

## **Work Package I. Preparation**

# **ENERGY EDUCATION NEEDS – CURRICULUM REVIEW AND EMPLOYABILITY**

Laos, Cambodia and Myanmar



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## 1 Introduction

The Kingdom of Cambodia, the Union of Myanmar and the Lao People's Democratic Republic are among the most rapidly growing countries in the ASEAN region. Economic development of these countries has resulted in increasing energy demand and consumption. This has led to significant challenges and development needs in the energy sector – both in terms of investments, technology, competent employees, knowledge and education. This survey was to gather information on the current status of energy education in DEEM partners' institutions in Myanmar, Laos and Cambodia as well as employability of their graduates. The study found that although the energy sector development is critical, higher energy education has not yet received necessary attention either in terms of energy programs or courses offered. The universities in question, Royal University of Phnom Penh, Institute of Technology of Cambodia, National University of Laos, Yangon Technological University and University of Yangon, offer Bachelor and Master level programs mainly in renewable energy or energy engineering, but not yet in interdisciplinary topics such as energy planning, energy economics, or energy and environmental politics, all crucial in sustainable energy sector development. It is clear that in order to be in line with requirements of energy sector development, energy education in abovementioned HEIs need to be enhanced either in terms of diversification of programs offered, substantial knowledge provided, as well as constant dialogue with the labour market and policy making to meet the current needs, and offer more long-term oriented, problem-based, quality education. Modernised and student centred pedagogics play a crucial role in this task.

Findings on employability of DEEM partner university graduates indicate that graduates from engineering fields (ITC, NUOL) can easily find their job in industrial or private sectors, while from other fields (RUPP, some other faculties of NUOL) usually join governmental sector or social business. Results of Myanmar partners are provided in a separate report (van Vugt, 2018).

## 2 Background

The Mekong Region is experiencing the impacts of climate change and greenhouse gas emissions in Southeast Asia are predicted to increase rapidly due to economic growth. At the same time, a significant proportion of especially rural households still lack access to modern energy services although the energy sector is rapidly developing as the countries aim to graduate from the least developed country status. In the face of climate change, there is a strong need to support building sustainable energy pathways. Responses to the variable challenges present in the energy-poverty-environment-climate nexus call for multidisciplinary and situated knowledge and capacities. Currently there is a gap in local capacity in the sustainable energy and climate change issues to respond to these challenges.

In Cambodia various national plans and policies emphasize 1) the quality of education and human capacities at HEIs “education sector lags...principal problems include the low quality

of learning, limited learning infrastructure, insufficient well-qualified teachers, not fully implemented quality assurance system, and few quality institutions of higher education” upto international/ASEAN standards and 2) mismatch with needs in the sectors for qualified labor “university curricula remain quite disconnected from the skills needed in the market place” (Rectangular strategy, National Strategic Development Plan). Energy sector prioritises on investing in renewable energy (e.g. National Roadmap, Policy and Plan for Green Growth and Rural Electrification Master Plan), human development and capacity building (national roadmap, policy and plan for green growth; Rural Electrification Plan) and provide access to grid quality electricity services throughout the country to support economic development. Environmental education is recognized (MoE) as an important vehicle for green growth. The government recognises that lack of sustainable energy expertise in higher education is slowing down the achievement of the national electrification goals. Both ITC and RUPP have stated their need for multidisciplinary sustainable energy (engineering) education.

Electricity production comprises of a significant economic segment in Laos, accounting 14% annual growth rate in 2011-2015 and continuing to do so with tens of new projects annually (OECD 2018). In Lao PDR the 7th and 8th National Socio-Economic Development Plans (NSED 6 & 7 2011-2015; 2016-2020) emphasize human resource development and staff capacity building. The Renewable Energy Development Strategy (2011) emphasises 1) renewable energies important component of the national economic development to ensure energy security, socio-economic development, and environmental and social sustainability, 2) promotes efficient use of energy, becoming self-sufficient in energy supply and 3) involving participation of public and private sectors in renewable energy development. MoED strives for regional and international standards for higher education system research and teaching as critical component in integrating the Lao PDR in the regional and global economy and graduating from the LDC status by 2020. Higher education plays a crucial role in the development of sustainable energy and climate change expertise in Laos. However, there is insufficient capacity to respond on national demands on the field. In 2015, the Faculty of Engineering at NUOL requested education support in sustainable energy engineering and climate change.

After a political transition and gradual opening up of Myanmar, a number of new laws are being negotiated in the parliament on energy, environment and education. The National Environmental Policy and the Energy Policy guide Myanmar’s energy and environmental issues, however there is a huge gap in implementation and monitoring capacity. Higher education is seen as a cross-cutting theme throughout the three pillars of country priorities in Myanmar development plan (e.g. in natural resource governance) that are followed by the international community (e.g. UN). Energy efficiency and conservation, promotion of renewable energy and increasing energy production are priorities to address “persistent power shortages and the lack of technically capable staff” that hinders the much needed sustainable development of the country. It has been identified that sustainability issues need to be integrated throughout the existing subjects in curricula at YU and YTU to foster national energy expertise and markets.

Hence, DEEM Work package I “Preparation” is to gather comprehensive information on current status in energy education in Mekong DEEM Partners’ institutions, their future needs and graduates’ employability, that necessary for elaboration of training programs under DEEM project. The results of Myanmar are provided in a separate report (van Vugt 2018) due to a more comprehensive study process.

## **2.1 Study objective**

The aim of this survey is to assess the current situation of energy education in terms of curricula and employability in Mekong partners’ universities. The further analysis summarises the discussions from seven stakeholder seminars held during the project 2016-2019.

# **3 Methodology**

## **3.1 Survey methodology**

The study started off with a desk study by searching information on websites and periodical reports of partners’ institutions to get overall understanding of the current education offer and energy sector needs.

In order to gather necessary information, the coordinators and or legal representatives in the three universities were asked to fill in the questionnaire and were then interviewed by NUOL survey team. The questionnaire and interview focused on the following issues (see Annex 1):

- General information

This section mainly touched historical data and current capacity of Mekong partner universities, in particular, number of staff members, annual students’ enrolment and graduates, academic semesters and grading system.

- Energy education

The section starts with the exploring current Energy education in partner universities: program’s name, type and degree; brief description and structure of the program; teaching arrangement, etc.

- Future needs for energy education

This section is to explore future plans/needs of partners’ universities concerning the energy education.

- Employability

This section focused on access to finding employment matching with one’s study background and possible reasons for challenges.

### **3.2 Survey team and process**

NUOL DEEM project team, as a leader of WP 1, is responsible for this survey. The task was planned for Month 3 to Month 7 (around January-May 2017), but implemented with significant delay and finalised in January 2018 only. The delay was due to survey design, administrative issues, partner's ability to provide responses to surveys, and managerial issues.

NUOL DEEM has sent the questionnaire to partners' institution DEEM team before dispatching NUOL DEEM staffs to do further surveys in Yangon and Phnom Penh.

The surveys started from meeting with partner institutions' DEEM project team and interviewing of relevant people in charges of academic affairs/education. By the ways, the general statistics data was also collected. Furthermore, some data were taken from the official websites of Mekong partners' universities [0-0] and somewhere else [0].

### **3.3 Stakeholder seminars**

By time of publishing this report, four stakeholder seminars were organised in all three countries: Laos, December 2016

Cambodia, October 2017

Laos, October 2017

Myanmar, October 2017

The seminars gathered altogether more than a hundred participants from various stakeholder organisations; ministries, research institutes, private sector, international and national civil society organisations, UN entities, embassies and other development actors and donors.

Key findings from the key stakeholder workshops indicate: 1) Strong reliance on international actors in the energy sector development and therefore 2) Inadequate capacity of local human resources to respond comprehensively to energy sector challenges 3) Lack of systematic linkages and collaboration between the academia, ministries and private sector actors especially in the energy sector thus 4) The local universities are not capable of updating the energy sector needs in the educational offer 5) transitions towards sustainable energy futures (even 100%) are possible but need to take into account also societal and environmental aspects that in the current energy planning are often secondary priorities after economic determinants

As a result DEEM project was to take into account 1) strengthening the academia-government linkages especially through collaboration and by inviting the government in relevant trainings and events 2) enhancing the approach to holistic nature of energy planning that goes beyond technical aspects 3) Strengthen the educational offer to respond to the current societal and

environmental challenges especially in the energy sector. More seminars are expected at a later stage of the project.

## 4 Results

### 4.1 General information

University of Yangon (founded in 1920) is the oldest of the Mekong DEEM partners' universities, while NUOL (founded in 1996) is the youngest one. For Myanmar universities (e.g., YTU and UY), the bachelor programs were closed for 1996-2013, therefore, upon the survey period there was no established tracking system of alumni for a full reflection on employability in Myanmar. It was observed that despite young age, NUOL is the largest among partners' institutions in term of either staffs number or students enrolment.

Different Postgraduate programs are offered in all institutions except for RUPP. Two annual study semesters are applied in all institutions, but timing varies. There is also no unified grading system: 5 levels (UY and YTU), 6 levels (RUPP), 8 levels for ITC and NUOL. None of the universities apply the Bologna principles (ECTS) in grading. Finding common accreditation systems for the ASEAN universities are currently ongoing to internationalise the teaching offer and its' related credits for transferability in other universities.





## 4.2 Energy education

### 4.2.1 Existing energy curricula

Energy education has different status in partner's institutions. Commonly there are no energy-dedicated PhD programs offered at any partners' institutions at the time of investigation, 2017 (Table 1).

Master program in energy-related fields are offered as follows:

ITC, M. Eng. in Energy Engineering and Management

YTU, M.S. Eng. in Renewable Energy Engineering

NUOL, M.Sc. in Renewable Energy

Energy Bachelor degree are offered at ITC and NUOL. Different diploma/associate degree programs in energy related fields are offered at ITC and YTU. Besides, YTU also offer short term program: post graduate diploma in Biomass energy and Renewable energy system. at the moment of study, UY only offers various courses within the Physics degrees related to renewable energy, but no degree.

Table 1 Energy related education programs

Description of programs	Institutions				
	ITC	RUPP	YTU	YU	NUOL
PhD program	0	0	0	0	0
Master degree	1	0	1	0	1
Bachelor degree	1	0	0	0	1
high diploma/Associate degree/	1	0	1	0	0
Short term program	0	0	2	0	0

Energy-related topics that commonly included in to teaching learning programs in partners' institutions include (1) Renewable energy; (2) Energy conversion; (3) Energy efficiency and Energy conservation; (4) Energy for sustainable development; (5) Energy security.

### 4.2.2 Future needs for energy education

When asking about the future objectives and needs in energy education programs, universities had different priorities, depending mainly on their current status as well as the national energy policy focus. ITC has a plan to launch master program in energy engineering and resource management, while NUOL is about to start Master program in Energy management during 2018. YTU planned to offer Master programs in renewable energy, energy management and security. RUPP shown a need to add one more subject "Climate change science" in to environment and UY did not show their future needs for launching energy education programs in 2017, but rather updating their old courses.

In Myanmar, curricula updates are decided upon the respective ministry (since higher education reform, Ministry of Education) and cannot be altered autonomously but with agreement from all national departments offering similar curricula. Thus, in UY Physics degrees have been fixed with the national curricula. The National Education Strategic Plan (NESP) for 2016-2021 seeks and supports autonomy for Myanmar universities that would allow more freedom in the design and implementation of education, substance, and pedagogical approaches.

All stakeholder consultations have emphasised the critical need of understanding the linkage between energy sector development, national development goals and economic growth, together with impacts of climate change and potentials of renewable energy. Also the regional context and implications of Chinese and Thai investments, to name but a few, impact the sector strongly. Increasing national expertise and educating experts familiar with the context and motivation to develop and improve their home country are critical.

Ministries, national planning agencies and other decision making bodies wish to consult universities more and include latest academic research and knowledge into processes.

### 4.3 Employability

YTU and UY have reopened their bachelor degree in 2012-13 academic year, therefore, there were yet no graduates by the surveys dates and were not able to give estimate on the graduates' place of employment proportion. They also do not yet have thorough tracking system in place as of 2017. In case of NUOL, there was not existing comprehensive surveys on employment of its graduates and thus, no information on graduates' employability to date. Therefore, only information from ITC and RUPP are available (Table 2): almost 88% of ITC graduates have gotten jobs in private sector, while only half (50%) of RUPP graduates joined work private companies.

Table 2 Employment proportion of graduates

Institution name	ITC	RUPP	YTU	TU	NUOL
Governmental sector	2%	30%			
State owned enterprises	5%	0%			
Private companies	80%	50%			
Founded their own business	3%	0%			
Other (please specify)	10%	20%			
<b>Total</b>	<b>100%</b>	<b>100%</b>			

Usually the graduates from ITC and RUPP do easily find a job. The reasons of getting job easily probably are as following: *qualification and job requirements matched; graduates qualification; university facilitates to labour market*. Besides additional graduates' properties, such as *interpersonal skills, language skills* also play an important role. ITC also emphasised the importance of *personal network and contact, and adaptability and flexibility of student's*

*employment expectations.* In case of NUOL, the graduates of Faculty of Engineering usually have no problem with employment. This information is gathered through personal communication with students, not with an official alumni tracking system. Education and economic trends in society has affected in excessive enrolment to some specializations but due to limited/low market demand, high number of the graduates can result in difficulty with employment. ITC also pointed to a fact that ability to locate jobs near home or in own region could serve as another difficulty reason in job finding.

## 5 Discussion and conclusion

As seen from the survey results, despite of high priority and crucial role of energy sector in Mekong area countries, the current energy education does not yet meet the rapidly developing national needs. Most universities offer some degree programmes or courses related to energy engineering, but the offer is still rather technical and does not reflect the current needs. As stated in national policy documents and development priorities, energy sector development requires problem-based, analytical, long-term and interdisciplinary skills and knowledge that can consider various aspects and the complexity of the development challenges these countries face today. In such vulnerable contexts, also societal, cultural, political and environmental considerations must be made.

This study and analysis indicate that the topics, approaches and pedagogics that form the essential focus of the DEEM project are urgently needed in all partner universities, yet with institutionally tailored focus and level of depth. Not only is it enough to update current courses with improved pedagogics and student-centred, problem-based approaches and renewable energy technologies as topics, but also new degree programmes with interdisciplinary energy studies in focus.

## 6 References

Lao PDR National Strategic Economic Development Plan 2016-2020

[http://www.la.one.un.org/images/publications/8th\\_NSEDP\\_2016-2020.pdf](http://www.la.one.un.org/images/publications/8th_NSEDP_2016-2020.pdf)

OECD (2018) Economic Outlook for Southeast Asia, India and China 2019.  
<http://www.oecd.org/dev/asia-pacific/sao-2019-Lao-PDR.pdf>

Renewable Energy Development Strategy for Laos (2011)  
<http://www.eepmekong.org/index.php/resources/country-reports/laos/57-laos-06/file>

Institute of Technology of Cambodia website. <http://www.itc.edu.kh>

Royal University of Phnom Penh website. <http://www.rupp.edu.kh>

National University of Laos website. <http://www.nuol.edu.la>

University of Yangon website. <https://www.uy.edu.mm>

Yangon Technological University website. <https://www.ytu.edu.mm>

<https://www.scholaro.com/pro/Countries/Myanmar/Grading-System>

## Appendix 1: General information

Table 3 General information of Mekong DEEM partners' universities

Programs \ Institution	ITC	RUPP	YTU	YU	NUOL
A. General information					
a. Foundation	1964	1960	1958	1920	1996
b. Total Staffs	361	450	527	1249	1,981
- Teaching	263	335	177	735	1,514
- PhD	58	15	86	(n/a)	139
- Master	146	280	94	(n/a)	825
- Bachelor	88	0	146	(n/a)	924
- Other	69	2	201	(n/a)	89
B. Total students (female)	3,760(850)	12,000	2046(855)	15,593	21,535(8,934)
- PhD	5	n/a	137	1,109	15
- Master	26	n/a	467	769	1,480
- Bachelor	3218	n/a	1371	4,523	19,800
- HD	511	n/a	71(26)	620	240
- Other		n/a	0	2,793 <sup>(1)</sup>	
C. Academic semester	2(Oct-Jan, Feb-Jun)	2(Oct-Jan, Feb-Jun)	2 (Dec-May, Jun-Oct)	2 (Dec-Mar, May-Sep)	2(Sep-Dec, Feb-Jun)
D. Academic grading levels	8 (F-fail)	6 (D-fail)	5 (F-fail)	5(F-fail)	8 (F-fail)

<sup>1</sup> Human Resource Development (HRD) Diploma

## Appendix 2: Questionnaire

SECTION A. INFORMATION ABOUT THE UNIVERSITY				
<b>A1</b>	<b>Your institution name:</b>			
<b>A2</b>	<b>Year of foundation</b>			
<b>A3</b>	<b>Number of staff (most recent statistics)</b>	Total		Female
		Teaching		Female
		PhD		Female
		Master		Female
		Bachelor		Female
		Other		Female
<b>A4</b>	<b>Number of students (recent academic year)</b>	Total		Female
		PhD		Female
		Master		Female
		Bachelor		Female
		Higher Diploma		Female
		Other		Female
<b>A5</b>	<b>Academic Semesters</b>	Number of academic semesters		
	First semester	From		To
	Second semester	From		To
	Third (if any)	From		To
<b>A6</b>	<b>Annual enrolments (last academic year)</b>	Total		PhD
		Master		Bachelor
		Other		
<b>A7</b>	<b>Graduates last year</b>	Total		PhD
		Master		Bachelor
		Other		
<b>A8</b>	<b>Academic Grading System</b>			
	Grading letters	Percentages or Points	GPA	Grade Description


## SECTION B. ENERGY EDUCATION

Please tick  or provide the information where appropriate

B1	Are there any special programs dedicated to energy education in your university?		<input type="checkbox"/> Yes → B2	
			<input type="checkbox"/> No → Skip to B3	
B2	(If yes) How many programs are there offered at your university? (if there more than 4 programs, kindly add more rows accordingly)			
<b>B2.1</b>	<b>Name of the program 1:</b>			
	Education duration (years)		Program's Degree	
	Type of program:	<input type="checkbox"/> Regular program; <input type="checkbox"/> Special program; <input type="checkbox"/> Intensive program; <input type="checkbox"/> Other (please specify): _____		
	Program Description and Course Structure			
	Credit points: total	Required	Elective	Others
	Number of recent enrolments	Total		Female
	Number of recent graduates	Total		Female
<b>B2.2</b>	<b>Name of the program 2:</b>			
	Education duration (years)		Program's Degree	
	Type of program:	<input type="checkbox"/> Regular program; <input type="checkbox"/> Special program; <input type="checkbox"/> Intensive program; <input type="checkbox"/> Other (please specify): _____		
	Program Description and Course Structure			
	Credit points: total	Required	Elective	Others
	Number of recent enrolments	Total		Female
	Number of recent graduates	Total		Female
<b>B2.3</b>	<b>Name of the program 3:</b>			
	Education duration (years)		Program's Degree	
	Type of program:	<input type="checkbox"/> Regular program; <input type="checkbox"/> Special program; <input type="checkbox"/> Intensive program; <input type="checkbox"/> Other (please specify): _____		

	Program Description and Course Structure						
	Credit points: total		Required		Elective		Others
	Number of recent enrolments		Total		Female		
	Number of recent graduates		Total		Female		
<b>B2.4</b>	<b>Name of the program 4:</b>						
	Education duration (years)			Program's Degree			
	Type of program:		<input type="checkbox"/> Regular program; <input type="checkbox"/> Special program; <input type="checkbox"/> Intensive program; <input type="checkbox"/> Other (please specify): _____				
	Program Description and Course Structure						
	Credit points: total		Required		Elective		Others
	Number of recent enrolments		Total		Female		
	Number of recent graduates		Total		Female		
B3	(If no) Are there energy or climate change related subjects/courses included in any programs in your university? (if there are more than 10 subjects, kindly add more rows accordingly)				<input type="checkbox"/> Yes → B4 <input type="checkbox"/> No → Skip to C		
B4	Subject's name		Program's name		Program's Degree		Credit points
B4.1							
B4.2							
B4.3							
B4.4							
B4.5							
B4.6							
B4.7							
B4.8							
B4.9							
B4.10							

### SECTION C. FUTURE NEEDS FOR ENERGY EDUCATION

C1	Are there any plans to launch Energy education programs at your university?	<input type="checkbox"/> Yes → C2		
		<input type="checkbox"/> No → skip to C3		
C2	Program name	Program Degree		
C2.1				
C2.2				
C2.3				
C2.4				
C3	Would you wish to launch Energy education programs at your university in the future?	<input type="checkbox"/> Yes → C4		
		<input type="checkbox"/> No → skip to C5		
C4	(If yes) What energy education programs would likely to be launched at your university? (please fill in the bellow table)			
	Program name	Program's Degree		
C4.1				
C4.2				
C4.3				
C4.4				
C5	(If no) Are there any energy related subjects you would like to include into existing programs in your university? (kindly add more rows, if needed)	<input type="checkbox"/> Yes → C6		
		<input type="checkbox"/> No → Skip to D		
C6	Subject's name	Program's name	Program's Degree	Credit points
C6.1				
C6.2				
C6.3				
C6.4				

### SECTION D. EMPLOYABILITY

D1	Do your graduates easily find employment?	<input type="checkbox"/> Yes → D2, D3		
		<input type="checkbox"/> No → Skip to D4		
D2	(If Yes) Where do they find jobs? (approximately)	<input type="checkbox"/> Governmental sector	Proportion %	
		<input type="checkbox"/> State owned enterprises	Proportion %	
		<input type="checkbox"/> Private companies	Proportion %	
		<input type="checkbox"/> Founded their own business	Proportion %	
		<input type="checkbox"/> Other (please specify)	Proportion %	
D3	What would be the reasons for easy employability?			
	<input type="checkbox"/> <i>Qualification and job requirements matched</i>			
	<input type="checkbox"/> <i>Graduate qualifications</i>			
	<input type="checkbox"/> <i>Universities facilitate access to labour market (networks, contacts with government, private companies, etc)</i>			
	<input type="checkbox"/> <i>Education matches labour market needs</i>			
	<input type="checkbox"/> <i>Interpersonal skills</i>			
	<input type="checkbox"/> <i>Language skills</i>			
	<input type="checkbox"/> <i>Substance skills</i>			
	<input type="checkbox"/> <i>Personal networks and contacts</i>			



	<input type="checkbox"/> <i>Adaptability of knowhow obtained</i>
	<input type="checkbox"/> <i>Adaptability and flexibility of student's employment expectations</i>
	<i>Other, please specify:</i>
D4	(If No) What would be the reasons?
	<input type="checkbox"/> <i>Qualification and job requirements not matched</i>
	<input type="checkbox"/> <i>Ability to locate jobs near home, or in own region</i>
	<input type="checkbox"/> <i>Lack of access to job information</i>
	<input type="checkbox"/> <i>Lack of consistency between university education &amp; labour market needs</i>
	<input type="checkbox"/> <i>High work experience requirements</i>
	<input type="checkbox"/> <i>Lacking interpersonal skills</i>
	<input type="checkbox"/> <i>Lacking substance skills</i>
	<input type="checkbox"/> <i>Lacking language skills</i>
	<input type="checkbox"/> <i>Lacking personal networks and contacts</i>
	<input type="checkbox"/> <i>Lacking interest in employment</i>
	<input type="checkbox"/> <i>Low salaries in public sector</i>
	<i>Other, please specify:</i>

## Appendix 3: Summary of energy education programs in Mekong partner universities

Programs \ Institution	ITC	RUPP <sup>(2)</sup>	YTU	YU	NUOL <sup>3</sup>
A. General information					
a. Foundation	1964	2000	1958		1996
b. Total Staff(female)	361 (101)	12(3)	527(325)		1,981 ( 893)
i. Teaching	263(62)	12(3)	177(126)		1,514 (519)
ii. PhD	58(9)	2(1)	86(64)		139(31)
iii. Master	146(35)	8(1)	94(65)		825(284)
iv. Bachelor	88(31)	0	146(117)		924(284)
v. Other	69(26)	2(1)	201(79)		89(50)
c. Total students(female)	3,760(850)	143(80)	2046(855)		21,535(8,934)
i. PhD	5(1)	0	137(32)		15(0)
ii. Master	26(3)	0	467(116)		1,480(519)
iii. Bachelor	3218	143(80)	1371(681)		19,800(8,307)
iv. HD	511	0	71(26)		240(105)
v. Other		0	0		
d. Academic semester	2(Oct-Jan, Feb-Jun)	2(Oct-Jan, Feb-Jun)	2(Dec-May, Jun-Oct)		2(Sep-Dec, Feb-Jun)
e. Academic grading	8 (F-fail)	8 (D/E/F-fail)	?		8(F-fail)

<sup>2</sup> Department of Environmental Science

<sup>3</sup> Faculty of Engineering only

**B2. Energy education programs**

Institutions	Program name	Department	Program degree	Type of program	Duration	Credit points
ITC	Electrical and Energy Engineering	Electrical and Energy Eng.	M. Eng.	Regular	2 years	
	Electrical and Energy Engineering	Electrical and Energy Eng.	Eng.	Regular	5 years	
	Electrical and Energy Engineering	Electrical and Energy Eng.	Associate	Regular	2 year	
RUPP	None					
YTU(ME)	Renewable Energy Engineering	Mechanical Eng.	Post Graduate Diploma	Regular	1 year	41
YTU(EP)	Renewable energy	Electrical Power Eng.	Non-degree	Regular	4 months	20
YU	None					
NUOL	Renewable Energy	Physics	M.Sc.	Batch	2 years	
	Hydropower energies Eng.	Electrical Eng.	B.Eng.	Regular	4 years	

**B3. Energy courses in other programs**

Institutions	Course name	Department	Program degree	Credit points
ITC	1. Production & conversion of Electrical energy	Electrical & Energy Eng.	Associate	2
	2. Energy conversion	Electrical & Energy Eng.	Engineer	3
	3. Energy efficiency & Conservation	Electrical & Energy Eng.	Engineer	3
	4. Technologies for sustainable development	Electrical & Energy Eng.	Engineer	2
	5. Power electronics for energy conversion	Electrical & Energy Eng.	Engineer	2
	6. Energy lab	Electrical & Energy Eng.	Engineer	2
RUPP	1. Energy, technology & environment	Environmental science	Bachelor	3
	2. Introduction to cleaner production	Environmental science	Bachelor	3
	3. Basic climate change science	Environmental science	Bachelor	3
	4. Renewable energy	Physics	Bachelor	3
	5. Energy and Sustainability	Geography and land management	Bachelor	3
YTU(ME)	1. Sustainable Energy	Mechanical Engineering	Bachelor	
YTU(EP)				
YU				
NUOL	1. Renewable energy	Environmental. Engineering and Management	M. Eng.	1.5
	2. Waste to energy	Environmental. Engineering and Management	M. Eng.	3
	3. Renewable energy	Hydraulic Engineering	M. Eng.	1.5
	4. Renewable energy	Electrical Eng.	M. Eng.	2
	5. Renewable energy	Electrical Eng.	Bachelor	2
	6. Renewable energy	Mechanical Eng.	Bachelor	2
	7. Energy conversion	Mechanical Eng.	Bachelor	2
	8. Energy Management	Mechanical Eng.	Bachelor	3
	9. Energy Management in industrial enterprise	Industrial Eng.	Bachelor	2
	10. Power Plants Engineering	Mechanical Eng.	Bachelor	3

## C: Future needs

Institutions	Program name	Program Degree
ITC	Energy Engineering and Resources management	Master program
RUPP		Master program
YTU(ME)	Renewable energy	Master program
	Energy Management and Security	Master program
YTU(EP)	Renewable energy	Master program
	Energy Management and Security	Master program
YU		
NUOL	Energy Engineering and Management <sup>4</sup>	Master program

## Section D: Employability

Institutions	ITC	RUPP	YTU <sup>5</sup>	YU	NUOL
<b>7 D 1. Do your graduates easily find the job?</b>	Yes	Yes			Yes
D 2. Where do they find their jobs?			N/A	N/A	N/A
• Government sector	2%	30%			
• State owned enterprise	5%	0%			
• Private company	80%	50%			
• Founded their own business	3%	0%			
• NGO		20%			
•					
<b>8 D 3. Reasons for easily finding job</b>					
• Qualification & Job requirement matched	Y	Y	Y		Y
• Graduates' qualification	Y		Y		Y
• University facilitates access to labour market	Y				Y
• Education matches market needs	Y				Y
• Interpersonal skill	Y	Y	Y		
• Language skill	Y		Y		
• Substantial skills	Y		Y		Y

<sup>4</sup> To start up first batch in March 2018

<sup>5</sup> YTU has just reopened graduate programs in 2012, no graduates to date of surveys

Employability issues \ Institutions	ITC	RUPP	YTU <sup>5</sup>	YU	NUOL
• Personal networks and contacts	Y		Y		
• Adaptability of know how obtained					Y
• Adaptability and flexibility of students expectation for the jobs		Y			Y
D 4. Reasons for job finding difficulties					
• Qualification and job requirements not matched					Y
• Ability to locate jobs near home or in own region	Y				Y
• Lack of access to job information					Y
• Lack of consistency between university education & labor market needs					
• Lack of consistency between university education & labour market needs					Y
• High work experience requirements					Y
• Lacking interpersonal skills					
• Lacking substance skills					
• Lacking language skills					
• Lacking interest in employment	Y				Y
• Low salaries in public sector	Y				Y