



Capacity development and strengthening for energy policy formulation  
and implementation of sustainable energy projects in Indonesia

# Capacity development and strengthening for energy policy formulation and implementation of sustainable projects in Indonesia

## CASINDO

### DELIVERABLE NO. 9:

**Report on specific competency trainings (basic level) by  
TEDC for SMK teachers from the five CASINDO regions**

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NL Agency  
*Ministry of Foreign Affairs*

**Bilateral energy cooperation between  
Indonesia and the Netherlands BECIN**

March 2011

## Preface

This report is deliverable no.9 of the project ‘Capacity development and strengthening for energy policy formulation and implementation of Sustainable energy projects in INDOnesia (CASINDO)’. The CASINDO project aims to establish a self-sustaining and self-developing structure at both the national and regional level to build and strengthen human capacity to enable the provinces of North Sumatra, Yogyakarta, Central Java, West Nusa Tenggara and Papua to formulate sound energy policies and to develop and implement renewable energy and energy efficiency projects. Information on upcoming events, the presentations and meeting minutes of project team meetings and completed project reports can be found on the CASINDO website: [www.casindo.info](http://www.casindo.info)

The CASINDO project is funded by NL Agency and implemented by a consortium co-ordinated jointly by the Indonesian Ministry of Energy and Mineral Resources and the Energy research Centre of the Netherlands (ECN), comprising the following organisations:

- Indonesian Ministry of Energy and Mineral Resources, Jakarta.
- Muhammadiyah University of Yogyakarta, Yogyakarta.
- Diponegoro University, Semarang.
- University of Sumatra Utara, Medan.
- University of Mataram, Mataram.
- University of Cenderawasih, Jayapura.
- Institute of Technology of Bandung (ITB), Bandung.
- PPPPTK BMTI, Technical Education Development Centre (TEDC), Bandung.
- Eindhoven University of Technology, Eindhoven.
- ETC-Nederland, Leusden.
- Energy research Centre of the Netherlands ECN, Petten.

In the course of the preparation of this progress report the authors consulted extensively with the technical teams in North Sumatra, Yogyakarta, Central Java, West Nusa Tenggara and Papua and with the Ministry of Energy and Mineral Resources. The contributions provided by these organisations are greatly appreciated.

The sole responsibility for the content of this report lies with the authors. It does not represent the opinion of NL Agency and NL Agency is not responsible for any use that may be made of the information contained herein.

## Abstract

This report describes the trainings conducted by TEDC Bandung on specific competencies for the teachers of the 11 SMK involved in CASINDO in the renewable energy technologies micro hydro power , solar photovoltaic, wind energy, biomass, biogas and energy efficiency. The report also contains a description of the Training of Trainers activities conducted by the CASINDO consortium for TEDC staff in the renewable energy technologies micro hydro power, solar photovoltaic, wind energy, biomass , biogas and energy efficiency. Additionally, the report also describes training activities that are closely linked to and highly relevant for CASINDO. These training activities are not on the CASINDO budget.

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## List of abbreviations and organisations

BM	Biomass
BG	Biogas
DGEEU	Directorate General of Electricity and Energy Utilization
EE	Energy efficiency
ETCERE	Education and Training Agency of the MEMR
EWG	Indonesia–Netherlands Energy Working Group
HYCOM	ASEAN Hydropower Competence Centre
IDBP	Indonesian Domestic Biogas Programme (BIRU)
MEMR	Ministry of Energy and Mineral Resources
MHP	Micro Hydro Power
RE	Renewable Energy
REP	Renewable Energy Program
RET	Renewable Energy Technology
SMK	Sekolah Menengah Kejuruan -Vocational and Technical School
PPP	Public-Private Partnership
PV	Photovoltaic
TEDC	Technical Education Development Centre
WP	Work Package
WE	Wind Energy

## 1. Introduction

This report on Delivery 9 describes the trainings on specific competencies for the teachers of the 11 SMK involved in CASINDO in the renewable energy technologies (RET) Micro Hydro Power (MHP), solar photovoltaic (PV), wind energy (WE), biomass (BM), biogas (BG) and Energy Efficiency (EE) within the framework of the implementation of WP3: ‘Development of skilled manpower for renewable energy and energy efficiency’.

According to CASINDO’s project document Delivery D8 was originally focused on: ‘Province-specific adapted curriculae, syllabi and lesson modules on MHP and solar PV for SMK teachers and students for the provinces of Yogyakarta and Nusa Tenggara Barat’. In the same document Delivery D9 was focused on: ‘Province-specific adapted curriculae, syllabi and lesson modules on MHP/PV/BM/BG/WE/EE for SMK teachers and students for the provinces of Central Java, North Sumatra and Papua’.

After the selection of the 11 SMK as pilot schools for the CASINDO project (see report D7), it was decided in consultation with these SMK by TEDC, to change the strategy for years 2010 and 2011 and to redefine the content of D8, D9, D10, and D11 accordingly. Firstly SMK Teachers had to be trained in the MHP, PV, WE, BM, BG and EE for upgrading their knowledge required for proper RET integration in the schools (D8, D9). Secondly in 2011 at SMK level operational curriculum development and development of related modules for narrow linkage between theory and practice will take place (D10, D11).

The reasons for the change in strategy were the following:

1. SMK Teachers needed firstly to acquire knowledge on RET before they could contribute to operational curriculum development at school level
2. In the curriculum development the focus will lie on operational curricula at SMK school level
3. Basis for these operational curricula will be the national curriculum. TEDC is engaged in discussions with and the final submission of this national curriculum to the SPEKTRUM programme of the Ministry of National Education proposal on RET to be done in March 2011

With a national curriculum on RET well established the 11 SMK will be in a better position (in terms of curriculum space and budgetary means) to work on the concretization of their operational curricula and related first teaching in RET.

On the redefinition of the deliverables D8, D9, D10, and D11 and their deadlines was reported in CASINDO’s 1<sup>st</sup> Progress Report -June 2009 to February 2010- (issued in June 2010) in Annex C: ‘Revised list of deliverables and schedule’. The Deliverables D8 and D9 regard the training of SMK teachers. Distinction is made between the training in general RET competencies and the training in specific RET. D8 contains: ‘Report on general competency training conducted by TEDC for 1-3 SMK teachers from each of the five CASINDO regions, and D9: ‘Report on training on specific RE technologies conducted by TEDC for SMK teachers from five CASINDO regions’. This report on D9 is closely related to the report on D8: they will be submitted at the same date.

Under CASINDO ETC/TTP and TEDC discussed the acquisition of RET demonstration equipment for SMK. Technical specifications for this equipment were developed; in this document is reported on this issue as well.

Outside CASINDO TEDC staff followed trainings in RET that are relevant for CASINDO. In this document attention will be given to TEDC's cooperation with the Indonesian Domestic Biogas Programme (BIRU) and concerned trainings followed. The same counts for TEDC's Cooperation with other partners: E9 Countries on vocational training in MHP training and the ASEAN Centre for Energy (ACE).

## 2. Training of SMK Teachers in specific RET competencies

### 2.1 Introduction

In this report on D9 factual information about the trainings delivered by TEDC will be given. This information is based on detailed dossiers put up and maintained by TEDC per each delivered training. These dossiers contain the following elements: training brochure containing the target group, approach and content of the training, reporting by each SMK participating in the training on learning experiences (theoretical and practical), personal appreciation of each trainee of the training followed, TEDC's reporting, including the learning materials used and the reports from the external assessors on the knowledge and skills acquired by the trainees.

With respect to each training the distinction was made between the general programme related to the definition of the competencies to be catered in the training and the main programme of the training itself. Under the general programme separate and distinct attention was given to the issue of energy conservation in each training; sometimes other elements like national RET perspectives, cultural and educational aspects. In the main programme of the training itself attention is given to the learning process on practical competencies (how to teach) geared to the transfer of the learning contents to the SMK students. Related to this the development of the operational curricula for the so-called concentration RET at SMK level have gotten attention. During the trainings practical workshop-based assignments at TEDC were carried out. After the completion of the main programme the trainees get a practical field assignment that has to be completed at SMK level after the training at TEDC and that is concentrated on the application of the learning contents in school practice. After the completion of each training acquired theoretical knowledge and practical skills were assessed by external RET assessors.

The report on D9 will contain general remarks and observations on the way the trainings were carried out and what first outcomes they have generated. It should however be noted that this report does not give a comprehensive evaluation of the training activities carried out and the generated outcomes thereof. As the three teacher trainings in specific competencies (on PV, WE and MHP) have taken place only in the 2<sup>nd</sup> half of 2010 and the 1<sup>st</sup> quarter of 2011, it is too early to give even first indications of outcomes. Only after the termination of the year 2011, when the learnt training contents related to the two concentration RET per each SMK were applied in the teaching practice, outcomes can be traced. As in D8, all teacher trainings in D9 are also still at basic level. This means TEDC Bandung has advanced training plans for them after the capacity of TEDC Bandung staff is developed further.

In this report outputs per training will be indicated. Referred is then to the following types of tangible outputs:

- The tangible end products after the termination of each training: (for example: valves, small turbine, or electrical switch panel)
- Training Certificates issued to the training participants after the successful completion of the general programme and the main programme
- Completion letter issued by TEDC after termination field assignment with remarks about the implementation of the learning modules for the SMK students
- Training competency certificates were issued after each training and concerned the operation of the specific taught RET. The certificates were signed by specific assessors per each RET taught; the assessors come from the private sector and have considerable experience with RET specific operational matters.

## 2.2 Summary teachers trainings specific competencies

### 2.1.1 Teacher Training specific competencies PV

Period/place: 19 - 30 July 2010, TEDC Bandung

Duration: 100 hours

Participants: 12 teachers from 6 SMK

Content:

- *Main programme:* Introduction of solar PV technology; Solar PV components (analysis design and copying by assembling of inverter, charger, battery control unit); solar PV installment (installment assignment); Operation and testing solar PV (Comparison system by manufacture with own installed system); Maintenance of solar PV installation (Analysis of maintenance scheme and modifications)

Output:

- End products from training course (Installed PV system)
- 12 certified SMK teachers for PV specific competencies
- 12 completion letters with remarks after assignment to SMK teachers from TEDC
- 12 Competence certificates from PT GMN (PV company from Jakarta)

### 2.1.2 Teachers Training specific competencies WE

Period/place: 4 - 14 August 2010, TEDC Bandung

Duration: 100 hours

Participants: 6 teachers from 2 SMK

Content:

- *Main programme:* Introduction to wind energy technology; Wind energy application plan; Assembling and installment of wind turbine (Reassembling of wind turbine made by TEDC staff and installment afterwards; also installment wind turbine delivered by company); Maintenance of wind turbine; Making and testing wind turbine (production of equipment to test wind generator output; visit to aeronautic company in Bandung for production blades of full fiberglass); Wind turbine marketing and workforce (lecture by PT Citra Katon Jakarta – member of Wind Energy Association- on wind energy labor market); Competence test

#### Output:

- End products from training course (small scale wind turbine)
- 6 certified SMK teachers for WE specific competencies
- 6 completion letters with remarks after assignment to SMK teachers from TEDC
- 6 Competence certificates supported by assessor LAPAN (National Institute of Aerospace and Flight Indonesia)

#### 2.1.3 *Teachers Training specific competencies MHP*

Period/place: 31 January - 04 March 2011, TEDC Bandung

Duration: 260 hours

Participants: 21 teachers (teachers in mechanics -7-, electricity -7-, civil -7-) from 7 SMK

#### Content:

- *New general programme element:* National MHP perspectives, cultural and educational aspects
- *Main programme:* Introduction MHP; Basic MHP calculations (debit, power measurement); Feasibility study and initial plan of MHP plant (desk study, prefeasibility study/preparation equipment, field measurements, confrontation study data with fine-tuned measurements for feasibility study, designing MHP system, matching with external and client requirements); Construction of parts of MHP system and testing (based on composite design, adaptation of design to detailed field circumstances); Installment in the field after training

#### Output:

- End products from training course (one turbine 3 KW, digital control panel, civil construction)
- 21 certified SMK teachers for MHP specific competencies
- 21 completion letters with remarks after assignment to SMK teachers from TEDC
- 21 Competence certificates signed by assessors H. Sentanu (Small Hydro Power Association Bandung) and Komarudin (PT ENTEC Bandung)

## 2.3 Qualitative aspects of the teacher trainings and first perceived outcomes

Teacher trainings in specific competencies have been given for the RET MHP, PV and WE. This was not the case for BM and BG, because TEDC staff has only received basic trainings on BM and BG in 2010, as was reported in the report on D8.

In the dossiers of each training trainees have given their personal appreciation about the trainings followed. The place and function of the practical SMK level assignments was assessed positively; the workshop-based assignments at TEDC has given a positive impetus to reflection on the question what demonstration equipment for concentration RET the best can be acquired and how this equipment can be used. It is too early to make statements about the impact of the trainings on specific RET competencies on the formulation of operational SMK level curricula regarding these concentration RET.

TEDC carried out monitoring during the different trainings; in general the motivation of the trainees proved to be high. In-school TEDC monitoring on the specific RET competencies did not take place as these trainings only have taken place after the visits paid by TEDC and ETC/TTP in June 2010 to the SMK in Yogyakarta and Central Java. In these visits it became clear that the way to handle the two

concentration RET per each SMK will deserve focused attention in the 2<sup>nd</sup> half of 2011 and beyond. The official approval of the national RET expertise programme by SPEKTRUM will be a central condition herein.

The reports on the practical field assignment at SMK level after completion teacher training at TEDC proved to be useful again (as also in the teacher trainings on general RET competencies) for giving a good impression of how teachers put the learnt training contents in practice. These field assignments mostly served the socialisation of RET in the respective SMK.

The acquired knowledge and skills by the trainees were assessed by qualified external assessors with ample technical and commercial experience in 'their' specific RET at hand. Not only was their judgment of and feedback to the trainees experienced as simulating, but also was their incorporation in the training setup essential for guarding the quality standards of the trainings. The competency assessment by external parties is an effort by TEDC to develop assessment competency systems on different renewable energy technologies by professional certification institutions of renewable energy technologies, which until now did not exist at all.

In the TWGVII meeting (meeting with 11 CASINDO SMK in October 2010) some feedback was given on the specific effects of the delivered teacher trainings: general aspects as awareness raising, the ways RET integration could take place, and the start of new RET programmes were more dominant in the discussions. Feedback on the trainings on specific RET competencies will be given in the upcoming TWGVII meeting, which is due in October 2011.

### 3. Additional training TEDC staff

#### 3.1 Introduction

The realisation of the planned deliverable under D9 required that TEDC staff members themselves followed trainings in specific RET under CASINDO. This concerned those RET that were not touched upon before CASINDO. In the three EWG projects TEDC staff was only trained in the RET MHP, PV, WE, and BG at basic level. Under CASINDO TEDC staff participated in a training on EE in 2009 with few staff members, also at basic level. In 2010 two general trainings in BM for TEDC staff were carried by BTG and BPPTK Kulonprogo Yogyakarta; these training were also given at basic level. In general can be stated that for specific competencies on all RET more training for TEDC staff is still needed.

Outside CASINDO TEDC staff has followed trainings in RET as well that are relevant for CASINDO. Within the framework of TEDC's cooperation with the Indonesian Domestic Biogas Programme (BIRU) TEDC staff followed additional trainings in how to build a biogas digester. This training served the purpose to provide trainings for masons for BIRU within the framework of its production of biogas digesters.

## 3.2 Summary trainings to TEDC staff

### 3.2.1 *On the Job Trainings Biogas Training for Mason and Supervisor for TEDC staff*

Period/place: 23-30 June 2010 (Pangalengan – Bandung), 14-21 July (Cikajang, Garut), September – October 2010, in different places, Tanjung - Sumandang)

Duration: 80 hours

Participants: Five out of ten TEDC staffmembers were ToT participants in the On the Job Training (OJT) Biogas, namely 1 in the 1<sup>st</sup> training; 3 in the 2<sup>nd</sup>, and 1 in the 3<sup>rd</sup> training

Content:

- *Main programme* : All steps in production process of biogas digester in 8 days (determination circle of the dome wall, measurement heights inlet and outlet, production of dome with mull, plastering inside dome, installation of pipes and tabs); How to conduct teaching – learning process in biogas training for masons IDBP/training methodology

Output:

- 14 certified TEDC trainers for biogas mason trainings (certification by BIRU)

### 3.2.2 *Training MHP TEDC staff*

Period/place: 31 January – 04 March 2010, TEDC Bandung

Duration: 260 hours

Participants: 3 TEDC staff (jointly with 21 SMK teachers)

Content:

- *New general programme element:* Nation character, culture, education
- *Main programme:* Introduction MHP; Basic MHP calculations (debit, power measurement); Feasibility study and initial plan of MHP plant (desk study, prefeasibility study/preparation equipment, field measurements, confrontation study data with fine-tuned measurements for feasibility study, designing MHP system, matching with external and client requirements); Construction of parts of MHP system and testing (based on composite design, adaptation of design to detailed field circumstances); Installment in the field after training

Output:

- TEDC has now 3 new trainers on MHP for civil, electrical and mechanical engineering

## 3.3 Qualitative aspects of trainings TEDC staff and first perceived outcomes

All trainings provided to TEDC staff under the EWG projects and under CASINDO made the development of a national RET curriculum for the SPEKTRUM programme (Ministry of National Education, Department for Vocational training) possible. In case the national RET curriculum is approved, the impact of these trainings can be called maximal. In spite of that TEDC staff members feel that for an adequate support to the process of RET integration in the SMK as where it concerns the two concentration RET per each SMK, further training especially in all RET is still needed.

Examples of such trainings may entail a follow-up on the PT ENTEC trainings for TEDC carried out under the EWG projects that are geared to ToT on MHP in TEDC. For this the cooperation between TEDC and PT ENTEC needs to be strengthened with a special attention to practice oriented trainings.

The strengthening of the TEDC team stronger in RET knowledge and experience enabled TEDC to participate in the establishment of the Hydro Power Competence Centre –HYCOM- at TEDC (see also 5.2.3). This Centre will concentrate of high and specialised MHP competencies, but will, besides that, function as a platform for the further development of higher competency standards for other RET (PV, WE, BG, and BM) at TEDC. The cooperation with PT ENTEC can serve TEDC's facing higher level MHP trainings requirements within HYCOM framework; for the other RET similar partners have to be searched.

## 4. Technical specification demonstration equipment SMK

### 4.1 Introduction

Under CASINDO ETC/TTP and TEDC discussed the need for the acquisition of RET demonstration equipment for SMK. This resulted in detailed technical specifications of possible equipment to be acquired by the SMK and TEDC itself. On the development process of the technical specifications and the acquisition procedure will be reported in this document as well.

### 4.2 Development process

The development of the specifications of the demonstration equipment for the different RET was only possible after TEDC staff trainings and the trainings to SMK teachers. In these trainings it was possible to get acquainted with the specific situation within each of the 11 SMK. The SMK teachers could gain a better understanding of the need for specific equipment in the light of educational requirements on RET in each SMK.

After the different dialogues in the teacher trainings and TEDC staff trainings, TEDC assembled RET specialists to work out possible demonstration lay-outs per each RET in a workshop. In this way the specifications for possible demonstration equipment for MHP, PV, WE, and BM have been worked out. The specifications were put up in the form of small learning modules for the SMK teachers and their directors. Based on these materials TEDC will give guidance to the SMK-specific definition of the needed RET demonstration equipment for the two concentration RET that each SMK caters. After this inventory per SMK, the description of the needed demonstration equipment per SMK will be sent to TED. TEDC will put up the listing of materials, prices, costs, procurement schedules, and possible suppliers and send this to ETC/TTP. ETC/TTP will take care in direct consultation with each SMK how the acquisition of the demonstration equipment and the corresponding payments will be handled.

### 4.3 Procurement procedure

The described development process resulted in the following procedure:

- Two suppliers per RET equipment will be identified by TEDC
- The suppliers will receive the learning module, operation instruction, instalment instruction, equipment list, and guarantee from TEDC
- TEDC will provide a time table on the final establishment of the lists of goods to be procured
- ETC/TTP will handle in direct consultation with the SMK the acquisition of the demonstration equipment.

## 5. Cooperation programmes TEDC

### 5.1 Introduction

TEDC contributed over the period July 2010-February 2011 to 5 mason trainings for BIRU. In one of the trainings two TEDC staff members and in the other four carried out the trainings. The involvement of TEDC on the BIRU masons trainings was established after the participation of TEDC staff in On the job trainings offered by BIRU (see 3.2.1).

In the 7<sup>th</sup> E-9 Ministerial Review Meeting on Education for All that took place on 10 – 12 March 2008, in Bali, the E-9 member countries that includes Bangladesh, Brazil, China, Egypt, India, Indonesia, Mexico, Nigeria, and Pakistan agreed that the focus of educational system reform should be the improvement of teacher education and training. Further, all member countries also agreed to share and to implement effective and innovative strategies in developing and empowering teachers.

The Ministry of Education accepted to organise within the framework of E-9 MHP as subject for a training for the member countries of the E-9. TEDC and PT ENTEC set up the International Teacher Training E-9 Programme on Micro Hydro Power- Basic Level at the invitation of the Ministry of Education. The organisation and accommodation for the training was provided by TEDC. No participants from 9 countries participated in the training, due to lacking interest. It was decided to invite 24 teachers of 12 internationally certified SMK. Also students from Germany and Belgium were invited.

In 2010 the ASEAN Hydropower Competence Centre (HYCOM) was established with the main objective to capitalize on the existing experience and know-how in the ASEAN countries on MHP by introducing standardised MHP technology packages to manufacturers and engineers for regional and international technology transfer. HYCOM was the result of a common initiative of the Asean Centre for Energy (ACE), GTZ, TEDC and PT Entec.

In 2010 TEDC has planned and proposed 4 RET teacher trainings for the budget year 2011 to the Ministry of National Education. These 4 teacher trainings target non-CASINDO SMK that were included earlier in the training of MHP basic level. They include: the first 4 pilot SMKs that participated in the EWG projects preceding CASINDO, 12 SMKs that participated in the E-9 training (see 5.2.2) and some SMKs that will be involved in HIVOS' Indonesian program- BIRU or who have direct contacts TEDC. The 4 teacher trainings are: MHP level 4, WE basic level, Biogas basic level, and the biomass basic level. The Biomas (BM) training will only be done if TEDC has biomass processing facilities installed in-house.

### 5.2 Summaries cooperation programmes TEDC

#### 5.2.1 *Mason trainings by TEDC for BIRU Biogas (cooperation with BIRU)*

Period/place: 26 July – 3 August 2010, Lombok Tengah (West Nusa Tenaggarra); 18-25 August 2010 Denpasar (Bali), 5 – 12 October 2010 Kampung Sekepaku – Desa Mandiri Energi Haurngombong District Pamulihan, Sumedang (West Java); 7-14 February 2011 Dusun Panette, village Lebang, Dstrict Cendana, Enrekang (South Sulawesi); 6-23 February 2011 Banjar Takedan, village Selat, district Klungkung Klungkung (Bali)

Duration: 80 hours per each training

Participants: average 20 biogas masons in each training

Content:

- *Main programme:* Pretest of masons on existing competencies, Introduction of biogas, Selection of construction materials, Putting of bricks, Reading drawings, Plastering, Methods of bio-digester construction, lay-out bio-digester (roll play), Outlining working floor of digester, Concreting digester floor, Installing digester wall, Shaping dome with mall, Concreting dome, Concreting outlet cover, Installing gas outlet, Dismantle soil from digester, Installing dung outlet, Installing dung inlet, Installing biogas pipe installation, Make slurry pit, Finishing dome, Methods of biogas digester construction (role play), Post test of masons

Output:

- 99 certified biogas digester masons

### 5.2.2 *MHP Teacher training for E9 countries for their Ministries of Education*

Period/place: 20 September – 2 October 2010, TEDC Bandung

Duration: 100 hours

Participants: 3 International participants (Germany, Belgium) and 24 teachers from 12 from SMK

Content:

- *Main programme:* Indonesian teacher reform (Best practice on teacher reform projects, teacher certification); Skills training in MHP (MHP basic design, MHP operation and maintenance, MHP management, productive use and environment, Practice and field study), On the Job Training programme

Output:

- 27 certified trainees

### 5.2.3 *PPP in HYCOM development*

The establishment of HYCOM (ASEAN Hydro Power Competence Centre) entailed a Public-Private Partnership (PPP) between TEDC, PT Entec, ASEAN Centre for Energy and the ASEAN-German Hydro Power Programme. First achievement of this PPP was the construction of the Hycom Centre at the premises of TEDC. It is expected that the new infrastructure will serve as the basis for serving HYCOM's objectives, but also to attract the attention for other RET that are attended to within TEDC as well.

## 5.3 Qualitative aspects cooperation programmes TEDC and first perceived outcomes

TEDC's attention to RET related initiatives within CASINDO have proven to be beneficial to be engaged in a series of other RET initiatives as well. The most striking examples were the extended cooperation with BIRU and the large progress made in the establishment of an international competency centre on micro hydro power. The CASINDO activities that are geared to the integration of RET in SMK and the mentioned activities related to BIRU and HYCOM can be highly beneficial for each other: SMK teachers can in the future upgrade their MHP knowledge in HYCOM, BIRU masons trainings can be continued by SMK, and the HYCOM centre can grow out to a training centre for the whole range of RET.

## 6. Final remarks

TEDC's activities related to the realisation of D9 have taken place in a complex and ambitious context. This has put high pressure on TEDC's resources and planning flexibility. In spite of this situation the originally set objectives for D9 were largely fulfilled. The next challenge is now to utilise all experiences from the D9 related activities for an optimal integration of RET in the SMK, not only for the 11 CASINDO SMK, but also for the new 14 SMK to come, as is foreseen in TEDC's roll-out plans for CASINDO. Besides an Official approval of the national RET curriculum, an effective upscaling of RET integration in more SMK would also be a major outcome (and achievement) of the CASINDO SMK programme.