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- 1) 式次第
- 2) 出席者リスト
- 3) 連絡事項
- 4) EUMP プレゼン資料
- 5) JCC 会議メモ

Appendix 2-4 事務担当 CP の自己評価シート

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- 1) 式次第
- 2) 出席者リスト
- 3) EUMP プレゼン資料
- 4) JICA プロジェクトチーム資料
- 5) JCC 会議メモ

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## A-1：状況写真

(経営・事務管理、土木、発電技術、送電)



EDCへの移管セレモニー

2010年6月8日

MIME, モンドルキリ州政府による  
モンドルキリ電力公社のEDCへの  
移管式 (MIME, EAC, EDC, モンドル  
キリ州政府、JICA Study Team  
約100名が出席)



EDC総裁の水力発電所視察

2010年6月8日

EDC総裁 (H. E. Keo Rottanak) が  
現地オモレン水力発電所を視察  
し、運転スタッフを激励した。



モンドルキリ州政府との協議

2010年9月27日

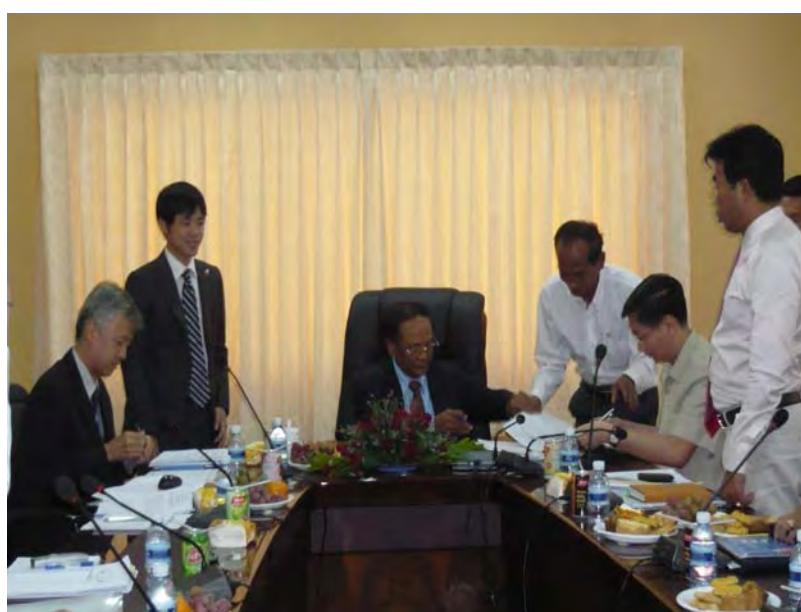
JICA終了時評価ミッションによ  
るモンドルキリ州政府への説明  
とインタビュー



モンドルキリ電力公社との協議

2010年9月27日

JICA終了時評価ミッションによるモンドルキリ電力公社への説明とインタビュー



JICAプロジェクト終了時評価調査

2010年10月4日

JICA終了時評価ミッションによるMIMEとの協議終了による議事録作成



第4回JCC会議

2010年10月4日

MIME長官、EAC総裁（代理）、EDC総裁・副総裁、DIME局長、EUMP所長他、JICAカンボジア事務所、JICAスタディーチームによる第4回JCC会議が開催され、第2年次業務の経過報告が承認された。（約50名出席）

カンボジア国モンドルキリ州小水力地方電化計画の運営・維持管理プロジェクト  
第2年次業務中間報告書 実施状況写真



組織・事務管理自己評価

2010年12月11日

モンドルキリ電力公社 (EUMP)  
スタッフとの自己評価と改善度  
の協議



小水力発電セミナー

2011年2月22日

JICAスタディーチームによる  
EDCへの小水力発電技術のセミ  
ナーを実施した。  
(出席者約28名)



第5回JCC会議 (最終)

2011年2月23日

MIME長官、EAC総裁、EDC総裁(代  
理)、DIME局長、EUMP所長他、  
JICAカンボジア事務所、JICAス  
タディーチームによる第5回JCC  
会議が開催され、第2年次業務の  
財務、技術、2011年度の業務方  
針が承認された。(約50名出  
席)

カンボジア国モンドルキリ州小水力地方電化計画の運営・維持管理プロジェクト  
第2年次業務中間報告書 実施状況写真



2年次業務開始

2010年5月31日

EDC副総裁、JICA事務所  
EUMP社長他、JICAチーム

2年次業務インセプションレ  
ポートの説明およびEDC移管へ  
の体制について協議



EDCへの移管セレモニー

2010年6月8日

EDCへ移管後、EDC総裁による新  
支店長、副支店長への辞令交付



EDCの現場視察

2010年6月4日

EDC本社スタッフによるオモレ  
ン水力発電所視察・協議



カンボジア国モンドルキリ州小水力地方電化計画の運営・維持管理プロジェクト  
第2年次業務中間報告書 実施状況写真



JICAプロジェクト終了時評価調査  
2010年9月27日

JICA終了時評価ミッションによるEDCモンドルキリ支店への説明とインタビュー

0



EDCモンドルキリ支店管理棟他  
2010年10月6日

EDCモンドルキリ支店による駐車場、予備品・機材格納庫増設状況

8



国道76号線状況

2010年10月9日

プランパーカイセマーモンドルキリ州への国道76号線全舗装開通によるアクセスの向上  
(写真はモンドルキリからカイセマに向かう)

カンボジア国モンドルキリ州小水力地方電化計画の運営・維持管理プロジェクト  
第2年次業務中間報告書 実施状況写真



2年次業務開始

2010年5月24日

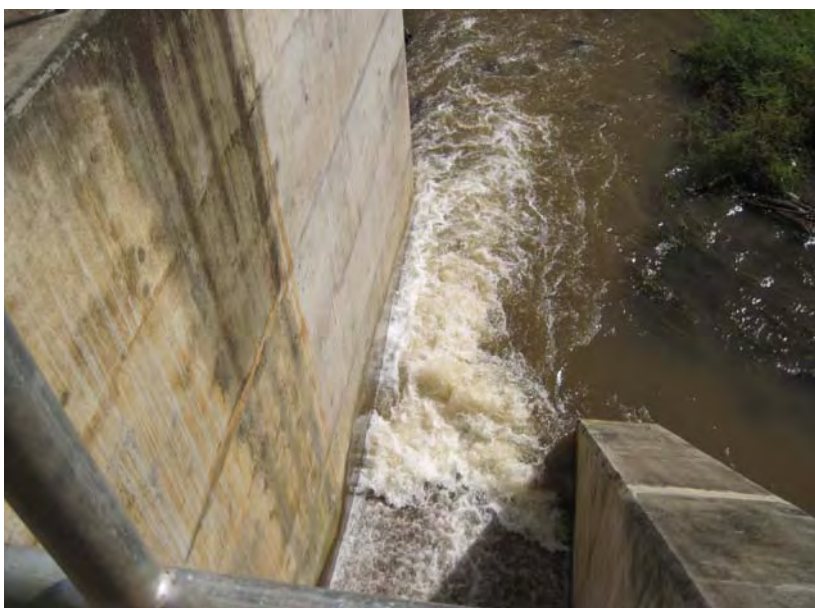
EUMPスタッフへの業務状況インタビュー



土木測水・ダム堆積状況

2010年5月21日

オロミスダム取水口前面での堆泥厚測定



オロミスダム排砂

2010年10月6日

オロミスダム取水口付近の排砂・泥のためのゲート開門状況

A-1-6



ヘッドタンクからの越流状況

2010年10月7日

河川流量増加に伴い、オロミスヘッドタンクからの越流状況（発電機出力は定格の185kWで運転中）



オモレンダム貯水状況

2010年10月7日

河川流量増加に伴い、オモレンダムは満水位を超えダム堤から越流を継続中（発電機出力は定格の185kWで運転中）



オモレンダム貯水状況

2010年10月7日

河川流量増加に伴い、オモレンダムは満水位を超えダム堤から越流を継続中（発電機出力は定格の185kWで運転中）





オロミス発電所定期点検  
2010年6月3日

第3回定期点検（運開後1.5年）EOM スタッフによる発電機回路絶縁抵抗測定



オロミス発電所定期点検  
2010年6月2日

第3回定期点検（運開後1.5年）EOM スタッフによる水車サーボモータ装置点検 調整試験



オモレン発電所定期点検  
2010年6月5日

第3回定期点検（運開後1.5年）EOM スタッフによる発電機内部点検および清掃





電気技術職への自己評価

2010年6月16日

技術移転能力評価のための第1回自己評価を実施した



電気技術職へのOJT

2010/6/7-8

オモレン水力発電所における電気シーケンス、部品機能、制御盤の現場状況



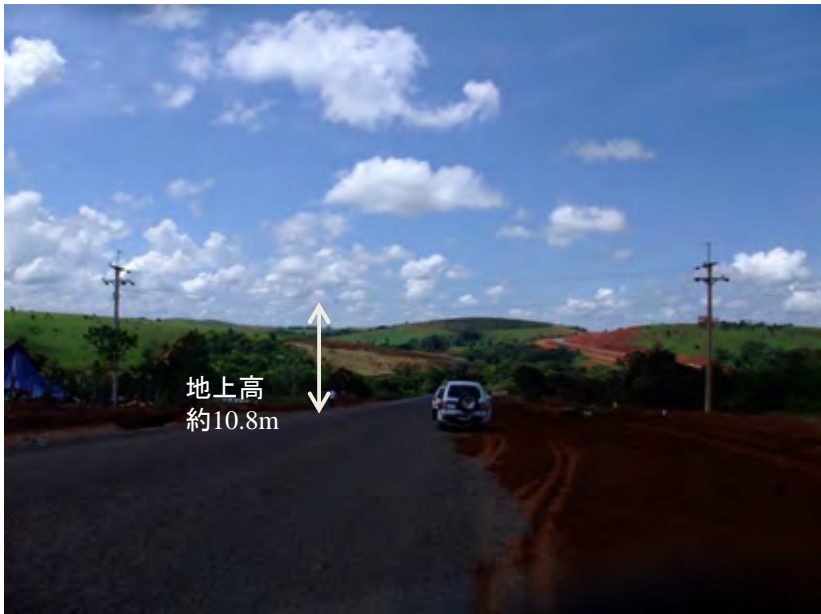
電気技術職へのOJT

2010/6/7-8

電気技術職（約12名出席）への電気理論、シーケンス、ブロック図、取扱説明書などの技術移転研修



カンボジア国モンドルキリ州小水力地方電化計画の運営・維持管理プロジェクト  
第2年次業務中間報告書 実施状況写真



22kV送電線パトロール  
2010年5月21日

オロミス付近道路横断状況  
地上高は規定どおり足りている



自己評価  
2010年5月22日

送電線CPへの自己評価と面談



現地研修  
2010年5月23日

電力技術基準およびEDC Design Standard説明と技術移転研修

カンボジア国モンドルキリ州小水力地方電化計画の運営・維持管理プロジェクト  
 第2年次業務中間報告書 実施状況写真



ベトナム連系線計画

2010年5月22日

既設ベトナム22kV 連系線 Svayriengスイッチングステーションの調査 (モンドルキリ電力系統連系計画のための現地調査)



現地研修

2011年12月14日

配電線設計ガイドラインのレクチャー



日常保守点検

2011年12月18日

予防保全の伐採状況



## A-2：経営・事務管理関連資料

**Appendix 2-1** EUMP 組織図（2011年2月時点：EDC 移管後）

**Appendix 2-2** ベトナム連系後の電気料金試算（1<sup>st</sup>：超概算）

**Appendix 2-3** 第4回 JCC 資料（JICA 終了時評価資料は除く）

- 1) 式次第
- 2) 出席者リスト
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- 5) JCC 会議メモ

**Appendix 2-4** 事務担当 CP の自己評価シート

**Appendix 2-5** 第5回 JCC 資料

- 1) 式次第
- 2) 出席者リスト
- 3) EUMP プレゼン資料
- 4) JICA プロジェクトチーム資料
- 5) JCC 会議メモ

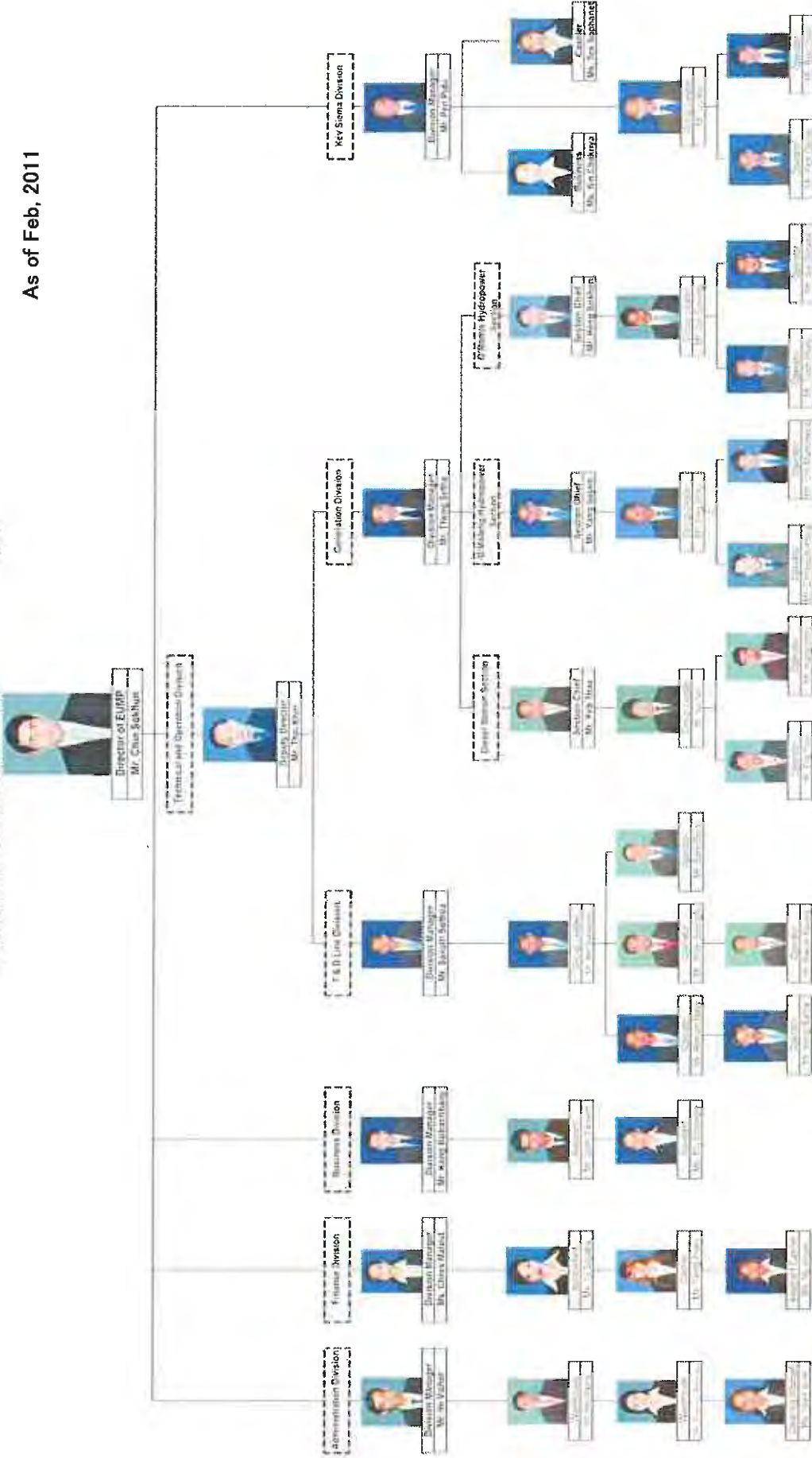


# ආචාර්ය කුමාරසේන මහතාගේ මණ්ඩලයේ

## Appendix 2-1

### ORGANIZATION CHART OF ELECTRICITY UNIT OF MONNET KIRI

As of Feb, 2011



Example of Assumed Tariff Rate after connection with Viet Nam (Second version)  
(Simplified and Approximate calculation)

Item	Unit	: Input data		Future Condition : Connected with Vietnam Energy Demand Level : 3,000MWh more than double of 2009
		Present Condition : Isolated net work using D/G Energy Demand Level : Year 2009	Energy Demand Level : Year 2009	
<b>I. O&amp;M Cost (Depreciation of construction is not included)</b>				
1. Total (Annual)				
a Ration supply energy	MWh/year	100%	100%	100%
b Energy sold	US\$/year	1,050	year 2009 level	3,000
c Salary and overhead cost	US\$/year	200,000	nearly actual record	220,000
d Fuel Cost for D/G	US\$/year	110,250	(p*m): coefficient 0.35 kWh/litter	31,500
e Import energy cost	US\$/year	N.A		143,414 (x*s): from Vietnam to Mondul kiri
f Sub-total	US\$/year	310,250	(c+d+e): excluding depreciation cost	394,914 (x+d+e): excluding depreciation cost
2. Hydropower				
h Ration supply energy	%	70%	Conservative side	47%
i Energy by hydropower	MWh/year	735	(b*h): About 60% of Energy is no used caused by energy demand pattern, Surplus energy	1,400
j Salary and overhead	US\$/year	140,000	(c*h): Cost allocation in line with amount of each energy source	102,667 (c*h): Cost allocation in line with amount of each energy source
k Generation Cost of Hydropower	US\$/kWh	0.19	(j/i):	0.07 (j/i):
3. D/G				
l Ration supply energy	%	30%	(a-h):	3%
m Energy by D/G	MWh/year	315	(b-i): Auxiliary power source	90 (b*i): Auxiliary power source
n Salary and overhead	US\$/year	60,000	(c*i): Cost allocation in line with amount of each energy source	6,600 (c*i): Cost allocation in line with amount of each energy source
o Generation Cost excluding Fuel cost	US\$/year	0.19	(n/m): nearly same value of hydropower	0.07 (n/m): nearly same value of hydropower
p Fuel Cost	US\$/kWh	0.35	1US\$ per litter	0.35 1US\$ per litter
q Generation Cost of D/G	US\$/kWh	0.54	(o+p):	0.42 (o+p):
4. Import Energy from Viet Num				
r Ration supply energy	MWh/year	N.A.		50%
s Energy imported from Viet Num	US\$/year	N.A.		1,510 (b*r): Auxiliary power source
t Salary and overhead	US\$/year	N.A.		117,333 (c*r): Cost allocation in line with amount of each energy source
u O&M cost for T/D	US\$/kWh	N.A.		0.08 (t/s): O&M cost for additional T/D
v Electric price at the border	US\$/kWh	0.069	FOB price from Vietnam in 2008 base	0.069 FOB price from Vietnam in 2008 base
v2 Import tax and VAT	%	0.012	7% of import, 10% of VAT	0.012 7% of import, 10% of VAT
w Transmission loss	%	N.A.		15% Loss ratio: shall be analyzed in detail
x Electric Cost including T/D loss	US\$/kWh	N.A.		0.095 (v2*(1-w)):
y Energy Cost of imported at demand point	US\$/kWh	N.A.		0.17 (u+x):
5. Combined Energy Generation Unit Cost				
g Energy Generation Cost	US\$/kWh	0.30	(f/b)	0.13
<b>II. Revenue</b>				
z Income ( considering commercial loss and including provision and profit)	US\$/kWh	0.37	5% revenue loss, 10% provision and 10% of profit	0.16 5% revenue loss, 10% provision and 10% of profit

## Remind !

1. Unit Cost of Energy is not Constant. It's depend on amount of energy sold.
2. This sheet does not include Construction Cost of Transmission Line from Vietnam. (No depreciation cost)
3. This sheet shows that unit cost of hydropower will decrease after connection with Vietnam

4<sup>th</sup> JCC Meeting of the Project for Operation and  
Maintenance of the Rural Electrification on  
Micro-Hydropower in Mondul Kiri Province

Date : A.M. 8:30~11:30 4<sup>th</sup> October, 2010

Place : Meeting Room of Ministry of Industry, Mine and Energy, Phnom Penh

1. **Opening Address** : H.E. Ith Praing, Chairman of Joint Coordination Committee  
Secretary of Sate, MIME

2. **Address by JICA** : Mr. Yasujiro Suzuki, Chief Representative, JICA Cambodia Office

3. **Introductions of the Participants by themselves**

(A.M 9:20)

4. **Agenda**

1) **General Progress: JICA Project Team (10')**

Mr. Koji Mishima, Chief Advisor of the Project

2) **Report of EUMP's Performance in 2010 (20')**

Mr. Chin Sokhun, Chief of Electricity of Mondul Kiri, EDC

\*\*\*\*\* Coffee Break (10') \*\*\*\*\*

3) **Explanation of Terminal Evaluation for the Project (60')**

Mr. Takanobu Shinoda, Representative, JICA Cambodia Office,

Ms. Ayako Watanabe, Consultant for Evaluation Analysis

- i) Purpose
- ii) Schedule
- iii) Evaluation method
- iv) Result of evaluation
- v) Lessons Learned
- vi) Recommendations

4) **Others**

5) **Signing of the Minute of Meeting**

5. **Closing**

បញ្ជីវគ្គបរទេស ៧៤២ JCC

2010/10/4

កិច្ចប្រជុំលើកទី៤ គណៈកម្មាធិការប្រឆាំងបេសកកម្មរបស់គំរោងដំណើរការ  
និងថែទាំវារីអគ្គិសនីខ្នាតតូចបំផុត នៅតំបន់ជាប់ស្រុកយ៉ាង ខេត្តមណ្ឌលគីរី  
ថ្ងៃទី ០៤ ខែ តុលា ឆ្នាំ ២០១០ វេលាម៉ោង ៨:៣០នាទី

ល.រ	ឈ្មោះ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា
១	ឯកឧត្តម វ៉ាន់ ក្រាំង	នាយករង	NIME		
២	ឯកឧត្តម សេង ភ័ន្យ	នាយករង	NIME		
៣	ចាន់ សុភីរិក្ខ	អគ្គ.ល	EDC	០១២៨១៥៤៥៤	U
៤	ហ៊ុន ឡាន	លេខាធិការ	EAC	០១១៥៥៧៦៦៧៧	[Signature]
៥	ឯកឧត្តម វ៉ាន់ ក្រាំង	នាយករង	EDC	០១១៤១៤៨២៨	[Signature]
៦	ឯកឧត្តម វ៉ាន់ ក្រាំង	នាយករង	NIME	០១១៧៨១១៦៨១	[Signature]
៧	ឯកឧត្តម វ៉ាន់ ក្រាំង	នាយករង	NIME	០១២៩៤៤៥៣៩	[Signature]
៨	ឯកឧត្តម វ៉ាន់ ក្រាំង	នាយករង	EDM	០១២៣៨៩៤៨៥	[Signature]
៩	Yamakawa Hirokatsu	Volunteer	EDC (JICA)	០១២៩៨៧២៥៣	[Signature]
១០	Takahito Oikawa	Advisor	JICA Team		[Signature]
១១	Junya SHINOHARA	Advisor	JICA Team	០១៧៤៥០០៨៧	[Signature]
១២	Yukitaka HIRAGA	Advisor	JICA study team	០១៧៤៦៧៦២៣	[Signature]
១៣	Koji MISHIMA	Chief Advisor	JICA study team	០១២-២៩៩-០៧១	[Signature]
១៤	Ayako WATANABE	Member	JICA Mission		[Signature]
១៥	Kry Meng Aug	Staff	JICA study team	០១២-៦៩៧៧៧៦	[Signature]
១៦	Takanobu Shinoda	Representative	JICA Cambodia Office	០១២-៩០៧៦៥៣	[Signature]
១៧	Yukihiko KOBAYASHI	Senior Representative	JICA Cambodia	០១២ ៩០៧៦០៨	[Signature]
១៨	Yuto KANEMATSU	Staff	JICA CAMBODIA	០១២២២២៧៣៩	[Signature]
១៩	សា. វ៉ាន់ ក្រាំង	នាយករង	NIME	០៨៨៨៨០៧៧៦៧	[Signature]
២០	អគ្គ.ល	អគ្គ.ល	NIME		[Signature]
២១	អគ្គ.ល	Deputy Director	NIME		[Signature]
២២	PEN PHA	Chief of operation office	EDC	០១២ ៨៥៤ ២៥៦	[Signature]

២៣. HENG PISETH officer, EDC ០១៧៧៧០៦៨ [Signature]

២៣	ស្រី ឆាយ	អគ្គនាយក	EPC	011 771976	ឆាយ
២៤	លោកស្រី កែវ រតនៈ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង			
២៥	ស្រី ណារី	អគ្គនាយក	MIME	012 921133	MIME
២៦	លោក ឆាយ		EPC	011 762224	ឆាយ
២៧	លោកស្រី គុណ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង		097 566688	គុណ
២៨	ស្រី ឆាយ	ប្រតិភូ	MIME		ឆាយ
២៩	ស្រី ឆាយ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	099 7699488	ឆាយ
៣០	ស្រី ឆាយ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	097 7979211	ឆាយ
៣១	ស្រី ឆាយ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	EPC	097 9501011	ឆាយ
៣២	ស្រី ឆាយ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	EPC	097 707776	ឆាយ
៣៣	ស្រី ឆាយ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	EPC	011 788262	ឆាយ
៣៤	ស្រី ឆាយ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	012 249090	ឆាយ
៣៥	ស្រី ឆាយ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	097 7622017	ឆាយ
៣៦	ស្រី ឆាយ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	MIME	010 295727	ឆាយ
៣៧	ស្រី ឆាយ	ប្រតិភូការងារគ្រប់គ្រងគម្រោង	MIME	016 322198	ឆាយ
៣៨	ស្រី ឆាយ	Local Coordinator	JICA Project Team	017 342122	ឆាយ
៣៩					
៤០					
៤១					
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## **Modification of the part of work plan for 2<sup>nd</sup> period**

### 1. The medium and long term business strategy and financial budget's plan

The mid/long-term strategy has the feature as “rolling plan” which should be reviewed and revised, if necessary, by comparing the results of the year and the prospect for the coming years. The one for the first year was prepared mainly by JICA Team and simultaneously utilized for transferring concerned technologies/skills to EUMP C/P staff.

#### 1) Management matter

It became unnecessary due to the transfer of EUMP to EDC on 8<sup>th</sup> June 2010, since EDC has its own management strategy covering the whole structure of the company including EUMP.

#### 2) Technical Engineering matter

No change

### 2. Revision of the management and administration manuals

#### 1) Management matter

After the transfer, EUMP came to be expected to follow the regulations of EDC, which is in the process of applying the same regulations to the whole company including EUMP. Therefore, revision of previous manual is not necessary.

#### 2) Technical Engineering matter

No change

## 第4回 JCC 会議メモ

1. 日時 : 2010年10月4日(月) 8:30-12:00
2. 場所 : MIME 3F 会議室
3. 出席者 : MIME, EAC, EDC, EDC/EOM, JICA, JICA study team(計約50名)
4. 議題 :
  - 1) Opening Address : H.E. Dr. Ith Praing, Chairman of Joint Coordination Committee  
Secretary of State, MIME
  - 2) Address by JICA : Mr. Yasujiro Suzuki, Chief Representative, JICA Cambodia Office
  - 3) Address by EDC : H.E. Mr. Chan Sodavath, Deputy Managing Director, EDC
  - 4) Introductions of the participants by themselves: (A.M 9:20)
  - 5) Agenda
    - (1) General progress: JICA Project Team (10')  
Mr. Koji Mishima, Chief Advisor of the Project
    - (2) Report of EUMP's Performance in 2010 (20')  
Mr. Chin Sokun, Chief of Electricity of Mondul Kiri, EDC, EUMP  
\*\*\*\*\* Coffee break (10') \*\*\*\*\*
    - (3) Explanation of Terminal Evaluation for the Project (60')  
Mr. Takanobu Shinoda, Representative, JICA Cambodia office,  
Ms. Ayako Watanabe, Consultant for evaluation analysis
    - (4) Signing of the Minute of meeting
  - 6) Closing
5. 内容 :
  - 1) Mr. Ith Praing 挨拶
    - ・ EDC への移管の目的は、EUMP をよりよい商業運営するためである、
    - ・ EUMP が Board を作るにはあまりにも小さい、
    - ・ EDC はカンボジアの法律によって運営されているので、EUMP も守る必要がある。
  - 2) 小林次長 JICA 事務所あいさつ
  - 3) 一般経過報告 (JICA チーム三島)
    - ・ 業務・中長期計画報告、
    - ・ 技術報告
    - ・ O&M マニュアルの見直しは、EDC が今後実施することとなった。JICA チームは変更点のみを修正に加える。
  - 4) EUMP からの事業報告 (Mr. Chin Sokun)
    - ・ 事務、会計、技術報告が発表された。(P.P 報告書参照)

5) EDC 総裁挨拶

- ・ EUMP の報告をうれしく思う、
- ・ また、MIME,DIME,EUPM/JICA の協力にも感謝している、
- ・ EDC に移管されたことを歓迎し、今後も EUMP を成長させたい、
- ・ 評価ミッション MOM の内容については全て賛成します、
- ・ 今後は、設備の有効活用が重要であり、組織を十分にして、長く発電運用できるようにしたい、そのためには、(1) 人材育成、(2) 情報の共有化、(3) EUMP の成長、(4) 部品交換の予算確保、(5) 部品リストの用意が重要である、
- ・ EDC として5-10年後にその効果が出るようにしたい、
- ・ 今後はミニ hidro を開発して行きたい。

6) MIME 次官 (Mr.Ith Praing) 挨拶

- ・ うまくいった Project であるので、体外的に発表することが必要である、
- ・ 第3の水力発電所も開発したいし、東北(ラタナキリ)地方などの小水力も開発したい。

以上





モンドルキリ州小水力地方電化計画の運営・維持管理プロジェクト  
JICAを通じた日本政府からの無償援助

このプロジェクトがスタートしたのは2007年8月3日終了したのは2008年10月15日

本格的に稼動したのは2009年2月23日

JICAの運営・維持管理プロジェクト（O&M）が始まったのは2008年11月 終了は2011年3月



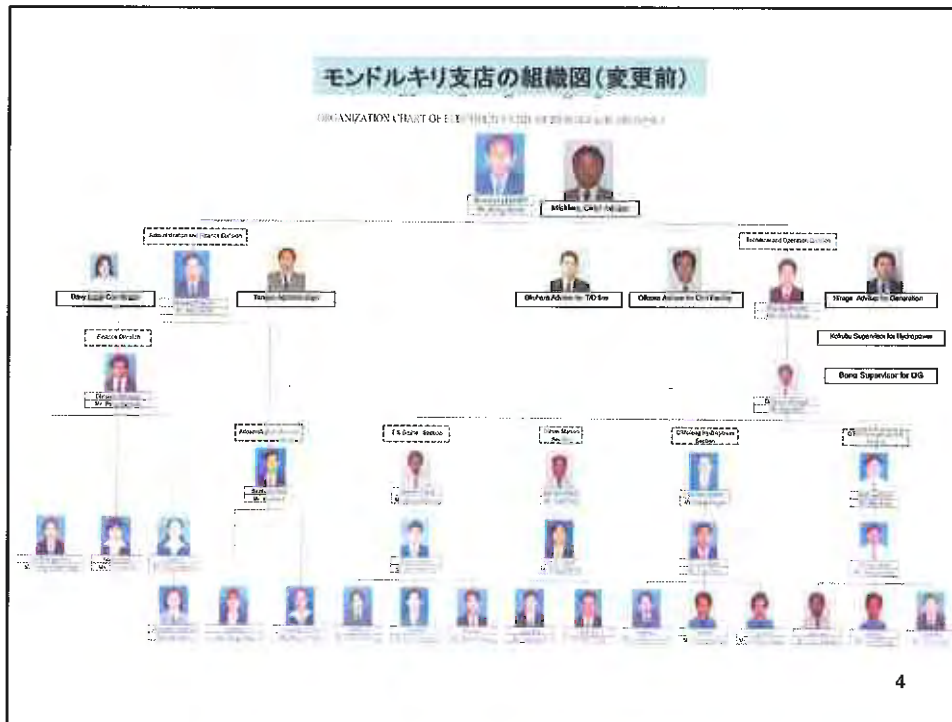
1

目次

1. 経営管理組織とその仕事内容
2. モンドルキリ州都における電力の供給状況
3. EDCモンドルキリ支店の経理と経営状況
4. 維持・管理と発電の状況
5. 電力の開発戦略の指針

2

1. 経営管理組織とその仕事内容



2007年12月1日にEUMPはその活動のために日本側より車1台を受け取りました。



5

2008年3月27日にEUMPは技術部のために日本側より車1台を受け取りました。



6

モンドルキリ電力

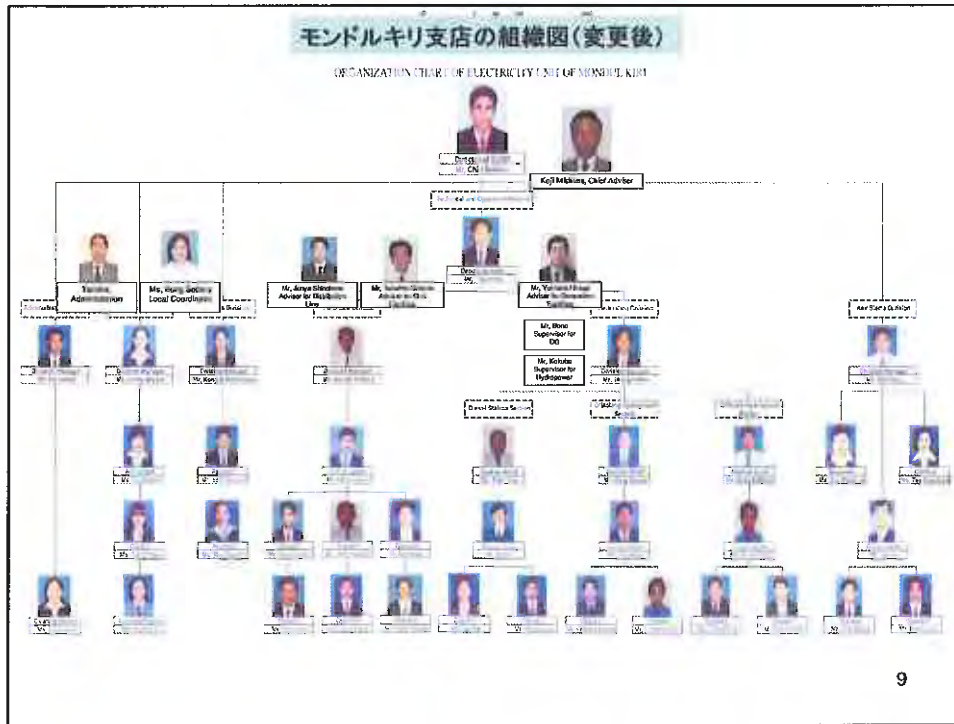
- ・2007年～2010年6月7日までEUMPはMIMEとDIMEの管理下にありました。
- ・2010年6月10日以降EDCの管理へと移動しました。

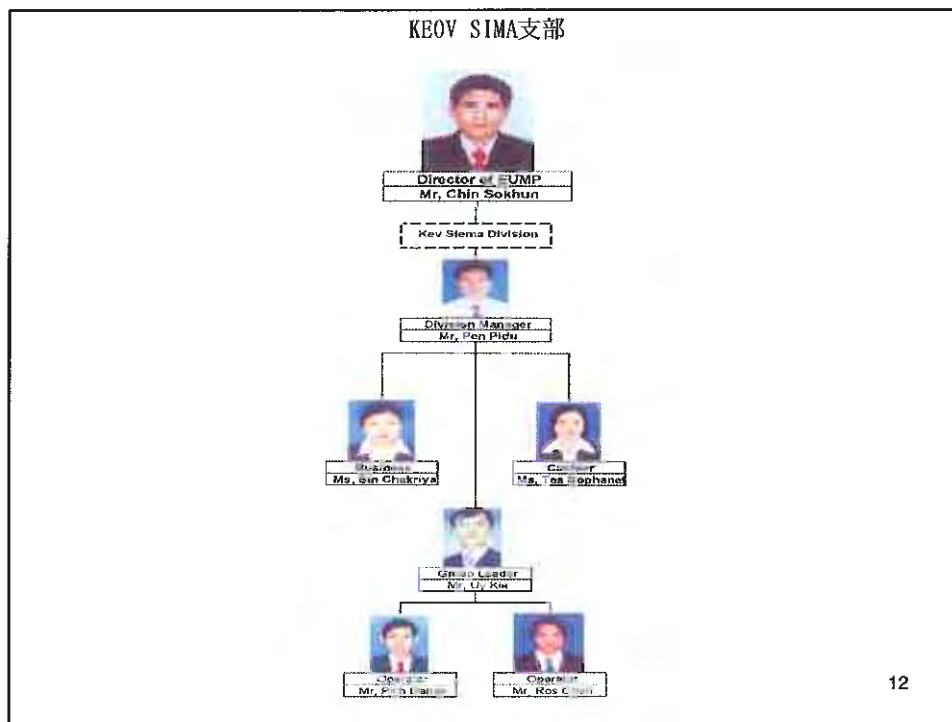
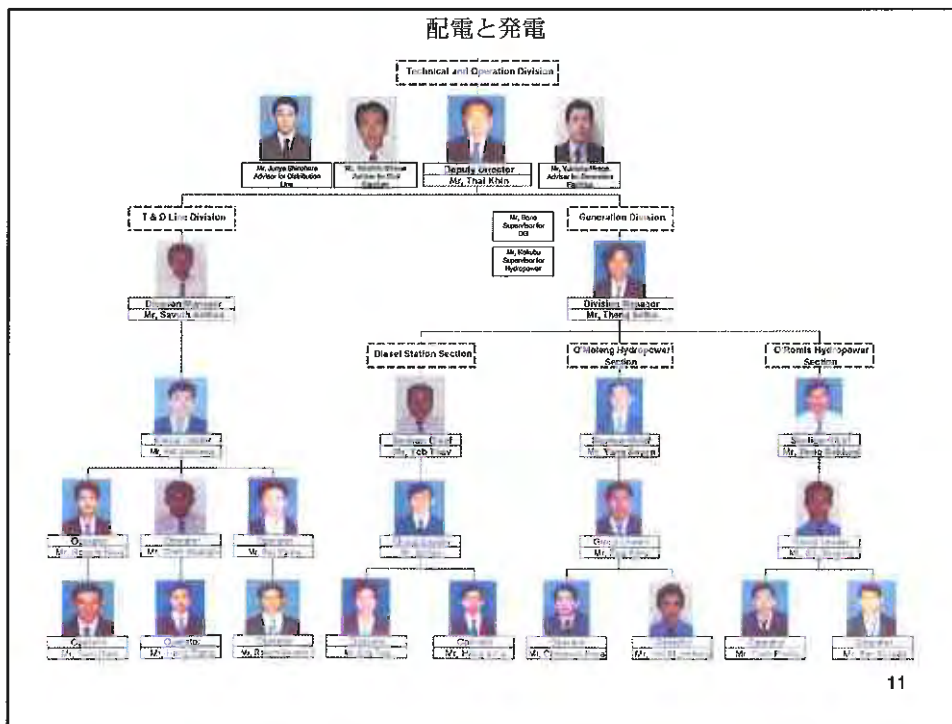
7

2010年6月8日にEDCへの移管式典が行われ、MIMEのIth Praing次官が  
スイセム大臣の代理とそて出席されました



8





2010年9月17日 技術的な仕事のために、EDC本部から車1台を受け取りました。  
(KEOV SIMA支部用)



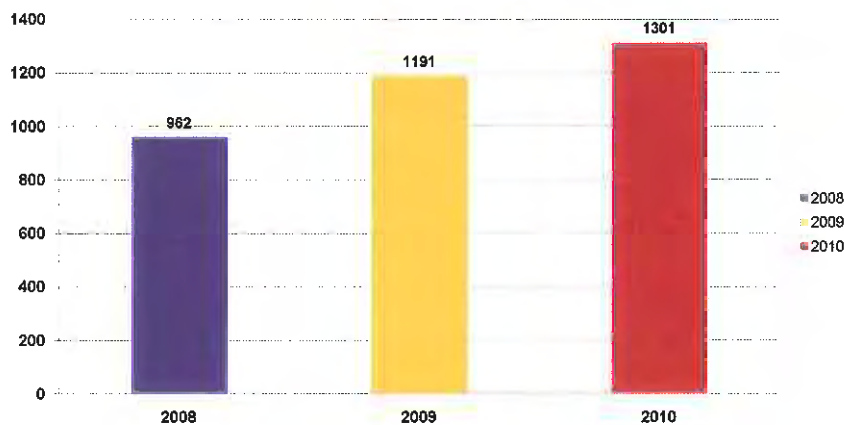
13

## 2. モンドルキリ州都における電力の供給状況

14

このグラフは利用者数を表す。2008年は962軒、2009年1191軒、2010年8月までは1310軒が利用している。

Increase Customer to 2008-2010

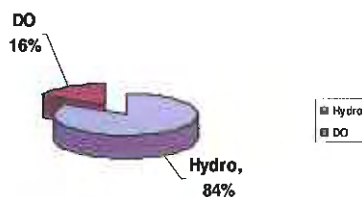


15

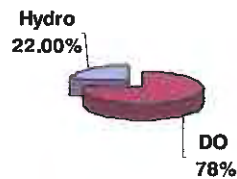
モンドルキリ支店の発電状況

I- Generation	Unit	2008-2009 14 months	Jan-Aug/2010 8 months
DG installed capacity	KW	300	300
Hydro installed capacity	KW	370	370
Total generation	MWh	1,427	1,196
Generated by DO	MWh	216	928
Generated by Hydro	MWh	1,211	268

Generation for 2008&2009



Generation Jan-Aug In 2010





3. EDCモンドルキリ支店の経理と経営状況

17

モンドルキリ支店の電力の販売状況

II - Commercial	Unit	2008-2009	Jan-Aug 2010
<b>Customer Number</b>	<b>Conn</b>	<b>1,191</b>	<b>1,301 (8.45%)</b>
Residential	conn	1,046	1,141
Commercial	conn	73	75
Industry	conn	23	23
Government	conn	52	57
Other	conn	0	5
<b>Energy Sale</b>	<b>Mwh</b>	<b>1,151.366</b>	<b>997.895</b>
<b>Monthly Average</b>	<b>Mwh</b>	<b>82.24</b>	<b>124.74</b>
Average per customer	KWh/month	69	96
Residential	Mwh	718.115	478.990
Commercial	Mwh	293.301	309.347
Industry	Mwh	23.027	29.937
Government	Mwh	116.623	99.790
Other	Mwh	0	79.832

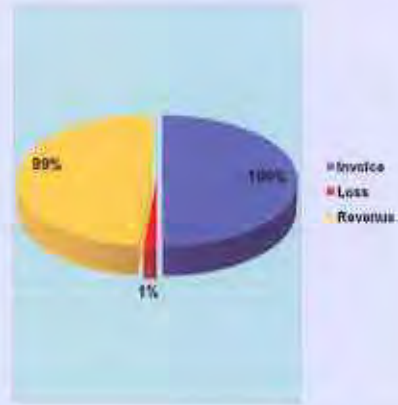
18

2008年～2009年における電力供給と電気代の回収状況

・2009年は州都の1500家族のうち、約73%の家庭に電力を供給した。

・2009年のEUMPの発電量は1,457,352KWhで、そのうち小水力発電所2ヶ所で12,151,535KWh、ディーゼル発電所で215,817KWh発電した。そのうち、1,151,366KWhを販売した。

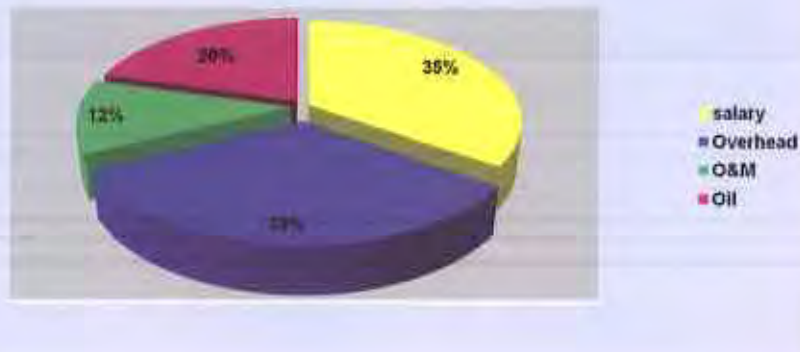
Income from Invoice 2008- 2009



19

このグラフは1年2ヶ月間の支出を表す。その内容は人件費35%、一般のオペレーションコスト33%、維持・管理・修理12%と燃料代20%となっていました。

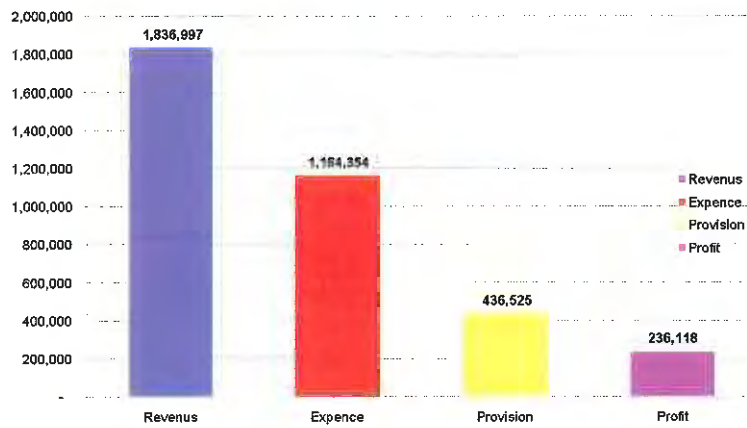
Expencc 2008-2009  
excluded Provision



20

このグラフは1年2ヶ月間の営業を表す。収入が47%、支出27%、利益と積立金26%となる。

Income Statement 2008-2009

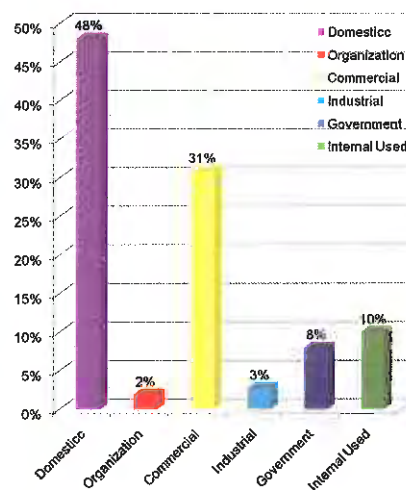


21

2010年の電力供給状況

- 2010年の州都の電化率は75%です。
- 2010年8月までのEUMPのそう発電量は11,956,032KWh、そのうち小水力発電所から267,276KWh、ディーセル発電所が928,756KWhでした。
- 2010年8月までの電力販売量は997,891KWhです。

Numers Costumers 2010

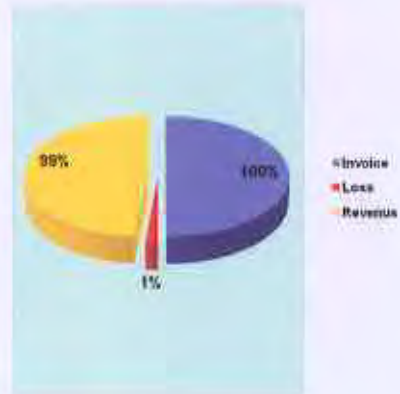


22

このグラフは電気代と支払い状況を表す2010年の8月までの分です。

- 2010年の州都の電化率は76%です。
- 2010年8月までのEUMPのそう発電量は11,956,032KWh、そのうち小水力発電所から267,276KWh、ディーゼル発電所が928,756KWhでした。
- 2010年8月までの電力販売量は997,891KWhです。

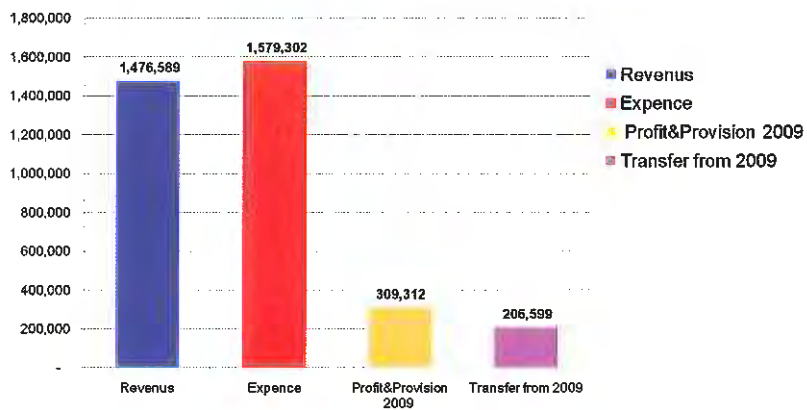
Income from Invoice 2010



23

このグラフは2010年8月までの営業を表す。収入41%、支出53%、そして、2009年の利益と積立金は9%でそのうち6%を使用しました。

Income Statement 8 Months 2010



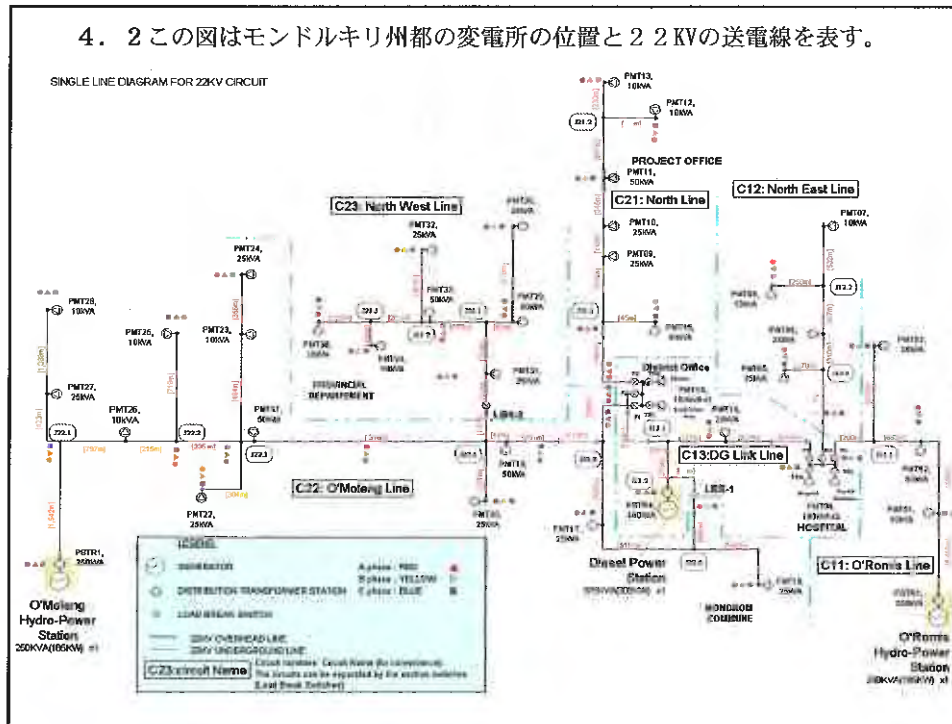
24

4. 維持・管理と発電の状況

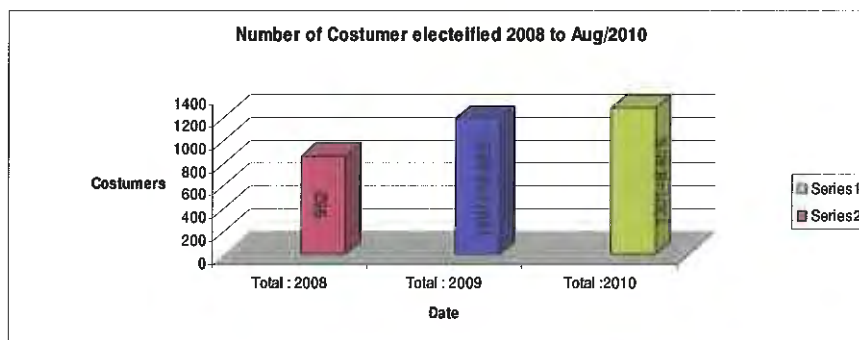
25

4. 1 この図はモンドルキリ州都の全ての総配電を表すものです。

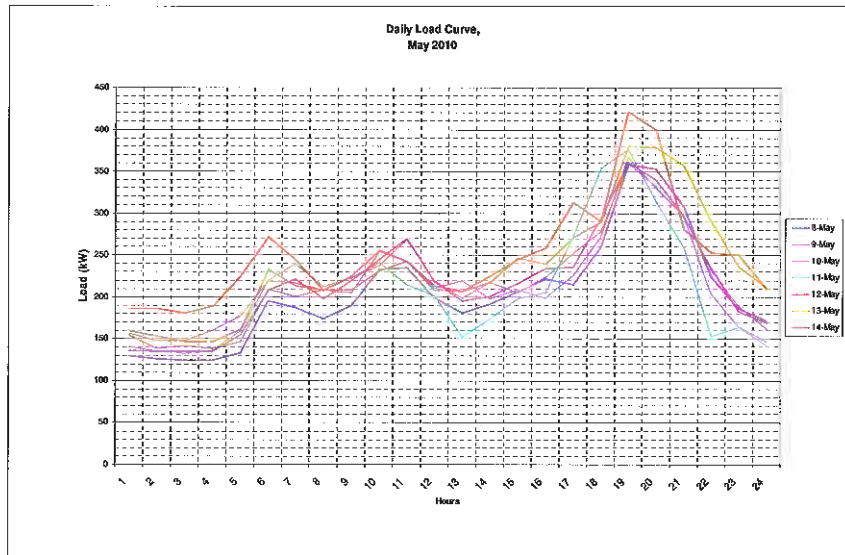




4.3 2008年～2010年8月の電力需要の増加  
 4.3.1 2008年～2010年8月の利用者の増加

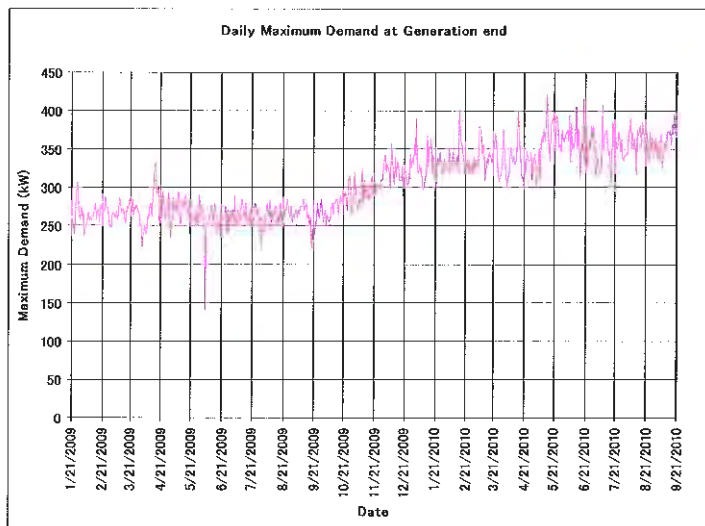


4.3.2 一日毎の負荷



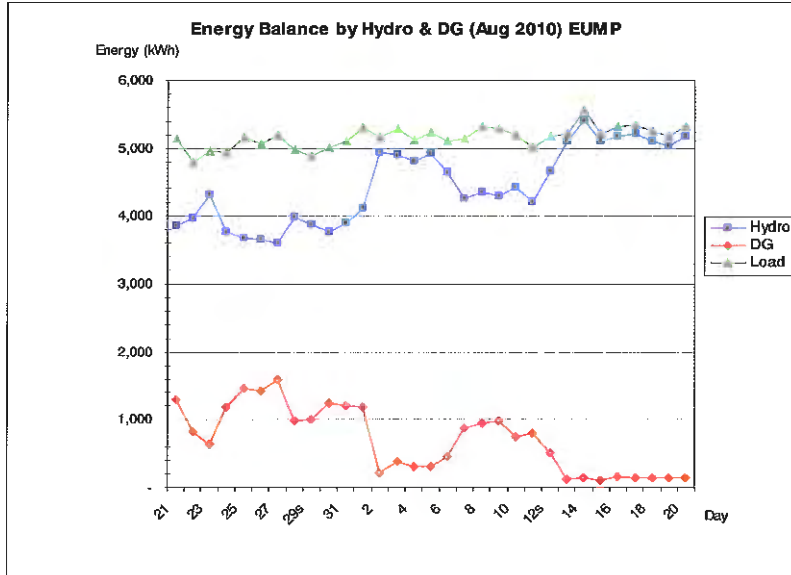
29

4.3.3 月毎の負荷



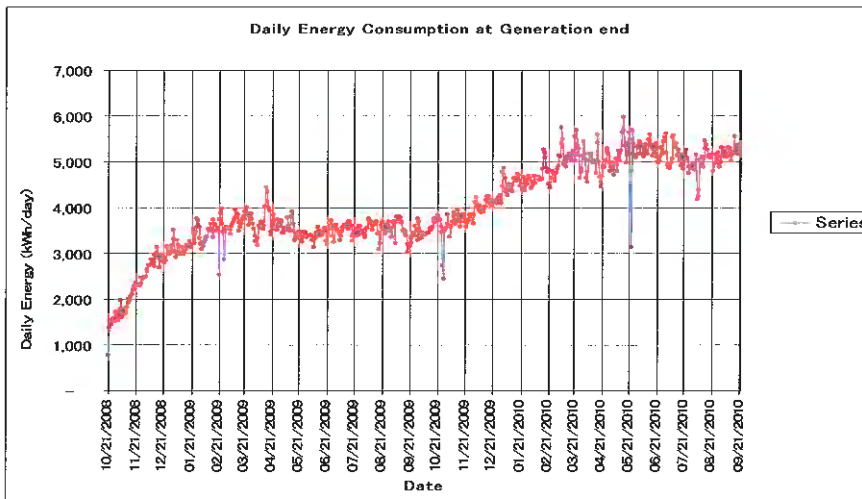
30

4.3.4 一日毎の発電量



31

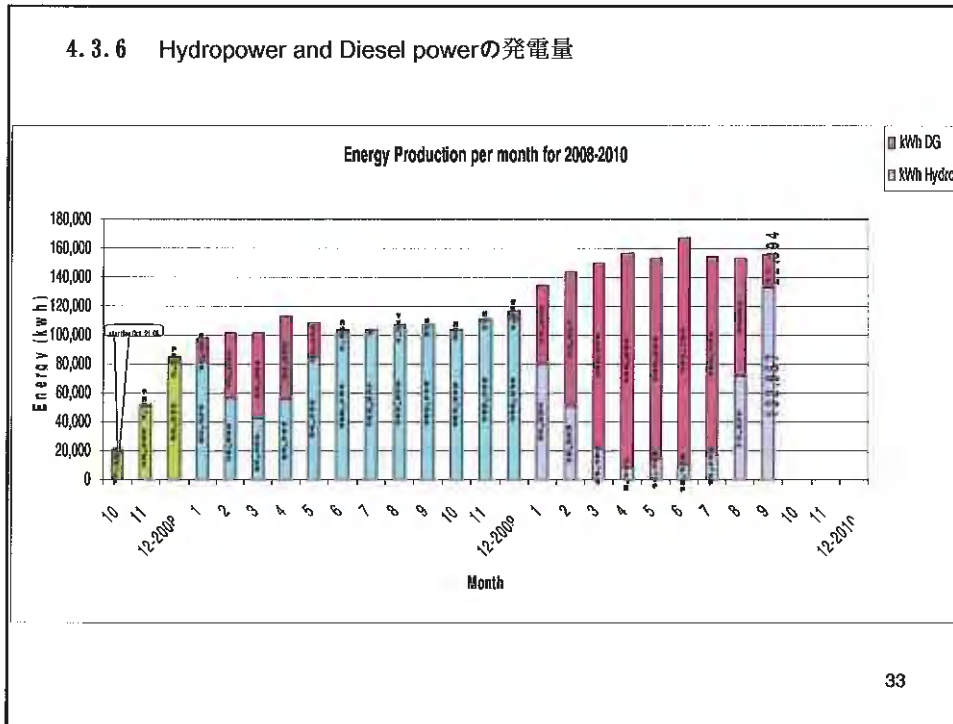
4.3.5 月毎の電力使用量



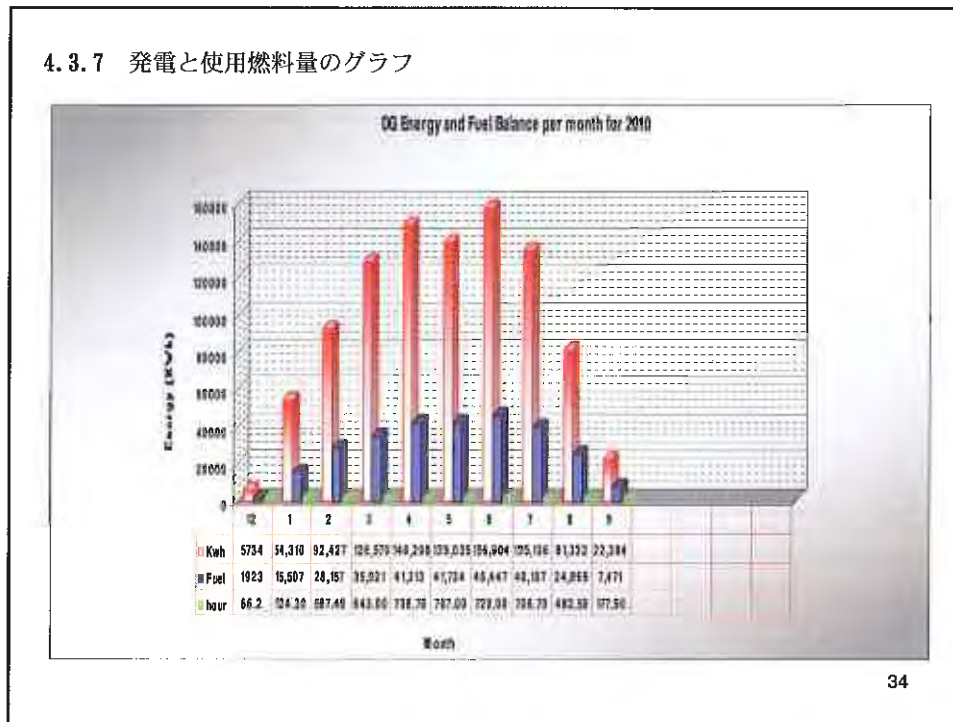
32



4.3.6 Hydropower and Diesel powerの発電量

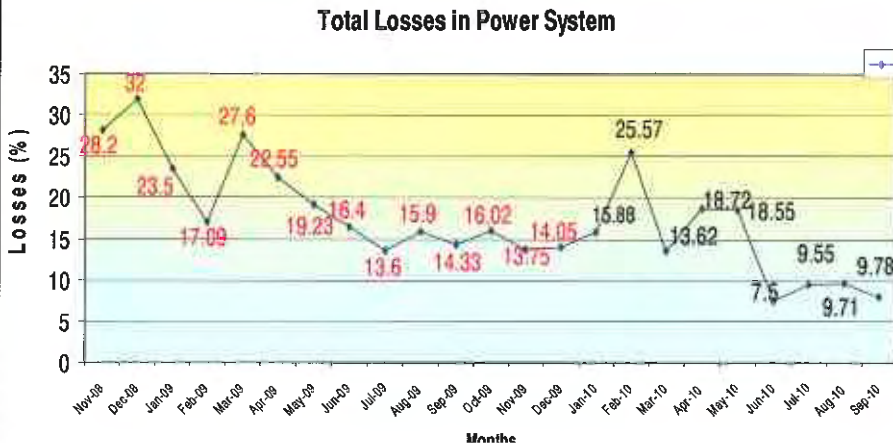


4.3.7 発電と使用燃料量のグラフ



4-3-8 Total losses per month in Power system

At the first month of commercial operation, the Energy losses is approximately 32 % high. But the losses is decreasing gradually in the following months, even if energy consumption is being increased.



4.4 維持・管理と見回り  
4.4.1 月毎の運転状況の表

Daily Operation Record (Hydropower)										Name of PS										O/Ranks										Date: 02 / August / 2010										Weather fine									
Time	Generator (V)			Hz	Speed	Prime Mover	GV	JCV	Var	Generator(A)	Cor	Line (V)			HV	GWH	SWH	Line(A)				Temperature (C)				Wind	Moist	Water																					
	RS	ST	TR									R	S	T				1	2	3	4	5	6	7	8																								
0100	400	400	400	50	1000	2.5	40	0	0	0	100	1	400	400	50	0022.1	70085.1	65	75	85	34	34	43	44	51	28	0																						
0200	400	400	400	50	1000	2.5	40	0	0	0	1	1	400	400	50		85			34	35	43	44	54	28	0																							
0300	400	400	400	50	1000	2.5	40	0	0	0	0	1	400	400	50		85			35	36	43	43	54	28	0																							
0400	400	400	400	50	1000	2.5	40	0	0	0	0	0.98	400	400	50		85			35	36	44	43	54	27	-5																							
0500	400	400	400	50	1000	2.5	40	0	0	0	0	0.98	400	400	50		85			34	32	42	43	52	27	-20																							
0600	400	400	400	50	1000	2.5	39	0	0	0	0	0.98	400	400	50	0022.5	70300.1	80	80	100	34	32	43	42	50	27	0																						
0700	400	400	400	50	1000	2.5	40	0	0	0	0	0.98	400	400	50		85			34	33	43	43	51	27	-5																							
0800	400	400	400	50	1000	2.5	40	0	0	0	0	0.98	400	400	50		85			34	37	41	43	51	27	-2																							
0900	400	400	400	50	1000	2.5	38	0	0	0	0	0.99	400	400	50		79			34	32	43	43	51	28	0																							
1000	400	400	400	50	1000	2.5	40	0	0	0	0	0.97	400	400	50		85			34	32	43	43	51	28	-5																							
1100	400	400	400	50	1000	2.5	40	0	0	0	0	0.97	400	400	50		85			34	33	44	44	51	28	-5																							
1200	400	400	400	50	1000	2.5	40	0	0	0	100	0.98	400	400	50	0027.4	70040.0	90	80	100	35	34	43	44	51	28	-5																						
1300	400	400	400	50	1000	2.5	38	0	0	0	0	1	400	400	50		80			35	34	43	44	51	28	-15																							
1400	400	400	400	50	1000	2.5	38	0	0	0	0	0.99	400	400	50		80			36	34	43	44	51	28	-15																							
1500	400	400	400	50	1000	2.5	35	0	0	0	0	0.96	400	400	50		80			36	34	43	44	51	28	-18																							
1600	400	400	400	50	1000	2.5	35	0	0	0	0	0.96	400	400	50		80			36	34	43	44	51	28	0																							
1700	400	400	400	50	1000	2.5	38	0	0	0	0	0.96	400	400	50		80			34	33	43	42	51	28	0																							
1800	400	400	400	50	1000	2.5	40	0	0	0	100	0.98	400	400	50	0030.1	70375.0	95	80	100	34	32	42	42	51	28	0																						
1900	400	400	400	50	1000	2.5	38	0	0	0	0	0.84	400	400	50		85			34	37	43	44	51	28	0																							
2000	400	400	400	50	1000	2.5	32	0	0	75	0	0.22	400	400	40		75			34	32	42	42	50	27	0																							
2100	400	400	400	50	1000	2.5	32	0	0	75	0	1	400	400	40		75			34	32	42	41	50	28	0																							
2200	400	400	400	50	1000	2.5	32	0	0	75	0		400	400	40		75			35	32	42	41	50	28	0																							
2300	400	400	400	50	1000	2.5							400	400	40					36	32	42	41	50	28																								
2400	400	400	400	50	1000	2.5							400	400	400																																		

Approved by Deputy Director Technical and Operation Div. \_\_\_\_\_  
 Co-ordinated by Chief \_\_\_\_\_  
 Name of Operator: \_\_\_\_\_ Total Running Hours: 11553.0  
 Signature: \_\_\_\_\_  
 (1) Mondu Kkiri (2) Sen Simeng (3) Touh Phally (4) Sor Shrandh  
 Note: (1) \_\_\_\_\_

4.4.2 月毎の運転状況をチェックする表

Daily Check list (1/2)  
Every morning at 8:00  
ការពិនិត្យតម្រូវការថ្លៃ ជំនួសរាល់ថ្ងៃ ម៉ោង ៨:០០ (1/2)

Date ថ្ងៃ ខែ ឆ្នាំ	Name ឈ្មោះ	Fuel oil Service tank មាត់ប្រេងសេវាប្រេង	Lubricating Oil level កំរិតនៃការប្រេង			
			Engine ម៉ាស៊ីន	Generator ប្រព័ន្ធបង់	Compressor ម៉ូទ័រ	Engine ម៉ាស៊ីន
01/08/2010	THAV	270 L	✓	✓	✓	✓
02/08/2010	THAV	300 L	✓	✓	✓	✓
03/08/2010	THAV	340 L	✓	✓	✓	✓
04/08/2010	NIN	180 L	✓	✓	✓	✓
05/08/2010	THAV	210 L	✓	✓	✓	✓
06/08/2010	VOUTHY	170 L	✓	✓	✓	✓
07/08/2010	NIN	220 L	✓	✓	✓	✓
08/08/2010	NIN	225 L	✓	✓	✓	✓
09/08/2010	TOLA	270 L	✓	✓	✓	✓
10/08/2010	VOUTHY	230 L	✓	✓	✓	✓
11/08/2010	TOLA	260 L	✓	✓	✓	✓
12/08/2010	TOLA	170 L	✓	✓	✓	✓
13/08/2010	TOLA	200 L	✓	✓	✓	✓
14/08/2010	VOUTHY	180 L	✓	✓	✓	✓
15/08/2010	TOLA	230 L	✓	✓	✓	✓
16/08/2010	TOLA	180 L	✓	✓	✓	✓
17/08/2010	TOLA	310 L	✓	✓	✓	✓

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Daily Check list (1/2)  
Every morning at 8:00

ការពិនិត្យតម្រូវការថ្លៃ ជំនួសរាល់ថ្ងៃ ម៉ោង ៨:០០ (1/2)

Date ថ្ងៃ ខែ ឆ្នាំ	Name ឈ្មោះ	Drain from Air ប្រព័ន្ធគ្រប់គ្រងខ្យល់			Cooling Water tank ត្រង់ទឹកត្រជាក់		Rocker Arm Tank ត្រង់ទឹកក្រដាម
		Compressor ម៉ាស៊ីនប្រេង	Separator ម៉ាស៊ីនប្រេងបំបាត់ មេឡូធីន	Air Tank ត្រង់ខ្យល់	Jacket ត្រង់ទឹក	Cooler ត្រង់ទឹកត្រជាក់	
01/08/2010	THAV	✓	✓	✓	200 L	200 L	6 L
02/08/2010	THAV	✓	✓	✓	200 L	200 L	6 L
03/08/2010	THAV	✓	✓	✓	200 L	200 L	5 L
04/08/2010	NIN	✓	✓	✓	200 L	200 L	4 L
05/08/2010	THAV	✓	✓	✓	200 L	200 L	8 L
06/08/2010	VOUTHY	✓	✓	✓	200 L	200 L	8 L
07/08/2010	NIN	✓	✓	✓	200 L	200 L	7 L
08/08/2010	NIN	✓	✓	✓	200 L	200 L	7 L
09/08/2010	TOLA	✓	✓	✓	200 L	200 L	7 L
10/08/2010	VOUTHY	✓	✓	✓	200 L	200 L	7 L
11/08/2010	TOLA	✓	✓	✓	200 L	200 L	7 L
12/08/2010	TOLA	✓	✓	✓	200 L	200 L	6 L
13/08/2010	TOLA	✓	✓	✓	200 L	200 L	6 L
14/08/2010	VOUTHY	✓	✓	✓	200 L	200 L	6 L
15/08/2010	TOLA	✓	✓	✓	200 L	200 L	6 L
16/08/2010	TOLA	✓	✓	✓	200 L	200 L	5 L

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4.4.3 事故の記録表

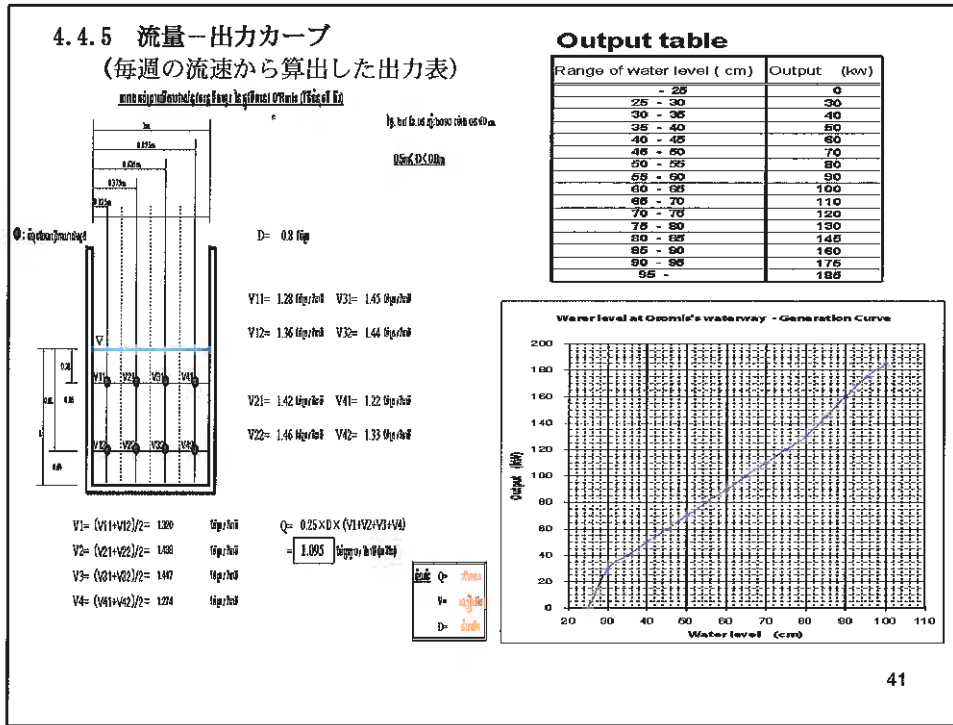
FAULT RECORD FOR MONDUL KIRI POWER STATION, EUMP  
(Urgent Report)

Date	21/09/2010		
Fault time	am 6:10		
Fault Power station	O'Meng		
Power System Load	Total: 230 kW		
Dist Part (kW)	O'Meng	O'Benis	O'E
	Output 140 kW	Output 90 kW	Output stop kW
1 Status	Blackedout the power system for 15 minutes		
Kind of Fault			
Fault Indicators	Sevra Alarm	03WL 1	02-1 & 2 CB trip
Reason why	At 3:25, O'Benis water level alarming, and operator just stopped the turbine. Then O'Meng also stopped by low frequency due to the stop of O'Benis station.		
2 Countermeasure			
Recovery time	am 6:10	Output : 140kW	
Temporary recover			
Normal recover	Normal starting turbine.		
3 Operator name			
4 Approved by			Confirmed by
Note			File:
5 Comments by JICA advisors team	When occurred the alarm of water level, the operator shall check the head tank and out put of O'R must decrease 90 or 100kW, and O'M must increase 140 to 160kW shortly. So that the system did not blackout. The operator must know the Alarm is only information to operators and for countermeasure.		

4.4.4 運転中の異常を記録する表

EVENT RECORDS FOR MONDULKIRI POWER STATION

No	Date	Station Name :		Event Records	Recover / Countermeasure	Operation name
		Time (from)	Time (to)			
1	29/01/2009	24:00:00		( 02 - 1 ) Sever alm 03 WL1		
2	31/01/2009	06:23		Off control Source 230V		Heng sokhun
3	11/02/2009	05:09	11:00	Under Voltage ( 02 - 2 , 02 - 1 ) ( 60kw )		Eng Rithy
4	16/02/2009	00:43		Over current ( 02 - 2 ) Trip Sever alarm ( 60kw )		Heng sokhun
5	07/03/2009	18:17	19:25	Over current ( 02 - 2 ) ( 60kw )		Eng Rithy
6	03/05/2009	20:00	20:30	03 WL1 DC 24V ( 60kw )		Eng Rithy
7	03/05/2009	21:55		Over Voltag Grund Fault ( 130kw )		Eng Rithy
8	06/05/2009	17:40		03 WL1 DC 24V ( 130kw )		Chheoum Kasai
9	07/05/2009	09:30	10:00	03 WL1 DC 24V ( 135 kw )		Heng sokhun
10	13/5/2009	13:50	13:53	Under Voltage(02-2, 02-1) Trip Sever alarm ( 60kw )		Um Monychybra
11	15/5/2009	13:50	13:52	03 WL1 DC 24V ( 100kw )		Heng sokhun
12	18/5/2009	10:00		03 WL1 DC 24V ( 100kw → 110kw )		Eng Rithy
13	26/5/2009	05:57		03 WL1 DC 24V ( 130kw )		Heng sokhun
14	17/6/2009	23:44	00:03	( 02 - 2 ) Trip Sever alarm ( 60kw )		Eng Rithy
15	18/6/2009	08:45	10:00	( 02 - 2 ) Trip Sever alarm ( 140kw )		Heng sokhun
16	24/6/2009	14:37	14:38	03 WL1 DC 24V ( 70kw )		Eng Rithy
17	30/6/2009	14:13	14:15	03 WL1 DC 24V ( 66kw )		Eng Rithy
18	30/6/2009	14:25	14:27	03 WL1 DC 24V ( 60kw )		Eng Rithy
19	01/07/2009	11:22		04WL1 04L DC 24V Severa lam ( 130kw )		Heng sokhun



### 4.4.6 修理の為に停電をした記録

#### OUTAGE SCHEDULE

DATE OF WORK		8/4/2010 to 8/6/2010		
WORK OUTLINE		Diesel inspection		
Place		Diesel		
Purpose		Diesel inspection		
Responsible person at the site				
Deenergized MV Line		From	LBS 2	
		To	PMT29, PMT30, PMT31, PMT33, PMT34, PMT35	
Outage PMT		PMT29, PMT30, PMT31, PMT33, PMT34, PMT35		
	PROCEDURE	Outage PMT	TIME	
			Scheduled	Result
1	O'Romis P/S MCB Operation		07:30	
2	O'Moleng P/S MCB Operation		07:30	
3	Diesel P/S MCB Stop Operation		08:00	16:00
4	LBS 2 Open for reducing load			
5	PMT-16 Off for reducing load			
Result of outage period**				

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4.4.7 2008年～2010年までの事故報告書

・27件がありました。

Fault Record of 2010 (Power station & Line)

No.	Date	Trouble (what kind of)	Reason	Countermeasures	Duration of stopping time	Results	Stop(H)
1	22-Feb-10	External trouble on 22kV lines	The building constructor take wood to dragged the MV cable to be separate to put the stair for concreting the new building	To provide a protection cover on the MV cable and confirm no damage the MV cable	14:00 ~15:00		1
2	24-Mar-10	External trouble on 22kV lines	EUMP staffs saw the Chinese constructor tight the MV cable together with Optic cable, and then EUMP staff reported to their director to cut off the feeder for take out the tight of those cable.	Repairing of cables	10:00 ~14:00		2
3	25-Mar-10	External trouble on 22kV lines	The group of T&D staffs go to the scene on 24-Mar-10 to cut MV cable over the national road due to the big truck could not have a trip across the road	Change of the 22kV line	10:00 ~14:00		4
4	14-Apr-10	DG trouble	During national festival, the load has rapidly increased and power stations could not control the load, then power system was blackout.	Re-start of the power system	20:30 ~22:30		2
5	18-Apr-10	Failure of 22kV transmission line	The main meter at P-01 broken due to the thunder	Replacement of parts	14:00 ~15:00		1
6	27-Jun-10	External trouble on 22kV lines	The people who are rental the land for build the small cottage at O'long restaurant (near O'Romis restaurant) has been through his cable across the MV 22kv at pole CR-047, and cause the serious injured to whole body	Inspection of trouble point	10:00 ~11:00		1
7	29-Jun-10	Failure of 400V distribution line	Some peoples was cut the tree drop on LV cable, make the LV cable drop out from the pole No. P07-120 to P07-121	Replacement of parts	14:00 ~15:00		1
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4.4.8 第3回定期点検（維持・管理活動の様子）



4.4.8 第3回定期点検（維持・管理活動の様子）



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4.4.8 第3回定期点検（維持・管理活動の様子）



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5. 電力の開発戦力方針（電化率普及の方針）

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- ・適切な電気代で、センモノロム市内とその他の地域に十分な電気を供給する。
- ・電気の需要に応じて、発電量を増やす。
- ・安定的な電力供給になって、信頼を得る。
- ・2011年のEDCの予算で、ベトナムからダクダム経由でセンモノロムまでの送電線の計画沿って実施する。
- ・2011年2つの村にさらに電力を供給する。
- ・技術面では、より一層の研修が必要。

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Annex -3 ថ្នាក់ដឹកនាំរបស់ក្រុមហ៊ុន

ឈ្មោះ	សំណង់ដឹកនាំចំពោះ លេខផ្សារសេដ្ឋកិច្ចជាតិ	សំណង់ដឹកនាំចំពោះ លេខសេដ្ឋកិច្ចជាតិ	សំណង់ដឹកនាំចំពោះ លេខសេដ្ឋកិច្ចជាតិ
កាលបរិច្ឆេទ	03 June 2010	កាលបរិច្ឆេទ	29 September 2010
ហត្ថលេខា		ហត្ថលេខា	

ឈ្មោះ	ឈ្មោះ
Section Chief, Administration and Procurement Section	Im VICHET
	ហត្ថលេខា

កូដភារកិច្ច	កាលបរិច្ឆេទ		ឈ្មោះ	លេខសេដ្ឋកិច្ចជាតិ	លេខសេដ្ឋកិច្ចជាតិ	លេខសេដ្ឋកិច្ចជាតិ	កាលបរិច្ឆេទ	
	កាលបរិច្ឆេទ	លេខសេដ្ឋកិច្ចជាតិ					កាលបរិច្ឆេទ	លេខសេដ្ឋកិច្ចជាតិ
Task Code A1P1 ការងារត្រួតពិនិត្យការងារសេដ្ឋកិច្ចជាតិ 建設工事契約	ខ្ញុំមិនដឹងថាមានប្រែប្រួលឬទេ 私に工事を準備しているかは知らない		Im VICHET					
Task Code A1P2 ការងារត្រួតពិនិត្យការងារសេដ្ឋកិច្ចជាតិ 保守作業契約			Im VICHET					

- EDC へ移管後、建設メンテナンスについて、よく理解できるようにしたい。
- この仕事を自分たちと出来る。
- 将来はもっと上手にできるように頑張る。



Project Name	Project Manager	Project Start	Project End	Project Status	Project Description	Project Objectives	Project Deliverables	Project Risks	Project Budget	Project Resources	Project Milestones	Project Notes
Project A	John Doe	2023-01-01	2023-03-31	Completed	Development of a new software module.	Improve system performance and user interface.	New software module, user manual, test reports.	Scope creep, resource shortage.	\$50,000	3 developers, 1 QA, 1 PM.	Phase 1: Requirements, Phase 2: Design, Phase 3: Development, Phase 4: Testing, Phase 5: Deployment.	Successful completion, user feedback positive.
Project B	Jane Smith	2023-04-01	2023-06-30	In Progress	Marketing campaign for Product X.	Increase sales and brand awareness.	Marketing materials, social media posts, press releases.	Budget overruns, low engagement.	\$75,000	Marketing team, external agency.	Campaign launch, initial sales increase.	Need to adjust budget and strategy.
Project C	Mike Johnson	2023-07-01	2023-09-30	On Hold	Research and development for Project Z.	Explore new market opportunities.	Research reports, prototype designs.	Lack of funding, unclear requirements.	\$100,000	R&D team, external consultants.	Initial research phase, no further action.	Re-evaluate project viability.

Agencies Personnel	Name Title	Agency	Agency Address	Agency Phone	Agency Fax
	CSA				
	CSA				

Agency	Agency Name		Agency Address	Agency Phone	Agency Fax
	Name	Address			
	USAID	USAID	USAID		
	USAID	USAID	USAID		
	USAID	USAID	USAID		
	USAID	USAID	USAID		

Agency Name					
Name	Address	Phone	Fax	Agency	Agency
USAID	USAID				
USAID	USAID				
USAID	USAID				
USAID	USAID				

Doc. No. 100-100000

Title	Author	Date	Subject	Classification	Remarks	Index
Accounting Manual	A. J. Perry	1942	Accounting	Accounting	Accounting Manual	Accounting Manual
Accounting Manual	A. J. Perry	1942	Accounting	Accounting	Accounting Manual	Accounting Manual
Accounting Manual	A. J. Perry	1942	Accounting	Accounting	Accounting Manual	Accounting Manual
Accounting Manual	A. J. Perry	1942	Accounting	Accounting	Accounting Manual	Accounting Manual
Accounting Manual	A. J. Perry	1942	Accounting	Accounting	Accounting Manual	Accounting Manual

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氏名	Age	出身地	職業	備考
鈴木 貞一	35	東京府	銀行員	
鈴木 貞二	35	東京府	銀行員	

氏名	年齢	出身地	職業	備考
鈴木 貞一	35	東京府	銀行員	
鈴木 貞二	35	東京府	銀行員	
鈴木 貞三	35	東京府	銀行員	
鈴木 貞四	35	東京府	銀行員	
鈴木 貞五	35	東京府	銀行員	

伊藤 貞一  
東京 出身  
自 由 業 者

伊藤 貞二  
東京 出身  
自 由 業 者

伊藤 貞三  
東京 出身  
自 由 業 者

伊藤 貞四  
東京 出身  
自 由 業 者

伊藤 貞五  
東京 出身  
自 由 業 者

今般生(生命)問題研究。特に  
合制(新)内閣に對しては、  
自命(新)の事(新)に對しては、  
パソコ(新)の事(新)に對しては、  
新日(新)の事(新)に對しては、  
今般(新)の事(新)に對しては、

題意: 問の三番目 (向心) 要は保角線とい  
 分らる。またその保角線は、  
 二つの直線と、保角線とを  
 一対の直線と保角線とを  
 保角線と保角線とを  
 保角線と保角線とを

問題	解答	解説	別解
<p>問1</p> <p>△ABCの外接円をωとし、その中心をOとする。ω上に点Dをとり、直線ADを延長し、ωと再び交わる点をEとする。直線BEとACの交点をFとする。直線CFとABの交点をGとする。直線AGとBCの交点をHとする。直線AHとBCの交点をIとする。直線BIとACの交点をJとする。直線CJとABの交点をKとする。直線AKとBCの交点をLとする。直線ALとBCの交点をMとする。</p>	<p>△ABCの外接円をωとし、その中心をOとする。ω上に点Dをとり、直線ADを延長し、ωと再び交わる点をEとする。直線BEとACの交点をFとする。直線CFとABの交点をGとする。直線AGとBCの交点をHとする。直線AHとBCの交点をIとする。直線BIとACの交点をJとする。直線CJとABの交点をKとする。直線AKとBCの交点をLとする。直線ALとBCの交点をMとする。</p>	<p>△ABCの外接円をωとし、その中心をOとする。ω上に点Dをとり、直線ADを延長し、ωと再び交わる点をEとする。直線BEとACの交点をFとする。直線CFとABの交点をGとする。直線AGとBCの交点をHとする。直線AHとBCの交点をIとする。直線BIとACの交点をJとする。直線CJとABの交点をKとする。直線AKとBCの交点をLとする。直線ALとBCの交点をMとする。</p>	<p>△ABCの外接円をωとし、その中心をOとする。ω上に点Dをとり、直線ADを延長し、ωと再び交わる点をEとする。直線BEとACの交点をFとする。直線CFとABの交点をGとする。直線AGとBCの交点をHとする。直線AHとBCの交点をIとする。直線BIとACの交点をJとする。直線CJとABの交点をKとする。直線AKとBCの交点をLとする。直線ALとBCの交点をMとする。</p>



Kung Patricia Many (2)

System	System	System	System	System
<p>System with EDC</p> <p>System with EDC</p> <p>System with EDC</p> <p>System with EDC</p>	<p>System with EDC</p> <p>System with EDC</p> <p>System with EDC</p> <p>System with EDC</p>	<p>System with EDC</p> <p>System with EDC</p> <p>System with EDC</p> <p>System with EDC</p>	<p>System with EDC</p> <p>System with EDC</p> <p>System with EDC</p> <p>System with EDC</p>	<p>System with EDC</p> <p>System with EDC</p> <p>System with EDC</p> <p>System with EDC</p>

- EDCの目標は、システム全体の効率性を向上させることである。  
 - EDCは、システム全体の効率性を向上させるために、システム全体の効率性を向上させることである。  
 - EDCは、システム全体の効率性を向上させるために、システム全体の効率性を向上させることである。  
 - EDCは、システム全体の効率性を向上させるために、システム全体の効率性を向上させることである。

- 在庫管理の改善、以前より在庫の減少  
 手回りの速い、特に湖沼の減少
- 2001年10月、在庫の減少が2000年  
 の20%増の100%増
- 2002年10月、在庫の減少が2001年  
 の100%増

2001年10月	2002年10月	2003年10月	2004年10月	2005年10月	2006年10月
<p>71250 (増)</p> <p>在庫の減少が2000年の20%増の100%増</p>	<p>71250 (増)</p> <p>在庫の減少が2001年の100%増</p>	<p>71250 (増)</p> <p>在庫の減少が2002年の100%増</p>	<p>71250 (増)</p> <p>在庫の減少が2003年の100%増</p>	<p>71250 (増)</p> <p>在庫の減少が2004年の100%増</p>	<p>71250 (増)</p> <p>在庫の減少が2005年の100%増</p>
<p>在庫の減少が2000年の20%増の100%増</p>	<p>在庫の減少が2001年の100%増</p>	<p>在庫の減少が2002年の100%増</p>	<p>在庫の減少が2003年の100%増</p>	<p>在庫の減少が2004年の100%増</p>	<p>在庫の減少が2005年の100%増</p>
<p>在庫の減少が2000年の20%増の100%増</p>	<p>在庫の減少が2001年の100%増</p>	<p>在庫の減少が2002年の100%増</p>	<p>在庫の減少が2003年の100%増</p>	<p>在庫の減少が2004年の100%増</p>	<p>在庫の減少が2005年の100%増</p>
<p>在庫の減少が2000年の20%増の100%増</p>	<p>在庫の減少が2001年の100%増</p>	<p>在庫の減少が2002年の100%増</p>	<p>在庫の減少が2003年の100%増</p>	<p>在庫の減少が2004年の100%増</p>	<p>在庫の減少が2005年の100%増</p>
<p>在庫の減少が2000年の20%増の100%増</p>	<p>在庫の減少が2001年の100%増</p>	<p>在庫の減少が2002年の100%増</p>	<p>在庫の減少が2003年の100%増</p>	<p>在庫の減少が2004年の100%増</p>	<p>在庫の減少が2005年の100%増</p>

Form 3-1 (Rev. 10-1-70)

<p>NAME: <u>Family - 1st Party</u></p> <p>ADDRESS: <u>1234 Main St, Apt 2</u></p> <p>CITY: <u>San Francisco, CA</u></p> <p>STATE: <u>CA</u></p> <p>ZIP: <u>94102</u></p>	<p>DATE: <u>12/15/71</u></p> <p>BY: <u>[Signature]</u></p>	<p>REASON: <u>Family - 1st Party</u></p>	<p>REASON: <u>Family - 1st Party</u></p>	<p>REASON: <u>Family - 1st Party</u></p>	<p>REASON: <u>Family - 1st Party</u></p>
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Serial	Particulars	Debit	Credit	Balance
1	<p>12/15/71</p> <p>Family - 1st Party</p> <p>1000.00</p>			1000.00
2	<p>12/15/71</p> <p>Family - 1st Party</p> <p>500.00</p>			500.00
3	<p>12/15/71</p> <p>Family - 1st Party</p> <p>250.00</p>			250.00
4	<p>12/15/71</p> <p>Family - 1st Party</p> <p>125.00</p>			125.00
5	<p>12/15/71</p> <p>Family - 1st Party</p> <p>62.50</p>			62.50

Handwritten notes in the right margin:

1. 12/15/71 1000.00

2. 12/15/71 500.00

3. 12/15/71 250.00

4. 12/15/71 125.00

5. 12/15/71 62.50

**5<sup>th</sup> JCC Meeting of the Project for Operation and  
Maintenance of the Rural Electrification on  
Micro-Hydropower in Mondul Kiri**

**Date : A.M.10:00~12:00 23<sup>rd</sup> February, 2011**

**Place : Meeting room of Ministry of Industry, Mine and Energy, Phnom Penh**

1. Opening Address: H.E. Dr. Ith Praing, Chairman of Joint Coordination Committee  
Secretary of State, MIME
2. Address by JICA: Mr. Yasujiro Suzuki, Chief Representative, JICA Cambodia Office
3. Introductions of the participants by themselves:  
(A.M 10:30)
4. Agenda
  - 1) Presentation of EUMP's Business Performance in 2010 (25')  
Mr. Chin Sokun, Chief of EUMP
  - 2) Presentation of JICA Study Team (10')  
Mr. Koji Mishima, Chief Advisor of the Project
  - 3) Comments for Finalization of the Project (15')  
By JICA:  
By MIME:  
By EdC
  - 5) Closing Remarks : H.E. Dr. Ith Praing, Chairman (5')

\*\*\*\*\* End \*\*\*\*\*

**Participants List : 40 persons**

## 1. Cambodian side

## 1) MIME (7)

- H.E. Dr. Ith Praing, Chairman, Secretary of State
- H.E. Tun Lean, Director General, General Department of Energy
- Dr. Bun Narith, Deputy General Director, General Department of Energy
- Mr. Kong Pisith, Director of DIME
- Mr. Much Chhun Horn, Director, Hydropower Dept.
- Mr. Chiv Hour, Officer, Deputy Director
- Mr. On Vuthy, Office, Deputy Director

## 2) EAC (3)

- Mr. Theng Marith, Director, Electricity Regulation Dept. (JCC member)
- Mr. Teng Saraeun
- Mr. Suon Ponnarith

## 3) EDC (7)

- H.E. Keo Rottanak, RCC Delegate in charge of Managing
- Dr. Chulasa Praing, Director, Corporate Planning & Projects Dept.(JCC member)
- Mr. Aun Hemmarith, Deputy Director, Generation Dept.
- Mr. Pen Pha, Generation Dept.
- Mr. Heng Piseth, Generation Dept.
- Mr. Houg Chantha, Chief of Technical
- Mr. Chan Chetra, International Cooperation Office

## 4) EDC Mondulkiri (11)

- Mr. Chin Sokhun, Chief of EUMP
- Mr. Im Vichet, Chief of Administration Section
- Ms. Roerng Phaynary, Staff of Warehouse & Fuel Oil Control
- Ms. Chres Malout, Chief of Accounting Section
- Ms. Ty Souyatra, Accountant
- Mr. Sot Saroem, Commercial Staff
- Mr. Sayuth Sothea, Chief of Technical Section
- Mr. Theng SETHA, Chief of Production
- Mr. Yeb Thav, Chief of Diesel Power Plant
- Mr. Um Monychetra, O'Moleng Staff
- Mr. Reom Navy, Distribution Line Staff

## 2. Japanese side

## JICA (3)

- Mr. Yasujiro Suzuki, Chief Representative
- Mr. Takanobu Shinoda, Representative
- Mr. Heng Salpiseth, Project officer

## JICA Project Team (6)

- Mr. Koji Mishima, Chief Adviser
- Mr. Tetsuro Tanaka, Adviser for Administration
- Mr. Takahito Oikawa, Adviser for civil
- Mr. Yukitaka Hiraga, Adviser for Generation
- Mr. Junya Shinohara, Adviser for Transmission and Distribution
- Ms. Eong Sodavy, Local Coordinator

## Observer (1)

- Mr. Yamakawa, JICA Senior Volunteer for EDC

## 3. Interpreter (Japanese – Khmer)

- Mr. Bun Sopheaknith

**ព្រះរាជាណាចក្រកម្ពុជា**  
**ជាតិ សាសនា ព្រះមហាក្សត្រ**

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**បញ្ជីចាត់តាំង**

**កិច្ចប្រជុំបញ្ជាក់គណៈកម្មាធិការរួចសំរាប់សំរួលរចនាគំរោងដំណើរការ និងផែនការវិនិយោគសាងសង់ស្ថានីយ៍ប្រតិបត្តិការនៅ តំបន់បាត់ដំបង**  
**ខេត្តបាត់ដំបង**

នៅក្រសួង ឧ.រ.ថ ថ្ងៃទី ២៣ ខែ កុម្ភៈ ឆ្នាំ២០១១ ម៉ោង ១០:០០

ល.រ N°	នាម និង គោត្តនាម Name	ឋានៈ - តួនាទី Title - Position	ស្ថាប័ន - អង្គភាព Organization / Company	ហត្ថលេខា Signature
1	ឯកឧត្តម អ៊ុន ឆ្លៀង	រដ្ឋលេខាធិការ	ក្រសួង ឧ.រ.ថ	
2	ឯកឧត្តម ខួន រ៉ាន់ឌី	រដ្ឋលេខាធិការ	ក្រសួង ឧ.រ.ថ	
3	ឯកឧត្តម តែច តេន:	ប្រតិភូរាជរដ្ឋាភិបាលកម្ពុជា ទទួល បន្ទុកជាអគ្គនាយកអគ្គិសនីកម្ពុជា	អគ្គិសនីកម្ពុជា	
4	ឯកឧត្តម សេង អ៊ឹមឃ្យ	អនុរដ្ឋលេខាធិការ	ក្រសួង ឧ.រ.ថ	
5	ឯកឧត្តម ខុន លាន	អគ្គនាយកម៉ាស៊ីន	ក្រសួង ឧ.រ.ថ	
6			MIME	
7			MIME	
8			MIME	
9			MIME	
10			MIME	
11			MIME	
12	លោក. តឹ សិដ្ឋ	Chief of Technical data, Gen-office.	EDC.	
13	លោក ឌី ធី		EDC.	
14	លោក ឌី ធី		EDC.	
15			EDC.	
16			MIME	
17			MIME	
18			MIME	

19	Mr. Amos	លោក អ័រ អ័ម៉ុន	MIME	
20	Mr. H. H.	លោក អ័រ អ័ម៉ុន	MIME	
21	Mr. H. H.	លោក អ័រ អ័ម៉ុន	EDC	
22	J. S.	លោក អ័រ អ័ម៉ុន	EDC	
23	J. S.	លោក អ័រ អ័ម៉ុន	EDC	
24	Yasujino Suzuki	Chief Representative	JICA	
25	Takanobu Shiroda	Representative	JICA	
26	Bun Sopheaknith	Interpreter		
27	Koji Mishima	JICA Team	JICA team	
28	Yukitaka Hiraga	JICA Team	JICA team (Gen)	
29	Tetsuro Tanaka	JICA Team	JICA team (ad-)	
30	Takahito Oikawa	JICA Team	JICA Team (Civ. I)	
31	Junya SHINOHARA	JICA Team	JICA Team (C&D)	
32	Saveth Sothea	លោក សាវ៉េត សុទ្ធា	EDC	
33	Am manycheira	លោក អ័រ អ័ម៉ុន	EDC	
34	SOT SARDOM	លោក សុត សារ៉ុន	EDC-MDK	
35	YAMAKAWA HIROKATSU	ST JICA	EDC	
36	HENG Salpiseh	JICA program officer	JICA CAMBODIA office	
37	Vom. THAV	លោក វ៉ុន ថាវ	EDC	
38	THENG SETHA	លោក ថេង សេថា	EDC	
39	SENG KIRITHY	លោក សេង គិរិធី	MIME	
40	Oeng Sodavy	Local Coordinator	JICA team	
41	Chiu Seichum	លោក គីវ ឆិវ	MIME	
42	Chiu Seichum	លោក គីវ ឆិវ	EDC	
43	Im. Vichet	លោក ឈឹម វិចិត	EDC	
44				

## 第5回JCC会議メモ

1. 日時 : 2011年2月23日(水) 10:00-12:00
2. 場所 : MIME 3F 会議室
3. 出席者 : MIME, EAC, EDC, EDC/EOM, JICA, JICA study team(計約50名)
4. 議題 :
  - 1) Opening Address : H.E. Dr. Ith Praing, Chairman of Joint Coordination Committee  
Secretary of Sate, MIME
  - 2) Address by JICA : Mr. Yasujiro Suzuki, Chief Representative, JICA Cambodia Office
  - 3) Introductions of the participants by themselves: (A.M 9:20)
  - 4) Agenda
    - (1) Report of EUMP's Performance in 2011 (20')  
Mr.Chin Sokun, Chief of Electricity of Mondul Kiri, EDC, EUMP
    - (2) General progress: JICA Project Team (15')  
Mr.Koji Mishima, Chief Advisor of the Project
    - (3) Finalization of the Project and Closing Remarks of JCC (30')
      - 1) By JICA:  
Mr. Takanobu Shinoda, Representative, JICA Cambodia office,
      - 2) By MIME:  
H.E. Dr. Ith Praing, Chairman of Joint Coordination Committee  
Secretary of Sate, MIME
  - 5) Closing

## 5. 内容 :

- 1) 議長 Dr. Ith Praing 挨拶
  - ・ 本 JCC は最後の会議となります。日本からの援助で小水力発電所とディーゼル発電所および関連設備を作っていただき、2008年11月から営業を始め センモロノム市へ電力供給をしてきた。
  - ・ また、2010年6月8日からは EDC 移管されてその傘下となった。
  - ・ JICA からの援助で、カンボジアの経済の向上が図られ、JICA によるその援助に感謝している。
- 2) 鈴木 JICA 事務所長あいさつ
- 3) EUMP からの事業報告 (Mr.Chin Sokun)
  - ・ 2010年度の事務、会計、技術報告が発表された。(P.P 報告書参照)



4) 一般経過報告 (JICA チーム三島)

- ・ 中長期計画報告の改訂版
- ・ O&M マニュアルの見直が終わりその改訂版を提出した。今後は EDC が修正を実施する。

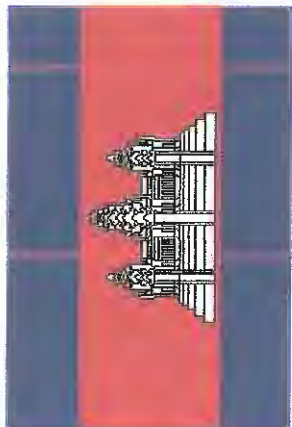
5) MIME 次官 (Dr.Ith Praing) コメント

- ・ 成功したプロジェクトであり、O&M もうまく行ったと思います。
- ・ 全体のプロジェクトを通じてカンボジア・EDC また、センモノロムの市民に貢献している。
- ・ これからも EDC/EUMP が維持管理を十分実施し、設備を有効に使って生きたい。
- ・ O&M のスペア一部品や技術サポートを今後もお願いしたい。
- ・ モンドルキリや東北 (ラタナキリ) 地方などの新規小水力も開発したい。

6) JICA (篠田駐在員) コメント

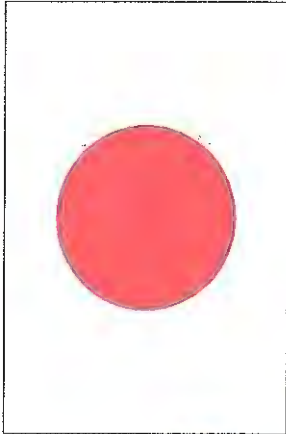
- ・ この 2.4 ヶ月のプロジェクトを通じて、EUMP は大きく成長したと思う。
- ・ 前回の JCC でも指摘したとおり、このプロジェクトの目標は十分達成できたと思う。
- ・ 無償案件で作った電力設備を守り、24 時間電力供給できていることは EDC/EUMP の努力の賜物である。しかし、この後更なる努力を望みます。
- ・ JICA 終了時評価ミッションが現地を調査し、多くの市民が満足していることを実感している。
- ・ 今後は、料金と潜在需要家の現地の声にこたえていくよう望む。
- ・ また、ベトナムとの電力連系は水力との初めての連系であり、EDC として適切に運用されることを望みます。
- ・ JICA としても、この成功したプロジェクトを全世界にアピールしたい。皆様のご支援に感謝いたします。

以上



# គំរោងវារីអគ្គិសនី

ការតុបតែងបណ្តាញស្នូលបណ្តាញ ដោយវារីអគ្គិសនី



ខ្នាតតុបតែងវារីអគ្គិសនីដាច់ស្រយាល ខេត្តបន្ទាយកក

ក្រុមការងារគម្រោងសម្រេចសម្រាប់ការស្រាវជ្រាវសិក្សាស្រាវជ្រាវ ដោយសហគ្រាស អគ្គិសនី ជប៉ុន JICA

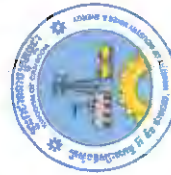
គំរោងនេះចាប់ផ្តើមនៅថ្ងៃទី០៣ ខែសីហា ឆ្នាំ ២០០៧

បើយបញ្ចប់ស្ថាប័នស្រាវជ្រាវថ្ងៃទី១៥ ខែតុលា ឆ្នាំ ២០០៨

និយាយសម្រាប់ការស្រាវជ្រាវស្រាវជ្រាវ ២០០៧ ខែកុម្ភៈ ឆ្នាំ២០០៩

គំរោង JICA (O&M) ចាប់ផ្តើមនៅខែសីហា ឆ្នាំ២០០៨

និង បញ្ចប់នៅខែមីនា ឆ្នាំ២០១១



# ប្រាសាទ

- ១. របបនិយមន័យនៃការគ្រប់គ្រង និងចរន្តការងារ
- ២. ស្ថានភាពផ្គត់ផ្គង់ និងផលិតផល ជាមធ្យមសិក្សា និង លើក

## ខេត្តបន្ទាយមានជ័យ

- ៣. សកម្មភាពប្រើប្រាស់ និងជួសជុល
- ៤. ស្ថានភាពអាជីវកម្ម ហិរញ្ញវត្ថុ របស់សិក្សានិស្សិត
- ៥. និស្សិតប្រើប្រាស់ប្រព័ន្ធគ្រប់គ្រងសិក្សា

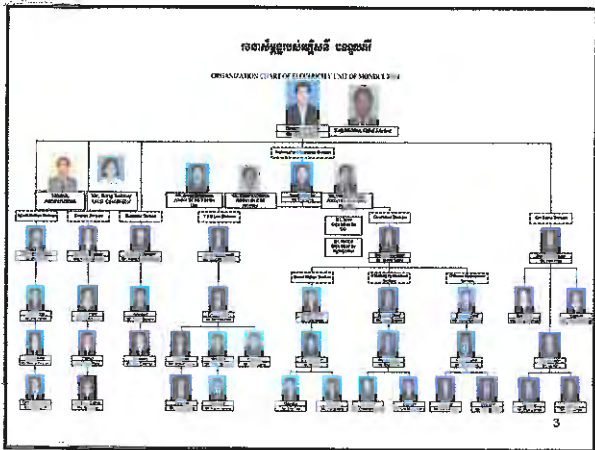
១. បេសកកម្មនៃការគ្រប់គ្រង និងបណ្តុះបណ្តាល

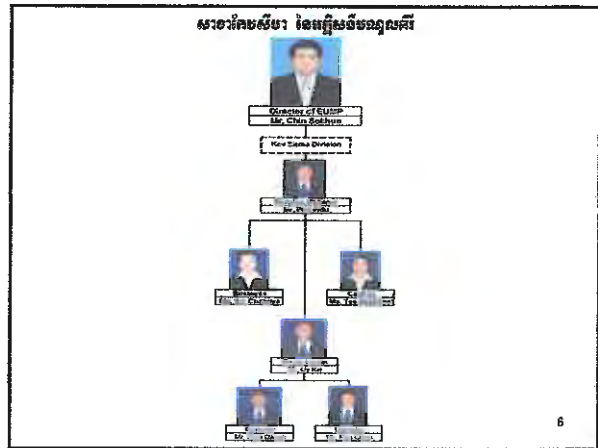
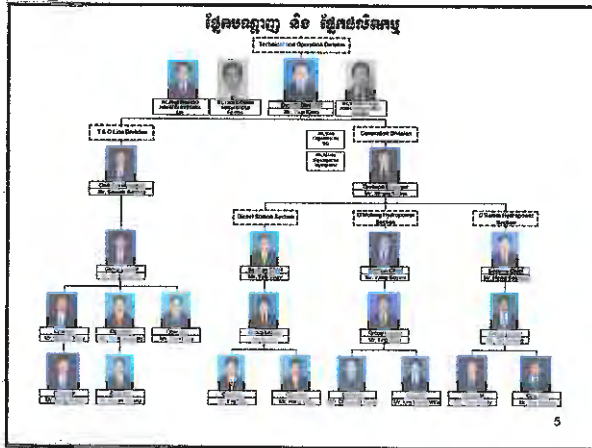
1

**អគ្គិសនីមណ្ឌលគីរី**

- ~ បាត់ដំបង ឆ្នាំ២០០៧ លោកបណ្ឌិត ខៀន វិសិដ្ឋ ឆ្នាំ២០១០ អគ្គិសនីមណ្ឌលគីរី ស្ថិតនៅក្រុងបាត់ដំបង គ្រប់គ្រងរបស់ ក្រសួង និងមន្ទីរឧស្សាហកម្ម រ៉ែ និងថាមពល ខ
- ~ ឆ្នាំ២០០៨ ខែមិថុនា ឆ្នាំ២០១០ អគ្គិសនីមណ្ឌលគីរី ត្រូវបាន ផ្តោតស្ថិតនៅក្រុងបាត់ដំបង របស់អគ្គិសនីកម្ពុជាវិជ្ជា ខ

2





**១.១ បញ្ជីនាមបុគ្គលិកដែលបានចូលរួមក្នុងការងារស្រាវជ្រាវ និង ការងារប្រតិបត្តិការ**

**ពីឆ្នាំ២០០៨ ដល់ ឆ្នាំ២០១១**

លេខ	បញ្ហាស្រាវជ្រាវ	ឈ្មោះ	គុណ្ណ	រយៈពេល
1	ការស្រាវជ្រាវអំពីប្រព័ន្ធគ្រប់គ្រងបន្ទុក 370Kw	ហ្វ្រីដ	2	
2	ការស្រាវជ្រាវអំពីប្រព័ន្ធគ្រប់គ្រងបន្ទុក 3000kw	ហ្វ្រីដ	1	
3	ការស្រាវជ្រាវ	ក្រីស្ត	1	
4	ប្រព័ន្ធបណ្តាញ MV22KV	តម	28	
5	ប្រព័ន្ធបណ្តាញត្រួតពិនិត្យ LV 230/400V	កម	32	
6	ប្រព័ន្ធបណ្តាញ	ហ្វ្រីដ	38	
7	ប្រព័ន្ធបណ្តាញ	ហ្វ្រីដ	3	
8	ប្រព័ន្ធបណ្តាញ	ក្រីស្ត	2	
9	ប្រព័ន្ធបណ្តាញ	ហ្វ្រីដ	1	
10	ប្រព័ន្ធបណ្តាញ	ហ្វ្រីដ	1	

**១.២ ការបណ្តុះបណ្តាលបុគ្គលិកសម្រាប់ប្រតិបត្តិការ O&M Project**

I- ឆ្នាំ២០០៨ ដល់ឆ្នាំ២០០៩ បុគ្គលិកបណ្តុះបណ្តាល បានបណ្តុះបណ្តាលដោយប្រគល់ជូន ដោយបុគ្គលិកបណ្តុះបណ្តាលជប៉ុន (ជប៉ុន) Sponsored by JICA team

1. Technical Training 03 Times
2. Account Training 01 Time

II- ឆ្នាំ២០០៩ ដល់ឆ្នាំ២០១១ បានបណ្តុះបណ្តាលបុគ្គលិក Site on-job training as below :

- 1- Site On-job training of 9 times on general management by Mr. Mishima Koji, chief of JICA team.
- 2- Site On-job training of 11 times on Electrical-mechanical work by Mr. Hiraga Yukitaka, Electro mechanical Engineer
- 3- Site On-job training of 7 times on Admin & Account by Mr. Taraka tetsuro, Administration Specialist
- 4- Site On-job training of 9 times on Maintenance and Repair of Civil structures by Mr. OHAWA Takahito, Civil engineer
- 5- Site On-job training of 10 times on Transmission and Distribution line by Mr. Okuhara& Mr. Shimohara, Transmission and Distribution Engineer.
- 6- On-job training of 4 times on Hydro work by Mr. Kukobu, Hydro Engineer.
- 7- On-job training of 4 times on Maintenance and Repair of Diesel generator by Mr. Hono, Manager after sales service.

**២. ស្ថានភាពផ្គត់ផ្គង់ និងផលិតកម្ម ថាមពលអគ្គិសនី នៅទីរួមខេត្តមណ្ឌលគិរី**

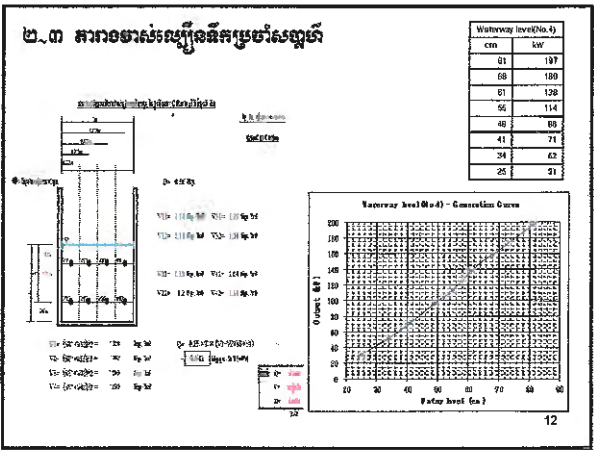


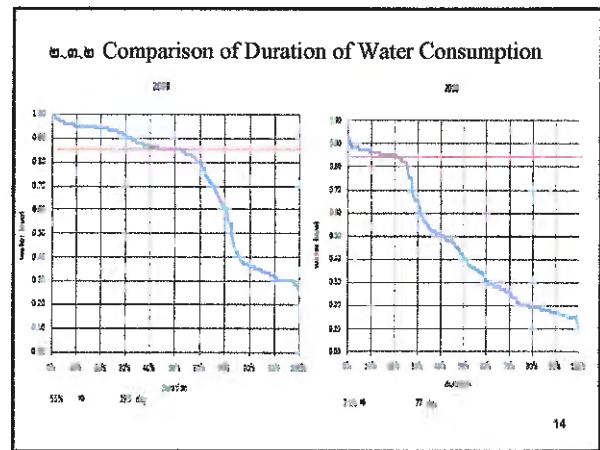
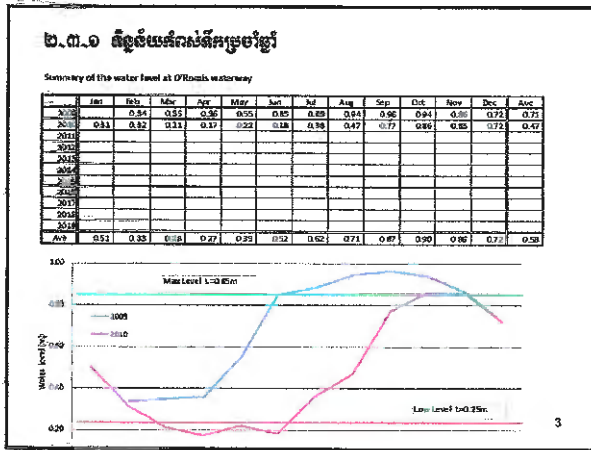
**២.២ ស្ថានភាពផលិតកម្ម អគ្គិសនីមណ្ឌលគិរី**

I- Generation	Unit	2008-2009 14 months	2010
DG installed capacity	KW	300	300
Hydro installed capacity	KW	370	370
Total generation	MWh	1,427	1,822 (22%)
Generated by DO	MWh	216	984
Generated by Hydro	MWh	1,211	838

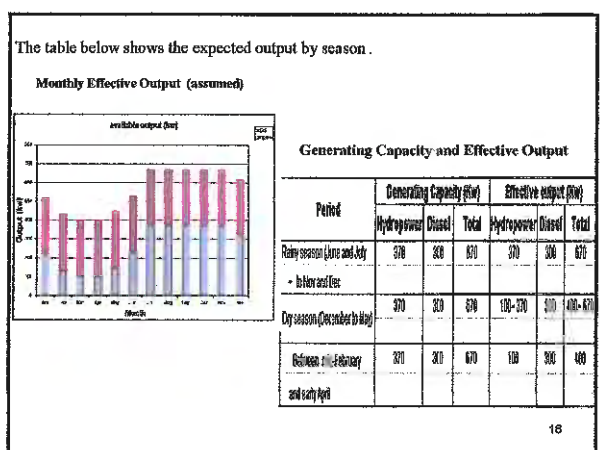
Generation for 2008&2009

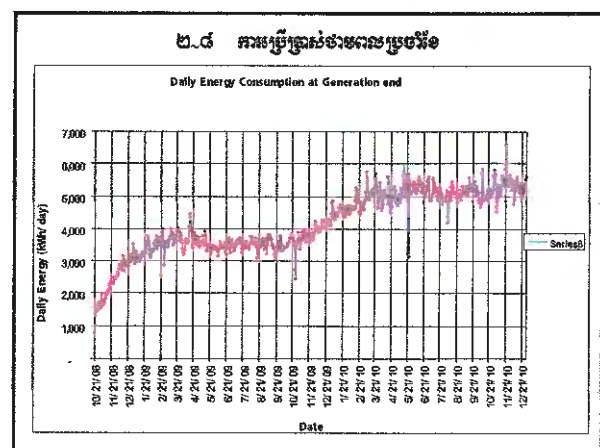
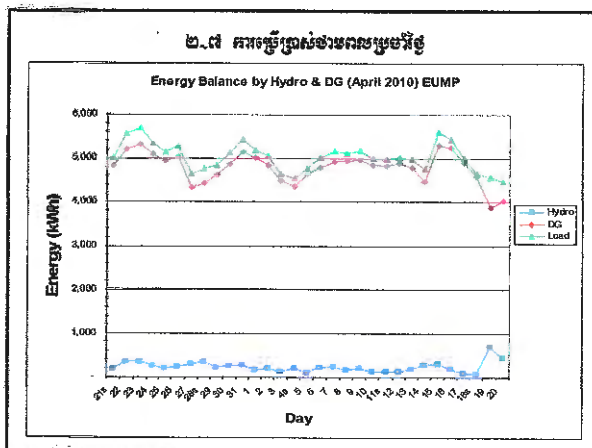
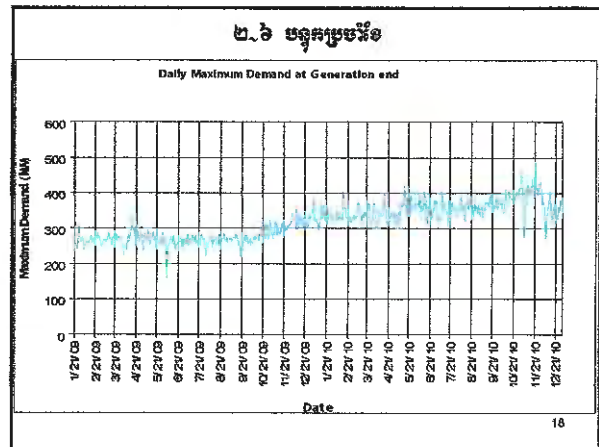
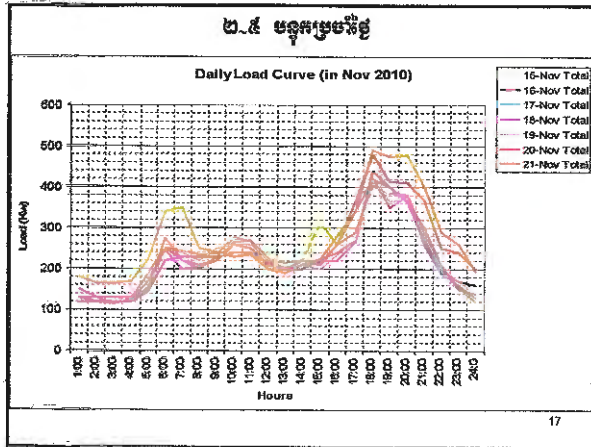
Generation for 2010



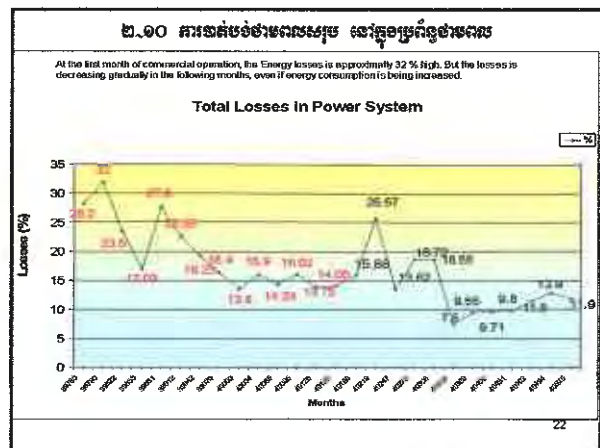
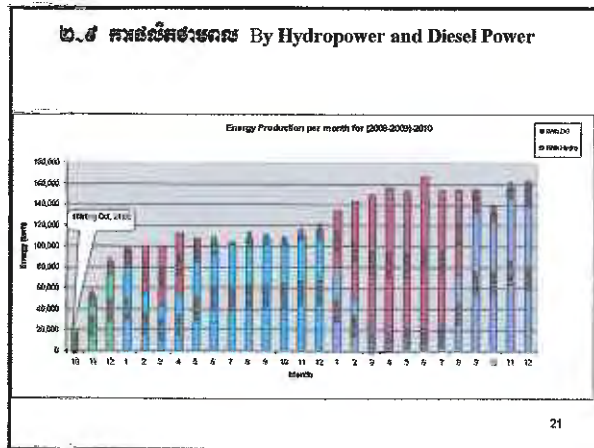


**2.4) ផលិតផលប្រើប្រាស់**  
**ផលិតផលប្រើប្រាស់ (Effective Output)**  
អគ្គិសនីប្រើប្រាស់ប្រចាំថ្ងៃ ត្រូវបានកំណត់ដោយផ្អែកលើ ប្រព័ន្ធអគ្គិសនី ដែលមានអំពូលកម្រិត 370kW ដឹកជញ្ជូនទៅកាន់ ពីពេលវេលាប្រមាណ ០២កម្រិត ដែលមានអំពូលកម្រិត 300kW សរុបមាន 670kW តែដោយជំនួសគ្នាប៉ុណ្ណោះ ដោយសារតែ មានប្រព័ន្ធអគ្គិសនីអនុភាពសរុបមាន 300kW តាមការកំណត់របស់ក្រុមហ៊ុនដែល អាចពេញលេញបាន និងអនុវត្តកម្រិត ទិន្នផលនៃការដំឡើងថ្មីដែលមានអំពូលកម្រិតសរុបមាន ៥០% របស់ប្រព័ន្ធ រហូតដល់ខែមករា របស់ឆ្នាំនៃសិវិក៍សេស មានតែលេខជាដាច់ខាតក្នុងការដំឡើងថ្មីក្នុងរយៈពេល ៥០% របស់ប្រព័ន្ធអនុភាពដែលប្រើប្រាស់អគ្គិសនីប្រចាំថ្ងៃមាន ៥០០kW ធ្វើឱ្យមាន 30% រយៈពេល ៥០% អនុភាពដែលផ្តល់ អនុភាពដោយសរុបត្រូវបានកំណត់ដោយផ្អែកលើ វិស័យ ២៤ម៉ោង ក្នុងថ្ងៃទ្រទ្រង់ គឺបានប្រើប្រាស់ 400kW









**៣. សកម្មភាពថែទាំ និងជួសជុល**

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**៣.១ របៀបការងារជួសជុល និងថែទាំបរិក្ខារ ២០០d របស់មូឡាឌី ២០១០**

តាមកម្មវិធីសម្រេចរដ្ឋបាល មានដូចតទៅ :

- ផ្តល់ការថែទាំប្រចាំខែ (Periodic Inspection and Repairs)

តាមមូលបតិករណ៍សំរាប់ថែទាំប្រចាំខែ និង រ៉ឺម៉ង់ប្រតិបត្តិ ៤៨ម៉ឺនដុល្លារអាមេរិក : ២.០០០ម៉ោង, ៤.០០០ម៉ោង, ៦.០០០ម៉ោង, ៨.០០០ម៉ោង

សកម្មភាពជួសជុលប្រចាំខែ (Periodic Inspection)      សកម្មភាពជួសជុលប្រចាំឆ្នាំ (Periodic Inspection)

24

**៣.៣.១ របាយការណ៍កិច្ចការសរុបសំរាប់ឆ្នាំ២០០៨ ដល់ ឆ្នាំ២០១០**  
**មានម៉ត្រូង ២៧ កិច្ចការ**

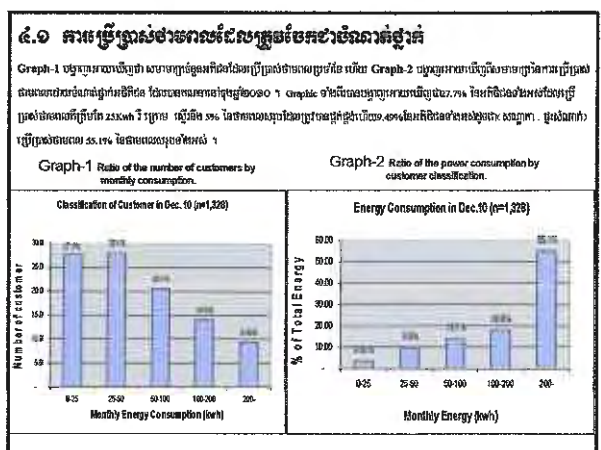
**Fault Record of 2010 (Power station & Line)**

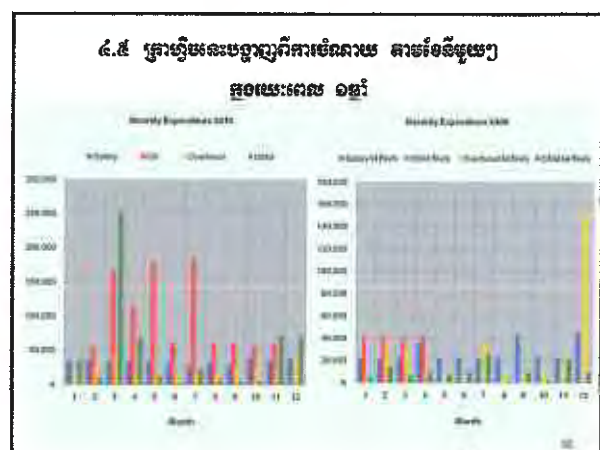
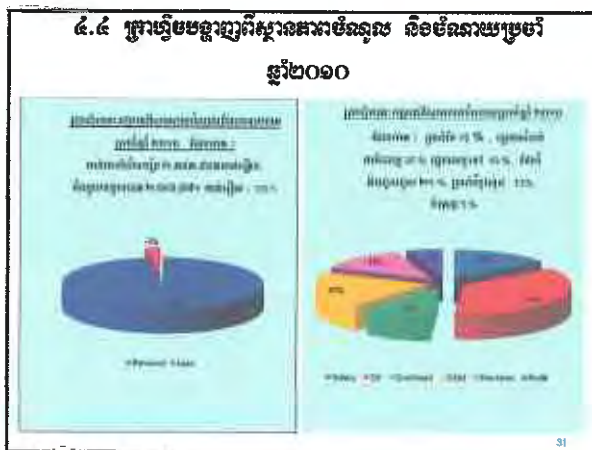
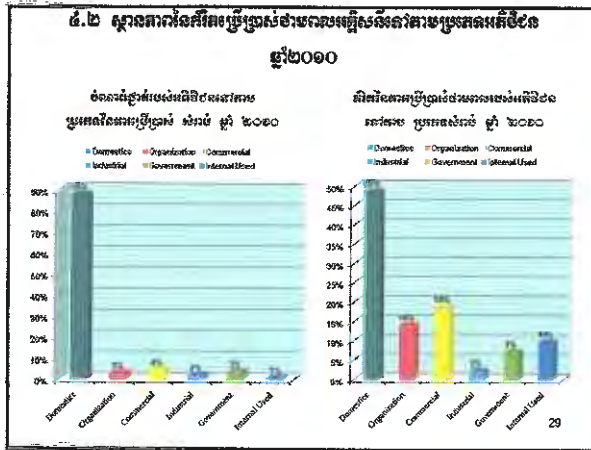
No.	Date	Technical details of faults	Reason	Consequences	Duration of disruption	No.affected	Length
1	27-Feb-10	External trouble on 22kV line	The lightning arrester cable was cut by 250V power line. The lightning arrester cable was cut by the 250V power line on the same tower.	28 customers or power lines were cut on the line. No revenue is generated.	14:00-14:30		1
2	28-Mar-10	External trouble on 22kV line	22kV cable over the 66kV conductor right. The 66V cable support was tilted. Cable, supports & CUMP were reported to B... in order to cut off the line for take out the illegal cable.	22 customers or power lines were cut on the line.	16:00-17:00		2
3	26-Apr-10	External trouble on 22kV line	The group of T&D staff go to the scene on 24-Mar-10 to cut 22kV cable over the overhead road but the big truck could not have a tip across the road.	Change of the 22kV line	10:00-14:00		4
4	10-May-10	OT trouble	During national festival, the load has rapidly increased and power stations could not control the load. Then power system was blackout.	The shut of the power system	20:30-22:30		2
5	16-Aug-10	Failure of 22kV equipment	The main motor at P&T station due to the failure	Replacement of parts	14:00-16:00		
6	24-Sep-10	External trouble on 22kV line	The people who are control the load in both the power station of Ch&Kang and another power station (Kampong Speu) had been through the cable across the 66V cable at pole 065041, and a cable was broken between the poles.	Replacement of cable pole	09:00-11:00		3
7	23-Nov-10	Failure of 60kV distribution line	Some people was cut the line along 66kV cable, when the 66kV cable drop out from the pole No. P&T-123 to P&T-121	Replacement of parts	14:00-15:00		1



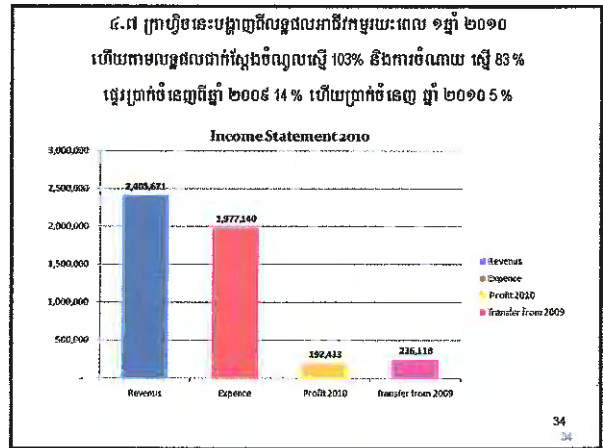
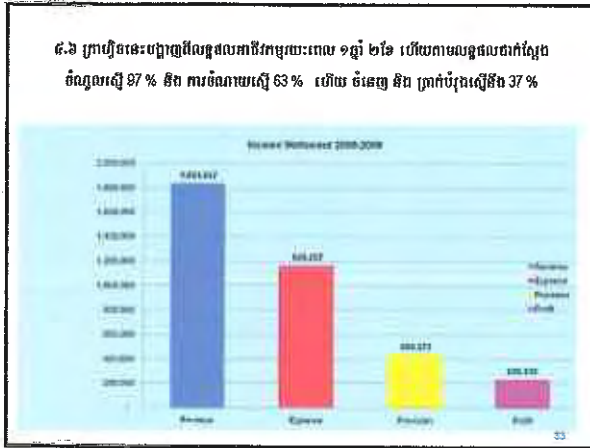
**៤. ស្ថានភាពអារម្ភ ហិរញ្ញវត្ថុ របស់អគ្គិសនីមណ្ឌលកិរី**

27





5%



**៥. និស្សន្ទសារស្តីអំពីផ្សេងៗគ្នា**

- ☛ ព្រឹត្តិបត្រចាយលក់អគ្គិសនីឱ្យបានគ្រប់គ្រាន់នៅទូទាំងក្រុងសែនមនោរម្យ និងតាមបណ្តាស្រុក នានាតាមព្រំដែនរម្យ ។
- ☛ បង្កើតលទ្ធភាពនៃការលក់ចាយលក់ ដើម្បីបំពេញបំរុងការពេលអនាគត ។
- ☛ ការងារមានការទុកចិត្ត និងស្មោះត្រង់ការលក់ចាយលក់អគ្គិសនី ។
- ☛ អនុវត្តការងារសាងសង់នៃប្រព័ន្ធពី VN អាមេរិកជាក់លាក់ក្រុង សែនមនោរម្យ ដោយពិការបស់ EDC នៅឆ្នាំ ២០១១ ។
- ☛ អនុវត្តការងារព្រឹកបណ្តាញទៅកាន់ភូមិចំនួន ២ នៅ ឆ្នាំ ២០១១ ។
- ☛ យកចិត្តទុកដាក់លើការងារ និង សិក្សាស្រាវជ្រាវពីលទ្ធផលបច្ចេកទេស ។

ស្រុចម្ពៅស្ទើរតែមិនមានសេចក្តីស្រឡាត់ស្រឡាយស្រដៀងគ្នាទៅនឹងប្រទេសដទៃទៀត ឯករាជ្យភាព  
លោកសិណាត អស់លោក លោកស្រី ដែលបានយកចិត្តទុកដាក់ស្រាប់



ស្រុកស្រែចម្ការ រាជធានីភ្នំពេញ អង្គការស្រែចម្ការ កម្ពុជា  
ស្រុកស្រែចម្ការ រាជធានីភ្នំពេញ អង្គការស្រែចម្ការ កម្ពុជា  
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ស្រុកស្រែចម្ការ រាជធានីភ្នំពេញ អង្គការស្រែចម្ការ កម្ពុជា

ស្រុកស្រែចម្ការ !

**Maintenance Plan of the Electric Facilities and Prospect of  
Tariff Rate after Connecting with Vietnam Contents**

1. Preface
2. Medium & Long Term Plan (M&L TP) for Electric Power Facilities
  - 2.1 Judgment of Work priority
  - 2.2 Civil Facilities
  - 2.3 Generating Facilities
  - 2.4 Transmission & Distribution Facilities
3. Study of the necessity for revise
4. Prospect of Tariff Rate after Connecting with Vietnam

**Preface**

- Long and mid-term plan is a rolling plan that should be revised comparing actual performance with future prospect. The Project Team wishes that EDC Mondul Kiri should be able to revise the Plan yearly by itself in the hereafter referring to this strategy.

**Judgment of Work Priority for Electrical Facility on M & L Term Plan, 2009**

Note: N/A: Not applicable A: Applicable

Evaluated Items	Upper: Objective Parts						Evaluation-1	
	Lower: Evaluated Points							
Compliance PCB, Disposal and Hazardous CB	Not necessary			Necessary			Evaluation-2	
Safety	Not necessary			Necessary				
Environment Noise, Clearance, Discharge	Not necessary			Necessary				
Maintenance	Out of order		Manufacturer support system		Spare Parts		Evaluation-3 to 5	
Order stop, Support system, Spare parts	N/A 0	A 30	A 0	N/A 30	A 0	N/A 50		
Reliability	Run time		Repaired times		Performance		Evaluation-3 to 5	
Past Experience, Repair, Service life, etc.	Less 0	Over 50	3> 0	>3 30	Good 0	Not good 50		
Technical	Not necessary			Necessary			Evaluation-3 to 5	
Heavy trouble as same type	0			80				
Functionary	Improved efficiency		Improved function & reliability		Improved work ability		Evaluation-3 to 5	
Efficiency, Function, Easiness	No 0	Yes 20	No 0	Yes 10	No 0	Yes 10		
Economics	Ineffectiveness		Effectiveness (small)		Effectiveness (medium)		Evaluation-3 to 5	
Economical effect	0		10		30			
Performance	Ineffectiveness		Effectiveness		Effectiveness (large)		Evaluation-3 to 5	
Stoppage, Economically	0		50		50			
Valuable Power Source	Expectation (small)			Expectation (medium)		Expectation (large)		Evaluation-3 to 5
Expectation (Pumping P/S, System share)	0			10		20		
Management System (O&M/S, Analysis, Evaluation)	Unnecessary			Necessary			Evaluation-3 to 5	
System Coordination	0			100				
Protective relays	Coordination		Kind of relays		Applied equipment		Evaluation-3 to 5	
	Unnecessary 0	Necessary 30	B & C 10	A 20	Tr. 20	Bus 30		
Risk Assessment	Black out		Turbine/generator stoppage		Spilled water		Evaluation-3 to 5	
Evaluation of effectiveness in faults	No 0	Yes 50	No 0	less 3 days 30	over 3 days 50	No 0		
						Yes 20		

**Long and Mid-term Plan**

Unit: US\$

Powerhouse Site	Item	Total	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018
			Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
<b>Civil Structures</b>												
(1) O'Moling		27,800	2,780	2,780	2,780	2,780	2,780	2,780	2,780	2,780	2,780	2,780
(2) O'Renis		45,400	4,540	4,540	4,540	4,540	4,540	4,540	4,540	4,540	4,540	4,540
(3) Diesel Powerhouse		8,000	800	800	800	800	800	800	800	800	800	800
(4) Administration		11,800	1,180	1,180	1,180	1,180	1,180	1,180	1,180	1,180	1,180	1,180
Sub-total		93,000	9,310	9,310	9,310	9,310	9,310	9,310	9,310	9,310	9,310	9,310
<b>Electric Facilities</b>												
(1) O'Moling		19,014	4,589	4,586	4,586	4,586	22,445	4,586	4,589	22,445	4,586	76,021
(2) O'Renis		143,525	4,302	4,302	4,302	4,302	21,053	4,302	4,302	21,053	4,302	71,207
(3) Diesel Powerhouse		19,088	5,689	5,689	5,689	5,689	31,217	5,689	5,689	31,217	90,762	5,689
(4) Administration		0	0	0	0	0	0	0	0	0	0	0
(5) Common		40,468	3,035	3,035	3,035	3,035	8,094	3,035	3,035	8,094	3,035	29,035
Sub-total		202,095	17,022	17,022	17,022	17,022	62,889	17,022	17,022	62,889	102,683	158,062
<b>Transmission and Distribution Line</b>												
		27,778	2,778	2,778	2,778	2,778	2,778	2,778	2,778	2,778	2,778	2,778
<b>Total</b>		422,973	44,110	44,110	44,110	44,110	148,889	44,110	44,110	148,889	108,110	193,100

**Medium & Long Term Plan for Transmission & Distribution Facilities**

Unit: US\$

Power Station	Description	Total	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
			Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
<b>Transmission &amp; Distribution Facilities</b>												
1. Asset & Repair Cost	1. 22kV Overhead Lines	32,879	3,288	3,288	3,288	3,288	3,288	3,288	3,288	3,288	3,288	3,288
	2. 22kV Underground Cable	1,855	181	181	181	181	181	181	181	181	181	181
	3. Pole-mounted Transformer	9,745	975	975	975	975	975	975	975	975	975	975
	4. Watt-hour Meter & accessory	29,128	2,913	2,913	2,913	2,913	2,913	2,913	2,913	2,913	2,913	2,913
	5. VHF FM Radio Set, etc.	31,894	3,189	3,189	3,189	3,189	3,189	3,189	3,189	3,189	3,189	3,189
	<b>Subtotal</b>	<b>106,501</b>	<b>10,650</b>	<b>10,650</b>	<b>10,650</b>	<b>10,650</b>	<b>10,650</b>	<b>10,650</b>	<b>10,650</b>	<b>10,650</b>	<b>10,650</b>	<b>10,650</b>
2. Contingent Cost	1. Bucket Car Inspection	11,000	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100
	2. Switch Station Inspection	5,900	590	590	590	590	590	590	590	590	590	590
	3. Insulated Tools Inspection	3,650	365	365	365	365	365	365	365	365	365	365
	4. Tree-Cutting & Trimming Work	4,000	400	400	400	400	400	400	400	400	400	400
	5. Periodical Training	5,000	500	500	500	500	500	500	500	500	500	500
	<b>Subtotal</b>	<b>29,550</b>	<b>2,955</b>	<b>2,955</b>	<b>2,955</b>	<b>2,955</b>	<b>2,955</b>	<b>2,955</b>	<b>2,955</b>	<b>2,955</b>	<b>2,955</b>	<b>2,955</b>
<b>Total</b>	<b>136,051</b>	<b>13,605</b>	<b>13,605</b>	<b>13,605</b>	<b>13,605</b>	<b>13,605</b>	<b>13,605</b>	<b>13,605</b>	<b>13,605</b>	<b>13,605</b>	<b>13,605</b>	<b>13,605</b>
3. Common Items	Test equipment and tools, etc.	10,545	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,054
	Spare parts for disaster restoration	100,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
	Contingency	31,555	3,155	3,155	3,155	3,155	3,155	3,155	3,155	3,155	3,155	3,155
	<b>Subtotal</b>	<b>142,100</b>	<b>14,210</b>	<b>14,210</b>	<b>14,210</b>	<b>14,210</b>	<b>14,210</b>	<b>14,210</b>	<b>14,210</b>	<b>14,210</b>	<b>14,210</b>	<b>14,210</b>
<b>Total of Asset &amp; Repair Cost</b>	<b>248,151</b>	<b>24,815</b>	<b>24,815</b>	<b>24,815</b>	<b>24,815</b>	<b>24,815</b>	<b>24,815</b>	<b>24,815</b>	<b>24,815</b>	<b>24,815</b>	<b>24,815</b>	<b>24,815</b>
<b>Total of Contingent Cost</b>	<b>38,550</b>	<b>3,855</b>	<b>3,855</b>	<b>3,855</b>	<b>3,855</b>	<b>3,855</b>	<b>3,855</b>	<b>3,855</b>	<b>3,855</b>	<b>3,855</b>	<b>3,855</b>	<b>3,855</b>
<b>Grand Total</b>	<b>286,701</b>	<b>28,670</b>	<b>28,670</b>	<b>28,670</b>	<b>28,670</b>	<b>28,670</b>	<b>28,670</b>	<b>28,670</b>	<b>28,670</b>	<b>28,670</b>	<b>28,670</b>	<b>28,670</b>

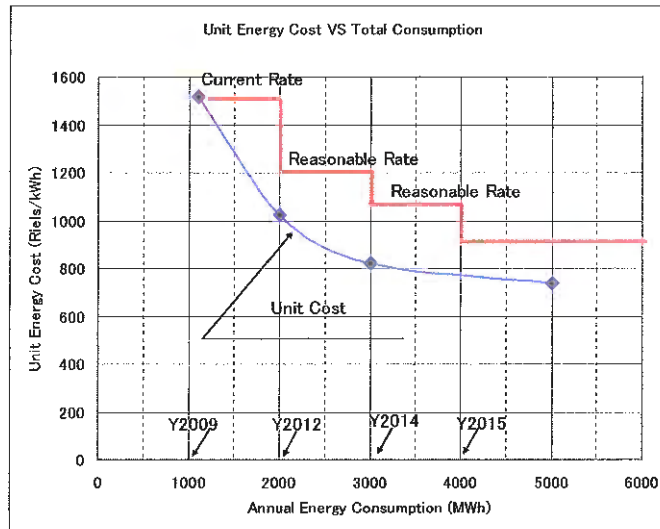
### Prospect of Tariff Rate after Connecting with Vietnam

- Preconditions
- 1) Hydropower is to make the utmost utilization of river discharge, so that the hydropower plants will be operated for base load.
- 2) Imported energy will be supplied for middle and peak loads.
- 3) The diesel power plant will basically be put for standby and used for swing operation in order to maintain stability of the power system when power demand much fluctuates, especially at evening time.
- 4) The medium-voltage connecting line with Vietnam will be constructed with EDC's own funds and be recovered from tariff collection.



### Result

Indicated in red line is a suggested tariff rate for sustainable electric utility service by Mondul Kiri power system.



### Suggestion

- The tariff rate should be revised according to change of the unit cost in such a way to cover the unit cost and the replacement costs of facilities or investment for future expansion.