed fast.

In the context of strong economic growth, increasing industrialisation and a rising power consumption, the increase of electricity demand is nearly double the economic growth rate. By 2020, electricity demand is expected to double, compared with 2012; by 2030 this could be a five-fold increase if the high economic growth rates continue. Because of low efficiency, production is highly resource-intensive. At the same time, Viet Nam is one of the countries most affected by climate change. Rise of sea level and extreme meteorological phenomena are posing threats to the highly populated coastal and river delta regions as well as northern mountainous areas of the country.

In Viet Nam natural resources are used extensively, and the country is strongly affected by climate change.

In order to address these challenges, Viet Nam issued the National Green Growth Strategy for the period 2011 to 2020 and vision to 2050 (VGGS), operationalised for all ministries and other stakeholders by a comprehensive action plan.

In order to address environmental challenges, the VGGS has been issued.

The VGGS is driven by several national policies and Viet Nam’s awareness of, and contributions to international efforts to respond to climate change. The Viet Nam National Climate Change Strategy, approved in December 2011, provides a strong foundation for formulating long-term socio-economic development plans. Along with the VGGS, the Government acknowledges the need to address environmental and socio-economic challenges mainly by focusing on changing the growth model towards a more sustainable one. Green growth is seen as an appropriate development path, which is compatible with the adjustment needs of the Vietnamese growth and economic model. The VGGS addresses the process of economic restructuring towards more sustainable usage of natural resources and with it, the reduction of greenhouse gas (GHG) emissions. Furthermore, it aims at socio-economic improvements for the people of Viet Nam.

The VGGS considers a low carbon economy and green growth as principles in achieving sustainable development.

The three strategic tasks of the VGGS focus on:¹

- reducing the intensity of greenhouse gas emissions and promote the use of clean and renewable energies;
- greening production;
- greening lifestyle and promoting sustainable consumption.

The three strategic tasks of the VGGS focus on reducing emissions, greening production and greening lifestyle.

These tasks are accompanied by a catalogue of 17 “solutions” and respective activities. With the VGGS as guiding background, all stakeholders are requested to develop sector specific action plans for addressing sustainable development until 2015.

¹ See Nguyen Chi Quoc 2012, p. 2f.

The aims of the VGGs are operationalised in the GGAP.

Efficient use of energy and renewable energy are priority topics in the GGAP.

Based on the VGGs, the National Action Plan on Green Growth (GGAP) for the period 2014 – 2020 has been developed and discussed with various stakeholders in several consultation meetings in 2013. The GGAP, finally approved in March 2014, contains²

- 4 main themes;³
- 12 groups of activities and
- 66 specific activities.

The Government is committed to give priorities and allocate sufficient budget “especially to improve efficient use of energy and to develop renewable energy.”⁴ As a consequence, efficient use of energy and renewable energy can be seen as the priority topics in the GGAP.

² See GGAP 2014

³ These themes are 1. Setting up institutions and formulating green growth action plans at the local level; 2. Reducing the intensity of GHG emissions and promoting the use of clean and renewable sources of energy; 3. Greening production; 4. Greening lifestyle and promoting sustainable consumption.

⁴ Ibid, p. 3

2 Greening Viet Nam's economy

2.1 Characteristics of a green economy

Green growth and green economy

If the global economy continues following the current development path, it is very much likely that the increasing consumption of resources will destroy the ecosystems of our planet. On the other hand, economic growth is necessary to meet the needs of a growing population.

In order to find a way out of this dilemma, the concept of green growth is intensely addressed all over the world. It came up in the run-up to the 3rd United Nations Conference on Sustainable Development held in Rio de Janeiro, Brazil, from 13 to 22 June 2012. The concept is embedded in the overall concept of sustainable development and aims at stimulating economic growth by acknowledging ecological limits as well as anticipating economic shortages and costs.

Within the overall concept of sustainable development, the concept of a green economy was established on a global level as the new environmental guiding principle. It refers to an economy that is oriented towards ecological sustainability, economic profitability and social inclusion. Green economy is characterised as an innovative economic approach, which meets the following requirements:⁵

- avoidance of harmful substances and emissions into all environmental media (air, soil, water);
- further development of the circular economy, that means avoiding of waste, reusing and recycling of waste materials as well as closing of regional material circles as far as possible;
- absolute reduction of usage of non-renewable resources, particularly by means of efficient use of energy, raw materials and other natural resources;
- continuous substitution of non-renewable resources by sustainably produced renewable resources;
- long-term switch to an energy system based on renewable energies;
- conservation or restoration of biodiversity as well as eco-systems and their performances.

The transformation process from the conventional economic model towards a green economy has far-reaching economic effects, on the macro level as well as on the micro level. According to the United Nations Industrial Development Organization (UNIDO) the green economy approach consists of a two-pronged endeavour:⁶

1. *Greening of industries* – ensuring that all industries, regardless of sectors, size or locations, continuously improve their environmental performance through using resources more efficiently, phasing out toxic substances, substituting fossil fuels with renewable energy sources, improving occupational health and safety, taking on increased producer responsibility and reducing the overall risks.
2. *Creating green industries* – stimulating the development and creation of industries that provide environmental goods and services. This sector covers all types

A change of the growth model is needed.

The concept of green growth is embedded in the overall concept of sustainable development.

A green economy aims at ecological sustainability, economic profitability and social inclusion.

“Greening industries” means to improve environmental performance, whereas “green industries” provide environmental goods and services.

5 BMUB 2015, p. 5

6 UNIDO 2011, p. 16

of services and technologies aimed at contributing to reducing negative environmental impacts or addressing the consequences of various forms of pollution. This includes material recovery and recycling companies as well as companies that transport, manage and treat waste. Further examples are engineering companies that specialize in wastewater treatment, air pollution control and waste treatment equipment. The sector also encompasses environmental and energy consultants, as well as providers of integrated solutions, e.g. energy service companies that offer design and implementation or provide monitoring, measuring and analysis services of energy saving projects. Green industries also include companies which manufacture and install renewable energy equipment and that develop and produce clean technologies.

According to this, among others, the following economic segments belong to the green economy:

- water supply;
- waste water treatment;
- waste management;
- organic farming;
- sustainable forestry and aquaculture;
- eco-tourism;
- public transport;
- green construction;
- nature reserve management;
- manufacturing, installing, operating, maintaining and repairing renewable energy technologies.⁷

Additionally, there is a wide range of companies in research, trade, production and services that contribute to the green economy, but do not exclusively operate in the green economy, e.g. in food retailing, drive and control technology, automotive and power generation.

The green economic segment is closely linked with conventional segments.

BOX 1.1: GREEN AND GREENING

In this brochure the term “green” is used to highlight specific economic sectors which as a whole are highly relevant for nature reserve, environmental protection and climate protection such as renewable energy, sustainable forestry, green construction, organic agriculture, water supply, waste water treatment and waste management. Unlike this, the term “greening” is used if the focus is on the process of transforming economic sectors to become more sustainable and environmentally friendly. Improvement of environmental performance, reduction of emissions, avoiding of waste, energy and resource efficiency are some of the main topics of “greening”.

The transformation to a green economy - which also means a social transformation of lifestyles, habits and behaviour - is a big challenge, but also a big chance. Different countries face different challenges. However, in general, the following opportunities and risks are seen:

1. Investments in ecological change are able to stimulate the development of technologies and innovation.

The transformation to a green economy and society contains opportunities as well as risks.

⁷ Although renewable energies are defined as green, not all renewable energy applications are eco-friendly or socially acceptable. Hydro power coming from dams can destroy landscapes and eco-systems. Generating fuel from biomass can compete with food production and it can cause ecological damages like the farming of biomass plants (corn, palms etc.) in monocultures.

2. Optimizing energy and resource efficiency leads to significantly improved competitiveness of enterprises.
3. By introducing new (greener) production procedures as well as by producing environmentally friendly products, new jobs can be created.
4. Jobs of many existing workers (e.g. plumbers, electricians, metal workers and construction workers) will simply be redefined as their day-to-day skill sets, work methods and profiles are greened.
5. Some employment will be substituted – as in shifting from fossil fuels to renewable energies or from landfill and waste incineration to recycling.
6. Certain jobs in economic sectors that are less environmentally friendly may be eliminated without direct replacement.

On balance, United Nations Environmental Programme (UNEP) is convinced that the greening of economies has the potential to be a new engine of growth, a net generator of decent jobs and a vital strategy to eliminate persistent poverty. According to this, a transition to a green economy has the potential to benefit all: environment and climate, economy and employment markets and last but not least every citizen.

Green jobs

In general, jobs within the green economy are called green jobs. In more detail, jobs can be called green jobs if they match the following characteristics. Such jobs⁸

- reduce negative environmental impacts;
- contribute to environmental, economic and social sustainability of enterprises and economic sectors;
- meet the criteria for decent work – adequate wages, safe conditions, workers' rights, social dialogue and social protection.

Even if the jobs in the green economic segments mentioned above are called “green jobs” - this does not necessarily mean that all people working in these segments need specific green occupations or specific green skills. Most of the skills needed in a green economy can be found in already existing occupations.

2.2 Sectors relevant for greening in Viet Nam

In Viet Nam, tendencies in regard to greening can be seen in the following sectors and areas of the economy:

- cleaner production;
- renewable energy;
- agriculture, forestry and aquaculture;
- urbanisation;
- construction;
- eco-tourism and
- transportation.

Cleaner production

Considering environmental protection in industry by cleaner production approach is an important issue in the GGAP.⁹ Cleaner production is a preventive, company-specific environmental protection initiative. The concept was developed by UNEP and UNIDO and aims at reducing the environmental impact of the industry. Based on an analysis of the flow of materials and energy, options

Changes are seen to be higher than risks.

In general green jobs do not require special green occupations.

Production, agriculture, urbanisation, construction, tourism, and transportation are relevant for greening in Viet Nam

Cleaner production aims at reducing the negative environmental impacts of the industry.

8 See ILO/CEDEFOP 2011, p. 4

9 See GGAP, activities 43 and 52.

to minimize waste and emissions out of industrial processes through source reduction strategies are identified. Improvements of organisation and technology help to reduce and to optimise the use of materials and energy. They also help to avoid waste, waste water generation and gaseous emissions as well as waste heat and noise.¹⁰

The Viet Nam National Cleaner Production Centre delivers cleaner production services in Viet Nam.

Supported by UNIDO and the Swiss State Secretariat for Economic Affairs (SECO) and in cooperation with UNEP, the Viet Nam National Cleaner Production Centre (VNCPC) was established in 1998. It is part of the Hanoi University of Technology. The mission of the VNCPC is to disseminate cleaner production concepts and promote its application in industrial activities in order to improve the competitive position of the industry in Viet Nam in the context of global economic integration. Besides cleaner production assessments, the centre delivers new cleaner production related services in the field of energy efficiency, quality and productivity, total productive maintenance, ISO 14001 (Environmental Management Systems), Occupational Health & Safety and Corporate Social Responsibility or SA 8000 (accountability standard). Based on estimations of potential savings through resource efficiency, the centre also delivers assessments on environmentally sound technologies.

ILLUSTRATION 1.1: VNCPC'S WEBSITE



Screenshot of VNCPC's homepage (<http://vncpc.org/en/>)

¹⁰ See Cleaner Production

Renewable energy

Regarding the energy sector, the following goals are stated in the VGGS:

- diversifying energy sources and limiting the dependence on imports;
- securing reliable power supply all over the country;
- promoting renewable energies and
- reducing the emission intensity of the energy industry.

For that purpose local sources as well as new renewable energy sources shall be increasingly used, the grid connection to neighbouring countries as well as efficiency and quality of the power grid shall be improved and finally the power grid shall be gradually developed towards “smart grid”. As a result, a significant reduction of GHG-emissions, an eco-friendly energy production as well as an improvement of living conditions shall be achieved.

Renewable energy sources currently utilized and available in Viet Nam include hydropower, wind energy, biomass, biogas, biofuels, energy from domestic waste, solar energy and geothermal energy. With investment from the government and support from foreign countries and organizations, Viet Nam has studied and implemented many projects in the field of renewable energy with a special focus on solar and wind energy. The wind energy project in Binh Thuan, for example, was implemented by Viet Nam Renewable Energy Joint Stock Company between 2008 and 2011. In the first stage the capacity of power supply has been 30 MW.

VGGS's goals for the energy sector focus on diversification of energy sources, reliable power supply, renewable energies and reduction of emissions.

A wide range of renewable energy sources is available in Viet Nam.

ILLUSTRATION 1.2: WIND POWER PLANTS IN BINH THUAN



Photo: Phan Thanh Tung, GIZ Viet Nam

Sustainable agriculture, forestry and aquaculture

Environmental protection in Viet Nam does not keep up with the progressive economic development of the country. Biodiversity of forest and maritime ecosystems are under pressure. Water resources and soil are endangered by pollution and erosion in rural areas. Example Mekong delta:¹¹ The Mekong delta, home to 17 million people and Viet Nam's most important agricultural region,

Ecosystems are facing existential threats.

¹¹ See GIZ 2014, p. 5

is facing existential threats. Climate change is leading to rising sea levels; some areas of the coast are currently eroding by 30 meters per year. The mangrove forests along the coast which protect the hinterland from floods and storms are in dramatic decline. Furthermore, increasing saltwater intrusion leads to saline soils which pose considerable challenges to rice production. Another threat for the Mekong Delta is a possible extreme weather event, especially storm floods.

The ICMP already shows positive impacts after a few years.

In 2011, the governments of Australia, Germany and Viet Nam jointly launched the Integrated Coastal Management Programme (ICMP) to make the coast of the Mekong Delta more resilient against the effects of climate change. The programme is following a cross-sectoral and vertical approach, spanning across six working areas: agriculture, aquaculture, coastal protection, forests, planning & budgeting and water management. In the first phase (2011 – 2014) the programme already achieved the following impacts:¹²

- On 99% of the coastline of Soc Trang and Bac Lieu, waves no longer directly affect the dyke.
- 603 hectares of mangrove forests have been rehabilitated.
- 22 livelihood models that reduce environmental pressure and increase incomes by up to 60% have been introduced in 8,500 households.
- Two policy packages on forest management and irrigation management have been produced and are expected to benefit 8.7 million people.

ILLUSTRATION 1.3: MANGROVE PLANTATION IN SOC TRANG



Photo: GIZ

The potential of energy-saving in buildings in Viet Nam is relatively high.

Sustainable Construction

Currently with the global energy consumption of 40%, buildings have become the “culprit” of climate change. According to Mr. Dinh Chinh Loi, an expert of the Ministry of Construction, the potential of energy-saving in buildings in Viet Nam is relatively high.¹³ As a consequence, green building is a solution for cutting down on energy consumption. Additionally, reduction of 30-50% of water, 35% of CO₂ as well as 50%-90% of wastes can be achieved by applying the green building concept.¹⁴ Green buildings are¹⁵ environmentally responsible,

¹² Ibid., p. 13

¹³ See VGBC (a)

¹⁴ In GGAP activities 54 to 58 are directly or indirectly linked to sustainable construction.

¹⁵ See VGBC (b)

resource-efficient throughout their life-cycle and are designed, constructed and operated to reduce the overall impact of the built environment on human health and the natural environment by:

- efficiently using energy, water, and other resources
- protecting occupant health and improving employee productivity
- reducing waste, pollution and environmental degradation

The Green One UN House in Hanoi¹⁶ is the first of 16 pilot projects around the world that gather multiple UN agencies in a single building to encourage collaboration. The project involved the demolition and refurbishment of all the existing building services, finishes and walls. New construction included two new entry buildings providing separate entrances for people, vehicles and goods, and a technical building housing mechanical and electrical equipment. Within the main building, additional workstation and office space to accommodating the growing needs of the co-located organisations have been provided by introduction of two double storey bridges on the East and West sides of the courtyard. The design acquired Gold level according to the LOTUS rating system administered by the Vietnam Green Building Council and became a capacity building project for green building design in Viet Nam.

The Green One UN House in Hanoi is an example for green building in Viet Nam

Key green features:

- good passive design
- efficient equipment to minimise energy consumption
- reduced waste during construction and operation
- recycling the building structure and materials
- green roofs

ILLUSTRATION 1.4: GREEN ONE UN HOUSE IN HANOI



Photo: UNDP in Viet Nam

¹⁶ See United Nations Viet Nam; Vietnam Green Building Database and Network

Efficient and effective use of energy and reducing GHG-emission in the transportation sector are required according to the GGAP.

In Dong Nai and industrial zones buses run with compressed natural gas.

Sustainable Transportation

Transport systems have significant impacts on the environment, accounting for between 20% and 25% of world energy consumption and CO₂-emissions. GHG-emissions from transport are increasing at a faster rate than any other energy using sector. Road transport is also a major contributor to local air pollution.¹⁷ In the GGAP implementing efficient and effective use of energy and reducing GHG-emission in the transportation sector plays an important role.¹⁸ Among others

- approved projects on environment pollution control in transportation, emission from cars and motorbikes shall be implemented;
- the application of new technology, usage of renewable energy and less GHG emitting fuels in transportation shall be enhanced;
- a set of management in fuel, emission standards and vehicles maintenance shall be implemented and
- investments shall be done in order to develop types of public transportation saving energy, using clean energy with low emission.

Viet Nam has been testing several green energy models and solutions such as biofuels usage (petrol / diesel mixed with ethanol and biodiesel) and gradually and partially replacing petroleum and developing a “clean fuel” industry. In 2009, Thanh Cong Group as one of the leading companies in the automotive industry in Viet Nam delivered the first 50 of 500 Daewoo buses run with CNG (compressed natural gas). These buses are used as worker shuttle buses in industrial zones and as public passenger transport buses in the Dong Nai province. Using CNG instead of fossil fuels helps to reduce environmental pollution and saves 40% of costs.

ILLUSTRATION 1.5: BUS RUNNING WITH COMPRESSED NATURAL GAS



Photo: CNG Viet Nam

17 See Sustainable transport

18 See GGAP, activities 17 to 19.

3 The contribution of TVET to the green(ing) economy

3.1 The role of TVET in achieving the goals of the VGGS

TVET can contribute to achieving the goals of the VGGS by developing a competent workforce capable to meet the requirements of the greening economy in Viet Nam.¹⁹ For TVET is a cross-cutting topic, involvement of TVET is not only relevant to a single group of activities but for implementing all three strategic tasks of the VGGS. Most of the tasks and activities (“solutions”) stated in the VGGS and in the GGAP have at least an implicit skills development component. In general TVET is concerned in three respects:²⁰

- In order to achieve the goals of the strategy, skills demands of the respective sectors have to be analysed, and green skills have to be trained either in an integrated way through additional modules or in specialized occupations.
- Vocational colleges (particularly the Centres of Excellence for TVET) can become role models for eco-friendliness and play an active role in awareness-raising campaigns (e.g. in communities and small and medium-sized enterprises - SMEs).
- If vocational colleges contribute to the implementation of the VGGS actively, the strategy will become an integrated part of school-life, greening activities of partner companies can be supported and the social acceptance of the VGGS will be promoted.

The objective of TVET is the development of a competent workforce capable to meet the requirements of the greening economy in Viet Nam.

3.2 The contribution of TVET to the greening economy

The importance of developing human resources for sustainable development through technical and vocational education and training is undisputed. Education in general and TVET in particular are ascribed a significant role in this transformation process towards sustainable development. It's the skilled workforce who deals with energy and resources at their workplaces efficiently and prevents environmental risks and damages - or not. It's also the skilled workforce who is needed in order to manufacture or apply environmentally friendly technologies properly. On the other hand, shortages in skilled labour could hinder the transition to a green economy.

Shortages in skilled labour could hinder the transition to a green economy.

Besides technical skills, better awareness and mindset change are needed. Transforming the economy and society in line with the concept of sustainable development is only possible if people embrace the inherent values and attitudes of this idea and if people possess the needed skills and are able to apply them in practice. This makes clear that integrating sustainability into the skills development sector cannot be reduced to individual vocational subjects or occupations. The challenge for TVET, then, is to re-orient and re-direct its curricula with respect to the conservation and sustainable use of resources, social equity and appropriate development and additionally with the competencies to implement sustainable practices at the workplaces.

One challenge for TVET is to re-direct its curricula.

¹⁹ TVET is explicitly mentioned in the VGGS (activity 15) as well as in the GGAP (activity 38).

²⁰ See Mertineit 2013, p. 14

TVET always has to meet new skills requirements resulting from technological and economic changes.

Green basic skills should be trained in every occupation and training course.

Additionally, special green technical skills are needed in some jobs.

Greening TVET benefits the society and industry as well as learners / workers and TVET institutions.

Both, requirements of green jobs as well as of a greening of jobs are the results of technological and economic changes in industry. Meeting these requirements in vocational education and training courses is not a new, but a common business for the skills development sector. New are the specific green skills requirements which come up in this context:

- Employees have to understand the environmental impact of their occupations / jobs.
- They have to know, how they can contribute to a clean environment and avoid environmental risks and damages at their workplaces (e.g. by handling hazardous substances correctly).
- They need the knowledge and skills to use energy and resources efficiently and how they can avoid waste, re-use or recycle materials.
- A change of mindset is needed. Central is the ability and willingness of the producer to take on the responsibility for the results of one's work – of course within the employment's limits which need to be respected.

Occupational work done professionally – this also means it is resource and cost-efficient, avoids waste and environmental risks and damages - is the basis for success in every occupation, not only in the so-called green sector. Therefore, cross-cutting topics, like applying the guiding principles of waste management, handling hazardous substances correctly, keeping water clean as well as working energy and resource efficient, are relevant for the whole workforce and should be trained in every occupation and training course.

Additionally, in some occupations / jobs / industries, complementary and in addition to already required skills, special technical skills are needed e.g. to install solar systems, to maintain wind turbines or to operate a wastewater treatment plant. Even these “green” skills are just special technical skills which in principle cannot be distinguished from conventional technical skills. The application is just different.

3.3 Benefits of greening TVET

Greening TVET which supports the transition towards a green economy and society creates benefits for

- society,
- industry,
- learners / workers and
- TVET institutions.

Benefits for society

- The cultural change which is necessary for a sustainable development is supported by a workforce equipped with adequate skills and attitudes.
- The living conditions in the country will improve due to the implementation of the National Green Growth Action Plan, particularly in regard to reduction of air and water pollution. This will be done by competent labour, which has been well trained in respect to applied technologies.
- On balance, in a greening economy, new jobs will be created. TVET will prepare people to be able to meet the skills requirements of these new jobs.

Benefits for industry

- The competitiveness of not only single industries, but the whole Vietnamese economy will be strengthened by a well trained workforce who is familiar with environmental requirements integrated in every job and is trained in relevant green specializations.
- The working conditions in the companies will be improved, because employees have learned in their vocational training how to behave correctly and how to avoid risks and damages in the workshops, on construction sites and at workplaces.

Benefits for learners / workers

- The integration of green skills in every training as well as the provision of specializations in regard to green technologies as add-ons to conventional training courses will improve the job opportunities of the graduates.
- Improvements of working conditions in workshops, on construction sites and at workplaces caused by correct occupational behaviour and knowledge about standards to be considered will reduce the risks of accidents and occupational diseases.
- If learners' and workers' commitment to greening activities are appreciated by their teachers / superiors the job satisfaction will be increased.

Benefits for TVET institutions

- Becoming role-models for eco-friendliness will improve the image of a TVET institution.
- Due to the fact that greening is a quality feature of TVET, vocational colleges will improve their TVET performance.

4 Challenges and recommendations

4.1 Challenges

Contributing to the implementation of the Green Growth Strategy

TVET has to support the implementation of the VGGs.

TVET is explicitly mentioned in the Green Growth Strategy as well as in the National Action Plan. TVET's contribution to achieve the goals of the VGGs and the GGAP is to develop a competent workforce capable to meet the requirements of a greening economy in Viet Nam. The Ministry of Labour, Invalids and Social Affairs (MoLISA) is named as the lead agency in this respect. Like all ministries and concerned agencies, MoLISA is requested to formulate its special projects / programmes which show how it will implement the GGAP's requirements in its scope of responsibility.

Defining a clear concept of greening TVET

The additional value of greening TVET has to be made clear.

For many stakeholders, greening is still a black box. Terms such as "green", "greening", "green economy", "green TVET", "sustainable development" are unknown. Greening is still not a mainstream topic in TVET. It is mainly perceived as a set of requirements which have to be considered in TVET additionally to other tasks. The chance that greening can be a driver to support the quality breakthrough in TVET is not seen.

Identifying green skills demands

Green skills demands have to be identified in cooperation with the economy.

Most activities mentioned in the VGGs as well as in the GGAP contain at least an implicit TVET component: Their implementation requires skilled workers, who are capable to handle environmental friendly technologies as well as energy and resource efficient procedures adequately. On the other hand, currently green skills requirements in the Vietnamese economy cannot be predicted in detail and the companies and their representatives do not explicitly require green skills from the graduates of TVET institutions.

Preparing teachers for green skills requirements

Teachers have to be trained in regard to green issues.

There is a lack of capable TVET teachers. This includes technical skills and knowledge, pedagogical components, workplace experiences and also relevant environmental knowledge. However, TVET teachers are required to teach and train green skills and to raise the environmental awareness of their students. Up to now, they are not prepared for these tasks and do not fully understand their mission.

Making TVET institutes to systematically take green skills requirements into consideration

TVET institutions should become role models for greening.

Vocational colleges and other TVET institutions are of vital importance for contributing to the VGGs, because they are the place, where the workforce is prepared to meet the skills requirements of a greening economy and society. They have the chance to reach many people and to train them to become ambassadors of the greening process and to use and pass on their green skills in business and private life. This cannot be achieved by piecemeal or ad hoc approach. A holistic framework is needed to transform TVET institutions in a comprehensive manner.

4.2 Recommendations

A national green skills development strategy should be developed.

A national green skills development strategy should be developed to expose TVET's potential. The green skills development strategy should be embedded in the TVET development strategy, but focus on green skills requirements and how they shall be considered in the TVET sector. The strategy should be underlined by a green skills development programme which shows short-, medium- and long-term targets as well as activities in order to achieve these goals, responsibilities, key performance indicators and funding.

A national green skills development strategy should expose TVET's potential.

All stakeholders should become familiar with the concept of greening TVET.

All TVET stakeholders have to understand the terms and concepts and the strategic relevance of greening TVET for a sustainable development of the country in general and for the implementation of acceptance of greening policies in particular. This should be done in terms of workshops (on national, regional and local level) and brochures as well as by using the internet. In this respect

All TVET stakeholders have to understand the terms and concepts and the strategic relevance of greening TVET.

- examples of good practice should be documented, collected and disseminated, which show how environmental issues can be considered i) in vocational education and training and ii) in an entire TVET institution;
- policy makers, administrators and managers have not only to be sensitized for the strategic relevance of greening TVET, but also to be trained to understand how to support and / or to use greening TVET for further developing or implementing greening policies.

Green skills requirements should be identified and considered adequately.

Research has to be conducted in order to identify green skills requirements - occupational specific as well as cross-occupational - in different economic sectors; this has to be done under consideration of national and international political, economic and technological development and trends. Emphasis should be put first on selected, most relevant occupations for greening, such as occupations in the construction and the supply sector as well as in industry and agriculture. Therefore skills relevant for greening should be identified and integrated in relevant curricula and examination tasks. In the context of integrating green issues into curricula, international experiences should be taken into account. Research should be done further on in order to study if there are requirements for green specializations in already existing occupations and /or new green occupations.

TVET research has to be done in order to identify green skills requirements.

TVET teachers should be prepared for green skills requirements.

Teachers are the key for a successful implementation of green skills requirements in TVET. Principles and practices of green TVET should be added to both pre-service and in-service TVET teacher training. In order to support TVET teachers and students, special training materials should be designed and introduced. Didactically prepared teaching and learning aids play an important role in encouraging the integration of environmental protection and sustainable development into vocational training and in how people behave at their workplace. These materials should be related to vocational fields and, in addition to

Principles and practices of green TVET should be added to both, pre-service and in-service TVET teacher training.

basic knowledge relevant to the job, should also offer special job-related knowledge about environmental protection respectively energy and resource efficiency and contain good examples.

TVET institutions should be prepared in order to support the transition to a green society and economy.

TVET institutions should become green too.

Because it is not sufficient just to train technical skills but to raise environmental awareness and to support a change of mindset – of both, the instructors and the students – TVET institutions should become green too. That means they should become role models for environmental friendliness as well as a source of inspiration, innovative and profound training providers and accepted strategic partners for a sustainable development of their regions.

Greening TVET institutions should develop a special profile and integrate green issues into their training courses.

Based on a profound technical and vocational education and training performance and embedded in the framework of the college's integrated management system greening TVET institutions should develop a special profile and integrate green issues into their training courses. They should live what they preach and try to reduce the carbon footprint of their campuses by means of green projects, formal and informal training, technical support etc. In this respect

- criteria for green TVET institutions should be developed, introduced and integrated into the Centre of Excellence concept;
- a campaign on “Greening TVET institutions” should be conducted supporting TVET colleges to become role models for sustainable attitudes and behaviour in partnership with the relevant TVET administration as well as industry;
- environmental officers in colleges could be introduced and trained;
- a support structure should be built-up, including guidelines, resources, technical advice, workshops, conferences and trainings, technical exchange as well as a collection of good practices and competitions etc.;
- a “greening TVET institutions” certificate could be developed, which meets the respective requirements. According to special standards, which have to be developed, three degrees of certificates could be distinguished like “beginner level”, “advanced level” and “expert level”;
- aspects of greening should be part of quality assessment of TVET colleges done by the General Directorate of Vocational Training (GDVT) or other assessment bodies.

PART II:

**GREENING TVET-CONCEPTS AND FIELDS OF
ACTION BY TVET INSTITUTIONS**

1 Concepts of greening TVET

1.1 Greening TVET on different system levels

TVET contributes to achieving both the goals of the VGGS and the GGAP.

TVET can contribute to sustainable development by providing adequate skills development, which meets the requirements of a greening economy and society. TVET shall enable learners both to apply green skills at their workplaces and to play an active role in greening their social, ecological and working environment. In this respect, TVET contributes to achieving the national and international targets of sustainable development and climate protection as stated in VGGS and the GGAP in the period 2013 – 2020.

Contributions of TVET to achieving the goals of the VGGS have to be introduced on three system levels.

Contributions of TVET to achieving the goals of the VGGS have to be introduced on three system levels:

- *On the macro level*, TVET is an integral part of both the VGGS and the GGAP. The key question on this level is: How can requirements of greening be systematically introduced and established in Viet Nam's TVET system? In this regard, green skills requirements of the economy have to be identified and considered in occupational standards, in curricula and examinations and in indicators of TVET quality assessment.
- *On the meso level*, the focus is on TVET institutes. The key question on this level is: What does greening of TVET institutes mean and how can TVET institutes be supported to become green(er)?
- *On the micro level*, green skills requirements have to be considered adequately in training programmes and courses, education and training arrangements and training situations. Teachers and trainers have to be trained in order to be capable to train students as well as labourers in this respect. Training material has to be developed. The key question on this level is: Which green skills have to be trained in which methodological training environment?

1.2 Approaches to greening TVET

Greening of jobs and the economy has to be reflected in TVET.

Technological and economic changes in industry result in both new green jobs and greening of existing jobs. To meet new skills requirements required by technological and economic changes in TVET is not new. What is new, are the special skills requirements which come up in this context.

The integrating of new requirements into existing occupations seems to be more appropriate than developing new occupations.

Instead of developing new occupations, the integration of new requirements into already existing occupations (setting new emphases, adding qualifications) as well as providing training courses on special green topics required by industry on further training levels seems to be the more adequate approach.

There are three options of greening curricula.

In general, there are three options of greening curricula (training and teaching contents), which do not exclude each other, in the context of greening TVET:

1. integration of green basic skills into all occupations;
2. identification, development and training of occupation-specific green skills and
3. development of specific green occupations.

Integration of green basic skills into all occupations

Employees should understand the environmental impact of their occupations /jobs. They should know how they can contribute to a clean environment and avoid environmental risks and damages at their workplaces. They need knowledge and skills to use energy and resources efficiently, as well as to avoid waste, re-use or recycle materials. Central is the ability and willingness to take responsibility for the results of one's work within the employment's limits. For every occupation has at least an indirect effect on the environment, these skills are relevant for every job and occupation and should be trained in every trade and training course.

Employees should know the environmental impacts of their occupational behaviour and how they can avoid them.

Teaching these skills and abilities should proceed in an integrative approach during the entire training period and as much as possible in direct connection with specific occupational activities.

In order to show how this can be done, the element "environmental protection" in the German occupational profile can be seen as a suitable reference. It is part of all German training regulations within the German dual TVET system. Accordingly, trainees at the end of their apprenticeship should be able to contribute to the prevention of business-related environmental damage in the affected area at their place of work. In detail, they should be able to:

- explain the possible impact on the environment and explain the contributions of their training company to environmental protection;
- apply regulations for environmental protection valid for the training company;
- utilize the possibilities of economic and environmentally friendly energy and materials;
- avoid waste and dispose of materials in an environmentally sound manner.

BOX II.1: GREEN SKILLS REQUIREMENTS IN SELECTED OCCUPATIONAL FIELDS

Every occupation has an environmental impact, may it be big or small, direct or indirect. The main topics are:

- energy efficiency (e.g. control of electric motors / drives, compressed air, air conditioning, electric lighting, office machines & equipment, efficient power engineering in buildings);
- renewable energy (e.g. solar heating and cooling, photovoltaic, biomass, wind energy, hydro energy);
- water management (e.g. efficient use of fresh water, rain water usage, avoidance of water pollution);
- waste management (eliminate, reduce, re-use, recycle, dispose);
- correct handling of hazardous substances (e.g. welding fumes, wood dusts, solvents, cooling lubricants, acids and bases, oils and oily materials, hydraulic-fluids; batteries).

Of course there are differences between the occupational fields: the environmental impacts of administrative and office occupations are different from occupations in the field of metal technology; and occupations in the automotive sector have to deal with different green issues than the ones in the field of electrical engineering.

ILLUSTRATION II.1: CONSIDERING ENVIRONMENTAL ASPECTS WHILE OPERATING A MILLING MACHINE



Photo: Ralf Bäcker

Milling machine operators (among others):

- programme (CNC) tool machines for lathe processing, milling, drilling or grinding of metallic components;
- chuck work pieces, put machines into operation, monitor production processes;
- carry out quality assurance reviews;
- document work and results;
- clean, maintain and repair machines and systems.

Relevance to greening:

- degreasing metal sheets and pieces (solvents);
- filling in, monitoring and disposing cooling lubricants;
- correct planning and processing (no scrap, no mistakes);
- correct disposing of metal chips.

In principle, green technical skills cannot be distinguished from conventional technical skills. The application is just different.

Identification, development and training of occupation-specific green skills

In some occupations / jobs / industries, in addition to existing required technical skills, special technical skills are needed e.g. to manufacture energy efficient refrigerating systems, to operate efficient building energy technologies or to install, maintain and repair solar systems or wind turbines. These “green” skills are just special technical skills which in principle are not necessarily different from conventional technical skills, but are applied for different occupational purposes.

There are two options to provide knowledge and skills in understanding and proper handling of these specific green technologies:

1. *Specialization in an already existing occupation.* Example: a mechatronic fitter with a specialization in efficient refrigerating technologies; the basic skills are the same as a mechatronics fitter, in the last period of training the specialization is added.
2. *Additional training module on initial or further training level.* Example: A training course on solar technology (installing, maintaining and repair of solar thermal heating systems as well as photovoltaic - PV systems) is integrated into the training of electronic technicians. This course can also be provided for already employed people with a background in electrical engineering / electronics who want to improve their skills.

ILLUSTRATION II.2: PV SYSTEM AND SOLAR HEATING SYSTEM MODEL FOR TRAINING IN GREEN TECHNOLOGIES



Photo: Ralf Bäcker

Development of specific green occupations

If a specialization in an already existing occupation as well as additional training modules / qualifications are not seen as meeting the specific skills requirements in green economic sectors specific green occupations can be developed. In Germany, for example, there are four occupations focusing on specific technical aspects of environment protection in the fields of water supply, waste water treatment and waste management:

- *Water supply engineering technician.* Tasks: maintenance and monitoring machines and plants for water production, preparing, routing, laying and repairing water pipes.
- *Sewage engineering technician.* Tasks: preparing wastewater and attending wastewater pipe systems, as well as monitoring and steering the operations in sewage treatment plants and canal systems.
- *Recycling and waste management technician.* Tasks: organizing the collection and sorting of waste, its reuse or environmentally sound disposal.
- *Pipe, sewer and industrial service technician.* Tasks: cleaning, monitoring and attending wastewater pipelines and canals, tanks and waste structures in businesses and also in the private and public sphere.

New green occupations should only be developed if specific skills requirements cannot be met by existing occupation and additional training.

ILLUSTRATION II.3: WORKING IN THE WASTE WATER TREATMENT SECTOR



Photos: Ralf Bäcker (l.), Nguyen Huu Tam, (r.)

As the amount of jobs for graduates in specific green occupations is very limited providing a specialization or an additional training module in an appropriate basic occupation might be a better option.

This option should only be pursued if there is a sufficient demand for graduates of these occupations on the labour market. Experience shows that the amount of jobs in these fields is very limited. Also in these four occupations basic skills in metal working and electrical engineering / electronics are needed. Maybe providing a specialization or an additional training module in an appropriate basic occupation is a better option, because on the one hand it would meet the specific skills requirements of employers and on the other hand, it widens the job opportunities of the graduates.

2 Greening of TVET institutions²¹

2.1 Overview

Skills development is the master key for an economic and social transition towards sustainable development. Sustainable development requires a new mindset, green transformation of the economy and occupational as well as cross-occupational skills adequate to support the required transformation processes. TVET institutions are of vital importance to prepare the workforce to be able to meet the skills requirements of a greening economy and society.

In TVET institutions, a large number of young people are trained to be ambassadors of greening who showcase and pass on their green skills to others in their own professional and social communities. For it is not sufficient just to train technical skills but also to raise environmental awareness and to support a change of mindset of both - the teachers and the students / learners – TVET institutions have to also become green.

According to the greening TVET institutions approach which goes back to a proposal of Mr S. Majumdar, Head of the UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training,²² green TVET institutions should fulfil the following requirements:

- They are role models for eco-friendliness as well as a source of inspiration and an innovative and profound training provider and accepted strategic partner for a sustainable development of their region.
- They have developed a special organizational profile and integrate green issues into vocational education and training programmes systematically.
- They live what they preach and try to reduce the carbon footprint of their campuses.
- They integrate their internal as well as important external stakeholders (particularly enterprises) into the greening process, train their teachers, provide further training for companies and unemployed people and improve the living conditions of their communities by means of green projects, informal training, technical support etc.

Greening is much more than just a new topic which could be left to committed individual teachers or executed in single projects additionally to the “real” subjects, a greening of TVET institutions cannot be achieved by piecemeal or ad hoc approach. Instead, a holistic framework is needed to transform TVET institutions in a comprehensive manner to support the green society and green economy.

Based on a profound TVET performance that meets the skill requirements of the labour market, green TVET institutions follow a holistic framework that is built upon the following dimensions in order to anchor sustainable development principles in the organisation:

- *Green Campus*: Permanently reducing the carbon footprint of students, teachers and staff within the TVET institutions.

TVET institutions can play an important role in transforming the economy towards greening.

TVET institutions have to become green too.

Characteristics of green TVET institutions

Greening TVET institutions requires a holistic approach.

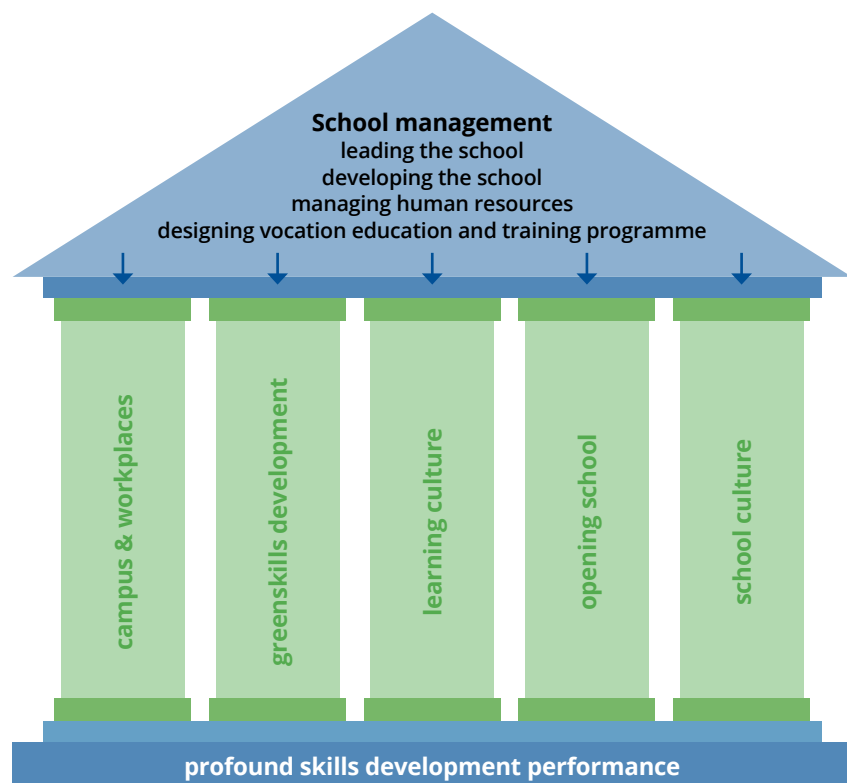
Green TVET institutions follow a holistic approach.

21 This chapter is inspired by GIZ 2015.

22 See Majumdar 2010

- *Green Curriculum*: Meeting upcoming skills for green(er) jobs by integrating green issues into already existing curricula and/or providing new green training programmes and projects.
- *Green Research*: Fostering the development of a research culture in relevant areas - not necessarily on an academic level but as a teaching and learning approach.
- *Green Community*: Extending sustainable development practices at community level by transferring knowledge to the community as well as by bringing in experiences and questions from private life to school.
- *Green Culture*: Strengthening green values, ethical standards, attitudes and practices, because without a change of values, ethics and lifestyle nothing will happen.
- *Management integration*: Following a systematic approach (executing an environmental review, identifying relevant aims and activities, implementing and monitoring activities, fixing results and updating measures) the greening activities are embedded in the corporate management system.

ILLUSTRATION II.4: THE GREENING TVET INSTITUTIONS CONCEPT



2.2 Key elements and fields of action of TVET institutions

Green Campus

Characteristics

Based on the philosophy of practicing what is being preached it is intended to reduce the ecological footprint of students, teachers and staff within the TVET institutions. The operation of the buildings, machines, equipment, tools and materials, as well the design of the buildings and the school grounds shall become environmentally and resource friendly. The most important fields of action for greening the campus are

- reduction of energy consumption / efficient use of energy;
- reduction of water consumption and pollution;
- reduction of waste generation and recycling;
- control and correct handling of hazardous materials;
- minimization of air pollution;
- environmentally friendly travelling and transport;
- healthy and environmentally friendly food and food services;
- green landscaping & consideration of biodiversity on the school ground;
- green construction & buildings.

Not all topics have to be covered at once. In the beginning, the focus should be mainly on

- reduction of energy consumption;
- reduction of water consumption and pollution;
- reduction of waste generation and recycling;
- control and correct handling of hazardous materials.

Green Campus: reducing the ecological footprint of the TVET institution.

In the beginning the focus should be on energy and water consumption, waste reduction or correct handling of hazardous materials.

BOX II.2: TIPS ON HOW TO REDUCE ENERGY CONSUMPTION AND HOW TO USE ENERGY EFFICIENTLY²³

Cooling

The cooling system is one of the largest energy consumers in vocational colleges. Even by small changes in the system, efficiency can yield large savings to a college's operating budget as well as a reduction of greenhouse gases. Ground source heat pumps can provide considerable energy cost savings in relation to traditional cooling systems. The installation of solar water heaters on roofs of the buildings can reduce dramatically both, water heating costs and greenhouse gases.

More tips in detail:

- Plan the size of ventilation systems in a demand-oriented manner.
- Clean and inspect filter screens of air-conditioning systems regularly. This will keep the electricity consumption at its best and eliminate dust and pollen from conditioned air.
- Use light coloured curtains to reflect sun and heat outward.
- Protect the outdoor cooling units from the sun. Place them on the south or shady side of your house.
- Reduce thermal load of air-conditioned rooms.
- Minimise or turn off cooling devices in areas that are not used throughout the day.
- Close doors and windows when using air-conditioning systems.

23 See GIZ 2014a; module 3

Electric lighting

Lighting accounts for nearly half of the electric bill in TVET institutions. Many colleges have areas in the building that are overlit or that can utilize natural lighting. Retrofitting the lighting system with energy-efficient bulbs or auto-on/off-technologies can reduce a large amount of a college's electrical consumption. It is important to note that incandescent bulbs produce more heat than light and can trigger cooling systems, resulting in even more energy use.

More tips in detail:

- Use compact fluorescent lights or LED bulbs in light fixtures.
- Use low energy lamps for exterior lighting.
- Do not use decorations that require electricity.
- Place work space near to windows to take advantage of natural light.
- Use task lighting desk lamps if possible and shut off overheads.
- Turn off lights when not in use.
- Put posters near light switches reminding people to turn off the lights whenever daylight is sufficient or lights are not used.
- If a room has multiple light switches, turn only those lights on which are required for the task at hand.
- Clean lamps, bulbs and reflectors regularly, because dirt decreases the amount of light given out.

Office machines and equipment

Almost every office nowadays is equipped with several PCs, copiers, monitors, printers, scanners and fax-machines. They all consume electric current. Increasing numbers of machines, higher requirements and intensive use have exploded office energy-consumption in spite of more efficient devices in the last years. Many devices consume electricity when in standby-mode, many even when switched off. Reducing these “vampire loads” is easy: Just plug appliances into a power bar and turn off the power bar when not in use.

More tips in detail:

- Use Energy Star computers, monitors, printers, copiers and appliances.
- Use printers for several PC-stations simultaneously.
- Change power management features on computers to an energy efficient setting.
- Turn off computer monitors when not in use.
- Deactivate screen savers.
- At the end of the day and on the weekends disconnect office machines totally from the grid unless your network technician instruct otherwise.
- Place your electronics and other devices strategically so that you can put them on a power strip– making it easier to turn them all off at once.
- Unplug phone & battery chargers when fully charged.

Example from Viet Nam

In Ho Chi Minh Vocational College of Technology (HVCT), some greening activities have already been implemented, others are planned.²⁴

Current activities	Future activities
<ul style="list-style-type: none">• effective and efficient usage of natural light• regulating and encouraging correct placement of rubbish• having a waste water treatment station• planting trees around the campus• saving paper by recycling one page paper, printing out in case need• saving water by rain water storing• turning off air condition one hour before end of work and leaving the room• effective using of elevator (1st and 2nd floor do not need use of elevator)• cleaning classroom and workshop after learning• establishing an environmental club for promoting all activities of environmental protection and effective use of energy and resources	<ul style="list-style-type: none">• using eco-friendly products and materials• integrating environmental education in training activities• classifying of waste from its source• basic and advanced training for teachers and students about green skills• classifying and storing hazardous waste and building a store house for hazardous waste• contracting with agencies to treat hazardous waste• awareness-raising on green skills, including an environmental contest to develop a common understanding• developing a green office• establishing a green club

ILLUSTRATION II.5: STUDENT PRESENTING THE HARMFUL IMPACTS ON THE ENVIRONMENT OF TOOLS THEY ARE USING EVERYDAY



Photo: Nguyen Minh Cong, GIZ

²⁴ Results of a teacher working group about Greening TVET.

Green Curriculum

To create Green Curricula green skills requirements are integrated into training courses.

Characteristics

In order to meet upcoming skills for green or greening jobs, green TVET institutions integrate green skills requirements into existing courses (e.g. green basic skills). If required by companies new training courses or modules on green technologies or procedures are designed (e.g. with focus on energy and resource efficiency and/ or renewable energies). Greening TVET institutions are also used as learning laboratories by means of adequate equipment which enhances explorative learning. The capacity of teachers and instructors has to be developed to enable them to provide these kinds of training.

Example from Viet Nam

From 10th to 23rd January 2015, a further training course was organized at HVCT for teachers from HVCT and in-company trainers from sewerage companies.²⁵ The course aimed to improve the capacity of teachers of HVCT and selected engineers from sewerage companies, who are involved in the cooperative vocational training programme, in order to enable them to teach and instruct students in the pilot technical vocational training programme for “Sewage Engineering Technician” in the future. Within the course the following topics were covered:

- advanced pedagogical approaches like student oriented teaching and teaching with case studies;
- basics of designing and implementing vocational training phases at an enterprise;
- managing training records and criteria to evaluate students at an enterprise;
- importance of interaction between teachers of a vocational training college and in-company trainers of sewerage companies.

Additionally, professional knowledge of wastewater treatment and drainage was trained, like techniques on controlling wastewater treatment and drainage systems, operating sand settling tanks and common equipment, such as pumps and air compressors. Practical work focused on controlling, operating, maintaining equipment of a wastewater treatment and drainage system, the method of detecting and repairing failures in operation and work safety.

ILLUSTRATION II.6: PARTICIPANTS PRACTICED DISASSEMBLING A PUMP AT THE WORKSHOP



Photo: Hoang Dinh Tu, Planco-GOPA

²⁵ The course was developed and conducted by GIZ in the frame of the component TVET for Waste Water Sector of the Programme Reform of TVET in Viet Nam.

Green Research

Characteristics

Externally, research interventions, which are carried out in cooperation with universities, other research institutes and industry, e.g. in the areas of renewable energy (solar heating and cooling, PV), energy and resource efficiency (efficient lighting systems, waste management) and green innovations, serve the purpose of bridging campus-wide initiatives to respond to the needs of the industry and community. Internally, research interventions support the scientific and technical basis for undertaking day-to-day campus-wide green initiatives and doing scientific research activities, e.g. by testing and comparing performance and efficiency of different types of solar systems etc.

Green research fosters a research culture in relevant areas of the college and responds to the needs of the industry and community.

Some ideas for green research in TVET institutions:

- checking best technologies, installations and procedures in order to improve the energy performance in the building, e.g. by installing effective ventilation systems, use of nature light or effective lighting systems to reduce energy consumption;
- calculating and comparing costs and monetary effects e.g. of different lighting technologies or procedures to save energy in classrooms and offices;
- testing different types of window insulations;
- studying how individual motivation and behaviour can best be improved in order to save energy and / or to contribute to the development of a green culture.

Example from Viet Nam

Green researchers can start with simple things. It is not necessary that the idea is brand new. It should fit to the vocational college and should contribute to improving its environmental performance such as building of a rain water storing system to re-use rainwater for watering trees in the school.

ILLUSTRATION II.7: IDEA OF A STUDENT FOR DEVELOPING A GREEN SCHOOL IN NINH THUAN VOCATIONAL COLLEGE

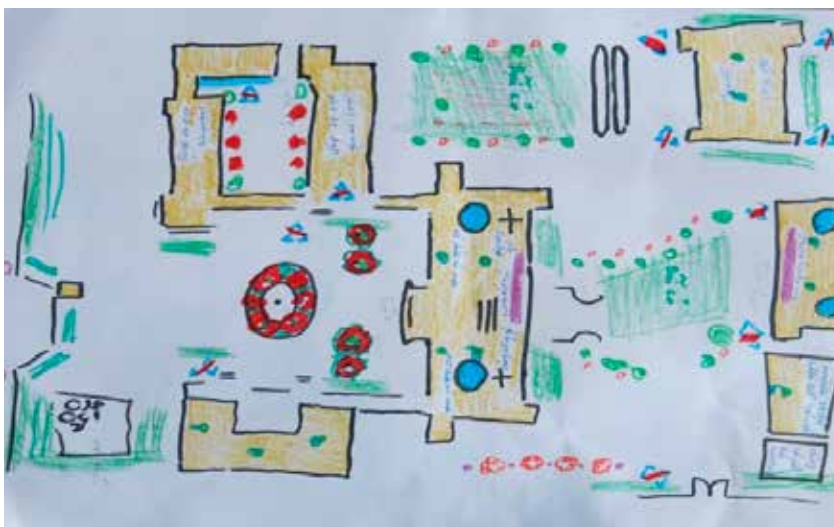


Photo: Dang Thi Huyen, NIVT

Green Community

Green Community: extending sustainable development practices to community level.

Characteristics

Greening TVET institutions see themselves as a nucleus of greening and as a strategic partner for the sustainable development of their region. Through local, regional and supra-regional partnerships, they build on their skills and make them available to their municipalities, the local economy and other regional stakeholders. Greening TVET institutions extend their activities and practices to the community level and participate actively in the sustainable development of their communities e.g. by offering formal and / or informal training (installation of solar heaters, operation of biogas plants etc.), supporting projects to solve local problems (installation of PV based lighting systems, improvement of water supply and / or waste water management) and providing training courses concerning green issues for local industry. Greening TVET institutions join others to form a network. They use the network to exchange knowledge and experience as well as to convince other TVET institutions to also adapt principles of greening.

Example from Viet Nam

In Ninh Thuan Vocational College, Ninh Thuan province, the trainees and students have formed the club “Volunteer club for Green – Clean - Beautiful – Ninh Thuan province”. Every month, the club organizes some activities such as cleaning the beach and the 16 April Square. These are voluntary activities for the community and attract many students and trainees of Ninh Thuan College. Other activities of the voluntary club contain cutting bushes, collecting waste and cleaning public areas. All activities contribute to increase environmental awareness and sense of responsibility in order to protect a liveable environment and to contribute to a clean, green and nice environment of the community.

ILLUSTRATION II.8: STUDENTS OF VOLUNTEER CLUB “GREEN – CLEAN – BEAUTIFUL”, NINH THUAN PROVINCE, CLEANING THE 16 APRIL SQUARE



Photo: Mai Xuan Viet, Ninh Thuan Vocational College

Green Culture

Characteristics

Greening TVET institutions provide an exemplary space for living and learning. They have a value orientation which embodies reciprocal respect, esteem and acceptance of responsibility, provide a healthy workplace and promote maintaining health among the teachers. The green culture is based on green ethics and behaviour of each individual, including:

- respect and consideration of environmental issues;
- protection of the nature with its ecosystems and biodiversity;
- consideration of the needs and interests of future generations;
- change of mindset and behaviour.

Greening TVET institutions take the concept of participation seriously. They promote individual responsibility of staff members and apply the concept of participation to teachers, students and administrative staff by connecting top-down and bottom-up approaches. Even if the original initiative on greening comes from individuals a systematic greening of TVET institutions cannot be done by a small group of committed individuals alone. It only can occur if all relevant stakeholders are informed about and involved into the greening process. Staff and students can significantly contribute to greening the TVET institution, e.g. by efficient consumption of energy and other resources, because they know their workplace best or have to learn what to consider respectively. Only when actively involved in the greening strategies of the TVET institution and when sensitized, motivated and qualified for greening their workplace, training workshop, office etc. they can detect and eliminate shortcomings and implement potential improvements at an early stage.

Example from Viet Nam

In fact, activities in regard to green culture have been implemented in many TVET institutions in Viet Nam, cleaning classrooms and workshops every day, cleaning the school yard at the end of a week and on special occasions, planting trees around the school to create greener spaces are typical examples. These activities become regular activities and habits of all students, teachers and staffs in school. These activities also contribute to increasing environmental awareness of all people and encouraging them to do better.

Green Culture: strengthening green values, ethical standards, attitudes and practices.

Greening TVET institutions take the concept of participation seriously.

ILLUSTRATION II.9: "PINK SUNDAY" AT NINH THUAN VOCATIONAL COLLEGE FOR PLANTING AROUND COLLEGE



Photo: Mai Xuan Viet, Ninh Thuan Vocational College

Greening the economy requires skilled workers, who are aware of considering green issues in their occupational behaviour. In order to raise environmental awareness of students - the future generation of workers - HVCT organized a future workshop on “Climate change and Environmental responsibility” for 28 first year students in May 2014. The future workshop is a special methodological approach with five phases: preparation - criticism - imagination - realization – follow up. The method is democratic, comprehensive, challenging and innovative. It is action-oriented and appropriate for students. At the end of the workshop 15 of the 28 students immediately enrolled in a Green Club. Until the day of implementing green activities, the Green Club attracted more than 30 students and 10 teachers actively, cheerfully and voluntarily cleaning and fertilizing the flower beds and greening some selected locations.

ILLUSTRATION II.10: STUDENTS DEVELOPING IDEAS FOR GREENING TVET



Photo: Nguyen Minh Cong, GIZ Viet Nam

Management Integration

Characteristics

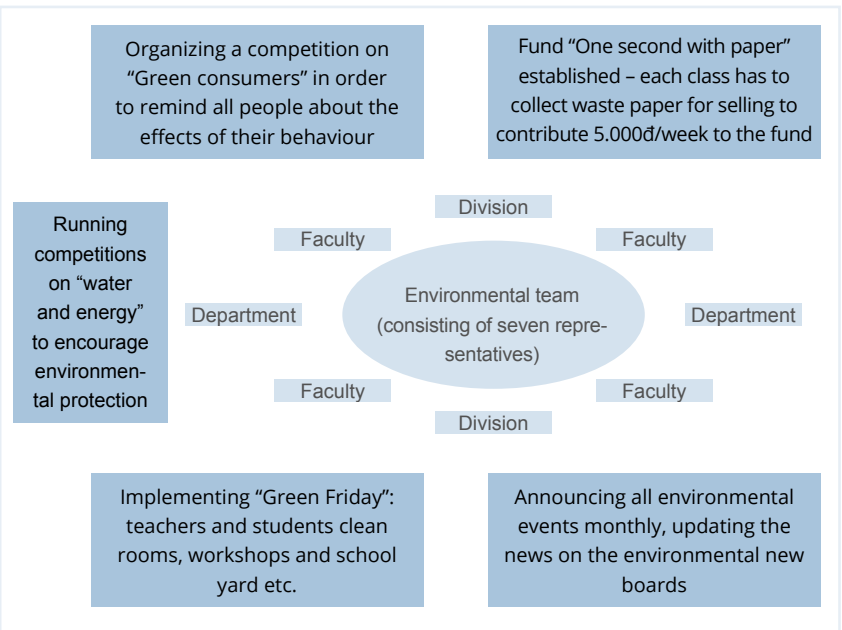
Greening TVET institutions is a leadership task. It needs to be supported by the college management and is anchored in the organization by attributing both official responsibility and personal responsibility. Greening TVET institutions have a college-specific green profile, codified into the organizational mission statement. They have developed strategic development goals, which are carried out and put into practice within defined processes and through strategic projects. Responsibilities and accountabilities are fixed on all levels: management, staff (both technical and administrative) and students. Greening is a part of the school's integrated quality management. As continually developing teaching and learning sites, green TVET institutions regularly and systematically assess the results of their activities. They evaluate the results and derive from them consequences for future action, in the spirit of on-going improvement.

Management Integration:
embedding greening activities
in the management system of
the institution.

Example from Viet Nam

Kien Giang Vocational College is a vocational institution in the south of Viet Nam. With technical support from GIZ, the institution has conducted many activities toward environmental protection. Advised and supported by the management board of the college a club of environmental volunteers was established in May 2012. Starting with 40 volunteers the number of members increased to 60 in 2013.

ILLUSTRATION II.11: ORGANIZATIONAL CHART OF THE ENVIRONMENTAL VOLUNTEER CLUB IN KIEN GIANG VOCATIONAL COLLEGE



The Environmental Volunteer Club has implemented many activities relevant for environmental protection. These activities helped to increase the environmental awareness of teachers, students and staff. They became actively involved in the development of green campus and environmental protection at the college. Furthermore some of them became "environmental ambassadors" and pass on their knowledge and behaviour to their families and local communities.

2.3 The implementation process

A systematic procedure to start and implement a process on greening TVET institutions consists of seven steps that any vocational institution can adopt and adapt to its respective framework conditions:

Procedure of implementation:
seven steps.

1. *Assigning a process manager*: Like any other process greening needs somebody who takes on responsibility and manages and operates the process.
2. *Establishing a green committee*: Representing all stakeholders the green committee is the central forum for steering the greening activities.
3. *Informing and involving stakeholders*: Greening an organisation cannot be achieved by individuals but requires the involvement and collaboration of all stakeholders.
4. *Developing a green policy and strategy*: Through a green policy the TVET institution demonstrates its commitment to sustainable development; its strategy contains its strategic goals in regard to greening.
5. *Conducting an environmental review*: A systematic integration requires review and assessment of the environmental impacts of the TVET institution.
6. *Developing a greening programme*: The greening programme reflects the green policy and strategy and provides information on objectives, activities, schedules and responsibilities.
7. *Implementing, monitoring, evaluating and consolidating of greening activities*: **Activities are implemented and the progress is regularly monitored and measured; once in a year the greening activities are reviewed by senior management; new focus areas, objectives and activities are fixed; the greening activities are continued, disseminated and consolidated.**

BOX II.3: STARTING A PROCESS OF GREENING

Note:

Although implementation of green issues costs a lot of effort, one should not get lost in details, but always keep in mind the global and regional challenges TVET institutions have to meet. When starting a process of greening, TVET institutions show that they are committed to take on responsibility for a sustainable future. In this respect greening is much more than separating waste, consuming less energy or having a poster presentation. Greening TVET institutions' mission is to provide adequate skills development which meets the requirements of the greening economy and society and contributes to achieving Viet Nam's targets of the Green Growth Strategy and National Action Plan respectively.

The process manager manages and operates the greening process and is supported by action teams

Step 1: Assigning a process manager

Like any other process, greening needs somebody who takes on responsibly and manages / operates the process. We call this person "process manager". He or she is the internal and external contact person for greening the respective TVET institution. The process manager's main tasks are

- internal and external communication on greening;
- preparing, chairing and documenting the meetings of the green committee;
- informing the members of the green committee about the greening TVET institution's concept;
- developing and implementing a school-specific procedure on greening the institution coordinated with senior management and green committee;
- preparing, implementing and documenting an environmental review;

- regularly reporting to the senior management on greening performance;
- providing training for staff and students if special knowledge and skills are required;
- supporting the involvement and recognition of the top management;
- attaining staff support beyond individual areas and functions.

If possible the process manager is supported by one or several temporary action team(s) of committed people. This can be mixed groups (staff and students) or homogeneous groups (staff or students). These action teams - it does not matter how they are called - are located on operational level.

Step 2: Establishing a green committee

Representing all stakeholders the green committee is the central forum for steering the greening activities. The process manager shares responsibilities and tasks with the members of the green committee. Regular meetings should take place for coordination. The frequency of meetings is based on demand; it should, however, take place at least once every quarter. The green committee's main tasks are

- ensuring that all stakeholders of the school community are represented in the decision-making process;
- integrating the greening programme into the school development plan and organization;
- ensuring acceptance and “open doors”;
- steering and coordinating the greening process at the college;
- supporting process manager and action teams;
- developing, implementing and monitoring the school's green policy and strategy;
- developing a greening programme;
- coordinating planning and implementing the projects (according to budget, time and quality);
- monitoring and evaluating greening activities.

The green committee is the central forum for steering the greening activities.

BOX II.4: IMPLEMENTING THE CONCEPT

Note:

- Ensure commitment: No start without commitment from management as well as buy-in from staff and ownership of projects.
- Consider suitable time frames needed a) to explain the concept and to answer questions and b) to implement the concept.
- Goals should be realistic and achievable.
- Prioritize: There might be a lot of ideas but limited resources. Greening a college cannot be done overnight but is a long-term process.
- Consider communication requirements: It is important that everyone understands the concept and its importance.
- The greening programme should consider the following: Greening item desired to be achieved; start date and end date fixed; time frame allowed; responsible person / department for specific items named; funds allocated.

Relevant internal and external stakeholders have to be involved.

Step 3: Informing and involving stakeholders

Greening an organisation cannot be achieved by committed individuals alone but requires the involvement and collaboration of important stakeholders. Because they can support or hinder the greening process to a certain extent, relevant internal and external stakeholders should be regularly informed about the greening activities of the TVET institution. As far as possible and relevant they should even be involved in the greening process.

BOX II.5: RELEVANT STAKEHOLDERS

Internal stakeholders (examples):

- senior management
- teaching staff
- administration staff and facility managers
- students

External stakeholders (examples):

- MoLISA and DoLISA
- GDVT
- provincial government and authorities
- chambers, trade associations etc.
- local companies
- parents

ILLUSTRATION II.12: METHODS / INSTRUMENTS TO INFORM AND INVOLVE PEOPLE

Method / instrument	Focus: informing people	Focus: involving people
Environmental policy	X	
Competition		X
Green committee		X
Green Day		X
(Green) notice board	X	
Suggestion scheme		X
Tree-planting campaign		X
Lecture	X	
Flyer	X	
Working group		X

Step 4: Developing a green policy and strategy

The TVET institution's commitment to a sustainable development finds its expression in a green policy and its strategy which contains its strategic long-term goals in regard to greening. The green policy is meant to

- present commitment regarding greening the TVET institution to internal and external stakeholders and
- lead the greening activities in the college in a certain direction.

The green policy presents commitment regarding greening to internal and external stakeholders, leads the greening activities and at the same time expresses the college's mission statement.

BOX II.6: GREEN POLICY BY TVET INSTITUTION (EXAMPLE)

Environmental guidelines of Johannes Gutenberg-Schule Heidelberg (Germany):²⁶

- We support environmentally aware action.
- We teach ecological principles and sustainability in all departments. In our college we demonstrate the compatibility of ecology and economy.
- We consider ourselves as multipliers of ecological thinking.
- We sensitize all parties involved in college-life by specific teaching contents in order to improve our environmental behaviour. We support the overall concept of sustainable development by specific projects of students and analysing ecological contexts in the classes.
- We adhere to all environmental rules and regulations.
- We commit to regularly check and adhere to all laws and regulations concerning our college in regard to their relevance for our college.
- We constantly improve all environmentally relevant processes.
- We constantly evaluate our environmental aspects, look for further improvements and thus strive for a continuous improvement of our environmental performance.
- We foster healthy lifestyles.
- We enhance the well-being of students and staff by offering healthy activities.
- We save resources.
- We optimize the consumption of natural and energy resources by constantly monitoring of our consumption-data.

The green policy should emphasize that the college accepts the challenge of sustainable development and that it responds to it *in a college-specific manner*. This includes a commitment to continuous improvement of the ecological performance, but focuses on educating and training people to be able to contribute to Viet Nam's greening economy and society. It should be clear that the green policy should be an expression of the overall college's mission statement and by no means separated.

Step 5: Conducting an environmental review

A systematic implementation of green issues requires a review of the direct and indirect environmental aspects and an assessment of the environmental impacts of the TVET institution.²⁷ The environmental review is crucial to understand

A review of the direct and indirect environmental aspects and an assessment of the environmental impacts are the basis for a greening programme.

²⁶ Johannes-Gutenberg-Schule 2012

²⁷ *Direct* environmental aspects are activities over which an organisation can be expected to have an influence and control (e.g. consumption of material, energy and water; waste and waste water production; usage of hazardous substances; CO₂ emissions and biodiversity on the school grounds. *Indirect* environmental aspects on the other hand are current or potential activities over which the organisation can be expected to have an influence, but no control such as positive environmental impacts by environmental education / training, traffic or environmental impacts of suppliers.

the current environmental situation in the college and provides the basis of the TVET institution's greening programme. It has to be determined which domain the review should refer to. This can be the whole vocational college, a campus or a training workshop. It is also possible to focus on one or several topics such as energy, water and/or waste. However, the analysis should cover all six key elements of the greening TVET institutions approach.

BOX II.7: ENVIRONMENTAL REVIEW

Note:

A rough analysis will shed light on the energy and resources demand profile and the amount of consumption in past years:

- *Survey consumption rates:* Subscriber contracts and tariffs, delivery receipts and bills depict an overview over amount and temporal progression of the overall energy consumption in the TVET institution for the various energy-forms and media.
- *Detect "energy-paths" within the college:* Which installation is provided with which energy source?
- *Identify main consumers:* The energy consumption can be allocated to individual consumers by electricity meters, heat counters, gas meters as well as control-reports from meter controllers. In case there are no meters, the energy-demand of individual installations can be estimated by their default capacity, average capacity and service-time (service hour counter).

In the same way materials (raw materials, operating and auxiliary materials), water consumption, waste production etc. can be analysed.

Focus is on relevant environmental aspects to be improved.

It is highly recommended to prepare the results in form of charts and graphs. Additionally, good practices should be considered in the environmental review as well: Do teachers already integrate green issues in lessons or training courses? Are there greening activities already going on like turning off lights and computers when not needed, making full use of paper and materials, recycling in the classroom or encouraging waste separation?

In the following, the greening process should focus on environmental aspects which are ecological relevant and where the TVET institution has opportunities to improve its performance.

Step 6: Developing a greening programme

Identifying fields of action and determining objectives and improvement measures are the two steps in developing a greening programme.

The greening programme reflects the green policy and strategy and provides information about objectives, activities, schedules and responsibilities. The greening programme is the core of the greening process in the TVET institution.

The development of a greening programme is divided into two phases:

1. *Identification of fields of action:* Linked to the college's strategy and based on both the results of the environmental review and the assessment of environmental aspects, relevant fields of action can be identified, which shall be improved. Of special interest are improvement opportunities that can be implemented easily and cause few or no costs, so-called none or marginal investment related measures ("low-hanging fruits"). We suggest beginners in greening focus on a few relevant topics such as energy efficiency, water

saving and/or waste management and to consider how the school's performance can be improved in respect to these topics in all six key factors of greening TVET institutions.

2. *Determination of objectives and improvement measures:* For the selected fields of action, concrete objectives and improvement measures are derived. Along with every measure, responsible persons, estimated costs and the final deadline will be noted.

BOX II.8: GREENING PROGRAMME

Note:

- Keep the plan practical, focusing on what can be achieved realistically in light of technical equipment, budget, schedules, school breaks and graduation dates.
- Not every objective can be achieved in one year. Better to set smaller targets (e.g. reducing electricity consumption at XY campus by 10% until ...) than bigger ones. Then another target in this respect can be defined in the following year.
- The sum of these different objectives and activities form the greening programme. The greening programme has to be discussed in the green committee and approved by senior management.

Step 7: Implementing, monitoring, evaluating and consolidating of greening activities

The implementation of greening activities are coordinated and supervised by the responsible persons or the action team respectively. To find out whether or not the targets laid out in the greening programme are successfully achieved, the progress is regularly monitored and measured. This is done by the process manager in close coordination with the green committee. The green committee possibly also has to decide what has to be done in order to support the implementation of special activities if there are unforeseen obstacles coming up.

The implementation of the improvement activities and projects should be embedded in an information and awareness raising campaign. Everybody in the college or at the campus should know that the college is committed to sustainable development and that everybody is requested to contribute.

After a year an internal audit should be done by the process manager to evaluate

- what has been achieved so far;
- what is still open;
- what has been a success;
- what has gone wrong and
- which lessons can be learnt.

Additionally, suggestions for new objectives and activities should be considered.

The results should be summarized in a report and presented to the green committee as well as to senior management. It is important that senior management is involved, because it is its task to review greening activities in order to ensure its continued suitability, adequacy and effectiveness. The management review shall address the possible needs for changing green policy, focal areas, objectives and activities in the light of audit results, changing circumstances and the commitment to continuous improvement. The results of the management review

The greening activities are being implemented and regularly monitored. An information and awareness raising campaign supports the success.

Senior management has to be involved to ensure its sustainability, adequacy and effectiveness.

should be integrated into the evaluation report and presented to the school public. In the following year the greening activities are continued, disseminated and consolidated.

BOX II.9: EVALUATION REPORT

Note:

The evaluation report should contain not only programmes and statistics, but also success stories and profiles of people involved in the greening process. This is an important issue, because the feedback on the consequences of the greening activities can influence attitudes and values of people and thus enhance eco-friendly behaviour.

Glossary

Energy efficiency is the most important precondition for developing a sustainable energy system. Energy must be produced, transferred and used in a way that creates as much output as possible with as little energy consumption as possible. Low efficiency of old power plants must be addressed as much as energy loss due to old cables and power lines, waste through inefficient terminal devices or incorrect user behaviour. There is a huge (theoretical) potential for saving energy through these avoidable losses, which, however, is practically almost completely offset by (→) rebound effects.

(Source: BMZ 2013)

Energy efficiency

Environmental expertise is an integral part of vocational coping skills. It refers to the ability to recognise, assess and minimise direct and indirect negative impact on the environment. Environmental expertise is not static in nature. It is rather a dynamic process that manifests itself in an individual's continuous dealing with the effects on the environment caused by occupational activities in a context of constantly changing occupational, organisational, political and ecological conditions.

In detail, environmental expertise entails the following areas:

- (Environmental) knowledge relating to specific occupations or across occupations;
- The willingness to take responsibility for and take steps towards the preservation of the environment; and
- The ability, commitment and willingness to take environmental protection into consideration in professional practice.

Since any occupational activities requiring environmental expertise are normally carried out in concrete situations within a company or organisation, where other people, groups, institutions or departments are involved, communication and cooperation skills are further essential elements of environmental expertise.

(Source: Jungk/Mertineit 1999)

Environmental expertise

The key message in the discourse on green economy is that environmental protection should be considered more than just a general cost factor. Instead it offers great economic opportunities. Ecological sustainability and economic progress should no longer be seen as opposites. However, until now, no commonly accepted definition of the term green economy exists. Most commonly used is the working definition of the UNEP that defines green economy as an economy which “results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low-carbon, resource-efficient and socially inclusive”.

(Source: UNEP 2011)

Green economy

Green or environmentally sound growth means promoting economic growth while at the same time protecting the environment and resources. There is no commonly accepted definition. According to the definition of OECD “Green growth means fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. To do this, it must catalyse investment and innovation which will underpin sustained growth and give rise to new

Green growth

economic opportunities.” Green Growth implies breaking the link between economic growth and increased pressure on the environment, thus enabling economic growth to reduce poverty within the current generation while maintaining the carrying capacity of the earth for future generations.

Sources: OECD 2011, p. 4; Kamp-Roelands 2013, p. 4

Green jobs

There are many diverging opinions as to what constitutes a green job. UNEP defines green jobs as “positions in agriculture, manufacturing, construction, installation, maintenance as well as scientific and technical, administrative and service-related activities, which contribute substantially to preserving or restoring environmental quality”. The ILO considers a job green as one that helps to reduce negative environmental impact and contributes to environmental, economic and social sustainability of enterprises and economic sectors.

Sources: UNEP/ILO/IOE/ITUC 2008, p. 35; ILO/CEDEFOP 2011, p. 4

Green skills

Green skills are specifications of (→) environmental expertise. Generally speaking, green skills refer to the knowledge, abilities and skills that are needed to meet environmentally relevant requirements of a particular enterprise and in the workplace. A uniform catalogue for related competences does not exist. Individual countries, such as the United Kingdom or Australia, have in fact attempted to create a list of specific green skills. However, they are categorised by fields (e.g. waste, energy, construction) and do not contain skills across occupational fields (core skills). The ILO-CEDEFOP study “Skills for Green Jobs” presents a list of core skills that are relevant for green jobs.

Source: ILO/CEDEFOP 2011, p. 107

Rebound effect

The rebound effect describes the phenomenon in which the energy savings of potential and efficiency improvements (for instance, as a result of isolation of buildings, efficient lighting or low fuel engines in cars are hardly ever or only partly achieved by consumers and, on the contrary, may lead to an even higher consumption of energy. This is the case, for instance, if an individual purchases a more fuel-efficient car but uses it for additional trips or even purchases an additional car because of the low consumption values. More examples: Heating the home more because the price of heating is lower after having improved the insulation. People that use energy-saving lamps tend to leave the light on longer reasoning that this would be cheaper. This effect is called direct rebound. Indirect rebound refers to all other effects: For example, after efficiency has been improved, the consumer has leftover purchasing power that can be used for all kinds of categories of products and services imaginable. In the extreme case, this can lead to a backfire effect: Ultimately more resources are used up through the use of more efficient technologies.

Source: Madlener/Alcott 2011, p. 6f

Renewable energies

Renewable energies are derived from resources that are continually replenished or come from resources that are not depleted by use. This includes energy from sunlight, wind, rain, tides, waves, and geothermal heat, as well as biomass which comes from renewable raw material. Utilising renewable energies does not contribute to an increase in the amount of greenhouse gases in the atmosphere. Consequently, they are one of the most important instruments against climate change. In many cases, small power stations using sunlight, water, biomass or geothermal heat are able to meet communal energy needs in a decentralised, economically and environmentally sound and climate

friendly way. In developing countries they can thus make a significant contribution to meeting energy supply and reducing poverty.

Source: BMZ 2013

The definition today most commonly used came from the UN World Commission on Environment and Development, the so-called Brundtland Commission. According to this definition, “Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs”. Sustainable development was proclaimed the key guiding principle for global action at the UN Conference for the Environment and Development in Rio de Janeiro in 1992. Since that time, sustainable development has indeed been accepted as the global guiding principle. The key concept of sustainable development is to keep the world in balance. The key thought is that, in the long run, we cannot live at the expense of people in other regions of the world or at the expense of future generations. The environment, economy and society mutually affect each other. There will be no long term economic or social progress without a healthy and intact environment. At the same time, it will not be possible to protect the environment efficiently, if people have to fight for their economic livelihoods.

Source: WCED 1987

Sustainable development

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