Sustainable Rural Energy Development Programme (SRED)

Stock-taking Review

For: UNDP Country Office
Pyongyang, DPRK

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List of Abbreviations and Acronyms

APR	Annual Progress Reports
BPAC	Bureau Project Appraisal Committee Meeting (UNDP)
CO	Country Office
COF	Cooperative Farm
CPAP	Country Programme Action Plan (UNDP)
CTA	Chief Technical Advisor
CWERD	Centre for Wind Energy Research and Development
DIM	Direct Implementing Modality (UNDP)
DEX	Direct Execution Modality (UNDP)
DPRK	Democratic People's Republic of Korea
EB	Executive Board (UNDP)
EE	Energy Efficiency
GEF	Global Environment Facility
ITE	Institute of Thermal Engineering
MDG	Millennium Development Goals
MEPI	Ministry of Electric Power Industry
MIC	Ministry of Coal
NCC	National Coordinating Committee
NEX	National Execution Modality (UNDP)
NPD	National Project Director (SRED)
PIU	Project Implementation Unit
PM	Project Manager (SRED)
PSC	Project Steering Committee
PTC	Project Technical Committee
RBAP	Regional Bureau for Asia and the Pacific (UNDP)
RE	Renewable Energy
RET	Renewable Energy Technology
SCST	State Commission for Science and Technology
SOAS	State Academy of Science
SRED	Sustainable Rural Energy Development
SWEDPRA	Small Wind Energy Development and Promotion in Rural Areas
TE	Terminal Evaluation
TOR	Terms of Reference
TRAC	Target for Resource Assignment from the Core (UNDP)
UNDP	United Nations Development Programme
WFP	World Food Programme

1. Executive summary

The present document reflects the findings of a stock-taking review of UNDP's Sustainable Rural Energy Development (SRED) programme in the Democratic People's Republic of Korea (DPRK). The objectives of this review are: (i) to perform an assessment of the SRED programme; (ii) to review the project's activities; (iii) to collect lessons learnt from project implementation; (iv) to recommend on removing shortcomings and future interventions under SRED by UNDP. The SRED Programme restarted operations in January-April 2011, after a long resumption period (2007-2010). The total project budget amounts to US$ 5,035,596.50 funded by UNDP using TRAC resources.

The country situation provides a strong rationale for UNDP to address the energy situation in the rural areas in DPRK and contribute to the Millennium Development Goals (MDGs). The choice for the Cooperative Farms (COFs) as an exclusive target group seems not fully justified by human development or vulnerability criteria since other groups are equally vulnerable. From a practical point of view however, the COFs provide a good starting point to implement renewable energy and energy efficiency technologies in rural DPRK and extract valuable lessons. On the other hand, the focus on COFs may imply that potential synergies at a higher level[1] are not recognized or exploited.

SRED has made substantial progress in terms of expenditures and outputs since 2011. As of December 2012, about 56% of total resources have been spent. It is anticipated to terminate the Programme by end 2013. This is only feasible if implementation of the pending renewable energy demonstration pilots evolves without delay; earlier experiences suggest that more time is needed. Project progress is still very much in terms of delivered activities. It is unlikely that the envisaged improvements in development conditions are actually be attained, implying that the expected end-of-project situation would not be reached. Specifically in the field of policy support and implementation structures (human and institutional capacity), progress has been smaller than anticipated. Given the present context for DPRK, these activities are no longer actively pursued.

The implementation of the SRED programme exhibits important deviations from the original strategy and budget. This is mainly due to the impact of changes in the project context (primarily related to international political issues), which have led to: (i) a long suspension of activities; (ii) changes in budget distribution; (iii) the suspension of certain activities[2]; and (iv) the inability to leverage additional financial resources from other agencies and/or financiers[3]. These deviations imply an alteration of the anticipated project strategy away from achieving its ultimate objective (i.e. to prepare DPRK to implement a nation-wide rural energy programme).

Technology demonstration and barrier removal activities are more difficult than anticipated. The approach proposed by SRED is subject to external factors and risks that may not have been acknowledged as such at design stage[4]. In practice, the project follows a learning-by-doing approach. The Programme's time schedule is highly optimistic and too short to finalize all envisaged components. By consequence, project implementation is continually perceived as "delayed", while the technology pilots are in fact valuable elements in a learning process for UNDP and its Government partners.

The communication with the national partners, as well as the coordination between them, is inadequate and greatly affects overall effectiveness. While the State Academy of Science (SAOS) should develop technological know-how, the State Commission for Science and Technology (SCST) is in charge of transforming this technology into useful products and processes, and of delivering them to society. However, the roles between SAOS and SCST are not clearly defined (or understood) and one may question whether both entities are actually prepared to deliver technology to end-users. Coordination issues inevitably extend to the people from the cooperative farms and the equipment suppliers.

It is important to distinguish between energy products and renewable energy projects. The challenge regarding products (such as coal stoves) is mostly related to product development and testing to ensure

[1] Probably at county level.

[2] Specifically policy development, capacity building, and support for grid-connected energy technologies.

[3] It is noted that SRED now fully draws on UNDP resources and no longer pursues external financing.

[4] Including the effect of slow communication between UNDP and SRED staff, and the national counterparts due to Government restrictions.

performance, durability, cost reduction, ease of installation and maintenance; and to efficient mechanisms to reach the end-user. Renewable energy projects (such as small hydro power plants) are more complex and require an individual approach. UNDP is closely involved with the supervision, logistics and operational management. The national partners and local people have little experience with renewable energy projects and lack the managerial and technical skills to implement them. Up-scaling will not be possible if project implementation is not successfully transferred to a national entity with substantial executing capacity. UNDP cannot assume this role as part of a successful exit strategy.

SRED pays little attention to the design of sustainable delivery models for energy solution in the rural areas. Energy products produced by national factories and workshops should be sold directly to end-users instead of to the Programme. The signal presently received by the national counterparts is that sales are guaranteed at a high price; which consolidates a comfortable niche market. This situation is not in the interest of the beneficiaries targeted by SRED and does not generate any leverage on the resources provided by UNDP.

The lack of appropriate delivery mechanisms is also linked to institutional and policy barriers. UNDP is still in the process of understanding the role of national actors, which limits its possibilities to identify key partners and processes for promoting effective delivery mechanisms and supportive policy measures. Hopefully, on-going work with NCC and the national partners can strengthen this knowledge base.

The Consultant holds to the opinion that SRED must do a large effort to collect and systemize lessons learned from the present demonstration pilots and actually produce guidelines, manuals and best practices. This work should be done with great detail and include an assessment of the maturity of the various energy solutions demonstrated under SRED. To enable these activities, the Project horizon should be extended beyond December 2013. A differentiated approach can be followed, including on-going support of promising (but not yet mature) technologies (component 2) if sufficient institutional capacity is available.

2. Introduction

As contemplated in its Country Programme Action Plan (CPAP) for the Democratic People's Republic of Korea (DPRK) covering the 2005-06 period, UNDP embarked on the Sustainable Rural Energy Development (SRED) Programme in the country through "energy pilot demonstration schemes" in specific regions and Cooperative Farms (COFs). SRED Programme started operation in August 2006 and had been operating for 7 months, when it was suspended (March 2007).

The Programme was approved for resumption by UNDP's Executive Board (EB) in 2009 and a revised SRED Project Document was signed on 17 July, 2010, anticipating a 24-months project duration. The SRED Programme is implemented directly by UNDP DPRK under the DEX/DIM modality. Effective operations were started up in January-April 2011, when the Project Manager (PM) and project staff were contracted and a project office established. Project termination is presently scheduled to December 2013. The total project budget amounts to US$ 5,035,596.50 funded by UNDP using TRAC-1 resources.

As formulated in the Project Document, the objective of the Sustainable Rural Energy Development (SRED) programme is to improve human development indicators and quality of life through energy services in rural areas of DPRK. SRED takes the Cooperative Farm (COF) as an entry point for a household-based assessment of rural energy needs and services, and for the identification of the energy resources and technologies that best meet those needs. Upon completion of the SRED Programme, it is expected that DPRK will have its capacity strengthened for the successful implementation of a national rural energy programme along the principles and practices of sustainable development.

Renewable Energy and Energy Efficiency options in selected Cooperative Farms

Energy Technology / Cooperative Farm	Small hydro power	Household biogas	Pig farm biodigester	Rice husk gasifier	Solar water pumping (PV)	Solar water heaters	Energy efficient stoves		Thermal isolation	
							coal	*biomass*	*walls*	*windows & doors*
Ryudong COF (Unsan County, South Pyongan)	o[5]	x	x	-	-	x	x	x	x	x
Myongchon COF (Jangyon County, South Hwanghae)	x	x	x	-	-	x	x	x	x	x
Yaksu COF (Kangso County in South Pyongan Province)	-	x	x	x	-	x	x	x	x	x
Mopung COF (Anbyon County, Kangwon)	o	x	x	-	x	x	x	x	x	x

Four (4) COFs in 3 provinces were identified for pilot demonstration schemes in rural energy development. Fifteen (15) demonstration projects on the following technologies were selected: solar water heating, solar water pumping, rice husk gasifier, biogas, small hydropower, and energy efficient biomass and coal stoves.

3. Objective and methodology of stock-taking review

The objective of the stock-taking review is:

[5] Support to small hydropower was originally pursued at three sites. Construction under SRED will only take place in Myongchon COF.

(i) to perform an assessment of the SRED programme;
(ii) to review the project's activities;
(iii) to collect lessons learnt from project implementation; and
(iv) to recommend on removing shortcomings under the SRED Programme and future interventions by UNDP in area of sustainable rural energy development.

The assignment will further outline possible options to enhance the SRED programme and prepare a concept note for future rural energy programming by UNDP in DPRK[6].

The stock-taking review is an internal process initiated by UNDP DPRK to review and discuss the current situation, consistency of project logic with current realities, relevance of and prospects for achievement of project outputs within the limited time and resources, and to recommend outputs more attuned to current realities, Government priorities and UN policies, programming and operational guidelines. Although of a similar nature, the present review is not intended as a formal evaluation process and shall not be interpreted as such.

The activities undertaken consist of a two-week mission to DPRK (from 26 January – 9 February 2013) and desk work, including a review of SRED project documents provided by UNDP, presentations, and notes handed over by NCC. Given the limited time available for the assignment, the extensive project documentation was selectively reviewed. Consulted documents include annual workplans (AWP), annual progress reports (APR), quarterly and M&E reports, procurement lists, and minutes of the meetings by the Project Steering Committee (PSC) and Project Technical Committee (PTC).

4. Development context and approach of SRED Programme

The rationale behind the SRED programme is that access to energy services in the rural areas of DPRK must be restored and/or improved in order to increase agricultural productivity, as well as quality of life and school attendance. A situation analysis is provided in the Project Document (p.6) based on a household survey conducted in October 2005.

> *"Per capita energy consumption in rural areas amounts to half of the national average, indicating limited access to energy services (be it farming, rural industries and rural residential) by the rural population. It also indicates that biomass fuel contributes significantly towards meeting cooking and heating requirements in the rural areas, with significant variations within and between counties. (…) All respondents have electricity for lighting from the national grid, but only for two hours a day, which forces them to use kerosene for lighting."*

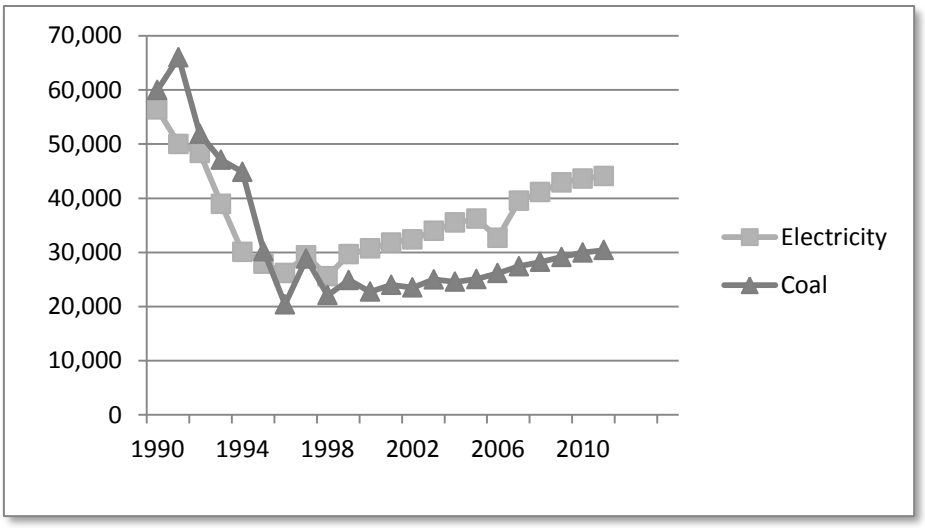
The visits to three Cooperative Farms during the stocktaking mission give rise to the following observations:

- Reduced energy consumption does not necessarily imply increased vulnerability of individuals and human livelihoods. Food supply is reportedly more precarious in the larger cities[7]. Per capita energy consumption in cities may be larger because some level of public lighting, transport and district heating services is provided[8].
- Interviewed people state that supply of grid electricity was acceptable about a decade ago, but nowadays it is virtually non-existent. These statements are confirmed by the presence of old electric appliances alongside new 12-V equipment powered by car or motorcycle batteries.

[6] Please refer to Annex A for a description of the deliverables under this Assignment.
[7] Source: FAO/WFP Crop and Food Security Assessment Mission to the Democratic People's Republic of Korea, 25 November 2011, UNFAO/WFP, Rome.
[8] On the other hand, energy consumption in rural areas may be higher during the agricultural period as energy is required for pumping water.

- The use of kerosene for lighting was never observed nor mentioned by people in the COFs visited. Some people use battery-powered torches and 12-V LED lights which can be bought in shops in DPRK.
- Coal and biomass are both used for heating, the latter often being used as a coal-saver[9].

The reported reduction in energy access is in agreement with the decline of primary energy consumption in DPRK over the last two decades (see next figures and data[10]), although the individual impact of this decline on the industrial sectors, public services in major cities, and households in rural areas, is not known. With respect to the consumption of grid-based electricity in the visited areas, one must observe that the distribution systems (lines and transformers) are obsolete. Any transport of electric energy to remote rural users will therefore be associated with very large losses.



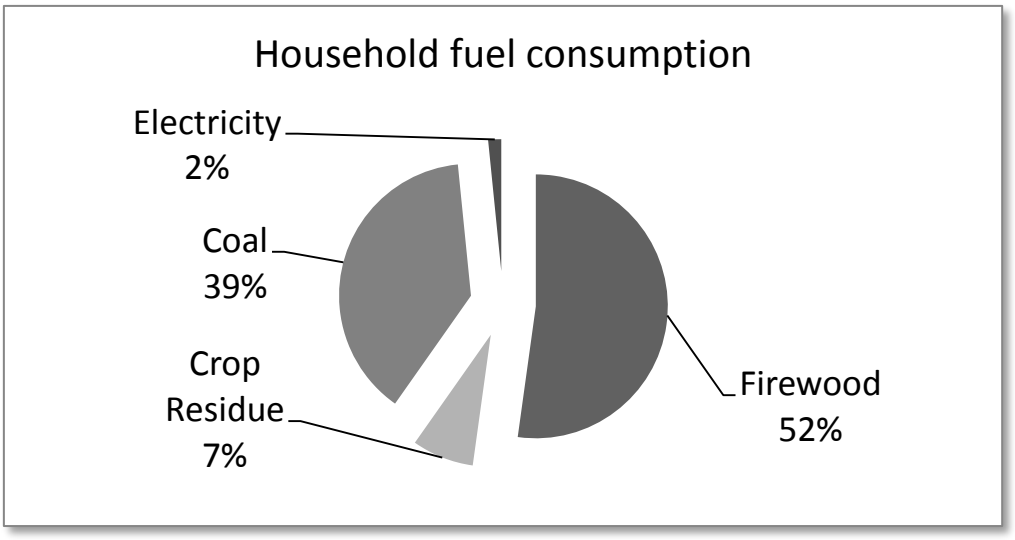
Simple observation can tell that the energy situation in the rural areas in DPRK is precarious, not only for household use, but also with respect to fuels for transport and agricultural machinery, greatly affecting economic productivity[11]. It must be noted that the many people in the rural areas (possibly the majority) do not live in cooperative farms but in smaller villages and towns; and that they are generally not dedicated to farming as a main economic activity. The UNDP CO does presently not have a comprehensive understanding of the social, geographic, and economic organization of the areas in DPRK outside the cities. It is suggested to strengthen in-house knowledge on these aspects, as it will contribute to justify the choice for the COF as an entry point made for SRED. Representatives from the national government (NCC) and international agencies (WFP) indicate that COFs are not the most vulnerable groups in the country; NCC would like to see a broader approach altogether.

The following graph shows the use of energy sources by rural households, based on data provided by NCC during the mission.

[9] Fossil coal can be purchased from the mines up to the volume defined by State Planning Commission; in Ryudong COF, the price is about US$ 10 per tonne, delivered at the COF. Limited transport facilities, costs, logistics, road conditions, are all factors that may affect the local availability of coal for household. People therefore rely on biomass as a backup (for heating and cooking).

[10] Based on data provided by NCC during mission.

[11] It would be worthwhile assessing the impact of limited energy inputs available for transport on economic productivity in the rural areas. People rely on bicycles, handcarts and oxcarts for local transport; which are actually biomass-powered (hence renewable energy-based) traction systems. However, these put a large burden on people's time and quality of life, with large opportunity costs.



As can be derived from the following table, about 90% of all energy inputs are used for space heating in the long cold winter. This energy service can only be provided by fossil coal or firewood. Electricity makes up only a small percentage (2%), supposedly for electric lighting, entertainment and kitchen appliances.

Energy services required by rural households		
Energy use	Energy (kWh)	
Heating	16,628	90.1%
Cooking	920	5.0%
Electricity	352	1.9%
Hot water	546	3.0%
Total	**18,446**	**100.0%**

Please note that these are official figures and cover a larger users group than the Cooperative Farms. The actual situation regarding electricity use varies from place to place. In some rural areas there is almost no electricity at all in winter time. During irrigation and harvest time, electricity is provided and households take benefit of this. The mission observed that electricity distribution grids exist in many places, but these are obsolete and badly maintained. It may take several weeks – if not months- to repair technical failures and one may expect rural families often not to have access to electric energy at the moments they need it[12].

The depicted development context provides a strong rationale for UNDP to address the energy situation in the rural areas in DPRK and contribute to the Millennium Development Goals (MDGs). The choice for the Cooperative Farms as an exclusive target group however, seems not fully justified by human development or vulnerability criteria. From a practical point however, the COFs provide a good starting point to implement renewable energy and energy efficiency technologies and extract valuable lessons. The fact that COFs largely operate as more-or-less independent socioeconomic units, facilitates assessing baseline situation and achieved impacts.

[12] Please note that electricity consumption is not metered at the level of individual households.

5. Present status of the SRED Programme

Three sources of information are used to assess the current status of the SRED Programme:

(1) Annual Progress Report 2012;
(2) Strategic Results Framework (SRF); and
(3) Observations during field visits.

A detailed description of the field visits and a review of the SRF are given in the Annexes. The following table presents the expenditures from the project start in 2006 till 2012, as well as the (consolidated) delivery forecast for 2012, and remaining funds for 2013.

Approved Total SRED Budget	Expenditure 2005-2010	Expenditure 2011	Delivery 2012	Remaining Budget 2013
(US$)	(US$)	(US$)	(US$)	(US$)
5,650,000.00[13]	800,566	1,236,701	1,112,636	2,500,107
(100%)	(14.2%)	(21.9%)	(19.7%)	(44.2%)

From 2005-2010 the Project spent only 14.2% of the resources. In 2011 there has been drastical increase to 21.8% and 19.7% in 2012. About 56% of total resources were spent as of end December 2012. It is anticipated to terminate the project by end 2013. This is only feasible if the implementation of the pending renewable energy projects (one hydropower plant, one pig farm digester, one rice husk gasifier) can evolve without delay. Three more digesters are programmed, but these will be produced in DPRK. This involves a process of technology transfer, which has already started, and the availability of production facilities. Based on earlier experiences with SWEDPRA, the Consultant is not optimistic that the three systems can be produced and installed in the course of 2013.

The following table summarizes the status of SRED for each of the defined components (outputs) according to the Annual Progress Report 2012. The situation reported by the SRED team is in agreement with the observations made during the mission. A more detailed analysis of progress and issues related to each of the defined targets is included in Annex B.

Present status SRED on Progress towards Achieving Intended Outputs				
Intended Outputs	**Output targets**		**Inputs**	**Present Status**
	Year 1	Year 2	(US$)	(APR 2012)
1. Number of provinces and cooperative farms identified for pilot demonstration of rural energy projects.	1. Compilation of rural energy consumption & supply, socio-economic, environmental data and assessment (for civil and engineering works and equipment specifications).		45,000	Completed
2. Rural energy demonstration projects implemented and running successfully.	1. Feasibility studies (applicability and adaptability of specific technology choices for SRED and potential follow-ups) of each technology application for rural energy services demonstration projects conducted; 2. Optimal energy & technology mix for the target counties and farm cooperatives identified and	3. Demonstration projects consisting of different mix of technologies implemented in the four target counties by the end of Project.	1,525,000	Targets 1 and 2 completed. Target 3 under implementation.

[13] Please note that this figure is different to the one in the ProDoc (US$ 5,035,596.50).

	appraised.			
3. Capacity development needs at different levels identified and appropriate training programmes organized and implemented	1. Study tours for relevant officials organized in Asia (China, Philippines and Vietnam); 2. Training and short courses for different technological solutions and aspects of sustainable rural energy organized and conducted within and outside DPRK for relevant participants.	3. In-country training on integration of sustainable rural energy in education curricula; 4. Participation in 3-5 international training workshops; 5. Study tours for relevant officials organized in Asia (China, Philippines) and Europe (Denmark, Germany, and Sweden).	860,000	Targets 1 and 2 completed. Target 3 under implementation.
4. Policies and mechanisms are put in place to address barriers and constraints to implement rural energy projects.			645,000	Activities not yet started.
5. Compilation and dissemination of lessons learned and "Good Practices".			285,000	Activities not yet started.
6. Formulation and design of sustainable rural energy programme for implementation at the national-scale.			480,000	Activities not yet started[14].

It is concluded that out of six project components:

- Output 1 has been completed;
- Outputs 2 and 3 are being implemented;
- Outputs 4, 5, and 6 have not yet started.

In this respect, the 4th SRED PSC meeting[15] correctly observed that:

> *"Output 5 "Lessons learned" can be done only after installation of demonstration projects and based on the results of the monitoring and evaluation of the installed equipment;*
>
> *Output 4 "Policies and Mechanisms" and Output 6 "Scale-up Programme" are not in progress but need to take urgent commencement (...) in parallel with Output 2 ("Demonstration pilots"), (...), which takes roughly one year to fully complete key activities for improvement of sustainable rural energy system and policy environment.*
>
> *Output 4 "Policies and Mechanisms" need more careful approach and discussions and corrections based on additional evaluation. The policy, regulatory or institutional change is important to address structural and systemic barriers to energy access but project has not been able to do much in this area due to the political context. Only some small steps could be taken in this regard i.e. survey of policies and regulations and gap analysis as a starting point."*

In the opinion of the Consultant, Output 4 can be implemented if a number of conditions are in place, including: (i) sufficient implementation capacity within the SRED Programme team; (ii) detailed propositions in terms of policies and support mechanisms for rural energy development; (iii) identified counterparts with a mandate to review and formalize new regulation and policy instruments; and (iv) effective high-level policy support to national project partners. Due to the new requirements of UNDP Management, several activities under Output 3 "Capacity Development Needs at Different Levels Identified and Appropriate Training Programmes Organized and Implemented" were reviewed and

[14] With the exception of preparation of some terms of reference.
[15] 4th joint SRED/SWEDPRA PSC meeting on 5 September, 2012.

cancelled. Policy development (Output 4) is not actively pursued due to the international political context.

The implementation of the demonstration pilots under Output 2 is producing a wealth of experiences about the implementation of new technologies in the rural areas. Many problems and issues appear, as reported by the Project Manager to UNDP and the national partners (NCC). The stocktaking review has made an attempt to summarize these based on the information contained in the Annual Progress Report 2012. The result is presented in the following table. For more details and questions raised please refer to Annex B.

Problems identified during implementation of RE & EE demonstration pilots[16]		
Identified problem	**Type of problem**	**Related barrier**
Weak local technical skills	technical capacity	human capacity / skills
Weak local planning and coordination capacity	managerial skills	human capacity / skills
Lack of energy supply to perform works	technical infrastructure	infrastructure
Damage during international transport	logistics	-
Delay due to visa issuing	external / planning	-
Delay due to winter weather	external / planning	-
Need to adjust to agricultural calendar	external / planning	-
Lack of coordination local supervision agency and end-users	roles and responsibilities	human / institutional capacity
Local supervision agencies' experts without clear TOR	roles and responsibilities	human / institutional capacity
Delay in procurement (transport of equipment)	logistics / planning	infrastructure
Contracted local expert not delivering	human resources selection	human / institutional capacity

As can be seen, problems arise due to inadequate human capacity (specifically technical and managerial skills) and the lack of technical and logistical infrastructure (access to electric energy when required, quick transport)[17]. These are largely related to systemic barriers which cannot be addressed by the SRED programme. Extra care during project planning and the provision of necessary inputs at least can help mitigating some of these issues at the location of the interventions.

The project also has to cope with adverse external conditions (specifically harsh winter climate, slow visa issuing and bureaucracy, agricultural calendar in the rural areas) which one has to live with. The climate and agricultural calendar greatly reduce the number of workable months during a year and also put constraints to the availability of "free" local labour to support the demonstration projects. Unfortunately, the short time horizon of a programme like SRED gives little room to adapt to this type of seasonal cycles.

Three issues were found that are related to the management and organization of the Programme itself. First, a continuous process of reprogramming activities as a result of over-optimistic planning. As seen, winter climate, logistics, procurement, visa and other bureaucracy, all take more time than expected. The response to international calls for tender was very low; suppliers did not always comply with equipment specifications or did not take into account site conditions; few international transport companies were willing to provide their services; the prices of services and equipment offered were very high. Contracts are also frequently amended. More realistic planning could reduce the work load for the project team and supporting UNDP staff.

[16] The classification of problems is made by the Consultant.

[17] The absence of facilities, including energy supply, during field work is highly detrimental for overall progress of the SRED Programme. Technical specialists from companies come to DPRK for a very short time. Operations such as welding, drilling, and mixing, and the use of tools depend on the availability of electricity. SRED asks local authorities to provide diesel generators or other electricity sources to enable installation activities.

Second, the fact that local experts hired by the Project do not always deliver as expected. It is not clear whether: (i) this is a human resources issue caused by an ineffective selection process of an individual person; (ii) the expert sent on behalf of a national institute (such as SAOS) does not have the required skills and competences; or (iii) the required skills and competences are not available within the contracted institute. The Consultant suspects that this problem is partly due to the systemic barrier concerning technical and managerial skills.

The third issue is a lack of coordination by and with the State Academy of Science (SAOS). As it was explained during the mission, the State Commission for Science and Technology (SCST) is the entity in charge of transforming technology (generated at SOAS) into useful products and processes, and of delivering them to society – also in the rural areas[18]. However, the roles between SAOS and SCST are not clearly defined and one may question whether both entities are actually prepared[19] to deliver technology to end-users.

Coordination issues inevitably extend to the people from the cooperative farms and the equipment supplier[20]. Ownership, and specific roles and responsibilities would need to be defined better; however, these concepts may not be as strongly developed as in other (market-oriented) countries. Coordination issues may therefore as well be partly systemic. Coordination is a challenging factor throughout project implementation, given the restrictions on direct communication between UNDP and SRED staff, and the national counterparts[21]. In any case, with a view on sustainability and large-scale replication, one must establish effective organization structures to deliver rural energy projects that can do without continuous intervention by a SRED Project Manager and National Project Director.

It is important to distinguish between energy products and energy projects. The challenge regarding products is mostly related to product development and testing to ensure performance, reliability, ease of installation and maintenance; to achieving cost reductions; and to developing efficient delivery mechanisms to the end-user. Systematic testing is needed to certify that proposed technical solutions are reliable, safe, and effective. In market economies with well articulated and efficient logistics, products can be dispatched massively. In the case of DPRK one needs to find out how products can be efficiently delivered to the end-user. For long-term sustainability, transport must be provided by the end-user or intermediaries, not by UNDP. Once products are tested and produced, they should find their way to the end-user without much further involvement from UNDP.

Projects require capital investment (equipment), skilled human resources, proper planning, management and supervision. Present project implementation processes are tedious, with UNDP being closely involved with the supervision, logistics and operational planning. National partners and local people have no experience with the implementation of renewable energy projects and they lack adequate managerial and technical skills. The used contract modalities are basically focused on procurement of equipment; they do not fully specify the roles of the actors involved in project implementation. A turn-key modality, which would assign full responsibility to a (foreign) contractor, seems not feasible in the context of DPRK. There are also many factors that are out of control for a foreign supplier. Future up-scaling is unlikely to be successful if project implementation is not transferred to a national entity with substantial executing capacity. Yet, it is not clear how this should

[18] Please note that SCST does not appear in the original SRED Project Document. In 2009, the Academy of Science (AOS) was split up into SAOS and SCST.

[19] In terms of the profile of professional staff, infrastructure, an elaborated vision and work programme in the field of rural energy services, technical and financial resources to assume this task, as well as an effective mandate therefore.

[20] As the mission could observe when visiting the biogas digester in Mopung and the hydro plant in Myongchon COF.

[21] This can be illustrated by the following example reported by the PM (and observed by the Consultant). In the Mopung COF local experts are responsible for supervising the construction of the the pig farm biogas system. The national expert is contracted by SRED. However, he proceeds without any drawings or design documents at hand, notwithstanding the fact that all documents were shared with the national partners (through the National Project Director). By consequence, the expert does not properly instruct the local farm people and the integrity of the project is jeopardized. Coordination and communication between the national experts is inadequate. It is also not clear whether the local expert actually understands the purpose of technical specifications and manuals.

be arranged for in the medium term. It is recommended to discuss the modalities for implementation in more detail with the national stakeholders.

As a general conclusion, SRED has made substantial progress in terms of expenditures and outputs since 2011 and may finalize some of the planned demonstration pilots by the end of 2013. This in itself is a good achievement. Notwithstanding, progress is still very much in terms of "delivered activities" (study tours, equipment). It is unlikely that the envisaged improvements in development conditions[22] as pursued by the Outputs 2, 3 and 4, can be attained. This would imply that the expected end-of-project situation:

> *"After SRED completion, DPRK will be ready to implement a national rural energy development programme",*

would not be reached. According to the Consultant, this situation is due to: (i) flaws in the identification and validation process of the underlying assumptions for the SRED Programme; (ii) the resulting design of the Programme; (iii) and the role and capacity of the national counterparts; and (iv) the effect of external factors on the project design, effectively suppressing several anticipated activities (policy, capacity building, procurement). It is observed that the Project Document does not specify "who" in DPRK should be made ready to implement this national rural energy development programme. One would expect a strong partnership to develop between UNDP and the recipient "learning" national institute during the course of SRED. This is presently not the case.

6. Programme design and assumptions

The SRED Programme is based on a proposal on rural energy for DPRK prepared in 2003[23]. The Programme was aligned with the 2005-2006 Country Programme, which emphasized initiatives at community level. As mentioned in the Project Document[24], UNDP's Bureau Project Appraisal Committee (BPAC) made the following recommendations: (i) to define the results of the programme in human development terms and approach the energy problem in terms of rural development, food security, capacity-building, and institutional strengthening; (ii) to link pilot projects to improved livelihoods of vulnerable groups and demonstrate how energy projects can make a difference for vulnerable populations in specific villages/communities; (iii) to shift away from the 'supply' and technology driven-orientation and focus on the energy requirements of specific (vulnerable) communities and households; (iv) to determine the 'mix of energy sources' in function of the energy requirements of households; (v) to examine the scope for replication within the policy/institutional environment of DPRK; and (vi) to limit capital investment to less than 20% of the budget.

Upon resumption of UNDP in DPRK, the Project Document was revised and newly signed on 17 July 2010. The total cost of equipment was determined at 30% of the total project budget when the Project was resumed[25]. In 2010, the international context for DPRK had changed compared to 2005, when the Project was initially designed. International sanctions were in place and the opportunities to leverage additional sources of funding greatly reduced. In response, in 2011 several missions were executed to assess the feasibility of the original portfolio of demonstration pilots and to propose a selection eligible for funding out of the (reduced) budget. Meanwhile, equipment costs have risen, transportation costs to and within DPRK have drastically increased, and the high cost and low availability of construction materials on the local market further affect budget requirements (see section 9. Funding and synergies).

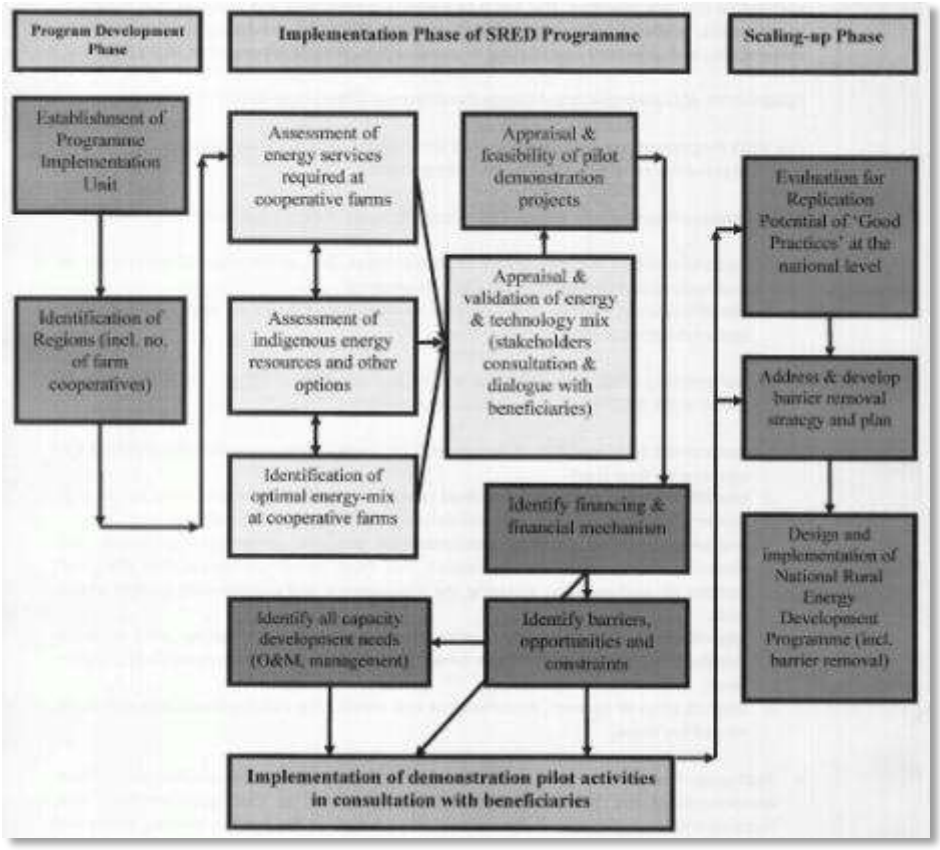
[22] Policy, human and institutional capacity, and sustainable technology solutions.
[23] The "Draft Report on Sustainable Rural Energy DPR Korea" (2003), prepared by UNDP Consultants, Nguyen X. Luong (task leader), Juan B. Heredia, Dr. Bernard Joos and national experts.
[24] Project Document 2005, Page 10.
[25] Letter from UNDP DRR to NCC, 17 June 2010.

It may be obvious that the SRED programme is highly exposed to external factors, which greatly affect its strategy and effectiveness. In order to comply with international restrictions on trade with DPRK, UNDP's procurement and control processes have become complex and slow. Internal UNDP policies have a direct effect on the project strategy, as certain outcomes and activities are no longer actively pursued (specifically: support for policy development, capacity building, procurement, and support for grid-connected energy technologies). The international context also greatly reduces the pool of suppliers of equipment and technical expertise to select from. Altogether, the assumptions underlying the original programme strategy may no longer be valid under the present circumstances.

The SRED Programme, as originally designed, is described in the Project Document and consists of three phases:

i) Development phase: identification of capacity development needs and implementation of training programmes (output 1);
ii) Implementation phase: implementation of demonstration pilots, and putting into place supportive policies and mechanisms to remove barriers and constraints (outputs 2-5); and:
iii) Scaling-up phase: Compilation of lessons learned and good-practices as input for a country-wide rural energy development Programme (output 6).

The three phases are indicated in the next flow chart (from Project Document).



A thorough analysis of the operational strategy of the programme goes beyond the scope of this stock-taking mission. Nevertheless, one can observe the following:

- The project approach is linear. There is no feedback loop foreseen to benefit from operational experiences from the demonstration pilots to review barriers, capacity needs and defined "energy mixes" during project implementation.
- As the project development phase can be considered all elements up to "Appraisal & validation of energy & technology mix" (which is output 2.2). The throughput time for the

appraisal phase is too short to obtain sufficient knowledge about the development context in the rural areas[26].

- The identification of barriers, opportunities and constraints (i.e. output 4.1) is expected to be completed before the implementation of the demonstration pilots (output 2) but has not started yet.
- Capacity development needs concerning O&M and management are supposed to be addressed before implementation of the demonstration pilots. The activities proposed under Output 3 are not targeted at these specific skills but are more generic.
- The RE/EE demonstration pilots imply complex and lengthy processes which are not reflected as such in the flow chart. Instead, it is assumed that the pilots can be delivered "on demand", after which the programme can move on to the next step. However, many specific conditions need to be in place for swift project execution which cannot just be assumed. These conditions may not have been recognized or understood due to insufficient preparation time and expert support during the design phase of the SRED Programme.
- Funding and financial mechanisms are supposed to be arranged for before pilot implementation. In practice, UNDP has become the only financier. In the absence of co-funding and with a 20%-limit on equipment procurement for UNDP, the total volume of RE/EE investments under SRED has become lower than anticipated. Several demonstration pilots (especially small hydro) had to be postponed.
- According to the flow chart, the removal of barriers under output 4 (policy and mechanisms) is presented as part of the scale-up phase, which seems not fully consistent with the barrier identification step before pilot implementation. It must also be noted that the activities proposed in the SRF are not supportive (or sufficient) to establish the envisaged output 4. Barrier identification and analysis (output 4.1) should at least partly be done during the design phase of SRED[27].

With limited previous working experience in rural energy in DPRK, the linear approach followed by SRED is highly optimistic and subject to external factors and risks that may not be acknowledged as such. In practice, the project follows a learning-by-doing approach, which makes completely sense. In many occasions, the PM recalls earlier experiences to expedite subsequent demonstration pilots. The Programme's tight time schedule however, is not well matched to this more practical approach. By consequence, project implementation is continually perceived as "delayed", while a more positive perception could be that very useful lessons are being learnt within a relatively short period (since 2011).

In the opinion of the Consultant, the activities proposed in the Strategic Results Framework are not always appropriate and/or sufficient, specifically under the outputs 3 (Capacity development) and 4 (Policies and mechanisms). Study tours, curriculum building and international workshops are not effective to increase technical and management skills at farm level (and are presumably targeted at higher-level persons). The stocktaking mission could observe the need for improved technical and managerial competence for project implementation[28]. Unfortunately, the context in DPRK offers little

[26] The mission observed that knowledge on the use of energy in Cooperative Farms (and rural areas in general) is rather limited. In order to understand energy use, one needs to understand the development context in the rural areas, which includes understanding productive processes, social organization, the use of natural resources, labour, time management, and interaction with the exterior. Acquiring this knowledge takes time and may sound unpractical for preparing a specific energy programme. However, as RBAP-BPAC (Project Document, p.10) observed: "there should be a shift from framing the problem as a rural energy problem, to framing it as a rural development and food security problem". The time reserved for project preparation under SRED is very short to obtain a solid understanding of the context for rural DPRK, even if limited only to COFs.

[27] If not by barrier removal, how would SRED assist DPRK "to be ready to implement a national rural energy development programme" (expected end-of-project situation)?

[28] By comparing the competences of local staff with a mission sent by the Chinese contractor to build the new small hydro plant at Myongchon COF. Local technicians and experts had no idea how to dismantle the old system, which requires a careful analysis of the whole process (lake to be emptied, or not; continuity of electricity supply during works; storage and protection of received equipment, etc). The Chinese crew had to

opportunities for nationals to acquire hands-on experience. Systemic issue likely limit the development of individual qualities such as leadership, creative problem solving, in spite of people being very dedicated and resourceful.

With respect to Output 4, the appraisal of the baseline situation as "quality testing procedures not fully in place" seems an understatement. For brevity's sake, it is referred here to the slow progress made on this point with wind turbine production under SWEDPRA. In the case of SRED, there is a host of technologies, each of which with specific technological implications. Also, "maintenance and repair machinery and procedures are outmoded". In general, capital assets in the rural areas are obsolete, inadequate, and often not operational at all due to the lack of spare parts, energy inputs, qualified staff and prime materials. The lack of investment and supply of operational inputs is caused by serious systemic challenges which cannot be addressed from a rural energy and development perspective alone. The autonomous maintenance capacities of rural communities are basic; proposed technologies must be adapted to this reality, either by being very simple, or by being very reliable (yet affordable). Output 4 should carefully explore these niches, which certainly exist, in order to focus on useful solutions and to decide where to locate technology support and repair centres.

The SRED programme covers a range of energy technologies, including solar thermal energy for water heating, efficient biomass and coal conversion (stoves), community and household-scale biogas systems, biomass gasification, and small hydropower, photovoltaic panels (PV) for drinkwater pumping, and energy-efficiency measures (thermal isolation of houses and community buildings). Small-scale wind energy was not covered, as this was already pursued under the parallel, GEF-funded, SWEDPRA project. Biofuels were initially included. On the PSC meeting on 12 March 2012, it was acknowledged that more information was needed to assess its potential in DPRK, as this technology appeared less relevant. It was therefore decided to exclude it from the SRED Programme.

Several of the people interviewed during the field visits mentioned that PV-systems would be a valuable complement for battery charging. In fact, this would make the "household energy package" complete for them: more comfortable indoor conditions by thermal isolation, reduced energy consumption (costs) for heating and cooking, and reliable electricity for a more amenable and productive life. Prices for PV panels have fallen dramatically (2012 market prices), offering a unique opportunity for DPRK for massive electrification of remote areas[29]. The SRED programme could include some PV-pilots to demonstrate the benefits of this technology and develop local maintenance services. Photovoltaic systems for household and community services could bring a great change in rural DPRK. In interviews with NCC however, it was highlighted that electricity supply for the rural population is not a Government priority.

Please refer to the review of the SRED Strategic Results Framework in Annex C for more detailed comments and observations.

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define all these issues although local experts were supposed to provide this input information to the supplier. This situation suggests that the local people lack the experience to grasp the full problem and propose useful solutions. Training (courses) will not likely be effective here, as professional competences are mostly learned on-the-job. DPRK people may be taught to perform more operational tasks however.

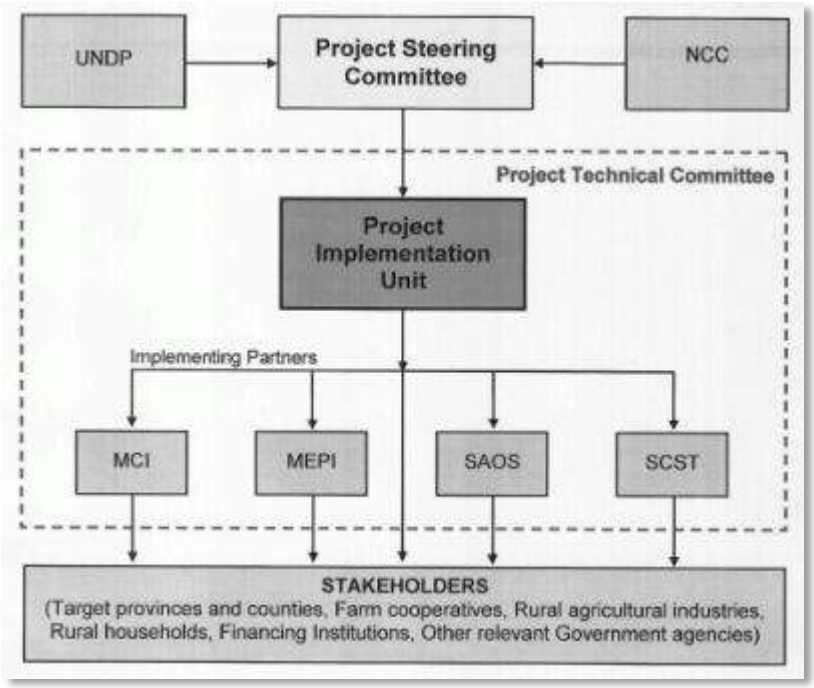
[29] At the time the SRED programme was designed (2005), PV technology was still too costly for large-scale applications (units energy costs of approx. 1.0 USD/kWh); presently, grid-connected PV systems have reached "grid parity" in several countries, meaning that electricity self-supply by households has become cheaper than grid electricity (about 0.2 USD/kWh). PV technology (in mini-grids with battery back-up) could match the modest electric power demands of the rural population and would avoid the costly and difficult rehabilitation of the regional transmission and distribution grids, which operate at huge technical losses. A possible option to finance large-scale PV electrification in rural DPRK would be under a bilateral programme with China, since this country is the largest producer of (low-cost) PV panels worldwide and DPRK's closest trade partner.

7. Project management and institutional set-up

The SRED programme is executed by UNDP in accordance with UNDP Direct Execution/Direct Implementation (DEX/DIM) guidelines. The UNDP Country Office in DPRK has the overall responsibility for project implementation in coordination with the DPRK Government, through the National Coordinating Committee (NCC) for UNDP. Other government partners provide technical and operational support and liaise with the authorities and stakeholders in the target provinces, counties and farm cooperatives. These government partners include:

- Ministry of Electric Power Industry;
- Ministry of Coal Industry;
- State Academy of Sciences and its relevant institutes/centers; and
- State Commission for Science and Technology and its relevant institutes/centers.

The project's institutional arrangements as defined in the Project Document are presented in the next figure[30].



This representation reflects the formal requirement that overall supervision on behalf of the DPRK Government is by NCC, which is also the direct communication line for UNDP. The line ministries (MIC, MEPI, SAOS and SCST) enter the project as operational entities and are subordinated to NCC, obviously providing their expertise to support higher-level decision making. Under the Steering Committee (PSC), the Project Technical Committee (PTC) formally executes the SRED Programme as a joint UNDP-NCC effort.

In practice, the SRED Project Manager, supported by UNDP's staff at the Country Office, is leading the Programme[31]. Based on information and TORs from PM procurement of goods and services is prepared by Procurement Officer and reviewed and approved by CO Senior Management. Staff assigned by the line ministries provides support and is available for dialogue[32], in the first place the National Programme Director (NPD) provided by SAOS. The National Training Coordinator (NTC)

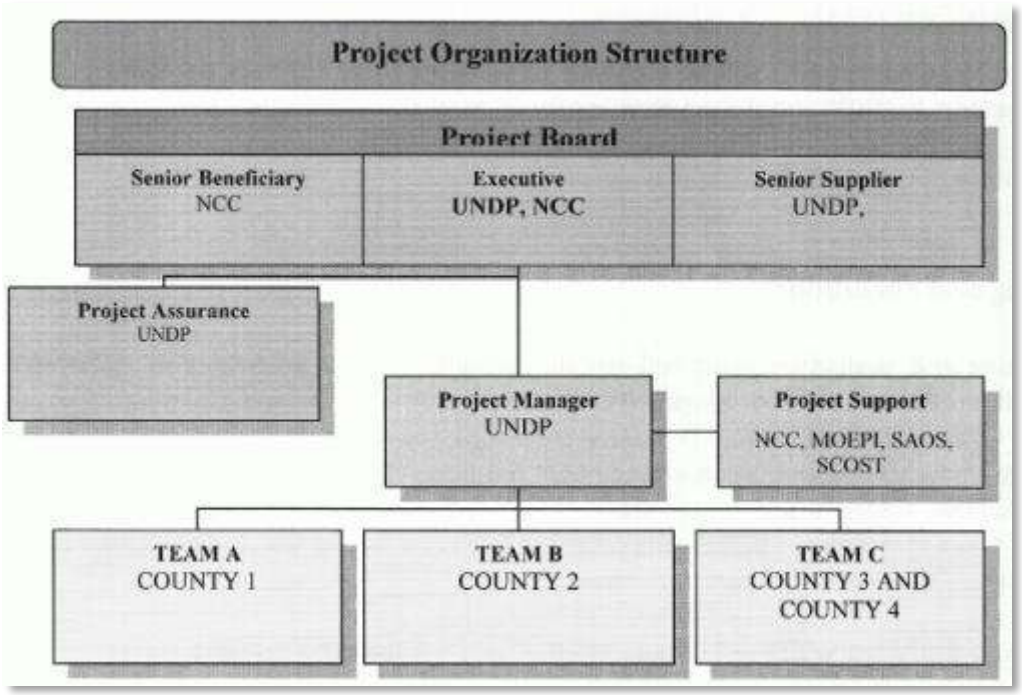
[30] Project Document, p.24.

[31] Originally, the Project would recruit and international resident Chief Technical Advisor (CTA) to provide technical advice to UNDP and the government. It soon became clear that full-fledged managing by national staff did not work due to the barriers and constraints in place, and the CTA was assigned as Project Manager for SRED and SWEDPRA combined.

[32] Prior formal approval by NCC.

works part time. Technical work by the line ministries (generally SAOS) is performed under subcontracts with the SRED Programme (according to specific terms of reference and submission of a price quotation). This situation implies that the SAOS and SCST act both as project partners and subcontractors of SRED.

Under DEX modality, this double function of the line ministries seems difficult to avoid, given the requirement for UNDP to execute all project expenses and to take direct responsibility for all project activities. Under the NEX modality, the Project Implementation Unit (PIU) could well be located inside a line ministry (SAOS or SCST). The potential benefits of the NEX modality include increased ownership by the national counterpart and a reduced work load for UNDP staff.



The experiences with SRED so far show that counterparts' managerial and technical skills to implement project components (especially the demonstration pilots), are rather weak; continuous supervision by PM (supported by NPD) is needed to correct operational issues. Activities by line ministries are not always well coordinated with the PM. Internal project processes are heavily slowed down as a result of the mandatory indirect communication. There is also an ownership issue in a sense that counterparts are not used to perceive the project as a joint effort but rather think from the perspective of their own organization. By consequence, information is not always shared and coordination is not always considered necessary[33]. Given these limitations, it is difficult to conceive an execution modality that could avoid the SRED PM being involved in operational issues at such a detailed level as currently the case.

8. Project monitoring

Monitoring of progress is continuously done by the SRED Project Manager with backup from UNDP CO, which counts with a Senior M&E Specialist. The Programme has prepared a monitoring plan to assess progress in the field. The context for project monitoring in DPRK has been analyzed in detail as part the SWEDPRA Terminal Evaluation[34]. A few issues are highlighted here.

[33] These issues were also reported during the terminal evaluation of the UNDP/GEF initiative SWEDPRA.
[34] Please refer to the SWEDPRA Terminal Evaluation final report for further details.

First, the choice to cluster SRED pilot activities in a few (4) cooperative farms not too far from Pyongyang greatly facilitates monitoring and verification of field activities. Field demonstration under SRED is much better controlled than under SWEDPRA, in a sense that the type and the location of installations are agreed beforehand. Any installation not included in the work plan is not considered part of the programme[35]. In the case of SWEDPRA, different types of wind generators were installed in a disperse manner without previous knowledge of UNDP. Towards project termination, the main counterpart (CWERD / SAOS) wished to claim these installations as results of the SWEDPRA project. While physical inspection was already difficult as a result of travel distances, it was not possible to assess the overall performance and appropriateness of these systems in the field, nor their relation with the Project's inputs[36].

A lesson learned from SWEDPRA is that a clear understanding by both parties about what belongs to the project and what not helps avoiding misunderstandings and mistrust. Under SRED, there appear to be much less issues concerning the exchange and verification of information. Besides the better definition of interventions as already mentioned, there is also closer interaction of the SRED Project Team with national staff and beneficiaries during field work, thereby initiating a process of learning to know and value each other. Under SWEDPRA, joint field work did not take place and working relations were therefore more distant.

Second, monitoring under SRED may be somewhat compromised given the direct involvement of the PM and his assistants in project supervision, including corrective actions at an operational level. Ideally, the responsibility for the successful and timely delivery of the demonstration pilots would be assumed by a contractor, who should be in charge of coordination and planning of activities and staff. Formally, the county teams have this role, supported by the national project partners SAOS and SCST. Due to the inadequate local managerial skills, the SRED PM has to supervise all activities very closely and visit the places frequently, simultaneously using his observations for progress monitoring.

As a general appraisal, SRED project monitoring by UNDP CO is effective and includes several instruments, including the present stock-taking review intended to obtain feedback from an independent observer.

9. Funding and synergies

The SRED programme consists of technical assistance activities and investment in equipment for the rural energy demonstration pilots. The original, total investment requirements for the identified pilots are of the order of the total UNDP funding (approx. US$ 5 mln) according to the cost breakdown in the following table. As one can see, about 4/5 of the total budget would be related to the development of small hydro power plants.

SRED Demonstration Pilots - Original project costs (US$)[37]

CoF / RET	Yaksu	Myongchon	Mopung	Ryudong	Total (4 sites)
3 small hydro plants	-	535,000	2,574,000	1,103,000	**4,212,000**
4 gasifier plants	228,000	309,000	232,000	228,000	997,000
4 solar water heater	22,000	22,000	25,000	22,000	91,000
1 solar water pump	-	-	30,000	-	30,000

[35] For example, the biogas installation at Keynam Stock Farm, Sinwon County, which was visited by the mission on 29 January 2013.

[36] In particular the "old model" wind generators as they are referred to in the Terminal Evaluation.

[37] Based on data provided in Q3 (Quarterly) Report, 2011.

4 biogas plants	62,000	42,000	45,000	47,000	196,000
4 energy efficient stoves	5,300	2,300	2,300	3,500	13,400
Total (20 projects)	**317,300**	**910,300**	**2,908,300**	**1,403,500**	**5,539,400**

After resumption, the maximum amount of budget that UNDP can allocate to equipment is 30% of the project sum. The contribution by UNDP to each identified project is defined in the Project Document[38] including Kangso Coal Mines support as presented in the following table:

SRED Demonstration Pilots – Original UNDP budget on equipment		
	Implementation of Rural Energy Demonstration Projects (SRED Output 2)	**Budget (US$)**
1	Clean and efficient coal technologies for heating applications in rural households, service institutions and agricultural processing in Kangso & Unsan counties; "First-phase" rehabilitation of Kangso Coal Mines, South Pyongan Province	250,000
2	Small hydropower plant (SHP) and energy conservation & efficiency for electricity use in Ryudong COF farm cooperative, Unsan county, South Pyongan Province	250,000
3	Small hydropower plant (SHP) and energy conservation & efficiency electricity use in Myongchon COF farm cooperative, Jangyon county, South Hwanghae Province	250,000
4	Small hydropower plant (SHP) and energy conservation & efficient electricity use in Mopung-ri, Anbyon county, Kangwon Province	250,000
5	Biomass gasifier and efficient use of produced gas for electricity generation	50,000
6	Biogas systems & efficient use of biogas for electricity & heating in households, service institutions & agro-processing	50,000
7	Improved biomass direct combustion systems for cooking & space heating in households/service institutions and process heating in agriculture	50,000
8	Solar thermal systems in agro-processing and buildings	50,000
9	Solar photovoltaic systems & efficient use of electricity	50,000
	Total SRED budget equipment	**1,250,000**

The total amount of UNDP resources available (US$ 1,250,000) leaves a large financing gap (roughly US$ 4,000,000) for financing of equipment that is not covered by the Project. The Programme would therefore seek external funding through the SRED Resource Mobilization Strategy, targeting the international donor community and/or financing mechanisms. One of the financing instruments that would be explored was the Clean Development Mechanism (CDM), which was particularly interesting to finance the small hydro plants. After resumption and given the international context for DPRK, it was decided not to pursue this further. The expectation in 2005 to develop synergies for cooperation with other agencies was not met.

After resumption, three missions were carried out in 2011 by a feasibility study team, PM and UNDP staff to assess the projects identified in the Project Document in more detail[39] and assign priorities. Several options were reviewed after the third mission, resulting in a revised budget[40] to fund selected demonstration pilots with combined UNDP and external resources. By 10 February 2012, the International Feasibility Study Team completed the prioritization and selection of fifteen (15) demonstration projects out of the above identified 20 projects based on: (i) technical merits (quality, efficiency); (ii) environmental merits; (iii) operation and maintenance; (iv) feasibility; and (v) replicability.

[38] Based on Project Document, p. 34 and adapted by PM (Q3 report 2011).

[39] On 23-28 May, 19-24 June, and 10-13 July 2011.

[40] The present selection is "option 4" as proposed in Q3, 2011.

SRED Demonstration Pilots - Project selection and budget February 2012 (US$)					
CoF / RET	Yaksu	Myongchon	Mopung	Ryudong	Total (4 sites)
1 small hydro plant	-	531,920	-	-	**531,920**
1 gasifier plant	227,800	-	-	-	**227,800**
4 solar water heaters	27,810	27,630	30,800	28,050	**114,290**
1 solar water pump	-	-	30,180	-	**30,180**
4 biogas plants	30,180	115,514	115,514	30,180	**458,056**
4 energy efficient stoves	2,200	2,200	2,200	2,200	**8,800**
Total (15 projects)	**287,990**	**677,264**	**178,694**	**60,430**	**1,371,046**

On 1 March 2012, the PSC approved the first batch of twelve (12) prioritized demonstration projects out of preselected fifteen (15) demonstration projects, distributed as follows over the different RE & EE technologies: solar water heating (4), solar water pumping (1), rice husk gasifier (1), biogas (1), small hydropower (1), and energy efficient biomass and coal stoves (4). This selection was made taking into account the available budget, project timeframe, technology mix, financial sustainability and ownership arrangements.

SRED Demonstration Pilots – Final project selection and budget March 2012 (US$)					
CoF / RET	Yaksu	Myongchon	Mopung	Ryudong	Total
1 small hydro plant	-	531,920	-	-	**531,920**
1 gasifier plant	227,800	-	-	-	**227,800**
4 solar water heaters	27,810	27,630	30,800	28,050	**114,290**
1 solar water pump	-	-	30,180	-	**30,180**
1 biogas plant	-	-	115,514	-	**115,514**
4 energy efficient stoves	2,200	2,200	2,200	2,200	**8,800**
Total (12 projects)	**257,810**	**561,750**	**178,694**	**30,250**	**1,028,504**

Three (3) biogas projects in pig farms were deferred to a later stage, to be considered after finishing and monitoring of the first demonstration pig farm biogas project.

SRED Demonstration Pilots – Budget distribution		
	Cost of items	**Approximate Budget (US$)**
1	Equipment	631,000
2	Construction and Insulation costs	206,000
3	Equipment transportation	53,000
4	Project management costs (2.5% of 1,2 and 3)	21,000
5	International supervision (165 days)	54,000
6	Local supervision (1.4% of 1, 2 and 3)	12,000

7	Training of operators	25,000
	Total project cost	1,002,000
8	Contingency (9% of total project cost)	90,000
	Total project budget	**1,092,000**

Over time, the amount of funding available for investment steadily decreased, reducing the number of beneficiaries that could directly be reached by the Project. In several occasions, expectations were created among the local people which could not be met. This is not helpful to create confidence in the reliability and commitment of foreign experts and agencies, including UNDP. A possible way to avoid false expectations is by establishing a separate investment fund for sustainable energy solutions, rather than combining investment with TA activities into one programme. Since the implementation modality would continue to be DIM, one would need to establish two separate projects: the TA Programme and one investment fund, both implemented by UNDP[41]. If this is not feasible, the Consultant would suggest UNDP to focus on TA alone, meanwhile advocating for the creation of a national fund for rural energy[42].

By doing so, the Programme can fully focus on technical assistance and the removal of (systemic) barriers. One would avoid communicating messages like "out of US$ 5,650,000 of UNDP project funding, only 30% can be used for equipment"[43]. It also avoids assigning large budgets that cannot be executed in a short time span. Expectedly, separating investment and TA activities will have a positive effect on project implementation.

[41] Ideally, setting up an investment fund for rural energy solutions would be part of the exit strategyof a rural energy programme. Given the sustained need for finance in DPRK, the Consultant envisages the creation of a permanent investment facility, combining UNDP and other funding resources. According to comments received from HQ (Nov 2013), such a facility would still need to be implemented by UNDP under the DIM modality. This greatly reduces the options to leverage additional funds, gradually transfer ownership to the host country and, ultimately, reduce DPRK's reliance on donor funding for rural energy, which is a prerequisite for long-term sustainability.

[42] Which, for the near future, will lead to UNDP freeing up funds for continued demonstration by procurement and technical assistance (similar to what is done under SRED). However, demonstration does not allow reaching large numbers of rural people; while the options and budget for procurement are limited as a result of UNSC and UNDP restrictions.

[43] Presently, more money also goes into Project Management than into investment, which may be frowned at by the national counterparts.

10. Discussion of findings

The role of energy on rural development, human health and environmental quality in DPRK, which provides a rationale for UNDP involvement, is described in the following excerpt[44]:

> *"The rural population is the most vulnerable group in terms of access to food security and energy services. The limited endowment of natural resources suitable for agriculture makes it critical for many in the rural areas to find alternative employment and income-earning opportunities. At the same time, the prevailing lack of reliable energy supply and non-use of energy efficiency measures are some of the main barriers to the creation of employment opportunities outside farming."*
>
> *"Alternative energies could become a solution for greenhouse gas emissions, land degradation, erosion and the deterioration of the natural ecosystems, and attendant increases in the risk of natural disasters. A number of barriers are currently hampering widespread and sustainable introduction and distribution of renewable energy and energy efficiency technologies in DPR Korea. As a consequence, the environmental, development and human health related challenges arising from the increasing use of fossil and local biomass fuel in rural DPR Korea are becoming more serious."*

The situation described is actually very complex and still not well understood. Due to a number of reasons, there is a lack of detailed background knowledge of the local context. By consequence, the assumptions underlying the SRED intervention are not always valid. Moreover, necessary development and implementation conditions are assumed to be in place - but they are not. The context for development projects in DPRK is rather unique, and one of the lessons learned from SRED should be, that few things can be assumed to be in place. Instead, one should aim for making relevant conditions explicit as much as possible and verify if these are actually fulfilled. If not, this is often caused by systemic issues which cannot easily be addressed by a UNDP project. One should then look for a different approach or better focus on targets that can be addressed more effectively.

One of the findings of the SRED stocktaking mission is that the rural population may not be the sole most vulnerable group. Rural people use fuel for heating and cooking, but make little use of advanced energy services and have learned not to rely on them, which reduces vulnerability. Rural communities also have opportunities to grow their own food and are therefore less dependent on the public distribution system than urban families[45]. Notwithstanding, the lack of energy services in the rural areas makes daily living conditions hard and extremely basic. Together with the lack of agricultural inputs and other supplies, low energy inputs also greatly reduce productivity, opportunities to add value by food processing, and impede efficient transport to the markets.

As correctly stated, many environmental issues exist in DPRK. One indicator reflecting the burden on the environment and natural resources is the energy intensity per unit GDP, which is among the highest in the world. The country has large fossil coal reserves, but without adequate distribution structures in place people recur to firewood as a substitute. The country suffers from deforestation and related adverse phenomena such as soil erosion, flooding, and the loss of water resources for hydropower generation and irrigation. Compared to most other countries, DPRK puts a larger stress on its environment and claims more of its natural resources than justified by its economic output.

Until the 1980s, the economy of DPRK generated substantial industrial output and living standards were better. It is not clear to what extent people in remote areas shared in this relative wealth. After 1990 – and accelerated by the disappearance of most socialist systems worldwide- the country's productive assets could no longer be maintained and modernized. The system became not only environmentally unsustainable, but also economically. Capital-intensive assets had to be abandoned due to a lack of spare parts or fuel. People returned to manual or animal power for traction and land labour; to bicycles or handcarts for transport; and to local biomass instead of modern cooking fuels that can no be longer mined or delivered. De-capitalization implies the return of less productive

[44] From Terms of Reference for the assignment (see Annex A).

[45] Although this may not always be the case.

methods and technologies, involving an even larger demand for direct natural resources (land, firewood, water) and people's time.

It this context it is doubtful whether the supply alone of renewable energy (RE) and energy efficiency (EE) technology to rural communities can achieve long-term impact. The SRED programme is focused on demonstrating both simple technologies (such as thermal isolation with locally-made foam cement bricks) and more advanced ones (including prefabricated double-glass windows). It also demonstrates energy generation technologies for providing heat (solar water heaters) or electricity (small hydro power). The more advanced technologies are capital-intensive and cannot be produced locally. Mass-products, such as heat (vacuum) tubes are produced in such large quantities for the world markets that national-scale production will not easily become competitive. Moreover, DPRK's industrial basis exhibits a number of weaknesses[46] to become an efficient supplier of technology-intensive solutions, even for the national market.

During the preparation phase of SRED[47] (2005), UNDP's Regional Bureau for Asia and the Pacific (RBAP) recommended that the energy problem in rural DPRK be framed as a development problem. The Bureau also suggested not to depart from the technology supply side, but from an understanding of local energy needs[48]. However, what would be the rural development problem addressed by providing local energy solutions? The experiences with SRED so far point into the direction of basic needs relief rather than strengthening of a development process. The most effective energy technologies provided under SRED are linked to heat supply for cooking and space heating, which are directly supportive for improving human health. The implementation of energy technologies for productive processes[49] turns out to be very tedious, with project costs rapidly exceeding the capabilities of the SRED programme. There are no indications that such capital-intensive solutions will be sustainable. UNDP nor the national partners have the execution capacity and managerial skills to implement a larger-scale programme[50].

As a generalized appraisal, the Consultant questions whether the rural development problem is actually located at "grass roots" level. People actually can draw on substantial skills and knowledge[51] (human capital), strong social structures are in place (government, family, community), and access to farmland and water is secured. However, the available natural resources are depleted (and need repair) while the climate is a serious limiting factor to the agricultural cycle and productivity. The cold winter climate also asks for physical measures to protect human's health and make life bearable. Technological development, including infrastructure, is the way to provide solutions. If people are not able to create the required capital locally, this must be supplied from a higher level. If this does not happen, people tend to move away. If this not possible, they subsist under precarious conditions.

It is acknowledged by all that living conditions in rural DPRK are far below acceptable standards. A quick solution is to provide direct assistance (needs relief financed by international donor organizations). A slower but more sustainable option is to inject capital inputs to local people to make them productive and generate sufficient income to meet their own needs[52]. The mechanisms to provide these external capital inputs are not functioning as they should. This is a development problem that goes beyond the rural level: it is primarily a problem of higher-level structures and the overall country context. Presently nor the international agencies, nor the Government, nor the rural people themselves are able to trigger a development process.

[46] Including the lack of: precision machinery, efficient management structures, investment capital, resource efficiency, difficult access to internal markets as a result of deficient transport infrastructure, and general access to prime materials and energy.

[47] SRED Project Document.

[48] In order to determine the "ideal energy mix".

[49] Including a PV pumping system for a tree nursery and equipment for small-scale electricity generation (gasifier and small hydro).

[50] It should also not be UNDP's role.

[51] Even after a process of collectivization, small-scale agricultural practices and calendars are expectedly influenced by ancestral habits.

[52] History has shown that advanced technologies (for example wind turbines and solar photovoltaic panels) can only be produced by organizations that build on a vast basis of technological capital (such as patents, specialized equipment, standards, production facilities and procedures) and human capital (highly specialized personnel).

As a minimum, this inability of the individual stakeholders would ask for an ongoing dialogue to work towards more functional support structures for the rural population. The SRED Programme fits into such dialogue by demonstrating the benefits and potential of small-scale rural energy solutions. This dialogue should extend to the role of investors (as suppliers of financial capital) and (public or private) entrepreneurs (as agents within sustainable delivery models). Although the financial sector in DPRK is state-controlled, the country has demonstrated capacity to attract foreign resources to develop large-scale infrastructure[53]. It would be a great step forward to expand this type of investment to create nuclei for development in other areas in DPRK, thereby creating opportunities for job creation and income generation.

11. Conclusions

1. The implementation of the SRED programme exhibits important deviations from the original strategy and budget. This is mainly due to the impact of changes in the project context (primarily related to international political issues), which have led to: (i) a long suspension of activities; (ii) changes in budget distribution; (iii) the suspension of certain activities[54]; and (iv) the inability to leverage additional financial resources from other agencies and/or financiers. These deviations imply an alteration of the anticipated project strategy away from achieving its ultimate objective (i.e. to prepare DPRK to implement a nation-wide rural energy programme). It is recommendable to make explicit the present objectives that SRED wants to achieve.

2. By consequence, progress of SRED is very much in terms of delivered activities[55]. It is unlikely that the envisaged improvements in development conditions (as pursued by the Outputs 2, 3 and 4) will actually be achieved. As a result, the expected end-of-project situation will not reached[56]. According to the Consultant, this is not only a result of the changes in international context but also due to flaws in the identification and validation of the underlying assumptions for the SRED Programme., The Programme is highly ambitious in its objective, time frames are extremely short, roles of national counterparts are not always clear and their technical and managerial skills would need substantial strengthening. These are valuable lessons learned that were not available in 2005.

3. SRED has made substantial progress in terms of expenditures and outputs since 2011. As of December 2012, about 56% of total resources have been spent. It is anticipated to terminate the Programme by end 2013. This is only feasible if the implementation of the pending renewable energy projects (one hydropower plant, one pig farm digester, one rice husk gasifier) evolves without delay[57]. Three more digesters are programmed that are to be produced in DPRK. This involves a process of technology transfer (which has already started) and the availability of production facilities. Based on earlier experiences with the SWEDPRA project, the Consultant is not optimistic that these three systems can be produced and installed in the course of 2013.

4. The country situation provides a strong rationale for UNDP to address the energy situation in the rural areas in DPRK and contribute to the Millennium Development Goals (MDGs). The choice for the Cooperative Farms (COFs) as an exclusive target group seems not fully justified by human development or vulnerability criteria since other groups are equally vulnerable. From a practical point of view, the COFs provide a good starting point to implement renewable energy and energy efficiency technologies and extract valuable lessons. The COFs operate as more or less independent socioeconomic units, which facilitates assessing the baseline situation and achieved impacts. On the

[53] Such as: development of new railways (with China), new sea ports (with Russia) and a mobile telecom network (with Egypt).
[54] Specifically policy development, capacity building, and support for grid-connected energy technologies.
[55] Including equipment, reports and study tours.
[56] The expected end-of-project situation is that after SRED completion, DPRK will be ready to implement a national rural energy development programme.
[57] Considering that field work is largely restricted to the period March-October due to the harsh winter conditions in DPRK.

other hand, the focus on COFs may imply that potential synergies at a higher level[58] are not recognized or exploited.

5. Technology demonstration and barrier removal activities are more difficult than anticipated. The linear approach[59] proposed by SRED is subject to external factors and risks that may not have been acknowledged as such at design stage. In practice, the project rather follows a learning-by-doing approach. In many occasions, the PM recalls earlier experiences to expedite subsequent demonstration pilots. The Programme's tight time schedule is not well matched to this more practical approach. By consequence, project implementation is continually perceived as "delayed", while a more positive perception could be that many useful lessons are being learnt within a short time period (since 2011).

6. The activities proposed in the Strategic Results Framework are not always appropriate and/or sufficient[60]. Study tours, curriculum building and international workshops are not effective to increase technical and management skills at farm level (and are targeted at higher-level persons). The stocktaking mission could observe the need for improved technical and managerial competence for implementing the demonstration pilots. Unfortunately, the context in DPRK offers little opportunities for nationals to acquire hands-on experience.

7. The SRED Programme team does presently not have a comprehensive understanding of the social, geographic, and economic organization of the rural areas in DPRK. It is suggested to strengthen in-house knowledge on these aspects, as it will contribute to justify the choice for the COF as an entry point made for SRED. Representatives from the national government (NCC) and international agencies (WFP) indicate that the cooperative farms are not the most vulnerable groups in the country. NCC would like to see a broader approach altogether.

8. The technology pilots are valuable elements of a learning process for UNDP and its Government partners. It is important to distinguish between energy products[61] and renewable energy projects[62]. The challenge regarding products is mostly related to product development and testing to ensure performance, durability, ease of installation and maintenance; and to efficient mechanisms to reach the end-user. Systematic testing is needed to certify that proposed technical solutions are reliable, effective, and safe.

9. Projects require capital investment (equipment), skilled human resources, proper planning, management and supervision. Project implementation processes are tedious, with UNDP being closely involved with the supervision, logistics and operational management. The used contract modalities are basically focused on procurement of equipment and do not fully specify the roles of the actors involved in project implementation. National partners and local people have little experience with renewable energy projects and lack the managerial and technical skills to implement them. Up-scaling will not be possible if project implementation is not successfully transferred to a national entity with substantial executing capacity.

10. The energy projects requested by the Cooperative Farms (specifically the capital-intensive small hydro power plants) are not always justified from an economic perspective, or are not the least-cost solution. As observed during the mission, end-users are eager to see electricity service established or restored, which is understandable. Electricity usage in the rural areas however is very inefficient from a chain perspective as a result of obsolete distribution lines, inefficient appliances and ineffective processes. End-users and intermediaries must learn to become not only energy- but also resource-efficient. It is recommended to apply appropriate analytical tools (such as life-cycle analysis) to energy solutions, once initial experiences have been gained with the demonstration pilots. The national counterparts must be trained to apply these concepts and tools to specific situations.

[58] Probably at county level.

[59] With a "linear approach" it is meant, that project outputs build one upon each other.

[60] Specifically under the intended barrier removal outputs 3 (capacity development) and 4 (policies and mechanisms).

[61] As energy products can be considered: improved coal stoves, efficient lighting, and energy efficient building materials – windows, doors, thermal isolation elements.

[62] Such as bio-digesters and small hydro power plants.

11. SRED is paying little attention to the design of sustainable delivery models for energy solutions in the rural areas. However, energy products produced in DPRK (including efficient coal and biomass stoves, and thermal isolation blocks) are presently sold to UNDP[63]. One would expect these to be marketed to end-users instead (which seem to have some purchasing capacity). The signal presently received by the national counterparts is that sales are guaranteed at a high price, which consolidates a comfortable niche market. There is no stimulus to reduce product costs and optimize transport logistics, and to supply the product in large volumes (at a reduced margin per product). This situation is not in the interest of the beneficiaries targeted by SRED and does not generate any leverage on the resources provided by UNDP[64].

12. The lack of appropriate delivery mechanisms is linked to institutional and policy barriers. SCST has the mandate to deliver technology to society but may lack the necessary human resources, or may not have a vision on how to collaborate with lower-level authorities (provinces, counties, farms). UNDP is still in the process of understanding the role of national actors[65], which limits its possibilities to identify key partners and processes for promoting effective delivery mechanisms and supportive policy measures. Hopefully, on-going work with NCC and the national partners can strengthen this knowledge base. A specific policy barrier may be, that energy products for the rural areas (except coal) are not mainstreamed in the national planning system. A systemic barrier for most national partners is likely the lack of familiarity with modern logistics and supply services as a paradigm to follow.

13. The Consultant holds to the opinion that SRED must do a large effort to collect and systemize lessons learned from the present demonstration pilots and actually produce guidelines, manuals and best practices. This work should be done with great detail and include an assessment of the maturity of the various energy solutions demonstrated under SRED. To enable these activities, the Project horizon should be extended beyond December 2013. A differentiated approach can be followed, including on-going support of promising (but not yet mature) technologies (component 2) if sufficient institutional capacity is available.

12. Lessons learned

1. The limited background information and knowledge available make it more difficult to validate assumptions and propose an adequate project strategy. Moreover, the project context can change quickly due to international issues, and changes in mandates and staffing of national counterparts. UNDP is still in the process of understanding the role of national actors, which limits its possibilities to identify key partners and processes. This situation asks for a robust project design.

2. Project activities need substantially more time than anticipated. The renewable energy projects take more time than expected due to external conditions (among others: the long, idle winter period) and inadequate local managerial skills. Also, product development (including the design and production of efficient stoves) is underestimated. Even under favourable conditions SRED's objectives and timeline would be very ambitious.

3. The communication of the Project with the national partners, as well as the coordination between them, is inadequate and greatly affects overall effectiveness. While the State Academy of Science (SAOS) should develop technological know-how, the State Commission for Science and Technology

[63] By the Institute of Thermal Engineering (ITE), which is linked to SAOS.

[64] Instead of buying products (for example, efficient coal stoves) directly at cost price (0% leverage), UNDP could opt for a modality in which the supplier is financially rewarded for meeting an agreed sales target. This could be a 10-30% payback of the total sales volume; which would allow the supplier to offer a discount to the end-users. Alternatively, one may think of UNDP buying an extra volume (worth 10-30% of the target) for distribution among the most vulnerable groups. In both cases, there would be a leverage of 3 to 10 times the original UNDP funds. Under this mechanism, the supplier must move to reach the end-user and not UNDP.

[65] The lack of a detailed understanding of supply chains in DPRK was also observed under SWEDPRA. Not only UNDP has limited knowledge in this respect, but also the project partners (SAOS and SCST) seem not to know in detail how production and supply are organized (or were not able to communicate their knowledge).

(SCST) is in charge of transforming this technology into useful products and processes, and of delivering them to society. However, the roles between SAOS and SCST are not clearly defined (or understood) and one may question whether both entities are actually prepared to deliver technology to end-users. Coordination issues inevitably extend to the people from the cooperative farms and the equipment suppliers.

4. SRED pays little attention to the design of delivery models for energy solutions in the rural areas. This situation is not in the interest of the beneficiaries targeted by SRED and does not generate any leverage on the resources provided by UNDP. This does not provide a paradigm for sustainability.[66]

5. The energy projects requested by the Cooperative Farms (specifically the capital-intensive small hydro power plants) are not always justified from an economic perspective, or are not the least-cost solution. It is recommended to apply appropriate analytical tools (such as life-cycle analysis) to energy solutions, once initial experiences have been gained with the demonstration pilots.

6. The Programme would seek external funding from the international donor community and/or financing mechanisms through the SRED Resource Mobilization Strategy. This strategy has not been successful and synergies for cooperation with other agencies did not develop. The international context for DPRK is not favourable for attracting external funding.

7. National partners and local people have little experience with renewable energy projects and lack the managerial and technical skills to implement them. Up-scaling will not be possible if project implementation is not successfully transferred to a national entity with substantial executing capacity.

8. The political context directly affects project implementation and execution. As a result, the policy-related activities were suspended. High-level considerations also directly intervene with the project budget, thereby altering the overall project strategy and limiting direct investment in equipment. A negative side-effect is that false expectations are created among rural beneficiaries, which are not met.

[66] It must be noted that the current delivery models are not supportive to the original objective of SRED (to create the conditions for enabling large scale deployment of rural energy projects in DPRK). This objective is out of reach however. The present energy pilots hopefully provide more insight about which technologies have upscaling potential in DPRK.

ANNEX A Terms of Reference

UNITED NATIONS DEVELOPMENT PROGRAMME
TERMS OF REFERENCE

I. POSITION INFORMATION	
Position Name:	International Consultant for Stocktaking of Sustainable Renewable Energy Development Programme (SRED).
Project Name:	Sustainable Renewable Energy Development Programme (SRED).
Duration:	Consultancy work covers period from 22 January until 15 February 2013 including one two-week mission to Pyongyang and 4 project sites from 25 January until 8 February 2013.

II. BACKGROUND INFORMATION/OBJECTIVES

The DPR Korea has a population of approximately 25 million, out of which 65% live in rural areas. The rural population is the most vulnerable group in terms of access to food security and energy services. The limited endowment of natural resources suitable for agriculture makes it critical for many in the rural areas to find alternative employment and income-earning opportunities. At the same time, the prevailing lack of reliable energy supply and non-use of energy efficiency measures are some of the main barriers to the creation of employment opportunities outside farming. Alternative energies could become a solution for greenhouse gas emissions, land degradation, erosion and the deterioration of the natural ecosystems, and attendant increases in the risk of natural disasters.

A number of barriers are currently hampering widespread and sustainable introduction and distribution of renewable energy and energy efficiency technologies in DPR Korea. As a consequence, the environmental, development and human health related challenges arising from the increasing use of fossil and local biomass fuel in rural DPR Korea are becoming more serious.

To respond to the above challenges UNDP is implementing SRED (Sustainable Rural Energy Project) and SWEDPRA (Small Wind Energy Development and Promotion in Rural Areas Project) projects in DPRK since 2006. Both projects have re-started in 2010 after a prolonged period (3 years) of suspension. It is expected that both these projects will be closed by end of April 2013. UNDP DPRK is expecting to seek a No-Cost Extension for SRED and is proposing an independent stocktaking/interim assessment. UNDP DPRK therefore seeks the services of a consultant for an assignment comprising of a mission of about 14 working days and 1 week home-based for the following:

- Quick assessment/stock taking of SRED project;
- Brief review of project activities;
- Lessons learned from project implementation;
- Recommendation on removing shortcomings and future interventions by UNDP in SRED.

The above information prepared by International Consultant will be shared with UNDP Asia Pacific Regional Center (APRC) for review and validation of findings and recommendations on the way

forward.

III. FUNCTIONS

Under the overall guidance of UNDP DRR in DPR Korea and in close consultation with the SRED/SWEDPRA Project Manager, M&E Advisor and other relevant programme colleagues in the CO, the International Consultant will undertake internal SRED stocktaking, discuss current situation, consistency of project logic with current realities, relevance of and prospects for achievement of project outputs within the limited time and resources and recommend outputs more attuned to current realties, government priorities and UN policies, programming and operational guidelines.

More specifically, the tasks of International Consultant during his mission will include:

- Quick internal stocktaking/assessment of SRED project logic, country context, outputs against resources and time frame, implementation arrangements, country/sector context, procurement, special operations environment.
- Consultation with UNDP Senior Management, APRC Regional Technical Specialist and programme staff and key stakeholders on need for and technical inputs to a) ToR for independent SRED programme evaluation of the project and b) ToRs for local and international consultants for new project formulation.
- Review the "Support to Diversification of Energy Resources and Energy Saving in DPR Korea" concept paper supplied by the government.
- Consistent with policy, programme and operational environment, provide suggestions on possible new UNDP intervention/project ideas in Rural Energy Development area (Renewable Energy and Energy Efficiency), in conjunction of concept notes provided by the Government.
- Explore and suggest opportunities for funding and partnerships.

Prior to engagement and visiting the SRED/SWEDPRA Project Office, International Consultant shall receive all the relevant documents including at least:

- Project Document – two versions
- "Support to Diversification of Energy Resources and Energy Saving in DPR Korea" concept paper
- Inception Workshop Report
- Annual Work and Financial Plans
- Annual Project Report/Project Implementation Review (API/PIR) for 2011, and 2012;
- Quarterly Reports
- Minutes of Project Technical Committee/Project Steering Committee meetings
- Back-to-Office Reports of UNDP staff (if any)
- Study reports/Conference proceedings/government guidelines, etc.

To provide more details, as may be needed, the following will be made available for access by the International Consultant:

Terms of Reference for past consultants' assignments and summary of the results;

Past evaluation, audit reports (if any).

The International consultant should at least interview the following people, but not limited to:

- UNDP Deputy Resident Representative;
- UNDP Programme Analyst on Energy and Environment;
- Senior Programme Advisor-M&E
- Regional Technical Specialist (possibly use Skype interview)
- National Project Director (NPD)
- National Training Coordinator (NTC)

- Project Manager (PM)
- Project Administrative Assistant
- UNDP Financial Officer
- UNDP Procurement Officer
- Project Steering Committee Members
- Relevant project stakeholders, and personnel, but not limited to:
- National Coordination Committee (NCC)
- State Academy of Science (SAOS)
- State Commission of Science and Technology (SCST)
- Non-Conventional Energy Development Centre (NCEDC)
- APRC Regional Technical Specialist (possibly use Skype interview)
- Research institutions and Experts in the country, where applicable
- Other relevant personnel at UNDP Country Office in DPRK.

IV. DELIVERABLES

- ✓ Draft stocktaking/assessment report on SRED;
- ✓ Draft concept note with set of recommendations for possible UNDP intervention in Rural Energy Development consistent with current country, programme, policy and operational context.
- ✓ Set of recommendations for **options** on SRED extension and/or substantive revision; focus, scope and approach and, implementation arrangements (including the mix of government partners, their ongoing sector strategies and priorities consistent with UNDP outlook, their expectations and what they will bring to the table, their mandates and roles in any would-be project);
- ✓ ToR for independent SRED programmes evaluation of the project.
- ✓ ToRs for local and international consultants for possible new project formulation.

ANNEX B Review of implementation status demonstration pilots

The next is based on Annual Report 2012 (and on Q3 report 2012)

OUTPUT 2: **IMPLEMENTATION OF RURAL ENERGY DEMONSTRATION PROJECTS.**				
	TARGET 2.1 for the Year 2 (2012): - Demonstration projects consisting of different mix of technologies implemented in the four target counties by the end of Project.			
##	Description of Activities	Comments	Status (Q3 - 2012)	Identified issues (stocktaking mission Jan-February 2013
1a	RFQ-2012-20. July 12, 2012 Solar Hot Water System (SHWs) for 4 CoFs	Delivered on 26 November to Nampo and local company has distributed equipment in all 4 sites within one week until 30 November. International experts from Top Sources were not able to come for installation from 4 to 17 December 2012 as planned. Monitoring of 4 sites showed that local partners were not able to prepare frames with platforms for installation of SHW systems. Small tools and electricity is not available locally and need time for better planning it before arrival of the international experts from Top Sources. It was recognized during custom check that some equipment has been damaged. Based on report from NPD by Monday, 3 December UNDP Procurement Team agreed with Top Sources to replace the damaged items and provide in addition tools for installation. We deliver 85% of PO 1278 this year (lines 1-4).The remaining 15% for installation and training will be the only portion that should be budgeted for next year due to delay with visa issuing, damaged tubes, absence of small tools, welding and electricity as well as request do not work from 17 December until middle of January 2013. Taking into account all above as well as cold weather until end of	• Procurement team will contact 8 companies. • Received response on SHWs (passive) from 5 companies and international and national experts will evaluate 5 offers until Sep 1. • International Expert finalizes evaluation by 13 September.	local technical skills local planning and coordination capacity lack of energy supply to perform works damage during international transport delay due to visa issuing delay due to winter weather need to adjust to agricultural calendar -> Was this not foreseen by SRED? What were the underlying assumptions (if any)? How can this be dealt

		February and calendar of cooperative farms' there is the suggestion by local experts (also NPD has confirmed it by phone) to postpone the visit of Top Sources experts for installation work in DPRK to April. The given time will allow local technical supervisors and cooperative farms to finalize preparatory works; allow receiving all tools and damaged parts and distribute it to respective cooperatives before arrival of the Top Sources experts. The most important to ensure energy supply for welding works and drilling by cooperative farms.		with in the future?
1b	RFQ-2012-17 Construction local materials for Solar Hot Water System (SHWs) for 4 CoFs. PO 1235 with Kumkop	Already delivered to all 4 sites. Inspection done in November in Myongchon, Ryudong and Yaksu and in December in Mopung. In addition 100kg (25 kg per each site) of welding rod for stainless steel has been procured.	• Raised Requisition with No. 380 on June 5. • PO with Kumkop is issued with No.1235 on 17 July. • Delivery of construction materials done by 10 September. • Paek has to do R&I	no issues
1c	RFQ-2012-23 Technical Supervision and Capacity Building Activities for Solar Hot Water System (SHWs) in 4 Pilot CoFs.	NPD was visiting the sites from end November-beginning of December to check preparation work by local people. In December PM has conducted monitoring visits to all 4 CoFs. It was identified that there is lack of coordination between SAOS as selected local institution and the end users. SAOS technical local experts were acting without clear ToR, directions and coordination.	• ToR submitted to Procurement Team on July 11 • Raised Requisition with No. 401 on 23 July • Advertised until 30 July 2012 and received three Quotations from local institutions and winner is Institute Thermal Engineering. • UNDP evaluated 3 quotations and reviewed by CAP meeting • Contract signed in the end of September	Lack of coordination between SAOS and end-users SAOS experts without clear TOR -> Has SAOS proposed a detailed working methodology? How is local presence arranged for? Have SAOS experts experience to work this way?
2a	ITB-2012-06. June 21, 2012 100 kW Rice Husk Gasification Power Plant in Yaksu	There was disagreement on technical specification between local experts and international experts so it took some time on questions and answers. It was solved and evaluation report was done on December 4. Case submitted to RACP by December 7. If approved, PO will be created before December 21 in the amount of 386,000 USD. Delivery would occur after 20 weeks (May 2013).	• Advertised until Aug 8 and received 5 offers and now evaluating technical part by international and national until September 1. • Local technical experts provided comments by 9 October.	no issues

2b	Construction local materials for 100 kW Rice Husk Gasification Power Plant in Yaksu.	Process was made for procuring the materials in 2012. However, CAP requested to wait for next year in order to avoid damaging materials due to unsuitable storage (materials are expected to be used by April 2013). Procurement Unit will ask the selected supplier if they can accept a PO for delivery in March-April 2013, in order to avoid long-time storage and secure a lower price.	• Depends on final information on time for delivery Rice Husk Gasification Power Plant to Yaksu Cooperative Farm.	Delay in procurement phase (transport of equipment) -> Likely a result of the weak logistic links between exterior and DPRK (systemic barrier)
2c	RFQ-2012-23 Technical Supervision and Capacity Building Activities for 100 kW Rice Husk Gasification Power Plant in Yaksu.	Contract signed with Institute of Thermal Engineering. All works required by May 2013. It is important to take into account lessons learned identified during technical supervision of local works for SHW systems and Energy Efficiency in Buildings.	• ToR submitted to Procurement Team on July 11 • Raised Requisition with No. 400 on July 23 • Advertised and received three quotations from local. • Evaluated 3 quotations – winner is Institute of Thermal Engineering, SAOS • UNDP evaluated 3 quotations and reviewed by CAP meeting. • Contract signed in the end of September.	What are these lesson?
3a	ITB-2012-04. March 12, 2012 600 kW Myongchon Hydropower Plant PO 1236 with Hangzhou Nannan	Price is 416,800 USD in two installments: 369,800USD in 24 weeks (6 months) and 47,000 in 10 weeks (2.5 months). The second installment will be paid in 2013 only after completion all work. Equipment will be ready on 10th Dec, and sent to the port to be shipped. Items of equipment will arrive to Nampo by end of December. Expected to complete delivery in March 2013.	• Handed over 3 offers to international and local experts on May 9. • Local experts will finish evaluation report until June 16. But delay until June 19 afternoon due to late response from bidders. • International experts provided evaluation report by June 16. • After receiving on 19 June evaluation from local/international expert we conducted UNDP technical evaluation meeting on 3 July. Hangzhou Nannan Hydropower Development Co. LTD is a winner.	Stocktaking mission has seen this equipment at the site. Chinese mission was present (30 January 2013). In spite of requested guidance, locals have no idea how to dismantle old system. In fact, this requires careful analysis of the whole process (lake to be emptied, or not; old plant provides electric power). The Chinese supplier has to define all these issues. -> This situation suggests that the local people (CoF plus DPRK experts) lack the

			• Contract signed by 25 July. It is only possibility to negotiate with the company timing for manufacturing after approval of PO by 11 July. • NPD has requested to ask the company provide in advance guidance for preparing materials, dismantle old equipment and preparing place for installation of the new hydropower turbine. • Regional ACO on the week of 16 July. • Regional Bureau approved on 21 July.	experience to grasp the full problem and propose useful solutions. Training (courses) will probably not be effective here, as professional experience must be learned by doing. DPRK people may be taught to perform operational activities however. -> For overall management however, foreign experts seem needed for the near future. Perhaps, more experienced project leaders exist in other organizations in DPRK. Delivery in March 2013 is unrealistic due to weather conditions and complex project execution. -> SRED is very optimistic in terms of throughput time for SHP projects in DPRK. This should be a lesson for the future. -> UNDP contract modality may be a complicating factor, as it is still much tuned to the delivery of equipment at lowest cost; the need to solve project organization problems is not well accounted for. After delivery, UNDP "pays a price" in terms of delay and need to put own people. Moreover, professional expertise available within supplier company is not fully tapped. Suggestion to

				review contract modalities and find ways for further improvement. General impression is yet that this output is successfully moving forward towards completion.
3b	RFQ-2012-29 Construction local materials for Demonstration for 600 kW Hydro Power Plant in Myongchon Cooperative Farm.	Winter conditions must be considered in this and other cases as cold climate can impact on construction materials delivery. All construction materials already delivered to Myongchon Cooperative Farm and monitored by UNDP in November and December. Need to add 1,500 kg of welding rob according to BTOR by HCR. Procurement of welding rod completed.	• Raised Requisition with No. 391 on June 28 • Advertising on 24 September and evaluation will be done by end of the first week of October. • PO by 19 October. • Delivery to CoF in November	Winter conditions affect construction activities and materials delivery.
3c	RFQ-2012-24 Technical Supervision and Capacity Building Activities for Demonstration for 600 kW Hydro Power Plant in Myongchon Cooperative Farm.	Contract is signed. Need to check workplan of the local contractor. It is important to take in account lessons learned identified during technical supervision of local works for biogas, SHW systems and Energy Efficiency in Buildings.	• ToR submitted to Procurement Team on July 11 • Raised Requisition with No. 398 on July 19 • Advertised until Aug 15 • PO by 24 September.	See comments under 3a. Would it be possible to specify the precise roles and responsibilities of the three involved partners (supplier, local contractor, SRED PM). Any role for the CoF? -> Who has the ultimate responsibility? -> Is it possible to devise a project execution arrangement without active involvement of SRED/UNDP?
4a	ITB-2012-05. March 12, 2012 biogas system for a pig farm in Mopung Contracted (CPS-2012-02) with Fluid	Equipment will arrive to Nampo in December. 2 International experts made the first mission to prepare place for installation from 20-24 November. All other installation work due to request of national partners was moved to the beginning of 2013. Commissioning of biogas equipment only possible if air temperature will not be below zero. It	• Evaluation meeting by UNDP CO on May 25 has s**elected "Fluid" Public Foundation, Kyrgyz** • Fluid has *offered USD 81,015 for transportation to Hasan, Russia and USD 101,015 to*	Stocktaking mission has seen this equipment at the site. (4 February 2013). Winter conditions delay project execution.

		is important to urge construction of green house. Monitoring visit planned on 20-21 January 2013. Contract amended to conclude installation by April 2013.	*Nampo* • Contract (CPS-2012-02) - valued USD 66,015 is signed and dead line for manufacturing is 24 of August. Equipment costs – USD 25,115, technical supervision – USD 11,900 and final installation USD 29,000. • PM will visit and inspect the manufacturing process from 20-24 of August. This is important as the rest 3 systems will be produced in DPRK after installation of this system and training of local staffs. • Procurement team will work in parallel to find a suitable transportation solution for the items from the manufacturer site till the installation site. • The first amount due to the contract - advance 20% of USD 13,203.00 has been transferred to Public Foundation "Fluid" based on the contract #CPS-2012-02 through Ref ID 1770002981 on 13 July. • Second amount also paid.	Transport costs from Kyrgyz to Nampo are much higher than equipment costs (roughly 75%-25%) Local transport is arranged by SRED procurement team. This highlights the low level of development of logistics within DPRK. How should this be arranged for under a large-scale programme? It is the intention to produce further systems locally. -> Have national industries to replicate the system been identified and assessed? When? Contracts are often amended. This means additional workload for SRED and UNDP staff. Can this be avoided?
4b	RFQ-2012-28 Construction local materials for biogas system and green house for a pig farm in Mopung.	Already delivered to Mopung. Inspection done from 21-13 November.	• Raised Requisition with No. 392 on June 28 • Advertisement by 29 August. • Delivery in the end of September or beginning of October.	no issues
4c	RFQ-2012-23 Technical Supervision and Capacity Building	Contract signed in the end of September and work is in progress. Monitoring visit in November 20-24 has showed that local technical	• ToR submitted to Procurement Team on July 11 • Raised Requisition with No.	Local technical expert is not delivering as expected. This suggests that the selection

	Activities for biogas system for a pig farm in Mopung.	expert is not well informed about the biogas and greenhouse construction plan and documentation. PM and NPD took immediate action to follow up on improving the situation. It is important to take in account lessons learned identified during technical supervision of local works for SHW systems and Energy Efficiency in Buildings.	401 on July 23. • Advertised and received three quotations from local. • Evaluated 3 quotations – winner is Institute of Thermal Engineering, SAOS • UNDP evaluated and reviewed by CAP meeting • Contract signed in the end of September.	process is not effective. PM and NPD are not technically responsible for this job (there should be no need to supervise a supervisor.) -> Is this issue related to qualifications of the individual assigned by SAOS, to the capacities of the offerrer, or to coordination?
4d	Follow up work with 3 other biogas systems	ToR submitted to Procurement Team in December 2012. Requisition made by PA on December 2012.Ms. Hong's comment: This issue should be followed by careful monitoring after 6 months of operation and compare with work of other successful biogas projects in DPRK. It has to be properly reflected in AWP for 2013. Local participants for training should very carefully discuss and selected in advance.	• ToR submitted to Procurement Team in December 2012. • Requisition made by PA on December 2012.	no issues
5a	RFQ-2012-02. March 12, 2012 RFQ-2012-16. May 14, 2012 50 m3/day solar water pumping system in Mopung.	50 m3 water tank, solar batteries and pumping equipment are installed and training for 15 local people was conducted by international expert from HeliosWatt. For winter time period from December till end of February the pump will be dismantled and saved in warm place. Monitoring of work can be done only after 3 months work from March until May-June.	• Local experts have submitted report on May 31 • International experts submitted draft. Cu will send questions relating to SHW systems to offers via procurement unit on June 11 and will finish final report within 4 days after received response from offers. Procurement team asked bidders to provide answer no later than June 15. Among 6 bidders only responded so far. • As soon as we will get 3 remained responses, we will deliver responses by bidders to Mr. Cu and he provided final report on June. • Then Procurement Unit arranged an evaluation	Stocktaking mission has seen this equipment installed the site. (4 February 2013). apparently no issues, project works well and price seems very acceptable Does this system have solar batteries?

			meeting in June 19 and COP finally selected a winner. • Contracted (PO 1228 with HeliosWatt) with value of USD 18,100 has been signed. • Departed from Italy on Aug 15 and it will arrive in Dalian on Sep 23, expected 5-10days for handling goods in Dalian port and it take 1day from Dalian to Nampo port. But China will celebrate national holiday from 1-8 of Oct. • Arrival to Nampo on 10 October. • Delivery to CoF by 12 October.	
5b	RFQ-2012-19 Construction local materials for 50 m3/day solar water pumping system in Mopung.	Delivered to the field and used for the purpose. Monitoring done in November.	• Bidding for local construction materials by 14 July. • Raised Requisition with No. 393 on July 5 • Evaluated by UNDP on Aug 3. • CAP meeting on Aug 8 • Issued PO on Aug 21 • Delivered to Mopung until end of September. • Transfer to Government by 12 October.	no issues
5c	RFQ-2012-22 Technical Supervision and Capacity Building Activities for 50 m3/day solar water pumping system in Mopung.	Contract signed by end of September and work is completed. Expecting report by local expert.	• ToR submitted to Procurement Team • Raised Requisition with No. 399 on July 23 • Draft RFQ-2012-22-DPRK modified on 19 July • Advertised and received three quotations from local and winner is Pyongyang Power Design Center. • Evaluated by UNDP on Aug 3.	no issues

			• CAP meeting on August. • Contract signed by end of September.	
6	RFQ-2012-03. March 13, 2012 Coal-Fired Energy Efficient Cooking Stoves to Yaksu and Ryudong PO 1199 with MEPI	160 pcs of Coal Stoves made by Pyongyang Power Design Center, MEPI – 100pcs for Yaksu and 60 pcs for Ryudong. Stoves distribute in the cooperative farms based on criteria of social and economic vulnerability for a selection of receiving families: only one spouse exists or working, amount of kids, women and old people, income. The use of stoves monitored in December and the received monitoring information can be used for the decision on follow up actions. Expecting distribution lists in the respective cooperative farms from NPD and heads of cooperative farms.	• **Pyongyang Power Design Center, MEPI and issued Purchase Order 1199 was selected on May 10** 160 pcs of Coal Stoves – 100pcs for Yaksu and 60 pcs for Ryudong. • Pyongyang Power Design Center, MEPI delivered it on 17 June and SRED is going to combine monitoring visit of distributed equipment and instruction on using of stove in June-July (coordinated with schedule of M&E of SWEDPRA project). • Paek Kyong Chol submitted R & I report by July 5. • Stoves distribute in the cooperative farms based on criteria of social and economic vulnerability for a selection of receiving families: only one spouse exists or working, amount of kids, women and old people, income.	no issues The stoves are reportedly for use in Summer time, so why monitoring in December? What factors cause variation in income? What does economic vulnerability mean within the CoF socio-economic unit?
7	RFQ-2012-04. March 13, 2012 Biomass-Fired Energy Efficient Cooking Stoves in Myongchon and Mopung PO 1200 with SAOS	40 pcs of Biomass Stoves made by Institute of Thermal Engineering , SAOS – 20pcs for Myongchon and Mopung respectively. Stoves distributed in the cooperative farms based on criteria of social and economic vulnerability for a selection of receiving families: only one spouse exists or working, amount of kids, women and old people, income. The use of stoves monitored in December and the received monitoring information can be used for the decision on follow up actions.	• **Institute of Thermal Engineering , SAOS and issued Purchase Order 1200 was selected on May 15** • 40 pcs of Biomass Stoves – 20pcs for Myongchon and Mopung respectively. • Institute of Thermal Engineering, SAOS delivered it on 24 June and SRED is going to combine monitoring visit of distributed equipment	no issues -> Is there a cost breakdown to produce and deliver the stoves to the end-users? It seems not logical to have the stoves procured by UNDP unless done as direct poverty alleviation.

		Expecting distribution lists in the respective cooperative farms from NPD and heads of cooperative farms.	and instruction on using of stove in June-July (coordinated with schedule of M&E of SWEDPRA project). • Paek Kyong Chol submitted R & I report by July 5. Stoves distributed in the cooperative farms based on criteria of social and economic vulnerability for a selection of receiving families: only one spouse exists or working, amount of kids, women and old people, income.	-> Is it possible to sell the stoves directly to the end-users or to the CoF? -> Is there any mechanism to stimulate cost reductions?
8	RFQ-2012-07 (April 12, 2012) Feasibility Study for Ryudong Small Hydropower by international expert	This work might be continued depending on example of successful follow up actions by the Government partners on Feasibility Study of Mopung HPP. Possibly in 2013.	• Raised Requisition with No. 355 on Apr 23. • During PM absence on RR Mr. Hyong Chol Ri has evaluated two offers on May 23 but none of two meet the requirements. • All offers that we received are not suitable and not proper vendors for our technical requirements. • Total budget for this RFQ is 30 thousand dollar, but all offered price are more than 70 thousand dollar. Exceeded budget. • NTC revised ToR and evaluation criteria and the task is given to 1 consultant rather that to a company. • ToR reviewed by PM and provided to Procurement.	This site was visited by the stock-taking mission (6 February 2013). The available budget is very low for a feasibility study by an international expert; it may be a prefeasibility study. Normally, a full feasibility study is done after a decision by all partners to develop a project. The feasibility study may discover unexpected constraints and should propose mitigation measures. A prefeasibility study can be done by an individual and, as a minimum, identify potential "red flags" and constraints, as well as economic feasibility. -> The context at Ryudong – Ri suggests that this moment was not yet reached. -> If no full commitment to this

				SHP project can be given, it is recommended not to pursue this activity any longer. A lesson learnt can be, to focus only on sites for which full support (Government and UNDP) can be given.
9	RFQ-2012-11 (April 18, 2012) Feasibility Study of Mopung HPP by international expert.	Feasibility Study of Mopung HPP by Full Advantage's international experts is completed. Final report was submitted and commented by the Government. Follow up action plan with specific resources for establishing equipment has to be provided by NPD.	• **Full Advantage was selected** among of 3 bidders • Procurement team submitted to RACP and RACP approved it on June 14. • Contract signed by both parties (CPS-2012-01) on July 2, 2012. • Receipt in Atlas by PM on 10 July. • First assessment team (3 experts) visited project site - Mopung from 23-28 July 2012. • Full Advantage sent draft technical design report on Aug 12 • National experts sent their comment on report on Aug 27 Second mission is completed from 29 September – 1 October.	This site was visited by the stock-taking mission (6 February 2013). no issues
10	RFQ-2012-08 (April 10, 2012) Assessment of Mopung Hydropower plant by local expert Contracted with CEPDI through INST-2012-03	Activity completed and payment done.	• **Central Electric Power Design Institute, MEPI** was s**elected** and contracted with CEPDI (INST-2012-03); contract period from May 10 to June 22 2012. • Submitted assessment report on June 12. • The report will be used for RFQ-2012-11 (April 18, 2012). Feasibility Study of Mopung HPP by international expert. Payment	Work is first done by a national expert and then reviewed by an international one. It would be more interesting to work together in a team. The present modality is a result of limited interaction between foreign and national experts. SRED This reduces project effectiveness, is less enriching for individual professionals, and leads to longer throughput

			for the completed work issued by 14 July.	times. -> It is recommended to highlight these negative effects to the government counterparts.
11a	RFQ-2012-09 (April 10, 2012) Assessment of Energy Efficiency Measures in 4 sites by local expert Contracted with ITE through INST-2012-04.	1st step of Activity completed by Institute of Thermal Engineering, SAOS and 1st step of payment done. Construction materials provided in September. The 2 step l started at this time. Need to check the work. Visits to Mopung in 20-24 November and Myongchon, Ryudong and Yaksu from 10-13 December have showed that the local technical expert not well prepared for the work and do not have proper understanding and do not follow the agreed design and documentation. Need follow up by NPD. Follow up monitoring will be done in 2013.	• **Institute of Thermal Engineering, SAOS** was selected and contracted with ITE (INST-2012-04); contract period from May 10 2012 to May 10 2013 with 3 steps. The first result by June 22, the second result by end of this year and final report May 10 2013. The first result is important as based on it Solar Hot Water Systems installation will be coordinated. • Submitted 1st assessment report on June 12 • Information on materials will be used for bidding process for purchasing of local construction materials coordinated with materials for SHW systems. • Payment for the first task done by 14 July. • Special attention will be paid to concrete foam for isolation, windows and doors.	local technical expert not well prepared for the work and do not have proper understanding. -> Is the contractor providing value for money? -> How does this relate to, for example, the case of HeliosWatt, delivering a PV system? One would expect the national contractors to work low-cost.
11b	Construction materials for Energy Efficiency Measures in 4 sites by local expert.	All materials provided and stored in all 4 sites.		no issues

OUTPUT 3:RELEVANT OFFICIALS TRAINED & THEIR CAPACITIES ENHANCED THROUGH THE CONDUCT OF STUDY TOURS FOR: (A) POLICY AND TECHNOLOGY ASPECTS OF SUSTAINABLE RURAL ENERGY SYSTEMS; (B) PROJECT DEVELOPMENT, IMPLEMENTATION & INVESTMENTS IN SUSTAINABLE ENERGY SYSTEMS.		
TARGET 3.1 for the Year 2 (2012): **- In-country training on integration of sustainable rural energy in education curricula conducted by end of Project.** **- Participation in 3-5 international training workshops by end of Year 2.**		
	Description of Activities	Comments
12	RFQ-2012-12 (May 9, 2012) International Training on Planning and Management in Germany.	Seven local experts from relevant institutes participated in the training from 11 to 30 November 2012 at Renewables Academy (RENAC) in Berlin, Germany. Done. Follow up action plan from NTC is needed.
13	RFQ-2012-13 (May 9, 2012) Study Tour Germany.	Six local officers and experts from relevant ministries and institutes participated in the study tour from 8 to 17 November 2012 organized by RENAC. Completed. Draft ToR for DPRK participants prepared by NTC and commented by PM on 13 July and shared with NPD. Need for follow up action plan from NTC.
13a	RFQ-2012-27 (Aug 3, 2012) Study Tour in Mongolia.	Six local officers and experts from relevant ministries and institutes participated in the study tour from 28 October to 7 November 2012 organized by Germany ProfEC. Completed. Draft ToR for DPRK participants prepared by NTC and commented by PM on 13 July and shared with NPD. Need for follow up action plan from NTC.
14	RFQ-2012-26 (Aug 2, 2012) International Training on Integration of Sustainable Rural Energy in Education Curricula.	UNDP SM suggested canceling the training. Preferably to invite international consultant rather than sending DPRK experts abroad.

OUTPUT 4:POLICIES AND MECHANISMS PUT IN PLACE TO REMOVE BARRIERS TO IDENTIFICATION AND IMPLEMENTATION OF ENERGY DEMONSTRATION PROJECTS.

TARGET 4.1 for the Year I (2011):

- Barriers, opportunities and constraints related to the development & implementation of demonstration projects identified and measures to overcome them initiated;

- Detailed feasibility studies of different types of technologies (with specific reference to local products and products can be improved to international standards) for rural applications by Month 6;

- Baseline & methodological study, CER calculation, PIN production and investigation of potential international carbon buyers for bundled SHP by Month 10.

According to the AWP the main activities will start late in the beginning of 2013 (see below Annex 1).

TARGET 4.2 for the Year 2 (2012):

- Local design criteria and quality standards for RE & EE technologies established by Month 18;

Testing facilities & quality standard testing procedures for RE & EE technologies established by Month 20;

- Local experts/ facilities for maintenance & repair of RE & EE equipment & devices put in place by end of Project;

- Detailed feasibility study on potential for applications of biofuels (how to reform relevant national policies and regulations; adopt international standards and practices) in the country by Month 22.

According to the AWP the main activities will start late in the beginning of 2013 (see below Annex 1).

OUTPUT 5: LESSONS LEARNT COMPILED:

TARGET 5.1 for the Year 2 (2012):

- Project Development and Implementation Guides for different technologies completed by Month 22;

- Compilation of "good practices" report consisting of Case Studies of implemented projects including integration of financing and CDM aspects completed& printed by Month 20;

- Investment study and financing packages, including carbon financing for sustainable rural energy systems conducted by Month 18;

- Monitoring continuously being done and evaluation conducted at Month 13;

- Project life-cycle analysis and GHG emission impact analysis conducted by Month 23;

Information materials produced and information campaigns regularly conducted for the general public from Month 20;

- Seminars and other awareness-building campaigns for policy makers and national/local decision makers conducted from Month 20.

According to the AWP the main activities will start in the beginning of 2013(see below Annex 1).

OUTPUT 6: A SUCCESSOR RURAL ENERGY PROGRAMME DESIGNED:

TARGET 6.1 for the Year I (2011):

- Integrated energy-economy-environment planning exercises & sustainable energy scenarios using LEAP and adaptation of LEAP in Korean language by Month 10.

According to the AWP the main activities will in the beginning of 2013(see below Annex 1). ToR for new programme design and development was submitted to UNDP Senior Management by end of September.

TARGET 6.2 for the Year 2 (2012):

- Pilot projects evaluated vis-à-vis standards & experiences on "good practices" by Month 22;

IRED initiated and applied to SRED by Month 16;

- Provinces/counties with the most potential for national-scale replication of demonstration projects identified and RE resources and energy demand for provincial and county level mapped out by Month 16;

- Rural energy surveys and energy assessment of selected additional provinces/counties conducted by Month 18;

- Project Document on the National-scale Sustainable Rural Energy Programme prepared by Month 22;

- Policy recommendations, including development of institutional and organizational capacities, for sustainable rural energy development by Month 23;

- Donor consultations conducted by Month 22.

According to the AWP the main activities will start in the beginning of 2013.

ANNEX C Review SRED Strategic Results Framework

The following table represents the Project's SRF. The output definitions are taken from the Annual Progress Report (APR) 2012 for consistency. The indicators, baseline status, outputs and inputs (budget) are as defined in the Project Document. The present status provides the situation as appraised by PM in the APR 2012. The last two columns reflect comments and issues raised by the stock-taking mission.

Intended Outcome as stated in the Country Programme Results and Resource Framework: Strengthened sustainable and efficient use of conventional energy and accessibility of alternative energy sources for local communities and households.							
Outcome indicators as stated in the Country Programme Results and Resource Framework, including baseline and targets: Strengthened sustainable and efficient use of conventional energy and accessibility of alternative energy sources for local communities and households							
Applicable Key Result Area (from 2008-11 Strategic Plan): Focus Area 4 – Environment and Sustainable Development							
Partnership Strategy: - UNEP; UNIDO; UNESCAP; MEPI, SCST, SAOS							
Intended Outputs	**Baseline**	**Output targets**		**Inputs**	**Present status**	**Comments stock-taking review**	
		Year 1	Year 2	(US$)	(APR 2012)	Output issues	Project strategy issues
1. Number of provinces and cooperative farms identified for pilot demonstration of rural energy projects.	Survey of 3 counties completed	1. Compilation of rural energy consumption & supply, socio-economic, environmental data and assessment (for civil and engineering works and equipment specifications).		US$ 45,000	Completed	(Programme development phase.)	
2. Rural energy demonstration projects implemented and running successfully.	(1) Prefeasibility studies conducted; (2) Identification and appraisal in 3 counties completed; (3) Demonstration sites and mix of technologies identified.	1. Feasibility studies (applicability and adaptability of specific technology choices for SRED and potential follow-ups) of each technology application for rural energy services demonstration projects conducted; 2. Optimal energy & technology mix for the	3. Demonstration projects consisting of different mix of technologies implemented in the four target counties by the end of Project.	US$ 1,525,000	Targets 1 and 2 completed. Target 3 under implementation. Refer to Annex B for details	1. It is difficult to appraise this output at an aggregated level, since the proposed RE technologies are different. Many issues come up during execution, which demonstrates that the feasibility studies did not serve the purpose of mitigating	This output has design flaws: - throughput times are not realistic; - many technical and organizational issues affecting were not recognized at design stage and are often technology-specific; - by consequence, the set of assumptions is incomplete

		target counties and farm cooperatives identified and appraised.				implementation risks. 2. If technologies are not proven and implementation paths not fully under control, then one cannot define an "optimum mix".	and/or not validated; - many barriers –often systemic – are in place that are overlooked; - project implementation is much more tedious and capacity-consuming than anticipated.
3. Capacity development needs at different levels identified and appropriate training programmes organized and implemented.	(1) Collaborators in Asia and Europe identified; (2) Collaborating institutions for the training identified; (3) Sustainable rural energy offered in educational institutes but not integrated in the educational curricula; (4) Specific international training workshops not identified.	1. Study tours for relevant officials organized in Asia (China, Philippines and Vietnam); 2. Training and short courses for different technological solutions and aspects of sustainable rural energy organized and conducted within and outside DPRK for relevant participants.	3. In-country training on integration of sustainable rural energy in education curricula; 4. Participation in 3-5 international training workshops; 5. Study tours for relevant officials organized in Asia (China, Philippines) and Europe (Denmark, Germany, and Sweden).	US$ 860,000	Targets 1 and 2 completed. Target 3 under implementation. Refer to Annex B for details.	1. During project implementation, UNDP has decided to give preference to in-country training instead of study tours abroad. In fact, there seems to be no established relation between study tours and project impact; and high-level policy makers are not well reached.	- The budget for this component is very large compared to the resources made available by DPRK counterparts; - Training courses on technology and project management are appropriate; however, national counterparts still do not deliver as expected in the county projects/teams. Local competence is needed here, as UNDP and foreign suppliers have insufficient capacity (and it is not their job). - There is no clear linkage between training of individuals and the roles assumed by DPRK counterpart institutions. Duties and responsibilities should translate into a human resources plan, for which training can be an input. - There is no detailed proposition how to deliver energy services to and within the CoFs. - Why is Ministry of Education not involved in the project?

4. Policies and mechanisms are put in place to address barriers and constraints to implement rural energy projects.	(1) Barriers exist but are not systematically identified and recorded; (2) Local design criteria and quality standards for RE&EE not consistent with international standards; (3) Testing facilities for RE&EE are limited, and quality testing procedures not fully in place; (4) Maintenance & repair of RE & EE equipment and devices are done using outmoded machinery and procedures; (5) prefeasibility studies conducted for some technologies but not all; (6) no current activity on CDM; (7) no significant activities being done in the country.	1. Barriers, opportunities and constraints to the development & implementation of demonstration projects identified and measures to overcome them initiated; 2. Detailed feasibility studies of different types of technologies (with specific reference to local products and products that can be improved to international standards); 3. Baseline & methodological study, CER calculation, PIN production and investigation of potential international carbon buyers for bundled SHP.	4. Local design criteria and quality standards for RE & EE technologies; 5. Testing facilities & quality standard testing procedures for RE & EE technologies; 6. Local experts / facilities for maintenance and repair for RE/EE technologies established; 7. Detailed feasibility study on potential for applications of biofuels (how to reform relevant national policies and regulations; adopt international standards and practices).	US$ 645,000	Activities not yet started.	1. One would expect barriers to be identified and addressed before starting the pilots. 2. Seems repeated. What is the difference with Output 1 and 2? 3. Carbon finance for SHP makes sense, once project implementation becomes a routine job. 4. Local design criteria and quality standards should be proposed prior to defining the pilot projects. How can the project accept the improved coal stoves if there are no quality standards defined? 5. The mission has not seen evidence of a developed infrastructure for testing and maintenance. What is the baseline with respect to testing and quality assurance? 6. This is related to the need for a clear proposition for a business model to deliver energy services.	This component puts in doubt the approach followed by SRED. The SRF is linear and assumes that outputs can be generated subsequently (and according to a tight time schedule). However, this component suggests that SRED pursues a learning-by-doing approach. Given the lack of previous working experience in this field in DPRK, this makes completely sense. It may also prove more effective to identify barriers by trial-and-error, than by contracted studies (external observation). The challenge will be, to systemize the lessons learnt as input for future work. It may prove beneficial to narrow the scope and focus on primary issues to deliver impact for beneficiaries. From this perspective, topics such as CDM are secondary-level can be deferred to skilled financial specialists. It may be a good idea to specify quantitative targets for energy access by rural end-users, in line with progress on MDG's.
5. Compilation and dissemination of lessons learned and "Good Practices".	(1) No lessons learnt compiled.		1. Project development and implementation guides for different technologies completed;	US$ 285,000	Activities not yet started.	5. A life-cycle analysis is not easy to perform given the lack of insight in the productive chains	Most activities under this output (2, 3, 4, 6, 7) do not depend on lessons learnt. It may be worthwhile

			2. Compilation of "good practices" report consisting of case studies of implemented projects, including integration of financing and CDM aspects; 3. Investment study and financing packages, including carbon financing for sustainable rural energy systems; 4. Monitoring continuously being done and evaluation conducted; 5. Project life-cycle analysis and GHG emission impact analysis; 6. Information materials produced and information campaigns regularly conducted for the general public; 7. Seminars and other awareness-building campaigns for policy makers and national/local decision makers conducted.			in DPRK. 6. The defined baseline is not fully correct, because public programmes already exist to promote energy efficiency. It is not clear how well these are tailored to the CoFs. Information campaigns do not have to wait until lessons-learnt are compiled. 7. The policy makers and "national local decision makers" need to be clearly identified and their roles understood, otherwise it is not possible to justify the effectiveness of this output.	including an output "promotion", preferably linked to work on energy policy with the relevant authorities. This could be reflected more adequately adjusting the definition of the output and the indicator, The importance given to life-cycle assessment and GHG impacts is clearly inspired by the time spirit when SRED was designed. While relevant, it is doubtful if time is ready for it. Once efficient project design and implementation procedures are in place (which means that new projects are being implemented rather quickly), then one can submit them to LCA and emission analysis.
6. Formulation and design of sustainable rural energy programme for implementation at the national-scale.	(1) No comprehensive sustainable rural energy project exists.	1. Integrated energy-economy- environment planning exercises and sustainable energy scenarios using LEAP and adaptation of LEAP in Korean language.	2. Pilot project evaluated vis-à-vis standards and experiences on "good practices"; 3. IRED initiated and applied to SRED; 4. Provinces/counties with the most potential for national-scale replication of demonstration projects identified and RE resources and energy	US$ 480,000	Target 6: ToR for new programme design and development was submitted to UNDP Senior Management by end of September Activities on other targets not yet started	(Scaling-up phase) 8. Leveraging of donor funding is always on the UNDP agenda. Should this be a project activity, or can it be dealt with at the inter-institutional level?	Prioritization of energy supply in counties and provinces should follow from a national development plan for the rural areas. Based on this, one can prepare a national rural energy plan and identify technical options and required (investment) resources.

			demand for provincial and county level mapped out; 5. Rural energy surveys and energy assessment of selected additional provinces/counties conducted; 6. Project Document on the National-scale Sustainable Rural Energy Programme prepared; 7. Policy recommendations, including development of institutional and organizational capacities, for sustainable rural energy development; 8. Donor consultations conducted.				It must be observed that the counterparts NCC, MEPI, SAOS, SCST are apparently not the competent authorities to define such priorities. A grass-roots approach could depart from an assessment of the role of energy as input to generate local value (productive processes, improved quality of life, education). Local socio-economic units (such as CoFs) are always embedded in larger systems; a successor SRED project should consider this. While DPRK is a command economy, field work suggests that many services for the rural areas are in practice solved at a grass-roots level. A successor SRED programme should try to capitalize on these underlying mechanisms – which requires better understanding thereof.
Project Management	(1) No project management.	(1) Project management team in place 3 months after project approval		US$ 1,195,597		(Programme development phase.)	The project management team also performs substantial output-related work.

ANNEX D Mission agenda

Day & Date	Time	Activity	Location	UNDP Focal Point	DPRK Government Focal Point
26 January Saturday	16:00	Arrival at Pyongyang by JS152	Airport	PKC	n/a
	18:00	Check-in Hotel	Haebangsan Hotel		
27 January Sunday	09:00-12:00	Work in UNDP CO	SRED/SWEDPRA Project Office	ZT, PKC	n/a
	12:00-14:00	Lunch			
	14:00-18:00	Work in UNDP CO			
28 January Monday	09:00-10:00	Work in UNDP CO	SRED/SWEDPRA Project Office	ZT, KCJ, PKC	n/a
	10:00-12:00	Meeting with UNDP Senior Management, Programme and Project Staff (SM,BB,ZT,KCJ)	UNDP Conference Room		
	12:00-13:30	Working Lunch	TBI		
	14:00-15:00	Meeting with National Coordinating Committee for UNDP (NCC)	Haebangsan Hotel	ZT, KCJ, PKC	NCC, MEPI, SAOS, SCST
	15:00-18:00	Meeting with relevant Ministries of SRED project for reviewing on SRED activities			
29 January Tuesday	08:00-11:00	Departure to / arrive at Keynam Stock Farm, _Sinwon county	South Hwanghae Province	ZT, PKC	SRED NPD
	11:00-12:00	Site-visit of Keynam Stock Farm – 50m3 biogas system			

	12:00-13:00	Departure to / arrive at Haeju City			
	13:00-14:00	Check in Haeju Hotel			
	14:00-18:00	Work in Haeju Hotel			
30 January Wednesday	08:00-10:00	Departure to / arrive at Jangyon County	South Hwanghae Province	ZT, PKC	SRED NPD
	10:00-12:00	Site-visit of Myongchon Cooperative Farm – project site			
	12:00-13:30	Lunch			
	14:00-17:00	Return back to Pyongyang	Haebangsan Hotel		
31 January Thursday[67]	08:00-09:30	Departure to / arrive at Kaechon City	South Pyongan Province	ZT, PKC	SRED NPD
	09:30-10:30	Site-visit of Youngjin dong – household biogas system with greenhouse			
	10:30-12:00	Return back to Pyongyang			
	12:00-13:30	Lunch			
	14:00-15:00	Departure to / arrive at Kangso County			
	15:00-17:00	Site-visit of Yaksu Cooperative Farm – project site			
	17:00-18:00	Return back to Pyongyang	Haebangsan Hotel		
1 February Friday	09:00-12:00	Participation in UNDP Programme Retreat	Taedonggang Diplomatic Club	ZT, PKC	n/a
	12:00-13:30	Lunch			
	14:00-18:00	Meeting with Muller and SDC staff (tentative)			
2 February Saturday	09:00-12:00	Meeting with Muller and SDC staff (tentative)	SRED/SWEDPRA Project Office	ZT, PKC	n/a
	12:30-13:30	Lunch			
	14:00-18:00	Work in UNDP CO			
3 February Sunday	09:00-12:00	Work in UNDP CO	SRED/SWEDPRA Project Office	ZT, PKC	n/a
	12:30-13:30	Lunch			

[67] The activities on 31 January and 1 February 2013 had to be cancelled due to illness of the Consultant.

	15:00-18:00	Departure to / arrive at Kangwon Province	Kangwon Province	ZT, PKC	SRED NPD
	18:00-	Check in Tongmyong Hotel			
4 February Monday	09:00-10:00	Departure to / arrive at Mopung Cooperative Farm, Anbyon County	Kangwon Province	ZT, PKC	SRED NPD
	10:00-12:00	Site-visit of Mopung Cooperative Farm – project site			
	12:00-14:00	Lunch			
	14:00-17:00	Return back to Pyongyang	Haebangsan Hotel		
5 February Tuesday	09:00-12:00	Discussion on New Energy Project	Haebangsan Hotel	SM, BB, PSU team, ZT, KCJ, PKC	NCC, MEPI, SAOS, SCST
	12:00-14:00	Working Lunch			
	14:00-16:30	Discussion on New Energy Project			
	17:00-18:00	Debriefing and Wrap-up meeting with UNDP Senior Management (SM,Nasa,BB,ZT,KCJ)	UNDP Conference Room	ZT, PKC	n/a
6 February Wednesday	08:00-10:30	Departure to / arrive at Unsan County	South Pyongan Province	ZT, PKC	SRED NPD
	10:30-12:30	Site-visit of Ryudong Cooperative Farm – project site			
	12:30-14:00	Lunch			
	14:00-15:00	Departure to / arrive at SAoS	State Academy of Science (SAoS) Unjong District, Pyongyang	ZT, PKC	SWEDPRA NPD
	15:00-17:00	Site-visit of 5kW Wind Turbine, Manufacturing Workshop and Power Performance Testing Field			
	17:00-18:00	Return back to Pyongyang			
7 February Thursday	09:00-12:00	Discussion on New Energy Project	Haebangsan Hotel	ZT, KCJ, PKC	NCC, MEPI, SAOS, SCST
	12:30-13:30	Lunch	TBI	ZT, PKC	n/a
	15:00-16:00	Meeting with UN TG on Climate Change, Energy and Environment	UNDP Conference Room		
	16:00-18:00	Meeting with NCC and relevant Ministries for discussion on New Energy Project	Haebangsan Hotel	ZT, KCJ, PKC	NCC, MEPI, SAOS, SCST

8 February Friday	09:00-11:00	Work in UNDP CO	SRED/SWEDPRA Project Office	ZT, PKC	n/a
	11:00-12:00	Participation in Interagency Meeting	UNDP Conference Room		
	12:30-13:30	Lunch	TBI		
	14:00-18:00	Work in UNDP CO	SRED/SWEDPRA Project Office		
9 February Saturday	07:00-08:00	Check out Hotel and departure to Airport	Haebangsan Hotel	PKC	n/a
	09:00-	Departure from Pyongyang by JS151			

NOTES							
Ms. Shabnam Mallick	Senior Deputy Resident Representative	**SM**			Mr. Paek Kyong Chol	Project Assistant	**PKC**
Ms. Nasantuya Chuluun	Operations Manager	**Nasa**			Ms. Hong Jong Hui	National Project Director of SRED	**SRED NPD**
Mr. Baba Mustafa Marong	Senior Programme Advisor for M&E	**BB**			Mr. Kim Yong Son	National Project Director of SWEDPRA	**SWEDPRA NPD**
Mr. Alan Alor	Procurement Officer	**AA**			National Coordinating Committee for UNDP		**NCC**
Mr. Zharas Takenov	Project Manager of SRED/SWEDPRA	**ZT**			Programme Support Unit		**PSU**
Mr. Kim Chol Jin	Programme Analyst	**KCJ**			Mr. Kim Kwang Hui	Driver of UNDP DPRK CO	

ANNEX E Pictures and observations during field visits

First visit (Haeju, 29-30 January):

Myongchon – Ri (Jangyon County, South Hwanghae Province)

Thermal isolation houses

P1300060

Observe that foam cement stones are not always regularly and closely packed, which may produce draughts and locally reduced thermal isolation coefficients in the wall. The foam cement is placed on top of a concrete socket to avoid direct contact with the ground. It is not clear if the design has eliminated potential cold bridges and what practical experiences are. Foam cements pieces in the picture are exposed to outside conditions – this may cause degradation of the material.

P1300059

Double glass-windows installed.

P1300066

One house with new windows installed. The walls have not been isolated yet, apparently (at least not visual in the pictures - check). Another house here was visited, indoor temperature was about 14 degrees, with new door and windows in place. The lady expressed that this was an improvement. During the day, she opens the window sometimes for ventilation. Although the Ondol system should not release fumes into the house, CO measurements are recommended.

P1300069

Foam cement blocks are locally produced by mixing cement and sand with a detergent. The work and drying process is done in an area shielded with plastic film to increase indoor temperatures (like in a greenhouse). The stirring is done by a stirring device, operated by an electric motor if electricity is available. If not, by a mechanical (fuel engine) tiller and a belt transmission. The energy efficiency of this chain is very low, to start with the stirrer. The operators would like to see electricity service restored (by means of a SHP financed by the Project). However, one should start by creating efficient applications of electric energy. Of course, people use what they have, but apparently nobody is trained to implement substantial improvements. The process is done batch-wise, and one wonders why the stirring drum is so small. Each time the belt is put onto the pulley by hand, which exposes the fingers to great injury. The workspace is also very polluted by the exhaust smoke.

P1300075

Next to the house is the support construction for the solar water heater (vacuum tubes). This is needed since the house itself cannot carry the weight. It looks rather bulky. One would like to see something more aesthetic and in the same style as the houses. The construction may also cast shading on the side window, which reduces light levels inside the house. Can such a construction be shared by neighbouring houses? (Given the fact that they are all in a row, at regular distances. Is it possible to make use of the space below the support structure?

Hydro power plant (UNDP imported)

P1300078

The penstock of the SHP built by the local community (presumably assisted by province and county). The installed turbines and generators do not provide power as expected due to overheating problems and very high tolerances. Transformers and cables look very old and are not protected.

P1300094

A group of Chinese experts from ICSHP were present, as they will prepare and commission the new power plant at the same site (funded by UNDP under the SRED Programme). Material had arrived in containers (except for the turbine outlets). For some reason, local people had removed many of the packing slips from the boxes. Instructions were given to cover the boxes to protect them from the rain and snow.

Removing the old turbines is not an easy task because the penstock is not equipped with a valve. Therefore, the lake has to be emptied. There is also no electricity once the old hydro plant is stopped. As a solution, the experts propose to keep one generator running for power production during the construction phase. Local manpower is available, but needs to be scheduled as people have regular tasks as well.

Second visit (Wonsan, 3-4 February):

Mopung – Ri (Anbyon County, Kangwon Province)

Biogas digester

P2040008, P2040009 and P2040012

A biogas digester system has been imported from Kyrgyzstan and is under construction. The manufacturer has made a visit to DPRK and will return for final installation and commissioning. The units are built from recycled steel material, which helps him to keeps costs considerably lower than most competitors. It is the intention to reproduce the system locally.

P2040014

The digester is placed horizontally, and a biogas storage tank vertically. This unit was found in vertical position on top of the iron reinforcements for the concrete socket. This is very unstable as it may bend under the weight. Strong winds may also cause the tank to fall down. This issue was discussed with the people from the farm who said they were instructed to put it this way. This situation makes evident the importance of finding the right contracting modality in DPRK and assign responsibilities to involved actors (supplier, SAOS, COF). Turn-key, with full responsibility for the supplier, is hardly feasible for foreign companies in DPRK for this type of smaller projects. On the other hand, one must recognize that UNDP cannot always be there for overall supervision and does not have the manpower and capacity to assume this role if activities are scaled up.

P2040010

The Cooperative Farm at Mopung is connected to a low-tension distribution network but does not receive electricity. Above, there are high-tension transmission lines.

P2040016

The biogas digester will be fed with pig manure. Pigs are actually found in place.

PV water pumping system

P2040018 and P2040017

A 50-kW PV water pumping system was installed to supply water for a tree nursery. The system was installed by an Italian supplier. The anchoring system is simple and innovative, avoiding the need for concrete works. The water is lifted to a large tank, from which the trees are watered by gravity (drip system).

The leader of the Mopung Cooperative Farm is an ambitious man, always looking for opportunities to progress. They have the bio-digester, the PV pumping system, and also look into small hydro. The tree nursery produces seedlings in a greenhouse and small trees in the field. The trees are used for reforestation of the areas used for firewood recollection in the hills. Each Cooperative Farm has assigned certain areas for this use. However, deforestation is a major problem. The surpluses produced by the tree nursery are sold to other farms and generate some income.

It would be interesting to understand the overall energy (and GHG emission) performance of the chain, including transport movements. The PV system will no doubt supply the water needed, but is this the most cost-effective solution? Is it financially sustainable? What is the unit cost of firewood compared to fossil coal? It was seen several times that people use biomass as a backup in case coal is not available (either because of its cost (US$ 20/ton delivered) or because it cannot be obtained.

The PV pump may be the right solution but the technology gap with the agricultural tools in the background is striking.

Workshop

P2040021

A visit was paid to the local workshop, were people were actually doing maintenance on the agricultural machinery – which is a logical activity in the winter (idle) season. Here one can also observe the distribution lines, supposedly providing electric energy in previous times. According to the local staff, the latches were used mainly for producing bolts and small parts, not for more complex operations such as overhauling engine pistons, etc. This was surprising, as such small parts can be acquired at low costs on the world markets (read: in China). From the perspective of individual energy services, this use of energy inputs does not justify the construction of a hydro power plant. It is also surprising that the workshop is not able to carry out more complex manufacturing. Tyres, machine spare parts and fuel have to be purchased at the local market and must be paid for. Therefore, cash income is necessary for the Cooperative Farm.

P2040024

A small hydro plant (SHP) could be constructed in the outlet channel of a state-owned, larger hydro scheme. Water is reportedly available throughout the year. According to the farm leader, such a SHP would not impact the availability of water downstream, where there are four or five more cooperatives, which use the water for irrigation. This statement should be verified by study. It is surprising that this nearby farm cannot derive electricity from the larger hydro plant, which must also have low- or medium-tension circuits in service for internal power supply. From a technical and economic viewpoint, adapting the medium-tension circuits for power supply to the nearby region, is likely more feasible than installing a new (river-type) hydro plant in the channel.

thermal isolation and solar water heaters

P2040022 and P2040023

At Mopung, thermal isolation for houses will be provided, as well as solar water heaters. The concrete support for the SWH was in place, the systems are not yet delivered. Please note that low-temperature concrete is not easily obtained in DPRK; by consequence, activities are suspended in winter time. Also here, the SWH support structure dims the light at the nearby window.

Third visit (Unsan County, 6 February):

Ryudong – Ri (Unsan County, South Pyongan Province)

Small hydropower

P2060110

The SRED Project has supported a study to generate small-scale hydroelectricity at one of the gates of a bigger hydro scheme. This activity has been suspended as grid-connected electricity production is no longer considered as "rural" by UNDP. Similar to the situation in Mopung, it is remarkable to see that the kinetic energy of the water outflow of larger dams, is considered as a source for electricity generation.

This situation gives rise to many questions, including:

- What does this mean with respect to the hydraulic efficiency of the large dam?
- What does this mean with respect to local grid systems (low and medium tension) in relation to the main system? Who is responsible for the grid infrastructure (main and local), how are they linked in terms of ownership, maintenance, supply?
- If appropriate, can local grids be designed fully isolated from the main system?
- What would be the best technical and economical solution to benefit from the large dam? By a kinetic turbine? Or by tapping a transformer to supply the local grid?

The people from Ryudong – Ri made clear that they are eager to have the SHP installed, but it has repeatedly been communicated that UNDP cannot do this. People clearly value the availability of electric power, but have little insight in the costs and technological choices to provide it.

P2060118

A visit was paid to the nursery (kindergarten). Small children stay here when parents are at work in the fields; therefore there is also a kitchen. The Project has isolated the walls, installed double-glass windows, and will provide solar water heating and a PV system.

P2060114 and P2060115

Basic electricity wiring is in place. When asked, people confirm that about ten years ago, supply was reasonable (like 8-10 hours per day). Now it is very erratic (virtually non-existent, but the line sometimes becomes “life”, which is actually a dangerous situation).

P2060122

A household was visited. At -6 ^{o}C outside temperature, indoor it was +14 ^{o}C thanks to thermal isolation, windows and improved doors. The indoor climate felt comfortable and the lady explained that the isolation helps saving energy. They use 2 tons coal per winter, from which 1,000 briquettes are made. The coal supplied at the Cooperative Farm costs 20US$ per ton.

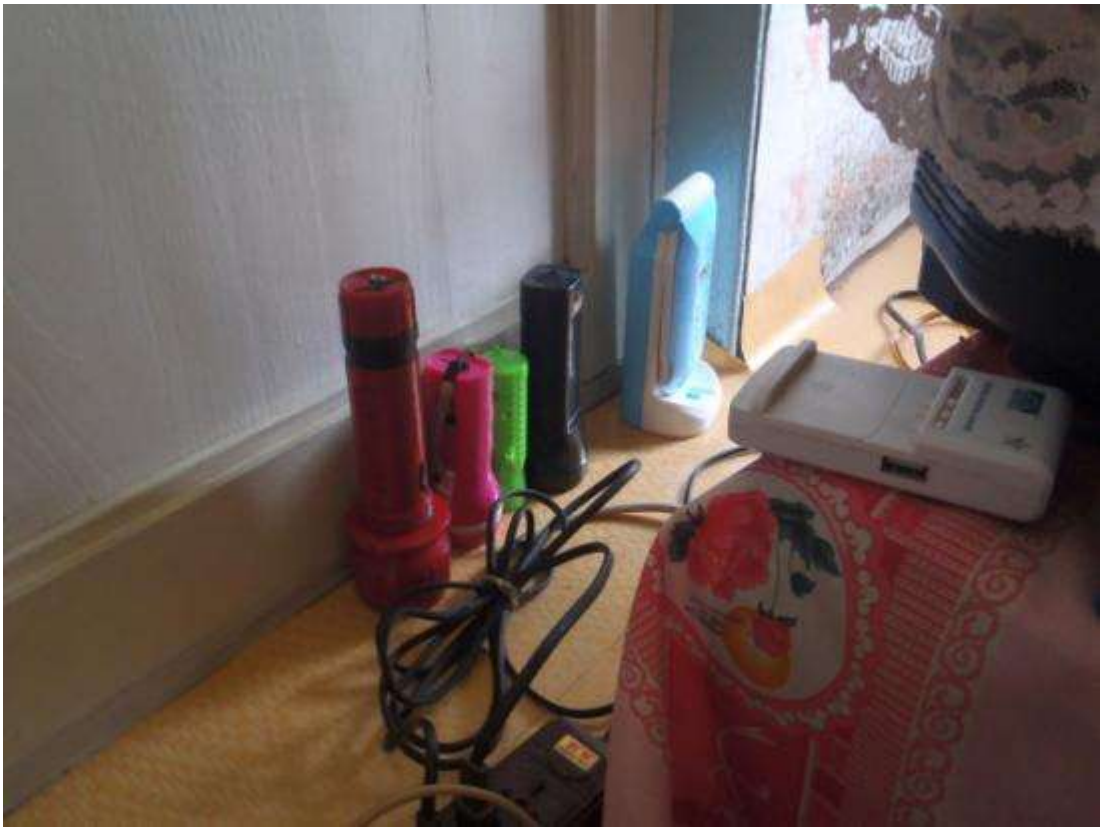
P2060123 and P2060124

The Ondol stove consumes 3 briquettes per day (which means that 1 ton of coal would last 2 winters) . However, this is basic use – 5 to 6 briquettes per day would be needed for more comfortable indoor life. This is too expensive. The Ondol is equipped with a water tank, to have warm water available during the day. The exhaust fumes are directed into the floor heating system. The power of the system is controlled by regulating the air intake. If coal is not available (or as a coal/cost saver) a second Ondol stove is in place, which is fuelled with biomass residues.

P2060125 to P2060128

The family has several electric appliances, most notably a large television and incandescent light bulbs in the ceiling. This is a strong indicator that, in former times, they used to get electricity from the grid[68]. The electricity service became worse 10-12 years ago, and is no longer available now. The family has created a 12 volt system to supply the same services, electric light and television, although at a more modest level. The 12-volt cables are neatly worked away, and a light switch is placed next to the original 220-V one. The system was built by her husband (the lady said); the LED lights and a simple TV are bought on the market (imported from China). Power is supplied by a truck battery. The battery is charged when grid electricity is available. However, this seems so rare lately that people would like to have a PV-panel for battery charging. It would be interesting to verify with the authorities whether grid electricity can be supplied for at least a few hours during one or two times per week for people to charge their batteries.

[68] It is illogical that a family spends money on appliances if no energy is available to use them.



P2060131

Efficient coal stoves are provided under the SRED Programme. These are equipped with an electric fan for start-up. The stoves are produced by SAOS (Institute for Thermal Engineering - ITE) and sold to UNDP at a cost of about USD 40. This looks like a strange way of doing business, because stoves would normally be sold to the end-users, not to UNDP. The costs seem high compared to woodstoves in other countries. Reportedly, this is due to the use of a special thermal isolation material in the walls of the stove. These stoves are designed for use in summer, when the large Ondol stove is not needed and would consume more coal than actually needed for cooking alone. The small stoves are designed for outdoor use.

P2060132

Next to the house is a structure being put in place for the solar water heater system.

ANNEX F Terms of Reference Terminal Evaluation SRED Programme

I. POSITION INFORMATION

Position Name:	International Consultant for Terminal Evaluation (TE) of Sustainable Rural Energy Development Programme (SRED)
Project Name:	Sustainable Rural Energy Development Programme (SRED)
Location and Duration:	DPRK; 25 non-consecutive days, including one two-week mission to Pyongyang and 4 project sites in rural DPRK
Estimated throughput time:	three (3) months
Team composition:	One (1) International Consultant (team leader) and one (1) national expert

II. BACKGROUND INFORMATION

The DPR Korea has a population of approximately 25 million, out of which 65% live in rural areas. Since 1990, the economy has suffered major setbacks. Many of these can be related to energy supply lagging increased demand due to a lack of capital investment, worn out technology and increased energy losses. The energy sector in DPRK is heavily reliant on coal and coke (over 60% of demand in 1990). Petroleum, all of which is imported, accounted for only 7% of supply in 1990, electricity another 7% and biomass provided an estimated 24%. Industrial demand accounts for nearly half of all consumption, residential about a third (half of this contributed by wood and biomass). The remaining sectors (agriculture, military, transport, commercial and non-energy) account for about 3-5% of total demand. Due to a lack of reinvestment and technological upgrading, the electricity system in DPRK produces far below demand and is highly energy-inefficient, and contributes to atmospheric pollution and climate change.

The economic decline has been felt nowhere more than in the agricultural sector. Electricity shortages caused an estimated 25% reduction of irrigation capability in 1996 compared to 1990 levels. Irrigation is essential for rice production in the temperate climate of DPR Korea. Rural households, rural clinics, hospitals and schools suffer severe energy shortages, seriously affecting standards of living and economic activity. The rural population is the most vulnerable group in terms of access to food security and energy services. The limited endowment of natural resources suitable for agriculture makes it critical for many in the rural areas to find alternative employment and income-earning opportunities. At the same time, the prevailing lack of reliable energy supply and non-use of energy efficiency measures, are among the main barriers to the creation of employment opportunities outside farming.

As can be derived from the following table, about 90% of all energy inputs for rural households are used for space heating in the long cold winter. This energy service is provided by fossil coal or firewood. Electricity makes up only a small percentage (2%), supposedly for electric lighting, entertainment and kitchen appliances.

Energy services required by rural households		
Energy use	Energy (kWh)	
Heating	16,628	90.1%
Cooking	920	5.0%
Electricity	352	1.9%
Hot water	546	3.0%
Total	**18,446**	**100.0%**

The actual situation regarding electricity use varies from place to place. In some rural areas there is almost no electricity at all in winter time. During irrigation and harvest time, electricity is provided and households take benefit of this. The depicted development context provides a strong rationale for

UNDP to address the energy situation in the rural areas in DPRK and contribute to the Millennium Development Goals (MDGs), which are subscribed by the national Government.

A number of barriers currently hamper widespread and sustainable introduction and distribution of renewable energy and energy efficiency technologies in DPR Korea. As a consequence, the environmental, development and human health-related challenges arising from the increasing use of fossil and local biomass fuel in rural DPR Korea are becoming more serious. To respond to the above challenges, UNDP is implementing the SRED (Sustainable Rural Energy Programme) and SWEDPRA (Small Wind Energy Development and Promotion in Rural Areas Project) initiatives in DPRK since 2006. Both projects have re-started in 2010 after a prolonged period (3 years) of suspension. The SRED Programme is planned to close in 2014, while SWEDPRA is terminated by the end of 2013.

III. SRED PROGRAMME DESCRIPTION

The Country Program Action Plan (2005-2006) supports Sustainable Rural Energy Development (SRED) in DPR Korea through "pilot demonstration schemes" in specific regions and cooperative farms. SRED starts with an assessment of energy services required at the cooperative farm(s) level, linking energy provision with the Human Development Index:

- Identifies opportunities - but also constraints and barriers- with participation of stakeholders – and formulates a plan for barrier removal;
- Identifies optimal "energy-mixes" (for both carriers and technologies) from all the dimensions of Sustainable Development (financial, social and environmental);
- Allows flexibility when matching energy services requirements with energy resources available from both within and outside the boundaries of the selected cooperative farms; and
- Promotes synergy from concerted efforts by national and international institutions at the community level.

The SRED project was originally signed on 16 March 2006 to start implementation but was interrupted due to the suspension of UNDP operation in 2007. After reformulating the scope, the Project resumed activities in 2010. The total budget is: US$ 5,650,000 from UNDP TRAC funds.

Objective: The project is designed to help DPR Korea in the successful implementation of the national Rural Energy Programme along sustainable development principles and practices. This programme will, inter alia, have helped to improve the working and living conditions in rural areas.

Strategy: The SRED programme will formulate energy interventions that focus on improving human development indicators and on improving the quality of life, through provisions of energy services as spelled out in the UNDP and DPRK Country Programme Action Plan (2005-2006). The SRED Programme strategy will use the farm cooperative as an entry point for the provision of energy services. The programme considers that engagement at the farm cooperative level is critical for a user-based assessment of rural energy needs and services, and identification of the suitable energy and technology mix that best meets those needs. The SRED Programme is structured into three phases:

- Programme Development Phase: This phase identification of regions and selection of cooperative farms in each region for the implementation of the SRED programme.
- Implementation Phase: Include key activities to achieve project outputs as described in the SRED Results and Resources Framework.
- Scaling-up Phase: After the completion of the pilot demonstration projects the various components of the SRED programme will be evaluated so that 'good-practices' can be documented for replication at the national level. Based on the lessons learned during the implementation phase, SRED will help formulate strategies and plans for scaling-up of sustainable rural energy development at the national level.

Key Outputs:

(1) Provinces and cooperative farms identified for pilot demonstration schemes in rural energy development;
(2) Demonstration activities implemented and running successfully;
(3) Training programmes identified and implemented;
(4) Policies and mechanisms put in place to address barriers and constraints to implement rural energy projects;
(5) Lessons learned and 'good-practices' compiled for sharing and knowledge management; and
(6) Sustainable Rural Energy Development Programme updated/re-formulated and designed for the implementation at the national-scale.

The SRED programme is executed by UNDP in accordance with UNDP Direct Execution/Direct Implementation (DEX/DIM) guidelines. The UNDP Country Office in DPRK has the overall responsibility for project implementation in coordination with the DPRK Government, through the National Coordinating Committee (NCC) for UNDP. Other government partners provide technical and operational support and liaise with the authorities and stakeholders in the target provinces, counties and farm cooperatives. These government partners include:

- Ministry of Electric Power Industry;
- Ministry of Coal Industry;
- State Academy of Sciences and its relevant institutes/centers; and
- State Commission for Science and Technology and its relevant institutes/centers.

IV, EVALUATION APPROACH AND METHOD

The approach and method[69] for conducting terminal evaluations of UNDP projects has developed over time. In the field of energy and climate change, UNDP has mainstreamed its evaluation methodology with the Global Environment Facility (GEF), which has been the principal source of financing. This methodology shall also be followed for the Terminal Evaluation (TE) of the SRED Programme (which is funded directly by UNDP).

The TE will be implemented by a team of two consultants, one international consultant (IC) and one national consultant (NC). The evaluators are expected to frame the evaluation effort using the criteria of **relevance, effectiveness, efficiency, sustainability, and impact,** as defined and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects.

Information will be gathered from[70]: (a) the Programme's Monitoring and Evaluation system; (b) review of extant reports and documents; (c) individual interviews; (d) on-site observations during field visits; and (e) interviews with key informants. A set of questions covering each of these criteria have been drafted and are included with this TOR[71] The evaluators are expected to amend, complete and submit this matrix as part of an evaluation inception report, and shall include it as an annex to the final report.

The evaluation must provide evidence-based information that is credible, reliable and useful. The evaluators are expected to follow a participatory and consultative approach ensuring close engagement with government counterparts, in particular NCC, UNDP Country Office, project team, UNDP Regional Technical Specialist based in the region, and key stakeholders.

V. OBJECTIVE AND SCOPE OF WORK

The objective of the requested consultancy is to execute the Terminal Evaluation of the UNDP Sustainable Rural Energy Development (SRED) Programme in DPRK in accordance with UNDP methodologies for Monitoring and Evaluation, in adherence with the defined timeframe. The scope of

[69] For additional information on methods, see the Handbook on Planning, Monitoring and Evaluating for Development Results, Chapter 7, pg. 163

[70] Please consult Annex H in this document for further guidance on applicable data collection methods.

[71] Please consult Annex G for the initial list of evaluation questions.

the work includes: (i) desk work and mission preparation; (ii) two-week mission to DPRK; (iii) interviews with stakeholders and fact-finding visits to project sites; (iv) preparation of draft report; (v) presentation of preliminary findings for the UNDP Country Office in DPRK; (vi) collection of comments by stakeholders; and (vii) compilation and delivery of final TE report, including recommendations, lessons learned and best practices.

The international consultant will be team leader and coordinate the evaluation process to ensure quality of the report and its timely submission. The national consultant will provide support in terms of technical backstopping, logistical support, interpreting, translation, etc. The evaluation team is expected to become well versed as to the project objectives, historical development, institutional and management mechanisms, activities and status of accomplishments. The international consultant (IC) is expected to conduct a field mission to Pyongyang, DPRK, and the project sites Yaksu, Myongchon, Mopung and Ryudong.

Interviews will be held with the following individuals and organizations at a minimum, but not limited to:

- UNDP Deputy Resident Representative;
- UNDP Programme Analyst on Energy and Environment;
- Senior Programme Advisor-M&E;
- Regional Technical Specialist (on distance);
- National Project Director (NPD);
- National Training Coordinator (NTC);
- Project Manager (PM);
- Project Administrative Assistant;
- UNDP Financial Officer;
- UNDP Procurement Officer;
- Project Steering Committee Members;
- National Coordination Committee (NCC);
- State Academy of Science (SAOS);
- State Commission of Science and Technology (SCST);
- Non-Conventional Energy Development Centre (NCEDC);
- Research institutions and experts in the country;
- Other relevant personnel at UNDP Country Office in DPRK; and:
- Beneficiaries and stakeholders in the target communities.

The evaluators will review all relevant sources of information, including:

- Project Document – two versions;
- Inception Workshop Report;
- Annual Work and Financial Plans;
- Annual Project Report/Project Implementation Reviews (APR/PIR);
- Quarterly Reports;
- Minutes of Project Technical Committee/Project Steering Committee meetings;
- Back-to-Office Reports of UNDP staff;
- SRED Stocktaking report (2013); and:
- Study reports, conference proceedings and government guidelines.

VI. DELIVERABLES

The evaluation team is expected to deliver the following reports under the overall responsibility of the international consultant:

Deliverable	Content	Timing	Responsibilities
1. Inception Report	Evaluator provides clarifications on timing	No later than 2 weeks before the evaluation mission.	Evaluator submits to UNDP CO

	and method		
2. Presentation	Initial Findings	End of evaluation mission	To project management, UNDP CO
3. Draft Final Report	Full report, (per annexed template) with annexes	Within 3 weeks of the evaluation mission	Sent to CO, reviewed by RTA and PCU
4. Final Report*	Revised report	Within 1 week of receiving UNDP comments on draft	Sent to CO for uploading to UNDP ERC.

*Upon submission of the final evaluation report, the evaluator is required also to provide an 'audit trail', detailing how all received comments have (and have not) been addressed in the final evaluation report.

VII. EVALUATION REPORT

The Terminal Evaluation report will cover at least the following aspects of SRED Programme: (i) development context; (ii) programme strategy and design; (iii) achievement of results; (iv) conclusions; (v) recommendations; and (vi) lessons learnt. The RE report make specific recommendations to enhance project outcomes and sustainability of results.

Project Rating

An assessment of project performance will be carried out, based against expectations set out in the Project Logical Framework/Results Framework which provides performance and impact indicators for project implementation along with their corresponding means of verification. The evaluation will at a minimum cover the criteria of: **relevance, effectiveness, efficiency, sustainability and impact.** Ratings must be provided on the following performance criteria. The completed table must be included in the evaluation executive summary.

Evaluation Ratings:			
1. Monitoring and Evaluation	***rating***	**2. IA& EA Execution**	***rating***
M&E design at entry		Quality of UNDP Implementation	
M&E Plan Implementation		Quality of Execution - Executing Agency	
Overall quality of M&E		Overall quality of Implementation / Execution	
3. Assessment of Outcomes	**rating**	**4. Sustainability**	**rating**
Relevance		Financial resources:	
Effectiveness		Socio-political:	
Efficiency		Institutional framework and governance:	
Overall Project Outcome Rating		Environmental :	
		Overall likelihood of sustainability:	

Financial aspects

The Evaluation will assess the key financial aspects of the project. Project cost and funding data will be required, including annual expenditures. Variances between planned and actual expenditures will need to be assessed, taking into consideration results from financial audits, as available. The evaluators will receive assistance from the Country Office (CO) and Project.

Mainstreaming with UNDP objectives and programming

The evaluation will assess the extent to which the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender.

VIII. IMPLEMENTATION ARRANGEMENTS

The principal responsibility for managing the TE resides with the UNDP Country Office (CO) in DPRK. UNDP CO will contract the evaluators and ensure the timely provision of per diems and travel arrangements within the country for the evaluation team.

The SRED Project Team will be responsible for liaising the evaluators with stakeholders and to set up interviews, arrange field visits, coordinate with the Government. etc. Throughout the assignment, the evaluation team will liaise closely with the UNDP Resident Representative (RR), Deputy Resident Representative (DRR), Programme Analyst (PA), Senior M&E Adviser, and SRED Project Manager (PM). Under leadership of CO the evaluators will further liaise with the concerned agencies of the Government, members of the international team of experts under SRED and the assigned counterpart staff.

IX. EVALUATION TIMEFRAME

The total duration of the evaluation will be 25 days according to the following plan:

Activity	Timing	Completion Date
Preparation	3 days	*x*
Evaluation Mission	12 days	*x*
Draft Evaluation Report	8 days	*x*
Final Report	2 day	*x*

X. TEAM COMPOSITION

The evaluation team will be composed of 1 international and 1 national evaluator. The individual experts shall have good technical knowledge of rural energy and development, renewable energy technologies, and policies for mitigation of and adaptation to the effects of climate change. The international consultant shall further possess good evaluation experience and reporting skills to carry out the assignment. The consultants shall have prior experience in evaluating similar projects. Experience with GEF financed projects is an advantage. The international evaluator will be designated as the team leader and will be responsible for quality and timely submission of the report. The allocation of tasks in the execution of this TOR shall be decided mutually between the International and National consultants. The evaluators selected should not have participated in the project preparation and/or implementation and have NO conflict of interest with project-related activities.

XI. QUALIFICATIONS INTERNATIONAL CONSULTANT

The international consultant must present the following qualifications and professional background:

- Minimum of ten years accumulated and recognized professional experience in renewable energy and climate change projects Knowledge of UNDP programming in the field of rural energy and climate change;
- Minimum of five years of experience with project evaluation and/or implementation in the result-based management framework, adaptive management and UNDP and/or GEF Monitoring and Evaluation Policy;
- Technical knowledge in the targeted areas, including solar energy, small hydropower, biogas, thermal insulation of buildings, energy policy;
- Post-Graduate in Engineering, Management or Business;
- Demonstrated ability to assess complex situations, succinctly, distill critical issues, and draw forward-looking conclusions and recommendations;
- Ability and experience to lead multi-disciplinary and national teams, and deliver quality reports within the given time;
- Familiar with developing countries context or regional situations relevant to that of DPRK;
- Experience with multilateral and bilateral renewable energy and climate change projects;

- Comprehensive knowledge of best practices in international renewable energy industry and energy efficiency measures for residential buildings;
- Excellent report writing skills in English.

ANNEX G List of question for evaluation

The questions below can be used for guidance of the Terminal Evaluation of the SRED Programme.

Relevance & impact

- Is the target group (Cooperative Farms) correctly chosen in view of UNDP and Government objectives?
- What kind of impact can be observed and verified? Is it feasible to seek impact on human livelihoods while working on technology implementation in the short timeframe of a project?
- Is there insight in the number of rural beneficiaries of SRED? Is there detailed information about the number of male, female, child beneficiaries per selected COF? How many people live in COFs in a selected county? How many other beneficiaries live in a county, outside the COFs? How can these be reached?
- Should SRED be viewed as an instrument to foster rural development or to relief basic needs? To what extent is the COF as an entry point aligned with rural development policies and processes? What are the main drivers for social and economic development in the rural areas?
- Which national institutions should be involved and prepared to make DPRK ready to roll out a national rural energy programme? What would be the specific objectives of such a national programme?

Effectiveness

- Has the SRED Programme been effective? Where, and where not?
- Has the use of UNDP funds been effective? What can be done to create leverage?
- Would it be possible to devise a methodology to assess the value of SRED interventions in terms of social, economic and environmental benefits? On what kind of interventions should SRED be focused, and why?

Stakeholder involvement

- SRED's project partners are line ministries assigned by the Government. To what extent is this compatible with work at "grass root level", as pursued by UNDP? Are there indications that "grass roots" would be more effective than higher-level intervention?
- Have project objectives been sufficiently discussed and agreed between UNDP and the Government? Has there been a clear path linking objectives with specific targets (including verification of results for end-users).
- Is it possible to map national entities and systems in terms of functions needed by society? Is it possible to identify functions that are not covered (gaps)? If so, are such gaps specific for renewable energy delivery, or systemic? Is it possible to create synergies (for example to optimize available transport resources)?

Training

- What has been the impact of study tours and other training activities? How has learning been anchored in the receiving organizations? Are there verifiable improvements in competence as a result of learning? How can this be verified?
- Have training needs been adequately assessed and specified? Has training been mainstreamed with institutional human resource development plans? Is there a clear link between training activities and SRED implementation, or has training been a result by itself (expecting future benefits).
- Has national UNDP staff sufficiently been involved in SRED implementation? Is there an added value of mobilizing its national staff for project implementation?
- What can be the scope for information technology for the dissemination of information and training about energy uses at county and farm level?

- The Project Document indicates the establishment of county teams. Have these been implemented and were they effective?

Project design

- Has the original barrier appraisal been adequate? How to rank the importance of the barriers: policy, technology, human skills, delivery mechanisms (projects, equipment), institutional framework (including coordination), finance (including mobilization of end-user resources)?
- Are the UNDP and Government objectives sufficiently specified (and quantified) for rural DPRK?
- Improved access to energy has to be seen as a rural development problem rather than an energy problem. How could this development problem be formulated?
- The SRED design is not differentiated according to gender. How could gender be included? Is there a national policy towards gender, i.e. to specifically improve the position of rural women?
- The SRED project design is linear (sequential deliverables). Has this been appropriate given the need to learn to work in DPRK? What other options exist?
- Is it possible to identify a set of conditions for success that can be guaranteed to be in place? What assumptions do we have and are these valid over time? Can these be verified at all?

Sustainability and exit strategy

- The project has not been able to leverage co-funding from other agencies. On the other hand, self-reliance is considered important in DPRK. What can be done to mobilize existing local capital, and how can capital accrual be accelerated?
- The SRED pilots demonstrate mostly foreign technology (small hydro, double-glass windows). What is the explicit purpose of this demonstration? Can it be purchased by local people? If yes, what would be the envisaged import channel? How would finance be arranged for? What are the payback times?
- If the objective is national production, what would be the expected end-of-project status? Operational and cost-effective national production? Is this feasible? For which technologies, and for which not?
- How can policy be addressed to accelerate capital accrual at the farm/county level? Is it feasible to rely on local (county) capital only? What is the added value of higher level structures and inputs? Can this be described?

Monitoring and implementation

- Have the monitoring arrangements for the SRED been adequate? How effective has been the flow of information from the demonstration projects to UNDP, for monitoring and/or supervision?
- What has been the root cause why the SRED policy component has not started? Has this been analyzed and discussed with the national counterparts?
- How can the impact of the DEX modality on the project be described? What alternative approaches can be devised under this modality?
- How can the impact of the indirect communication lines with national counterparts be described? Is the Government aware of the implications for project execution?

ANNEX H Review of data collection methods for evaluation

Table 28. Summary of common data collection methods used in UNDP evaluations (p.174/175 Handbook on Planning, M&E for Development Results)						
				Applicability for SRED		
Method	**Description**	**Advantages**	**Challenges**	**Purpose**	**Issues/comments**	**Responsibility**
1. Monitoring and Evaluation Systems	Uses performance indicators to measure progress, particularly actual results against expected results.	Can be a reliable, costefficient, objective method to assess progress of outputs and outcomes.	Dependent upon viable monitoring and evaluation systems that have established baseline indicators and targets and have collected reliable data in relation to targets over time, as well as data relating to outcome indicators.	Provides reference framework to assess attainment of targets. **Is presently of limited use for evaluating SRED programme.**	Existing MES is obsolete since: country context has changed; no baseline defined; several outcomes no longer pursued; budget has been reduced. *Needs a redefinition of targets prior to final evaluation in order to measure progress.*	M&E expert UNDP
2. Extant Reports and Documents	Existing documentation, including quantitative and descriptive information about the initiative, its outputs and outcomes, such as documentation from capacity development activities, donor reports, and other evidence.	Cost efficient.	Documentary evidence can be difficult to code and analyse in response to questions. Difficult to verify reliability and validity of data.	Provides background of SRED programme, context and implementation process.	Reports are available. Information is very large to read in short time, especially technical reports. *Suggested to prepare "technical packages" for each of the technologies pursued under SRED.*	To be provided by SRED team
3. Questionnaires	Provides a standardized approach to obtaining information on a wide range of topics from a large number or diversity of stakeholders (usually employing sampling techniques) to obtain information on their attitudes, beliefs, opinions, perceptions, level of satisfaction, etc. concerning the operations, inputs, outputs and contextual factors of a UNDP initiative.	Good for gathering descriptive data on a wide range of topics quickly at relatively low cost. Easy to analyse. Gives anonymity to respondents.	Self-reporting may lead to biased reporting. Data may provide a general picture but may lack depth. May not provide adequate information on context. Subject to sampling bias.	--	Not used since the number of stakeholders/beneficiaries that can be addressed directly is too small for a statistical approach. Also language and cultural issues.	--
4. Interviews	Solicit person-to-person responses to predetermined questions designed to obtain in-depth information about a person's impressions or experiences, or to learn more about their answers to questionnaires or surveys.	Facilitates fuller coverage, range and depth of information of a topic.	Can be time consuming. Can be difficult to analyse. Can be costly. Potential for interviewer to bias client's responses.	Obtain in-depth information from selected stakeholders/ beneficiaries	Have been used during SRED stocktaking mission and generated substantial information and insights from the local perspective. People generally have little understanding of the whole SRED programme. *People may be more actively selected on specific criteria (gender, technical knowledge, subject) to enhance quality of interviews and avoid biasing.*	SRED team to draft criteria and a shortlist of individuals (stakeholders/beneficiaries).
5. On-Site Observation	Entails use of a detailed observation form to record accurate information on-site about how a programme operates (ongoing activities, processes, discussions, social interactions and observable results as directly observed during the course of an initiative).	Can see operations of a programme as they are occurring. Can adapt to events as they occur.	Can be difficult to categorize or interpret observed behaviours. Can be expensive. Subject to (site) selection bias.	Assess ongoing activities and verify established outputs.	Have been used during SRED stocktaking mission in combination with interviews. Operational problems observed include (i) the lack of on-site activity; (ii) difficult to assess technological results by simple observation; and (iii) difficult to assess user attitudes and social/gender issues from observation. *Recommended to have a technical quality statement ready before the final evaluation, (per site and per technology) in order to*	SRED team with support from technical experts. Non-technical issues may be included as these may be inter-linked with design inssues and local management structures.

					prepare on-site observations and focus on critical issues.	
6. Group Interviews	A small group (6 to 8 people) are interviewed together to explore in-depth stakeholder opinions, similar or divergent points of view, or judgements about a development initiative or policy, as well as information about their behaviours, understanding and perceptions of an initiative or to collect information around tangible and non-tangible changes resulting from an initiative.	Quick, reliable way to obtain common impressions from diverse stakeholders. Efficient way to obtain a high degree of range and depth of information in a short time.	Can be hard to analyse responses. Requires trained facilitator. May be difficult to schedule.	--	Not used because of language and cultural issues, complex preparation and high risk of bias. *At higher level, useful information may be obtained by means of a workshop (such as done with SAOS/CWERD) during SWEDPRA. A PSC meeting may serve as a platform.*	--
7. Key Informants	Qualitative in-depth interviews, often one-on-one, with a widerange of stakeholders who have first-hand knowledge about the initiative operations and context. These community experts can provide particular knowledge and understanding of problems and recommend solutions.	Can provide insight on the nature of problems and give recommendations for solutions. Can provide different perspectives on a single issue or on several issues.	Subject to sampling bias. Must have some means to verify or corroborate information.	Obtain in-depth information and background knowledge, compare different project strategies and understand specific and systemic barriers	Key informants are a main source of information and include: NPD, national UNDP/SRED staff, selected COF representatives, and NCC. Cross-checking information is important to reduce biasing. Cultural and language barriers are an issue.	SRED team and UNDP M&E experts to select key informants and specify what information is expected from them.
8. Expert Panels	A peer review, or reference group, composed of external experts to provide input on technical or other substance topics covered by the evaluation.	Adds credibility. Can serve as added (expert) source of information that can provide greater depth. Can verify or substantiate information and results in topic area.	Cost of consultancy and related expenses if any. Must ensure impartiality and that there are no conflicts of interest.	To provide input on technical and other substance topics.	SRED encompasses a whole range of technologies. Deployment of (some of) these at a larger scale requires technical maturity and creating conditions for sustainability. Expert panels or external consultancies can review each technology, assess their present status, and issue recommendations for improval. This work could feed into the "technical packages" (see 2: Extant reports) to prepare the terminal evaluation. *It is recommended to carry out expert reviews for some of the technologies (selected after internal pre-screening).*	External experts (to be contracted)
9. Case Studies	Involves comprehensive examination through cross comparison of cases to obtain in-depth information with the goal to fully understand the operational dynamics, activities, outputs, outcomes and interactions of a development project or programme.	Useful to fully explore factors that contribute to outputs and outcomes.	Requires considerable time and resources not usually available for commissioned evaluations. Can be difficult to analyse	--	Not considered given the incipient stage of the SRED interventions. Instead, the Programme can try to produce initial "best practices" for replication.	--

Applicable methods: (1) M&E System (needs revision); (2) extant reports; (4) interviews; (5) on-site observation; (7) key informants.

Suggested methods: (8) expert panels;

Additional methods: Workshop (not listed in table).