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SEMI-ANNUAL REPORT

TASK 2: HIGHER EDUCATION PROGRAMS TO SUPPLY A PROFESSIONAL WORKFORCE FOR THE ENERGY SECTOR

THE ENERGY CAPACITY INITIATIVE (ECI), CONTRACT NO.
DOT-I-00-04-00022-00, ORDER NO. DOT-I-03-04-00022-00



JUNE 2009

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ON THE COVER: Project Management Workshop for Energy Professionals and Educators – Dr. Hameed Nezhad

Semi-Annual Report

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**THE ENERGY CAPACITY INITIATIVE PROJECT (ECI),
CONTRACT NO. DOT-I-00-04-0022-00, ORDER NO. DOT-I-
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DISCLAIMER:

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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I Executive Summary

The Energy Capacity Initiative project (ECI) aims to improve skill levels among policy makers inside and outside government, as well as management skills in state-owned and private energy companies, and in NGOs. The major ECI tasks are as follows:

Task 1: Energy Issues Analysis and Dialogue;

Task 2: Higher Education Programs to Supply a Professional Workforce for the Energy Sector; and

Task 3: Support the Integration of Georgia into European and Regional Energy Institutions through Participation in Regional Workshops and Conferences.

The primary objective of Task 2 is to improve the quality of the professional workforce available for the energy sector through support for *higher education programs*. To accomplish this objective, the following activities have been completed:

1. Professional Skills Gap Analysis for trained energy economists, energy managers, engineering managers, and policy analysts

The methodology for conducting a gap analysis has:

A. In-depth interviews with key stakeholders, including: administrators and faculty members at the universities; middle to top-level managers at GoG institutions and publicly-owned and privately-owned energy sector enterprises; and independent experts. Based on these interviews, the top five skills that need improvement include “Project Design and Management,” “Energy Economics,” “Energy Planning,” “Energy Financial Analysis,” and “Energy Engineering.”

B. A quantitative survey of potential energy sector graduate students to assess their interests in the educational program(s) to be developed. This survey was conducted by BCG Consulting Group under direct supervision of ECI Team. The survey included 200 senior undergraduate students, first year graduate students, as well as professional in the energy sector. The top four areas of strong interest by potential students include “Energy Economics and Financial Analysis,” “Energy Project Design and Management,” “Energy Engineering and Technology,” and “Energy Marketing.”

C. A brainstorming session was conducted with 34 participants from major universities and the Ministry of Energy. The main purpose of this session was to present ECI’s findings on Gap Analysis and to provide guidelines for the design and development of energy curriculum that will meet the needs of the energy sector in Georgia.

2. Development of local graduate-level energy-related programs based on the energy sector needs.

After the above brainstorming session, an RFA was sent to Georgian Universities to submit proposals on graduate-level energy programs that will meet the needs of Georgia’s energy sector. After a careful review of the proposals received from the universities, the following four universities were selected to develop the energy programs.

1. Georgian Technical University to develop a **Concentration in Energy Management** for their existing graduate programs in engineering disciplines.
2. International School of Economics (ISET) at Tbilisi State University (TSU) to develop a **Concentration in Energy Economics** for their existing graduate program in economics.
3. Akaki Tsereteli State University in Kutaisi to develop a new Master's degree program in **Power Industry Technology and Management**.
4. Grigol Robakidze University (a private university) to develop a **Concentration in Energy Management** for their existing MBA program.

To train the energy-sector professionals and to assist university professors in curriculum development, Dr. Hameed Nezhad had conducted workshops on “*Project Management & Project Risk Management*,” and “*Managerial Problem Solving and Decision Making Methods*,” and will be conducting “*World Energy Scenarios to 2050: Issues and Options*” in July. The participants included university professors, energy-sector professionals, and graduate students from Tbilisi, Batumi and Kutaisi. One seminar on energy was also conducted in Kutaisi.

Six representatives from the above universities, seven from the energy sector, and one person from the Ministry of Education participated in a workshop on “*Energy Economics, Technology and Policy*” that was organized by the Engineering and Professional Development (EPD) department at the University of Wisconsin, Madison. The four university representatives were given further training on curriculum development at the end of this workshop.

The participants' evaluations indicated that all these workshops were highly useful and relevant to their needs.

3. Masters degree scholarship program for three outstanding Georgian candidates

With the assistance of the **Scholarship Committee**, five semi-finalists for US scholarship were selected and reported to USAID in a priority order. USAID selected the following top three students to be sent to U.S. for graduate studies starting fall 2009:

- Mikheil Zibzibadze from GSE to Study “Management of Technology” at the university of Minnesota;
- Marina Arabidze from GOGC to major in Environmental Studies with a Certificate in Energy Analysis and Policy at the University of Wisconsin, Madison; and
- Nana Gurgenidze from MOE to study “Energy Management” at New York Institute of Technology.

These students are already in the United States and have enrolled in the selected programs.

Future plans include monitoring students' progress and further assistance to the four selected universities in curriculum development and the establishment of a Center of Excellence on "Energy Education, Training, Applied Research, and information."

II Professional Skills Gap Analysis

The professional skills gap analysis has been conducted by in-depth interviews with key stakeholders, including administrators and faculty members at the universities; middle to top-level management at GoG institutions and publicly-owned and privately-owned energy sector enterprises; and independent experts. These interviewed were complemented by a quantitative survey of potential students for the graduate-level energy programs to be developed. After completion of the interviews and student survey, a brainstorming session was conducted with participants from major universities and the energy sector. The main purpose of this session was to present ECI's findings on Gap Analysis and to provide guidelines for the design and development of energy curriculum that will meet the needs of the energy sector in Georgia. Appendixes 1 through 3 include the list of organizations and individuals interviewed; the three sets of questionnaires for the universities, the energy sector organizations and potential students, and the agenda for the brainstorming session.

The following sections provide the details of the Gap Analysis and our findings.

1. Interviews with the Universities

Two questionnaires were developed and distributed to the targeted universities. The first questionnaire was used to interview university administrators. The objectives of this questionnaire were:

- To learn about the existing energy-related graduate-degree programs at each university; and
- To learn about the energy-related courses/modules currently being taught at each university.

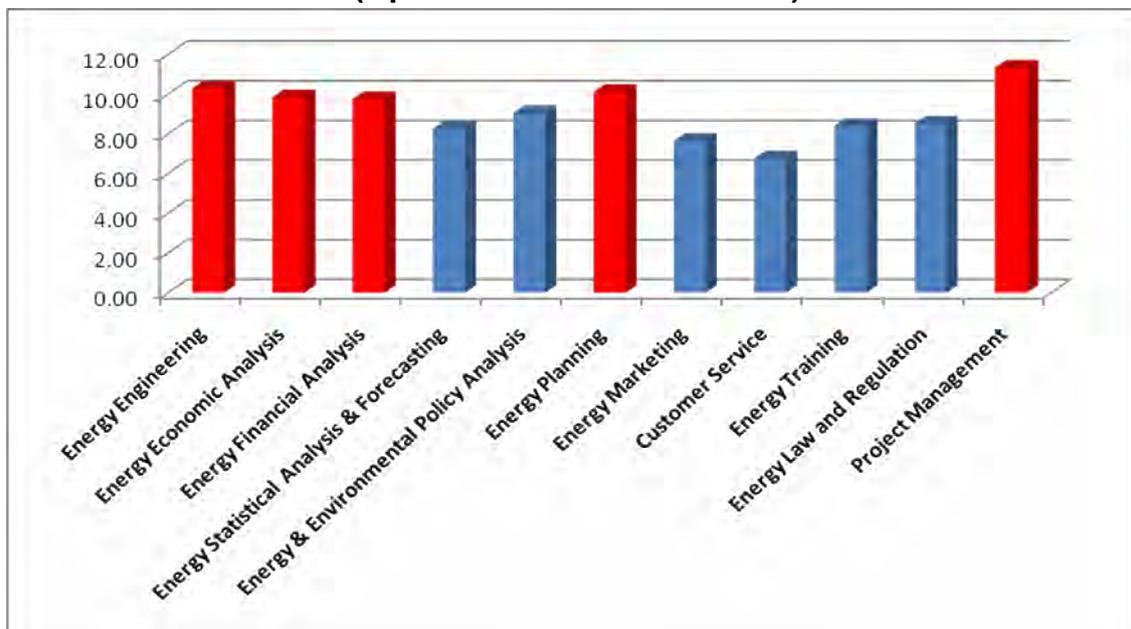
The second questionnaire was used to interview professors and curriculum unit coordinators. The objectives of this questionnaire were:

- To learn about the curriculum development process at each university;
- To seek your advice on the professional energy-related skills needed in Georgia;
- To seek advice on ways and means to improve skill levels of energy professionals in Georgia; and
- To identify and discuss the critical energy issues in Georgia.

The top five areas that need improvements are:

1. Energy Project Design and Management;
2. Energy Engineering;
3. Energy Planning;
4. Energy Economic Analysis; and
5. Energy Financial Analysis.

**Figure 1: Priorities of the Professional Skills Needed in Georgia
(Opinions of the Universities)**



Although the Technical university and Akaki Tseretli State University reported some related engineering programs, none of these programs provide sufficient training and education on the needed skills.

2. Interviews with the Energy Sector Organizations

Two types of questionnaire were developed to interview energy-sector organizations:

The objectives of the first questionnaire were:

- To learn about the existing management structure of the energy-sector organizations; and
- To learn about the quantity and quality of existing professional workforce in each organization.

The objectives of the second questionnaire were:

- To assess what are the needed professional skills in engineering, management, policy analysis, or any other relevant areas in the organization;
- To seek advice from the energy-sector employers on ways and means to improve skill levels of energy professionals in the energy sector (both public and private); and
- To identify and discuss the critical energy issues in Georgia.

More than 50 top and middle level managers in the energy sector were interviewed. Figures 2 through 6 show the results.

Figure 2: Top Managers' Educational Background

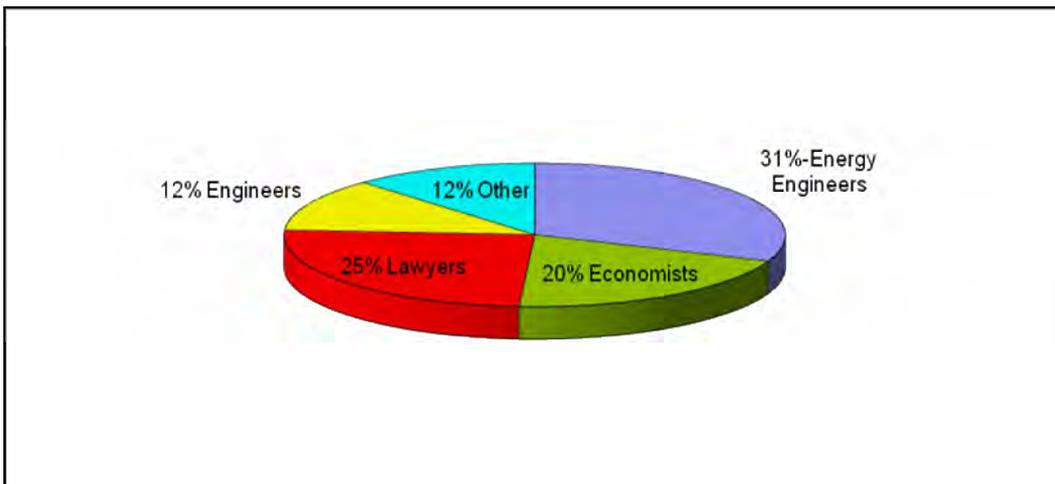


Figure 3: Mid-Level Managers' Education Background

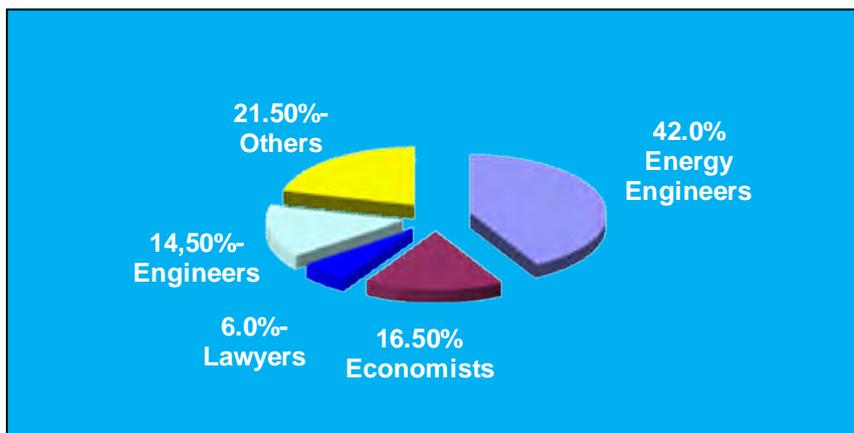
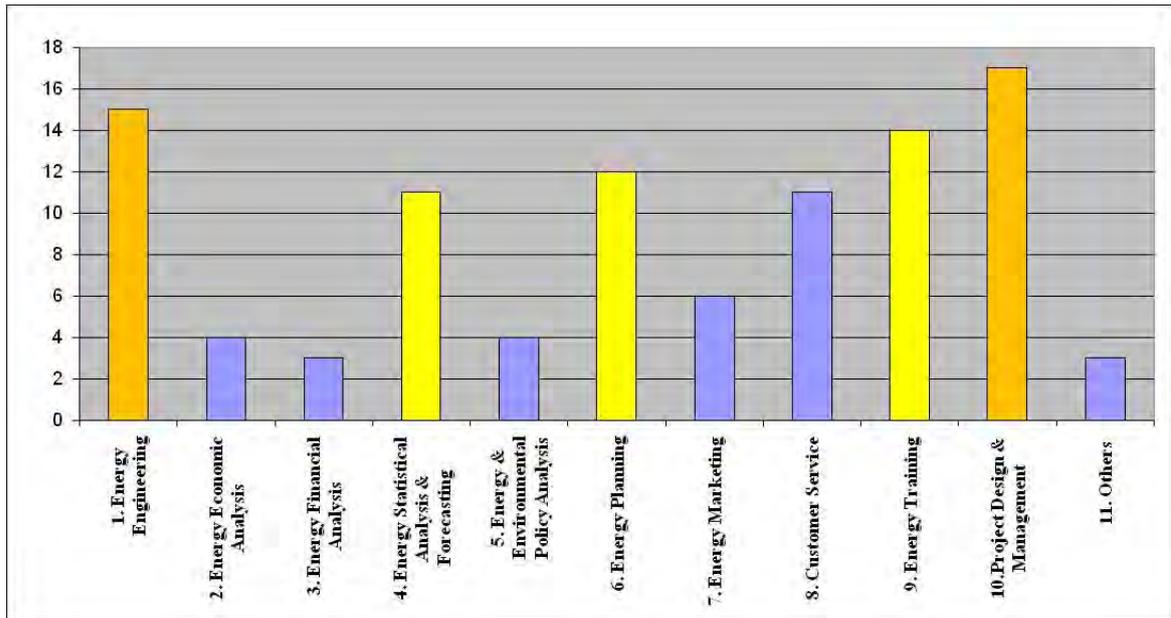


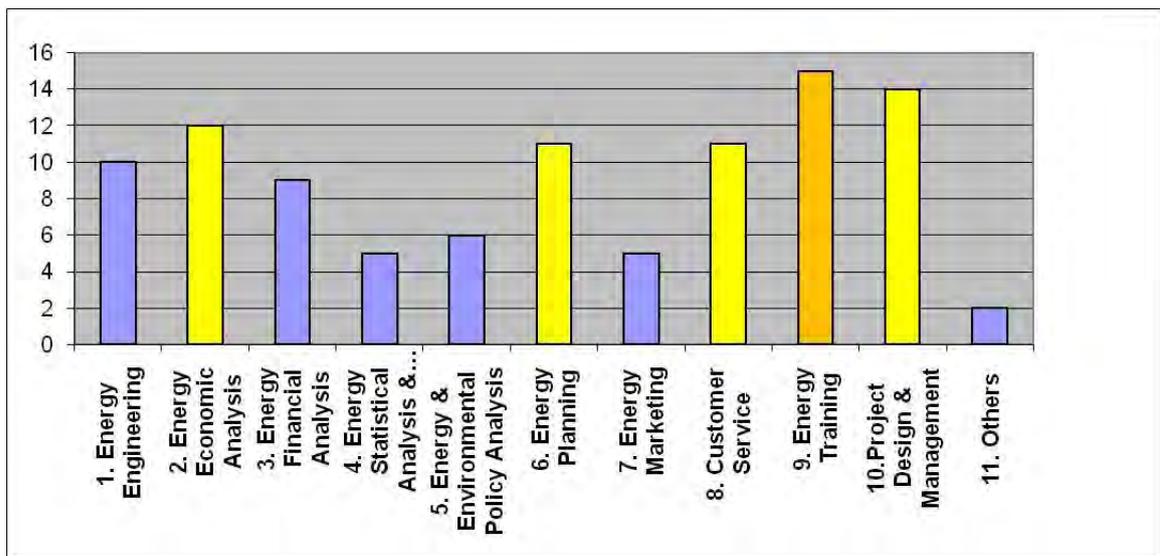
Figure 4: Gender Ratio



**Figure 5: Priorities of the Professional Skills Needed in Georgia
(Opinions of the Private Companies)**



**Figure 6: Priorities of the Professional Skills Needed in Georgia
(Opinions of the State Institutions and Companies)**



The top five areas needed by the private companies are:

1. Project Design and Management;
2. Energy Engineering;
3. Energy Training;
4. Energy Planning; and
5. Energy Statistical Analysis and Forecasting

The top five areas needed by the public sector institutions are:

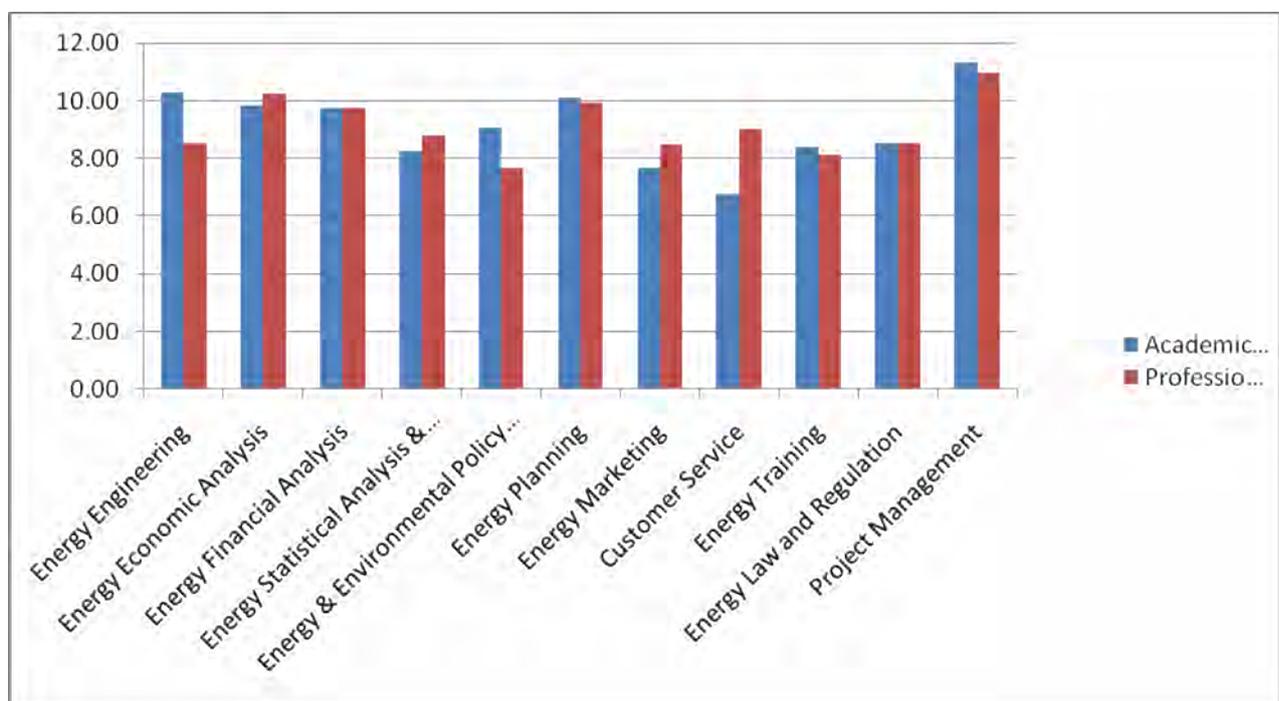
1. Energy Training;
2. Energy Project Design and Management;
3. Energy Economic Analysis;
4. Energy Planning; and
5. Customer Service.

Concluding Remarks from Skills Gap Analysis

Figure 7 shows the ratings of the needed skill areas by the universities and the energy-sector organizations. As shown in this figure, the top five skills needed in Georgia are:

1. Project Design and Management
2. Energy Economic Analysis
3. Energy Planning
4. Energy Financial Analysis; and
5. Energy Engineering

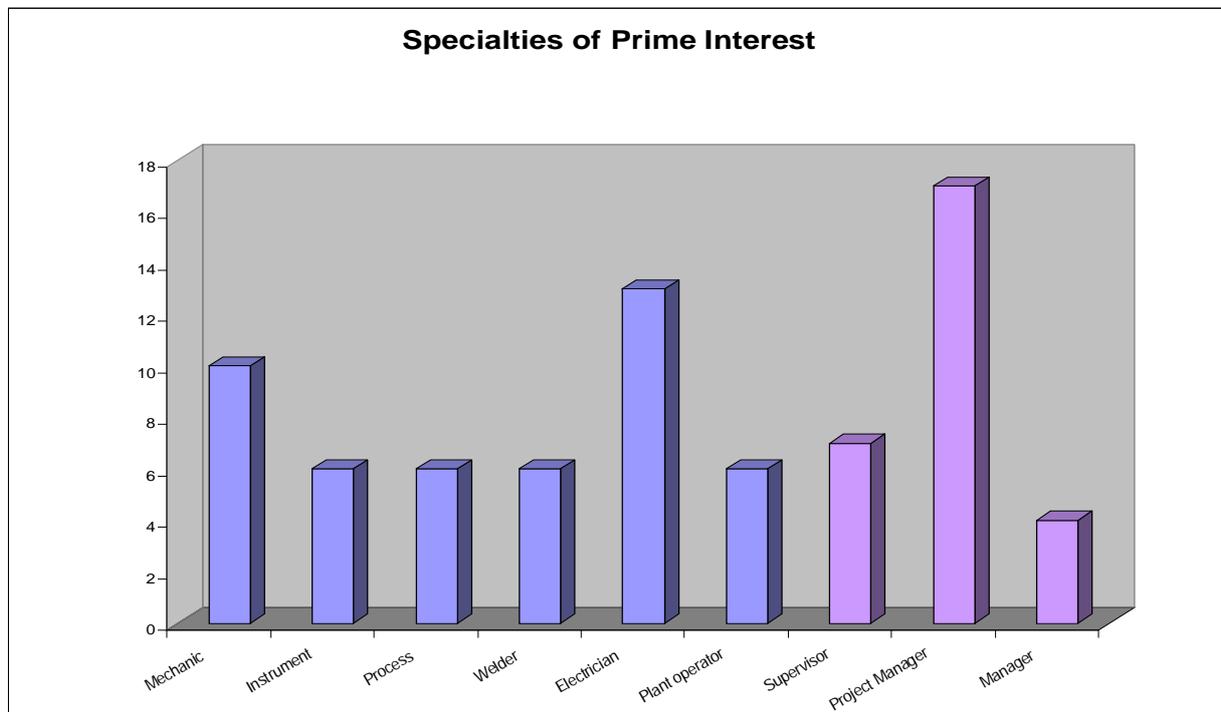
Figure 7: Professional Skills Needs Survey (Academic and Energy-Sector Professionals' Responses)



In all our interviews **Project Design and Management** was ranked very high. This is consistent with the survey conducted by the World Energy Group (WEG) in 2007 on vocation

training needs in Georgia as shown in Figure 8. The details of this study are included under literature review in Appendix 4.

Figure 8: Vocational Training Needs in the Energy Sector in Georgia



Other areas of concern mentioned during our interviews with energy-sector organizations and universities are summarized below:

- Lack of human resource (HR) development strategy in both private and public organizations. Only a few companies have job descriptions for their staff. All HR managers need further training in human resource development;
- Low salary rates in the state institutions;
- Lack of qualified staff. The experienced staff are near retirement, and young specialists (university graduates) do not have the necessary experience and knowledge;
- Lack of training capacity in various aspects related to Operations' Management, Project Management, Energy Economics, strategic planning and decision making, Energy and Environmental Policy, Vocational Education. Only 20% of the managers interviewed have received some form of training in the past three years.
- Based on our survey, 60% of respondents prefer certificates/ Short-term training courses; 30% prefer degree programs; and only 10 % prefers on the job trainings. The main problems in providing adequate training are lack of funds and lack of high-quality training programs.
- Lack of clear regulatory documents, manuals guidelines for Electricity System;
- Outdated norms and standards for electricity system operation, safety and security;

- Poor customers protection policy;
- Lack of modern education programs for energy sector;
- Lack of initiatives for efficient utilization renewable energy sources;
- Lack of energy savings and conservation policy in general and in the energy sector in particular;
- There is no long-term planning anywhere in both public and private organizations;
- Laboratories at Georgian universities are old. What students see in the labs are from the 1950s. This is not what they will see at work;
- Lack of effective collaborations between universities and industry;
- Lack of practical skills and experience. Those who are experienced lack communications, economic and financial skills. Their primary focus is on engineering. Young professionals are good in communications but lack engineering and technical experience;
- The employers complain about universities not offering what is needed and the universities are complaining about lack of cooperation by the employers;
- They need new teaching methods, new labs and equipment;
- There is no formal needs assessment. It is very much top down. The university decides to offer a new degree program without conducting any formal needs assessment;
- Ministry of Education also needs to make some changes to accommodate creation of the Energy Consortium. Currently, professionals without a Ph.D. cannot teach at the university;
- All those who were educated under the Soviet system have fallen behind in their knowledge of current issues and technologies. There is a need for continuing education;
- When we were part of USSR, all the planning were done in Moscow. After revolution, we stopped planning!

3. Survey of Potential Students for Graduate-Level Energy Programs

A quantitative survey of potential students was conducted to assess their interests in the graduate-level educational program(s) to be developed. This survey was conducted by BCG Consulting Group under direct supervision of ECI Team. The survey included face-to-face interviews of 20 energy-sector professionals, 93 undergraduate and 87 graduate students in Tbilisi, Kutaisi, and Batumi.

Figure 9 through 11 show the summary of students' survey. The details of this survey are included in the BCG report.

Figure 9: Interest in Energy-related Studies and Profession

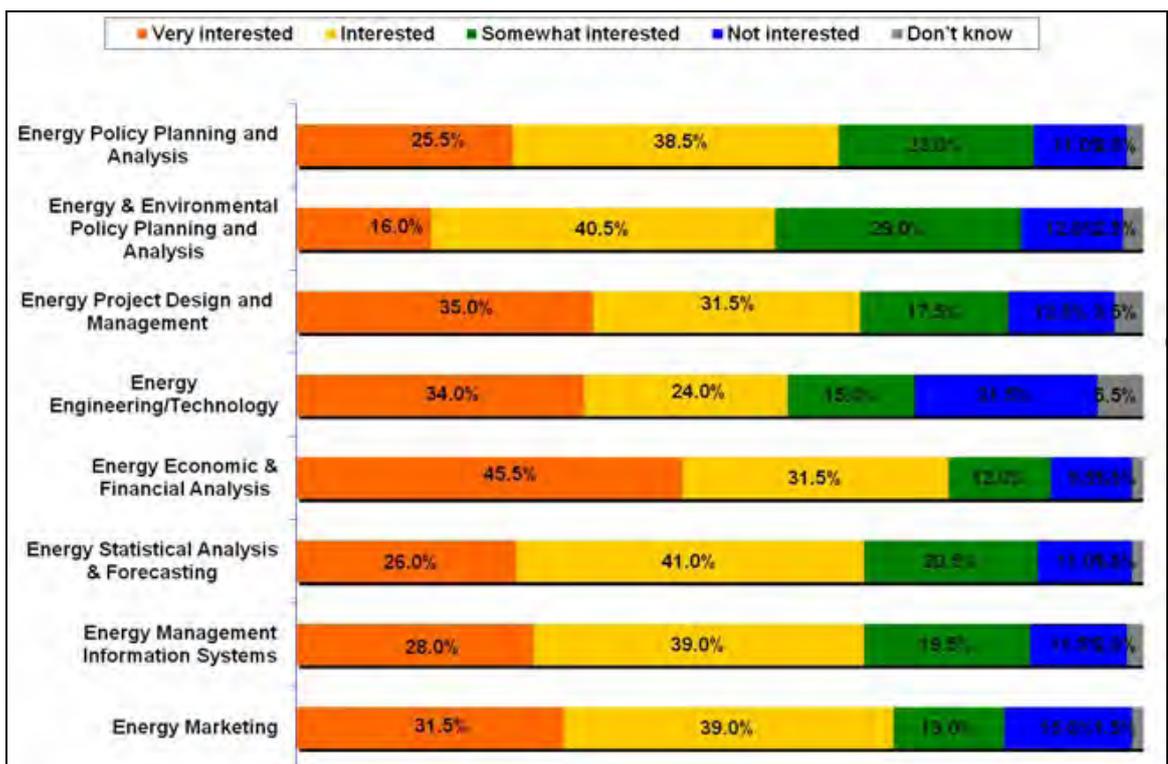


Figure 10: Preferences on Energy-Studies' Options

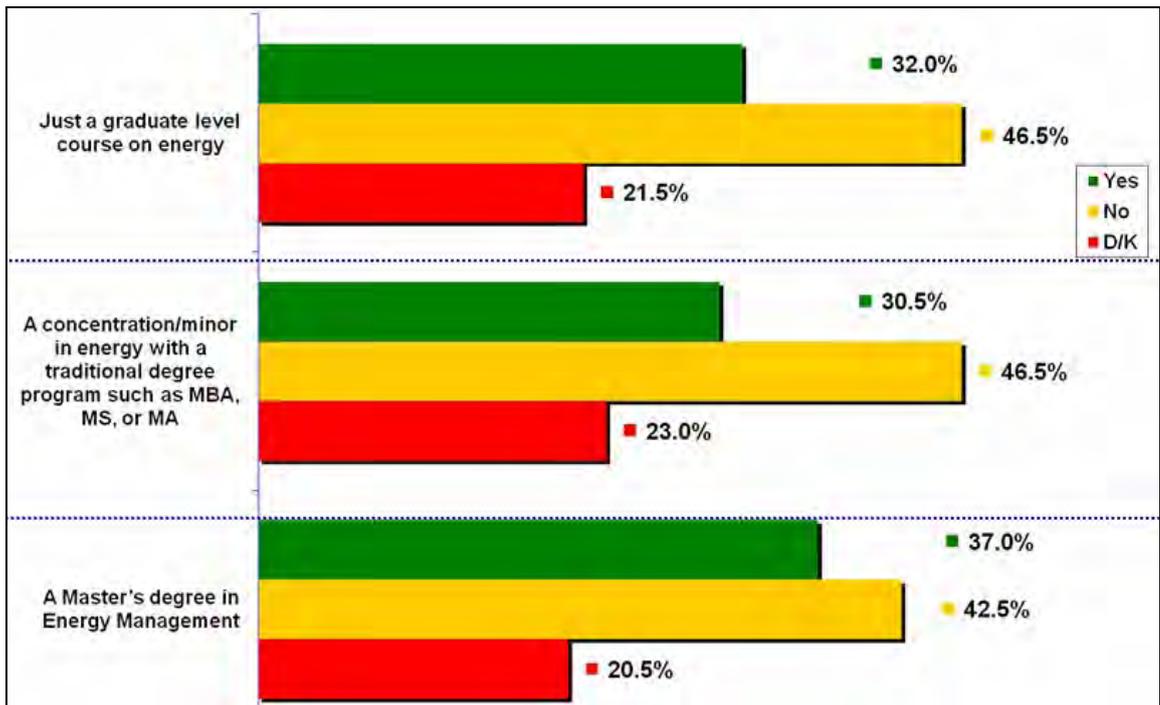


Figure 11: Preferences on Working for an Energy Organization

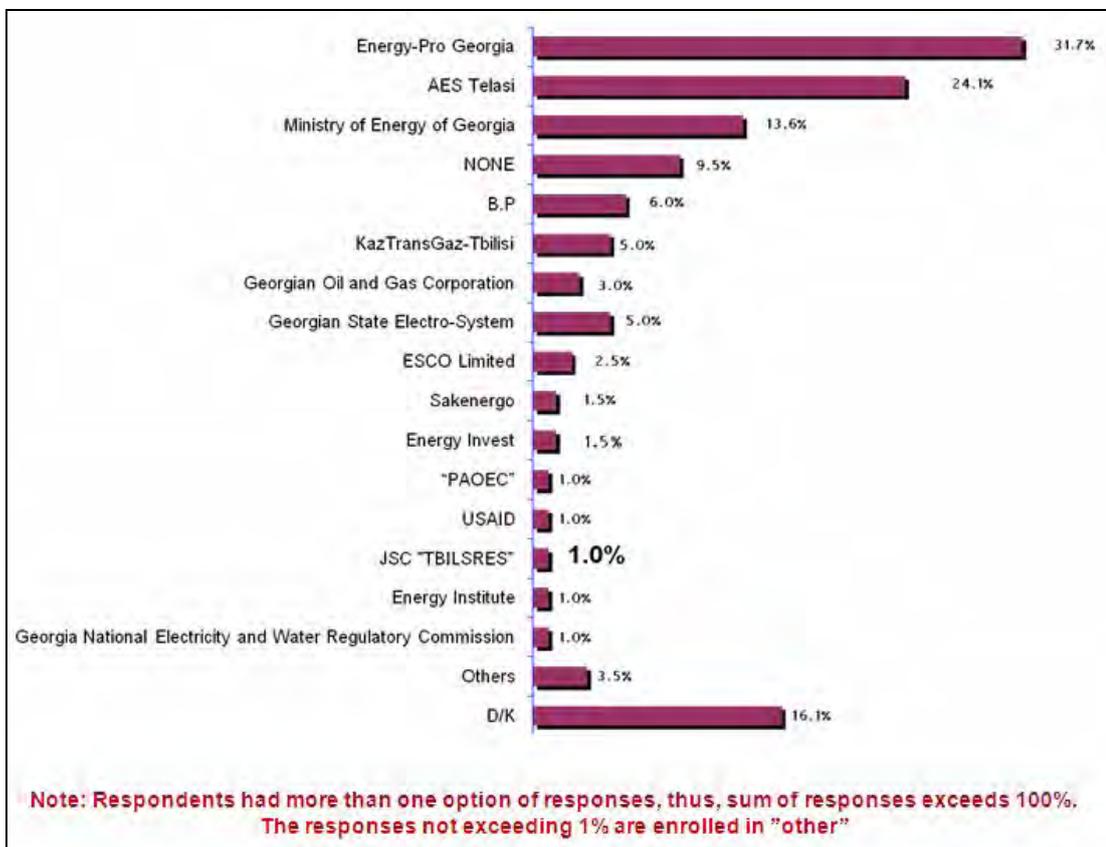


Figure 9 shows that the top four areas of strong interest by potential students include “Energy Economics and Financial Analysis,” Energy Project Design and Management,” Energy Engineering and Technology,” and “Energy Marketing.” This is consistent with our findings on the needed skills areas in both public and private sectors in Georgia. Figure 10 indicates that there is equal demand for variety of options such as just a course on energy; a concentration in energy with a traditional degree programs such as MBA, MS and MA; as well as a new Master’s degree program in energy management. Figure 11 shows students’ interest in working for an energy organization in Georgia. The top three included Energy-pro Georgia, AEs Telasi, and the Ministry of Energy.

Critical Energy Issues in Georgia

In all three surveys the respondents were asked to rate the critical energy issues in Georgia. Table 1 summarizes the results.

Table 1: Ratings of the Critical Energy Issues in Georgia

Critical Energy Issues in Georgia	Ratings by Universities	Ratings by Energy Sector	Ratings by Potential Students
Enhancing Energy Supply Security	1	9	4
Increasing energy supply in the region through regional cooperation (with the neighboring Caucasus republics as well as Turkey and Iran)	3	4	8
Developing and Implementing a National Energy Plan	4	3	2
Increasing awareness of energy issues among policy makers, private sector, educators, journalists, and general public	5	2	10
Increasing public understanding of, and participation in, decisions regarding delivery of energy services	8	1	11
Improving the process and methodologies for calculating energy tariffs	9	1	7
Improvement of electricity transmission and distribution system	6	8	3
Expanded use of renewable energy sources, particularly hydro, geothermal, solar, wind, and biomass energy	7	5	5
Promotion of energy efficiency and conservation measures for residential, commercial and industrial users	10	2	12
Minimizing environmental impacts of energy production, transportation, and use.	11	1	9
Educating and training needed workforce in the energy sector	2	8	6
Reliability of energy supply	11	6	1

III Local Energy-Related Programs

An RFA was sent on March 16 2009 to Georgian Universities to submit proposals on graduate-level energy programs that will meet the needs of Georgia's energy sector. By the deadline (April 13, 2009), the following eight proposals were received from Georgian universities.

Table 2: Higher Education Grants Proposals

Universities	Proposed Programs
1. Grigol Robakidze University (Private)	Energy Management Concentration
2. Shota Rustaveli State University	Master's degree in Energy Management
3. Akaki Tsereteli State University	Power Industry Technology and Management
4. Georgian Technical University	Concentration in Energy Economics
5. Georgian Technical University	Master of Science in Energy Management
6. Iv. Javakhishvili Tbilisi State University	Master of Science in Energy Management
7. Tbilisi State University of Economic Relations	Master's degree in Energy Economics
8. Iv. Javakhishvili Tbilisi State University - ISET	Concentration in Energy Economics

A "**Grants Committee**" consisting of seven members from ECI (Hameed Nezhad, Tsira Chikvaidze, Tornike Gotsiridze and Charles Burge), USAID (Mariam Ubilava and John Hansen), Ministry of Energy (Maia Makharashvili) and Ministry of Education (Nugzar Chitaia) formed to evaluate the submitted proposals. Each application was examined and rated individually as shown in the following table. Then, using Decide 2000® Software program, the proposals were compared with each other and rated according to the given criteria. The results are shown in Table 3 and Figures 12 through 15.

Table 3: Evaluations of Eight Higher Education Grant Proposals

		Energy Sector Needs	Sustainability	Qualifications	Partnerships	Cost-effectiveness			
NO	NAME	30	30	20	10	10	Total Score	Budget	Credits
1	Grigol Robakidze University (Energy Management Concentration)-Pr.	29	26	19	5	8	87	81,498	30
2	Shota Rustaveli State University (Masters degree program in Energy Management)	10	10	15	0	5	40	144,506	120
3	Akaki Tsereteli State University (Power Industry Technology and Management)	30	30	19	9	9	97	133,615	120
4	Georgian Technical University (Concentration-Economics of Energy)	30	10	10	5	5	60	60,000	120
5	Georgian Technical University (Master of Science in Energy Management)	29	25	19	2	9	84	80250	120
6	Iv. Javakishvili Tbilisi State University (Master of Science in Energy Management)	20	10	18	5	5	58	150,000	120
7	Tbilisi State University of Economic Relations (Master's degree program in Energy Economics)	20	10	18	7	2	57	399,651	120
8	Iv. Javakishvili Tbilisi State University -ISET (Concentration-Energy Economics)	30	25	20	9	10	94	200,000	21

Table 3 (Continued)

NO	NAME	COMMENTS
1	Grigol Robakidze University (Energy Management Concentration)-Pr.	The proposed concentration with some modification is needed and sustainable. Partnership is unclear. Budget need to be revisited.
2	Shota Rustaveli State University (Masters degree program in Energy Management)	No partners. Lack of justification of statements about the needs, number of students, and placement of the graduates. The proposal and course requirements lack focus.
3	Akaki Tsereteli State University (Power Industry Technology and Management)	Good partners. Focused curriculum. The requirements seem reasonable. The budget seems reasonable.
4	Georgian Technical University (Concentration-Economics of Energy)	Curriculum not focused. The role of the partner not explained. Cost not explained. Too many credits.
5	Georgian Technical University (Master of Science in Energy Management)	Curriculum is comprehensive, but lack focus on where the graduates would fit. If they are educating "Energy Managers" who will manage energy use, they should focus on that.
6	Iv. Javakishvili Tbilisi State University (Master of Science in Energy Management)	The program looks like an MBA with concentration in Energy MGMT. No justification is given for the projected enrollments.
7	Tbilisi State University of Economic Relations (Master's degree program in Energy Economics)	The requirements are mostly from MBA. Energy courses are not well-defined and redundant!
8	Iv. Javakishvili Tbilisi State University -ISET (Concentration-Energy Economics)	Not many Georgians are involved in the project. However, the program quality is almost guaranteed by involvement of international experts. Good curriculum. The proposed budget includes \$105,000 scholarships

Figure12: Decision Model

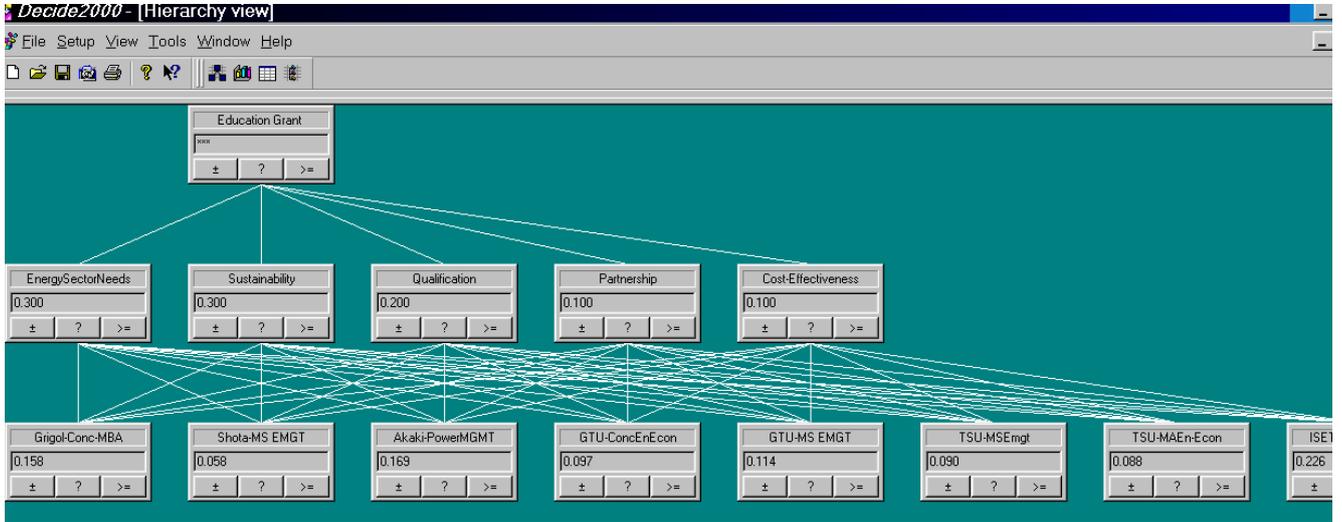


Figure 13: Priorities of Criteria and how each proposal is ranked against them

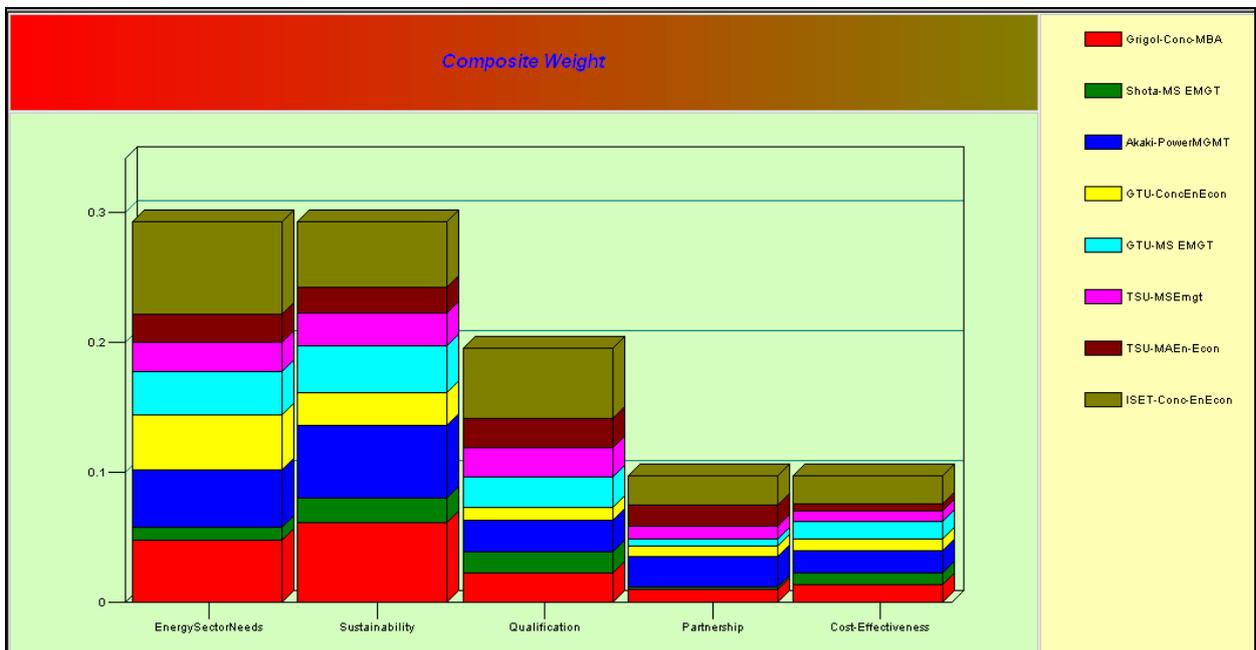


Figure 14: Priorities of Proposals against each criterion and their overall priorities

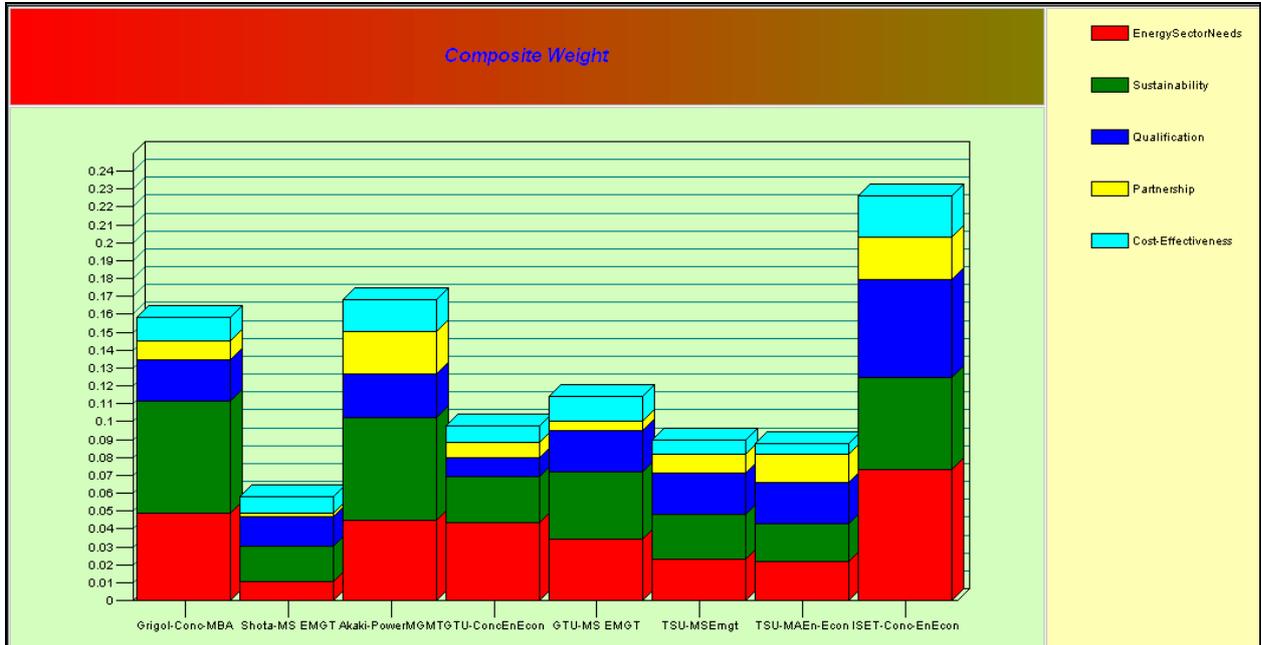
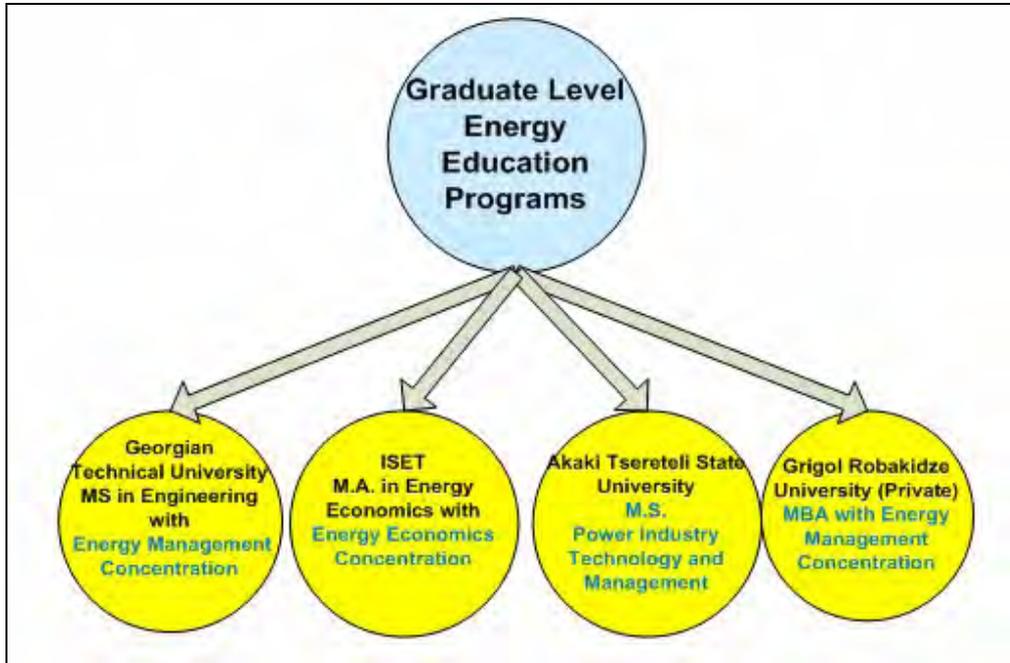


Figure 15: Payoff table showing priorities of criteria and proposals

level <input type="text" value="3"/> versus level <input type="text" value="2"/>						
Level 2	EnergySectorNeeds	Sustainability	Qualification	Partnership	Cost-Effectiveness	
Weight	0.30	0.30	0.20	0.10	0.10	
Level 3						Composite Weight
Grigol-Conc-MBA	0.16	0.21	0.12	0.10	0.13	0.158
Shota-MS EMGT	0.03	0.07	0.08	0.02	0.09	0.058
Akaki-PowerMGMT	0.15	0.19	0.12	0.24	0.18	0.169
GTU-ConcEnEcon	0.14	0.09	0.05	0.09	0.09	0.097
GTU-MS EMGT	0.11	0.12	0.12	0.06	0.14	0.114
TSU-MSEmgt	0.08	0.08	0.12	0.10	0.08	0.090
TSU-MAEn-Econ	0.07	0.07	0.12	0.16	0.06	0.088
ISET-Conc-EnEcon	0.24	0.17	0.28	0.24	0.23	0.226

Based on the above evaluations of the proposals, the following four universities were selected to develop the energy programs.

Figure 16: Selected Energy Programs



IV Training and Faculty Development

To train the energy-sector professionals and to assist university professors in curriculum development, Dr. Hameed Nezhad had conducted several workshops on “*Project Management & Project Risk Management*,” “*Managerial Problem Solving and Decision Making Methods*,” and “*World Energy Scenarios to 2050: Issues and Options*.” The participants included university professors, energy-sector professionals, and graduate students from Tbilisi, Batumi and Kutaisi. The last seminar on energy was also conducted in Kutaisi.



Six representatives from the universities, seven from the energy sector, and one from the Ministry of Education were selected to participate in a workshop on “***Energy Economics, Technology and Policy***” at the University of Wisconsin, Madison.

Prior to this workshop a pre-departure seminar for the 14 participants will be organized by Dr. Hameed Nezhad and Tsira Chikvatze. This seminar will include an introduction to the American cultural values and education system as well as details of the upcoming workshop and trip details.

V U.S. Scholarship Program

A five member committee representing USAID and ECI evaluated 72 completed scholarship applications that were received by the deadline. Using the following criteria - **academic excellence, quality of essay, and professional experience** - each committee member rated the applicants and then, using a spreadsheet, overall ratings were calculated. The committee members decided to invite the top 26 applicants for an interview.

Using the following criteria - **academic preparedness, motivation, communication skills, knowledge of the energy issues in Georgia, and leadership potential** - each committee member rated the interviewees using an Excel spreadsheet. The committee members decided to pick top 14 applicants for further evaluations. All these candidates were advised to take TOEFL (Test of English as a Foreign Language) and either GRE (Graduate Record Examination) or GMAT (Graduate Management Admission Test) examinations. ECI staff assist the candidates in taking these exams.

After receiving the test scores, five semi-finalists for US scholarship were selected and reported to USAID in a priority order. USAID selected the following top three students to be sent to U.S. for graduate studies starting fall 2009. Table 4 includes background information on the scholarship recipients. These students are already in the United States and have enrolled in the selected programs. Appendix 6 includes information on the selected energy programs.

Table 4: U.S. Scholarship Recipients

Name	Affiliation	TOEFL Score	Test	Test Score	Scores by the Scholarship Committee	Program
Mikheil Zibzibadze	GSE	600/4.5	GMAT	570/57%	95%	Master of Science in Management of Technology University of Minnesota Technological Leadership Institute
Marina Arabidze	GOGC	650/5.5	GRE	910	97%	Master of Science in Environmental Studies with Energy Analysis & Policy Certificate University of Wisconsin The Nelson Institute
Nana Gurgenidze	MOE	565/4.5	GRE	890	85%	Master of Science in Energy Management New York institute of Technology

VI Vision for the Creation of Center of Excellence for Energy Education, Training, Applied Research, and Information

In all our interviews with the university leaders, directors and faculty members as well as the top-level managers at the energy-sector organizations, the idea of creation of a **Center of Excellence for Energy Education, Training, Applied Research, and Information** was welcomed with great excitements. The “Center of Excellence” would serve not only the Georgian energy sector but the region as well.

Due to the interdisciplinary nature of energy, effective energy education and training programs require collaborations of many experts from different universities and the energy-sector organizations. Creation of a Center of Excellence will bring **stability** and **sustainability** to capacity building in the energy sector in Georgia. The Center would become self sufficient financially through its educational and research services to the energy sector in Georgia and the region. There are a number of energy centers in the United States with many years of successful operations. For example, the Department of Engineering Professional Development at the University of Wisconsin; **Center for Energy and Environmental Policy at the University of Delaware** (<http://ceep.udel.edu/ceep.html>); the **Energy and Resources Group** at the University of California, Berkeley (<http://socrates.berkeley.edu/erg/index.shtm>); and the **Nelson Institute** at the University of Wisconsin (<http://www.nelson.wisc.edu/grad/eap/curric.htm>).

The functions of the Center would include:

1. Energy Education

Graduate, undergraduate, and vocational energy education;

2. Energy Training

The Center could provide training to the energy sector organizations on variety of topics from current trend in energy technologies to analytical skills and management skills;

2. Applied Energy Research

Applied energy research could be designed to support activities of the energy-sector organizations from technical assessment to economic, financial, and policy analyses for both private companies and public institutions;

3. Energy Information

The Center could become a reference center for teaching and research on energy issues and technologies through its collection of both online and traditional reference materials and experts to guide the potential clients.

To ensure continuity and sustainability of our efforts in energy education and training, ECI team believes that the creation of a “Center of Excellence for Energy Education, Training, Applied Research, and Information” should be a high priority task . The first step recommended is to assess feasibility, local and regional impacts, and the investment requirements for the creation of such a center. Many Universities in the US have such

associated research institutes. These institutes provide more direct consulting with business and government than is possible in a strictly academic setting.

ECl conducted a brainstorming session on the concept of ***“The Center of Excellence”*** during the pre-departure orientation seminar as well as during the workshop at the University of Wisconsin. Appendix 7 is the outline provided by Dr. Nezhad. The seminar participants were asked to think about the elements of such a center and report back to ECl.

VII RECOMMENDATION

- A “**Working Group**” must be formed immediately by the four university grant recipients to start discussion and formation of the “**Center of Excellence for Energy Education, Training, Applied Research, and Information** (CEE).” This working group must meet at least monthly and every grant recipient must include their participation and contribution to this working group in their monthly report to ECI. The Working Group must plan and implement formation of CEE before the end of December 2009. The plan must include short, medium, and long term strategies for CEE. The participants of UW workshop will be exposed to some samples of such centers. They will also discuss the possibility of the formation of a “**Caucuses Center for Energy and Environmental Studies**” at UW and its potential collaboration with CEE.
- A one-day seminar on “**Energy Economics, Technology, and Policy: The American Experience**” should be organized in September after the participants return from the workshop/seminar on “**Energy Economics, Technology and Policy**” at the University of Wisconsin, Madison in the USA. . The objective of this seminar is to have the UW-workshop participants share their experiences. The seminar should be in two parts. The morning session would focus on the energy sector and the afternoon sector should focus on higher education. Besides the professionals and educators, the media should also be invited to this seminar.
- With EPD’s assistance, ECI should collaborate with Wendt Engineering Library. The objective of this collaboration should be to assist the four grant recipient universities in finding relevant online materials for course development. One of the key conditions of this collaboration should be access to UW library for at least 6 months.
- The four universities should submit a report to ECI regarding their needs for international consultants for curriculum development. We will then decide on how to proceed.
- Academic progress of U.S. scholarship recipients must be monitored closely and they should be assisted to complete their programs successfully.
- ECI must encourage the four grant recipients to subscribe to online library materials collectively. They have learned about online library resources at the UW workshop.
- The four university grant recipients must be required to submit monthly report to ECI to show their progress towards implementation of their proposed energy-related graduate programs. Their progress should be monitored closely by ECI team.

APPENDIX 1

LIST OF ORGANIZATIONS AND INDIVIDUALS THAT HAVE BEEN INTERVIEWED

1. Governmental Institutions

Ministry Of Energy

1. Deputy Minister (Levan Mchedlishvili);
2. Head of Administrative Department;
3. Head of Legal Department;
4. Head of Energy Department;
5. Head of Division of Energy Recourses;
6. Head of Division of Management;
7. Head of Division of Investment projects;
8. Head of Department of International Relations and Investment Projects

Georgia National Energy and Water Regulatory Commission GNEWRC

9. Commissioner (Irma Kavtaradze)
10. Executive director
11. Head of Economic Analyze and Price Making department
12. Head of methodology Department
13. Head of Electricity, Natural Gas Department
14. Head of Human Resource Department;

Parliament of Georgia

- Sector Economy and Economic Policy Committee
15. Chairman;
 16. First Deputy Chairman

2. State-Owned Companies

Georgia State Electrosystem (GSE)

17. Executive Director;
18. Technical Executive Director;
19. Commercial Executive Director;
20. Administrative Executive directors;
21. Department of Coordinating International Projects
22. Department Contracts and Expertise.

Electricity System Commercial Operator (ESCO)

23. Director
24. Head of Human Resource Department

Georgian Oil and Gas Corporation (GOGC)

25. Commercial Director

- 26. Head of Contracting Department;
- 27. Head of Strategic Designing Department

3. Private Energy Companies

Energo-Pro

- 28. Executive Director;
- 29. Operations manager
- 30. Commercial manager

Energy Invest

- 31. Executive Director

Telasi

- 32. General Director

Frontera Resources

- 33. General Director

4. Universities

Georgia Technical University

- 34. Faculty of Civil Engineering
Dean of the Faculty-**Zurab Gedenidze**, Full Professor
- 35. Faculty of Power Engineering and Telecommunication
Dean of the Faculty-**Gia Arabidze**, Full Professor
- 36. Humanitarian-Social Faculty
Dean of the Faculty-**Rusudan Kutateladze**, Full Professor

Tbilisi State University

- 37. Dean of Faculty of Electronics
- 38. Dean of Faculty of Economics

International School of Economics

- 39. Executive Director
- 40. Chancellor
- 41. Dean of School of Economics and Business

Batumi University

- 42. Dean of Faculty of Economics
- 43. Dean of Faculty of Business administration

Kutaisi University

- 44. Dean of Faculty of Energy
- 45. Dean of Faculty of Economics

Open University

- 46. Deputy Principal
- 47. Director, MBA Program

5. NGOs & Think Tanks

- 48. Georgian Foundation for Strategic and Informational Studies (GFSIS)
- 49. Civil Society Institute
- 50. Open society of Georgia
- 51. Georgians for Transit Development Transparency and Regional Integration (GTDTRI)
- 52. Caucasus Environmental NGO Network
- 53. Energy Academy
- 54. Director of the Energy Efficiency Center

APPENDIX 2

QUESTIONNAIRES

QUESTIONNAIRE FOR UNIVERSITY ADMINISTRATORS

OBJECTIVES OF THE QUESTIONNAIRE

The objectives of this questionnaire include:

1. To learn about the existing energy-related graduate-degree programs at your university.
2. To learn about the energy-related courses/modules currently being taught at your university.

1. GENERAL INFORMATION

- 1.1. Name of the University: _____
- 1.2. Mailing address: _____
- 1.3. Name and position of the person completing the questionnaire: _____
- 1.4. Email address: _____
- 1.5. Telephone/Mobile Number: _____
- 1.6. Number of students and graduates: _____
- 1.7. Number of faculty: _____

2. GRADUATE DEGREE PROGRAMS IN ENERGY- RELATED AREAS

2.1. If your university offers a graduate degree program in energy-related areas such as **energy engineering, energy technology, energy management, energy economics, energy policy**, please provide the details on the degree program such as:

- 2.1.1. Program start date: _____
- 2.1.2. Required curriculum (Program structure and course outline)
- 2.1.3. Qualifications of faculty members, including title, degrees, years of experience, courses taught relevant publication records, etc.
- 2.1.4. English competencies of faculty members: Excellent___ Good___ Poor___
- 2.1.5. English competencies of students: Excellent___ Good___ Poor___

2.1.6. Number of students currently enrolled in the program

2.1.7. Number of graduates

2.1.8. Job placement records. For example, percent employed after graduation, place(s) of employment, position(s), salary range, etc.

2.1.9. Tuition and fees

3. GRADUATE COURSES IN ENERGY- RELATED AREAS

3.1. If your university offers graduate-level courses that **cover any of the following topics**, please provide detailed information about the course(s).

Energy-Related Topics	No	Yes	List of course(s) that cover the topic
1. Energy & Environmental Policy Planning and Analysis			
2. Energy Project Design and Management			
3. Energy Engineering			
4. Energy Technology			
5. Energy Economic & Financial Analysis			
6. Energy Statistical Analysis & Forecasting			
7. Energy Management Information Systems			
8. Energy Marketing			
COMMENTS			

THANK YOU FOR YOUR GENEROUS COOPERATION

Name of the interviewer: _____

Date of Interview: _____

INTERVIEW GUIDES

WITH UNIVERSITY FACULTY, DEANS AND QA ADMINISTRATORS

OBJECTIVES OF THE INTERVIEW

The objectives of this interview include:

1. To learn about the curriculum development process at your university.
2. To seek your advice on the professional energy-related skills needed in Georgia.
3. To seek advice from you on ways and means to improve skill levels of energy professionals in Georgia.
4. To identify and discuss the critical energy issues in Georgia.

1. GENERAL INFORMATION

- 1.1. Name of the University: _____
- 1.2. Mailing address: _____
- 1.3. Names and positions of the persons participating in the interview session:___
- 1.4. Email address: _____
- 1.5. Telephone/Mobile Number: _____
- 1.6. Number of students and graduates:_____
- 1.7. Number of faculty:_____

2. CURRICULUM DEVELOPMENT PROCESS

Please explain the curriculum development process for a new graduate-level course and a new graduate-level program at your university:

- 2.1. Where does it begin?
- 2.2. What stages does a proposal go through until it is approved?
- 2.3. How long does this process take?

3. PROFESSIONAL ENERGY SKILLS NEEDED IN GEORGIA

- 3.1. In your opinion, what professional energy skills in Georgia need improvement?

Skills	Comments
--------	----------

1. Energy Engineering	
2. Energy Economic Analysis	
3. Energy Financial Analysis	
4. Energy Statistical Analysis & Forecasting	
5. Energy & Environmental Policy Analysis	
6. Energy Planning	
7. Energy Marketing	
8. Customer Service	
9. Energy Training	
10. Energy Law and Regulation	
11. Others (Please specify)	

- 3.2. Has your university offered any training program to the energy sector in Georgia? If yes, please provide the details.
- 3.3. In your opinion, what are the problems in providing training to the energy sector?
- 3.4. Are you interested in developing an energy program (major/minor/concentration) at your university?

4. STRATEGIES TO PROVIDE NEEDED ENERGY EDUCATION AND TRAINING

- 4.1. There could be several strategies employed to provide a needed energy education and training in Georgia. This could be **Graduate degrees** in energy-related areas such as energy engineering/technology, energy economics, energy management, etc. offered by different universities; **Concentrations** in energy-related areas such as energy engineering/technology, energy economics, energy management, etc. offered by different universities; **Short-term training** in energy-related areas such as energy engineering/technology, energy economics, energy management, etc. offered by different universities. In your opinion, which of these strategies would be more appropriate?
- 4.2. What do you think about creation of an “**Energy Consortium**” through a partnership among universities, government, and energy companies which would provide **energy education, training and research**,

- 4.3. What do you think about establishing ***Joint graduate programs*** with U.S. and European institutions?
- 4.4. In your opinion, what are the most critical energy issues in Georgia that require immediate attention?

THANK YOU FOR YOUR GENEROUS COOPERATION

Name of the interviewer: _____

Date of Interview: _____

QUESTIONNAIRE FOR PRIVATE AND STATE-OWNED ENERGY COMPANIES, GOVERNMENTAL INSTITUTIONS, AND NGOs

OBJECTIVES OF THE QUESTIONNAIRE

The objectives of this questionnaire include:

3. To learn about the existing management structure of your organization.
4. To learn about the quantity and quality of existing professional workforce in your organization.

1. GENERAL INFORMATION

- 1.1. Name of the Organization: _____
- 1.2. Mailing address: _____
- 1.3. Name and position of the person(s) completing the questionnaire: _____
- 1.4. Email address: _____
- 1.5. Telephone/Mobile Number: _____

2. ACTIVITIES OF THE ORGANIZATION

2.1. Number of employees:

Positions	Number	Gender (M/F ratio)	Educational Backgrounds
Top Level Managers (Directors & Deputy Directors)			
Mid-Level Managers (Department & Division Heads and their deputies)			
Professional Staff			

2.2. Number of employees in the functional areas within the organization

Functional Areas	Number	Gender (M/F ratio)	Educational Backgrounds
1. Energy Engineering			
2. Energy Economic Analysis			
3. Energy Financial Analysis			
4. Energy Statistical Analysis & Forecasting			

5. Energy & Environmental Policy Analysis			
6. Energy Planning			
7. Energy Marketing			
8. Customer Service/Public Relations			
9. Energy Training			
10. Energy Project Design & Management			
11. Others (Please specify)			

2.2. Number of international staff (if any) and their positions _____

THANK YOU FOR YOUR GENEROUS COOPERATION

Name of the interviewer: _____

Date of Interview: _____

INTERVIEW GUIDES

FOR PRIVATE AND STATE- OWNED ENERGY COMPANIES, GOVERNMENTAL INSTITUTIONS AND NGOs

OBJECTIVES OF THE INTERVIEW

The objectives of this interview include:

5. To assess what are the needed professional skills in engineering, management, policy analysis, or any other relevant areas in your organization.
6. To seek advice from you on ways and means to improve skill levels of energy professionals in your organization as well as in other energy-related organizations (both public and private) in Georgia.
7. To identify and discuss the critical energy issues in Georgia.

I. GENERAL INFORMATION

1. Name of the Organization: _____
2. Mailing address: _____
3. Name and position of the person(s) completing the questionnaire: _____
4. Function & responsibilities: _____
5. Number of years in this position: _____
6. Any previous positions: _____
7. Higher education degree(s): _____
8. Any other academic or professional certificates: _____
9. Email address: _____
10. Telephone/Mobile Number: _____

II. YOUR OPINION ABOUT ENERGY ISSUES AND ENERGY SKILLS

1. In your opinion, what are the most critical energy issues in Georgia that require immediate attention?

2. In your opinion, what are the main problems in recruiting and retaining qualified employees?

3. Does your company have a human resource development strategy?

4. In your opinion, what professional skills of your employees need improvement and how are you planning to improve their skills in any of the following areas?

Skills	How Many in the next 5 years?	How? (For example, certificates. Short-term training, courses, degree programs at universities, etc.)
1. Energy Engineering		
2. Energy Economic Analysis		
3. Energy Financial Analysis		
4. Energy Statistical Analysis & Forecasting		
5. Energy & Environmental Policy Analysis		
6. Energy Planning		
7. Energy Marketing		
8. Customer Service		
9. Energy Training		
10. Energy Project Design & Management		
11. Others (Please specify)		

5. In your opinion, what are the skills that your employees do not have and you wish they had?

6. How often do you provide training to upgrade your employees' professional skills and who provides the training?

		Trainers				
Training Programs	Number of training programs per year	<i>In-house</i>	<i>Local universities</i>	<i>Outside consultants</i>	<i>Travel abroad</i>	<i>Others (please specify)</i>

7. What problems have you faced in providing training to your employees?

		Problems				
Training Programs	Lack of adequate training budget	Lack of qualified trainers	Lack Of Training Facilities	Lack of high-quality training programs	Difficult for employees to get away from their daily work	<i>Others (Please specify)</i>

8. Do your current training programs satisfy your needs?

9. What are your short-term and long-term training needs?

10. Are you planning to hire new employees in areas such as **energy management, energy engineering, policy analysis**, or any other energy-related areas? If, yes, **when** and **how many** and in what **positions**?

11. Are you satisfied with the quality of applicants for vacant positions at your organization?

12. Are you willing to cooperate in a joint venture with universities and other energy-related organizations in creating a **Center of Excellence for energy education, training, and research**?

13. If yes, what would be your possible contributions?

Contributions	YES (please provide details)
Financial	
Facilities	
Trainers/Educators	
Research assistance	
Information assistance	
Others (please specify)	

14. We would appreciate any additional comments and suggestions for improving professional skills in the energy industry in Georgia.

THANK YOU FOR YOUR GENEROUS COOPERATION

Name of the interviewer: _____

Date of Interview: _____

Student Questionnaire

Questionnaire Cover Sheet

My name is ----, and I work for BCG research group. We are collecting the data to be used by the universities for the design and development of *graduate-level degree programs in energy management* in Georgia. These programs will produce graduates who will work in the energy sector contributing to the development of this sector in Georgia.

Your contact details were selected randomly by a computer. All of the information we collect is confidential, and results will be disseminated only in a general, aggregated form.

Participation in our research is completely voluntary. I hope very much that you will feel comfortable and answer the questions openly. If you do not want to answer a specific question, please tell me, and we will skip to the next question.

VISITATION RECORD:

	1	2	3
A. Visit number			
B. Result of visit			

Codes for result of visit

- 01 – Interview completed
- 02 –Told to come later
- 03 – Not interested in the program
- 04 – Having other plans in regards with professional career
- 05 –Refusal
- 06- Other reason (describe)

1. University _____
2. Faculty |__|__|
3. Specialty |__|__|
4. Degree level |__|__|
5. WHEN INTERVIEW CONDUCTED: DATE |__|__| MONTH |__|__|
6. INTERVIEW LASTED |__| HOURS |__|__| MINUTES]
7. INTERVIEWER LAST NAME _____
8. INTERVIEWER NUMBER |__|__|__|

QUESTIONNAIRE FOR POTENTIAL GRADUATE STUDENTS IN ENERGY FIELD

1. PROFILE INFORMATION

1.1. Name of the person responding to the questionnaire:

1.2. Age: _____ Years

1.3. Gender ___ Male ___ Female

1.4. Email address: _____

1.5. Telephone/Mobile Number: _____

1.6. If you are a graduate student, please answer the following questions. Otherwise, skip to question 1.7:

1.6.1. Name of the university that you completed your undergraduate studies:

1.6.2. Date of graduation: _____

1.6.3 Undergraduate Major(s)[Specialty]: _____

1.7. Professional Experience: _____ Years

1.8. Are you currently employed? Yes (full time)___ Yes (part time) No___

If, your answer to the above question is "Yes," please answer the following questions. Otherwise, skip to question 1.13.

1.9. Field of employment: _____

1.10. Your current employer (specify the company/organization) _____

1.11. Your position: _____

1.12. Is your position related to your degree?

Yes (related to my undergraduate degree) ___ Yes (related to my Master's degree)
No (not related)___

1.13. Specify any previous employers and positions in the last 5 years:

Employment

Position

2. YOUR VIEWS ON THE CRITICAL ENERGY ISSUES IN GEORGIA

2.1. In your opinion, what are the most critical energy issues in Georgia that require immediate attention?

ENERGY ISSUES	Very Critical	Somewhat Critical	Not Critical	No Opinion	Comments
2.1.1. Enhancing Energy Supply Security					
2.1.2. Increasing energy supply in the region through regional cooperation (with the neighboring Caucasus republics as well as Turkey and Iran)					
2.1.3. Developing and Implementing a National Energy Plan					
2.1.4. Increasing awareness of energy issues among policy makers, private sector, educators, journalists, and general public					
2.1.5. Increasing public understanding of, and participation in, decisions regarding delivery of energy services					
2.1.6. Improving the process and methodologies for calculating energy tariffs					
2.1.7. Improvement of electricity transmission and distribution system					
2.1.8. Expanded use of renewable energy sources, particularly hydro, geothermal, solar, wind, and biomass energy					
2.1.9. Promotion of energy efficiency and conservation measures for residential, commercial and industrial users					
2.1.10. Minimizing environmental impacts of energy production, transportation, and use.					
2.1.11. Educating and training needed workforce in the energy sector					
2.1.12. Reliability of energy supply					
2.1.13. Other issues (please specify)					

3. YOUR INTERESTS IN ENERGY- RELATED STUDIES AND PROFESSION

3.1. Please rate your level of interest in the following energy-related fields.

Energy-Related Fields	Very interested	Interested	Somewhat interested	Not interested	Don't know	Comments
3.1.1. Energy Policy Planning and Analysis						
3.1.2. Environmental Policy Planning and Analysis						
3.1.3. Energy Project Design and Management						

3.1.4. Energy Engineering/Technology						
3.1.5. Energy Economic & Financial Analysis						
3.1.6. Energy Statistical Analysis & Forecasting						
3.1.7. Energy Management Information Systems						
3.1.8. Energy Marketing						
3.1.9. Others (please specify)						

3.2. Which energy-study option do you prefer?

OPTIONS	Yes	No	D/K
3.2.1. Just a graduate level course on energy			
3.2.2. A concentration/minor in energy with a traditional degree program such as MBA, MS, MA, or Ph.D.			
3.2.3. A Master's degree in Energy Management			

3.3. Please name organization/s in the energy sector in Georgia: _____

3.4. Please name energy-sector organization/s that you would be interested to work for (please list as many as necessary): _____

3.5. In your opinion, does the energy sector in Georgia have people with adequate management and technical skills to manage the sector efficiently and effectively? Please explain.

Yes _____ No _____

4. YOUR VIEWS ON THE EDUCATION YOU HAVE RECEIVED AT THE UNIVERSITY

4.1. How would you rate the employment potential of your degree?

1. Excellent__ 2. Good__ 3. Fair__ 4. Poor__

Comments: _____

4.2. Do you feel that the education you have received at the university has been adequate?

1. Very adequate__ 2. Adequate__ 3. Somewhat adequate__ 4. Not adequate__

Comments: _____

4.3. How would you rate your basic knowledge of the field you studied at the university?

1. Excellent___ 2. Good___ 3. Fair___ 4. Poor___

Comments:_____

4.4. How would you rate your capacity to apply your knowledge in practice?

1. Excellent___ 2. Good___ 3. Fair___ 4. Poor___

Comments:_____

4.5. Please rate the following attributes regarding your educational experience in Georgia.

Attributes	Excellent	Good	Fair	Poor	Not Applicabl	Not Available	Comments
4.5.1. Qualification of teachers							
4.5.2. Teaching methods							
4.5.3. Quality of classroom facilities							
4.5.4. Quality of degree program							
4.5.5. Quality of library services							
4.5.6. Quality of books and other educational materials							
4.5.7. Quality of laboratories							

THANK YOU VERY MUCH FOR YOUR COOPERATION!

APPENDIX 3

GAP ANALYSIS BRAINSTROMING SESSION

GAP ANALYSIS AND HIGHER EDUCATION PROGRAMS IN THE ENERGY SECTOR

March 6, 2009

Tbilisi, Georgia

PROGRAM AGENDA

12:30 – 13:00	<p>Registration:</p> <p>Technical University, Administrative Building, III rd floor, Small Conference room.</p> <p>Address: 77 Kostava Str.</p>
13:00 – 13:10	<p>Welcoming remarks:</p> <p>Hameed Nezhad, ECI</p> <p>Mariam Ubilava, USAID</p>
<p>Session 1:</p> <p>13:10 – 14:40</p> <p>Presenters:</p>	<p>Gap Analysis Report</p> <ol style="list-style-type: none"> 1. Tsira Chikvaidze, TECIP 2. Tornike Gotsiridze, TECIP 3. Rusudan Nadiradze, BCG <p>Discussion</p>
14:40 – 15:00	<p>Coffee-Break</p>
<p>Session 2:</p> <p>15:00 – 16:00</p> <p>Presenter:</p>	<p>Higher Education Programs in the Energy Sector: <i>The US Experience</i></p> <p>Hameed Nezhad</p>
<p>Session 3:</p> <p>16:00-17:00</p> <p>Moderator: Tsira Chikvaidze</p>	<p>Higher Education Programs in the Energy Sector: <i>Georgian Approach</i></p> <p>Presentations of the groups</p>

Group work

Parallel groups: 1(Roses), 2(Snowdrops), 3(Tulips), 4(Orchidea), 5 (Lilies)

Identify Challenges and Ways Forward with Innovative Approaches in Higher Education Programs in the Energy Sector

1. What is the best approach that meets the needs of Georgia's energy sector?
 - a) A Master's degree program;
 - b) Energy-related concentrations as part of the existing graduate programs in areas such as Engineering, Economics, Law, Public Administration, and Agriculture;
 - c) A general graduate-level energy course to be offered as an elective to all graduate students
 2. What should be the potential Master's degree program(s)?
 3. What should be the language of teaching?
 4. What should be the length of the graduate programs (1 year, 2 years) and with how many ECTS (120, 90, 60)?
 5. What should be support system necessary for implementation of new graduate programs?
 6. How could this project help to overcome potential problems during the implementation of new graduate programs?
-

PARTICIPANTS OF THE BRAINSTORMING SESSION

Akaki Tsereteli State University (Kutaisi)

1. **Omar Zivzivadze**, Professor, Head, Electro-Technical Dep. (Technical Engineering)
2. **Murman Keburia**, Associate Professor, Dep. of Technical Engineering
3. **Jondo Noselidze**, Associate Professor, Electro-Technical Department
4. **Anzor Khurtsilava**, Full Professor, Electro-Technical Department

Shota Rustaveli State University (Batumi)

5. **Boris Kutubidze**, Full Professor, Head, Dep. of Electric Energy

Iakob Gogebashvili State University (Telavi)

Manana Kevlishvili, Head of QA, Dep. of Agriculture and Food Processing

Technical University of Georgia

6. **Gia Arabidze**, Full Professor, Dean, Dep. of Energy and Telecommunication

7. **Juri Lomidze**, Full professor, Head, Dep. of Teaching and Science
8. **Shalva Nachkebia**, Full professor , Head, Dep. of Electro-Energy
9. **Omar Kiguradze** (Full Professor, Head, Dep. of Energy and Telecommunication)

International Black Sea University

10. **Tamar Kiknadze**, Full Professor, Dean, Dep. of Business Management and Social Sciences

Tbilisi Gr. Robakidze University

11. **Murtaz Kvirkvaia**, Associate Professor, Dean, Dep. of Economics and Business

Tbilisi Ilia Chavchavadze State University

12. **Maia Gonashvili**, Associate Professor, Dep. of Business and Administration

Ivane Javakhishvili Tbilisi State University

13. **Eka Lekashvili**, Associate Professor, Dep. of Business and Economics, QA
14. **Ia Natsvlshvili** , Associate Professor, Dep. of Business and Economics, QA

Tbilisi State University of Economic Relations (TSUER)

15. **Lali Chagelishvili**, Full Professor, Dean, Dep.of Business and Administration
16. **David Sikharulidze**, Associate Professor, Dep. of Economics and Business

Tbilisi State University of Economic Relations and Law

17. **Badri Ramishvili**, Associate Professor, Dep. of Business and Administration

International School of Economics at Tbilisi State University

18. **Eric Livny**, Executive Director

Caucasus University

19. **Nugzar Skhirtladze**, Head, Quality Assurance Department

University of Georgia

20. **George Gigolashvili**, President, Business Consulting Group: Success Technologies
21. **Konstantin Topuria**, Dean, School of Business and Economics
22. **Sergo Tsiramua**, Dean, School of Information and Engineering Technologies

Free University of Tbilisi, ESM (European School of Management) Business School

23. **Revaz Vachnadze**, Director, MBA Program
24. **Nana Gogiberidze**, Coordinator of the MBA program, Co-Chairperson of the Mathematics Academic Program

Georgian Institute of Public Affairs (GIPA)

25. **Elizbar Tvauri**, Associate Professor, School of Government , Dep. of Public Administration and Local Government Administration
26. **Mikheil Gigiberia**, Associate Professor, School of Government , Dep. of Public Administration and Local Government Administration

Institute of Electrical and Electronics Engineering at Tbilisi State University

27. **Roman Jobava**, Head, MS in Electrical and Electronics Engineering

Ministry of Energy of Georgia

28. **Maia Avaliani**, Assistant Deputy Minister

29. **Teimuraz Izoria**, Senior Specialist, Investments Projects Division

30. **Giorgi Shukakidze**, Senior Specialist, Energy Department

31. **Ekaterine Balarjshvili**, Senior Specialist, Administrative Department

USAID

32. **Mariam Ubilava**, Project Management Specialist, Office of Energy and Environment

BCG

33. **Rusudan Nadiradze**

The Energy Capacity Initiative Project

34. **Hameed Nezhad**

35. **Tornike Gotsiridze**

36. **Sofio Barrett**

37. **Nutsa Ubilava**

38. **Tsira Chikvaidze**

APPENDIX 4

LITERATURE REVIEW

1. VOCATIONAL TRAINING NEEDS IN THE ENERGY SECTOR OF GEORGIA

Project Objective

In 2007, the *World Experience for Georgia (WEG)*, a think tank organization, was contracted by *BP Exploration Caspian Sea Ltd* to conduct **knowledge and skills gap analysis** for setting up an educational program for energy sector of Georgia. The primary focus of this project was on “**vocational training needs in the energy sector in Georgia.**”

Methodology

The study was conducted through a series of interviews and inquiries with various focus groups related to the energy sector, as well as review of relevant existing documents. About 50 meetings were held with 60 individuals from 30 groups, including BP staff, BP contractors, energy and utility companies, donor organizations, government agencies, education and training institutions were visited and interviewed.

The first round of interviews was conducted with BP staff and with its few experienced contractors in Georgia. The goals of these interviews were:

- a. To identify the main problems experienced by BP and its contractors in their business activities due to the lack of qualification of the workforce in the energy sector; and
- b. To solicit advice on the best ways of addressing the problems of energy education in Georgia.

After initial round of interviews, a meeting was held with BP management in Georgia, where the results of the first interviews were summarized and further priorities were set. It was decided to focus the study effort at two main fields of highest interest identified at the first stage of study – **Project Management** and **Vocational Technical Knowledge**.

Main Findings

Figure 1 summarizes the main findings of this study. As this figure shows, **Project Management** is the single most required competence mentioned by the largest number of respondents followed by “**technical” competence** such as electricians and mechanics. In general, **Management** and **Supervision** have been identified as **significant gaps in energy** and related branches of industry in Georgia. This indicates the general dissatisfaction with the organization of work processes in the country. This dissatisfaction is also reflected in Figure 2, where awareness of ISO 9000 and 14001, as well as general

“working culture” were indicated by interviewees as significant gaps in employee competences. Also, HSE (Health, Safety and Environment) is the most demanded skill.

Figure 1: Vocational Training Needs in the Energy Sector in Georgia

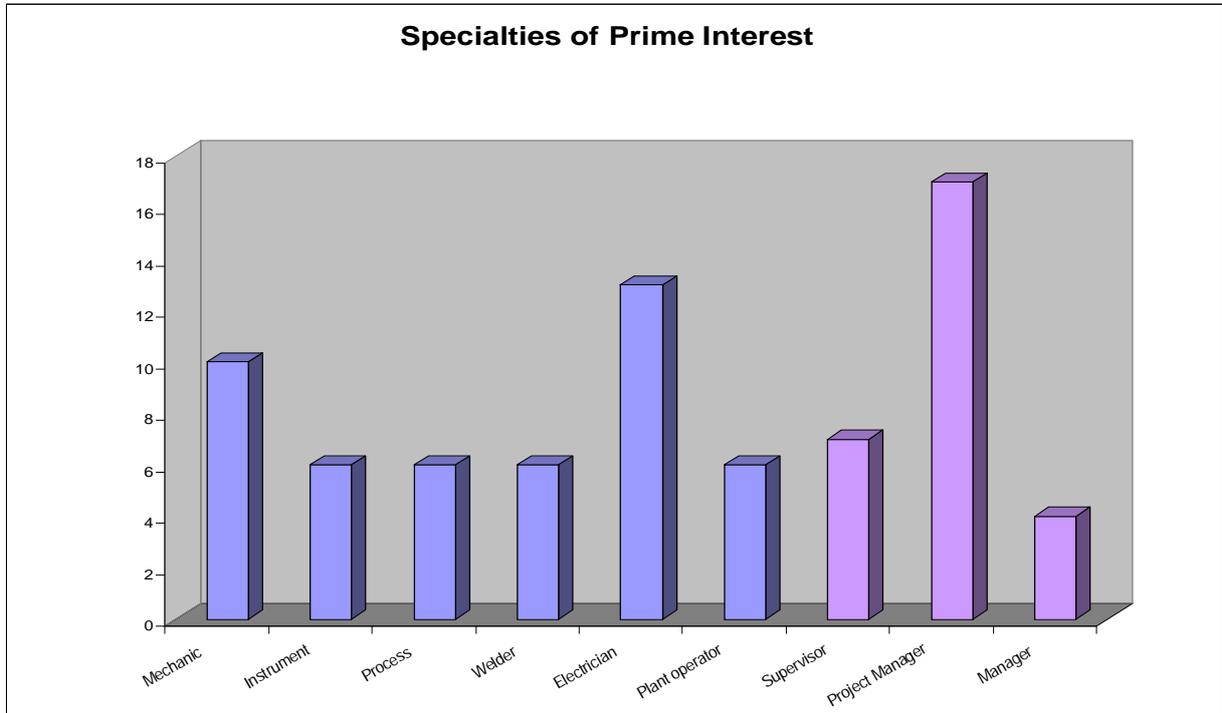
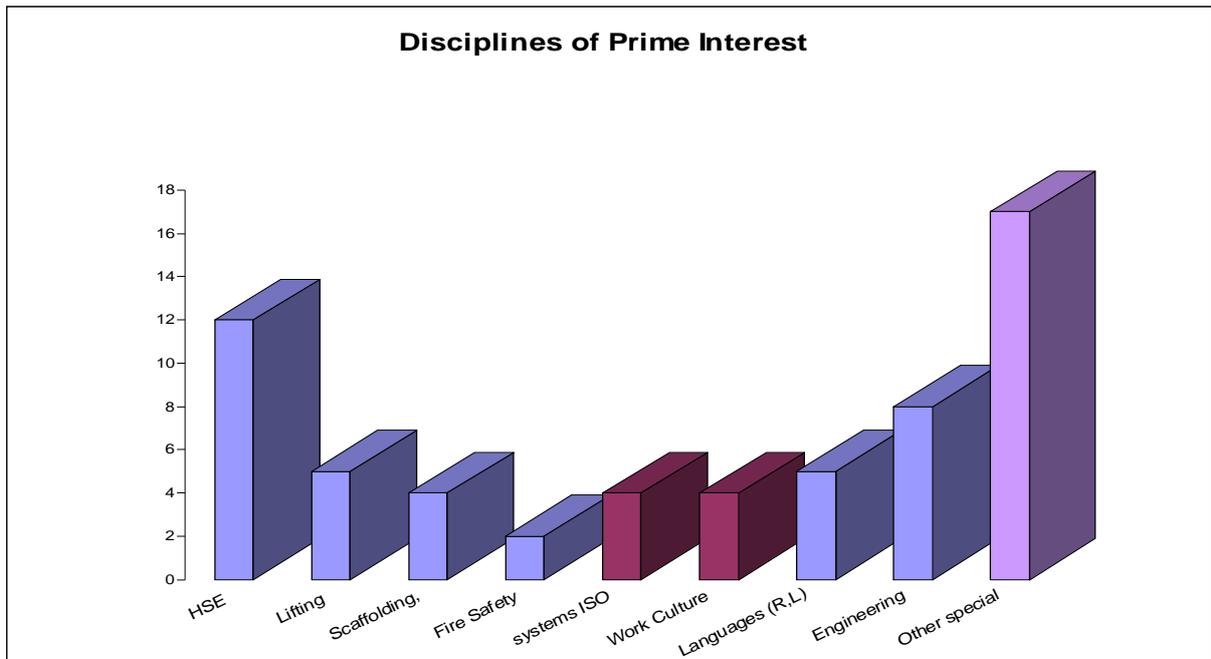


Figure 2: Skills most frequently mentioned by the respondents



The following sections explain the important elements of the above figures:

■ **Project Management**

Procurement and Tendering, planning, risk management and quality control were mentioned as lacking and most required qualities during implementation of industrial projects.

■ **Technician level competencies**

The need for improvement in technician competencies was expressed by most respondents. The needs are quite diverse and in many cases specific to the respective companies. The highest concentrated demand is for higher HSE competence of different job categories. Among specialty training – training of electricians and mechanics of different categories is most needed.

■ **Vocational Education and Training (VET) System & Professional Standards (National Qualification Framework)**

A formal foundation for professional vocational education and training in country should be laid by a system of professional standards. Currently there is no working system in Georgia for setting that foundation. This hampers development of training programs and curricula.

■ **Generation gap**

A gap in knowledge and qualifications has been identified as a problem that in a few years is going to further aggravate the situation with technician level qualification. According to number of interviewees the most skillful technical laborers are of the age between 50-65. These are the people educated and trained under Soviet system up to GOST standards. Next generation of workers do not have the systematic training and education and have very little to offer in terms of qualification to the industry. Once the older generation leaves there will be less and less qualified workers in the labor market. This emphasizes the importance and urgency of addressing the vocational education problems

■ **Engineering knowledge**

Engineering knowledge of modern technologies that would enable proper design, supervision and engineering support of the projects conducted in Georgia. This problem is outside the immediate scope of the study however it is a part of the general qualification shortage in the industry.

- **Language barrier** – has been identified as a problem hampering the communication between Georgian employees and their foreign more qualified colleagues as well as bringing into Georgia modern technology and practices.

Conclusions and Recommendations

1. The highest priority for BP's potential intervention in the energy sector's education identified by this study was establishing the **Project Management (PM)** courses. Improvement in PM practices has the highest potential for benefiting the sector and improving BP's operating environment in the long term. There is a possibility for cooperation

on this issue with other partner private companies (UGT/TBC/Magti) and the potential to benefit the largest number of business and public entities in a cost effective way. BP has an easy access to PM training providers, in house expertise and available space at ISET that can allow the expedient start of the project. Preliminary discussions have been held with potential partners as well as potential training providers. Thus, as the first priority it is recommended to proceed with setting up the **Project Management School** in cooperation with UGT/Magti/TBC Bank.

2. The second priority recommended for BP's consideration is setting up an **HSE training facility** on the basis of Tbilisi Multi-profile VET Center (MVET). The arguments in favor of such a decision are: a) the high demand from sector enterprises for HSE training, b) availability of classes and free space in MVET, c) expected presence of western consultants.

3. The third priority recommended for potential BP intervention in energy sector vocational training is development of **professional standards for mechanics and electricians of different categories**. The arguments in favor of such decision are: a) High demand for training of electricians and mechanics revealed by the inquiry, b) Absence of professional and training standards in these specialties combined with current lack of capacity for setting up these standards in educational authorities, c) Existing UNDP experience, need by Ministry of Education and Science, preparedness of Professional Development Center in Technical University to lead on this work.

All these forms of intervention would positively influence the development of energy sector and as well as improving BPs operational environment in the long term. However it is expected that high level project management courses will have the strongest positive impact and sustainable results.

2 BLACK SEA REGIONAL TRANSMISSION PLANNING PROJECT

This report details the accomplishments, findings and recommendations of the **Black Sea Regional Transmission Planning Project**, which was established in 2004 to foster regional cooperation in transmission planning and analysis. Impetus for the Project results from a desire among the **Transmission System Operators (TSOs)** in the region to identify investments necessary to improve system security and to take advantage of the potential for east-west electricity trade with neighboring markets in Southeast Europe and the UCTE system.

The only activity in this project that was related to capacity building was the establishment of the **Black Sea Sustainable Transmission Planning Working Group** comprised of a group of 14 planning specialists from the eight participating TSOs. Trained together in the use of the **project software and methodologies**, they cooperated to analyze bulk power flows on the regional network. Five Working Group meetings were hosted by participating TSOs over the course of the Project. Through their cooperation, Working Group members established confidence in their capabilities, agreeing to timetables, procedures and deliverables for each Working Group meeting. As a result, formal and informal communication among them has improved, proving the basis for both regional and bilateral cooperation.

APPENDIX 5:

WORKSHOPS & SEMINARS

Project Management Workshop

Tbilisi, Georgia

February 24, 25, and 26, 2009

Hameed G. Nezhad, Ph.D.

AEAI Consultant

Professor, College of Management, Metropolitan State University
Minneapolis Minnesota, USA

This workshop is divided into two parts:

PART I: Project Management Concepts & Methodologies (two days)

PART II: Software Tools for Managing Projects (one day)

Part I provides a systematic overview of project leadership and management. Topics covered include all aspects of project management from project initiation issues, RFP formulation, proposal decisions, preparation, and evaluation, project planning and implementation to organization, risk assessment, negotiation, and conflict resolution. Also included are project planning techniques such as PERT, CPM, and Earned Value Analysis.

Part II focuses on software tools for managing projects, including Microsoft Project 2007 and a customized Microsoft Excel software programs.

PART I TOPICS

Project Management Concepts
Project Life Cycle

Project Planning Process
Project Risk Management
Project Tracking and Control
The Human Aspects of Project Management Project Leadership Project Team
Conflict Resolution in Projects
The Art of Negotiation
Project Termination
Managing Multiple Projects
Types of Project Organization

PART II TOPICS

Microsoft Excel Applications to Project Management
Microsoft Project Software Applications

WORKSHOP SCHEDULE

Day 1

AGENDA	TIME
Registration	9:30-10 AM
Opening Remarks	10:00 AM-10:30 AM
Lecture	10:30 AM-11:30 AM
Coffee Break	11:30 AM-11:45 AM

Lecture	11:45 AM-1:00 PM
Lunch Break	1:00 PM-2:00 PM
Lecture	2:00 PM-3:00 PM
Coffee Break	3:00 PM-3:15 PM
Lecture	3:15 PM-4:30 PM
Discussions	4:30 PM-5:00 PM

Days 2 & 3

AGENDA	TIME
Lecture	10:00 AM-11:30 AM
Coffee Break	11:30 AM-11:45 AM
Lecture	11:45 AM-1:00 PM
Lunch Break	1:00 PM-2:00 PM
Lecture	2:00 PM-3:00 PM
Coffee Break	3:00 PM-3:15 PM
Lecture	3:15 PM-4:30 PM
Discussions	4:30 PM-5:00 PM

Project Management Workshop

List of Participants

Akaki Tsereteli State University (Kutaisi)

1. **Omar Zivzivadze**, Associate Professor, Head, Electro-Technical Dep. (Technical Engineering)
2. **Murman Keburia**, Associate Professor, Dep. of Technical Engineering
3. **Johnny Noselidze**, Associate Professor, Dep. of Technical Engineering

Shota Rustaveli State University (Batumi)

4. **Boris Kutubidze**, Full Professor, Head, Dep. of Electric Energy
5. **Mamuka Partenadze**, Full Professor, Dean, Dep. of Engineering and Technology

Iakob Gogebashvili State University (Telavi)

6. **Nikoloz Sul Khanishvili**, Dean, Dep. Agriculture and Food Processing
7. **Ira Shildelashvili**, Associate Professor, Dep. Agriculture and Food Processing

Technical University of Georgia

8. **Gia Arabidze**, Full Professor, Dean, Dep. of Energy and Telecommunication
9. **Juri Lomidze**, Full professor, Head, Dep. of Teaching and Science
10. **Shalva Nachkebia**, Full professor, Head, Dep. of Electro-Energy
11. **Omar Kiguradze**, Full Professor, Head, Dep. of Energy and Telecommunication
12. **Archil Grigalashvili**
13. **Nato Bebiashvili**
14. **Manana Samadashvili**
15. **Nazi Berdeladze**
16. **Tamar Maghradze**

Tbilisi State University of Economic Relations (TEUSI)

17. **Badri Ramishvili**, Associate Professor, Dep. of Business and Administration

Tbilisi Gr. Robakidze State University

18. **Murtaz Kvirikvaia**, Associate Professor, Dean, Dep. of Business and Administration
19. **David Sikharulidze**, Associate Professor, Dep. of Business and Administration

Tbilisi Ilia Chavchavadze State University

20. **Maia Gonashvili**
21. **Rusudan Dalakishvili**, Associate Professor, Dep. of Business and Administration

University of Georgia

22. **George Gigolashvili**, President, Business Consulting Group: Success Technologies
23. **Konstantin Topuria**, Dean, School of Business and Economics
24. **Sergo Tsiramua**, Dean, School of Information and Engineering Technologies

International Black Sea University

25. **Tamar Kiknadze**, Full Professor, Dean, Dep. of Business Management and Social Sciences

26. **Nikoloz Makharashvili**, Professor, Dep. of Business Management and Social Sciences, Head of QA (at the Dep)

Ivane Javakhishvili Tbilisi State University

27. **Eka Lekashvili**, Associate Professor, Dep. of Business and Economics, QA
28. **Ia Natsvlshvili**, Associate Professor, Dep. of Business and Economics, QA

International School of Economics at Tbilisi State University

29. **Ia Gelashvili**, Academic Affairs Officer
30. **Nina Sukhanskaia**, Associate Professor

European School of Management (ESM)

31. **Eka Tabatadze**, Short Term Courses' Coordinator

Georgian Institute of Public Affairs (GIPA)

32. **Elizbar Tvauri**, Associate Professor, School of Government, Dep. of Public Administration and Local Government Administration
33. **Mikheil Gigiberia**, Associate Professor, School of Government, Dep. of Public Administration and Local Government Administration

Institute of Electrical and Electronics Engineering at Tbilisi State University

34. **Roman Jobava**, Head, MS in Electrical and Electronics Engineering
35. **Lev Gheonjian**, Deputy Director, Dep. of Science
36. **David Topshishvili**
37. **Ana Gheonjian**

Caucasus University

38. **Shorena Bziava**, MBA Program Manager
39. **Nugzar Skhirtladze**, Head of Quality Assurance Office

Georgian American University

40. **David Papuashvili**, Associate Professor, Business Department

Ministry of Energy

41. **Maia Avaliani**, Deputy minister's assistant
42. **Nato Chokheli**, Lead Specialist, Investment Projects Division
43. **Temo Izoria**, Chief Specialist, Investment Projects Division
44. **Giorgi Shukakidze**, Chief Specialist, Energy Department

- 45. **Davit Khachidze**, Chief Specialist, Energy Department
- 46. **Eka Balarjishvili**, Chief Specialist, Administration Department

GNEWRC

- 47. **Nugzar Beridze**, Head of Electricity Department
- 48. **Nino Lashkhia**, Head of International Relations Department

Companies

GSE

- 49. **Giorgi Sharkovi**, Procurement manager
- 50. **Givi Sulava**, Procurement agent
- 51. **Mamuka Shonia**, Head of projects division, Project Department
- 52. **Irakli Manelidze**, Head of finance division
- 53. **Giorgi Dikhaminjia**, Head of administrative department

Energo-Pro

- 54. **Irakli Kokhodze**, Branches management division specialist
- 55. **Dimitri Revazashvili**, branches management division specialist
- 56. **Levan Pachuashvili**, Procedures Manager
- 57. **Tea Gardapkhadze**, Project Development coordinator
- 58. **Nikoloz Gugitishvili**, Warehouse chief specialist

ESCO

- 59. **David Mchdelishvili**, Metering Control Department specialist

WORKSHOP ON

Managerial Problem Solving & Decision Making Methods

Tbilisi, Georgia

May 5 and 6, 2009

Hameed G. Nezhad, Ph.D.

AEAI Consultant

Professor, College of Management, Metropolitan State University

Minneapolis Minnesota, USA

Decision making and problem solving skills are essential for being a successful leader in business, industry, or government. The primary purpose of this workshop is to introduce systematic approaches to problem formulation, problem solving, and decision making using both qualitative and quantitative approaches and techniques. Special emphasis will be placed on real-life applications of problem-solving and decision-making methods using Structure® and Decide 2000® software programs developed by Dr. Nezhad.

This workshop is divided into two parts:

PART I: Managerial Problem Solving & Decision Making Methods (one day)

PART II: Software Tools for Managerial Problem Solving & Decision Making (one day)

PART I TOPICS

Problem Solving Concepts
Modeling Process
Systems Thinking
Decision Making Process
Decision Trees
Scenario Planning Process

PART II TOPICS

Introduction to Structure® Software Program Lab
Lab Exercise using Structure® Software Program
Introduction to Decide 2000®
Lab Exercise using Decide 2000® Software Program

WORKSHOP SCHEDULE

Day 1

AGENDA	TIME
Registration	9:30-10 AM
Opening Remarks	10:00 AM-10:30 AM
Lecture	10:30 AM-11:30 AM
Coffee Break	11:30 AM-11:45 AM
Lecture	11:45 AM-1:00 PM
Lunch Break	1:00 PM-2:00 PM
Lecture	2:00 PM-3:00 PM
Coffee Break	3:00 PM-3:15 PM
Lecture	3:15 PM-4:30 PM
Discussions	4:30 PM-5:00 PM

Day 2

AGENDA	TIME
Structure® Software Lab	10:30 AM-11:30 AM
Coffee Break	11:30 AM-11:45 AM
Structure® Software Lab (continued)	11:45 AM-1:00 PM
Lunch Break	1:00 PM-2:00 PM
Decide 2000® Software Lab	2:00 PM-3:00 PM
Coffee Break	3:00 PM-3:15 PM
Decide 2000® Software Lab (continued)	3:15 PM-4:30 PM
Discussions	4:30 PM-5:00 PM

Managerial Problem Solving & Decision Making Methods PARTICIPANTS

Akaki Tsereteli State University (Kutaisi)

1. **Omar Zivzivadze**, Professor, Head, Electro-Technical Dep. (Technical Engineering)
2. **Ketevan Tskhakaia**, Associate Professor, Program Manager
3. **Murman Keburia**, Associate Professor, Dep. of Technical Engineering

Technical University of Georgia

4. **Gia Arabidze**, Full Professor, Dean, Dep. of Energy and Telecommunication
5. **Maka Gelashvili**, Associate professor, Program Manager
6. **Manana Maghradze**, Associate professor, (course on Management)
7. **Archil Grigalashvili**, Associate professor
8. **Tamaz Gilashvili**, Associate professor
9. **Ketevan Kutateladze**, Associate professor
10. **Maka Gudiashvili**, Associate professor, Program Manager

Ivane Javakhishvili Tbilisi State University

11. **Eka Lekashvili**, Associate Professor, Dep. of Business and Economics, QA
12. **Nata Kharadze**, Associate Professor, Dep. of Management

International School of Economics at Tbilisi State University

- 13. **Ia Gelashvili**, Academic Affairs Officer
- 14. **Nina Sukhanskaya**, Program Manager

Tbilisi Ilia Chavchavadze State University

- 15. **Maia Gonashvili**, Associate Professor, Dep. of Business and Administration
- 16. **Akaki Tsomaia**, Head of QA, Dep. of Business and Administration, Head of QA

International Black Sea University

- 17. **Tamar Kiknadze**, Full Professor, Dean, Dep. of Business Management and Social Sciences
- 18. **Nikoloz Makharashvili**, Professor, Dep. of Business Management and Social Sciences, Head of QA

Tbilisi Gr. Robakidze University

- 19. **Murtaz Kvirkvaia**, Associate Professor, Dean, Dep. of Economics and Business
- 20. **David Sikharulidze**, Associate Professor, Dep. of Business and Administration

Tbilisi University of Economic Relations

- 21. **Lali Chagelishvili**, Full Professor, Dean, Dep. of Business and Administration
- 22. **Ia Natsvlishvili**, Dep. of Management

Tbilisi State University of Economic Relations and Law

- 23. **Badri Ramishvili**, Associate Professor, Dep. of Business and Administration

Caucasus University

- 24. **Shorena Bziava**, MBA Program Manager
- 25. **Nugzar Skhirtladze**, Head, Quality Assurance Department

University of Georgia

- 26. **George Gigolashvili**, President, Business Consulting Group: Success Technologies
- 27. **Konstantin Topuria**, Dean, School of Business and Economics
- 28. **Sergo Tsiramua**, Dean, School of Information and Engineering Technologies

Free University of Tbilisi, ESM (European School of Management) Business School

29. **Keti Betlemidze**, Alumni and Career Development Office
Director, Alumni Coordinator
30. **Eka Tabatadze**, Program Manager, Open Enrollment Programs

APPENDIX 6

U.S. GRADUATE SCHOOLS FOR SCHOLARSHIP RECIPIENTS



Management of Technology (MOT)

<http://www.cdtl.umn.edu/index.php?pageid=16>

The Master of Science in Management of Technology (MOT) was launched at the University of Minnesota and the Institute of Technology's Center for the Development of Technological Leadership in 1990. It is one of the oldest and foremost MOT programs in the world and, to date, over 500 tech-based managers, from over 200 companies, have completed the program.

MOT students are making a different decision than are those who pursue an MBA program. MOT students choose to spend four semesters with a cohort of high-potential, tech-based leaders and managers with an average of 12 years of work experience. They've chosen a program that has the business foundation of an MBA education plus unique, MOT-specific skills that include:

- Strategic technical leadership, management, and innovation
 - Pivotal technology product development and market launch
 - Intellectual property strategy and management
- Managing technological business opportunities, threats, and disruptions
- Global competition and collaboration
 - Conflict management and business communication
 - Mapping, tracking, and forecasting technology-based business development

Customized Courses

Our standard short courses can be customized to address the specific needs of a company or audience. Or, we can create completely new courses, as long as the topics fall within our programs' areas of expertise. Customized courses allow for more focused and frank discussion and ensure optimal relevance of the content.

Past short course topics have included:

- Management of Technology and Innovation
- Managing Product Development Projects
- Marketing Management in Technology-Based Organizations
- Managing Functional Interfaces in New Product Development
- Problem Formulation and Managerial Decision Making
- Basic Technology Analysis
- Quality Control and Management
- Systems Thinking
- Chaos and Complexity: Management of Organizational Applications

Curriculum

The master of science in the management of technology (M.S.MOT.) program is administered by the Institute of Technology's *Center for the Development of Technological Leadership*. The two-year, executive-format program integrates the fields of technology and management and provides working engineers and scientists with management knowledge and skills needed to assume a technical leadership role within their organizations. The program focuses on management in technology-based environments in traditional and emerging industries. The curriculum includes technical and advanced management courses such as pivotal technologies, technology forecasting, project management, management of innovation, intellectual property management, and strategic management of technology. The core management curriculum includes areas such as finance, marketing, accounting, strategic planning and decision making, and conflict management. Students proceed through the program and advance as a cohort, taking a prescribed sequence of courses together. Case studies, class discussions, and study-group interaction stimulate the learning process. Students also participate in off-campus residencies, including an international residency; complete individual and team projects; and develop final projects as part of a capstone course. Most students receive corporate financial support.

Prerequisites for Admission—*A bachelor's degree in engineering, science, or other technology related field from an accredited program.* Applicants should also have completed coursework (or show proficiency) in economics, mathematical modeling, statistics, and computer literacy.

Special Application Requirements—*At least five years of professional experience in the applicant's technical field* (in exceptional circumstances, promising candidates with less experience may be considered). Applicants must submit three letters of recommendation, a résumé, and a statement of purpose. GRE or Graduate Management Admission Test (GMAT) scores are not generally required. The professional track record of the applicant weighs heavily in the admissions process. A personal interview with an admissions committee is required. Admission is in fall semester only.

Key to test abbreviations (GRE, TOEFL, GMAT, MELAB).

For an online application or for more information about Graduate School admissions, see the [General Information](#) section in the catalog, or visit the [Graduate School](#) Web site.

Courses—Refer to Management of Technology (MOT) in [University Courses](#) for courses pertaining to the program.

M.S.MOT. Plan B Degree Requirements

The M.S.MOT. requires 36 credits. In addition to course requirements, students must complete an oral exam and a written report for the capstone project (MOT 8234), which consists of an independent, original investigation requiring between 110 and 130 hours of effort.

Language Requirements—None.

Final Exam—An oral presentation of the capstone project is required.

Faculty

For latest graduate faculty listings, see <www.grad.umn.edu/faculty_rosters/faculty.html>.

Tuition (2008-2009): \$15,030 first year and \$14,150 second year

Contact Information—Management of Technology Graduate Program, Center for the Development of Technological Leadership, University of Minnesota, 510 West Bank Office Building, 1300 S. Second Street, Minneapolis, MN 55454 (612-624-5747; fax 612-624-7510; MOT@cdtl.umn.edu; www.cdtl.umn.edu).

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University of Wisconsin Madison



The Nelson Institute

<http://www.nelson.wisc.edu/grad/eap/curric.htm>

Program Description:



The Energy Analysis and Policy Program (EAP) gives UW-Madison graduate students the skills and knowledge needed by professionals in government, energy companies, consulting firms, and other organizations to grapple with these kinds of concerns. EAP complements the discipline-centered approaches of most graduate degree programs, including those in energy-related fields such as geology, economics, chemistry, engineering, and business.

Cost: \$1560.78/Credit

Eligibility and Prerequisites:

EAP welcomes applications from students in any graduate degree program at UW-Madison. Master's- degree students who complete the program receive *EAP certificates in addition to their degrees*, and doctoral students can count the program as a distributed minor. EAP is not available as a stand-alone graduate degree.

Generally, applicants to EAP should have completed at least one college-level course in each of the following subjects:

- physics
- chemistry
- biology or environmental science
- economics
- another social science
- calculus or another mathematics course beyond college algebra

Occasionally, students lacking some of the prerequisites are admitted to the program, and the EAP Admissions Committee recommends courses to make up the deficiencies.

Curriculum requirements:

The Energy Analysis and Policy Program's interdisciplinary curriculum considers a wide range of technical, economic, political, and social factors that shape energy policy formulation and decision-making. It examines current topics in energy resources, energy market structures and practices, traditional public utilities, energy technology, energy and environmental linkages, energy and environmental policy, and energy services. The curriculum also acquaints students with relevant skills: quantitative reasoning, analysis of energy issues, pricing and life-cycle costing, business analysis, and environmental quality assessment.

Each EAP student must complete **six courses (18 credits)** including:

- an introductory seminar
- one course each in energy policy, energy economics and business, energy technology, and environmental studies
- and a capstone seminar

Students may select courses to satisfy the requirements from the list below. Each semester the EAP Program will produce a list of course offerings for the upcoming year.

Program Seminars

- EnvSt/URPL/PubAff 809, Energy Analysis and Policy Seminar -- Introductory Seminar, Energy, Society & the Environment]. Instructor: Dr. Richard Shaten. Fall semester.
- EnvSt/URPL/PubAff 810, Energy Analysis Seminar -- Capstone Seminar. Spring semester.

Energy Technology

- Geol 411, Energy Resources. Instructor: Prof. Alan Carroll. Fall semester.
- NEEP 571, Economic and Environmental Aspects of Nuclear Energy. Instructor: Prof. Mike Corradini (EAP Chair). Spring semester.
- BSE/EnvSt 367, Renewable Energy Systems. Instructor: Prof. Doug Reinemann. Fall semester.
- ME/ChE 567, Solar Engineering of Thermal Processes. Instructor: Prof. Sandy Klein. Fall semester.
- ECE 356, Electric Power Processing for Renewable Energy Systems. Instructor: Prof. Thomas Jahns.
- ME 469, Internal Combustion Engines.
- ME 565, Power Plant Technology.
- ME 468, Building Energy Management and Space Conditioning.
- ME 569, Applied Combustion.

Energy Economics and Business

- AAE/Econ/EnvSt/TranPU/URPL 671, Energy Economics. Instructor: Dr. Richard Shaten. Spring semester

- TranPU 725, Public Utilities. Instructor: Prof. Rod Stevenson. Fall and Spring semesters.
- Econ/TranPU 630, Public Utility Problems. Instructor: Prof. Rod Stevenson.

Energy Policy

- EnvSt 539, Air Resources Science & Policy. Instructor: Prof. Tracey Holloway. Fall semester.
- EnvSt/AOS 535, Atmospheric Dispersion & Air Pollution. Instructor: Prof. Tracey Holloway. Spring semester.
- AAE/Econ/EnvSt/PubAff 881, Benefit Cost Analysis. Fall semester.
- TranPU 725, Public Utilities. Instructor: Prof. Rod Stevenson. Fall and Spring semesters.
- Law 837 Regulated Industries: Energy. Instructor: Prof. Peter Carstenson.

Environmental Studies

- EnvSt/AOS 535, Atmospheric Dispersion & Air Pollution. Instructor: Prof. Tracey Holloway. Spring semester.
- EnvSt 539, Air Resources Science & Policy. Instructor: Prof. Tracey Holloway. Fall semester.
- Agronomy/Entom/EnvTox/WLEcol 630, Ecotoxicology: Toxicant Effects on Ecosystems.
- Envir St/Prev Med 502, Air Pollution and Human Health. Instructor: Prof. Marty Kanarek. Fall semester.
- CEE423/ME466, Air Pollution Effects, Measurements and Controls.
- EnvSt/EnvTox/Prev Med 507, People, Chemicals, Environment.
- NEEP 571, Economic and Environmental Aspects of Nuclear Energy. Instructor: Prof. Mike Corradini (EAP Chair). Spring semester.

Electives

(Not intended to fulfill program requirements, but may serve to make up program prerequisites)

- AAE/Econ/Envir St 343 Environmental Economics
- AOS/EnvSt/Physics 472, Scientific Background for Global Environmental Problems.
- AAE 431, Natural Resource Economics.
- Envir St/Forest/WL Ecol 515 Renewable Resources Policy

Academic Programs Contact Information

For **general questions** about Academic Programs at the Nelson Institute or for information about **graduate admissions**, please email the Academic Programs Receptionist [Danielle Lamberson Philipp](#) or call (608) 262-7996.

Graduate School Admission

Your next step is to select a [graduate program](#) that best fits your research and career goals. There are incredible opportunities for graduate study at **UW-Madison with over 150 majors offering master's degrees and 110 offering the doctorate** - many of which are interdisciplinary. UW-Madison also offers a diverse campus with

about 45% of our graduate students from 100 countries outside of the U.S. UW-Madison was 12th in the nation for the largest number of international students in 2004-5 (Institute of International Education 2004-5).

Before starting the application, you need to know that graduate admissions is a shared process at UW-Madison. ***The faculty in the program to which you apply evaluate your application and make a recommendation to the Graduate School regarding admission.*** The final decision is made by the Graduate School. No applicant is admitted by the Graduate School without a favorable recommendation from the graduate program.

The Graduate School sets [minimum admissions requirements](#) for all prospective students. Program admission requirements are often more rigorous than the minimum requirements set by the Graduate School.

Graduate School Admission Requirements

Academic program admission requirements (see below) may be in addition to, or more rigorous, than the Graduate School requirements.

Grades

A minimum undergraduate **grade-point average (GPA) of 3.00** (on a 4.00 scale) on the equivalent of the last 60 semester hours (approximately two years of work). International applicants must have a strong academic performance comparable to a "B" or above average grades. We use your institution's grading scale; do not convert your grades to a four point scale.

Degree

A bachelor's degree from a regionally accredited U.S. institution, or a comparable degree from an international institution.

International applicants must have a degree comparable to a regionally accredited U.S. bachelor's degree.

Country: Georgia

Academic Requirements: 4-7 year first degree, bachelor or diploma.

Academic Documents Required: Official diploma (diplom) showing degree and date awarded with accompanying addendum - translation of academic record (not valid without the diploma) in Georgian or Russian and English. Addendum and diploma registration numbers must be the same. Documents must be issued by the school with the official stamps and signature accompanied by an official English translation.

English Proficiency Requirements: English proficiency test required unless English is the exclusive language of instruction at the degree granting institution.

Last Updated 02/11/2008.

Technical issues with this webpage, please contact gswebmaster@bascom.wisc.edu

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Your school should provide an official translation of your documents; otherwise have a translation done by your school or an official translator. In some countries these people are also notaries. Do not submit an evaluation from a credential evaluation service in lieu of a translation

English Proficiency

Every applicant whose native language is not English, or whose undergraduate instruction was not in English, must provide an English proficiency test score. Scores are accepted if they are within two years of the start of the admission term. Country of citizenship does not exempt applicants from this requirement. Language of instruction at the college or university level, and how recent it has been, are the determining factors in meeting this requirement.

Applicants are exempt if:

- English is the exclusive language of instruction at the undergraduate level; **or**
- they have earned a degree from a regionally accredited U.S. college or university not more than 5 years prior to the anticipated semester of enrollment; **or**
- they have completed at least two full-time semesters of graded course work, exclusive of ESL courses, in a U.S. college or university, or at an institution outside the U.S. where English is the exclusive language of instruction, not more than 5 years prior to the anticipated semester of enrollment.

The required minimum scores are:

TOEFL: 550 for paper test, 213 for computer, and 80 for internet (iBT)

MELAB: 77---Michigan English Language Assessment Battery

IELTS: 6---International English Language Testing System.

An applicant whose TOEFL (paper-based) test score is below 580; TOEFL computer based test (CBT) score below 237; (TOEFL internet based iBT) test score below 92; IELTS score below 7; or MELAB below 82 must take an English assessment test upon arrival. Depending on your score you may need to register for any recommended English as a Second Language (ESL) courses in the first semester you are enrolled.

International Financial Information

International applicants are required to have [adequate financial resources](#) to cover their expenses for the duration of their studies at UW-Madison. Do not send any financial statements until requested.

Academic Program Admission Requirements

Academic program admission requirements may be in addition to, or more rigorous, than the Graduate School requirements.

Find your [academic program](#) of interest to check on its specific requirements.

All supplemental materials, i.e. academic records, reasons for graduate study, resumes, should be sent to the [academic program](#).

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New York Institute of Technology



OLD WESTBURY CAMPUS

Office of Admissions
P.O. Box 8000 (Northern Blvd.)
Old Westbury, NY 11568

Phone: 516-686-7520
800-345-NYIT

Fax: 516-626-0419

Energy Management.M.S.

http://iris.nyit.edu/set/set1/pages/programs/08ENERGY/_mainframe.html

DEGREES	Graduate (M.S.)
CAMPUS	Old Westbury, Manhattan
VIEW PDF	grad0708.pdf

- Degree available through on-campus attendance or **entirely via the Internet.**
- **Advanced certificates** available in environmental management, facilities management, **energy technology**, and infrastructure security.
- One of only a few graduate energy management programs in the U.S

Program Requirements

- The Master of Science in Energy Management is a 36 credit, interdisciplinary program, which includes coursework in energy, environmental, and facilities management. This program provides the management skills, knowledge of technology, and understanding of environmental issues, which energy professionals need for career advancement.
- **The Advanced Certificate in Facilities Management (18 credits)** focuses on methods for streamlining building operations and developing cost-effective facilities maintenance strategies.
- **The Advanced Certificate in Environmental Management (18 credits)** includes courses in environmental technology, waste management, and geographical information systems.
- The Advanced Certificate in Energy Technology (18 credits) explores the latest developments in alternative energy sources, distributed generation, experimental vehicles, and facility automation systems.
- The Advanced Certificate in Infrastructure Security Management (18 credits) examines the strategies and technologies which are necessary to protect our critical infrastructure from damage and/or disruption.

Courses are available in convenient evening, weekend, and online formats.

If you have any questions, or if you would like more information about these programs, feel free to contact me by phone at 516-686-7578 or by email: ramundse@nyit.edu. We look forward to welcoming you to graduate studies at NYIT.

Robert N. Amundsen, Ph.D.

Director

(516) 686-7578

ramundse@nyit.edu

Master of Science in Energy Management

The School of Engineering and Technology of NYIT offers a unique Master of Science degree program in Energy Management, where students learn how to evaluate the energy sources of the future, help protect the environment, and optimize the performance of buildings.

The M.S. in Energy Management degree is designed to provide the up-to-date knowledge which is required for success in the energy field. This interdisciplinary program integrates the technical and managerial skills which are necessary to analyze and improve energy efficiency in commercial, residential and industrial buildings.

Graduates of the program, as energy, facilities, and environmental managers, are employed by power producers, equipment manufacturers, energy service companies, and owners of buildings such as hospitals, universities, shopping centers, retail chains, and office complexes. The 36-credit M.S. degree includes coursework in:

- Energy Conservation
- Alternative Sources of Energy
- Facilities Operation and Maintenance

- Energy Equipment Assessment
- Competitive Energy Markets

Advanced Certificate in Energy Technology

The current restructuring of the energy industry has created opportunities for decentralized, efficient power generation. Fuel cells, micro turbines, and photovoltaic arrays will enable companies to generate their own power, and sell surplus power through the utility grid.

Environmental mandates and rising fuel prices have inspired high-mileage, low-emission vehicles. Massive fleet conversion programs enable cities to meet their clean-air goals using natural gas-powered buses, taxis, and delivery vehicles. This 18-credit certificate includes coursework in renewable sources of energy, alternative fuels for vehicles, and independent power production.

Advanced Certificate in Facilities Management

The complexity of modern buildings has increased with the advent of sophisticated lighting systems, building controls, and air conditioning equipment. There are numerous career opportunities for Facilities Managers, who operate and maintain buildings and related infrastructure. Facilities Managers need to be able to control costs, while maintaining high standards of safety, comfort, and performance. This 18-credit certificate includes coursework in power plant systems, energy-efficient lighting, and automated building energy control systems.

Advanced Certificate in Environmental Management

Environmental protection has become a top priority for private industry, as well as the general public. Strict new regulations have created a need for managers with an understanding of environmental issues. Pollution prevention, waste minimization, and resource conservation have been shown to increase overall productivity, minimize costs, and preserve our environment. Environmental managers develop “green” product features, monitor compliance with regulations, and implement “clean” technologies which produce energy with lower emissions. This 18-credit certificate includes coursework in environmental technology, waste management, and advanced transportation systems.

Curriculum Requirements for the Master of Science in Energy Management

REQUIRED CORE COURSES	3
ENGY 610 Energy Management	3
ENGY 670 Energy Technology in Perspective	3
ENGY 690 Energy Policy, Economics and Technology	3
ENGY 890 Thesis, Practicum or Other Research	3
ENVT 601 Introduction to Environmental Technology	3
MGMT 605 Organizational Development and Behavioral Factors	3
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	18Credits

ELECTIVE COURSE REQUIREMENTS

Eighteen graduate credits of elective work are required. Any combination of graduate-level ENGY, ENVT and MBA courses may be used to satisfy the elective requirement. Course selections must be approved by the Director of the Energy Management program. Recommended electives are listed below.

FACILITIES MANAGEMENT ELECTIVES

ENGY 615 Energy Equipment Assessment	3
ENGY 620 Facilities Operation and Maintenance	3
ENGY 625 Facilities Management Seminar	3
ENGY 710 Power Plant Systems	3
ENGY 730 Computer Applications for Energy Management	3
ENGY 820 Automated Building Energy Control Systems	3
ENVT 715 Pollution Prevention and Waste Minimization	3
ENVT 720 Environmental Audits and Monitoring	3

ENVIRONMENTAL TECHNOLOGY ELECTIVES

ENGY 775 Alternative Energy Systems	3
ENVT 620 Introduction to Waste Management	3
ENVT 655 Fundamentals of Air Pollution	3
ENVT 710 Environmental Instrumentation Lab	3
ENVT 725 Environmental Issues in the New York Area	3
ENVT 730 Geographical Information Systems	3
ENVT 735 Environmental Modeling Techniques	3
ENVT 750 Environmental Risk Assessment	3

MANAGEMENT ELECTIVES

ACCT 745 Legal Environment of Business	3
ENGY 655 Environmental Economics	3
ENGY 750 Energy and Environmental Law	3
ENGY 790 Competitive Energy Markets	3
INTL 725 Multinational Business Management	3
MGMT 610 Operations Management	3
MRKT 601 Marketing Management	3
MRKT 725 Management of New Products	3

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Total Credits required 36 Credits	18 credits

NOTE: A Bachelor's degree is required for admission to graduate study in Energy Management at NYIT. A management or engineering background is desirable, but not required. All students must furnish official transcripts from all schools attended as part of their application. Consult the NYIT graduate catalog for more information.

Graduate Tuition and Fees (2008-2009): \$10768.00/Year

<http://catalog.njit.edu/graduate/frontmatter/tuitionfees.php>

Graduate Admission

To be considered for a master's program at NJIT, you must have completed a four-year undergraduate program accredited in the United States or its equivalent and demonstrate superior academic achievement in an appropriate discipline.

We look for students who placed in the top half of their graduating class and department, with a cumulative GPA no lower than 2.8 on a 4.0 scale. Individual departments may impose more stringent requirements.

If you plan to apply for financial support, or if your most recent degree was earned at a school outside the United States, you must submit **GRE scores** as part of your application for admission. Additionally, the following graduate programs require the GRE for *all* applicants: applied physics, architecture, biology, chemistry, infrastructure planning, and materials science and engineering.

The GMAT is required for all applicants to graduate programs within the School of Management.

The Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) is required for all international applicants not holding a degree from a United States post-secondary institution. The minimum score required is 79 for the Internet-based TOEFL exam, 213 for the computer-based TOEFL exam, or **550** for the paper-based TOEFL exam. A minimum score of 6.5 with no sub-score lower than 6.0 is required for the IELTS exam.

Application Checklist

- [Application for admission](#)
- \$60 nonrefundable application fee
- Official transcripts and proof of degree completion from all colleges and universities attended
- Official GRE/TOEFL results (All test results must be sent directly to the Office of Graduate Admission from ETS using code 2513.)
- [One letter of recommendation](#) in a sealed envelope
- Photocopy of visa or permanent-resident card (for non-U.S. citizens residing in the United States only).

The following table lists a summary of requirements and costs of these programs.

Comparative Costs and Requirements of the Selected Graduate Programs in the United States

University & Program	Deadline	Tuition & Fees	Total Costs (2 years)*	Test Requirements	Relative Ratings
University of Wisconsin Madison- Nelson Institute for Environmental Studies Master of Science in Environment & Resources with a Concentration in Energy Analysis and Policy	Flexible	\$50,500	\$85,122	Flexible GRE & TOEFL recommended	*****
University of Minnesota- Technology Management	Flexible	\$65,720**	\$78,000	Flexible	****
New York Institute of Technology- Master of Science in Energy Management	Flexible	\$43,072	\$74,644	TOEFL	****

*Total costs does not include international travel

**It includes a trip abroad, health insurance, etc.

APPENDIX 7

CENTER OF EXCELLENCE

FOR

ENERGY EDUCATION, TRAINING, APPLIED

RESEARCH AND INFORMATION

(CEE)

The mission of CEE would be to provide energy education, training, research and information services in Georgia and the Caucasus region.

1. To provide both graduate and undergraduate energy education in variety of fields including engineering, business, economics, public administration, and social sciences.
2. To utilize the physical, financial, and human resources of the universities as well as businesses, industries and governmental agencies in the region in training and applied research.
3. To serve as a forum for ideas and research on energy information dissemination, education and training.
4. To provide reliable and accurate energy information and assistance to the general public, businesses, industries, educational institutions, and governmental organizations.
5. To demonstrate cost-effective energy efficient products and renewable energy technologies.
6. To expand its activities to Caucasus region.

CEE Strategies and Activities

A. Energy Information

B. Energy Education and Training

C. Applied Research