



**Towards a Sustainable Energy Sector in the  
Caribbean and the Role of Higher Education  
Institutions**

**NEEDS ANALYSIS REPORT**

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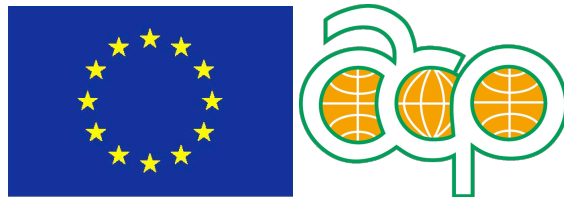
CAP4INNO: Knowledge transfer capacity building for enhanced energy access & efficiency in the Caribbean – NEEDS ANALYSIS REPORT

University of Alicante (Spain), Chalmers University of Technology (Sweden), University of Technology (Jamaica), Instituto Tecnológico de Santo Domingo (Dominican Republic), The University of the West Indies (Caribbean).

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## List of abbreviations

BCC	Barbados Community College
CASE	College of Agricultural Science and Education
EU	European Union
HEI	Higher Education Institution
INTEC	Instituto Tecnológico de Santo Domingo
IP	Intellectual Property
JIPO	Jamaica Intellectual Property Office
MOU	Memorandum of Understanding
NGO	Non-Governmental Organisation
NCU	Northern Caribbean University
OLADE	Latin America Energy Organisation
R&D	Research and Development
SEED	Student Entrepreneurial Empowerment Development
SJPP	Samuel Jackman Prescod Polytechnic
USPTO	United States Patent and Trademark Office
UTech Jamaica	University of Technology, Jamaica
UTT	University of Trinidad and Tobago
UWI	The University of the West Indies
WIPO	World Intellectual Property Organization

# 1. Introduction

## 1.1 CAP4INNO Project

This document is the first output of the Project “*Knowledge transfer capacity building for enhanced energy access & efficiency in the Caribbean (CAP4INNO)*”, specifically Activity 1.2 Training Needs Analysis in Caribbean partner countries. The objective of this activity was to conduct an in-depth analysis of training offered and training needs of Caribbean HEI’s academic staff (in Energy, Knowledge Transfer and Innovation), as well as competences and alliances needed in the energy sector (public and private).

The CAP4INNO project is co-financed by the European Commission in the framework of the by ACP-EU Co-operation Programme in Higher Education (EDULINK II).

The overall objective of CAP4INNO is to build capacities for transfer and exploitation of innovative solutions and modern technologies for enhanced energy access and efficiency in the Caribbean, in line with socio-economic regional development priorities.

The specific objectives of the CAP4INNO project are:

- a) To provide the labour market & economy with high-level skills required to enhance energy access & efficiency and foster the use of modern technologies, through modernising curricula and training offer in 3 Higher Education Institutions serving 18 countries in the Caribbean.
- b) To strengthen inter-institutional cooperation among HEIs, enterprises & governments in the Caribbean, and foster innovation & knowledge transfer, through networking & policy support actions.

The project addresses both institutional capacity building and improvements in academic quality and relevance in the region, leading to:

- Increased awareness on qualifications needed in the energy sector and training needs of staff and students to build capacities for a sustainable energy sector.
- Upgraded qualifications of partner HEI academic & management staff with a view to providing high-level skills required for capacity development in the energy sector.
- Improved institutional frameworks, modernised offer of academic and research programmes, and amplified lifelong learning opportunities for professionals, including via distance learning.

- Reinforced inter-institutional networking and cooperation among key actors of the innovation system: HEIs, enterprises, and government for enhanced energy access among the less favoured groups of Caribbean societies.
- Enhanced impact and promoted regional up-take of the pilot transversal courses in other faculties and HEIs in the Caribbean.

Working together in the project there are two universities from the EU (Spain and Sweden) and three universities from the Caribbean region.

<b>Name</b>	<b>Country</b>
<b>University of Alicante</b>	Spain
<b>Chalmers University</b>	Sweden
<b>University of Technology, Jamaica</b>	Jamaica
<b>Instituto Tecnológico de Santo Domingo</b>	Dominican Republic
<b>The University of the West Indies</b>	Caribbean

The project receives active support from the associated partners: Jamaica Intellectual Property Office (Jamaica), Oficina Nacional de la Propiedad Industrial (Dominican Republic), Intellectual Property Office (Trinidad and Tobago) and the World Intellectual Property Organization (Switzerland).

## 1.2 Training needs analysis in Caribbean partner countries: methodology

One of the first activities of the CAP4INNO project was conducting an in-depth analysis of training offered and training needs of Caribbean HEI's academic staff (in Energy, Knowledge Transfer and Innovation), as well as competences and alliances needed in the energy sector (public and private).

The objectify of this activity was to identify gaps in the current training offered and the sets of skills and tools that are needed in the region to build its capacity to develop and implement innovative energy solutions in order to address the skills gaps and the other factors that are preventing the country/region from developing an efficient energy sector to support its socio-economic development.

The following five target groups were surveyed:

1. Students
2. Academic staff



3. Senior manager on behalf of the University/Higher Education Institution
4. Managers of enterprises in the field of energy
5. Governmental institutions

A total of 448 students, 54 academic staff, 21 HEI's, 32 enterprise employees, and 32 government directives and employees in Barbados, Dominican Republic, Jamaica and Trinidad & Tobago, were surveyed during March and April 2014.

## 2. Target group 1: Students

### 2.1 Data concerning respondents

- 448 students from across the partner universities were surveyed: UWI - Barbados (146), UWI - Trinidad & Tobago (115), UTech Jamaica (114) and INTEC (124).
- As it can be seen in Figure 1 below, the gender mix of the respondents were mostly female at the UTech Jamaica and UWI institutions, and mostly male at INTEC. Figure 2 shows the age distribution of the respondents across the three institutions.
- Students were split evenly between first year (30%), second year (34%), and third year (29%), with 7% in their fourth year or above (mainly medical students).
- Figure 3 shows the subject specialisations of the students from each campus, where it is clear which institution offers which subject disciplines - with INTEC being focused mainly on Engineering, UTech Jamaica on Engineering and Business and the UWI offering a broader range of specialisations.

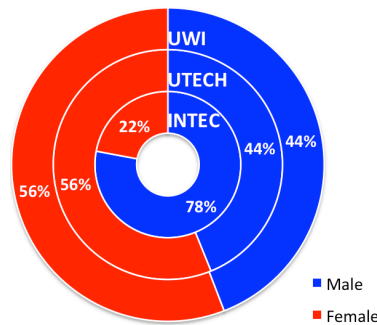
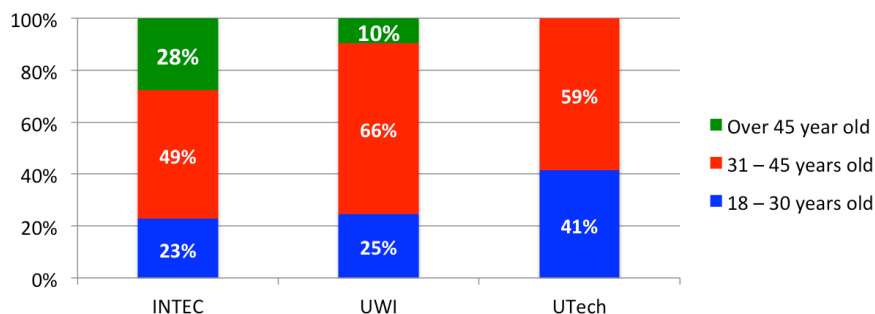
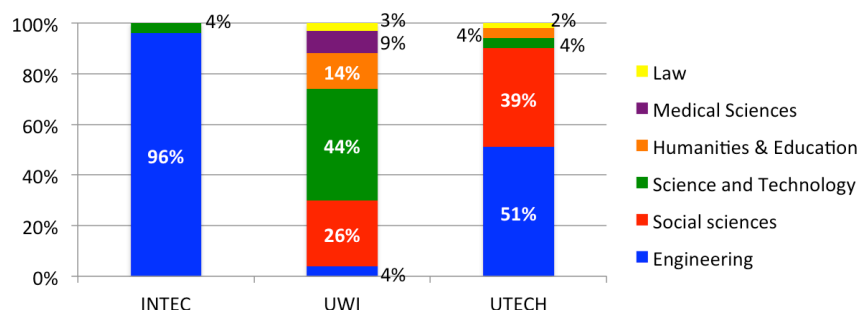


Figure 1. Gender mix of respondents from the different institutions



**Figure 2. Age distribution of respondents across the three institutions**



**Figure 3. Area of specialisation of the student respondents across each institution**

## 2.2 Findings

- **Student contact with industry:** Overall 36% of students had been in touch with, or worked with, industry or enterprises during their studies, either through study projects or through internships (Table 1). As expected, contact via internships was noticeably lower and varied significantly across the institutions with the more technically focused institutions such (INTEC and UTech Jamaica) having significantly higher contact with industry than UWI, which covers a broader range of disciplines (and also has substantially more student numbers).

**Table 1.** Positive response to question on student contact with industry.

Contact with industry	INTEC	UWI	UTech	Average
Through study projects:	43%	20%	45%	36%
Through internships:	24%	13%	41%	26%

**Student knowledge of the proposed thematic areas:** In all the institutions the lowest level of knowledge was shown on IP related subjects, where the results showed numbers as low as 11%. The highest level of acquired knowledge was in research methods (see

- Figure 4).
- **Student interest on thematic areas:** There was a noticeable increase between what was taught and what the students were interested in across all of the thematic areas. The renewable energy technologies were of most interest, but the difference in what was being taught and what the respondents were interested in was most noticeable in the innovation and entrepreneurship areas. The thematic areas of most interest did vary across the three institutions with INTEC students most interested in “Knowledge and technology Transfer”, UWI students most interested in “Use of clean energy sources” and UTech Jamaica students most interested in “Change management”.

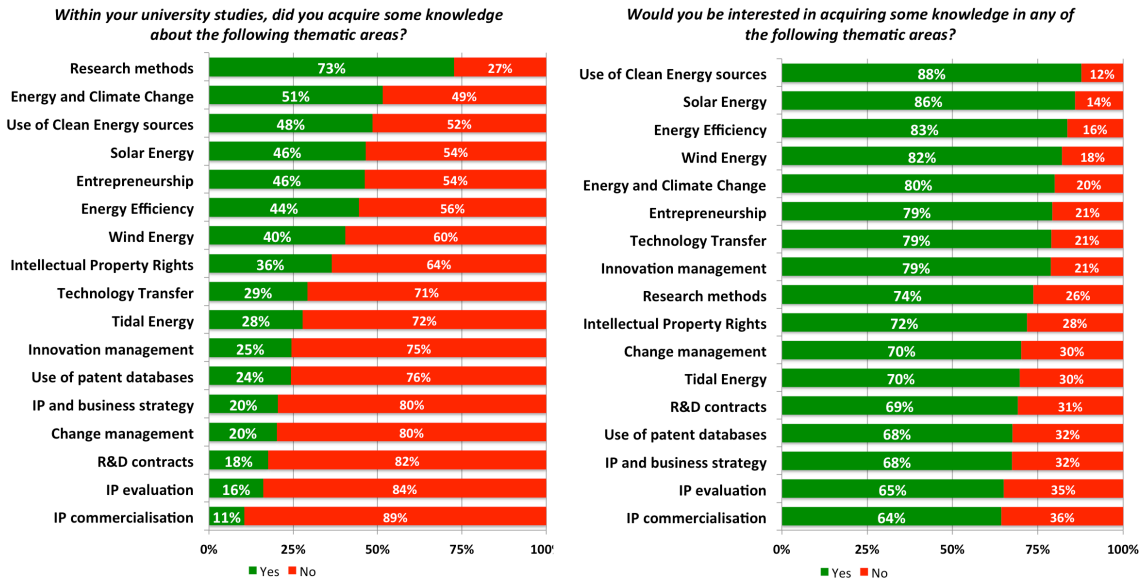


Figure 4. Respondents exposure and interest in the CAP4INNO thematic areas.

- Career prospects:** Figure 5 shows the anticipated career prospects for the respondents, indicating a surprising amount of interest in students setting up their own enterprising. Perhaps as expected for the Caribbean, a large number of students see their future careers lying abroad.

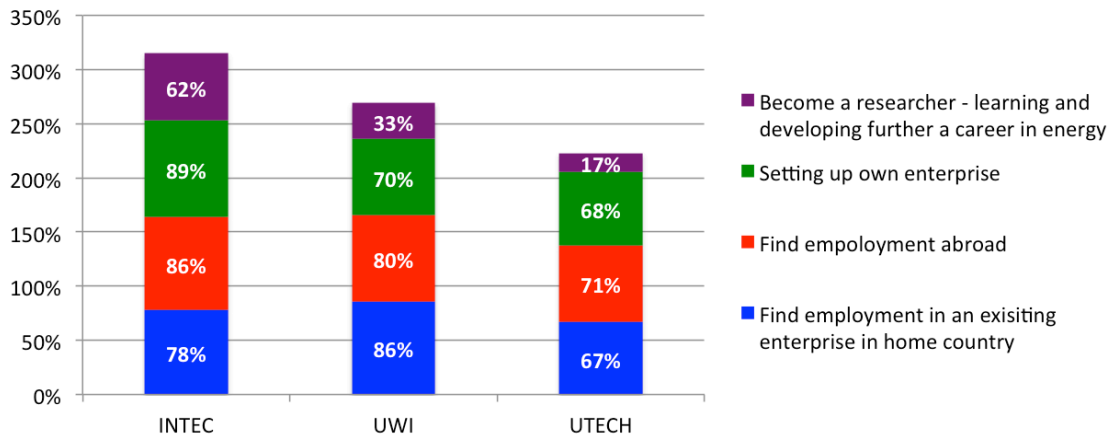


Figure 5. Career prospects anticipated by respondents (Note that multiple responses were possible).

## 2.3 General education and training relevant to CAP4INNO

### INTEC (Dominican Republic)

- Most of the students have not participated in Study projects, Internships or courses of interdisciplinary groups. It was obtained that 84% of the students had been taught how to conduct research, and how to evaluate research results.
- A desire to set up their own enterprise was indicated by 89% of the students. 58% felt confident in being adequately prepared to set up an enterprise, however 69% felt that the University support system to set up a business could be improved.
- The majority of the students used textbooks and used academic journals as reference for their research projects. More than half of the students (59%) were taught how to use patent databases, although 65% did not use them for projects.
- The lowest level of knowledge was on IP commercialization (16%), IP evaluation-finding (18%), R&D contracts (18%) and change management (20%), yet the interest on learning about these subjects was relatively high.
- From the survey it is clear that further training is needed on issues relating to student relationship with industry while there is a need to enhance multidisciplinary collaboration.
- Another important aspect is the low level of research and innovation in areas related to energy efficiency and renewable energy. This is a topic in which the CAP4INNO project has much to offer.

### UWI (Barbados and Trinidad & Tobago)

- Most students have gained knowledge of research methods and clean energy systems appear to have a solid foundation in study programmes.
- Topics related to innovation, implementation and entrepreneurship were studied by just 16% of the students polled.
- 27% of students have been taught how to evaluate research results for innovation value and 25% have used patent databases in their studies.
- The main sources of technical information were textbooks (93%) and research journals (84%). Of the remaining sources suggested, Espacenet was the most used but by just 6% of the respondents.
- The Cave Hill and St. Augustine Campuses each offer over 5,000 courses, with 7 undergraduate and 12 graduate courses related to innovation and entrepreneurship, and 8 undergraduate and 20 graduate courses related to energy systems.

### UTech (Jamaica)

- Students have been trained in traditional research methodologies. They are exposed to working with industry and to some extent in multi-disciplinary groups.

- Less than 50% felt that their training exposed them to the possibility of setting up their own businesses, and a similar percentage felt they were not prepared for this possibility. Also, 61% reported the absence of an enabling support system to set up a business. This finding suggests the need for greater entrepreneurship training under the CAP4INNO project, and awareness building by the Technology Innovation Centre regarding the business incubator services that exists at UTech Jamaica.
- More than half (59%) of the students were not taught how to use patent databases and 67% did not use them for their projects. Also, the average level of unawareness in the IP related thematic area was 60%. A majority of respondents used textbooks (82%) and journals (70%) to access technical information. These findings indicate that there is strong need for exposure, training and practice in the use of technical databases such as patent databases and in all IP related areas – the CAP4INNO project can help with this.
- Only 42% of the respondents reported being taught how to evaluate research results for innovation value. In addition, there exists a low level of R&D work in the area of innovation in energy – these are also areas in which the CAP4INNO Project can help.

## 2.4 Interest and cooperation with CAP4INNO

### UWI (Barbados and Trinidad & Tobago)

- As reflected in Figure 4, students showed a broad interest in each of the themes of the CAP4INNO project. Clean Energy Systems were of specific interest, along with entrepreneurship/business creation and innovation management.
- Only 4% of the students polled thought that IP was unimportant in their area of study, with 65% of students considering IP to be “important” or “most important”.
- 25% of respondents had worked in interdisciplinary groups with other students from areas such as entrepreneurship/engineering/business/law.
- 63% of students polled thought that their future could involve creating an innovation or patent in the field of Renewable Energy or Energy Efficiency.

### UTech (Jamaica)

- Entrepreneurship training.
- Exposure, training and practice in the use of technical databases such as patent databases.
- Exposure and training in all IP related areas - patents, licensing, etc.
- How to evaluate research results for innovation value.
- Building capacity in Energy efficiency, use of IP databases and innovation.
- Building capacity in academia and business to increase collaboration.
- Entrepreneurial and innovation opportunities emanating from technological developments in the energy and business sector.

### **INTEC (Dominican Republic)**

- Training in the development of multidisciplinary research.
- Building capacity to foster collaboration between universities and businesses.
- Building capacity in the use of databases of scientific and technical data.
- Building capacity in innovation and intellectual property.
- Training on the evaluation of the results of innovation.
- Building capacity in the use of IP databases relatives to renewable energy sources and energy efficiency.

## **2.5 Suggestion on topics for training**

### **UWI (Barbados and Trinidad & Tobago)**

- Suggested topics for training were activities that would support existing courses related to innovation and entrepreneurship, provide better visibility/promotion of the importance of these areas for the Caribbean region, and provide new courses for students to pursue, either through the introduction of one-off 'guest' lectures in existing courses, or use of existing university media channels.
- Strengthening of current student entrepreneurship empowerment initiatives, including Cave Hill's SEED project.

### **UTech (Jamaica)**

- It is proposed that training modules be developed for Caribbean HEIs in the areas above, drawing on the experience and good practices in partner countries.
- Entrepreneurship and business design.
- Building a teaching culture for enhancing entrepreneurship and Research Development and Innovation in energy.
- Fundamentals of Intellectual Property & Technology Transfer (role of IP in innovation, IP and value creation, methods/modalities of IP protection and exploitation, etc.).
- Technology surveillance and search techniques- Use of patent and other databases to unearth innovative technologies for energy access and efficiency.
- Curricula design for teaching innovation - Energy efficiency and Renewable energy.

### **INTEC**

- Using patent database with focus on energy efficiency and renewable energy sources.
- Best practices in establishing relationships university-industry collaboration.
- Best practices in developing multidisciplinary research.
- Experiences in creating new businesses.

- Experiences in improving curriculum to include IP issues related to energy efficiency and use of renewable energy sources.
- Good practice in motivation and training of students in IP issues and entrepreneurship.

## 2.6 Main conclusions from students

### UWI (Barbados and Trinidad & Tobago)

- Students are clearly interested in acquiring knowledge in clean energy systems and in innovation and entrepreneurship.
- Both the Cave Hill and St. Augustine campuses are already in the process of strengthening undergraduate courses and graduate programmes related to clean energy systems. This suggests that the focus of CAP4INNO training should be to assist with this, but to pay particular attention to innovation and entrepreneurship.

### UTech (Jamaica)

- There is a high level of unawareness in IP and IP related matters. Students are interested in seeing changes in curricula to reflect entrepreneurship, change management, innovation and IP. There is need to build capacity in these areas to exploit energy innovation technologies.

### INTEC (Dominican Republic)

- There is a good awareness on issues related to energy in general. There is interest in IP issues.
- A partial unawareness exists about the possibilities offered within the University Training and assistance in IP and entrepreneurship.
- There is a misuse of the information available in databases of national and international IP blocks.
- All possibilities for the development of interdisciplinary research are not exploited.

## 3. Target Group 2: Academic staff

### 3.1 Data concerning respondents

- 54 academic staff from across the partner universities responded to the survey request: UWI (18), UTech Jamaica (15) and INTEC (19). The gender mix of the respondents is shown in Figure 6.

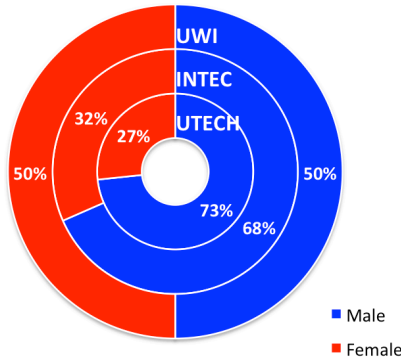


Figure 6. Gender mix of academic staff who responded to the survey.

- As Figure 7 shows, most of the academic staff held further degree training to Master’s level or PhD. Most of them had experience in private sector: INTEC (90%), UTech Jamaica (87%), and UWI (70%). Most showed knowledge of the thematic areas and believed they were able of teaching on these areas.

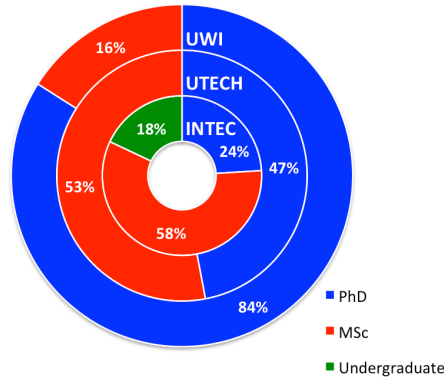


Figure 7. Academic training of the academic staff surveyed.

### 3.2 Findings

- Academic staff considers innovation and entrepreneurship to be an important issue, even though some pointed out it was not the most important – with clean energy use also being considered important.
- Most of the scholars have experience of interdisciplinary work with 25% involved on a regular basis, 60% on an occasional basis and 15% not at all.

### 3.3 General education and training relevant to CAP4INNO

- For all three institutions, textbooks and research journals were shown to be the main source of technical information for teaching and research, with very few staff using patent databases in their work (both National and International). However, some respondents stated that they do use other databases relevant to their interests (e.g. CIA factbook, MEA database).



- The academic staff surveyed exhibited strengths in their areas of technical knowledge. Their responses showed particular strength in the areas of how to do research. However, it would appear that research was not subsequently linked to innovation and commercialisation, the use of patent databases, change management and business creation. This would lead one to conclude that academic research has not progressed to the applied research stage or towards innovation and commercialisation, of research results used for business creation. The CAP4INNO Project can help to address these identified gaps.
- All three partner universities had experience of business incubators for start-ups however these were found to be under-supported both in a human capacity and a financial capacity.

### 3.4 Interest and cooperation with CAP4INNO

- The respondents were mostly already trained in research methods, but almost all staff felt unprepared to teach in the topics related to innovation, intellectual property and entrepreneurship. Of the inter-disciplinary courses suggested, the respondents saw entrepreneurship, IP databases, and knowledge/technology transfer as being of most use in their area of teaching/research (see Figure 8).
- Of the inter-disciplinary courses suggested, academic staff would be more interested in receiving specialist training in research methods, IP and business strategy, entrepreneurship and use of patent databases.

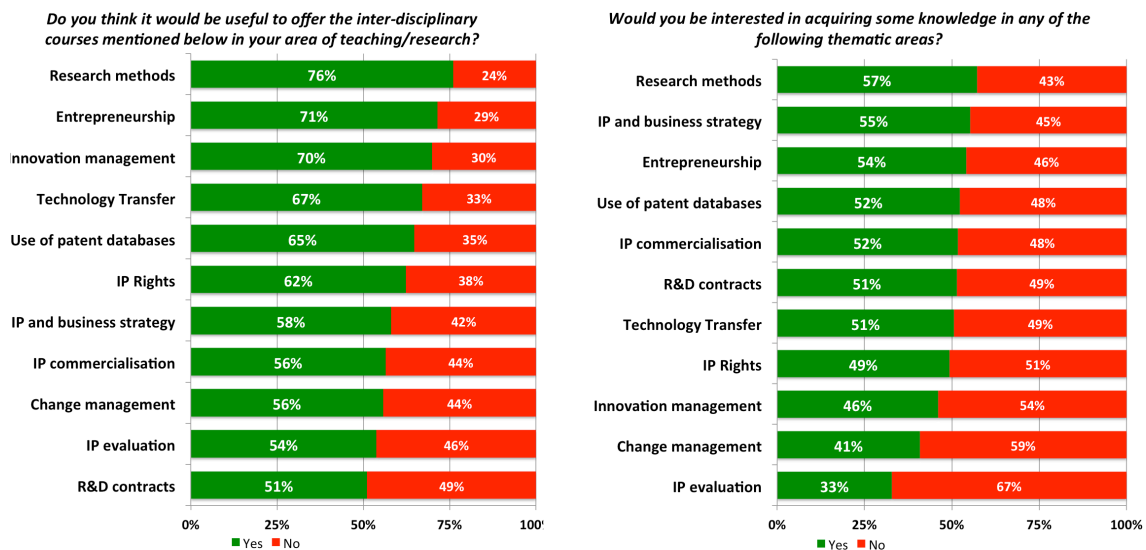


Figure 8. Thoughts of the academic staff respondents on the CAP4INNO thematic areas.

### 3.5 Suggestion on topics for training

- Training academics in the use of patent databases and building curricula to assist them in using them in their training of students and research activities.

- Training in research design for innovation, assessing research results for innovation value.
- Build capacity in knowledge and technology transfer.
- Building capacity in Energy efficiency, use of IP databases and innovation.
- Entrepreneurship and business design.
- Building a teaching culture for enhancing entrepreneurship and Research Development and Innovation in energy.
- Fundamentals of Intellectual Property & Technology Transfer (role of IP in innovation, IP and value creation, methods/modalities of IP protection and exploitation, etc.).
- IP commercialisation.
- Technology surveillance and search techniques- Use of patent and other databases to unearth innovative technologies for energy access and efficiency.
- Curricula design for teaching innovation - Energy efficiency and Renewable energy.

### **3.6 Main conclusions from academic staff**

- Staff are generally unaware of topics related to innovation, implementation and entrepreneurship. Clearly there is a need to increase general awareness of these subject areas.
- There are academic staff interested in specialising in areas related to intellectual property, in particular the use of patent databases, knowledge and technology transfer, Research and Development contracts, and entrepreneurship.

## **4. Target Group 3: Higher Education Institutions**

### **4.1 Data concerning respondents**

- Each partner surveyed representatives of HEIs from the partner countries. The response rate from each partner was: INTEC (6), UWI (11) and UTech Jamaica: (4), a total of 19 responses. Table 2 shows the number of academic staff, the number of faculties and the number of students for the HEIs that responded to the survey request.

**Table 2.** List of HEIs in partner countries with data provided by survey respondents

<b>Institution</b>	<b>No. Academics</b>	<b>No. Faculties</b>	<b>No. Students</b>
INTEC (Dom. Rep.)	540	5	5,000
UWI (Trinidad & Tobago)	2,600	7	27,000
UTT (Trinidad & Tobago) <sup>1</sup>	-	-	-
UWI (Barbados)	800	5	8,000
SJPP (Barbados) <sup>2</sup>	-	-	-
BCC (Barbados) <sup>3</sup>	-	-	-
UTech (Jamaica)	500	8	10,000
NCU (Jamaica) <sup>4</sup>	160	6	4,000
CASE (Jamaica) <sup>5</sup>	84	3	3,000

## 4.2 Findings

- All of the partner institutions run full-time and part-time study programmes related to energy, at both the graduate and undergraduate levels.
- All partner institutions participated in research activities related to the CAP4INNO thematic themes although there is a notable lack of funding for such activities, in particular research funding from government and industry based funding bodies. Most research funding was sourced from international funding bodies.
- Respondents collaborated with local and national enterprises, government and NGOs. Except for INTEC, there was very little collaboration with local IP offices.
- Collaboration with industry was mainly to arrange student internships and study projects, consultation with some research for enterprise. The least amount of collaboration was to undertake curriculum design to tailor study programmes to the needs of the enterprises.
- HEI's mainly collaborated with national enterprises, with some collaboration with regional enterprises and very little collaboration with international enterprises.

## 4.3 General education and training relevant to CAP4INNO

### UWI (Trinidad & Tobago and Barbados)

- There are some introductory undergraduate courses available in areas related to clean energy technologies and innovation/entrepreneurship but programmes.
- Both the Barbados and Trinidad campuses of the UWI have created a foundation for the innovation and entrepreneurial aspects of the CAP4INNO programme.

<sup>1</sup> University of Trinidad & Tobago

<sup>2</sup> Samuel Jackman Prescod Polytechnic

<sup>3</sup> Barbados Community College

<sup>4</sup> Northern Caribbean University

<sup>5</sup> College of Agricultural Science and Education

- Most focus has been placed on developing graduate taught programmes with a view to strengthening the R&D capacity in the area of sustainable energy and innovation/entrepreneurship.
- Trinidad has two business incubators (one at the St Augustine campus and the other at the University Trinidad and Tobago (UTT)).
- The Cave Hill campus in Barbados has a Student Entrepreneurial Empowerment Development (SEED) Project run as a co-curricular course and teaching the essentials of entrepreneurship.<sup>6</sup>
- From 2014-15 academic year, the Cave Hill campus will offer a graduate course on 'Sustainable Energy Innovation, Implementation and Entrepreneurship', as part of its Renewable Energy Management MSc programme. This was a result of the DAAD-funded INEES project and is in collaboration with Flensburg University, Germany.<sup>3</sup>

### **INTEC (Dominican Republic)**

- Respondents exposed weaknesses in linking research with the needs of the industrial sector. There are courses, mainly in the postgraduate level, about several issues related to IP, clean energy technologies.
- Nevertheless there is a need to advance the implementation of doctoral programs and other high-level courses.

### **UTECH (Jamaica)**

- There are poor linkages between HEIs and industries with respect to collaborative research.
- However, all HEIs engage with industries for practicums and internships for work experience. Collaboration in these areas is mainly with small and large national enterprises, not Regional enterprises and rarely with international business enterprises.
- Of the courses listed for selection, only one HEI offered most or all of the courses but the overwhelming indication was that there was a dearth of training in Patent databases IP, Change management, innovation and commercialisation of innovations.
- All HEIs leaders agreed that there was a need to include the entire suite of subjects identified in the survey. Special emphasis on IP, change Management, innovation management, renewable energy and energy efficiency, climate change, and the need to build capacity in these areas. These are all areas in which the CAP4INNO Project can help.

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<sup>6</sup> SEED - [www.cavehill.uwi.edu/seed/](http://www.cavehill.uwi.edu/seed/)

## 4.4 Interest and cooperation with CAP4INNO

### UWI (Trinidad & Tobago and Barbados)

- The University leaders see cooperation with CAP4INNO project as invaluable, particularly in the area of innovation and entrepreneurship in the clean energy systems sector, but in other sectors as well.
- Respondents acknowledged existing collaborative links with local and international enterprises/organisations, NGOs and Chambers of Commerce. However there are fewer links with national IP offices.

### INTEC (Dominican Republic)

The project CAP4INNO contribution can make a high impact on the following topics:

- Improve linkage investigations by the university with the needs of businesses.
- Continue to train university staff on all issues relating to IP.
- Diversification of the courses on IP issues and clean energy technologies.

### UTECH (Jamaica)

The CAP4INNO Project can help in the following ways:

- Exposure to models of industry/academia collaborations such as utilized by Chalmers University.
- Capacity building in the identified areas for improvement, through the planned training workshops.

## 4.5 Suggestion on topics for training

- There is clear agreement amongst the respondents for a need for training in the field of innovation, in particular:
  - Technology surveillance and search techniques: Use of patent databases and other information resources for research.
  - Research and Development contracts/management.
  - Building a teaching culture for enhancing entrepreneurship, R&D and Innovation in energy.
  - Good practice for the use of IP for the entrepreneurship and business creation.
- HEIs wish to create closer ties with government and industry. One suggestion is that CAP4INNO could include training that provides examples/case studies of how this can take place, its advantages to all parties, and how to fund this collaboration.

- Development of case studies of existing successful and unsuccessful innovation systems in the Caribbean.
- Steps towards the eventual creation of ‘research clusters’ seen as crucial if the region is to compete on the international stage.

#### 4.6 Main conclusions from HEIs

- Curriculum development in the areas of innovation, entrepreneurship and R&D is seen as a crucial steps to enable graduates to be better prepared for the labour market.
- Closer ties between government, industry, and other HEIs were seen as crucial for the eventual development of R&D and business clusters capable of competing on the international stage.
- The findings indicated that the HEIs surveyed are lagging in the areas of change management, entrepreneurship/business design and innovation management, and infusing innovation into curriculum development. Similarly, the use of patent databases, critical aspects of IP, and commercialization of innovation are at a fledgling state in two of the three universities, but relatively absent in the other HEIs.
- There is therefore a pressing need for a transformation in the curricula, but prior to that capacity has to be built in academia in the region to facilitate this shift. The learning curve can be accelerated by drawing on partner experiences in European HEIs and institutes - the CAP4INNO project offers this opportunity.

## 5. Target Group 4: Enterprises

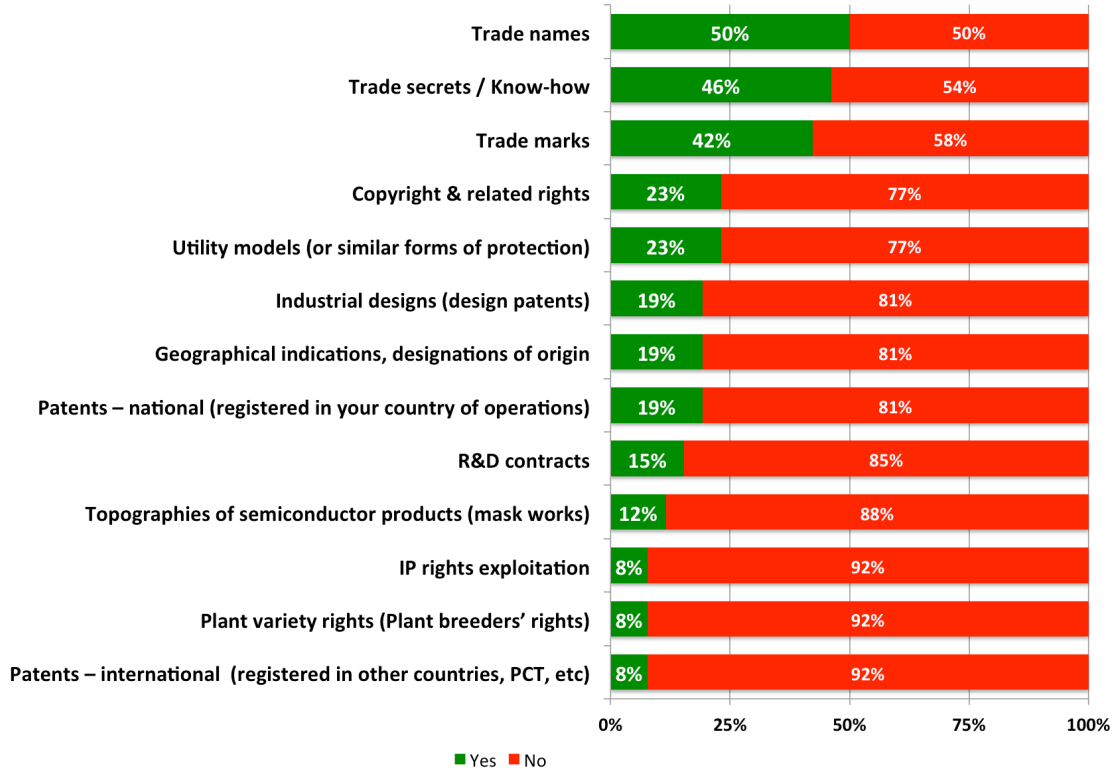
### 5.1 Data concerning respondents

- Each partner surveyed representatives of enterprises involved with the provision of energy services, from individuals up to utility companies. The response rate from each partner was: INTEC (6 companies), UWI (17 companies) and UTech: (9 companies), a total of 32 responses.

### 5.2 Findings

- Figure 9 shows the different types of intellectual property that companies might have, and whether the respondents had examples of these types of IP. Few of the respondents had registered or non-registered intellectual assets or intellectual property in their company’s name. The IP of those who did varied from financial models (e.g. a proprietary financial leasing and loan guarantee model) to technical products (e.g. a solar water ionizer purifier), to large infrastructure (e.g. a solar carport and electric vehicle charging station rated to hurricane category 3).

*Do you have any registered or non-registered intellectual assets / Intellectual Property in your company?*



**Figure 9. Enterprises with intellectual property in their company's name.**

- Respondents in Trinidad & Tobago, Barbados and Jamaica tended to source their technical information from textbooks, industry journals and general Internet searches, with very few using their national IP offices or patent databases such as JIPO, USPTO, Espacenet or WIPO.
- Conversely at least half of the respondents from the Dominican Republic used patent databases and their national IP office, as well as textbooks, industry journals and general Internet searches.
- From the results it appears that enterprises in Trinidad & Tobago, Barbados seldom worked with HEIs in matters related to the energy and IP sectors with little R&D, consultation collaboration or training by HEIs. Jamaican and Dominican Republic companies appear to have closer relationships with companies in matter related to energy and IP sectors. This is perhaps to be expected given that INTEC and UTECH are technical universities with close ties with engineering and utility companies.
- When collaboration did take place, it was the Universities that had initiated the partnership.
- A high percentage of respondents thought that enterprises should increase their collaboration with HEIs.
- HEIs with whom enterprises had collaborated included:

- McGill University.
  - The Samuel Jackman Prescod Polytechnic in Barbados.
  - Online courses arranged by the OLADE – Ecuador.
  - Darlana University.
  - The European Solar Engineering School in Sweden.
  - Instituto Tecnológico de Santo Domingo (INTEC), Dom. Rep.
  - Universidad Central del Este (UCE), Dom. Rep.
  - Universidad Central "Marta Abreu" de Las Villas (UCLV), Cuba
  - University of Technology, Jamaica (UTech Jamaica)
  - University of the West Indies, (UWI) Mona
- The main reason given for no previous collaboration with HEIs was that the opportunity had not arisen, suggesting that companies were open to collaboration, if the collaboration was to their benefit.

### 5.3 General education and training relevant to CAP4INNO

- The respondents employed only 14 graduates trained in the area of energy at national or regional universities in the Caribbean. Of these, 12 of the graduates satisfied their requirements for knowledge and skills, the others did not and further training was required.
- The low response rate (45%) of enterprises suggests a low level of awareness among the participants surveyed of the importance of, and benefits to be derived, in utilizing scientific knowledge to inform business strategy. Larger enterprises with international partnerships and owners utilise patent databases and are more knowledgeable about IP issues.
- Trademarks and trade names are the most common form of IP protection utilised – this presents an opportunity for exposure to the other methods through the CAP4INNO project.
- Most enterprises collaborate with HEIs at various levels, but the most frequent relate to student internships, and work-study programs and knowledge transfer.
- The respondents see R&D as important, but they desire more collaboration with HEIs through research, contracts and for keeping up with developments globally. This is positive for future developments, and represents another opportunity through the CAP4INNO projects for other successful models of collaboration - as utilized by societies with more robust cultures of innovation.



## 5.4 Interest and cooperation with CAP4INNO

- There was a strong emphasis on the need for current and future staff to be trained in knowledge and technology transfer, with research methods, R&D contracts and change and innovation management also being popular requirements.
- Suggestions for improved collaboration between HEIs and enterprises included:
  - Regular site visits: allowing students themselves to organise visits.
  - Targeted training programmes to suit the needs of growing industries, especially in developing technical capacity.
  - Implementation of projects with a public learning focus, developing students and persons from all backgrounds to learn from major case studies.
  - Conducting feasibility studies or analyses in exchange for course credit, while the business obtains information at low or no cost which will benefit the company.
  - Increased awareness of opportunities to share knowledge and cooperate.
- Students need to actively engage with companies and not depend on Universities to make the connection.
- Enterprises, except multi-nationals, do not engage in R&D at an advanced level and use mainly journals and few use textbooks as their source of knowledge. CAP4INNO offers an opportunity for training in several areas, which could improve business success.

## 5.5 Suggestion on topics for training

- Enterprises felt strongly that future graduates should be trained in all of the CAP4INNO thematic areas. Knowledge and technology transfer, research methods, R&D contracts and change management and innovation management were the more popular choices.
- None of the enterprises use patent databases for technical information in support of their business strategy. It is therefore suggested that, if feasible within the scope of the CAP4INNO project, awareness workshops be given in this area.

## 5.6 Main conclusions from enterprises

- The survey was somewhat hindered by the lack of interest and cooperation of some of the enterprises approached by the partners. There was a clear tendency to not provide any information that could be considered sensitive for the company was demonstrated, which made data collection difficult. The sample size cannot be considered representative of the Caribbean business universe, so the scientific value is limited. However those companies that did answer provided some pertinent insight into their use of IP and their relationship with HEIs.

- Although the survey response was not strong, those who did respond acknowledged intellectual property as being important to their business. However they were unaware of topics related to innovation and intellectual property. There is a clear need to increase general awareness of this subject area.
- Current collaboration with HEIs typically takes place in the areas of: Participation on Boards; project/thesis work with students; organising events; knowledge transfer/exchange.
- There is very little current collaboration with HEIs on research and development projects.
- Enterprises would generally like to see more collaboration with HEIs, in particular targeted training programmes to suit the needs of growing industries, especially in developing technical capacity, as well as conducting feasibility studies or analyses through student placements/internships.
- There is a receptive mood for industry to be engaged with HEIs in advancing business development. Many want to learn more and see an opportunity to do so through stronger collaboration with HEIs.

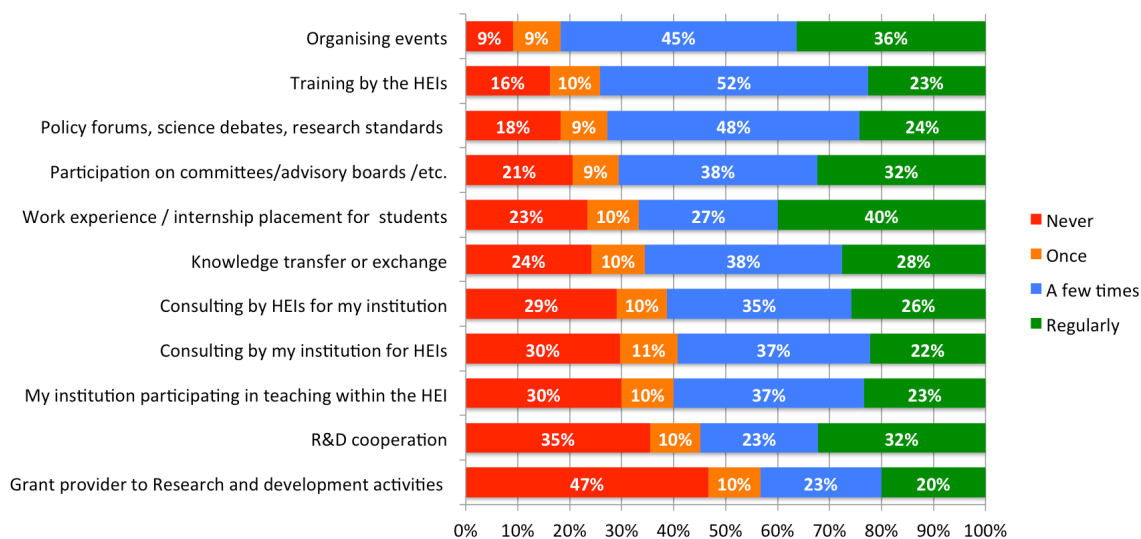
## 6. Target Group 5: Government

### 6.1 Data concerning respondents

- Each partner surveyed representatives of government involved with the thematic areas of the CAP4INNO project. The response rate from each partner was: INTEC (17), UWI (9) and UTech Jamaica: (7), a total of 33 responses.
- Respondents were involved with a variety of activities, including:
  - Education
  - Research
  - Industry
  - Energy related
  - IP related
  - Policy making
  - Development of occupational standards
  - Regulatory government agency
  - Market assessment & enquiry point service
  - Testing & Calibration services
- The respondents indicated their geographical area of activity was mainly on a national level, rather than regional or international.

## 6.2 Findings

- Most of the respondents stated that research was conducted within their particular government department with a high degree of collaboration with enterprises, Universities and research organisations (in particular international consultants). A low per cent of respondents stated that their research resulted in invention/innovation (less than 25%). Figure 10 show in which areas that the government respondents worked with HEIs.



**Figure 10.** Frequency that Government respondents worked with HEIs in energy and IP sectors.

- Most respondents indicated that there was insufficient collaboration between HEIs and local business sectors and civil society actors in any of the thematic areas, but particularly R&D and knowledge transfer. Government respondents also stated that there was not enough study programmes or training courses in the thematic areas. Specific comments were:
  - A need for more professional development programmes, such as: energy modelling, technologies/projects, renewable energy/policy planning. Believed to be limited programmes/training/courses outside of solar energy technologies, namely: wind, hydropower and biomass.
  - The need for practical/vocational certificates in clean energy technologies, and more opportunities for scholarships.
  - Better promotion of existing courses.
  - Greater emphasis on the ways that clean energy technologies can be used to make businesses profitable.
  - Qualified personnel. Training platforms, equipped laboratories, etc.
  - Mineral exploration, power quality equipment sizing and electrical installations, energy efficiency (energy audits, compressed air, etc.).

- Better collaboration between regional universities
- There was consensus that it would be desirable to modernise the energy and innovation/entrepreneurship programmes to that graduates would be better prepared for the labour market.
- Respondents thought that almost all of the thematic areas were important to the region (see Figure 11) to a certain degree (perhaps less so for tidal energy due to low tidal ranges throughout much of the Caribbean).

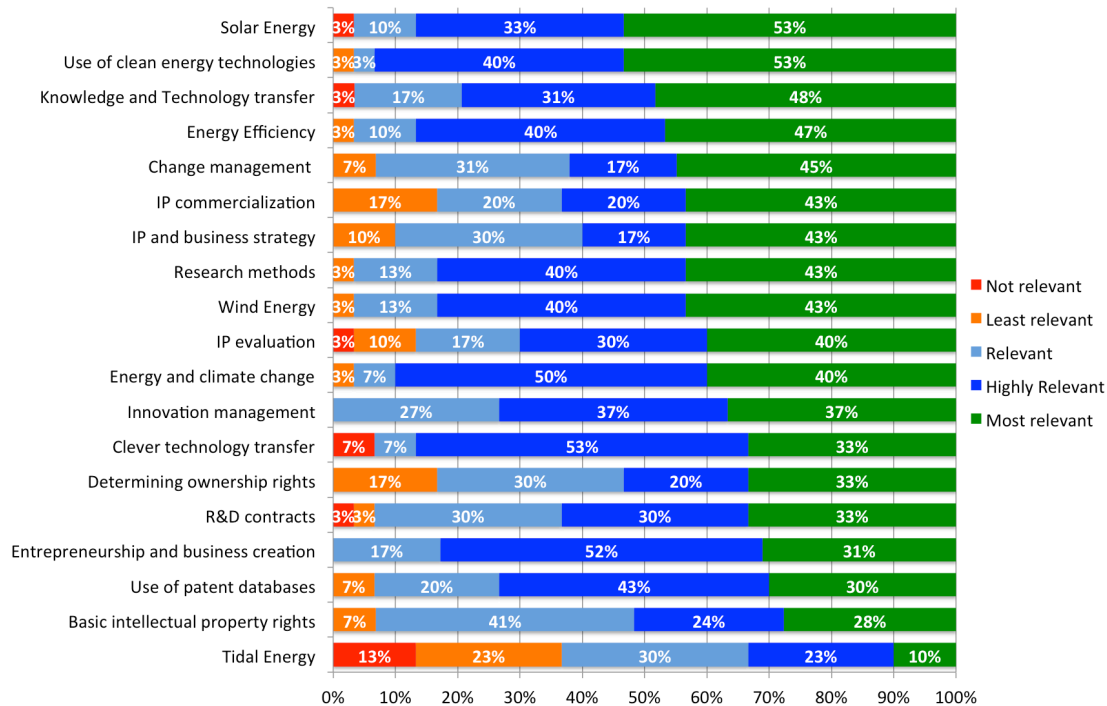


Figure 11. Government respondents' views on the relevancy of the CAP4INNO thematic areas.

- Respondents highlighted many good encounters through their collaboration with HEIs, including: knowledge exchange, event planning, project collaboration for energy efficiency and conservation, capacity building, discussions on various renewable energies technologies, creation of a masters program for renewable management and some of the interactions involving development of renewable industry. However there were also examples of unsuccessful encounters, including: a lack of adequate resources, a lack of timely response to requests and a lack of commitment/not committed to change.
- Some of the suggestions from respondents for improvement for cooperation with HEI were:

- The inclusion of regional energy information system tools (such as, [www.cipore.org](http://www.cipore.org), and [www.ceehip.org](http://www.ceehip.org)) for information gathering/research and as part of the students' curriculum
- Establishment of MOUs amongst Government Ministries, the private sector and HEIs that enable the HEI to provide mutually beneficial expertise/services to improve knowledge transfer, working applicability, and government processes, etc.
- Developing partnerships where entities provide internships, giving students job experience and opportunities for applying theory to practice.
- Develop/offer courses related to energy conservation and renewable energy technologies.
- Develop proposals for R&D projects suitable for local conditions aimed at accessing funding assistance from funding agencies, or forging partnerships with local industry/business.
- Establishment of a formal meeting mechanism to facilitate on-going dialogue and the exchange of knowledge and information.
- Signing research agreements, and professional training.
- Highly qualified teachers to offer their professional services.
- Target programs to area business, this will awake interest.
- Must have more presence and dynamic power, business and government sector.
- Investment in research projects.
- Assessment of the needs on both the HEI, and local business entities.
- Encourage greater collaboration on research and development activities.

### 6.3 General education and training relevant to CAP4INNO

- Government Ministries and agencies of government regarded collaboration with HEIs as important especially in the areas of research, knowledge transfer and for improving policies and processes.
- There was general satisfaction with the partnerships, but they expressed the need for greater inclusion of government representatives on boards, in teaching programmes and sharing of knowledge and information.
- There was a notable dissatisfaction with the number of courses offered in energy, innovation and entrepreneurship. The quality of these courses was also brought into question and hence general agreement that courses should be improved to meet the expectations of local and international labour markets. Some specific areas recommended for cooperation were:
  1. Student internships and MOUs.

2. HEIs sharing research outcomes on developments and best practices to inform the strategy.
3. Training collaboration between HEIs and Government Ministries/Agencies.
4. Partnership for events such as expositions and forums.
5. Partnerships with businesses to solve problems.

#### **6.4 Interest and cooperation with CAP4INNO**

Suggestions for improved cooperation with HEIs and CAP4INNO included:

- Exploration of synergies and creating partnerships.
- Assessment of the needs of both the HEIs and local business entities.
- Encourage greater collaboration on Research and Development activities.
- Development of core responsibility for this area.
- Part time short courses for professionals.
- Sourcing of funding by the development and submission of joint proposals.
- Creating forms of integration and collaboration for training, both IP issues as energy efficiency and use of RETs.
- Training development linking different entities for research, development and innovation.
- Training for the development of multidisciplinary research groups participation.
- Capacity building opportunities through CAP4INNO should include government and NGOs.
- Conducting research through multidisciplinary teams.
- Building networks nationally and within the region to fully take advantage of opportunities for energy innovation and enterprise development/expansion.

#### **6.5 Suggestion on topics for training**

As with enterprises, government organisations recognise the importance of graduate employees having experience of knowledge and technology transfer in particular, but also clean energy systems/use, research methods and IP rights. It was clearly stated that the following improvements could help to facilitate effective partnerships and collaborations among government, academia and enterprise:

- Using national and international databases
- Creating business
- How to develop research
- How to manage Innovations
- Management of intellectual property

- IP commercialisation
- Knowledge and technology transfer
- Use of clean energy technologies, with emphasis on energy efficiency solar and wind energy
- Intellectual Property Rights basic issues (patents, trademarks, geographical indications, copyright issues)
- Determine and assert your ownership rights
- IP and business strategy: creating a business strategy based on IP
- IP commercialisation
- IP evaluation: How to assess potential and create a strong IP portfolio
- Knowledge and Technology transfer
- Clever technology transfer – how to choose the most appropriate projects & how to manage them.

## 6.6 Main conclusions from government

- The number of respondents was relatively small but a large amount of information was provided by those who did respond.
- Connection with HEIs is strong with 80% of the respondents having conducted collaborative activities with HEIs.
- Respondents thought that HEIs could offer more study programmes and training opportunities related to the field of energy and were dissatisfied with the quality and content of courses in these programmes. Follow-up interactions indicated that a lack of advertisement of various courses and programmes offered by HEIs could be an explanation for this.
- Government organisations, and indeed most respondents of this needs analysis survey, recognised the importance of graduate employees having experience in knowledge and technology transfer in particular, but also in clean energy systems/use, research methods and IP rights.
- Generally, there is also a need for public education among all the groups surveyed, on the importance of having IP protection for one's creation/innovation, and the benefits guaranteed by such protection.

## 7. Final considerations

In general, the findings from the four countries (Barbados, Dominican Republic, Jamaican and Trinidad & Tobago) were similar, with only minor differences regarding the number of respondents, gender split and knowledge of the thematic areas.

There were major deficiencies in the student's knowledge of the various proposed thematic areas, but as low as the knowledge was, as high the interest on gaining knowledge of in these areas.

All the academic staff surveyed are trained to Master's and/or PhD level and are broadly willing to teach in the thematic areas of the Needs Analysis survey (or currently do teach them). All people surveyed considered energy efficiency and use of clean energy technologies to be important, and generally high levels of importance were stated for the innovation and entrepreneurship related subjects.



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