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1. 調査団員・氏名

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1.　調査団員・氏名

1. 調査団員・氏名

➢ **第 1 次現地調査時（2012 年 1 月 25 日～2012 年 3 月 24 日）**

氏　　名	担　　当	所　　属
安達　一郎	総括	独立行政法人国際協力機構 地球環境部　環境管理第二課　課長
松岡　秀明	計画管理	独立行政法人国際協力機構 地球環境部　環境管理第二課
飯塚　惠治	業務主任／バイオマス暖房計画	三井共同建設コンサルタント㈱
伝田　六郎	施設設計／自然条件調査①	三井共同建設コンサルタント㈱ （伝田技術士事務所）
山野　和秀	施設設計／自然条件調査②	三井共同建設コンサルタント㈱ （個人コンサルタント）
倉澤　壮児	維持管理計画／経済性分析	ユニコ　インターナショナル㈱ （日本環境コンサルタント㈱）
志賀　渉	積算／調達・機材計画	ユニコ　インターナショナル㈱
池田　博	環境社会配慮／CDM 事業化	三井共同建設　コンサルタント㈱
奈良　幸雄	業務調整／GIS	三井共同建設コンサルタント㈱

➢ 第 2 次現地調査時（2012 年 6 月 3 日～2012 年 9 月 9 日）

氏　　名	担　　当	所　　属
飯塚　惠治	業務主任／バイオマス暖房計画	三井共同建設コンサルタント㈱
伝田　六郎	施設設計／自然条件調査①	三井共同建設コンサルタント㈱ （伝田技術士事務所）
山野　和秀	施設設計／自然条件調査②	三井共同建設コンサルタント㈱ （個人コンサルタント）
倉澤　壮児	維持管理計画／経済性分析	ユニコ　インターナショナル㈱ （日本環境コンサルタント㈱）
木渓　秀樹	積算／調達・機材計画	ユニコ　インターナショナル㈱
池田　博	環境社会配慮／CDM 事業化	三井共同建設　コンサルタント㈱
奈良　幸雄	業務調整／GIS	三井共同建設コンサルタント㈱

➢ 第 3 次現地調査時（2013 年 1 月 28 日～2013 年 2 月 3 日）

氏　　名	担　　当	所　　属
松岡　秀明	総括	独立行政法人国際協力機構 地球環境部　環境管理第二課
飯塚　惠治	業務主任／バイオマス暖房計画	三井共同建設コンサルタント㈱
伝田　六郎	施設設計／自然条件調査①	三井共同建設コンサルタント㈱ （伝田技術士事務所）

2. 調査行程

2. 調査行程

2.1 第 1 次現地調査時

	月/日	曜日	総括 安達 一郎	計画管理 松岡 秀明	業務主任/バイオマス暖房計画 飯塚 惠治	施設設計/自然条件調査① 伝田 六郎	施設設計/自然条件調査② 山野 和秀	維持管理計画/経済性分析 倉澤 壮児	積算/調達・機材計画 志賀 渉	環境社会配慮/CDM 事業化 池田 博	業務調整/GIS 奈良 幸雄
1	1/25	水	本邦出発							本邦出発	
2	1/26	木	農業食品産業省大臣、首相府表敬訪問、サイト調査							農業食品産業省大臣、首相府表敬訪問	
3	1/27	金									
4	1/28	土									
5	1/29	日									
6	1/30	月	農業食品産業省大臣および 2KR-PIU 所長と M/D 案打合せ、UNDP 訪問、M/D 調印							農業食品産業省大臣、首相府表敬訪問	
7	1/31	火									
8	2/1	水	モ国出発		UNDP 訪問、調査整理表作成	サイト調査準備	UNDP 訪問、調査整理表作成	CFU 打合せ、UNDP 訪問		CFU 打合せ、UNDP 訪問	UNDP 訪問
9	2/2	木									
10	2/3	金									
11	2/4	土									
12	2/5	日			サイト訪問、再委託契約交渉、Energy Efficiency 面談	サイト調査準備、再委託契約交渉	サイト訪問、調査整理表作成	サイト訪問、CFU 打合せ、環境省大臣面談、UNDP 訪問	本邦出発 2KR-PIU 協議	サイト訪問、CFU 打合せ、環境省大臣面談、Energy Efficiency 訪問	サイト訪問
13	2/6	月									
14	2/7	火									
15	2/8	水									
16	2/9	木									
17	2/10	金									
18	2/11	土									
19	2/12	日			再委託手続き、建設・地方開発省訪問、農業機械展示会視察	質問票回収手配	質問票回収手配	調査情報整理 本邦帰国	2KR-PIU 協議、現地業者面談、農業機械展示会視察	農業機械展示会視察、State Ecological Inspectorate 面談	質問票回収手配サポート
20	2/13	月									
21	2/14	火									
22	2/15	水									
23	2/16	木									
24	2/17	金									
25	2/18	土									
26	2/19	日			MoAFI 大臣打合せ、ブリケット・ペレット工場視察	質問票整理、ペレット工場視察、サイト調査	質問票整理、ペレット工場視察、サイト調査		農業機械メーカー、販売代理店訪問、ブリケット・ペレット工場視察	MoAFI 大臣打合せ 本邦帰国	MoAFI 大臣面談、質問票整理サポート
27	2/20	月									
28	2/21	火									
29	2/22	水									
30	2/23	木									
31	2/24	金									
32	2/25	土									
33	2/26	日			大使館書記官面談	サイト調査、資料整理	サイト調査、資料整理		建設会社協議、世銀担当者協議		サイト調査
34	2/27	月									
35	2/28	火									
36	2/29	水									
37	3/1	木			統計整理、機材購入手続き、機材メーカー訪問	サイト訪問	サイト訪問		機材メーカー調査、UNDP 打合せ		機材購入手続きサポート
38	3/2	金									
39	3/3	土									
40	3/4	日			MoAFI 大臣打合せ、MSIF 面談、サイト訪問	サイト訪問	サイト訪問		調達情報収集、MoAFI 大臣打合せ、サイト訪問		機材購入手続きサポート
41	3/5	月									
42	3/6	火									
43	3/7	水									
44	3/8	木									
45	3/9	金									
46	3/10	土									
47	3/11	日			内務省消防局面談、経済省面談、現地コンサルタン	サイト訪問	サイト訪問		MoAFI 技術担当面談、経済省面談、サイト訪問、現地コンサ		サイト訪問
48	3/12	月									
49	3/13	火									
50	3/14	水									
51	3/15	木									

52	3/16	金			ト会社調査				ルタント会社調査、エネルギー展示会視察		
53	3/17	土									
54	3/18	日			報告書作成	現地調査結果整理、報告書作成	現地調査結果整理、報告書作成		UNDP 面談、日本大使館書記官面談、MoAFI 大臣打合せ、報告書作成		MoAFI 大臣打合せ
55	3/19	月									
56	3/20	火									
57	3/21	水									
58	3/22	木									
59	3/23	金									
60	3/24	土			本邦帰国				本邦帰国		本邦帰国

2.2 第 2 次現地調査時

	月/日	曜日	業務主任/バイオマス暖房計画 飯塚 惠治	施設設計/自然条件調査① 伝田 六郎	施設設計/自然条件調査② 山野 和秀	維持管理計画/経済性分析 倉澤 壮児	積算/調達・機材計画 木渓 秀樹	環境社会配慮/CDM 事業化 池田 博	業務調整/GIS 奈良 幸雄
1	6/3	日	本邦出発						
2	6/4	月	2KR-PIU・MoAFI 大臣打合せ、サイト調査準備、再委託準備						
3	6/5	火							
4	6/6	水							
5	6/7	木							
6	6/8	金							
7	6/9	土							
8	6/10	日	MSIF・UNDP 面談、再委託業者説明						
9	6/11	月							
10	6/12	火							
11	6/13	水							
12	6/14	木							
13	6/15	金							
14	6/16	土							
15	6/17	日	調達情報収集、MoAFI 大臣面談、再委託業者評価				本邦出発		
16	6/18	月					調達情報収集・協議、MoAFI 大臣面談		
17	6/19	火							
18	6/20	水							
19	6/21	木							
20	6/22	金							
21	6/23	土							
22	6/24	日	サイト情報収集、再委託締結、MSIF 訪問				調達情報整理、現地施工情報収集、MSIF 面談		
23	6/25	月							
24	6/26	火							
25	6/27	水							
26	6/28	木							
27	6/29	金							
28	6/30	土							
29	7/1	日	建設・地方開発省面談、MoAFI 面談、現地設計会社打合せ	本邦出発	本邦出発		建設・地方開発省面談、MoAFI 面談、現地設計会社打合せ		本邦出発
30	7/2	月		現地設計会社打合せ					現地設計会社打合せ
31	7/3	火							
32	7/4	水							
33	7/5	木							
34	7/6	金							
35	7/7	土							
36	7/8	日	再委託準備、MoAFI 大臣面談、ペレット製造設備・UNDP ボイラーサイト視察	MoAFI 大臣面談、ペレット製造設備・UNDP ボイラーサイト視察			MoAFI 大臣面談、ペレット製造設備・UNDP ボイラーサイト視察、見積依頼		MoAFI 大臣面談、ペレット製造設備・UNDP ボイラーサイト視察、機材購入手
37	7/9	月							
38	7/10	火							
39	7/11	水							
40	7/12	木							
41	7/13	金							
42	7/14	土							

									続き
43	7/15	日	サイト情報整理、現地設計・施工会社打合せ、再委託手続き	設計資料準備、現地工事 RFQ 準備、UNDP ボイラーサイト視察	設計資料準備、UNDP ボイラーサイト視察、設計資料準備		設計会社打合せ		現地工事 RFQ 準備サポート、UNDP ボイラーサイト視察、機材購入手続き
44	7/16	月							
45	7/17	火							
46	7/18	水							
47	7/19	木							
48	7/20	金							
49	7/21	土							
50	7/22	日	再委託契約、MoAFI 大臣面談、サイト情報整理	設計資料準備、現地設計会社打合せ、現地工事 RFQ 準備			ペット製造設備候補地視察、UNDP 訪問、調達情報収集、設計会社打合せ		現地工事 RFQ 準備サポート、機材購入手続き
51	7/23	月							
52	7/24	火							
53	7/25	水							
54	7/26	木							
55	7/27	金							
56	7/28	土							
57	7/29	日	サイト情報整理	設計資料準備、設計会社打合せ、RFQ 打合せ			調達情報収集		機材購入手続き
58	7/30	月							
59	7/31	火				本邦出発		本邦出発	
60	8/1	水	本邦帰国	サイト調査、調査結果整理	サイト調査、ペレット設備サイト検討	プロジェクト評価、ソフコン案検討、2KR-PIU・MoAFI 大臣打合せ	積算補助資料作成	資料整理、温室効果ガス削減情報収集	サイト調査、ソフコン案検討サポート
61	8/2	木							
62	8/3	金							
63	8/4	土							
64	8/5	日		引き合い書作成、MSIF 面談、設計会社打合せ	設計業務、調達情報・輸送調査、材料規格調査	質問状手配、欧州ペレット情報収集、ペレット製造プロセス・コスト試算	経済省訪問、UNDP 訪問、MSIF 訪問、輸入情報収集、ソフコン情報収集、モジュール情報収集	MoAFI 大臣面談、CFU 打合せ、Institute of Ecology and Geography 面談、経済省面談、UNDP 面談、MSIF 面談	引き合い書作成サポート、ソフコン案検討サポート、GIS 情報収集、UNDP 面談
65	8/6	月							
66	8/7	火							
67	8/8	水							
68	8/9	木							
69	8/10	金							
70	8/11	土							
71	8/12	日		引き合い書作成、MSIF 面談、設計会社打合せ、日本大使館書記官面談	設計業務、調達情報・輸送調査、材料規格調査	ボイラ調査、比較表作成、燃料費試算、ペレット需要調査・試算	設計会社打合せ、積算補助資料作成	環境社会配慮、CDM 事業化情報収集	設計会社打合せ、引き合い書作成サポート、GIS 情報収集、機材購入手続き
72	8/13	月							
73	8/14	火							
74	8/15	水							
75	8/16	木							
76	8/17	金							
77	8/18	土							
78	8/19	日		設計会社打合せ、報告書作成	サイト別地形調査、法規調査	報告書作成、ソフコン計画表作成	設計資料準備、設計会社打合せ、UNDP 打合せ、現地企業打合せ	温室効果ガス削減削減量算定、MoAFI 大臣面談	ソフコン計画サポート、GIS 情報整理
79	8/20	月							
80	8/21	火							
81	8/22	水							
82	8/23	木							
83	8/24	金							
84	8/25	土							
85	8/26	日		報告書作成、UNDP 面談	ボイラ容量算定	ソフコン計画表作成、見積手配	設計資料準備	温室効果ガス削減量算定	GIS 地図資料作成、UNDP 面談、ソフコン情報収集
86	8/27	月							
87	8/28	火							
88	8/29	水		本邦帰国					
89	8/30	木							
90	8/31	金							
91	9/1	土							GIS 地図資料作成、UNDP ワークショップ出席、ソフコン情報収集、MoAFI 大臣面談
92	9/2	日							
93	9/3	月							
94	9/4	火							
95	9/5	水							
96	9/6	木							
97	9/7	金							
98	9/8	土							
99	9/9	日							本邦帰国

2.3　第 3 次現地調査時

	月/ 日	曜日	総括 松岡　秀明	業務主任/ バイオマス暖房計画 飯塚　恵治	施設設計/ 自然条件調査① 伝田　六郎
1	1/28	月	本邦出発		
2	1/29	火	準備調査報告書（案）の先方政府への説明・協議、 議事録作成・署名		
3	1/30	水			
4	1/31	木			
5	2/1	金			
6	2/2	土			
7	2/3	日	本邦帰国		

3. 関係者（面会者）リスト

3. 関係者（面会者）リスト

氏　　名	職　　位	所　　属
Vasile BUMACOV (Mr)	大臣	農業食品産業省 (Ministry of Agriculture and Food Industry)
Iuric SENIC (Mr)	Department Head	農業食品産業省/ Organic Agriculture and Origin of Products Department
Petru MALERU (Mr)	Director	農業食品産業省/ Payment Agency for Agriculture (AIPA)
Valeriu BULGARI (Mr)	Executive Director	農業食品産業省/ 2KR-PIU
Liliana PELIN (Ms)	モニタリング・評価専門家	農業食品産業省/ 2KR-PIU
Mihai DOLMA (Mr)	Director	経済省/ Gaz & Energy Efficiency Department
Calin NEGURA (Mr)	Deputy Director	経済省/ Energy Efficiency Agency
Gheorghe SALARU (Mr)	大臣	環境省(Ministry of Environment)
Valeriu HOLBON (Mr)	Head of Dvision	環境省/ State Ecological Inspectorate
Stela DRUCIOC (Ms)	CDM 担当	環境省/ Carbon Finance Unit
Marcel RADUCAN (Mr)	大臣	建設･地方開発省(Ministry of Regional Development and Construction)
Alexandru BESLIU (Mr)	大臣カウンセラー	建設･地方開発省
Svetlana ROGOV (Ms)	Head of International Relations and Investments Division	建設･地方開発省
Vladimie CARLOV (Mr)	Chief Engineer	建設･地方開発省/ National Institute of Research and Design in Field Spacial Territory, urbanization and Architecture
Anatolie GHILAS (Mr)	General Director	地籍土地関係機関 (Cadastre and Land Relation Agency)
Nagorneac SERGHEI (Mr)	Director	地籍土地関係機関/ INGEOCAD
Nagorneac CONSTANTIN(Mr)	Chief of Technical Department	地籍土地関係機関/ INGEOCAD
Veacheslav SHOKIN (Mr)	調達担当	CAPMU(Consolidated Agricultural Projects Management Unit)
Nadja VETTERS (Ms)	Portfolio Manager	国連開発計画(UNDP)

氏　　名	職　　位	所　　属
Alexandru URSUL (Mr)	Project Manager	国連開発計画(UNDP-MEBP)
Nicolae ZAHARIA (Mr)	Senior Project Business Development	国連開発計画(UNDP-MEBP)
Tatiana CRACIUN (Ms)	Senior Project Officer Community Mobilization	国連開発計画(UNDP-MEBP)
Vsevlod VOLCOV (Mr)	Technical Engineer	国連開発計画(UNDP-MEBP)
Mihai MACIUCA (Mr)	調達スペシャリスト	国連開発計画(UNDP-MEBP)
Waldemar SOCHACZEWSKI (Mr)	農業食品産業省アドバイザー	European Union High level Policy Advice Mission
Aurelian ROTARU (Mr)	農業食品産業省専門家	European Union High level Policy Advice Team
Robin DREWETT (Mr)	チームコーディネーター	欧州復興開発銀行(European Bank for Reconstruction and Developemnt)
Boris POPADIUC	Executive Director	モルドバ社会投資基金 (Moldova Social Investment Fund)
Dumitru ROSCOVAN(Mr)	Team Leader	モルドバ社会投資基金
Munteanu (Mr)	Technical Difficulties Assistant	モルドバ社会投資基金
Ala MUSTEATA (Mr)		モルドバ社会投資基金
Patrik STALGREN (Mr)	一等書記官	スウェーデン大使館

4. 討議議事録（M/D）

MINUTES OF DISCUSSIONS
THE PREPARATORY SURVEY ON THE PROJECT FOR BIOMASS HEATING SYSTEMS IN RURAL COMMUNITIES IN THE REPUBLIC OF MOLDOVA

In response to the request from the Government of Moldova, the Government of Japan decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") on the Project for Biomass Heating Systems in Rural Communities (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Moldova the Preparatory Survey Team (hereinafter referred to as "the Team"), which is headed by Mr. Ichiro ADACHI, Director of the Environment Management Division 2, the Global Environment Department, JICA, and is scheduled to stay in the country from 26th January to 1st February, 2012.

The Team held a series of discussions with the concerned officials of Moldova and conducted a field survey.

In the course of discussions and field survey, both sides confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Preparatory Survey Report.

Chisinau, 31st January, 2012

Mr. Ichiro Adachi
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Mr. Vasile Bumacov
Minister
Ministry of Agriculture and Food Industry
Moldova

Mr. Valeriu Bulgari
Executive Director
2KR Project Implementation Unit
Ministry of Agriculture and Food Industry
Moldova

ATTACHMENT

1. Objective of the Project

The objective of the Project is that heating systems using biomass fuel are provided and sustainably utilized in the rural communities of Moldova.

2. Project Site

The Project sites are to be selected from the public institutes in rural communities of Moldova except Transnistria. The map of Moldova is shown in Annex-1.

3. Responsible and Implementing Agency

The responsible agency is the Ministry of Agriculture and Food Industry, and the implementing agency is the 2KR Project Implementation Unit under the Ministry of Agriculture and Food Industry (hereinafter referred to as "PIU"). Organization chart is shown in Annex-2.

4. Items Requested by the Government of Moldova

Following the discussions with the Team, the items described in Annex-3 were finally requested by the Government of Moldova. Both sides confirmed that the appropriateness of the final components of the Project would be decided by the Japanese side.

In addition, both sides agreed that the possibility to introduce biomass boilers using pellets as fuel and pelleting machines is also studied during the Survey.

Moldovan side understood that some of the items may be procured in Japan as a result of the Survey.

5. Japan's Grant Aid Scheme

(1) The Team explained that the sub-scheme of the Project will be decided from "Grant Aid for General Projects", "Grant Aid for Environment and Climate Change (hereinafter referred to as "GAEC")", and "Grant Aid for Community Empowerment (hereinafter referred to as "GACE")" based on the result of the Survey.

(2) The Moldovan side understood the Japan's Program Grant Aid Schemes explained by the Team, as described from Annex-4 to 9.

(3) The Moldovan side will take necessary measures, as described in Annex-6 for Japan's Grant Aid for General Projects and Annex-9 for GAEC and GACE for smooth implementation of the Project, as the condition of the Japan's Grant Aid to be implemented.

(4) JICA will report to the Moldovan side if there are any other undertakings based on the result of this Survey.

6. Objective of the Survey

The Team explained that the objective of the Survey is to collect information to ensure the appropriateness of the Project.

7. Schedule of the Survey

(1) The consultant members of the Team will continue the 1st Survey in Moldova until the end of March, 2012.

(2) The Team explained that the schedule of the Survey as follows. However, it is subjected to change based on the progress of the Survey.

April to July 2012: 2nd Survey

November 2012: 3rd Survey to explain draft Preparatory Survey Report
January 2013: Submission of the final report

(3) The Team explained that the implementation of the Preparatory Survey is not the commitment of the approval of the Project.

8. Other Relevant Issues

(1) Inception Report

The contents of Inception Report that the Team explained was understood and accepted in principle by the Moldovan side.

(2) Arrangements for the Survey

As a response to the request by the Team, the Moldovan side agreed to assign necessary number of counterpart personnel for the Survey and provide all the data and information relevant to the Project for the smooth implementation of the Survey. The Moldovan side also agreed to provide an appropriate office space for the Team.

(3) Responsibility of each Agency Concerned with the Project

PIU will collaborate with the relevant organizations to support the implementation of the Survey.

(4) Priority of the Project Sites

The Moldovan side agreed that the number of the Project sites may be changed based on the financial reasons, and thus, the candidate sites will be identified in priority order.

(5) Budget Allocation for the Project by the Moldovan side

The budget necessary for the Project including operation and maintenance cost will be assessed in the Survey. The Moldovan side assures that appropriate budget will be put in place in each community, and each village administration is responsible for the operation and maintenance of the facilities. PIU will provide technical support to these communities.

(6) Contribution from the beneficiaries to the Project

The Moldovan side agreed that the foundation of the biomass boiler will be constructed by the beneficiary (e.g. community or village administration). Also, the beneficially should acquire the necessary permission for the construction of the system from the relevant authorities.

(7) Other Undertakings of the Moldovan side

Although general undertakings of both sides are shown in Annex-6 and 9, the Team emphasized the responsibilities of the Moldovan side to execute following matters and the Moldovan side agreed to it.

1) Tax Exemption
Both sides confirmed that import tax, customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services will be exempted. The Moldovan side will take necessary measures for tax exemption, if any.

2) Necessary measures for Operation and Maintenance of facilities and equipment
The Moldovan side will take any necessary measures and allocate the necessary budget, if any, to operate and maintain the facilities and equipment which would be provided by

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the Project.

(8) Avoidance of Duplication with Other Projects

Both sides agreed that any component of the Project will not be overlapped with any other project supported by other donor agencies, NGOs, and Moldovan official organization(s).

(9) Safety and Security

The Moldovan side agreed to take measures to secure the safety of the members of the Team.

(10) Careful Handling of the Survey Reports

The Team explained that certain information in both the draft and the final reports of the Survey should be dealt with confidentially until the tender is closed when the Project proceeds to actual implementation stage, since disclosure of the information would affect fairness of tender procedure. The Moldovan side understood the sensitivity in dealing with the Survey reports and agreed on careful handling of the reports for achieving fair tendering.

(11) Environmental and Social Considerations

Both sides agreed that the Moldovan side will take necessary measures regarding environmental impacts for implementation of the Project according to the relative laws and acts in Moldova. Also, the beneficiaries should consult with the communities and acquire the agreement on the construction of the system.

ANNEXES

Annex-1	Map of Moldova
Annex-2	Organization Chart of PIU
Annex-3	Requested Components of the Project
Annex-4 and 5	Japan's Grant Aid Scheme for General Projects
Annex-6	Major Undertakings by Each Government for General Projects
Annex-7	Japan's Grant Aid for Environment and Climate Change (GAEC)
Annex-8	Japan's Grant Aid for Community Empowerment (GACE)
Annex-9	Major Undertaking by Each Government for GAEC and GACE

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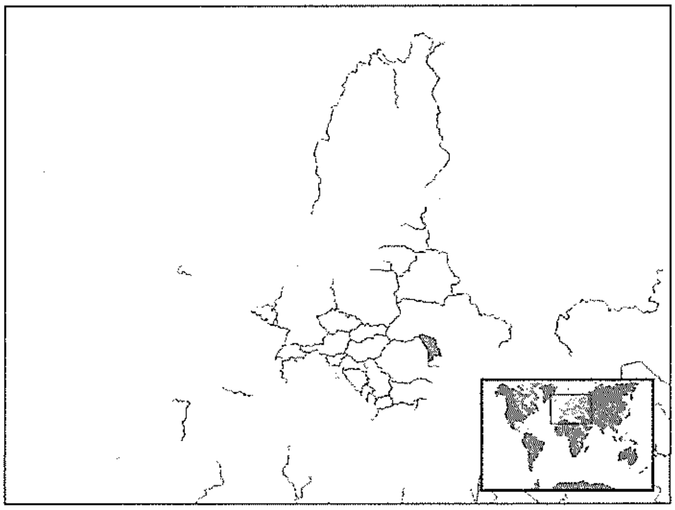
Annex-1

Map of Moldova



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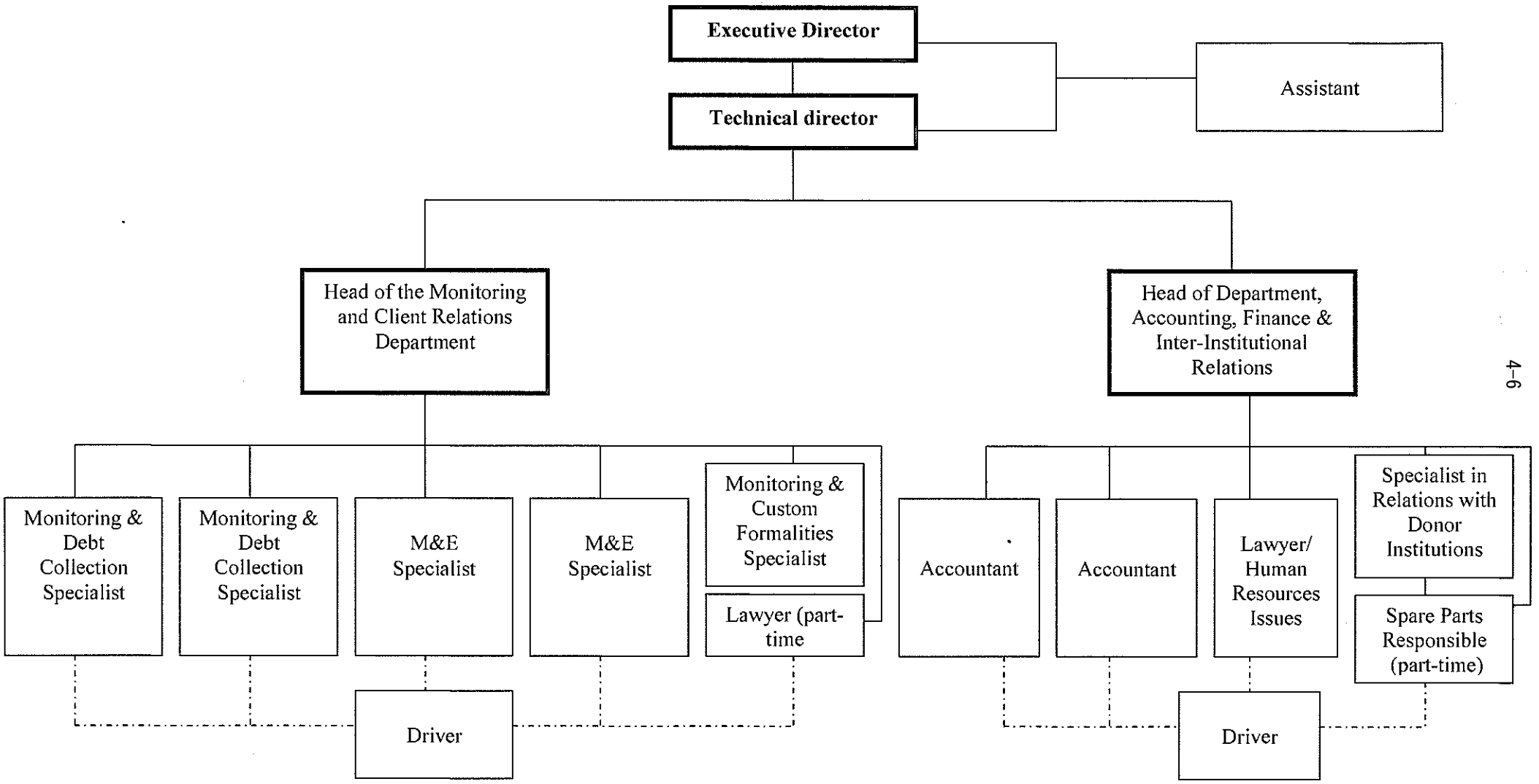
Annex 2

PIU Organizational Chart



Annex-3

Requested Components of the Project

	Items	Q'ty
1	Provision and Installation of Biomass Boilers - procurement of a biomass boiler - construction of the biomass boiler house - connection of the boiler to the heat exchanger	100 sets
2	Provision of a bailer	100 sets
3	Renovation and installation of heating pipe systems in the facility, if necessary	Not Identified Yet
4	Training of the community and government members for operation and maintenance	If necessary

These items are subject to change based on the Survey results.
The possibility to introduce biomass boilers using pellets as fuel and pelleting machines is also studied during the Survey.

Annex-4

JAPAN'S GRANT AID for General Projects

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

・Preparatory Survey
- The Survey conducted by JICA

・Appraisal &Approval
-Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet

・Authority for Determining Implementation
-The Notes exchanged between the GOJ and a recipient country

・Grant Agreement (hereinafter referred to as "the G/A")
-Agreement concluded between JICA and a recipient country

・Implementation
-Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and

effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

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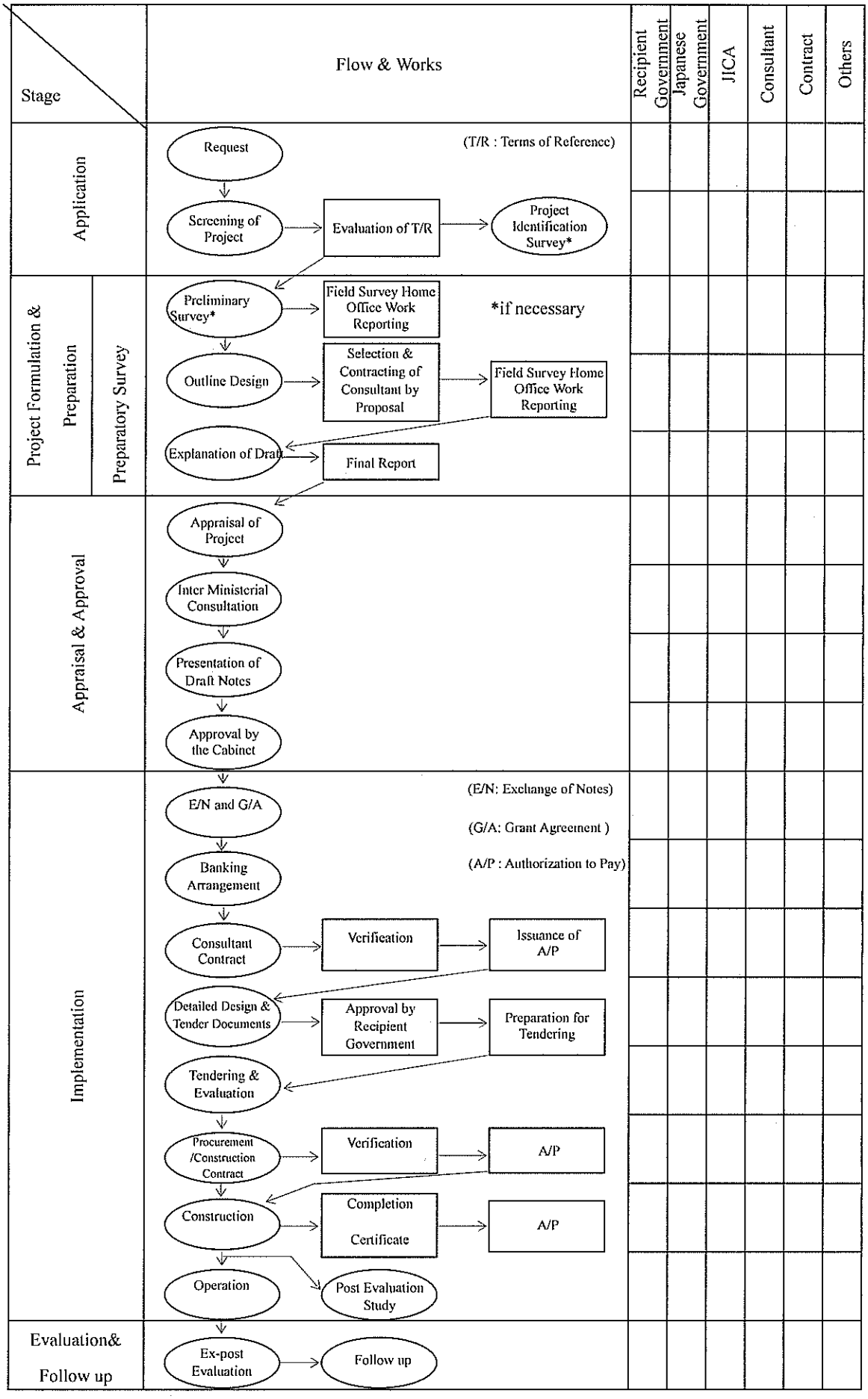
Annex-5

FLOW CHART OF JAPAN's GRANT AID PROCEDURES



Annex-6

Japan's Grant Aid for General Projects

Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	to secure [a lot] /[lots] of land necessary for the implementation of the Project and to clear the [site]/[sites];		●
2	To construct the following facilities		
	1) The building	●	
	2) The gates and fences in and around the site		●
	3) The parking lot	●	
	4) The road within the site	●	
	5) The road outside the site		●
3	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the [site]/[sites]		
	1) Electricity		
	a. The distributing power line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer	●	
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	●	
	3) Drainage		
	a. The city drainage main (for storm sewer and others to the site)		●
	b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site	●	
	4) Gas Supply		
	a. The city gas main to the site		●
	b. The gas supply system within the site	●	
	5) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	6) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
4	To ensure prompt [unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products] / [customs clearance of the products and to assist internal transportation of the products in the recipient country]		
	1) Marine (Air) transportation of the Products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services [be exempted] / [be borne by the Authority without using the Grant]		●
6	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
7	To ensure that [the Facilities and the products]/[the Facilities]/ [the products] be maintained and used properly and effectively for the implementation of the Project		●
8	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
9	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●

(B/A : Banking Arrangement, A/P : Authorization to pay)

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Annex-7

Programme Grant Aid for Environment and Climate Change of the Government of Japan

(Provisional)

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, the new JICA law was entered into effect on October 1, 2008. Based on the law and the decision of GOJ, Japan International Cooperation Agency (hereinafter referred to as "JICA") has become the executing agency of the Programme Grant Aid for Environment and Climate Change (hereinafter referred to as "GAEC").

The Grant Aid provides a recipient country (hereinafter referred to as "the Recipient") with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

GAEC aims toward emission reduction such as achievement of energy saving (environmental-easing measures) and environmental damage control by climate change. Multiple components can be combined to effectively meet the needs. Contractors, suppliers or consultants are not confined to Japanese firms only, and construction can be done based on the local method.

1. Procedures for GAEC

GAEC is executed through the following procedures.

Application	(Request made by the Recipient)
Study	(Outline Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by GOJ and Approval by the Cabinet)
Determination of Implementation	(The Notes exchanged between the GOJ and the Recipient)
Grant Agreement (hereinafter referred to as "the G/A")	(Agreement concluded between JICA and the Recipient)

Firstly, the application or request for a GAEC programme submitted by the Recipient is examined by GOJ (the Ministry of Foreign Affairs) to determine whether or not it is eligible for GAEC.

Secondly, if the request is deemed appropriate, JICA conducts the Outline Design Study, using Japanese consulting firms.

Thirdly, GOJ appraises the programme to see whether or not it is suitable for Japan's GAEC, based on the Outline Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the programme, once approved by the Cabinet, becomes official with the Exchange

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of Notes (E/N) signed by GOJ and the Recipient. Simultaneously, the Grant will be made available by concluding a grant agreement between the Government of the Recipient or its designated authority and JICA (hereinafter referred to as "the G/A").

JICA is designated by GOJ as an organization responsible for the execution of the Grant.

Procurement Agent ("the Agent") is designated to conduct the procurement services of products and services (including fund management, preparing tenders, contracts and so on) for GAEC on behalf of the Recipient. The Agent is an impartial and specialized organization and shall render services according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by GOJ and agreed between the two Governments in the Agreed Minutes ("A/M").

2. Outline Design Study

1) Contents of the Study

The aim of the Outline Design Study ("the Study"), conducted by JICA on a requested programme ("the Programme"), is to provide a basic document necessary for the appraisal of the Programme by GOJ. The contents of the Study are as follows:

(1) Confirmation of the background, objectives, and benefits of the Programme and also institutional capacity of agencies and communities concerned of the recipient country necessary for the Programme's implementation.
(2) Evaluation of the appropriateness of the Programme to be implemented under the Grant Aid Scheme for Environment and Climate Change from a technical, social and economic point of view;
(3) Confirmation of items agreed upon by both parties concerning the basic concept of the Programme.
(4) Preparation of an outline design of the Programme.
(5) Estimation of cost for the Programme.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid programme. The Outline Design of the Programme is confirmed considering the guidelines of Japan's Grant Aid scheme.

GOJ requests the Government of the Recipient to take whatever measures are necessary to ensure its self-reliance in the implementation of the Programme. Such measures must be guaranteed even through they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Programme. Therefore, the implementation of the Programme is confirmed by all relevant organizations of the Recipient through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses registered consulting firms. JICA selects

firms based on proposals submitted by interested firms. The firms selected carry out an Outline Design Study and write a report, based upon terms of reference set by JICA.

The consulting firms to work on the Programme's implementation after the Exchange of Notes could be, in principle, of any nationality as long as the Firm satisfies the conditions specified in the tender documents.

3. Implementation of GAEC after the E/N

1) Exchange of Notes (E/N) and Grant Agreement (G/A)

GAEC is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the programme, period of execution, conditions and amount of the Grant Aid, etc., are confirmed. The conclusion of the Grant Agreement (hereinafter referred to as "the G/A") between JICA and the recipient government will be followed to define the necessary engagement to implement the project such as payment conditions, responsibilities of the recipient government and procurement conditions.

2) Procedural details

Procedural details on the procurement of products and services under GAEC will be agreed upon between the Recipient and JICA at the time of the signing of the E/N and G/A.

Essential points to be agreed upon are outlined as follows:

a) JICA is in a position to expedite the proper execution of the program.

b) The products and services shall be procured and provided in accordance with "Procurement Guidelines for Environment and Climate Change of JICA.

c) The Recipient shall conclude an employment contract with the Agent.

d) The Agent is the representative acting in the name of the Recipient concerning all transfers of funds to the Agent.

3) Focal Points of "The Procurement Guidelines of Japan's (Type I - E) Grant Aid for Environment and Climate Change"

a) The Agent

The Agent is the organization which provides procurement services of products and services on behalf of the Recipient according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by GOJ and agreed between the two Governments in the A/M.

b) Agent Agreement

The Recipient shall conclude an Agent Agreement, within two months after the date of entry into force of the E/N and the G/A, in accordance with the A/M. The scope of the Agent's services shall be clearly specified in the Agent Agreement.

c) Approval of the Agent Agreement

The Agent Agreement, which is prepared as two identical documents, shall be

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submitted to JICA by the Recipient through the Agent. JICA confirms whether or not the Agent Agreement is concluded in conformity with the G/A and the Procurement Guidelines for Disaster Reconstruction Grant Aid, and approves the Agreement.

The Agent Agreement concluded between the Recipient and the Agent shall become effective after the approval by JICA in a written form.

d) Payment Methods

The Agent Agreement shall stipulate that "regarding all transfers of the fund to the Agent, the Recipient shall designate the Agent to act on behalf of the Recipient and issue a Blanket Disbursement Authorization ("the BDA") to conduct the transfer of the fund (Advances) to the Procurement Account from the Recipient Account."

The Agent Agreement shall clearly state that the payment to the Agent shall be made in Japanese yen from the Advances and that the final payment to the Agent shall be made when the total Remaining Amount becomes less than 3 % of the Grant and its accrued interest.

e) Products and Services Eligible for Procurement

Products and services to be procured shall be selected from those defined in the G/A.

f) Firms

In principle, a firm of any nationality could be contracted as long as the Firm satisfies the conditions specified in the tender documents.

The Firm, with approval by JICA, may be Japanese nationals and the products to be procured may be the products made in Japan or produced or manufactured by Japanese manufacturer(s) and/or its (their) affiliate(s) in any country.

g) Experts for Technical Assistance

Expert(s) could be deployed to carry out technical assistance. The expert(s) may be recommended by JICA when the conceptual consistency with the Studies is required. In principle, expert(s) is/are preferable to be Japanese nationals if appropriate.

h) Method of Procurement

In implementing procurement, sufficient attention shall be paid so that there is no unfairness among tenderers who are eligible for the procurement of products and services. (3)

For this purpose, competitive tendering shall be employed in principle.

i) Tender Documents

The tender documents should contain all information necessary to enable tenderers to prepare valid offers for the products and services to be procured by GAEC.

The rights and obligations of the Recipient, the Agent and the Suppliers of the products and services should be stipulated in the tender documents to be prepared by the Agent. Besides this, the tender documents shall be prepared in consultation with the Recipient.

j) Pre-qualification Examination of Tenderers

The Agent may conduct a pre-qualification examination of tenderers in advance of the tender so that the invitation to the tender can be extended only to eligible firms. The

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pre-qualification examination should be performed only with respect to whether or not the prospective tenderers have the capability of accomplishing the contracts concerned without fail. In this case, the following points should be taken into consideration:

(1) Experience and past performance in contracts of a similar kind

(2) Property foundation or financial credibility

(3) Existence of offices, etc. to be specified in the tender documents.

k) Tender Evaluation

The tender evaluation should be implemented on the basis of the conditions specified in the tender documents.

Those tenders which substantially conform to the technical specifications, and are responsive to other stipulations of the tender documents, shall be judged in principle on the basis of the submitted price, and the tenderer who offers the lowest price shall be designated as the successful tenderer.

The Agent shall prepare a detailed tender evaluation report clarifying the reasons for the successful tender and the disqualification and submit it to the Recipient to obtain confirmation before concluding the contract with the successful tenderer.

The Agent shall furnish JICA with a detailed evaluation report of tenders, giving the reasons for the acceptance or rejection of tenders.

l) Additional Procurement

If there is an additional procurement fund after competitive and / or selective tendering and / or direct negotiation for a contract, and the Recipient would like an additional procurement, the Agent is allowed to conduct an additional procurement, following the points mentioned below:

(1) Procurement of the same products and services

When the products and services to be additionally procured are identical with the initial tender and a competitive tendering is judged to be disadvantageous, the additional procurement can be implemented by a direct contract with the successful tenderer of the initial tender.

(2) Other procurements

When products and services other than those mentioned above in (1) are to be procured, the procurement should be implemented through a competitive tendering. In this case, the products and services for additional procurement shall be selected from among those in accordance with the G/A.

m) Conclusion of the Contracts

In order to procure products and services in accordance with the G/A, the Agent shall conclude contracts with firms selected by tendering or other methods.

n) Terms of Payment

The contract shall clearly state the terms of payment. The Agent shall make payment from the "Advances", against the submission of the necessary documents from the Firm on

the basis of the conditions specified in the contract, after the obligations of the Firm have been fulfilled. When the services are the object of procurement, the Agent may pay certain portion of the contract amount in advance to the firms on the conditions that such firms submit the advance payment guarantee worth the amount of the advance payment to the Agent.

4) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid Programme, the recipient country is required to undertake such necessary measures as the following:

a) To secure land necessary for the sites of the Programme and to clear, level and reclaim the land prior to commencement of the Programme,
b) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
c) To secure buildings prior to the procurement in case the installation of the equipment,
d) To ensure prompt unloading and customs clearance at the port of disembarkation and to assist internal transportation therein,
e) To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the Components including the employment of the Agent,
f) To accord all the concerned parties, whose services may be required in connection with supply of the products and services under the contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work,
g) To ensure that the Facilities and/or the Components be maintained and used properly and effectively for the implementation of the Programme,
h) To bear all the expenses, other than those covered by the Grant and its accrued interest, necessary for the implementation of the Programme, and
i) To give due environmental and social consideration in the implementation of the Programme.

(3)

5) Proper Use

The recipient country is required to operate and maintain the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

6) Re-export

The products purchased under the Grant Aid should not be re-exported from the recipient country.

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Annex-8

Grant Aid for Community Empowerment
of the Government of Japan
(Provisional)

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, the new JICA law was entered into effect on October 1, 2008. Based on the law and the decision of the Government of Japan (hereinafter referred to as "the GOJ"), JICA has become the executing agency of the Project or the Programme Grant Aid for Community Empowerment ("GACE") Grant Aid.

The Grant Aid provides a recipient country ("the Recipient") with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Procedures for GACE

GACE is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Outline Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by the Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)
Grant Agreement (hereinafter referred to as "the G/A")	(Agreement concluded between JICA and a recipient country)

Firstly, the application or request for a GACE Project or the Programme submitted by the Recipient is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for GACE.

Secondly, if the request is deemed appropriate, JICA (Japan International Cooperation Agency) conducts the Outline Design Study, using Japanese consulting firms.

Thirdly, the Government of Japan appraises the Project or the Programme to see whether or not it is suitable for Japan's GACE, based on the Outline Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the Project or the Programme, once approved by the Cabinet, becomes

official with the Exchange of Notes (E/N) signed by the Governments of Japan and the Recipient. Simultaneously, the Grant will be made available by concluding a grant agreement between the Government of the Recipient Country or its designated authority and the Japan International Cooperation Agency (JICA) (hereinafter referred to as "the G/A").

JICA is designated by the Government of Japan as an organization responsible for the proper execution of the Grant.

Procurement Agent ("the Agent") is designated to conduct the procurement services of products and services (including fund management, preparing tenders, contracts and so on) for GACE on behalf of the Recipient. The Agent is an impartial and specialized organization and shall render services according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the Agreed Minutes ("A/M").

2. Outline Design Study

1) Contents of the Study

The aim of the Outline Design Study ("the Study"), conducted by JICA on a requested Project or the Programme ("the Project or the Programme"), is to provide a basic document necessary for the appraisal of the Project or the Programme by the Government of Japan. The contents of the Study are as follows:

(1) Confirmation of the background, objectives, and benefits of the Project or the Programme and also institutional capacity of agencies and communities concerned of the recipient country necessary for the Project or the Programme's implementation.
(2) Evaluation of the appropriateness of the [Project] / [Project or the Programme] to be implemented under the Grant Aid Scheme for Community Empowerment from a technical, social and economic point of view;
(3) Confirmation of items agreed upon by both parties concerning the basic concept of the Project or the Programme.
(4) Preparation of an outline design of the Project or the Programme.
(5) Estimation of cost for the Project or the Programme.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid Project or the Programme. The Outline Design of the Project or the Programme is confirmed considering the guidelines of Japan's Grant Aid scheme.

The Government of Japan requests the Government of the Recipient to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project or the Programme. Such measures must be guaranteed even through

they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project or the Programme. Therefore, the implementation of the Project or the Programme is confirmed by all relevant organizations of the Recipient through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses registered consulting firms. JICA selects firms based on proposals submitted by interested firms. The firms selected carry out an Outline Design Study and write a report, based upon terms of reference set by JICA.

The consulting firms to work on the Project or the Programme's implementation after the Exchange of Notes could be, in principle, of any nationality as long as the Firm satisfies the conditions specified in the tender documents.

3. Implementation of GACE after the E/N

1) Exchange of Notes (E/N) and Grant Agreement (G/A)

GACE is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project or the Programme, period of execution, conditions and amount of the Grant Aid, etc., are confirmed. The conclusion of the Grant Agreement (hereinafter referred to as "the G/A") between JICA and the recipient government will be followed to define the necessary engagement to implement the project such as payment conditions, responsibilities of the recipient government and procurement conditions.

2) Procedural details

Procedural details on the procurement of products and services under GACE will be agreed upon between the Recipient and JICA at the time of the signing of the E/N and G/A.

Essential points to be agreed upon are outlined as follows:

a) JICA is in a position to expedite the proper execution of the Project or the Programme.
b) The products and services shall be procured and provided in accordance with "Procurement Guidelines for Japan's Grant Aid for Community Empowerment of JICA.
c) The Recipient shall conclude an employment contract with the Agent.
d) The Agent is the representative acting in the name of the Recipient concerning all transfers of funds to the Agent.

(3)

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3) Focal Points of "The JICA's Procurement Guidelines of Japan's Grant Aid for Community Empowerment (Type I – C)"

a) The Agent

The Agent is the organization which provides procurement services of products and services on behalf of the Recipient according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the A/M.

b) Agent Agreement

The Recipient shall conclude an Agent Agreement, within two months after the date of entry into force of the E/N and the G/A, in accordance with the A/M. The scope of the Agent's services shall be clearly specified in the Agent Agreement.

c) Approval of the Agent Agreement

The Agent Agreement, which is prepared as two identical documents, shall be submitted to the Government of Japan by the Recipient through the Agent. The Government of Japan confirms whether or not the Agent Agreement is concluded in conformity with the G/A and the JICA's Procurement Guidelines of Japan's Grant Aid for Community Empowerment, and approves the Agreement.

The Agent Agreement concluded between the Recipient and the Agent shall become effective after the approval by the Government of Japan in a written form.

d) Payment Methods

The Agent Agreement shall stipulate that "regarding all transfers of the fund to the Agent, the Recipient shall designate the Agent to act on behalf of the Recipient and issue a Blanket Disbursement Authorization ("the BDA") to conduct the transfer of the fund (Advances) to the Procurement Account from the Recipient Account."

The Agent Agreement shall clearly state that the payment to the Agent shall be made in Japanese yen from the Advances and that the final payment to the Agent shall be made when the total Remaining Amount becomes less than 3 % of the Grant and its accrued interest.

e) Products and Services Eligible for Procurement

Products and services to be procured shall be selected from those defined in the G/A.

f) Firms

In principle, the consultant firm who carried out the Outline Design Study will be recommended by JICA to the recipient country as the supervisor after the E/N and the G/A signing, in order to maintain technical consistency. Besides,

consultants of any nationality will be contracted for detailed design study and supervising works. Firms of any nationality could be contracted as contractors and suppliers as long as the firm satisfies the conditions specified in the tender documents.

g) Method of Procurement

In implementing procurement, sufficient attention shall be paid so that there is no unfairness among tenderers who are eligible for the procurement of products and services.

For this purpose, competitive tendering shall be employed in principle.

h) Tender Documents

The tender documents should contain all information necessary to enable tenderers to prepare valid offers for the products and services to be procured by GACE.

The rights and obligations of the Recipient, the Agent and the Suppliers of the products and services should be stipulated in the tender documents to be prepared by the Agent. Besides this, the tender documents shall be prepared in consultation with the Recipient.

i) Pre-qualification Examination of Tenderers

The Agent may conduct a pre-qualification examination of tenderers in advance of the tender so that the invitation to the tender can be extended only to eligible firms. The pre-qualification examination should be performed only with respect to whether or not the prospective tenderers have the capability of accomplishing the contracts concerned without fail. In this case, the following points should be taken into consideration:

(1) Experience and past performance in contracts of a similar kind
(2) Property foundation or financial credibility
(3) Existence of offices, etc. to be specified in the tender documents.

j) Tender Evaluation

The tender evaluation should be implemented on the basis of the conditions specified in the tender documents.

Those tenders which substantially conform to the technical specifications, and are responsive to other stipulations of the tender documents, shall be judged in principle on the basis of the submitted price, and the tenderer who offers the lowest price shall be designated as the successful tenderer.

The Agent shall prepare a detailed tender evaluation report clarifying the reasons for the successful tender and the disqualification and submit it to the Recipient to obtain confirmation before concluding the contract with the successful tenderer.

The Agent shall furnish JICA with a detailed evaluation report of tenders,

giving the reasons for the acceptance or rejection of tenders.

k) Additional Procurement

If there is an additional procurement fund after competitive and / or selective tendering and / or direct negotiation for a contract, and the Recipient would like an additional procurement, the Agent is allowed to conduct an additional procurement, following the points mentioned below:

(1) Procurement of the same products and services

When the products and services to be additionally procured are identical with the initial tender and a competitive tendering is judged to be disadvantageous, the additional procurement can be implemented by a direct contract with the successful tenderer of the initial tender.

(2) Other procurements

When products and services other than those mentioned above in (1) are to be procured, the procurement should be implemented through a competitive tendering. In this case, the products and services for additional procurement shall be selected from among those in accordance with the G/A.

l) Conclusion of the Contracts

In order to procure products and services in accordance with the G/A, the Agent shall conclude contracts with firms selected by tendering or other methods.

m) Terms of Payment

The contract shall clearly state the terms of payment. The Agent shall make payment from the "Advances", against the submission of the necessary documents from the Firm on the basis of the conditions specified in the contract, after the obligations of the Firm have been fulfilled. When the services are the object of procurement, the Agent may pay certain portion of the contract amount in advance to the firms on the conditions that such firms submit the advance payment guarantee worth the amount of the advance payment to the Agent.

(3)

4) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid Project or the Programme, the recipient country is required to undertake such necessary measures as the following:

(a) to secure lots of land necessary for the implementation of [the Project] / [the Programme] and to clear the sites ;

(b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of [the Project] / [the Programme] outside the sites referred to in (a) above;

(c) to ensure prompt unloading and customs clearance at ports of disembarkation

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in the Recipient and to assist internal transportation therein of the products;

(d) to ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Components as well as the employment of the Agent be exempted or borne by its designated authority without using the Grant and its accrued interest;

(e) to accord Japanese nationals and / or nationals of third countries, including such nationals employed by the Agent, whose services may be required in connection with the supply of the Components such facilities as may be necessary for their entry into the Recipient and stay therein for the performance of their work (The term "nationals" whenever used in the G/A means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons in the case of Japanese nationals, and physical or juridical persons of third countries in the case of nationals of third countries.);

(f) to ensure that the Facilities and / or the Components be maintained and used properly and effectively for the implementation of [the Project] / [the Programme];

(g) to bear all the expenses, other than those covered by the Grant and its accrued interest, necessary for the implementation of [the Project] / [the Programme]; and

(h) to give due environmental and social consideration in the implementation of [the Project] / [the Programme].

5) Upon the request of JICA, the Government of the Recipient shall provide JICA with necessary information on [the Project] / [the Programme].

6) With regard to the shipping and marine insurance of the products, the Government of the Recipient shall refrain from imposing any restrictions that may hinder fair and free competition among the shipping and marine insurance companies.

7) The products referred to in Article 3 shall not be exported or re-exported from the Recipient Country.

8) The Government of the Recipient shall ensure that any official of the Government of the Recipient does not undertake any part of the Japanese nationals' work and/or the work of nationals of third countries on purchase of the Components.

V. D.

Annex-9

Grant Aid for Environment and Climate Change (GAEC)
Grant Aid for Community Empowerment (GACE)
Major Undertakings to be taken by Each Government

	Items	To be covered by the Grant	To be covered by Recipient side
1	To secure land		•
2	To clear, level and reclaim the site when needed		•
3	To construct gates and fences in and around the site		•
4	To construct the parking lot	•	
5	To construct roads		
	1) Within the site	•	
	2) Outside the site		•
6	To construct the building	•	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1)Electricity		
	a.The distributing line to the site		•
	b.The drop wiring and internal wiring within the site	•	
	c.The main circuit breaker and transformer	•	
	2)Water Supply		
	a.The city water distribution main to the site		•
	b.The supply system within the site (receiving and/or elevated tanks)	•	
	3)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		•
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	•	
	4)Gas Supply		
	a.The city gas main to the site		•
	b.The gas supply system within the site	•	
	5)Telephone System		
	a.The telephone trunk line to the main distribution frame / panel (MDF) of the building		•
	b.The MDF and the extension after the frame / panel	•	
	6)Furniture and Equipment		
	a.General furniture		•
	b.Project equipment	•	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	Payment commission		•

(2)

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9	1) Marine(Air) transportation of the products from Japan to the recipient country at the entry to the recipient country	•	
	2) Tax exemption and customs clearance of the products at the port of disembarkation, inland transportation to the country		•
	3) Internal transportation from the port of disembarkation to the project site	(•)	(•)
10	To accord all concerned parties, whose services may be required in connection with the supply of the products and the services under the approved contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		•
11	To exempt or bear of all concerned parties from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the approved contract		•
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant		•
13	To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment		•
14	To ensure environmental and social consideration for the Programme.		•

(B/A: Banking Arrangement, N/A: Not Applicable)

(3)

V. B.

MINUTES OF DISCUSSIONS ON THE PREPARATORY SURVEY ON THE PROJECT FOR EFFECTIVE USE OF BIOMASS FUEL IN THE REPUBLIC OF MOLDOVA (EXPLANATION OF DRAFT REPORT)

From January to March and June to September 2012, Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a preparatory survey team on the Project for Effective Use of Biomass Fuel (hereinafter referred to as "the Project") to the Republic of Moldova (hereinafter referred to as "Moldova"), and through discussions, field survey, and technical examination of the results, JICA prepared the Draft Preparatory Survey Report (hereinafter referred to as "Draft Report").

In order to explain the contents of the Draft Report and to consult with the officials concerned of the Government of Moldova (hereinafter referred to as "the GOM"), JICA sent the Draft Report Explanation Team (hereinafter referred to as "the Team") to Moldova, which is headed by Mr. Hideaki Matsuoka, Deputy Director, the Environmental Management Division 2, Global Environment Department, JICA, from 29th January to 2nd February, 2013.

As a result of the discussions, both parties confirmed the main items described in the attached sheets.

Chisinau, 31st January, 2013

Mr. Hideaki Matsuoka
Leader
Draft Report Explanation Team
Japan International Cooperation Agency
Japan

Mr. Vasile Bumacov
Minister
Ministry of Agriculture and Food Industry
Moldova

Mr. Valeriu Bulgari
Executive Director
2KR Project Implementation Unit
Ministry of Agriculture and Food Industry
Moldova

ATTACHMENT

1. Contents of the Draft Report

The Moldovan side agreed and accepted in principle the contents of the Draft Report explained by the Team. The outline of the Draft Report is attached in Annex 4.

2. Japan's Grant Aid Scheme

The Team explained that this Project will be implemented under the sub-scheme of Grant Aid for Environment for Climate Change (hereinafter referred to as "GAEC").

The Moldovan side understood the Japan's Grant Aid Scheme, as attached in Annex 1 to 3, and will take the necessary measures as described in the Annex. The Moldovan side will also allocate necessary budget for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

The Moldovan side recognized, as the Embassy of Japan explained, that the Project will be formulated and conducted in accordance with the "Green Growth" policy of the Government of Japan, which emphasizes utilizing the major equipment such as pellet production plant and biomass boilers made by Japan's small - and - medium - sized enterprises.

3. Tentative Schedule of the Project and the Survey

JICA will complete the Final Report in accordance with the confirmed items and send it to the Government of Moldova by April 2013.

4. Confidentiality of the Project

(1) Detailed Specifications

Both sides confirmed all the information related to the Project including detailed specifications of the facilities, equipment and other technical information shall not be released to any other party(ies) before the signing of all the contract(s) for the Project.

(2) Project Cost Estimate

The Team explained to the Moldovan side the estimated project cost to be borne by the Government of Japan (hereinafter referred to as "the GOJ") and the GOM in Annex 5. The Team also explained that it is a provisional estimate and would be further examined by the GOJ for the approval of the Grant. The Moldovan side understood that the project cost estimate is subjected to be modified.

Both sides agreed that the project cost estimate should never be duplicated in any form nor disclosed to any other party(ies) before the signing of all the contract(s) for the Project. This confidentiality of the estimated project cost is necessary to ensure fairness of the tender procedure.

5. Other Relevant Issues

(1) Undertakings of the Moldovan Side

Both sides confirmed that the GOM would carry out the issues shown in Annex 3 and 4 in accordance with the implementation schedule of the Project in addition to the previous minutes.

Main undertakings by Moldovan side are as follows.

a. Construction of a Building for the Pellet Production Plant

A building for the pellet production plant should be constructed at the secured land of 2KR Project Implementation Unit by July 2014. This construction work includes other incidental work, such as electricity and water supply.

V.B.

b. Preparation for Pellet Boilers

The central assembly factory should be arranged by March 2014.

Also, a foundation of the biomass boiler and incidental work, such as secondary pipe installation, electricity and water supply, should be prepared at each site by April 2014 according to the work schedule in Annex 4. The work at each site should be completed under the proper support from 2KR Project Implementation Unit.

(2) Strengthening Operation and Maintenance

According to the results of the Preparatory Survey, the Team requested the Moldovan side to take necessary actions which were proposed in the Draft Report such as allocation of adequate budget and qualified personnel for proper, effective and sustainable operation and maintenance of the facilities and equipment, even after the Project completion.

The Team also requested that the necessary actions for recruitment of staffs and operators of the pellet production plant and biomass boilers be taken in time, since the training for the personnel as Technical Assistance will be started before the procurement of the equipment.

(3) The Number of the Project Sites and Supplied Equipment

The Team explained that the total Project cost has not been finalized and is subjected to change. In case of any change of the Project cost, the number of the Project sites and supplied equipment may also be changed according to the priority list of the sites. The Moldovan side understood it.

(4) Technical Assistance

The Team explained that the contents of the technical assistance as "Soft Component" would focus on the subjects as described in Annex 4, and the Moldovan side agreed on it.

The Moldovan side committed to assign responsible staff and operators before the Soft Component starts as described in the Draft Report.

(5) Project Title

Both sides agreed that the Project title will be changed from "The Project for Biomass Heating Systems in Rural Communities in the Republic of Moldova" to "The Project for Effective Use of Biomass Fuel in the Republic of Moldova" based on the discussions.

ANNEXES

Annex-1 to 3	Japan's Grant Aid Scheme
Annex-4	The Outline of the Preparatory Survey (Draft Report)
Annex-5	Project Cost Estimate

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Annex-1

JAPAN'S GRANT AID for General Projects

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

- Preparatory Survey
  - The Survey conducted by JICA
- Appraisal &Approval
  -Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
  -The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
  -Agreement concluded between JICA and a recipient country
- Implementation
  -Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

V.B.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and

effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

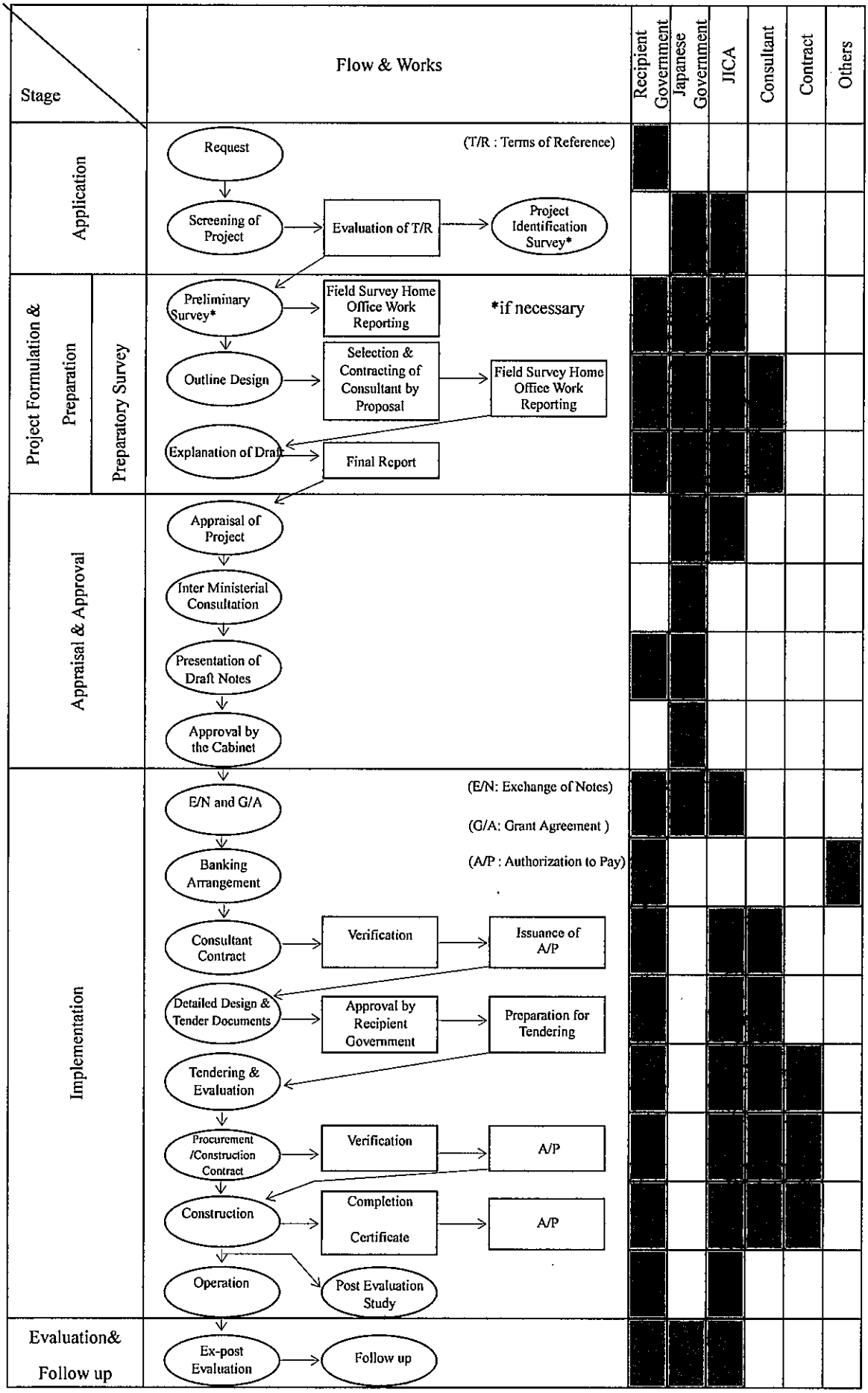
(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

V.B.

Annex-2

FLOW CHART OF JAPAN's GRANT AID PROCEDURES



Annex-3

Japan's Grant Aid for General Projects

Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure lots of land necessary for the implementation of the Project and to clear the sites		●
2	To construct the following facilities		
	1) The building for a pellet production plant at the 2KR-PIU workshop		●
	2) The foundation of pellet boilers at each site		●
	3) The gates and fences in and around the sites		●
	4) The parking lots		●
	5) The road within the site		●
	6) The road outside the site		●
3	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project in or outside the sites		
	1) Electricity		
	a. The distributing power line to the sites		●
	b. The drop wiring and internal wiring within the sites		●
	c. The main circuit breaker and transformer		●
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)		●
	3) Drainage		
	a. The city drainage main (for storm sewer and others to the site)		●
	b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site		●
	4) Gas Supply		
	a. The city gas main to the site		●
	b. The gas supply system within the site		●
	5) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
4	To ensure prompt [unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products] / [customs clearance of the products and to assist internal transportation of the products in the recipient country]		
	1) Marine (Air) transportation of the Products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
6	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
7	To ensure that the facilities and equipment be maintained and used properly and effectively for the implementation of the Project		●
8	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
9	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●

(B/A : Banking Arrangement, A/P : Authorization to pay)

V. B.

Annex 4

2KR Project Implementation Unit
Ministry of Agriculture and Food Industry
Republic of Moldova

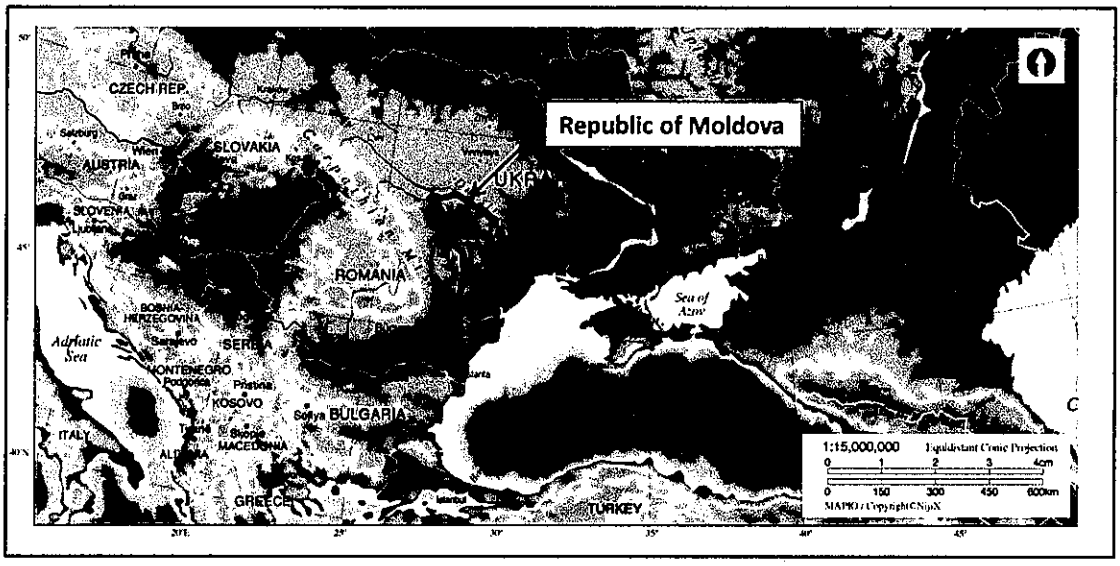
The Preparatory Survey on the Project for Effective Use of Biomass Fuel in the Republic of Moldova

Outline of Draft Final Report

January 2013

JAPAN INTERNTIONAL COOPERATION AGENCY

MITSUI CONSULTANTS CO., LTD.
UNICO INTERNATIONAL CORPORATION



No.	RAYON	VIILLAGE
1	IALOVENI	RĂZENI
2	HÎNCEȘTI	LĂPUȘNA
3	ANENII - NOI	MERENI
4	REZINA	IGNAȚEI
5	NISPORENI	VARZARESTI
6	ORHEI	JORA DE MIJLOC
7	STRASENI	MICAUTI
8	ORHEI	SUSLENI
9	STRASENI	SCORENI
10	HÎNCEȘTI	BUȚENI
11	UNGHENI	PÎRLIȚA
12	ORHEI	FURCENI
13	ORHEI	TREBUJENI
14	ORHEI	BRĂNEȘTI
15	CHISINAU	CRICOVA
16	REZINA	CUIZAUCA
17	ANENII NOI	MAXÎMOVCA
18	CHISINAU	BUBUIECIU
19	REZINA	MATEUTI
20	CALARASI	TIBIRICA
21	CHISINAU	TOHATIN
22	NISPORENI	SISCANI
23	ORHEI	CHIPERCENI
24	ORHEI	PIATRA
25	CHISINAU	2KR Training Center

Location Map

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Abbreviations

2KR-PIU	2KR Project Implementation Unit, Ministry of Agriculture and Food Industry
BOCM	Bilateral Offset Credit Mechanism
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
COP	Conference of the Parties, United Nations Framework Convention on Climate Change
E/N	Exchange of Note
EU	European Union
G/A	Grant Aid Agreement
GoM	Government of Moldova
IMS	Information Management System
JICA	Japan International Cooperation Agency

JIS	Japan Industrial Standards
JST	JICA Survey Team
MDL	Moldova Lei
MoAFI	Ministry of Agriculture and Food Industry
MSIF	Moldova Social Investment Fund
NTC	National Training Center, 2KR-PIU
ODA	Official Development Assistance
OIR	Operation Information Reporting
O&M	Operation and Maintenance
UNDP	United Nations Development Programme
USD	US dollar

Exchange Rate: 104.55 JPY/ Euro (6-month average from 1-Feb-2012 to 31-Jul-2012)
6.68 JPY/MDL (6-month average from 1-Feb-2012 to 31-Jul-201)
15.4120 MDL/Euro (Calculated from the rates above)
81.06 JPY/USD (6-month average from 1-Feb-2012 to 31-Jul-201)

Chapter 1 Basic Concept of the Project

1.1 Overall Goal and Project Purpose

The Republic of Moldova has very few domestic energy resources such as natural gas, oil and coal. They are being imported from Russia, Romania and Ukraine. Therefore the Government of Moldova (herein after referred as "the GoM") promotes developing more self-supply energy to make its economy stable.

In January 2006, difficulties were experienced in the negotiations on natural gas price with Russia, which in turn, resulted in suspension of natural gas supply to Moldova and Ukraine from Russia. This break in natural gas supply literally froze the Moldovan people. In the winter months, gas consumption normally increases 8-9 more than the summer months, hence, the GoM and the Moldovan people were in extreme distress because of no natural gas supply.

In the Moldovan rural communities, agriculture is a main industry and local authorities there do not have enough tax revenues for energy procurement. Consequently, the public facilities such as kindergartens and schools have problems for heating buildings and some of them had to be closed during the coldest month in the past.

The GoM hopes to improve the present energy situation in rural communities through introduction of alternative energy using straw, biomass energy resource. According to "the Energy Strategy of the Republic of Moldova until 2020", one of national policies for energy sector, the target share of alternative energy shall be 6% by 2010 and 20% by 2020 and "the PLAN Government Actions for the period 2011 – 2014" also states that the target share of alternative energy shall be 10% by 2015. Consequently, efficient use of energy and use of alternative energy for the public facilities (schools, kindergartens and hospitals etc.) are being facilitated. Thus, the GoM is urgently introducing new energy supply system.

A Grant Assistance for Grass-roots Human Security Project (Improvement of Heating System for the Kindergarten and School in Hirtopul Mare Village) was implemented by Japan in 2008. Two sets of biomass heating systems were installed and they verified that the effectiveness of the biomass heating system. The GoM officially requested the Government of Japan to assist expansion of the biomass heating system in 2009. In response to the request, Japan International Cooperation Agency (hereinafter referred as "JICA") conducted a preliminary study for collection of basic information and confirmation of the request in February 2011. The preliminary study concluded that it had high potentials to expand the biomass heating system in Moldova.

This project aims to contribute (1) energy cost reduction, (2) sustainable heating system operation, and (3) improvement of living conditions in the Moldovan rural communities, through installation of a pellet producing plant and biomass heating systems (boilers fuelled with the pellet made from agricultural residue) at public facilities (mainly education facilities such as primary schools).

In addition, through the expansion of the biomass heating systems, it intends to secure education opportunities for infants and children living in the rural areas and promote energy transformation from fossil energy to renewable energy as well as improve self-sufficiency in energy and reduce greenhouse gas emissions as an overall goal.

1.2 Basic Concept of the Project

To achieve the above-mentioned purposes, the Project shall procure and install biomass heating systems at public facilities (mainly education facilities such as primary schools) in the Moldovan rural communities and provide technical assistance for operation and maintenance. This will reduce dependence of imported natural gas, while the gas price has been increasing for the recent years, and cut down energy cost paid by local authorities. In addition, it will enable public facilities to operate heating systems continuously, which in turn, ensure education opportunities of rural children through fewer emergency school closure dates during the coldest season.

In line with this Project concept, the support plan under the Japanese Assistance will include (1) procurement and installation of 25 biomass boilers fuelled with the pellet made from agricultural residue at public facilities (mainly educational facilities such as primary schools) in rural communities

in the Central Region and one set of pellet production plant in Chisinau, and (2) technical assistance for operation and maintenance of these pellet boilers and the pellet production plant.

1.3 Summary of Social and Environmental Considerations

(1) Applicability of Clean Development Mechanism (CDM) to the Project

Japan will not participate in the second commitment period of the Kyoto Protocol after 2013 and is trying to establish new mechanisms to complement the current CDM including the Bilateral Offset Credit Mechanism (BOCM).

Regarding the CDM project utilizing Official Development Assistance (ODA), the Kyoto Mechanisms stipulate that "Public funding for the CDM project activities must not result in the diversion of the Official Development Assistance." There had been only one CDM project conducted by the Japanese ODA, "Zafarana Wind Power Plant Project, Arab Republic of Egypt". The Government of Japan issued an official document which confirmed that the public funding used for this project did not result in a diversion of Official Development Assistance.

In addition, "non-additional CERs" has been discussed worldwide for the CDM project by the ODA after COP3. Currently, it is a common international opinion that additional official fund besides current ODA only makes it possible to purchase the CERs.

Therefore the following two options have possibilities to obtain the CERs by this project.

1) After the Government of Japan issues an official document which clearly refers that the public funding used in the project does not result in a diversion of ODA, a host country discusses the applicability.
2) The Government of Japan and the host country discuss the purchase of CERs by "additional official fund" at an official level.

(2) Estimation of Greenhouse Gas Emission Reductions

Switching fuel from fossil fuel (coal and natural gas) to biomass enables reduction of CO_2. CO_2 emission reduction through the Project is estimated as shown below.

1) Project Boundary

Boundary of the Project is set as the following.

1) Baling agricultural residue at fields
2) Transportation of agricultural residue from the fields to the pellet production plant
3) Pellet production
4) Transportation of pellet from pellet production plant to boilers
5) Boiler operation

2) Baseline Emissions

Baseline emissions (BE_y) consist of 1) CO_2 emission from burning process of fossil fuels ($BE_{PFi,y}$) and 2) CO_2 emission of existing boilers for power consumption ($BE_{e,y}$). BE_y can be calculated by the following formula.

$$BE_y = BE_{PFi,y} + BE_{e,y}$$

$BE_{PFi,y}$ and $BE_{e,y}$ were calculated to be 8,066.8 tCO_2/y and 104.0 tCO_2/y.

From the above calculations, the baseline emission (BEy) from 24 boilers was calculated to be 8,170.8 t CO_2/y.

3) Project Emissions

As biomass fuel is carbon neutral in accordance with the Kyoto Protocol, CO_2 emission from biomass burning is considered to be "zero". Therefore the processes which CO_2 is emitted under the Project are considered as the following.

(a) Baling process of agricultural residue ($PE_{rol,y}$);
(b) Transporting process of agricultural residue from the fields to the pellet production plant ($PE_{F\text{-}P,y}$);

(c) Pellet production process ($PE_{pel,y}$);
(d) Transporting process of pellet from pellet production plant to boilers ($PE_{PF\text{-}BL,y}$);
(e) Boiler operation process ($PE_{boiler,y}$)

Project emissions (PE_y) can be calculated by the following formula.

$$PE_y = PE_{rol,y} + PE_{F-P,y} + PE_{pel,y} + PE_{P-B,y} + PE_{boiler,y}$$

Table 1.3.1 CO_2 Emission Data by Process

Emission process		CO_2 emission	
Baling of agricultural residue at fields	$PE_{rol,y}$	17.9	tCO_2/y
Transportation of baled agricultural residue from fields to pellet factory	$PE_{F\text{-}P,y}$	17.1	tCO_2/y
Pellet production	$PE_{pel,y}$	1,496.8	tCO_2/y
Pellet transportation	$PE_{P\text{-}B,y}$	836.9	tCO_2/y
Boiler operation	$PE_{boiler,y}$	172.9	tCO_2/y
Total		2,541.6	tCO_2/y

Source: JICA Survey Team

Project Emissions (PE_y) were calculated to be 2,541.6 tCO_2/y.

4) Estimated CO_2 Emission Reductions

As described below, emission reductions (ERy) are estimated to be 5,629.2 tCO_2/y.

$$ER_y = BE_y - PE_y$$
$$= 8,170.8 - 2,541.6$$
$$= 5,629.2\ tCO_2/y$$

Chapter 2 Outline Design of the Requested Japanese Assistance

2.1 Design Policy

This Project shall be undertaken under the Japan's Grant Aid scheme in accordance with the "Green Growth" policy, which emphasizes utilizing the major equipment manufactured by the Japanese small and medium sized enterprises. It means that this Project is a Japan tied grant project to Moldova.

Accordingly, the following are basic design policies of the Project.

- Country of origin of key equipment and materials has to be Japan.
- Both pellet boilers and pellet production plant consist of various equipment, various mechanical materials, various instrument materials and various electrical materials and have to be designed by integrated engineering capability in quality, cost and delivery.
- Both plants have to be designed by the technical information integrated in the manufacture(s) that has enough experiences in design, manufacturing, construction, operation and maintenance of such plants, combining the necessary Moldavian relating information including regulations.

2.1.1 Natural Conditions and Design Policy

(1) Natural Conditions

The data of monthly average temperature, monthly maximum temperature, monthly minimum temperature, monthly average rain fall, monthly average wind velocity, and annual duration of daylight hours and the records of earthquake in main cities are summarized in the tables hereinafter.

Table 2.1.1 Monthly Average Temperature Data in the 3 Regions

Region	North (Briceni)				Central (Chişinău)				South (Cahul)			
Year	2007	2008	2009	2010	2007	2008	2009	2010	2007	2008	2009	2010
January	2,5	-2,4	-2,8	-7,4	3,9	-1,5	-0,1	-5,2	3,7	-1,3	-0,1	-4,2
February	-1,2	1,2	-0,2	-2,9	0,5	2,3	1,5	-0,9	1,9	2,7	2,0	0,1
March	6,4	5,0	2,4	3,1	7,1	7,2	3,9	4.0	7,2	8,1	4,8	4,8
April	9,3	9,9	11,1	10,3	10,6	11,0	12,2	11.0	10,9	11,7	11,8	11,6
May	17,5	14,4	15,1	16,2	18,9	15,5	16,6	16,8	18,7	15,8	16,8	17,2
June	20,2	19,0	19,1	19,4	23,2	20,9	21,7	21.0	23,2	20,9	21,6	20,7
July	21,9	19,8	21,4	21,8	25,8	22,2	24,0	23,3	26,0	22,2	24,4	23,2
August	20,8	20,5	19,7	22,4	23,9	23,8	22,3	24,9	23,8	24,2	22,7	24,9
September	14,5	13,6	16,7	13,9	16,7	15,5	18,7	16,1	16,4	16,2	18,4	17,1
October	9,3	10,5	9,2	5,9	11,3	12,4	11,5	7,5	11,9	12,7	12,3	8,6
November	1,1	4,0	5,4	8,2	3,0	5,1	6,5	10,3	3,7	6,0	7,1	11,1
December	-1,7	0,5	-2,1	-4,3	-0,4	1,3	-0,1	-2,1	-0,3	2,6	0,0	-0,7
Annual Mean Temp.	**10,1**	**9,7**	**9,6**	**8,9**	**12,1**	**11,3**	**11,4**	**10,6**	**12,3**	**11,8**	**11,8**	**11,2**

Table 2.1.2 Monthly Maximum Temperature Data in the 3 Regions

Region	North (Briceni)				Central (Chişinău)				South (Cahul)			
Year	2007	2008	2009	2010	2007	2008	2009	2010	2007	2008	2009	2010
January	13,1	10,4	6,0	3,6	13,5	9,6	8,7	11,3	15,0	9,5	11,5	15,4
February	8,0	18,2	13,0	6,7	15,8	19,1	13,9	13,3	16,2	19,3	14,9	14,1
March	19,0	17,5	15,3	21,3	20,0	20,5	18,2	20,6	22,0	20,9	19,9	21,1
April	23,4	21,5	24,0	22,7	21,1	21,8	22,9	22.0	23,2	23,9	23,5	22,5
May	32,0	27,5	29,3	26,6	34,2	26,5	28,5	25,9	32,9	27,5	28,6	28,9
June	33,8	30,8	31,4	32,3	35,4	32,1	34,5	34,1	36,6	33,7	34,0	33,8
July	35,6	32,2	33,5	32,5	39,5	33,5	36,3	32,8	39,4	33,5	37,9	32,4
August	34,7	34,0	31,6	35,3	39,1	37,5	33,7	36,6	38,4	37,9	34,4	36,8
September	24,8	30,0	29,2	24,7	27,6	32,6	32,6	26,4	27,8	32,5	32,5	28,1
October	23,0	22,5	25,4	14,1	24,3	23,7	26,0	15,4	24,8	24,6	25,7	16,4
November	9,4	18,4	15,6	20,9	11,0	19,9	18,4	22,8	11,6	22,0	18,6	23.0
December	7,4	15,4	11,6	9.0	9,2	16,2	14,2	13.0	10,0	17,0	16,0	16.0
Annual Max. Temp.	**36,6**	**34,0**	**33,5**	**35,3**	**39,5**	**37,5**	**36,3**	**36,6**	**39,4**	**37,9**	**37,9**	**36,8**

Table 2.1.3 Monthly Minimum Temperature Data in the 3 Regions

Region	North (Briceni)				Central (Chişinău)				South (Cahul)			
Year	2007	2008	2009	2010	2007	2008	2009	2010	2007	2008	2009	2010
January	-10,7	-18,6	-14,9	-27,4	-9,1	-15,3	-12,1	-21,8	-8,4	-17.0	-10,6	-21,2
February	-18,1	-12,4	-8,7	-14,9	-16.0	-9,8	-6,6	-11,8	-15,8	-9,7	-5,7	-10,7
March	-2,1	-3,4	-8.0	-10,4	-0,3	-0,7	-6,2	-8,8	-1,8	-0,2	-5,5	-8,7
April	-0,5	0,9	-0,2	1,7	0,6	3,2	1,9	2,9	1,9	3,1	1,2	3,4
May	-2.0	4,5	3,9	7,5	3,3	6,3	7,3	9,3	4,1	6,6	8,2	8,5
June	10,4	1,5	8,4	9.0	14,2	8,8	11,1	12,7	13,4	8,8	11,8	10,6
July	11,4	10,9	10,4	13,3	12,6	13,7	13,9	13,9	12,3	12,7	15.0	14,5
August	9,8	8,9	9,2	7,9	13,5	10,2	13,5	11,8	11,6	10,2	13,1	12,7
September	3,6	4,8	5,5	5,8	8,2	4,8	8,8	7,8	5,9	5,1	7,2	8,4
October	-0,3	0,8	-2,6	-3.0	1,9	2,8	-1,1	-2.0	2,6	3,6	0.0	-2,5
November	-7,9	-5,9	-3,6	-6,3	-4,9	-5,5	-3,3	-0,9	-4,9	-3,8	-5,2	0.0
December	-11,9	-13,3	-19,7	-13,6	-8,8	-11,9	-16,8	-12,1	-9,8	-12,3	-16,7	-10,7
Annual Min. Temp.	**-18,1**	**-18,6**	**-19,7**	**-27,4**	**-16.0**	**-15,3**	**-16,8**	**-21,8**	**-15,8**	**-17.0**	**-16,7**	**-21,2**

Table 2.1.4 Monthly Average Rainfall & Humidity Data in the 3 Regions

Region	North (Briceni)				Central (Chişinău)				South (Cahul)			
Year	2007	2008	2009	2010	2007	2008	2009	2010	2007	2008	2009	2010
January	29	27	32	62	44	26	25	86	41	14	32	35
February	41	19	32	40	62	6	26	62	27	2	21	43
March	21	27	40	23	34	36	63	29	44	33	48	29
April	18	127	9	34	37	48	3	45	21	47	18	23
May	62	54	24	109	19	43	33	69	25	49	49	82
June	88	37	95	205	27	63	39	85	37	95	20	121
July	121	212	41	196	4	51	68	67	0	43	34	146
August	91	71	34	38	34	31	33	53	105	20	20	25
September	42	89	4	76	26	75	22	46	39	46	41	31
October	46	46	67	45	71	16	30	69	49	22	35	80
November	38	29	23	56	60	16	9	40	63	13	13	20
December	21	35	44	76	62	55	95	83	66	60	74	64
Annual Rainfall (mm)	**618**	**773**	**445**	**960**	**480**	**466**	**446**	**734**	**517**	**444**	**405**	**699**
Annual Rainy Days	**131**	**146**	**132**	**159**	**114**	**107**	**122**	**134**	**95**	**114**	**101**	**140**
Annual Mean Humidity (%)	**73**	**76**	**71**	**76**	**64**	**70**	**68**	**74**	**67**	**71**	**68**	**73**

Table 2.1.5 Monthly Average Wind Velocity & Duration of Daylight Data in the 3 Regions

Region	North (Briceni)				Central (Chişinău)				South (Cahul)			
Year	2007	2008	2009	2010	2007	2008	2009	2010	2007	2008	2009	2010
January	2,8	3,2	1,8	2,3	2,2	2,2	3,1	3,2	4,1	3,7	3,4	3,9
February	3,0	2,4	1,8	3,2	1,9	2,0	3,3	3,6	4,6	3,7	4,0	4,3
March	3,4	2,8	2,5	2,8	2,1	2,2	3,1	3,6	4,7	4,4	3,9	4,1
April	2,5	2,6	2,7	2,8	1,9	1,9	3,8	3.0	3,4	4,1	3,8	3,6
May	2,3	1,9	2,2	2,4	2,0	2,8	3,0	2,9	4,1	3,2	3,5	3,1
June	1,7	1,7	2,1	2,1	1,8	2,6	3,1	3,2	3,2	2,7	3,1	3,2
July	1,5	2,1	1,9	1,6	1,9	3,4	3,0	2,8	3,7	3,1	3,0	2,6
August	1,2	1,6	1,4	1,7	1,6	2,9	3,4	2,8	3,3	2,9	3,2	2,9
September	1,8	1,7	1,5	2.0	1,8	3,2	2,6	2,7	3,4	3,3	2,9	3,1
October	1,6	1,9	2,1	2,2	1,5	2,9	2,6	3.0	2,8	3,1	3,0	3,6
November	2,6	2,5	2,7	2,6	2,1	3,1	2,8	3,3	3,8	3,3	3,1	3,4
December	2,3	2,8	2,6	2,3	1,8	3,8	2,7	3,1	3,3	4,3	3,2	3,1
Annual Average Wind Speed (m/sec)	**2,2**	**2,3**	**2,1**	**2,3**	**1,9**	**2,8**	**3,2**	**3,1**	**3,7**	**3,5**	**3,8**	**3,4**
Duration of day light (hours)	**1791**	...	...	**1874**	**2320**	**2188**	**2327**	**2226**	**2031**	...	...	**2207**

Table 2.1.6 Records of Major Earthquakes in Moldova

Date of occurrence	Time of occurrence (Greenwich Mean Time)	Epicenter		Depth of Epicenter (km)	Magnitude (Richter)	Intensity at Chişinău
		Latitude	Longitude			
2005/5/14	1:53	45°60′	26°51′	140	5.3	IV
2005/6/18	15:16	45°68′	26°71′	130	5.4	III-IV
2006/2/16	2:49	45°59′	26°72′	100	4.4	0
2006/3/16	10:40	45°44′	26°63′	100	4.4	III
2007/2/14	6:56	45°38′	26°34′	150	4.2	0
2007/2/15	2:32	45°72′	26°81′	100	4.1	0
2008/3/21	16:18	45°80′	27°17′	30	4.1	0
2008/7/5	8:00	45°29′	30°90′	20	5.5	III-IV
2008/6/9	19:48	45°77′	26°56′	20	4.1	0
2009/4/25	17:18	45°70′	26°66′	100	5.3	III-IV
2009/8/5	7:49	43°85′	28°39′	30	5.0	0
2010/6/8	15:16	45°62′	26°38′	110	4.7	II
2010/9/30	5:31	45°60′	26°35′	140	4.7	II-III

(2) Design Policy

1) Environmental Conditions

A) Atmospheric Temperature

(a) Process design temperature for calculation of heat balance

- Maximum outdoor temperature: 40 °C
- Minimum outdoor temperature: -16 °C
- Indoor temperature: 22 °C (for kindergarten)
  18 °C (for other facilities)

(b) Mechanical design temperature

- Maximum outdoor temperature: 50 °C
- Minimum outdoor temperature: -30 °C

B) Humidity 40-60%

C) Wind Velocity

Depending upon the meteorological data of Moldova, average wind speed is not so high but sudden gusts of wind have to be considered for the design of buildings and outdoor structures in mid-summer and/or mid-winter.

- Wind velocity for mechanical design: 40 m/sec

D) Rainfall

- Maximum hourly rainfall for mechanical design: 50 mm/hour

E) Snowfall

- Maximum hourly snowfall for mechanical design: 30 mm/hour
- Maximum snow accumulation for mechanical design: 1.5 m

F) Earthquake

- Maximum horizontal acceleration for mechanical design: 400 Gal

2) Requirement and/or Regulation for Mechanical Design

A) Equipment and/or Materials Exported from Japan

- shall be in accordance with Japan Industrial Standards (JIS).

B) Temperature of Hot Water Discharged from Pellet Boilers

- Normal: 80 °C Maximum: 90 °C

C) Painting

(a) Color: Manufacturer's standard color

(b) Painting: Rust preventing: Once
Finishing: Twice

D) Hanging Rig

Four pieces of hanging rig shall be equipped on module and/or skid for pellet boiler under the consideration of weight balance.

3) Requirements and/or Regulation for Electrical and/or Instrument Design

A) Equipment and/or Materials Exported from Japan

- shall be in accordance with Japan Industrial Standards (JIS).

B) Electricity

- Power electricity: 380 V, 3-phase, 50 Hz
- Instrument electricity: 220 V, Single, 50 Hz

2.1.2 Survey Results of Japanese Manufacturers

The potential suppliers for the Project will be selected from the Japanese manufacturers and the JICA Survey Team (hereinafter referred as JST) surveyed possible manufacturers in Japan.

(1) Pellet Boiler

So far it has been confirmed that there are 4 possible companies and each of them has its own line-up machines as listed hereunder.

Table 2.1.7 Pellet Boiler Line-up by Manufacturer

Capacity (1,000kcal/h)	60	100	150	200	300	450	500	800	1,000
A Company	○	○	○	○	○	○	○(600)	○	○
B Company		○	○	○ ○(250)	○ ○(350)	○(400)	○		
C Company		○	○	○ ○(250)	○(350)		○		
D Company		○			○		○		

Source: JICA Survey Team

Essentially, boiler size should be decided based on the specific conditions of the beneficial buildings/facilities in accordance with the Moldovan laws/regulations. However, it will be costly to design and produce many boilers of specific capacities. Hence, the following 5 types of capacities are selected under the consultation with the MoAFI.

	1,000 kcal/h	or	kWh[1]
1.	100		116
2.	200		232
3.	300		348
4.	350		407
5.	500		584

Details of the companies and their products are described in the tables below.

[1] In Japan, "kcal/h" is widely used to indicate boiler capacity while "kWh" is commonly adopted in Moldova. Conversion factor: 1 kW = 0.86 kcal/h

Table 2.1.8 Comparison of the Boilers by Manufacturer

Element		A	B		C	D
Function	Equipment		Smoke tube	Water tube		
Boiled type		Non-pressurized hot water heat generator	<=	<=	<=	<=
Fuel supply	Hopper	reverse pyramid	<=		<=	<=
	First step screw feeder	metering screw	None		metering screw	<=
	Rotary valve	Exist	None		None	None
	Anti back-fire	Emergency shut-off dumper	Back-fire extinction		<=	<=
	Second Step Screw feeder	Exist	metering screw		None	Exist
	Fuel supply type	Drop down	Underfeed		Drop down	<=
Furnace	Grate	SS circle plate	Cast iron low corn sharp		SS circle plate	Horizontal Cylindrical grate
	Clinker breaker	Rotary breaker	Ring breaker		Pop-up combustion Fluidized combustion	Automatically intermittent movement
Ignition	Mechanism	L-oil pilot burner	Embers		L-oil pilot burner	L-oil pilot burner
	Pilot fuel tank	60 - 80L	No necessary a pilot burner		60 - 80L	60 - 80L
Air supply	Furnace inside pressure control	Inside pressure balanced control	<=		<=	<=
	Ventilation fun	Exist	<=		<=	<=
	Exhaust fun	Exist	<=		<=	<=
Furnace	Furnace wall	Fireproof brick	Water jacket		Partially water jacket	Double pipe air cooling
	Ash treatment	Tray manual exhaust	<=		<=	Automatic exhauster
Heat generating system		Water surface is open to atmosphere	<=	<=	<=	<=
	Heat generator	Vertical plate type	Vertical smoke pipe type	Horizontal water pipe type	Horizontal water pipe type	Vertical smoke pipe type
	Hot gas flow	Up & Down counter flow	<=	Rectangular flow	<=	Up flow
	Water supply	Automatic supply	<=		<=	<=
System control & Aram	Control	Generator water temperature	<=		<=	<=
		Fuel & air supply ON, OFF	<=		<=	<=
	Aram	Low water level alarm	<=		<=	<=
Dust collect	Dust Collector	Cyclone	<=		<=	<=
Primary circulation	Pump	In-line pump	<=		<=	<=
Heat Exchange	Heat Exchanger	Plate type	<=		<=	<=

Note: Symbol <= indicates same as the left column.

Table 2.1.9 List of Pellet Boiler Manufacturers

Item	Unit	A	B	C	D
Funded Year		1 November 1983	1 September 1981	April 1947*	12 August 1948
Capital	M Yen	10	10	12.16*	8
Employee number	person	8	10	70*	102
Factory location		Hokkaido	Shizuoka	Niigata*	Kagoshima
Site area	m2	11,154*	3,487	3,901*	14,248
Building area	m2	2,363*	974	1,277*	6,490
Timing of handing over		Factory shipment	Factory shipment	Factory shipment	Factory shipment
Condition of payment					
Contract		30%	30%	30%	30%
Middle of production		40%	40%	40%	40%
Final handing over		30%	30%	30%	30%
Engineering Capability					
Design Capability		Planning/Design	Planning/Design	Planning/Design	Planning
Purchasing Capability		Yes	little weak	Yes	Yes
In-house production Cap.		None	In-house production	Nonee	In-house production
Outsourcing production Cap.		Contract to out	Partially	Contract to out	Partially
Elec.& Inst. works		Contract to out	Contract to out	Contract to out	Contract to out
SV Capability		Yes	Yes	Yes	Yes
Past experienced record					
Pellet boiler		10	202 (include export)	34	None
Wood chip boiler		22	None	None	Wood chip boiler 3units
Others (Gas, Oil, boiler & Biomass Dryer etc.)		700 (include export)	Oil Boiler 60 - 100units/y	Oil & Gas boiler more than 100/y	Steam Fumigator 71units (include export)
Wood Biomass Boiler Sum		32	202	34	3

Note: Symbol * indicates outsourcing producer.

(2) Pellet Production Plant

The key equipment of pellet production plant is a pelletizer. In general, there are two types for pelletizing, one is flat die type and the other is ring die type. In Europe, the ring die type is commonly used as the pellet production increases. In Japan, both types are available from several manufacturers.

There are not so big differences in performance between the flat die type and the ring die one. In general, the ring die type is more suitable to a large capacity (more than 1.5 ton/h) plant but the flat die type is more suitable to a small capacity plant.

2.1.3 Potential Local Subcontractors for Construction and/or Installation Works

(1) Central Assembling Factory for Pellet Boiler

After importing parts of boilers from Japan, pellet boilers shall be assembled as module at a factory in Chisinau. (Refer to "2.1.4 Basic Design Policy" for details.) There is one potential factory in Chisinau and the outline is as follows.

Employee: Present 120 Possible 400

Facilities: Machine (Lathe, Cutting, Plasma Flat Cutting, Sand Blast), Welding, Painting, etc.

Area: 49,686 m^2

Building Area: 11,856 m^2

Max. Handling Size: Manufactured 5 m diameter object in the past, 4 m x 12 m length

(2) Transportation of Boilers

It is possible to transport an object of 4 m width x 4 m height x 12 m length under official permission issued by the Moldovan authority concerned.

(3) Installation Work

There are several local installation companies who have many experiences of the similar projects of UNDP and MSIF.

2.1.4 Basic Design Policy

(1) Pellet Boiler

As a result of site and domestic survey, basic design policies for pellet boiler are as follows.

- Use the pellets produced from the agricultural waste such as straw, leaves/stalks of sunflower and maize, and pruning twigs from orchards and/or vineyards in rural area in Moldova.
- Burning efficiency of pellet boiler should not be less than 80 %.
- Specification of gas emissions and waste ash from pellet boiler should be in accordance with the Japanese rules and regulations.
- Operation of pellet boiler shall be fully automatic including the safety devices such as back fire preventer. In addition, continuous operation for 6-month period (winter season) shall be possible except for brief shutdown for maintenance.
- All parts including piping, wiring and related peripheral devices for a pellet boiler shall be mounted and installed on a skid[2] constructed by steel structure at the central assembling factory in Chisinau in order to (1) reduce the installation workloads at site, (2) maintain the quality of products, and (3) minimize the total project cost.

(2) Pellet Production Plant

- Pellet production plant shall produce the pellets from the agricultural waste such as straw, leaves/stalks of sunflower and maize, and pruning twigs from orchards and/or vineyards in rural area in Moldova.

[2] The housing with skid is referred as "module".

- Specification of gas emissions and waste from the plant should be in accordance with the Japanese rules and regulations.
- Production rate shall be minimum 1 ton/h. This capacity has to be demonstrated with at least one material of the materials mentioned described.

2.2 Basic Plan (Construction Plan / Equipment Plan)

2.2.1 Selection of Sites for Pellet Boiler Installation

JST started the selection processes for pellet boiler installation for the Project by examination of the list of 138 candidate villages prepared by 2KR-PIU. In March 2012 when the first survey work in Moldova was completed by the JST, there were 119 candidate villages where 182 public facilities were included. Among them, the public facilities with more than 100 beneficiaries (including both pupils and employees) accounted for 118 in the 93 villages.

2KR-PIU had been accepting applications for the Project from rural villages during the first survey work period in Moldova, and the additional applications amounted to 88 villages and 92 public facilities at the end of March 2012. After pre-screening of these candidate villages by 2KR-PIU, these 58 additional candidate villages with 83 public facilities (over 100 beneficiaries) had been surveyed together with the remaining 22 candidate villages during the second survey work period in Moldova which started in June 2012. In the end, 117 villages had been selected as candidate sites for pellet boiler installation in the end of July 2012. The distribution of candidate villages by Region and Rayon is shown below.

Table 2.2.1 Distribution of 117 Candidate Villages by Region and Rayon

North		Center		South	
Rayon	Site No.	Rayon	Site No.	Rayon	Site No.
Briceni	3	Anenii Noi	2	Basarabeasca	2
Donduşeni	2	Călăraşi	4	Cahul	6
Drochia	9	Criuleni	3	Cantemir	6
Edineţ	6	Dubăsari	1	Căuşeni	2
Făleşti	3	Hînceşti	3	Cimişlia	3
Floreşti	3	Ialoveni	4	Leova	2
Glodeni	5	Nisporeni	3	Ştefan Vodă	1
Ocniţa	3	Orhei	8	Taraclia	1
Rîşcani	2	Rezina	4	UTA Găgăuzia	7
Sîngerei	5	Străşeni	3		
Soroca	2	Teleneşti	3		
		Ungheni	2		
		Mun. Chişinău	4		
Sub total	43	Sub total	44	Sub total	30

Source: JICA Survey Team

As for the selection criteria of candidate villages, the JST and MoAFI agreed the following basic points on 5 March 2012.

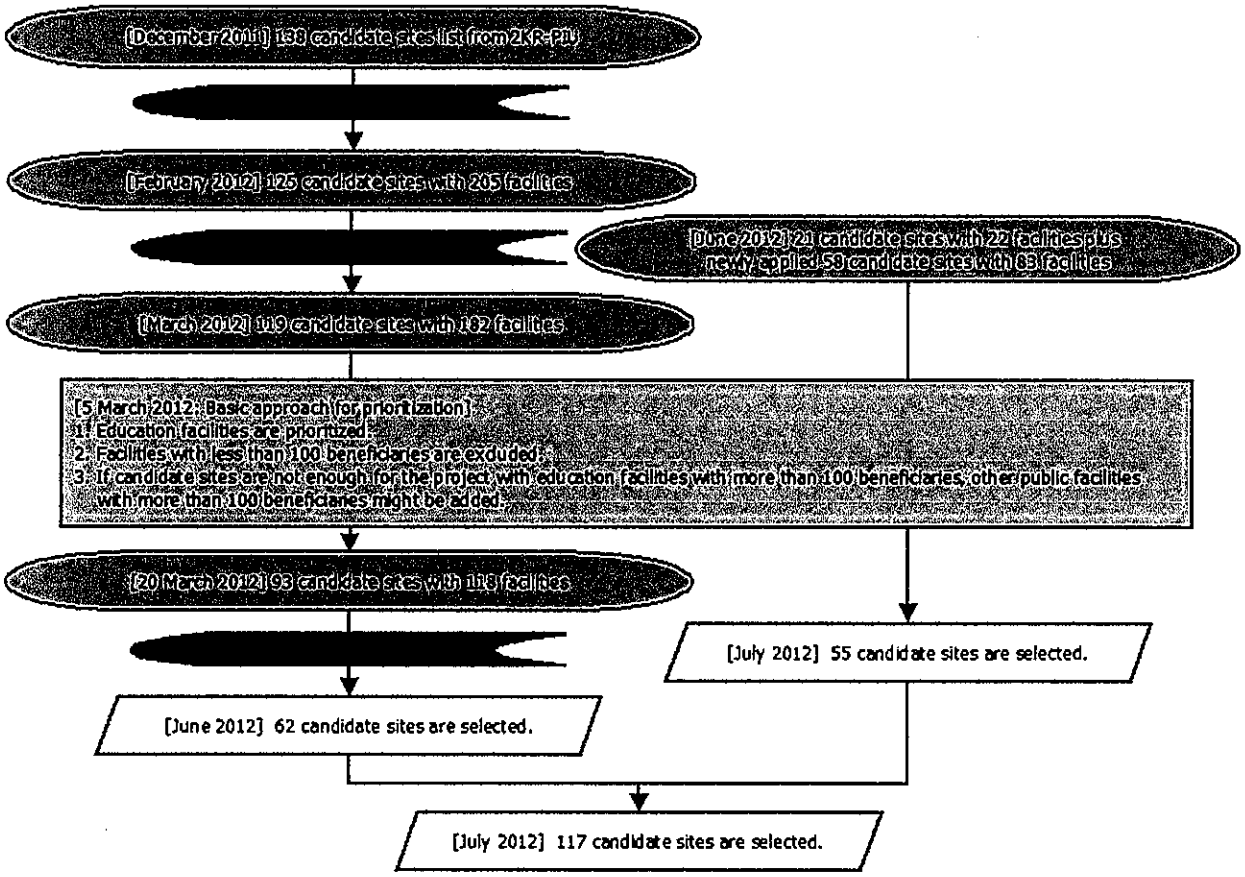
1. Educational facilities have higher priorities than other public ones. This resulted from the fact that other public facilities such as community centers and clinics nominated by village authorities have relatively fewer beneficiaries per site as compared to educational facilities.
2. Among the educational facilities, higher priority will be given to those with more beneficiaries (including both pupils and employees) from the viewpoint of efficiency, and those educational facilities with fewer than 100 beneficiaries will be excluded, in principle. This point is based on quantitative efficiency of one boiler procured through the Project.
3. In case that the educational facilities with over 100 beneficiaries are not enough for total project cost, other public facilities with over 100 beneficiaries will be examined as

candidate sites.

In addition, the JST and MoAFI agreed the ideas shown below.

4. Several facilities can be regarded as one candidate site if they could be heated by one pellet boiler because of their proximity based on the site survey result. (e.g. In case a primary school is located next to a community center and it concludes that installation of one pellet boiler between the two facilities could provide heating for the both two facilities.)
5. In case several facilities are applied as candidate sites from one village, the facility with more beneficiaries can be the first candidate site from that village after consultation with the village mayor.

The process flow diagram is indicated below.



Source: JICA Survey Team

Figure 2.2.1 Selection Flow Diagram of 117 Candidate Sites

Based on the following criteria, the 117 candidate sites were scored. Facility conditions were evaluated by visual inspection when the JST and its subcontractor visited the site.

Table 2.2.2 Evaluation Criteria for Site Prioritization

Criteria	Score
1. Educational Facilities	10
2. Non-educational Facilities	1
3. Number of Beneficiaries	Number of Beneficiaries x 0.01
4. Facility Conditions (3-level evaluation: A, B, C)	
Building -Windows, ceiling, wall (heat retention)	A:3, B:2, C:1
Indoor/outdoor piping, Indoor radiators (heat transfer)	A:5, B:3, C:1

Source: JICA Survey Team

It was agreed with 2KR-PIU that 30% of the six scores of the facility conditions are used for prioritization, and all the 117 candidate sites were prioritized by total score as shown below.

Table 2.2.3 Result of the 117 Candidate Sites Prioritization

S/N	Code No.	Region (1:North, 2:Central, 3:South)/ Rayon	Village	Building Information			Facility Condition						Agriculture performance	Total Score **
				Facility type *	Persons of Full day use	No. of Visitors	Windows Condition A:3, B:2, C:1	Ceiling Condition A:3, B:2, C:1	Wall Condition A:3, B:2, C:1	Outdoor Piping System	Indoor Piping System	Original Radiator		
				A	B		C	D	E	F	G	H	I	J
1	1903	2 Ialoveni	Răzeni	4	896		3	3	3	3	5	3		24.96
2	1802	2 Hînceşti	Lăpuşna	1	791		3	3	3	5	5	3		24.51
3	802	3 UTA Gagauzia	Congaz	4	1,060		1	1	1	3	3	3		24.20
4	1301	1 Briceni	Corjeuţi	4	820		3	3	3	3	5	3		24.20
5	1101	1 Glodeni	Ciuciulea	1	830		3	3	3	3	3	3		23.70
6	1003	1 Sîngerei	Sîngerei Noi	4	642		3	3	3	5	5	5		23.62
7	2202	2 Anenii - Noi	Mereni	112	658		3	3	3	3	5	5		23.18
8	304	1 Drochia	Sofia	4	557		3	3	3	5	5	5		22.77
9	805	3 UTA Gagauzia	Ceadîr - Lunga	3	807		1	1	2	3	5	3		22.57
10	604	1 Floreşti	Ghindeşti	4	520		3	3	3	5	5	5		22.40
11	3201	2 Rezina	Ignaţei	4	490		3	3	3	5	5	5		22.10
12	7203	2 NISPORENI	VARZARESTI	14	740		3	2	2	3	2	3		21.90
13	6902	1 FLORESTI	FRUMUSICA	4	658		3	3	2	3	3	3		21.68
14	2103	2 UNGHENI	COSTULENI	14	698		3	2	2	3	2.5	3		21.63
15	404	3 Cantemir	Goteşti	4	565		2	3	3	5	3	3		21.35
16	303	1 Drochia	Cotova	4	450		3	3	3	3	5	5		21.10
17	402	3 Cantemir	Pleşeni	3	436		2	3	2	5	5	5		20.96
18	1302	1 Briceni	Larga	4	400	50	2	3	3	5	5	5		20.90
19	1005	1 Sîngerei	Cotiujenii Mici	13	369		3	3	3	5	5	5		20.89
20	6802	1 FALESTI	CALINESTI	4	530		3	3	3	3	3	3		20.70
21	6301	3 CANTEMIR	COCIULIA	4	587		3	2	2	3	3	3		20.67
22	1706	2 Orhei	Jora de Mijloc	13	447		3	3	3	5	3	3		20.47
23	7702	2 STRASENI	MICAUTI	36	537		2	3	3	3	3	3		20.47
24	1712	2 Orhei	Susleni	4	326		3	3	3	5	5	5		20.46
25	801	3 UTA Gagauzia	Chirşova	138	618		1	2	2	3	3	3		20.38
26	1501	3 UTA Gagauzia	Cişmicioi	4	578		2	2	2	3	3	3		20.28
27	7703	2 STRASENI	SCORENI	4	480		3	3	3	3	3	3		20.20
28	1803	2 Hînceşti	Buţeni	3	360		3	3	3	5	5	3		20.20
29	306	1 Drochia	Suri	4	465		3	3	3	3	3	3		20.05
30	2104	2 Ungheni	Pîrliţa	3	400		3	3	3	5	3	3		20.00
31	1714	2 Orhei	Furceni	13	342		2	2	2	3	3	3	2	19.92
32	2701	3 UTA Gagauzia	Cioc - Maidan	14	486		2.5	2.5	2.5	3	3	3		19.81
33	1601	3 Taraclia	Cairaclia	4	307		3	3	3	3	5	5		19.67
34	403	3 Cantemir	Ciobalaccia	4	456		2	3	3	3	3	3		19.66
35	8102	3 GAGAUZIA	BESALMA	4	570		1	2	2	3	2	3		19.60
36	1108	1 Glodeni	Glodeni	1	292		3	3	3	3	5	5		19.52
37	1110	1 Glodeni	Sturzovca	38	378		3	3	2	5	3	3		19.48
38	1705	2 Orhei	Trebujeni	3	223		3	3	3	5	5	5		19.43
39	1702	2 Orhei	Brăneşti	13	195		3	3	3	3	3	3	2	19.35
40	501	3 Cahul	Burlacu	4	410		2	3	3	3	3	3		19.20
41	2802	3 Căuşeni	Copanca	1	200		3	3	3	5	5	5		19.20
42	8002	2 CHISINAU	CRICOVA	1	485		3	2	2	2	2	3		19.05
43	2602	1 Drochia	Gribova	3	184		3	3	3	5	5	5		19.04
44	1303	1 Briceni	Criva	3	180		3	3	3	5	5	5		19.00

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				A	B		C	D	E	F	G	H	I	J
45	301	2 REZINA	CUIZAUCA	4	344		3	3	3	3	3	3		18.84
46	1107	1 GLODENI	DUSMANI	139	381	70	1	2	2	2	2	1	2	18.81
47	6101	2 ANENII NOI	MAXIMOVCA	1	230		3	1	2	3	3	3	2	18.80
48	7401	1 OCNITA	SAUCA	3	191		3	3	1	3	3	3	2	18.71
49	2401	2 TELENESTI	CAZANESTI	13	328		3	3	3	3	3	3		18.68
50	6302	3 CANTEMIR	TARTAUL	13	473		3	2	2	3	2	1		18.63
51	8004	2 CHISINAU	BUBUIECIU	11	471		2	2	2	2	2	3		18.61
52	3501	1 Soroca	Căinarii Vechi	1	137		3	3	3	5	5	5		18.57
53	6603	1 DROCHIA	POPESTII DE SUS	14	404		3	2	1	3	3	3		18.54
54	7501	2 REZINA	MATEUTI	13	303		3	2	2	3	2	3	1	18.53
55	701	3 Leova	Ceadîr	3	216		3	2	3	3	5	5		18.46
56	1009	1 Sîngerei	Ciuciueni	133	216		2	2	2	5	5	5		18.46
57	6402	2 CALARASI	TIBIRICA	4	452		3	2	2	3	2	1		18.42
58	1206	1 Edineţ	Ruseni	3	180		3	3	3	3	5	5		18.40
59	2901	3 Ştefan Vodă	Feşteliţa	1	179		3	2	2	5	5	5		18.39
60	8003	2 CHISINAU	TOHATIN	13	409		3	2	2	2	2	3		18.29
61	6601	1 DROCHIA	MINDIC	3	362		3	2	2	3	2	3		18.12
62	6901	1 FLORESTI	ZALUCENI	3	101		2	3	3	3	3	3	2	18.11
63	7201	2 NISPORENI	SISCANI	3	300		3	3	3	3	2	3		18.10
64	1708	2 ORHEI	CHIPERCENI	3	217		1	3	3	1	2	3	2	18.07
65	1711	2 Orhei	Piatra	13	325		3	2	2	3	3	3		18.05
66	7202	2 NISPORENI	CALIMANESTI	129	198		1	2	2	3	2	3	2	17.88
67	6701	2 DUBASARI	OXENTEA	18	366		2	2	2	3	2	3		17.86
68	6202	3 BASARABESCA	CARABETOVCA	4	290		3	2	2	3	3	3		17.70
69	7801	2 TELENESTI	TINTARENI	4	371		3	3	2	3	1	1		17.61
70	7101	2 IALOVENI	HANSCA	3	200		1	2	2	3	3	1	2	17.60
71	202	2 Criuleni	Măşcăuţi	29	334		1	2	2	3	3	3		17.54
72	8101	3 GAGAUZIA	CONGAZCIC	13	332		1	2	2	3	3	3		17.52
73	1004	1 Sîngerei	Copăceni	3	180		1	2	3	5	5	3		17.50
74	6602	1 DROCHIA	TARIGRAD	4	259		2	2	2	3	2	2	1	17.49
75	506	3 Cahul	Larga Nouă	13	264		1	3	3	3	3	3		17.44
76	706	3 Leova	Tochile Răducani	3	204		3	3	3	3	3	3		17.44
77	7001	2 HINCESTI	IVANOVCA	13	223		1	2	2	3	3	3	1	17.43
78	6201	3 BASARABESCA	SADACLIA	1	148		3	3	3	3	3	1	1	17.28
79	7701	2 STRASENI	MICLEUSENI	1	162		1	1	1	3	3	3	2	17.22
80	504	3 Cahul	Alexanderfeld	3	209		2	3	3	3	3	3		17.19
81	7402	1 OCNITA	HADARAUTI	13	236		3	3	3	2	2	3		17.16
82	7601	1 SINGEREI	MARINESTI	13	265		3	2	2	3	2	3		17.15
83	1202	1 EDINET	HANCAUTI	3	182		1	2	2	2	2	2	2	17.12
84	6401	2 CALARASI	DERENEU	49	211	50	1	2	2	1	2	2	2	17.11
85	1105	1 Glodeni	Iabloane	33	289		2	2	2	3	3	2		17.09
86	401	3 Cantemir	Vişneovca	3	198		3	3	2	3	3	3		17.08
87	6604	1 DROCHIA	MOARA DE PIATRA	3	185		2	2	2	3	2	3	1	17.05
88	1405	1 Rîşcani	Hilinţi	13	255		2	2	2	3	3	3		17.05
89	1201	1 Edineţ	Parcova	3	163		3	3	3	3	3	3		17.03

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				Facility type *	Persons of Full day use	No. of Visitors	Windows Condition A:3, B:2, C:1	Ceiling Condition A:3, B:2, C:1	Wall Condition A:3, B:2, C:1	Outdoor Piping System	Indoor Piping System	Original Radiator		
				A	B		C	D	E	F	G	H	I	J
90	9002	2 Criuleni	Raculesti	3	219		2	2	3	3	3	3		16.99
91	1204	1 Edineţ	Bleşteni	3	158		3	3	3	3	3	3		16.98
92	1709	2 Orhei	Ivancea	3	147		2	2	2	3	3	3	1	16.97
93	2402	2 TELENESTI	ZGARDESTI	13	142		3	3	3	3	2	1	1	16.92
94	8001	2 CHISINAU	SINGERA	3	344		2	2	2	3	2	0		16.74
95	2503	3 Cimislia	Cimislia	1	187		1	3	3	3	3	3		16.67
96	1205	1 EDINET	CORPACI	3	166		2	2	2	2	1	1	2	16.66
97	906	1 Donduşeni	Scăieni	3	180		2	3	2	3	3	3		16.60
98	2601	1 DROCHIA	DROCHIA	3	240		2	2	2	3	2	3		16.60
99	6403	2 CALARASI	TEMELEUTI	3	177		2	3	3	3	2	3		16.57
100	8201	1 DONDUSENI	TAUL	3	266		1	2	2	3	2	3		16.56
101	2502	3 Cimislia	Satul Nou	1	104		3	3	3	3	3	3		16.44
102	2301	2 Călăraşi	Bravicea	1	160		2	3	2	3	3	3		16.40
103	1203	1 EDINET	ALEXANDRENI	36	159	21	2.5	2.5	2.5	3	2.5	3		16.39
104	3001	1 Ocniţa	Lencăuţi	3	187		1	3	2	3	3	3		16.37
105	1403	1 Rîşcani	Branişte	3	185		2	2	2	3	3	3		16.35
106	2001	1 FALESTI	NATALIEVCA	1	120		3	3	2	3	3	3		16.30
107	502	3 Cahul	Ursoara	1	125		3	3	3	5	3	3	-1	16.25
108	201	2 Criuleni	Işnovăţ	3	200		2	3	3	3	3	3	-1	16.10
109	9001	3 Cahul	Doina	3	189		3	2	1	3	2	2		15.79
110	302	2 REZINA	LIPCENI	13	178		2	2	2	3	2	2		15.68
111	2801	3 Căuşeni	Hagimus	3	200		1	1	1	3	3	3		15.60
112	7103	2 IALOVENI	ULMU	1	106		3	2	2	3	2	3		15.56
113	502	3 Cahul	Lebedenco	3	143		1	2	3	5	3	3	-1	15.53
114	7102	2 IALOVENI	PUHOI	1	104		3	2	2	3	2	1		14.94
115	2504	3 CIMISLIA	TROITCOE	3	182		1	2	2	3	1	1		14.82
116	3401	1 SOROCA	RACOVAT	1	164		0	0	0	3	3	3		14.34
117	6801	1 FALESTI	TAXOBENI	6	100		3	3	3	3	3	3	2	9.40

*Note1: Facility type: 1: Kindergarten, 2: Primary school, 3: Gymnasium, 4: Lyceum, 5: Other school, 6: Community & Culture Center, Library, Gym, 7: Church, 8: Hospital, Medical clinic, Rehabilitation Center, 9: Mayoralty office

**Note2: Total score (J): If the facility type (A) is educational (1-5), the total score (J) is calculated from the following formula: J = 10 + B*0.01 + (C+D+E+F+G+H)*0.3 + I. If the facility type (A) is non-educational (6-9), the total score (J) is calculated from the following formula: J = 1 + B*0.01 + (C+D+E+F+G+H)*0.3 + I.

Source: JICA Survey Team

After the second site survey in Moldova, 25 sites in the Central Region had been finally selected as the sites for pellet boiler installation through a series of discussions. (See the table below.)

Table 2.2.4 List of the 25 Candidate Sites for Boiler Installation

S/N	Priority Ranking	Code	Rayon	Community	Kinds of Beneficial Facility	Persons of Full day use	No. of Visitors	Proposed Boiler Size (kW)
1	1	1903	IALOVENI	RĂZENI	Lyceum	896		580
2	2	1802	HÎNCEŞTI	LĂPUŞNA	Lyceum	791		580
3	7	2202	ANENII - NOI	MERENI	2 Kindergartens + Primary school	658		348
4	11	3201	REZINA	IGNAŢEI	Lyceum	490		348
5	12	7203	NISPORENI	VARZARESTI	Kindergarten + Lyceum	740		580
6	22	1706	ORHEI	JORA DE MIJLOC	Kindergarten + Gymnasium	447		348
7	23	7702	STRASENI	MICAUTI	Gymnasium + Culture Center	537	150	580
8	24	1712	ORHEI	SUSLENI	Lyceum	326		232
9	27	7703	STRASENI	SCORENI	Lyceum	480		580
10	28	1803	HÎNCEŞTI	BUŢENI	Gymnasium	360		580
11	30	2104	UNGHENI	PÎRLIŢA	Gymnasium	400		348
12	31	1714	ORHEI	FURCENI	Kindergarten + Gymnasium	342		348
13	38	1705	ORHEI	TREBUJENI	Gymnasium	223		232
14	39	1702	ORHEI	BRĂNEŞTI	Kindergarten + Gymnasium	195		232
15	42	8002	CHISINAU	CRICOVA	Kindergarten	485		232
16	45	301	REZINA	CUIZAUCA	Lyceum	344		407
17	47	6101	ANENII NOI	MAXIMOVCA	Kindergarten	230		232
18	51	8004	CHISINAU	BUBUIECIU	2 Kindergartens	471		232
19	54	7501	REZINA	MATEUTI	Kindergarten + Gymnasium	303		348
20	57	6402	CALARASI	TIBIRICA	Lyceum	452		580
21	60	8003	CHISINAU	TOHATIN	Kindergarten + Gymnasium	409		348
22	63	7201	NISPORENI	SISCANI	Gymnasium	300		348
23	64	1708	ORHEI	CHIPERCENI	Gymnasium	217		232
24	65	1711	ORHEI	PIATRA	Kindergarten + Gymnasium	325		232
25					2KR Training Center in Chisinau			116
Total						10,421		

Source: JICA Survey Team

2.2.2 Basic Structure

(1) Pellet Boiler

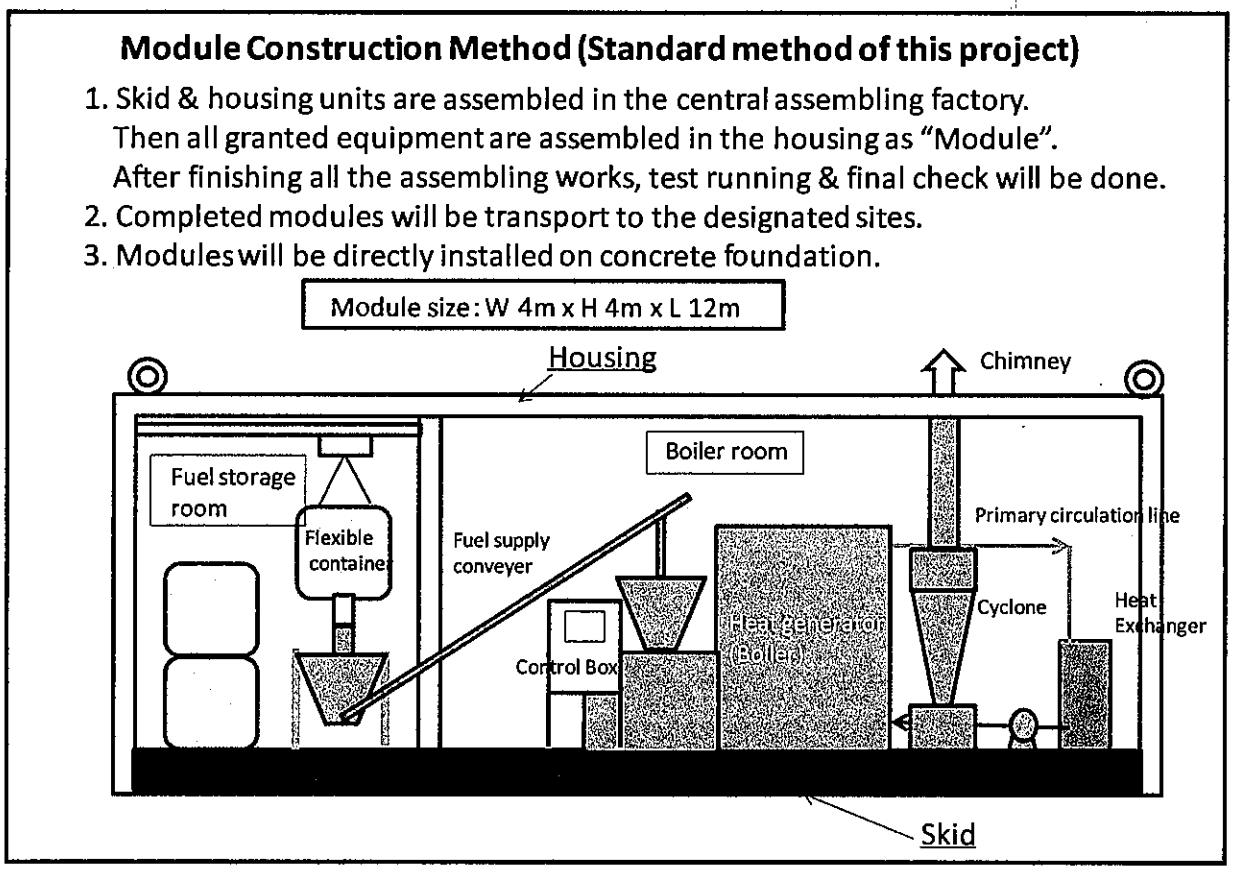
Pellet Boiler shall be installed on the skid and skid shall be installed in the housing in the central assembling factory as described in "2.1.4 Basic Design Policy".

However the module which is assembled in the central assembling factory will be;

4 m width x 4 m height x 12 m length

This size is possible to be transported on the Moldovan official roads but there are some sites where the road width is not enough for transportation of the module. Therefore, the following two methods are planned.

1) Module Method



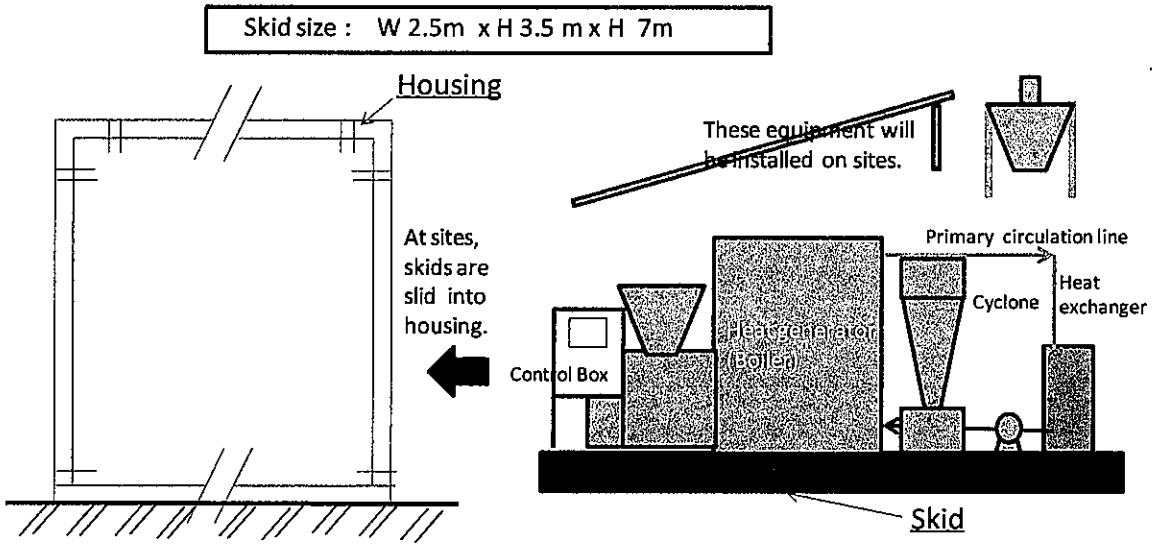
Source: JICA Survey Team

Figure 2.2.2 Module Method

2) Skid and Housing Method

Skid Construction Method (Impossible to transport modules to the sites)

1. Skids will be assembled in the central factory, then granted main equipment are assembled on it as "Skid". Tentative assemble test will be done.
2. Skids will be forwarded & transported to the designated sites. Housing parts will be assembled on the sites.
3. Skid & peripheral parts will be installed into the housing.



Source: JICA Survey Team

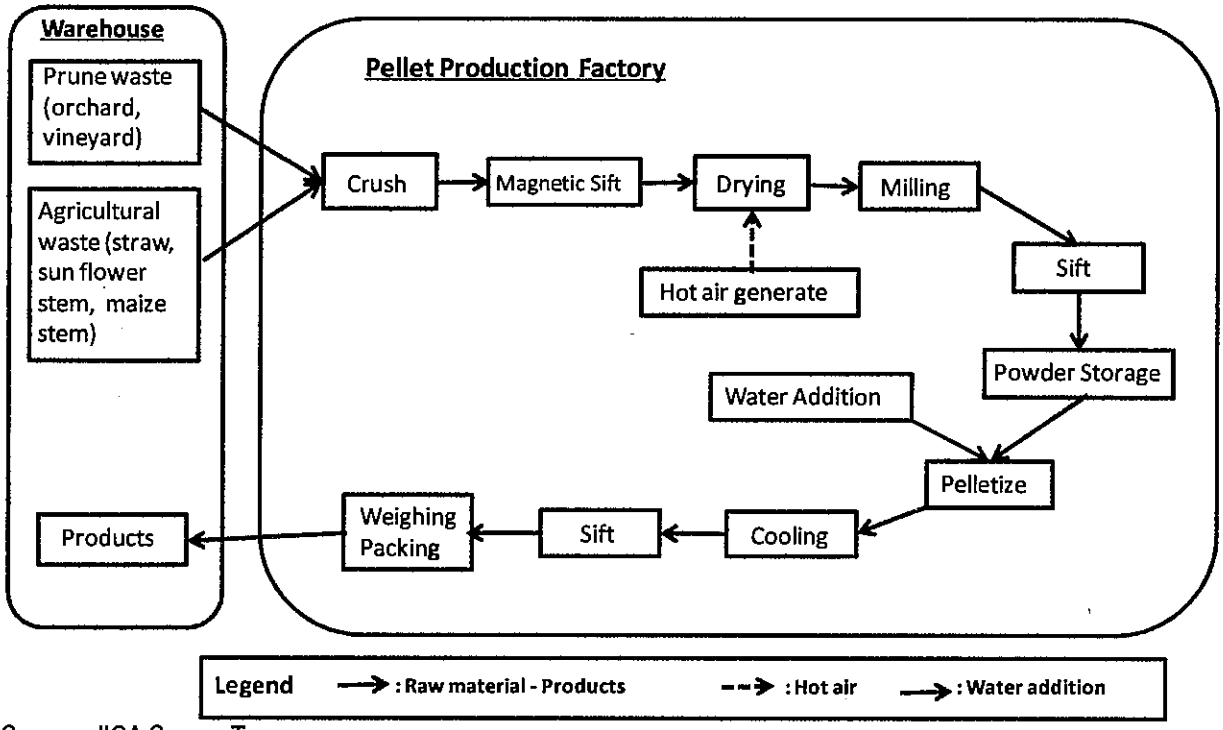
Figure 2.2.3 Skid and Housing Method

(2) Pellet Production Plant

Pellet production plant is the kind of biomass processing plant to produce the pellet fuels from the agricultural waste such as straw, leaves/stalks of sunflower and maize, and pruning twigs from orchards and/or vineyards in rural area in Moldova. The simplified block chart of the plant is shown in the Figure 2.2.4.

This plant consists of various kinds of equipment. Components/materials and key issues of the plant are as follows.

- The raw materials have various physical and chemical characteristics, hence the plant needs to be equipped with flexible and wide range operation ability.
- For some kinds of equipment such as crusher, dryer and milling machine, both hard materials (like pruning twigs) and soft materials (like straw) need be processed in the same line.
- The plant simultaneously handles dried biomass powder and operates a firing unit in the same line. Therefore, fire protection and safety measures have to be carefully considered.



Source: JICA Survey Team

Figure 2.2.4 Block Diagram for Pellet Production Plant

2.2.3 Installation Sites and Equipment Quantities

(1) Pellet Boiler

Pellet boilers shall be installed at the 25 sites in rural areas and the number of boilers by capacity shall be referred to the following table.

Table 2.2.5 Number of Pellet Boilers to Be Installed

Boiler Capacity			Number of Boilers
1.	100,000kcal	(116 kw)	1
2.	200,000kcal	(232 kw)	8
3.	300,000kcal	(348 kw)	8
4.	350,000kcal	(407 kw)	1
5.	500,000kcal	(584 kw)	7
			25

Source: JICA Survey Team

(2) Pellet Production Plant

One set of pellet production plant with 1 ton/hour capacity shall be installed within the premises of 2KR-PIU in Chisinau.

2.2.4 Basic Specifications of the Equipment

(1) Pellet Boiler

Pellet boiler shall consist of the following main equipment and/or facilities.

1) Pellet feed tank: 0.5-1.0 m^3
2) Pellet feeder: Screw type and automatic feed control
3) Pellet conversion & hot water generator:
   - Non-pressure hot water generator with alarm systems, back fire preventer, hot water

temperature controller, hot water level detector, level detector for pellet feed tank and earthquake sensor.

- Maximum hot water temperature shall be 90 °C, normal output temperature is 80 °C
- Heat efficiency shall be 80 % and 85% is preferable.
- Manual ash discharging
- Minimize the clinker stuck and scale on the surface of heat tube

4) Igniter shall be equipped. (either gas, oil burner or direct ignition on pellet)
5) The exhaust gas from boiler shall clear the limitation of Japanese standards.
6) Countermeasures for long term blackout

(2) Pellet Production Plant

Pellet production plant shall consist of the following main equipment and/or facilities

1) Stock yard for raw materials such as straw, sunflower, maize and twigs from orchard and vineyards
2) First step crusher of raw materials
3) Intermediate stock tank after first step crasher
4) Dryer of the materials with hot air generator:
   - Dryer shall be rotary kiln type and be installed with safety devices which immediately segregate the rotary kiln from hot air generator in an emergency such as electric power failure.
   - Hot air generator shall be able to burn spec-off pellet.
5) Second step crusher of the materials from the dryer:
   - Milling type is preferable.
6) Fine material stock tank for pelletizer
7) Pelletizer:
   - Consist of two trains and 0.5 ton/hour capacity each.
   - Materials shall be agricultural waste in Moldova such as straw, sunflower, maze and twigs from orchards and vineyards.
8) Pellet cooling facility
9) Sifter
10) Pellet filling facility:
    - Filling 1 m^3 flexible container bag
11) Countermeasures for long term blackout

2.2.5 Equipment Plan

The principal equipment specification, quantities and purpose of use are shown as below;

Table 2.2.6 Equipment specification, quantities and purpose of use

Name	Specification	QTY	Purpose of use
Pellet boiler (116kW)	Calorie: over 100,000kcal Dimensions: within 3.0 x 1.7 x 2.1(L x W x H (m)) Mileage: Approx. 30kg/hour Ignition: either gas, oil burner or direct ignition on pellet	1	For kindergarten, primary school, Gymnasium and Lyceum (educational facilities)
Pellet boiler (232kW)	Calorie: over 200,000kcal Dimensions: within 4.4 x 2.0 x 2.3(L x W x H (m)) Mileage: Approx. 60kg/hour Ignition: either gas, oil burner or direct ignition on pellet	8	For kindergarten, primary school, Gymnasium and Lyceum (educational facilities)

Name	Specification	QTY	Purpose of use
Pellet boiler (348 - 407kW)	Calorie: 300,000 - 350,000kcal Dimensions: within 4.5 x 2.3 x 2.6(L x W x H (m)) Mileage: Approx. 90kg/hour Ignition: either gas, oil burner or direct ignition on pellet	8	For kindergarten, primary school, Gymnasium and Lyceum (educational facilities)
Pellet boiler (407 - 464kW)	Calorie: 350,000 - 400,000kcal Dimensions: within 5.0 x 2.4 x 2.8(L x W x H (m)) Mileage: Approx. 120kg/hour Ignition: either gas, oil burner or direct ignition on pellet	1	For kindergarten, primary school, Gymnasium and Lyceum (educational facilities)
Pellet boiler (580kW)	Calorie: over 500,000kcal Dimensions: within 5.5 x 2.5 x 3.0(L x W x H (m)) Mileage: Approx. 150kg/hour Ignition: either gas, oil burner or direct ignition on pellet	7	For kindergarten, primary school, Gymnasium and Lyceum (educational facilities)
Pellet production plant	1. Primary crusher 2. Secondary grinder 3. Dryer 4. Raw material volumetric feeder 5. Pelletizer (1,000kg/hour capacity) (Flat die type or ring die type) 6. Chiller 7. Product screener 8. Silo for pellet storage 9. Packing machine with flexible container bag 10. Delivery conveyor between equipment 11. Cyclone dust collector 12. Main power board, control box 13. Other necessary equipment or devices	1	For fuel (pellet) supply to pellet boilers
Test stand	1. Flexible tube 2. Valves 3. Flow meter 4. Calorie meter 5. Circulation pump 6. Filter 7. Cooling tower	1	For performance test (boiled water supply and water leakage etc.) of boilers before installation

Source: JICA Survey Team

2.3 Outline Design Drawing

(1) Pellet Boiler

The following are the outline design drawings, which are attached in Appendix 2.

- Simplified diagram of Pellet Boiler: JST-FD-005-001
- Conceptual drawing of Test Stand: JST-FD-005-010
- Outline drawing of Module and the lay-out in Module:
  JST-LY-005-580-A, JST-LY-005-407.348-B, JST-LY-005-232-C, JST-LY-005-116-TW
- Structures of Module:
  JST-MD-005-580-A, JST-MD-005-407.348-B, JST-MD-005-232-C, JST-MD-005-116-TW
- Structure of Skid and Piping: JST-SK-005-580-A, JST-SK-232-C
- Plot Plans by site: 24 sites (except for 2KR-PIU site)

(2) Pellet Production Plant

Sample drawings of the pellet production plant are available only in Japanese.

2.4 Implementation Plan

2.4.1 Implementation Policy

The Project shall be implemented under the Grant Aid Scheme of Japan, therefore the following policies are applied to the implementation.

- After conclusion of the Exchange of Note (E/N) between Moldova and Japan, JICA and 2KR-PIU will have the Grant Aid Agreement (G/A) for the Project. In accordance with the specified period under the G/A, all the processes such as components confirmation, contractor selection through bidding, equipment procurement and installation, commissioning and reception shall be properly completed.
- Through good relationships between 2KR-PIU, a consultant team and a contractor, the project shall be smoothly implemented.

After signing the G/A between 2KR-PIU and JICA, a Japanese consultant team having a contract with 2KR-PIU shall perform the Project together with 2KR-PIU. On the other hand, the contractor, which will be selected through the bidding process, shall procure and install the equipment and facilities.

The Project is categorized as "equipment procurement" type. Pellet boilers and pellet production plant are two major components of the Project. Some construction works (e.g. making foundation for module) and preparation of educational buildings are undertakings of the Moldovan side. As for the pellet boilers, a module method will be introduced and the module will be produced by a local sub-contractor. The pellet boilers are necessary to accommodate the local laws as heating system. The fabrication of the module including the pellet boiler shall be conducted at a factory in Chisinau; the module shall be transported to the site and installed at the site.

The principal roles of the client, consultant and contractor for the Project are shown as below.

(1) Client

Ministry of Agriculture and Food Industry (MoAFI) is responsible for the Project. Implementation organization will be 2KR-PIU under MoAFI. 2KR-PIU will be a primary organization for the project implementation regarding consultant agreement and equipment procurement under the G/A.

(2) Consultant

After signing of the G/A, 2KR-PIU shall execute a consulting service agreement with a Japanese consulting firm (consultant) recommended by JICA. The consultant shall bear obligations on the agreement for the Project. The consultant shall give the following consulting services for the client.

Design confirmation and bidding arrangement

The consultant will provide technical assistance for Moldova such as final confirmation of the facilities and equipment (Specifications and quantities of the facilities and equipment, beneficiaries' obligations, etc.) including basic design amendment, making tender documents, opening tender and evaluation.

Procurement supervision

The consultant will supervise the procurement services such as shop inspection, pre-shipment inspection, transportation, fabrication, installation test run, initial operation training, etc. for the client and beneficiaries.

Soft Component

The following purposes are set for the Soft Component of the Project in accordance with "Soft Component Guideline (October 2010)" issued by JICA.

1) The Project proceeds smoothly. (Including undertakings by Moldova)

2) Good output is sustainably obtained.

Planned services are operation management and equipment maintenance and are shown as follows.

- Establishment of operation management system
- Reinforcement of the operation management system

· Enlightenment activity on biomass heating system

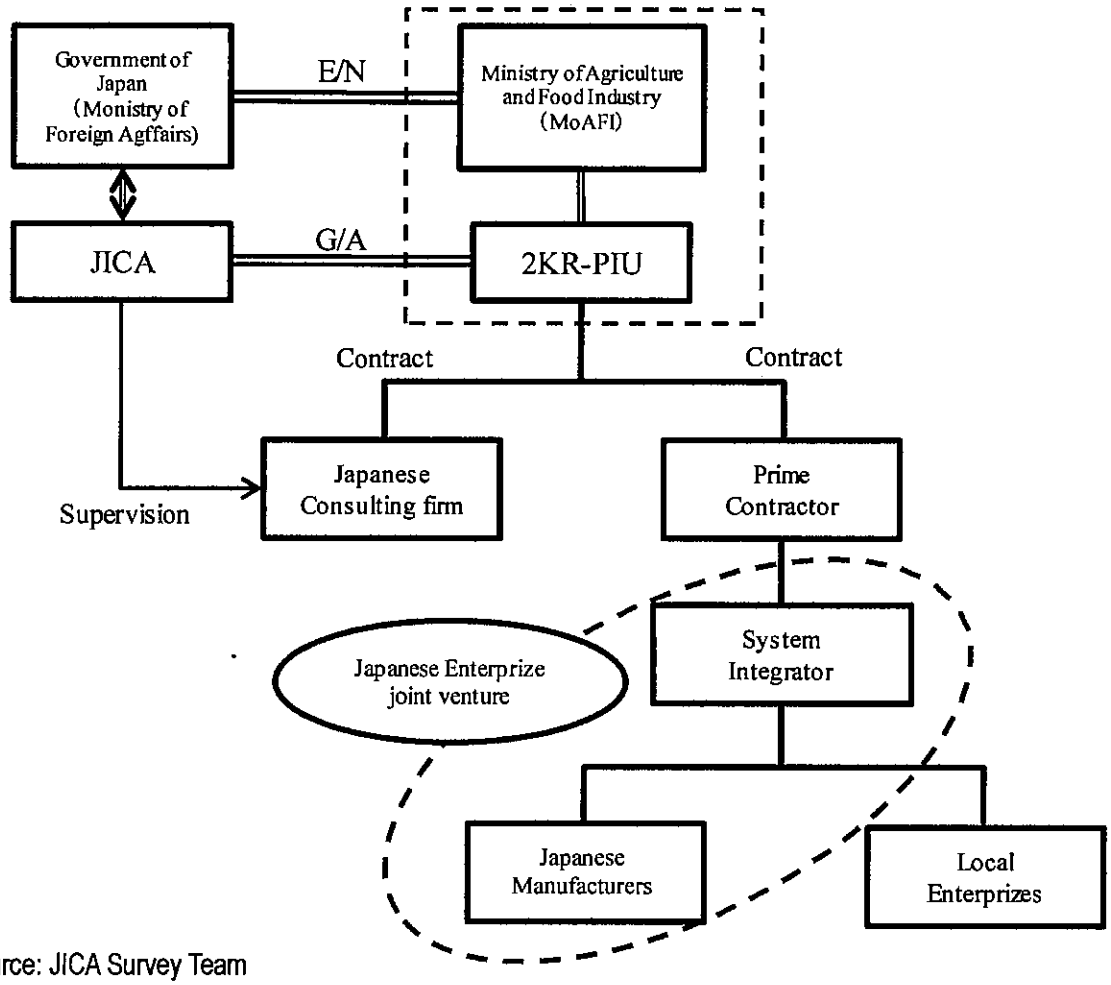
(3) Contractor

After the G/A conclusion, a Japanese contractor, which will be selected through a tender organized by the Moldovan side, shall make an equipment procurement contract with 2KR-PIU. The contractor shall make a subcontract with local firms for local procurement (boilers and modules fabrication, transportation and installation of the modules and commissioning). Besides, the consultant and the contactor shall have series of meetings and site inspection to confirm the beneficiaries' undertakings to complete the Project. The services of the contractor are as follows.

· Procurement, transportation and receipt of the equipment

· Fabrication, installation, test run and initial operation training of the equipment

Relations of the organizations concerned are indicated in the figure below.



Source: JICA Survey Team

Figure 2.4.1 Implementation Organizations

2.4.2 Implementation Conditions

To implement the equipment procurement such as transportation, fabrication, installation and commissioning smoothly, the client, the consultant and the contractor shall have to cooperate with close coordination and fulfill own duties without delay. All the parties involved in the Project have to pay attention to the points below.

(1) Considerations in Equipment Procurement

This Project aims to utilize the Japanese high-tech product which is manufactured not only by large enterprises but also small and medium enterprises and the suitable product will be granted to

Moldova. Pellet boilers and pellet production plant are objective equipment.

Necessary documents for importing the equipment from Japan to Moldova are as follows.

- Specifications and photos of boilers
- Translated manufacturers' catalogues (Romanian or Russian. English acceptable)
- The heat efficiency (above 80%) should be indicated. (It is enough written on the catalogue.)
- Pellet production plant requires the same documents as above.

The submission of above documents can be done by the consultant to 2KR-PIU, and they will proceed to MoAFI and the Ministry of Economy. According to the Ministry, approval of the documents will take about one month.

In Moldova, several laws described below are under revision to conform to the EU standards, and new legislation, "Law on Introduction of Biomass Energy" is under preparation.

- LAW on Energy Efficiency Nr. 142
- LAW on Renewable Energy Nr. 160
- National Program of Energy Efficiency 2011-2020, Nr. 833

(2) Considerations during Construction Work

The following are to be considered during the construction period.

- To confirm procurement schedule of boilers, transportation schedule to the sites and installation schedule
- Concrete foundation work by the Moldovan side should avoid winter season to keep quality. It is recommendable to commence the concrete work after spring.
- Before arrival of the pellet boilers from Japan, local production management and fabrication schedule should be discussed to prevent problems.
- About 8 and 9 housings will be produced per month, and fabrication, installation and commissioning of them are planned to take for 3 months. To avoid delay, schedule management and production management should be well-coordinated.

The modules will be fabricated at a factory in Chisinau. The factory need following safety measures.

- There are a lot of process machines, long raw materials and limitations of workers' pass in a factory. Factory workers should pay attentions carefully.
- While working with a crane in a factory, an accidental fall may occur. Paying attention before working is indispensable.
- Protect goggle, leather glove and helmet must be put if necessary.

After the modules completion in a factory, the modules will be delivered to each site. During delivery and installation works, the following are necessary.

- To avoid bumping of modules to overhead road crossing objectives (e.g. gas pipelines, phone lines and power cables) while transporting (taking a detour)
- Wrecker trucks will be necessary while unloading the modules at sites. It needs careful attention to parking place considering the own weight of wrecker truck and modules. Besides, it needs to pay attention to overhead objectives during the work period.

Work flow of the housing and boiler fabrication is attached in Appendix 3.

Some Japanese engineers from the manufacturer will come to Moldova for the installation work of the pellet production plant. Operators for the pellet production plant should work together with the Japanese engineers to understand the system for the proper operation after the completion.

2.4.3 Scope of Works

For the implementation of the Project, the Government of Japan and the Government of Moldova shall be responsible for the procurement and installation of the project components as shown below.

(1) Undertakings to be Borne by the Japanese Side

- Consulting services on design validation, tender documents preparation, tender arrangement and procurement supervision
- Procurement of the equipment manufactured in Japan in the equipment list
- Transportation, receipt, fabrication, installation, test run and initial operation training of the equipment
- Establishment of operation management system by the soft component

(2) Undertakings to be Borne by the Moldovan Side

Pellet boiler

- To build up a foundation for the module (including materials for the construction work)
- To supply electric power and clean water for the module
- To prepare fire protection and fire extinguishing facilities
- To prepare temporary ash storage
- To prepare facilities for operators (toilet, washing basin, etc.)
- To recruit the operators

Pellet production plant

- To prepare a building for the pellet production plant
- To prepare carriers (e.g. forklift)
- To supply electric power and clean water for the pellet production plant
- To prepare fire protection and fire extinguishing facilities
- To prepare facilities for operators (toilet, washing basin etc.)
- To recruit the operators

2.4.4 Consultant Supervision

(1) Procurement Planning

Pellet boiler

Because it is considered to be impossible to produce all the necessary boilers by one boiler manufacturer, the boilers will be procured from several manufacturers. Therefore, it is necessary to implement the Project on schedule considering the points below.

- To coordinate production plan of boilers in Japan and local production plan of housings carefully
- To make an effort to get the updated transportation information, especially marine transportation
- To confirm the transportation route from Chisinau to the sites
- To confirm the beneficiaries' preparations (concrete foundation for the module and secondary plumbing in the buildings)

Pellet production plant

- To make an effort to get the updated transportation information, especially marine transportation like the pellet boilers
- To confirm the beneficiaries' preparations (a building for the pellet production plant)

(2) Consultant Supervision

The construction work period will take 5 months. It will start with meetings for the construction work and complete after the initial operation training of the installed equipment.

Pellet boiler

Five-sized boilers shall be procured according to each site condition. In addition, several

manufacturers will provide them. The local subcontractor will need to fabricate the various boilers under different conditions. Therefore, all the concerned parties will have to have careful meetings on the manufacturer's detail specifications and drawings to avoid work delay.

Pellet production plant

Engineers from the Japanese manufacturer will install the pellet production plant on site. All the components and necessary parts shall be brought from Japan, but several materials shall be procured locally. The Japanese engineers and the local sub-contractor will have to clarify the critical points for fabrication in meetings before the work. Through the meetings, both parties will be able to work smoothly and immediately from the beginning of the work.

Table 2.4.1 Responsibilities by Work

Contents	Pellet boiler		Pellet production plant	
	Principal work	Initial operation skill	Principal work	Technical transfer for
Unpacking / arrangement	Local sub-contractor	Japanese supervisor	Japanese engineer	Local staff
Equipment layout	Local sub-contractor	Japanese supervisor	Japanese engineer	Local staff
Fabrication	Local sub-contractor	Japanese supervisor	Japanese engineer	Local staff
Installation	Local sub-contractor	Japanese supervisor	Japanese engineer	Local staff
Test run	Local sub-contractor	Japanese supervisor	Japanese engineer	Local staff
Initial operation training for operators	Local sub-contractor	Japanese supervisor	Japanese engineer	Local staff

Source: JICA Survey Team

2.4.5 Quality Control Plan

The quality control will start with sorting out various drawings (equipment fabrication drawings, detail drawings and shop drawings) to prepare work plans and procedures (fabrication and installation), and site control (arrangement) plan. As for the equipment, damages and quantities will be required as pre-delivery inspection and pre-shipment inspection.

(1) Equipment

Pellet boiler

Combustion test shall be done at a manufacturer's factory in Japan. The performance test with a test stand (dummy load) at Chisinau shall include all of the parts and devices without secondary plumbing.

Pellet production plant

Pre-delivery inspection at a manufacturer's factory in Japan shall be done for each equipment unit separately.

(2) Installation

Pellet boiler

While fabricating the boilers and housing, it will need to check the size and route of plumbing with the drawings, and water supply and leakage as intermediate approval. After installation on the sites, commissioning confirmation will be done with the beneficiaries as overall work completion.

Pellet production plant

After fabrication and installation of the equipment, test production of pellet will be done with the local raw material. Size, moisture content and forming condition of the test pellet will be measured, and approval of completion will be issued if all the parameters meet the specifications.

2.4.6 Procurement Plan

The major equipments which will be procured by the Project are as follows.

Table 2.4.2 Major Equipments Procured by the Project

	Equipment	Procured from	Country of origin	QTY
1	Pellet boiler (116kW)	Japan	Japan	1
2	Pellet boiler (232kW)	Japan	Japan	8
3	Pellet boiler (348 - 407kW)	Japan	Japan	8
4	Pellet boiler (407 - 464kW)	Japan	Japan	1
5	Pellet boiler (580kW)	Japan	Japan	7
6	Hoist with electric trolley	Japan	Japan	33
7	Roller conveyor	Japan	Japan	25
8	Pellet production plant	Japan	Japan	1
9	Flexible container bag	Japan	Japan	500
10	Test stand	Moldova	Moldova	1

Source: JICA Survey Team

The items from 1 to 9 in the above table will be procured in Japan as well as ancillary parts such as primary pipes between the boiler and heat exchanger. The materials for housing of the boilers will be locally procured. Secondary pipes from the heat exchanger to buildings are undertakings by the Moldovan side.

As for the pellet production plant, cables between units of the equipment will be procured in Japan, but power cables and power panel will be procured locally.

2.4.7 Operational Guidance Plan

Some pellet boilers have already been imported from other countries (Greece, Poland, Germany, Ukraine, etc.), and secondhand pellet production plants are also there in Moldova; therefore both kinds of equipment are not so rare equipment. But mechanical system of the boilers made in Japan for the Project is completely different from other countries' products. The Japanese boilers have semi-automatic control function from pellet supply to exhaust gas emission. Production capacity of the newly introduced pellet production plant will be same as the secondhand pellet production plant, but the plant size of the new plant is larger than the used one because the new one is equipped with semi-automatic function including conveyance between the different processes.

Manuals for basic operation and maintenance will be translated into either Romanian or Russian and initial operation guidance will be provided for operators. There are differences on operation between semi-automatic and conventional equipment, so it needs to teach them to the operators during the initial operation guidance. The major points are specified as follows.

Pellet boiler

Even though the operation is semi-automatic, human supervision is indispensable.

(i) The pellet is automatically supplied from the silo to the boiler, but it needs to supply the pellet to the silo by manpower. Therefore in case of alert for the pellet shortage in the silo, operators need to supply the pellet to the silo manually.

(ii) Clinker, which is produced in a furnace, is automatically removed. The clinker generation differs by raw material composition; therefore the operators should watch the clinker generation, and sometimes may need to remove the clinker manually.

(iii) Ash must be discharged by manpower.

(iv) Different raw materials by season and production location make the produced pellet various characteristics. Therefore it should avoid using the mixture of different pellets, and should use the single kind of pellet. It will be necessary to adjust operation because of different calorie and different clinker production if the mixture of different pellets is used.

(v) In case of power failure, proper manual operation is necessary to cope with poor combustion

because semi-automatic operation doesn't work. (e.g. manual combustion control for remaining pellet by stop of air blower and cyclone dust collector)

Pellet production plant

(i) It should avoid inputting different raw materials while the pelletizer is working.

(ii) It requires changing or adjusting a die before using different raw materials.

(iii) It needs careful operation for the raw material drying unit when power failure occurs.

(iv) Proper moisture content should be maintained.

It isn't considered that the above-mentioned cautions have been common so far, and adequate procedures for the optimum operation should be thoroughly instructed.

Reporting guidance

After installation of the pellet boilers and pellet production plant on the designated sites, the beneficiaries have to do a report of the equipment operation for the project evaluation. But a training of this reporting service is not included in the operational guidance; therefore the training of the reporting will be done in the soft component.

2.4.8 Soft Component (Technical Assistance) Plan

(1) Necessity of Soft Component Plan

Besides actual operation and maintenance of the installed equipment and plant, soft component (technical assistance) plan is required in order to manage and to have the 25 pellet boilers and 1 pellet production plant in good operation conditions for its long-term sustainable operation.

(i) Strengthening the project management skills for the smooth starting-up of the equipment in large numbers (=Necessity to develop information management system (IMS) and strengthen operation and maintenance skill to operate the IMS)

(ii) Planning of pellet supply chain model for diffusion on use of pellet boilers

(iii) Environmental education and information sharing for diffusion of pellet boiler

(2) Outline of the Soft Component Plan

1) Purpose

Goal of the soft component plan is to achieve the project purpose and as a result of reaching the project purpose, to reach the overall goal by developing necessary functions to realize the continuous operation of the granted equipment. (See "1.1Overall Goal and Project Purpose" for the project purpose and overall goal.)

2) Expected Results

The following three results are expected as a result of implementation of the soft component plan.

Result 1: Operation and maintenance (O&M) of pellet boilers are realized.

Result 2: O&M of pellet production plant is realized.

Result 3: Benefits of biomass utilization will be recognized by the public.

(3) Contents

Table 2.4.3 Activities of the Soft Component Plan

Result	Activities	Target persons/groups
Result 1 O&M of pellet boilers are realized.	○Project evaluation and monitoring method development ○Information management system (IMS) development ○IMS operation and maintenance skill development ○Development of reporting rule, education program and reporting manual for boiler operation information gathering	●2KR-PIU
	○Reporting rule education program for site managers ○Reporting rule education program for boiler operators ○Reporting rule operation monitoring program	●Mayor, Assistant ●Site Manager, assistant, boiler operator

Result	Activities	Target persons/groups
Result 2 O&M of pellet production plant is realized.	○Development of reporting rule, education program and reporting manual for pellet production information gathering	●2KR-PIU
	○Supply chain planning ○Education to develop skills to diffuse the pellet production	●2KR-PIU
	○Reporting rule education program for plant manager ○Reporting rule operation monitoring program	●2KR-PIU ●Plant manager, assistant, operators
Result 3 Benefits of biomass utilization will be recognized by the public.	○Web-site ○Web-site management skill development, operation manual development	●2KR-PIU
	○Workshop	●Members of related ministry, university, organization and donors
	○Education program ○Tool development	●Pellet boiler installed site users(teachers, student)

Source: JICA Survey Team

(4) Schedule

Three (3) JICA experts with different skills will cooperate to accomplish the three (3) goals of the soft component plan.

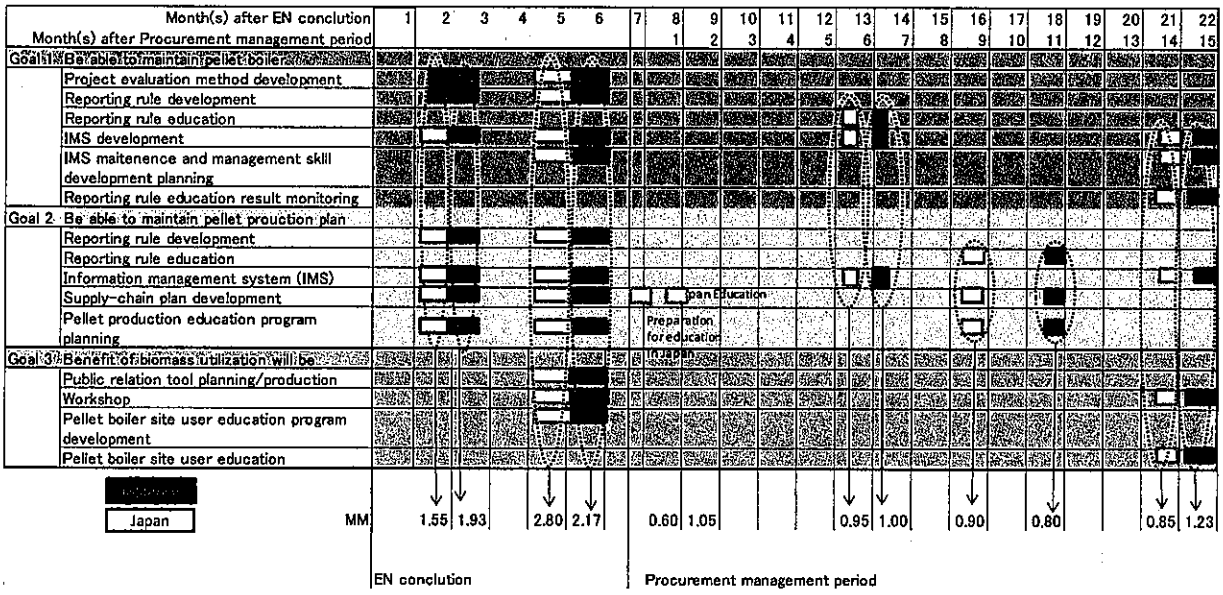
Table 2.4.4 Roles of Experts

		Soft Component Manager	Information Management System (IMS) expert	Facility Expert
Goal 1	Be able to maintain pellet boiler			
	Project evaluation method development	◎		
	Reporting rule development	◎		△ (Technical support)
	Reporting rule education	◎		△ (Technical support)
	IMS development	○	◎	△ (Technical support)
	IMS maitenence and management skill development planning		◎ (Instructor=Local resource)	
	Reporting rule education result monitoring	◎	△	
Goal 2	Be able to maintain pellet prouction plan			
	Reporting rule development	◎		
	Reporting rule education	◎		○
	Information management system (IMS) development		◎	
	Supply-chain plan development	◎ (Business planning)		◎ (Facility/technology)
	Pellet production education program planning	◎ (Business planning)		◎ (Facility/technology)
Goal 3	Benefit of biomass utilization will be recognized			
	Public relation tool planning/production	◎	△ (Involvement of IMS)	△ (Technical support)
	Workshop	◎	○ (IMS instructor)	
	Pellet boiler site user education program development	◎		△ (Technical support)
	Pellet boiler site user education	◎		

Source: JICA Survey Team

Soft component plan requires timely action along with the equipment/plant procurement, installation and start-up schedule. As a result, the period of soft component plan will take 22 months from the E/N conclusion.

Table 2.4.5 Schedule of Soft Component Plan



Source: JICA Survey Team

2.4.9 Implementation Schedule

Following the decision of the project implementation by the Government of Japan, the detailed design work (including final confirmation of the undertakings by the Moldovan side) shall be done by the Japanese consultant team, and a contractor for procurement and installation of the equipment shall be selected through competitive bidding. After the contractor bidding, the equipment procurement shall begin with the procurement meetings (preparation of shop drawings, verification of the drawings and approval of the drawings by the client).

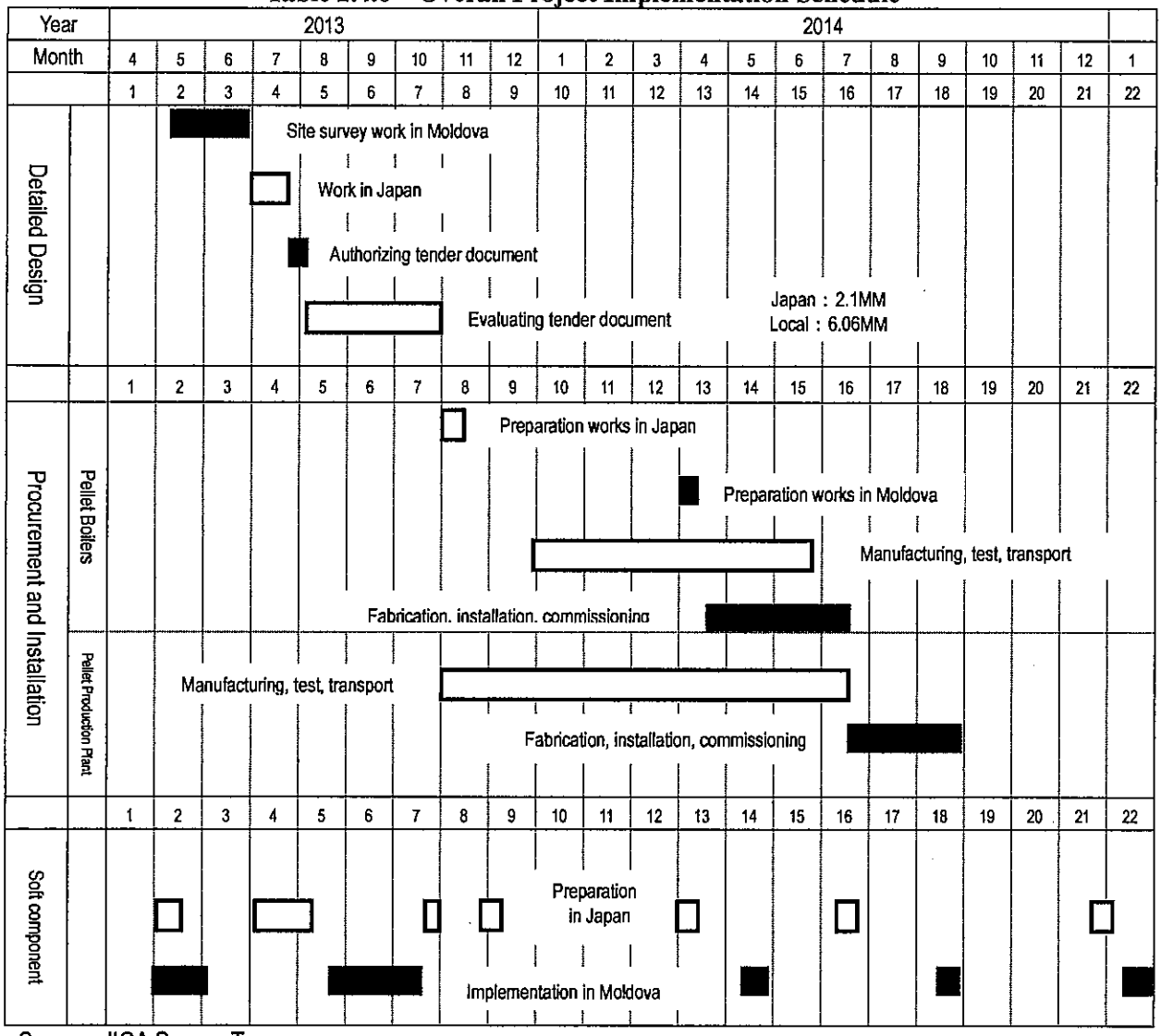
During the detailed design works by the consultant team, it shall need to get official importation approval of the equipment manufactured in Japan from the Ministry of Economy of Moldova. (Refer to "2.4.2 Implementation Conditions".) Hence, the term for the detailed design works is planned a bit longer than the normal one.

The following contents indicate the undertakings of Japan and Moldova during the project implementation period.

Undertakings of Japan	Undertakings of Moldova
- Document preparation for acquisition of importation approval of the equipment made in Japan	- Submission of the document to the agencies concerned
- Preparation of mechanical and shop drawings	- Confirmation of willingness to meet obligations by the beneficial local authorities
- Manufacturing, checkup and transportation of the equipment procured in Japan	- TAX exemption
- Procurement of other equipment in Moldova	- TAX exemption
- Installation work	- TAX exemption
- Inspection of the installation work	- Confirmation of completion
- Technical assistance for operation management (Soft component)	- Recruitment of necessary personnel for operation of the equipment

The table below shows overall schedule of the Project including the above contents.

Table 2.4.6 Overall Project Implementation Schedule



Source: JICA Survey Team

Chapter 3 Obligations of Recipient Country

3.1 Pellet Boiler

Principally, the materials to be set up on the skid shall be procured in Japan and shall be transported to Moldova, and the pellet boiler including peripheral accessories shall be installed in the dedicated housing. The equipment imported from Japan shall be fabricated on the skid and installed in the housing at a central assembly factory in Chisinau. After assembly of all the necessary equipment, the modules and the skids shall be transported to the 25 sites and installed at each site. Before commencement of the work, the following obligations shall be met by the Moldovan side.

- To prepare land and buildings of the central assembly factory (necessary to discuss with the Moldovan side for the details)
- To make sure the following preparations at each site
  - To build up a foundation for the module
  - To arrange secondary pipe installation (between the module and the beneficial buildings and plumbing with radiators in the buildings)
  - To supply electric power
  - To supply clean water
  - To arrange drainage for the module
  - To pave an access road to the foundation
  - To build a storage for the pellet (for seven days)
  - To prepare temporary ash storage
  - To prepare fire protection and fire extinguishing equipment
  - To prepare carriers (e.g. forklift)
  - To prepare facilities for operators (e.g. toilet, washing basin)
  - To install fences
  - To recruit the boiler operators

The above contents shall be thoroughly discussed during the detailed design works.

3.2 Pellet Production Plant

All the parts of the pellet production plant shall be procured in Japan, and each of them shall be inspected before shipping. Also pipes, valves, fittings and wires/cables shall be counted and inspected in accordance with the specifications before shipping. Some common parts or materials shall be procured in Moldova.

On the other hand, the following shall need to be prepared or procured by the Moldovan side.

- To prepare factory land and a building for the pellet production plant (Basic design and the necessary data for the equipment layout and loading data shall be supplied by a Japanese manufacturer.)
- To supply electric power
- To supply clean water
- To arrange drainage
- To pave an access road to the foundation
- To prepare temporary raw material storage
- To prepare fire protection and fire extinguishing equipment
- To prepare carriers (e.g. forklift)
- To prepare facilities for operators (e.g. toilet, washing basin)
- To install fences

- To recruit the pellet production plant operators

3.3 Soft Component (Technical Assistance) Plan

For the effective and sustainable utilization of the equipment procured by the Project, 2KR-PIU needs to implement the following activities.

- To utilize the various manuals and regulations which shall be prepared during the plan implementation, and revise them, if any
- To secure enough budget to manage the information management system and its web site properly
- To secure enough budget for information terminal devices (data transmission of calorie meters)
- To secure enough budget for regular monitoring of the equipment
- To maintain environmental education on biomass energy utilization to the pellet boiler users

Chapter 4 Project Operation Plan

4.1 Responsibility of Operation Management and Finance

The equipment shall be handled under the expected structure shown below.

Table 4.1.1 Expected Operation Management Structure

	Pellet boiler	Pellet production plant
O&M responsibility	24sites: Mayor Demonstration boiler: 2KR-PIU Director	2KR-PIU
Equipment/plant owner	24sites: Pellet boiler installing site manager (School master) Demonstration boiler: 2KR-PIU Director	2KR-PIU
Operator	24sites: Operator hired by pellet site or local authority Demonstration boiler: NTC staff	Operator hired by 2KR-PIU or organization which is entrusted by 2KR-PIU on pellet production plant operation
O&M expense sharing	24sites: Pellet boiler installing site Demonstration boiler: NTC	2KR-PIU

Source: JICA Survey Team

Cost allocation and financial sources for the equipment are expected as shown below.

Pellet boiler

At present, the budget for education facilities such as gymnasiums and kindergartens are directly allocated by rayon, which means gymnasiums and kindergartens will bear the expenses for the pellet boiler operation. Expenses of other public facilities will be borne by the local authority. In case the pellet boiler supplies the heating to both education and public facilities, there shall be a cost sharing rule between the two facilities. Expense includes pellet purchase cost, operator labor cost, electricity, consumables and maintenance service fees. Mayor of the local authority will take responsibility on project management and evaluation aspect, in any cases.

2KR-PIU will be responsible for management of a demonstration boiler installed in Chisinau National Training Center (NTC). Labor and operational cost will be borne by Chisinau NTC.

Pellet production plant

O&M expense shall be covered by the sales of pellets, but, for the start-up period, it shall be borne by 2KR-PIU. 2KR-PIU will manage the pellet production, but they can also entrust the O&M to other organization such as National Training Center (NTC) under the Ministry of Agriculture and Food Industry. The expense includes raw material procurement, operator labor cost, electricity/fuel, consumables and maintenance service fees.

4.2 Equipment Maintenance

Equipment is planned to be maintained under the following structure

Table 4.2.1 Expected Equipment Maintenance Structure

	Pellet boiler	Pellet Production Plant
Manual/Guidance book	Equipment supplier JICA Consultant	Equipment supplier
Daily check	Operator hired by site owner	Operator hired by 2KR-PIU or organization entrusted by 2KR-PIU
Periodical check (beginning and end of heating season)	Equipment supplier or its agent	Equipment supplier or its agent
Emergency	Equipment supplier or its agent	Equipment supplier or its agent

Source: JICA Survey Team

4.3 Supply Chain System of the Pellet

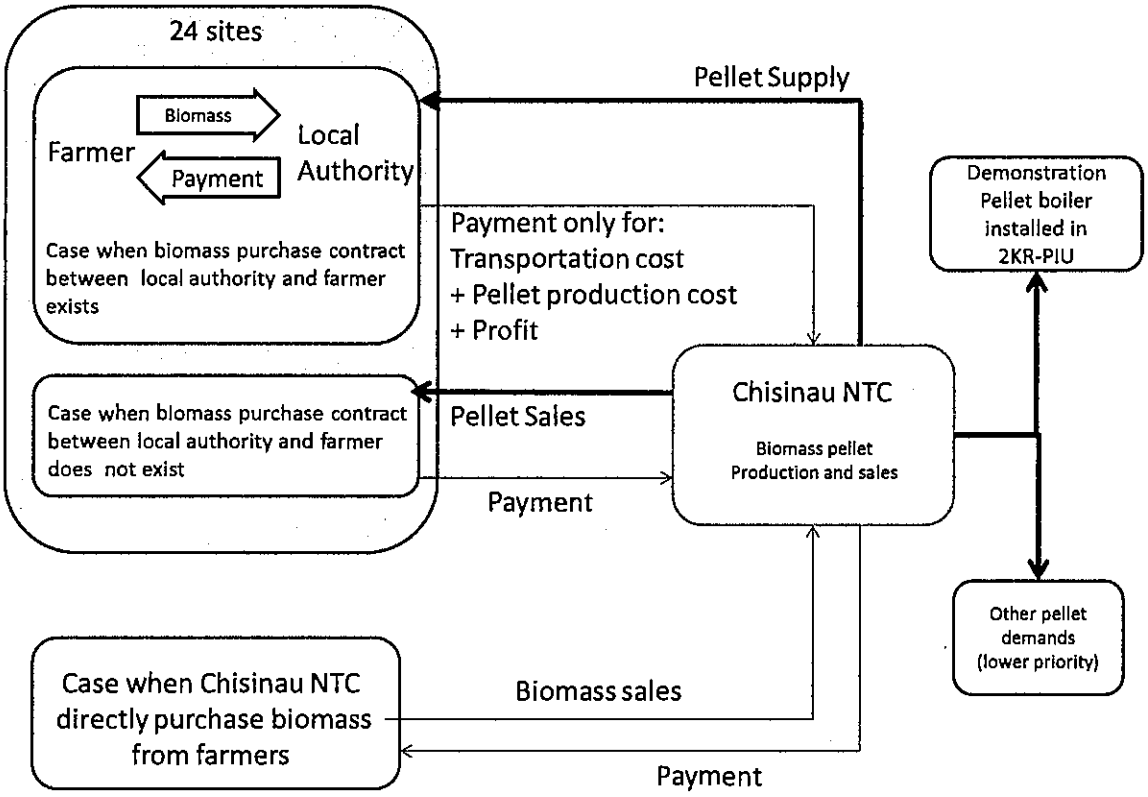
The supply chain system of the raw material and pellet product shall be planned within the soft

component plan. The draft idea is described in the diagram below.

There are two kinds of farmers: farmers living in the villages where 24 pellet boilers will be installed and farmers besides the 24 boiler sites. The pellet production plant will basically purchase the raw material from both of the farmers, and conclude a contract between local authorities for the pellet supply.

Also local authorities of the 24 boiler sites can conclude a procurement contract of raw material between the farmers within their own authorities, purchase the raw material and entrust to the pellet production plant. In this case, local authorities can save the intermediate margin.

The pellet production plant shall basically fulfill demand of the 25 sites (including demonstration boiler at 2KR-PIU), then sell the remains to other customers.



Source: JICA Survey Team

Figure 4.3.1 Structure of Pellet Supply Chain System

Chapter 5 Project Cost Estimation

5.1 Initial Cost Estimation

The summary of the initial cost is attached in Annex 5.

5.2 Operation and Maintenance Cost

5.2.1 Pellet Boilers

Five (5) sizes of pellet boilers between 116kW to 580kW are planned to be installed according to the heat demand volume of each site. Labor cost and operation information reporting (OIR) expenses are expected to be the same among the five-size boilers, but pellet, electricity, consumables and maintenance service expenses varies depending on the boiler size.

Table 5.2.11 Operation and Maintenance Cost by Boiler Size

Boiler Size	Cost					Total
	Operation ratio	17%				Lei/Year
	Pellet	Electricity	Maintenace	Labor	Reporting	
116 kW	51,237	2,031	12,000	19,750	1,000	86,018
232 kW	102,474	4,061	14,400	19,750	1,000	141,686
348 kW	179,330	7,107	25,200	19,750	1,000	232,387
407 kW	204,949	8,123	28,800	19,750	1,000	262,621
580 kW	256,186	10,153	36,000	19,750	1,000	323,089

Note 1: Estimation based on maintenance fee of 116kW boiler, 12,000 MDL. (e.g. 232kW/116kW x 0.6 x 12,000MDL = 14,400 MDL)
Note 2: Data above do not include the OIR related labor cost such as personnel expenses of local authority.
Source: JICA Survey Team

5.2.2 Pellet Production Plant

Production capacity of the pellet production plant which will be installed has 1 ton/hour, and the facility is planned to be operated 300 days/year, 14 hours/day. Output volume of pellet will be 90% of input amount (4,200 ton/year) which is 3,780 ton/year, considering the evaporation of moisture and residues. As a result, pellet production plant will require 5,482,820 MDL/year for operation and maintenance expense.

- Raw material procurement:
  1,218,000 MDL/year (raw material purchase: 4,200ton/year, transportation fee: 50km radius, storage fee)
- Product sales:
  472,500 MDL/year (product: 3,780ton/year, packing, transportation fee: 80km radius)
- Labor cost: 240,000 MDL/year (average 2,500 MDL/year per person x 8 person)
- Electricity: 1,552,320 MDL/year (1.54MDL/kWh x 300kWh x 0.8 x 14hours x 300days)
- Consumables: 1,500,000 MDL/year (shredder, pelletizer, heat furnace)
- Others: 500,000 MDL/year (maintenance service fee)

5.2.3 2KR-PIU

2KR-PIU will require maintenance budget for IMS related cost which is estimated to 18,155 MDL/year. 2KR-PIU will also require budget for biomass boiler diffusion activity, if necessary. The following cost does not include the labor cost of 2KR-PIU.

- IMS maintenance 18,155 MDL/year (system maintenance and consulting fee)
- Others (such as biomass boiler extension activity)

5. ソフトコンポーネント計画書

独立行政法人国際協力機構

モルドバ共和国

バイオマス燃料有効活用計画準備調査

ソフトコンポーネント「情報管理システムの構築・運営・維持管理能力向上並びにバイオマス暖房システム普及啓蒙活動」にかかる計画書

2013年3月

三井共同建設コンサルタント株式会社

ユニコ　インターナショナル株式会社

目　次

1　　ソフトコンポーネントを計画する背景

「モルドバ共和国バイオマス燃料有効活用計画」（以下、“本プロジェクト”）は、「「モ」国対象サイト（主に公共教育施設）において、バイオマス暖房システムが定着する」ために、バイオマス・ペレット・ボイラー（以下バイオマス・ボイラー）並びにペレット製造設備の機材整備を行うものである。

1－1　　プロジェクトの背景

モルドバ（以下「モ」国）はこれまで、天然ガス、石油、石炭等エネルギー源のほとんどをロシア、ウクライナ、ルーマニア等の周辺国からの輸入に頼っている。ソ連時代には連邦内の周辺国から安価にエネルギーの供給を受けていたが、独立以降、その価格は徐々に引き上げられ、現在では西欧諸国と変わらない価格で購入しなければならない状況にある。しかし、体制移行に伴う経済混乱に起因する外貨不足から十分なエネルギー源が輸入できず、経済活動の低下を招いている。また近年は、ロシアがウクライナ経由の欧州向け天然ガス供給を停止した際に、「モ」国でもガス供給が停止されるなどにより、社会経済的に大きな混乱が見られた。「モ」国にとって、エネルギー自給率向上は安定した経済社会活動を通じた市場経済化の推進やエネルギー安全保障にとって大きな課題となっている。特に農村地域では、農業が主な産業であるが、必要なエネルギー源を購入するだけの十分な税収入が得られず、幼稚園や学校と言った施設の冬の暖房が十分に行えない状況にある。

かかる状況において、「モ」国では農村地域から大量に得られる麦藁等のバイオマス残渣を代替エネルギーとして利用することが、エネルギー事情の改善や、農村地域における新たな産業に結びつくことが期待されており、2008 年には我が国の草の根・人間の安全保障無償「ヒルトプル・マレ村初等教育施設環境整備計画」によって、2 基のバイオマス暖房システム（藁ボイラー）を導入し、その有効性が実証された。この結果をもとに、2009 年、「モ」国政府は我が国に対して麦藁を中心としたバイオマス暖房システムの拡大に関する支援要請を行った。

この要請を受けて、2011 年 2 月から 3 月にかけて JICA による基礎情報収集・確認調査を実施し、①「モ」国の農村地域における開発と環境にかかる現状把握、②バイオマス（麦藁等）暖房技術をはじめとした代替エネルギーの利用可能性の検討、③代替エネルギーを利用した場合の農村地域の経済発展可能性の検討を行い、同国におけるバイオマス暖房の普及可能性があることを確認した。

表 1－1　プロジェクト概要

上位目標	「モ」国においてバイオマス暖房システムが普及する。
プロジェクト目標	「モ」国対象サイト（主に公共教育施設）において、バイオマス暖房システムが定着する。
期待される成果	成果 1. 対象となった全てのサイトにおいて、バイオマス暖房システムが設置される。 成果 2. 対象となったサイトにおいて、継続的にバイオマス燃料（ペレット）が利用可能となる。 成果 3. バイオマス暖房システムが持続的に運用・維持管理される。
プロジェクトの支援計画	① バイオマス暖房システム（ペレットボイラー）調達・設置 25 サイト（ボイラー総数 25 台、内 1 台はキシナウ 2KR に設置するデモンストレーションボイラー（以下“デモ機”）） ② ペレット製造設備調達・設置 1 か所 ③ 中央・地方政府、コミュニティに対する施設維持管理に係る技術支援・指導

出典：業務指示書等に基づき作成

1－2　　プロジェクトで調達する機材の運営・維持管理体制並びに教育訓練内容

1－2－1　調達機材の運営・維持管理責任並びに費用の負担者

本プロジェクトの調達予定機材は、下表 1－2 の通りの体制／役割分担に基づいて運営・維持管理される。なお、「モ」国カウンターパート（C/P）機関は、農業食品産業省下の 2KR プロジェクト実施ユニット（2KR-PIU）である。

表 1－2　調達機材の運営・維持管理責任

	バイオマス・ボイラー	ペレット製造設備
運営・維持管理責任者	24 台：各村長 デモ機：2KR-PIU 代表者	2KR-PIU
設備所有者	24 台：二次側施設[1]（責任者：学校長等施設管理責任者） デモ機：2KR-PIU	2KR-PIU
実際の運転者	24 台：二次側施設に雇用された運転要員 デモ機：2KR-PIU に雇用された	① 2KR-PIU に雇用された運転要員 ② 2KR-PIU に運営委託され

[1] 本プロジェクトで供給するバイオマス・ボイラーから熱循環器までを一次側施設、熱循環器以降の施設建物（学校や公民館等）を二次側施設と定義する。

	運転要員（NTC 運転員）	た NTC に雇用された運転要員
引渡し後の運営・維持管理経費負担	24 台：二次側施設予算管理組織（下記参照） デモ機：キシナウ NTC	2KR-PIU

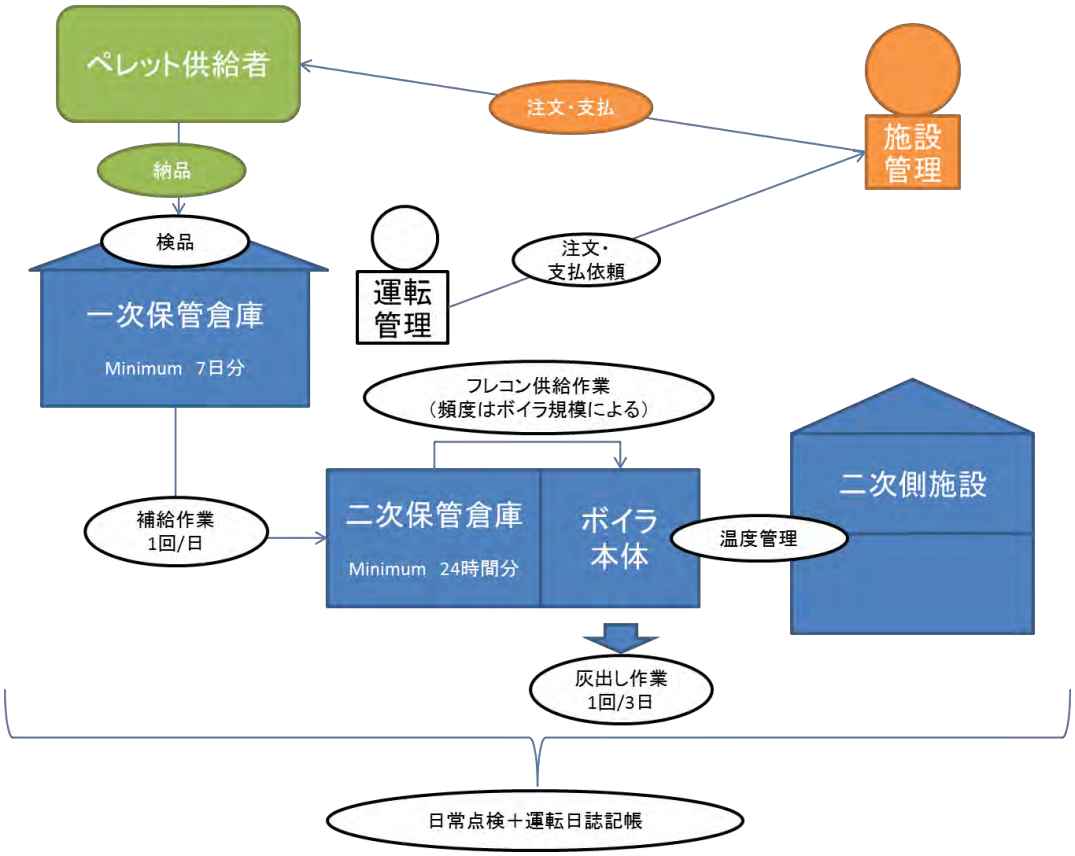


図 1-1　プロジェクトのイメージ図

設備引き渡し後の各設備の運営・維持管理にかかる経費については以下の通り：

(1)　バイオマス・ボイラー

学校や幼稚園などの教育施設の予算は村(Local authority)を介さずに直接県(Rayon)から分配される制度である。従って、教育施設のみに設置される 23 台のボイラーの経費負担者は当該教育施設の管理責任者が負担することになる。教育施設とその他公共施設とが複合する 1 台は、村若しくは教育施設のいずれかが全額を負担する、若しくはいずれかが経費負担を一時的に行い、面積換算等の基準を設けて相手方に経費請求することになる。この経費には、燃料費・運転要員雇用費・メンテナンス／点検費・運転経費（電力、補助燃料、薬剤等）等を含む。但し、バイオマス・ボイラー設置サ

イトが学校等教育施設のみであっても、プロジェクト管理・評価上の運営・維持管理責任者は村（Local authority）とする。

2KR-PIU 向けデモ機に関する運営･維持管理経費は設置場所(利用者)であり､2KR-PIU 同様、農業食品産業省傘下にある NTC（National Training Center）に属するキシナウ NTC の年間予算で賄われる。

(2) ペレット製造設備

ペレット製造設備関連経費は、初期の立ち上げ時以外はペレット燃料の販売対価で賄う。初期の運転経費は 2KR-PIU が準備する。事業としては 2KR-PIU が管理を行い、場合によっては施設の運営・維持管理を、2KR-PIU 同様に NTC に委託する。経費には運転要員雇用費・メンテナンス／点検費・運転経費（電力、補助燃料、薬剤等）等が含まれる。

1－2－2 調達機材の運営・管理の実施者と作業内容

(1) バイオマス・ボイラー

① 日常業務

調達機材が設置された各サイトにおける暖房対象施設（学校等）の管理者のもと、日常運転管理業務については、運転管理要員が行う。運転管理要員は村若しくは暖房対象施設で採用される。

② 緊急時対応、定期点検、修繕／改造等

発生頻度の低い緊急時の対応や定期的なメンテナンス作業を全てサイトの運転要員に教育するのではなく、国土が狭い利点を活かし、国の中央に位置する首都キシナウを拠点とする販売代理店が直接行う体制を整えることを入札の条件とする。

緊急時の連絡網やサービス体制の構築に関連する費用は調達機材側に含まれる。

バイオマス・ボイラーに関して各サイトのレベルで行う作業は下表 1－3 の通り。

表 1－3 バイオマス・ボイラー運転管理作業

定期点検（代理店実施）	＜暖房期間始動前点検、休止前点検＞＊法定定期点検はなし 【目的】 休止期間からのスムーズな立上げの為の準備作業 ＊必要に応じて新規採用ボイラー運転要員等の運転指導 【点検箇所例】 ボイラー本体、温水配管（一次・二次)、熱交換器、循環ポンプ、計装機器、燃料供給設備、建屋、搬送設備、軟水供給、燃料残量確認
日常業務（ボイラー運転要	【目的】 ・二次側施設で要求される熱を継続的に供給する通常運転 ・冬期期間中の温水配管内凍結防止のための低負荷運転

員実施)	【点検内容】 ・ボイラー運転管理（動作確認（機械／燃焼)、設定温度、ボイラー水量） ・燃料供給（供給機の燃料残量、供給設備の動作確認） ・計装機器（数値確認、計装機器の動作確認、通信機器の動作確認） ・在庫管理（一次、二次保管庫の燃料残量確認） ・燃料管理（水分計による含水率確認） ＜緊急対応＞ ・緊急停止、関係各所や代理店への緊急連絡
報告業務（サイト関係者)	【目的】 ・個々のボイラー運転管理記録することによる継続的運転の確保 ・各ボイラー設置サイト（25 サイト）の運転管理記録の集約・分析による全ボイラーの安定稼働に資する情報のフィードバック ・プロジェクト評価手段としての整備 【内容】 （1）運転日誌（毎日） ボイラー運転要員による二次側施設管理者への報告業務。ボイラー運転要員が各自のシフト毎にフォーマットに則った事項に関する確認を行い、その結果を記載する。各シフト勤務時間開始時点並びに終了時点における： 日時、氏名、外気温、ボイラー設定温度、(並びに二次側設定温度)、積算熱量値、一次／二次フレコン在庫数、ボイラー水量、メンテナンス点検リストの確認実施 ＊適宜：故障、メンテナンス作業における発見、部品劣化状況等特記事項、燃料含水率 （2）月報（毎月） 二次側施設管理者による村長への報告業務。内容は上記（1）運転日誌のデータや記載内容をフォーマットに則って転記し、1 か月ごとのレポートとしてまとめる。 （3）年報（暖房期間終了後） 村長による 2KR－PIU への報告業務。FAX で提出される。上記（2）の月報に加え、以下の情報をフォーマットに則って報告する。 ・オペレーション情報（ボイラー運転開始／終了日時、運転管理体制、月報） ・燃料情報（購入先、購入量、購入単価、荷姿、搬入頻度） ・収支結果（予算／決算状況） ・次年度予算予測額

(2) ペレット製造設備

① 日常業務

2KR-PIU 担当者若しくは 2KR-PIU が委託する NTC 責任者の管理のもと、日常運転管理業務については教育された運転要員が行う。運転要員は 2KR-PIU 若しくは NTC で採用される。

② 緊急時対応、定期点検、修繕／改造等

バイオマス・ボイラー同様、国土が小さい利点を活かし、緊急時の対応や定期的なメンテナンス作業は、国の中央に位置する首都キシナウを拠点とする販売代理店が直接行う体制を整えることを入札の条件とする。

従って緊急時の連絡網やサービス体制の構築に関連する費用は調達機材側に含まれる。

ペレット製造設備で行う作業は下表 1－4 の通り。

表 1－4　ペレット製造設備運転管理作業内容

定期点検	＊法定定期点検無し
日常業務（2KR 若しくは NTC）	【目的】 ・ペレット燃料の安定供給に向けた操業の実現 【内容】 ＜運転前点検＞ ・破砕機（モーター／減速機類、刃の欠損・摩耗、異物の有無・除去） ・乾燥設備（点火設備、燃料供給、ファン動作、燃焼室・灰出し・排気煙道清掃、異物除去） ・成形設備（モーター類、ダイの欠損・摩耗） ・冷却設備 ・移動設備（コンベヤ破損・摩耗、ローラー・モーター動作） ・電気計装機器（数値確認、計装機器の動作確認、通信機器の動作確認） ・建屋 ・搬送設備 ・在庫管理（保管庫の原料残量確認） ・原料管理（水分計による含水率確認） ・燃料供給契約 ＜緊急対応＞ ・緊急停止 ・緊急時連絡網
報告業務	【目的】

	・運転管理記録することによる継続的運転の確保 ・運転管理記録の分析による安定稼働に資する情報のフィードバック ・プロジェクト評価手段としての整備 【内容】 （1）運転日誌（毎日） 運転要員による 2KR 担当者（若しくは NTC 責任者）に対する報告業務。各自のシフト毎に記載する。各シフト勤務時間開始時点並びに終了時点における： ・日時、氏名、外気温、室内気温、原料在庫数量（運転前後）、消費電力量（運転前後）、当日使用原料供給元、原料含水率、梱包材等資材在庫数、メンテナンス点検リストの確認実施 ＊適宜：故障、メンテナンス作業における発見、部品劣化状況等特記事項、 （2）月報（毎月） 2KR 担当者（若しくは NTC 責任者）による 2KR-PIU に対する報告業務。内容は運転日誌のデータや記載内容を転記するほか、1 か月ごとのレポートとしてまとめるほか、以下の情報をフォーマットに則って追記する。 ・オペレーション情報（ボイラー運転開始／終了日時、運転管理体制、月報） ・原料情報（購入先、購入量、購入単価、荷姿、搬入頻度） ・収支結果（計画に対する実績） ＊年度終了 3 か月前には次年度事業計画書を添付

1－2－3　調達機材の運営・維持管理教育の考え方

「モ」国におけるバイオマス暖房システムの採用実施例は、我が国草の根無償案件や世界銀行支援案件など複数存在するが、ペレット製造設備並びにペレットを燃料とするボイラーの利用は比較的新しい技術に位置付けられるため、バイオマス・ボイラー並びにペレット製造設備の運営・維持管理の教育が必要となる。

本プロジェクトにおける調達機材の運営・維持管理教育は、設置する機材数がボイラー25 台、ペレット製造ライン 1 式と多いことから、効率性を考慮する必要がある。本プロジェクトにおいては、日本側設備供給者（設備メーカー／エンジニアリング会社／商社）が契約を結んだ現地代理店に対して行う教育を機材調達の範囲に含むものとする。また、エンドユーザーに対する運営・維持管理教育は現地代理店によって行われるが、この教材費などの費用に関しても機材調達の範囲に含むものとする。

一方、バイオマス・ボイラー並びにペレット製造設備共に、報告業務に関する教育は機材供与の運転教育に含まれていない。

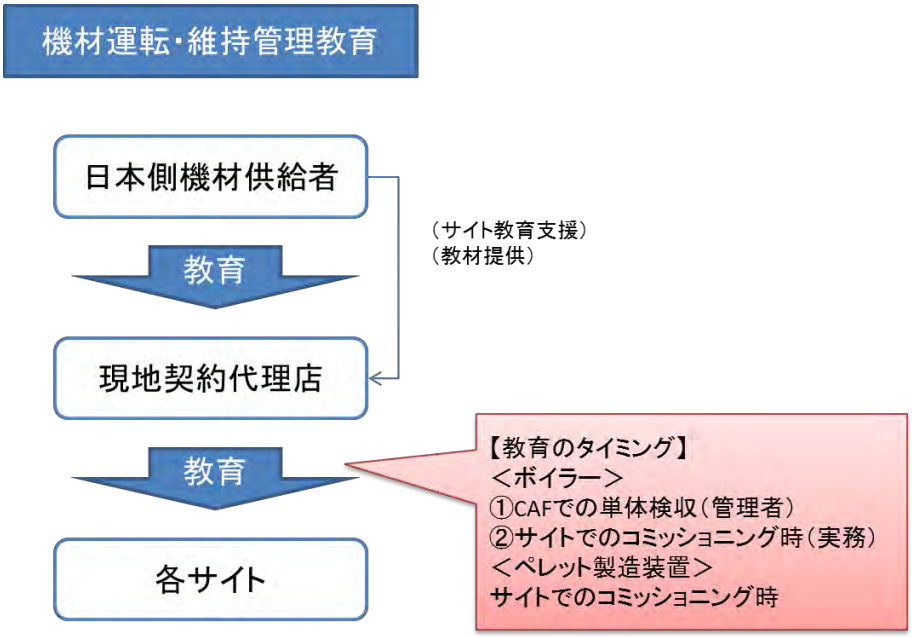


図 1－2　報告業務の教育タイミング

1－3　ソフトコンポーネントの必要性

以上から、調達機材の実務的な運転・維持管理教育については機材供与側で負担する。しかし本プロジェクトにおいては、調達機材である 25 台のバイオマス・ボイラー並びにペレット製造ライン 1 式が長期間に渡って運転され続けることを目的達成のために必要となると考える以下の活動をソフトコンポーネントとして実施する。

① 数多くの機材が納められるプロジェクト全体の円滑な立ち上がりに資するマネージメント機能の強化、
② 当該バイオマス暖房システムの更なる普及において重要となるペレット燃料のサプライチェーンモデルの計画、
③ 広報戦略に基づいた普及に資する環境教育・情報共有

燃料のサプライチェーンが機能することを含め、数多くの機材を確実に管理し、データ・実績を示すことは、バイオマス暖房システムそのものが技術面・経済面・社会面において導入するメリットがあることの裏付けとなる。以下、具体的な能力開発の必要性を述べる。

1－3－1 情報管理システムの構築・運営・維持管理能力向上の必要性

本プロジェクトにおける主な供与機材は、①25 の対象サイトに設置される 25 台のバイオマス暖房システム（ペレットボイラー）及び②ペレット製造設備一式である。

引き渡し後も全ての機材が高い稼働率を継続していることを確認し、プロジェクト評価を円滑に行う為にも、これら数多くのサイトから得られる運転データや、部品や不具合・定期検査等の情報を集積・分析・整理を行う為の“情報管理システム”が必要である。将来的には他ドナープロジェクトで設置されたバイオマス暖房システムの情報を併せ、ケースを増やすことも考慮に入れる。従って、効果的な情報管理システムの構築並びにその運用のための能力開発が必要である。

＜活動内容＞

・各バイオマス・ボイラーやペレット製造設備からの運転報告を得る際の報告ルール設定
・情報収集システムの構築（マニュアル並びに自動収集手段構築）
・情報分析/整理能力開発（人材教育）
・教育効果モニタリング（報告ルールの運用状況の確認）

1－3－2 ペレット燃料サプライチェーンモデル計画立案の必要性

供与機材であるバイオマス・ボイラーを定着させるため、供与するペレット製造設備並びにバイオマス・ボイラー間におけるサプライチェーンモデルを計画し、ペレット燃料事業の立ち上がりと流通の円滑化を支援する。本来であれば本計画は準備調査内で行うべきであるが、準備調査期間中に供与機材を麦わらボイラー（村落内での地産地消型）からバイオマス・ボイラー（燃料流通域の広域化）に変更したため、追加的にソフトコンポーネント内で実施することとした。

計画立案にあたって、2KR-PIU 職員（ペレット製造責任者及び担当者、モニタリング担当者）等を日本に招聘し、日本で行われているサプライチェーンの成功や失敗例を視察・研究することでより実効性の高い計画の立案に結び付けることを含む。

また供与予定のペレット製造設備を研修施設として活用し、「モ」国におけるペレット製造技術向上並びにペレット品質管理能力向上を図り、適正なペレット燃料市場の形成を通じた供与機材の継続的な運用に結び付ける。従ってソフトコンポーネントには、潜在的なペレット事業者や学術機関に対するペレット製造に関する研修（二次教育）のための活動計画立案のほか、二次教育実施のために 2KR 職員等が必要となる技術や知識の教育を行う必要がある。

＜活動内容＞

・サプライチェーンモデル計画の策定
・ペレット製造に関する二次教育の為の教育指導

1－3－3　広報戦略とバイオマス暖房システム普及啓蒙能力の必要性

情報管理システムやペレット燃料サプライチェーンモデルで得られた情報を関係者間で共有し、供与されたバイオマス暖房システムが長期間に渡って安定的に利用されることを

狙うほか、広く公にバイオマス暖房システムの実績を示すことで更なる普及を促すために、普及啓蒙ツール並びに活動が必要である。これには以下の項目が含まれる。

＜活動内容＞

・バイオマス暖房システム広報活動戦略の立案

・広報活動内容の立案、構築、運用

-情報発信/共有ホームページ（HP）構築

-二次側施設利用者に対する環境教育プログラムの立案、ツール作成、実施

・他ドナー、政府関係者、学識経験者向けに対するワークショップの計画・実施

＜想定される効果＞

(1) バイオマス暖房システム導入サイト間の情報共有がもたらす効果

・燃料調達効率化

（地域/原料別価格の標準化、共同調達によるコスト削減、燃料在庫把握、等）

・費用削減

（軽微メンテナンス情報提供による外注費削減、故障先行事例情報共有による故障の防止）

・予算化支援

（部品交換/メンテナンスサービスタイミング情報提供、燃料価格動向情報等）

(2) 普及啓蒙活動がもたらす効果

・バイオマス暖房システムの利用拡大、日本製技術の利用拡大の可能性

・バイオマスの利用促進

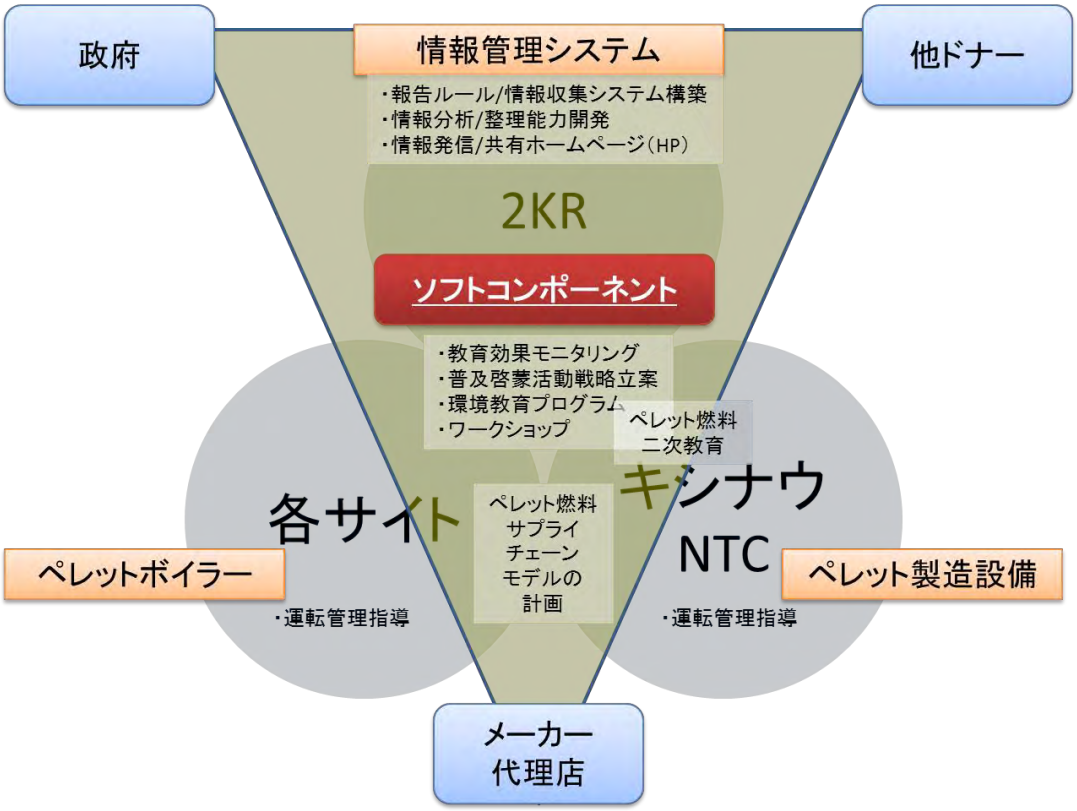


図 1－3　ソフトコンポーネント（三角形内）概要図

2　　プロジェクトにおけるソフトコンポーネントの位置づけ

本プロジェクトの目標（「モ」国対象サイト（主に公共教育施設）において、バイオマス暖房システムが定着する）の達成及びその結果、上位目標（「モ」国においてバイオマス暖房システムが普及する）の達成に向けて、ソフトコンポーネントとして本活動「供与機材維持管理能力の定着並びにバイオマス暖房普及啓蒙活動」の実施を計画する。以下に活動の概要を示すが、本計画書の添付資料－1 の Project Design Matrix（以下 PDM）の内容を説明する構成となっている。基本構造としては、以下の 3 点を行うものとする。

① バイオマス・ボイラー維持管理能力向上

供与機材の維持管理状況を“報告ルール”に基づき集積・分析・フィードバックすることで、機材供与先各サイトのマネージメント並びに維持管理のバックアップを行うと同時に関係者間で起こった問題点の蓄積・分析による改善を行う仕組みを作り上げ、バイオマス・ボイラーシステムへの社会的信頼性を高め、普及拡大を図るための仕組みづくりを行う。

報告ルールの円滑的な運用にあたって、人員の不在時の対応だけでなく、異動や退職による入れ替えがあっても対応できるように、村長から運転要員のレベルに至るまでの報告に関して、下図2－1を例とする管理体制構築を各サイトに義務付ける。

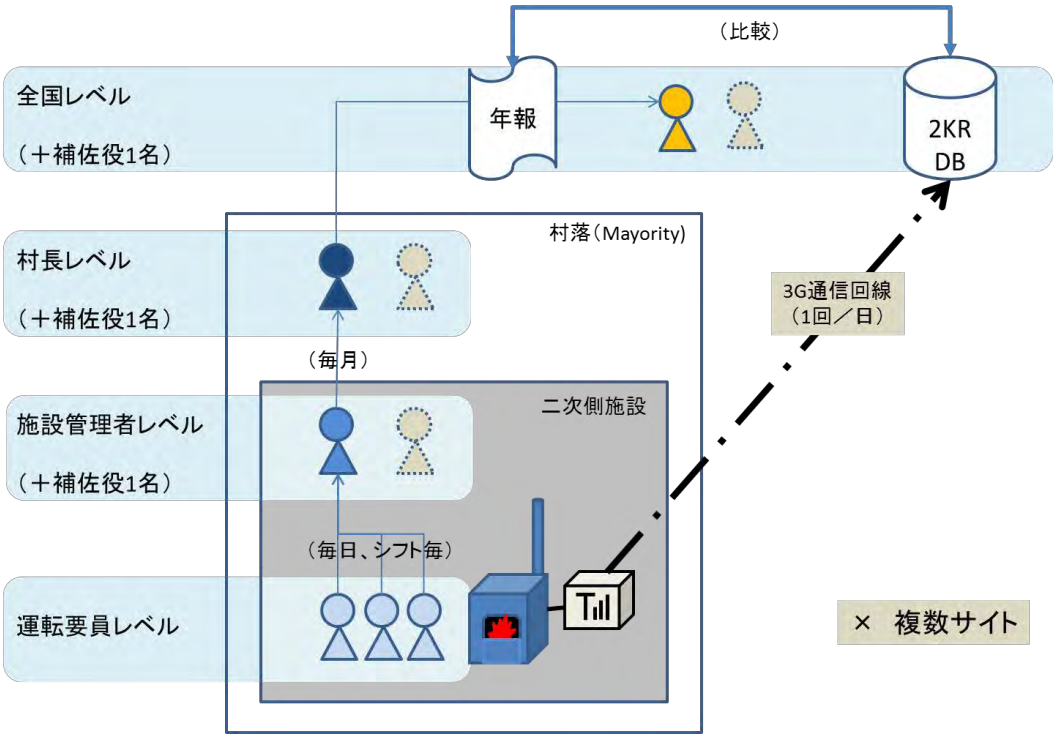


図2－1　バイオマス・ボイラー維持管理報告ルール体制図（案）

この中で、先方政府の要望により、各ボイラーサイトの積算熱量計データを2KR-PIUのデータベースに転送できるシステムを構築する。これにより大量のサイトから上がってきた報告について手書き報告書とデータとを用いて二重確認が可能となるとともに、蓄積される情報の加工・分析が容易となる。更に積算熱量計情報（出入口温度差×水量＝瞬間消費熱量、瞬間熱量×時間＝積算熱量、等各データ）及び異常（積算熱量ケーデータの変化の有無）を2KR-PIUからも一日一回以上把握することができるため、現場だけでなく2KR-PIUでも早急な対処の指示が行えることになることから、最終的に高い稼働率を維持することに繋がる。尚、2KR-PIUの管理能力並びにPCスキルは高く、本ソフトコンポーネントにおいて通信システムに関する知識／実践並びにGISソフト等、追加的に必要となる能力の開発を補うことでタスクを達成できることから、ソフトコンポーネント内でこうした教育を行う計画をしている。

また本プロジェクト以外にも将来的に増え続けると考えられる他のバイオマス・ボイラー情報も取り込むことができることを念頭に置いたシステム構成を行う。通信やメンテナンス等にかかる費用は、ペレット燃料の販売コストに計上することで確保する仕組みを構築する。

通信システムは「モ」国全土の約99%を網羅する第三世代携帯電話回線（以下“3G”）の利用を基本とする（サイト確定次第、各サイトが通信網に含まれることを確認する）。このためには自動通信を制御する端末を設置する必要があるほか、通信費を負担する必要がある。通信費に基本料金は無く、従量料金についても1回／日通信で100Lei／月（約700円）をはるかに下回ると試算され、また暖房期間以外は通信費が発生しない料金体系である。暖房期間を6か月とした場合でも最大約4,200円／年・ボイラーで、ボイラー総数25台でも約105,000円／年となる。通信端末は以下の写真2－１に示すようなものを想定している。当該システムは「モ」国の一般的な熱供給事業においても利用されている普及型の技術である。

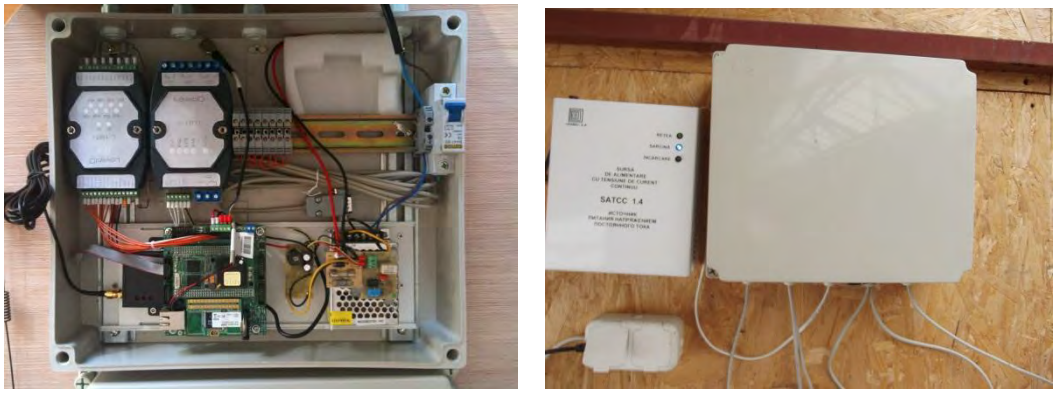


写真2－１　通信端末（例）

ソフトコンポーネント活動としては、上記報告ルールの構築並びにマニュアル作成を行い、ボイラー設置サイトの関係者に対してルール教育を3段階で行う。

【第1段階：マネージメント層研修】

中央組み立て工場（Central Assembling Factory, CAF）で組みあがったボイラーの検収の際に各サイトの村長並びに二次側施設の管理責任者にキシナウNTCに来てもらい、検収作業後0.5日程度をかけて報告ルールの教育研修を行う。24サイトの村長並びに二次側施設管理者の2名（合計48名）前後に加え、2KR-PIU、NTC、農業食品産業省等のメンバーを想定する。ボイラーの検収タイミング（現状3回を想定）に合わせて複数回行う。初回は日本側のコンサルタントが立ち会うが、2回目以降は2KR-PIUが中心となって行う。

【第2段階：実務者研修】

ボイラーを各サイトに設置した後の引渡し時における運転指導に合わせて、村関係者、二次側施設関係者、ボイラー運転管理要員に対して、0.5日程度をかけて報告ルールの教育研修を行う。ここではボイラーを実際に運転する人員に加え、上記マネージメント層研修に出席した村長及び二次側施設管理者並びにその補佐役を対象とする（7名程度/サイトを想定）。ボイラーの施工スケジュールに合わせ、日本側コンサルタントは5回前後の立会いを想定する。

【第3段階：報告ルールモニタリング】

報告ルール教育活動の総括として、日本側コンサルタント並びに2KR-PIU担当者は、設計監理期間最終段階（20か月目前後）の暖房時期に全25ボイラー設置サイトを巡回し、報告ルールの運用状況と改善の是非に関するモニタリングを行う活動を行う。2サイト程度/日（12日間前後）で実施する。

このほか、2KR-PIUに供与するペレット製造設備の運転管理要員に対しても同様の教育を行う。

② ペレット製造設備維持管理能力向上

本プロジェクトで供給されるバイオマス・ボイラーの燃料供給の円滑的な継続を目的として、キシナウNTCに設置予定のペレット製造設備から各バイオマス・ボイラーに安定的にペレット燃料を供給するために必要な活動や体制構築を整理したサプライチェーンモデルを計画する活動である。

この中には2KR-PIUの関係者を日本に招聘するペレット燃料のサプライチェーンに関する視察研修が含まれる。視察研修は14日間を想定し、日本国内において木質原料

の調達及びペレット化を行っている自治体や民間事業者を視察するほか、ペレットを利用している施設の視察を行い、「モ」国におけるペレット供給事業に関する計画書立案の参考とする。また同時にペレット製造設備並びにペレットボイラー工場の視察を行うことも検討する。

表2-1　　日本視察研修日程（案）

日	場所	内容	備考
1	モルドバ	移動	
	ウィーン		
2	東京	移動	
		オリエンテーション	視察計画等打合せ
3		移動	
	鹿児島	研修	運営組織体視察
4		研修	運営組織体視察、工場視察
5	東京	移動	
6		（休日）	
7		移動	
	北海道	研修	運営組織体視察
8		研修	運営組織体視察、工場視察
9	東京	移動	
	群馬	移動	
10		研修	運営組織体視察
11		研修	運営組織体視察、工場視察
	東京	移動	
12		計画書案作成	視察総括
13		移動	
	ウィーン		
14	モルドバ	移動	

また当該活動内では、2KR-PIUに供与するペレット製造設備を用いて、2KR-PIUが農業関係者や民間投資家等にペレット製造に関する技術/ノウハウを二次的に教育するための教育プログラムも計画する。

③ バイオマス利用の利点周知

本プロジェクトに関するホームページ（以下“情報共有HP”）を立ち上げ、バイオマス暖房の基礎知識並びに導入効果（環境改善／CO2削減、社会経済性等）のほか、機材供与側で行う運転管理教育内容や情報管理システムで得られた情報の共有によって、バイオマス暖房利用の更なる普及を支援する活動を行う。

供与機材であるバイオマス・ボイラーの二次側施設の利用者（先生・生徒・園児・周辺住民等）へのバイオマス利用の利点を紹介する教育プログラムを作成し、各サイトにおいて環境教育を行う。タイミング的には報告ルールモニタリング活動（実施設計開始20か月前後に実施予定）に併せて行い、作業の効率化を図る。デモ機を除く本プロジェクト24サイトの裨益効果の合計は学校で10,421人、公民館で150人に上り、

対象人員用の教育資料並びに教育用パネルも作成する。

また「モ」国内の学識者や他のドナー、自治体や国の関係者を集め、本プロジェクト活動の報告並びに周知の為のセミナーを開催する。全ての供与機材が設置された後、50名前後を対象としてキシナウ市内のセミナー会場を使用して行うことを想定している。本プロジェクトの紹介用パンフレット等を併せて作成する。

2－1　目標

プロジェクト目標（「モ」国対象サイト（主に公共教育施設）において、バイオマス暖房システムが定着する）の達成及びその結果、上位目標（「モ」国においてバイオマス暖房システムが普及する）の達成に向けて、数多くの供与機材が継続的に運転するための支援基盤の形成を行う。

2－2　成果

ソフトコンポーネント実施期間の終了時点で達成されるべき成果として以下の項目が挙げられる。

成果１　バイオマス・ボイラーの維持管理が行われる
成果２　ペレット製造設備の維持管理が行われる
成果３　バイオマス利用のメリットが周知される

なお、本ソフトコンポーネントの結果、機材供与地域におけるペレット燃料サプライチェーンが確立されること並びに運転管理教育に基づいた運転と情報管理システムによる適切な情報提供を受けることによって日本製のバイオマス・ボイラーの信頼性を証明することができ、更に成果 3 の普及活動事業による周知を行うことによって、日本中小企業製品の普及にも貢献することが期待される。

2－3　成果達成度の確認方法

本活動の成果達成度の確認指標について下表 2－2 にまとめた。

表 2－2　成果達成度の確認指標とデータ入手手段

成果	指標	指標データ入手手段
成果 1 ボイラーの維持管理ができる	○プロジェクト管理者の資源・能力に対して、複数サイトのプロジェクト管理に必	○プロジェクト評価報告書 ○運転日誌・月報・年次報告書

	要な人材レベル、機材、ルール等のインフラが整備される。 ○報告ルールが計画通り運用される。	○積算熱量計データ
成果 2 ペレット製造設備の維持管理が行えるようになる	○報告ルールが計画通り運用される。 ○機材供与地域におけるペレット燃料流通のサプライチェーン計画が作成される。 ○供与するペレット設備において、ペレット燃料に関する教育研修ができるようになる。	○運転日誌・月報・年次報告書
成果 3 バイオマス利用のメリットが認知される	○バイオマス・ボイラーに関する普及啓蒙情報を提供するホームページが立ち上がる。 ○供与するボイラーの二次側施設受益者に対する環境教育が行われる。	○ホームページアクセス統計 ○環境教育アンケート

出典：調査団作成

2－4　　活動内容（投入計画）

2－4－1　活動

本活動における期待される成果に対する活動内容を下表 2－3 にまとめた。

表 2－3　本活動の成果と活動内容

成果	活動	必要な技術	対象者
成果 1 ボイラーの維持管理ができる	○プロジェクト評価内容､モニタリング方法の習得 ○情報収集・管理システムの構築 ○同システムの操作/維持管理/利用能力開発 ○ボイラー報告ルール研修プログラム並びにマニュアル作成	PC スキル GIS 操作 システム管理能力	2KR-PIU
	○ボイラー管理者向け報告システム		村長

	運用実務研修 ○ボイラー実務者向け報告システム運用実務研修 ○教育ルールの運用状況モニタリング		村長補佐 施設管理者 施設管理者補佐 ボイラー運転員
成果 2 ペレット製造設備の維持管理が行えるようになる	○ペレット製造設備報告ルール研修プログラム並びにマニュアル作成		2KR-PIU
	○サプライチェーンの計画立案 ○二次教育実務研修		2KR-PIU 担当者
	○ペレット製造設備報告システム運用実務研修 ○教育ルールの運用モニタリング		2KR-PIU 担当者 装置管理者 装置運転員
成果 3 バイオマス利用のメリットが認知される	○広報戦略の立案 ○専門ホームページの立上げ ○ホームページ維持管理能力開発、運用マニュアル作成 ○ホームページ内に”簡易ボイラー計画サイト”や”テスト”の作成	PC スキル	2KR-PIU
	○プロジェクト広報の為のワークショップ開催		政府関係者、他ドナー等
	○二次側施設利用者への講習、住民説明会の実施 ○説明資料作成		二次側施設利用者（教育者、生徒）

出典：調査団作成

2－4－2 成果品

本活動を通じての「モ」国側の成果品は下表 2－4 を想定する。

表 2－4 本活動の成果に対応する成果品

成果	成果品
成果 1 ボイラーの維持管理ができる	【成果 1、2 共通】 ○情報管理システム ○報告ルール規定 ○運転日誌・月報・年次報告書フォーマット ○モニタリングマニュアル ○モニタリングマニュアルに基づくモニタリング報告書 ○データベース運用マニュアル ○データベース並びにデータベース入力フォーマット
成果 2 ペレット製造設備の維持管理が行えるようになる	

	【成果 2 のみ】 ○現場視察報告書 ○サプライチェーン計画書 ○二次教育教材
成果 3 バイオマス利用のメリットが認知される	○情報共有 HP ○HP 維持管理マニュアル ○HP 内の環境教育サイト ○環境教育・セミナー用資料

出典：調査団作成

2－4－3 投入

本活動は実施主体となる 2KR－PIU のモニタリング専門家並びにエンジニアが、プロジェクト全体を俯瞰する役割に位置付けられていることから主な能力向上の対象者となる。彼らを中心に、全ての機材供与対象サイトの関係者などが個別の能力向上対象者となる。

コンサルタントは 2KR－PIU と協力して本活動の成果並びに成果物を出していく関係となる。更に Arc-GIS など能力向上対象者への直接的指導を要する項目については効率性の面からローカルリソースを活用する。コンサルタントの構成はソフトコンポーネント担当のほか、情報システム専門家、ボイラー並びにペレット製造設備の技術面でのサポートとして“施設専門家”を含む 3 名体制とした。尚、コンサルタントの役割分担は下表を素案とする。

表 2-5　　コンサルタントの役割分担表（案）

		ソフトコンポーネント総括	システム専門家	施設専門家
成果1	ボイラーの維持管理ができる			
	プロジェクト評価の構築	◎		
	報告ルール構築	◎		△ （技術面支援）
	報告ルール教育	◎		△ （技術面支援）
	情報管理システム構築	○	◎	△ （技術面支援）
	情報管理システム維持管理能力開発		◎ （実務主体は現地リソース）	
	報告ルール教育効果モニタリング	◎	△	
成果2	ペレット製造装置の維持管理が行えるようになる			
	報告ルール構築	◎		
	報告ルール教育	◎		○
	情報管理システム構築		◎	
	サプライチェーン計画作成	◎ （経営計画面）		◎ （施設・技術面）
	ペレット製造二次教育内容企画	◎ （経営計画面）		◎ （施設・技術面）
成果3	バイオマス利用のメリットが認知される			
	広報ツール企画・作成	◎	△ （情報システムとの調整）	△ （技術面支援）
	ワークショップ開催企画	◎	○ （情報システム講師）	
	二次側施設利用者教育企画	◎		△ （技術面支援）
	二次側施設利用者教育実施	◎		

出典：調査団作成

日本側は、主に以下の項目を投入する。

- コンサルタント 3 名：合計 15.83MM（国内 8.7、移動を含む現地 7.13）
- 英語－ルーマニア語通訳：現地 2.44MM
- 日本語－ルーマニア語通訳：国内 0.5MM
- 情報管理システム開発、広報用ホームページ作成並びにそれらを維持管理する 2KR-PIU 担当者の教育にかかる現地 IT システムインテグレーター及び Arc-GIS 講師雇用費
- サプライチェーン計画検討を目的とした「モ」国側関係者の日本招聘費用
- 研修／セミナー開催費用並びに関連資料作成費

「モ」国側の投入は、主に以下の項目を投入する。

- 2KR-PIU のモニタリング専門家を中心とした企画者側の人件費
- バイオマス・ボイラー並びにペレット製造設備が設置されるサイトに関わる運転管理責任者並びに運転管理業務従事者への報告ルール等の説明の際の人件費
- 現地側関係者の各種研修参加費用

＊長期的にはこのほか情報管理システムやホームページの維持管理費用が必要となるが、このための資金はペレット製造販売のコストに計上し、確保する。

表 2－6 本活動に対する投入

成果	「モ」国側	日本側
成果 1 ボイラーの維持管理ができる	○情報収集・管理システム構築 ・2KR-PIU　モニタリング専門家、2KR-PIU　設備管理担当者、Energy efficiency agency モニタリング専門家 ・サイト情報通信システム維持管理/更新費並びに通信費 ○ボイラー報告ルール研修プログラム並びにマニュアル作成 ・2KR-PIU モニタリング専門家 ○ボイラー管理者向け報告ルール運用実務研修（0.5 日研修×3 回程度）参加及び研修参加費用負担 ・2KR-PIU モニタリング専門家　2 名（研修生兼講師） ＜初回のみ研修＞ ・2KR-PIU 関係参加者　8 名程度 ・代理店エンジニア　10 名程度 ・研修参加費用 ＜各回研修（8 サイト／回として）＞ ・村長 8 名＋二次側施設管理者 8 名（＋運転手 8 名） ・研修参加費用 ○ボイラー実務者向け報告ルール運用実務研修（0.5 日研修×25 回）参加及び研修参加費用負担 ・2KR-PIU モニタリング専門家（講師）、2KR 運転手兼エンジニア（講師補佐）	○情報収集・管理システム構築 ・コンサルタント（ソフコン／モニタリング、システム、施設専門家） ・現地 Arc-GIS　操作・運用講師 ・現地 IT システムインテグレーター　（システム開発） ○ボイラー報告ルール研修プログラム並びにマニュアル作成 ・コンサルタント（ソフコン／モニタリング、システム、施設専門家） ・現地 IT システムインテグレーター（資料作成助言） ・資料作成費（作成、翻訳、印刷、製本） ○ボイラー管理者向け報告ルール運用実務研修（0.5 日研修×1 回） ・コンサルタント（ソフコン／モニタリング、システム、施設専門家） ＊Central Assembling Factory（CAF）で行うボイラー単体検収と同時に開催 ・現地 IT システムインテグレーター（講師指導） ○ボイラー実務者向け報告ルール運用実務研修（0.5 日研修×最大 5 回） ・コンサルタント（ソフコン／モニタリング、施設専門家） ＊各サイトで行うボイラー引渡し時の運転指導と合わせて開催

	＜研修対象＞ ・運転要員　3 名程度×25 サイト ・二次側施設管理者＋二次側施設管理実務担当者　計 2 名程度×25 ヶ所 ・村長＋総務担当者　計 2 名程度×24 サイト ・2KR－PIU 責任者＋総務担当者　計 2 名程度 ・研修参加費用 ○報告ルール実施状況モニタリング（25 サイト） ・2KR－PIU　モニタリング専門家、2KR－PIU　エンジニア兼運転手 ・モニタリング費用（移動費等）	・コンサルタント参加時の各サイトへの移動費用 ○報告ルール実施状況モニタリング（25 サイト） ・コンサルタント（ソフコン／モニタリング） ・コンサルタント参加時の対象サイトまでの移動費 ＊成果 3. 内の“二次側施設利用者・住民への説明”を同時に実施。
成果 2 ペレット製造設備の維持管理が行えるようになる	○ペレット製造装置報告ルール研修プログラム並びにマニュアル作成 ・2KR-PIU モニタリング専門家　2 名 ○ペレット製造装置報告ルール運用実務研修（0.5 日研修×1 回） 参加及び研修参加費用負担 ・2KR-PIU モニタリング専門家（研修生兼講師） ＜研修対象者＞24 名程度 ・2KR-PIU 関係参加者　8 名程度 ・代理店エンジニア　5 名程度 ・政府関係者等　5 名程度 ・NTC 管理者及び担当者 2 名程度、2KR プラント管理担当者 1 名程度、ペレット製造装置運転要員 3 名程度 ・研修参加費用	○ペレット製造装置報告ルール研修プログラム並びにマニュアル作成 ・コンサルタント(ソフコン／モニタリング、システム、施設専門家) ・現地 IT システムインテグレーター（資料作成助言） ・ペレット製造装置納入事業者（資料作成助言） ・資料作成費（作成、翻訳、印刷、製本） ○ペレット製造装置報告ルール運用実務研修（0.5 日研修×1 回） ・コンサルタント（ソフコン／モニタリング、施設専門家） ＊ペレット製造装置の引渡し時訓練と同時に開催 ・IT システムインテグレーター（講師）

	○サプライチェーンモデル計画立案 ・ペレット製造装置管理者、ペレット製造装置主任担当者 、2KR-PIU モニタリング専門家 ○二次教育実務研修（1.5 日研修×1 回）参加及び研修参加費用負担 ＜研修対象者＞24 名程度 ・2KR-PIU 関係参加者　8 名程度 ・代理店エンジニア　5 名程度 ・政府関係者等　5 名程度 ・NTC 管理者及び担当者 2 名程度、2KR プラント管理担当者 1 名程度、ペレット製造装置運転要員 3 名程度 ・研修参加費用	○サプライチェーンモデル計画案 ・コンサルタント（ソフコン／モニタリング、施設専門家） ・モ国の日本招聘費用（3 名分、2 週間程度） ・プログラム／資料作成費 ○二次教育実務研修（1.5 日研修×1 回）及び資料作成 ・コンサルタント　（ソフコン／モニタリング、施設専門家） ・ペレット製造装置納入事業者　（講師） ・資料作成費（作成、翻訳、印刷、製本）
成果 3 バイオマス利用のメリットが認知される	○広報戦略 ・企画者（2KR-PIU、農業食品産業省、Energy Efficiency Agency） ○ワークショップ参加（50 名×1 回）及び参加費用 ・企画者（2KR-PIU、農業食品産業省、Energy Efficiency Agency） ・設備導入代理店、他ドナー、大学、政府関係者 ・ワークショップ参加費用 ○二次側施設利用者・住民への説明（0.25 日×25 サイト）	○広報戦略 ・コンサルタント（ソフコン/モニタリング） ○ワークショップ開催（1 回） ・コンサルタント（ソフコン／モニタリング、情報システム） ・ワークショップ開催費（会場費、通訳費等） ・資料作成費（作成、翻訳、印刷、製本） ○二次側施設利用者・住民への説明（0.25 日/サイト×25 サイト立会い）

	＊報告ルール教育効果モニタリングと同時に開催 ・2KR－PIU　モニタリング専門家、エンジニア兼運転手 ・学童褥益効果：10,421 名 ○説明資料、計画サイト等の企画 ・企画者（2KR-PIU、農業食品産業省、Energy Efficiency Agency） ○【立上げ以後】 ・内容更新/サーバー維持管理費	・コンサルタント（ソフコン／モニタリング） ○説明資料、計画サイト等の企画 ・現地 IT システムインテグレーター（サイト制作） ・資料作成費（作成、翻訳、印刷、製本）

2－5　実施リソースの調達方法

本無償資金協力の供与先である対象サイト 25 か所を束ねることになる 2KR－PIU はこれまで農業機材の管理は行ってきているが、暖房システムや燃料製造設備の扱い、更には情報管理システムや情報共有 HP の運営維持管理業務に従事した経験がない。プロジェクト実施で先行している UNDP でも大量のバイオマス暖房設備情報を一元管理する試みは現状実施されていないことから、機材供与を行うコンサルタントやローカルリソースを活用した取り組みが必要である。

2－5－1 日本人専門家の派遣

ソフトウェアコンポーネントとしての日本人専門家は以下の 3 名並びに現地通訳として英語-ルーマニア語通訳 1 名、国内招聘時の通訳として日本語－ルーマニア語通訳 1 名を含めた 5 名とする。

1) ソフトコンポーネント総括／モニタリング担当

内容が多岐に渡ることから、ソフトコンポーネント専門家は本活動で行った教育の効果に関するモニタリングを担当するほか、ソフトコンポーネント全体の企画業務と主担当者サポート（全ての成果に対して関わりを持つ）を行う。また各作業間の業務調整を担う。

担当者としては、機材供与実務を行うコンサルタントとの連携を円滑に行えることのほか、調査やプロジェクトでの総括経験を有する者が適格である。

またソフトコンポーネント総括は本無償資金供与機材の設置サイトに対する啓蒙活動目標並びに啓蒙対象範囲の設定を含む広報戦略の立案並びに啓蒙活動そのものの戦術立案（①情報システムで集約され、関係各所が共有すべき情報（運転記録・メンテナンス/部品情報・燃料価格・導入効果等）を共有する情報共有 HP の企画、②二次側施設利用者に対する啓蒙プログラム企画/ツール作成、③他ドナー・学識経験者・政府関係者等に対する本プロジェクト紹介ワークショップのプログラム企画/ツール作成、等）を併せて行い、バイオマス暖房システムの普及啓蒙活動の立ち上げを支援する役割を担う。情報共有 HP 更新や二次側施設利用者への啓蒙活動は、本無償資金供与機材の設置サイトでの継続的な実施のほか、本無償資金供与を行った結果、上位目標であるバイオマス暖房システムの普及が進んだ際にも流用されうる内容にすることを想定する。

従って担当者としては、更に宣伝広告活動や普及啓蒙活動の企画・実行経験がある者が適格である。

2) 情報システム専門家

情報管理システムの構築に関する概念設計を行い、これをベースにローカルリソースとなる IT システムインテグレーターとの仕様打合せ並びに作業依頼を行う。これには積算流

量計と通信端末を用いたデータ集積に関する計画を含む。また 2KR - PIU のシステム運用担当者向けの教育資料をローカルリソースと共同で作成し、教育を行う。バイオマス暖房システムが設置され始める前に情報管理システムのプロトタイプを運用できるようにする。全ボイラー設置後の最初の暖房期間（E／N 締結 20 か月後程度を想定）にプロトタイプシステムの試行並びに修正等をローカルリソースと共同で行い、システムのファイナライズを行う。同時に情報共有 HP の企画と情報管理システムへの取り込みを担当する。

担当者としては、情報システム関連企業や IT システムインテグレーターとしての高いレベルの知識を有する者が適格である。

3) 施設専門家

業務はペレット燃料サプライチェーン計画のほか、ペレット製造普及に関する二次教育内容の検討が中心となる、このほかボイラー並びにペレット製造の両方に関する報告ルール作りにおける助言、情報共有プラットフォームで共有すべくボイラーやペレット製造等の技術情報内容に関する助言等を行う。

担当者としてはバイオマス・ボイラー技術、ペレット製造技術、流通等に関する知見を持つ者が適格である

2－5－2 現地専門家の活用

1) IT システムインテグレーター

コンサルタントによる情報管理システムの概念設計をベースに、仕様に基づいた情報管理システムの作成作業を行う。情報管理システムにおいて積算流量計と通信端末を用いたデータ集積・取り込み機能は重要な項目であることから、併せて通信データの取り込みに十分な知見があることが望ましい。また 2KR - PIU のシステム運用担当者向けの教育資料をコンサルタントと共同で作成し、教育を行う。バイオマス暖房システムが設置され始める前に情報管理システムのプロトタイプを運用できるようにする。全ボイラー設置後の最初の暖房期間（E／N 締結 20 か月後程度を想定）にプロトタイプシステムの試行並びに修正等をコンサルタントと共同で行い、システムのファイナライズを行う。同時に規定された情報に関して、情報共有 HP にリンクさせる作業を Web デザイナーと共に行う。

2) Web デザイナー（IT システムインテグレーターが兼務することが望ましい）

情報共有 HP の作成を中心に行う。情報管理システムとリンクするものであることから、情報管理システムのローカルリソースポーション受託企業の範囲内で行われることが適当である。

3) Arc-GIS 操作講師

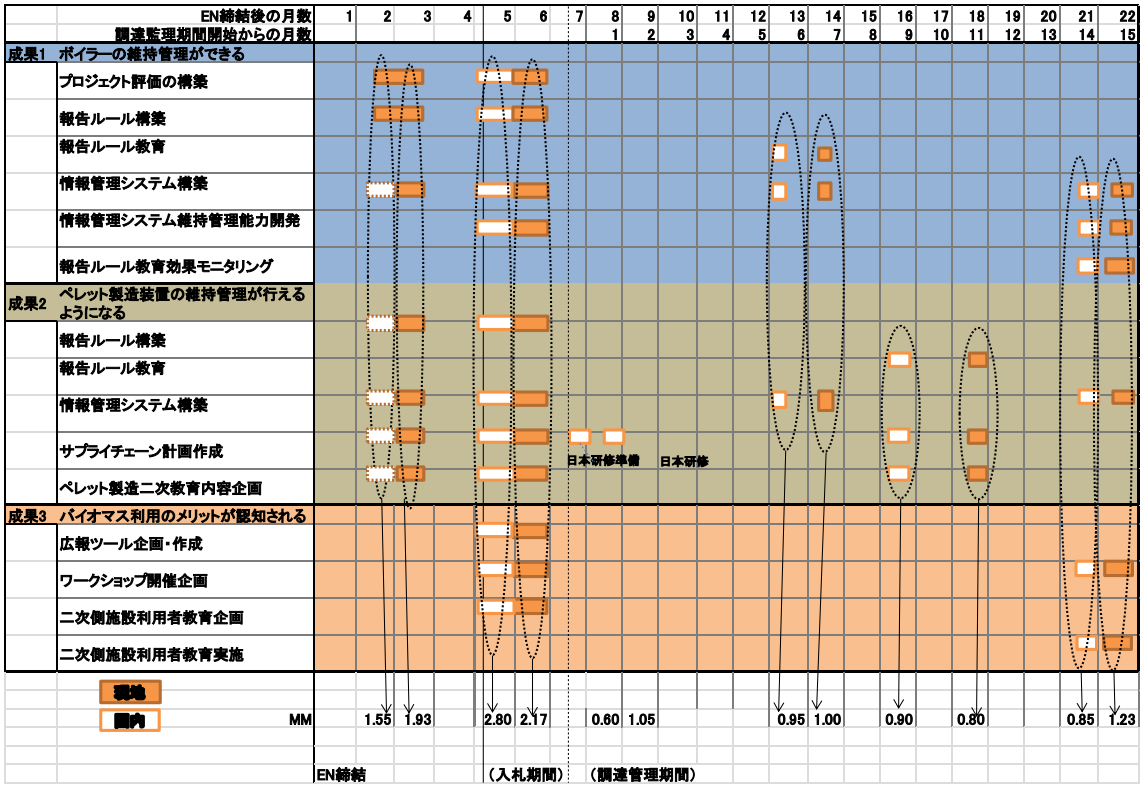
同ソフトウェアを現地で販売する代理店で実施しているプログラムを採用する。従って

同ソフトウェア販売代理店のうち、実績が豊富な事業者の選択が適当である。

2－6　　実施工程

本活動の実施工程は、E/N 締結より最大 22 か月（実施期間開始より 15 か月）とした。日本人専門家はその間、延べ 12 回の現地渡航を行い、移動等を含め 15.83MM を要する計画となっている。

表 2-7　ソフトコンポーネント実施工程計画



出典：調査団作成

2－7　　成果品

本活動の成果品としては 2－4－2 で示した成果品の他、ソフトコンポーネント実施状況確認書並びにソフトコンポーネント完了報告書を提出する。

2－8　　相手国実施機関の責務

本無償資金協力で導入される機材が有効に継続的に活用されるために、本案件の実施機関である 2KR-PIU は以下に示す内容を実施する必要がある。なお、計画ではこれら費用はペレット燃料販売費のコストに計上することで確保し続けることとする。

・本活動で作成した各種マニュアル・規程の利用と必要に応じた改訂
・情報管理システム並びに情報共有 HP の維持管理並びに予算の確保
・情報端末通信費（積算熱量計データ通信）
・定期的なモニタリングとモニタリング予算の確保
・バイオマス・ボイラー導入施設の利用者に対するバイオマス利用の環境教育実施継続

添付資料－1：本活動の Project Design Matrix (PDM) 1／4

プロジェクト名:「モ」国共和国　農村地域におけるバイオマス暖房システム計画準備調査			
対象地域:　モルドバ共和国			
プロジェクトの要約	指標	指標データ入手手段	外部条件
【上位目標】 バイオマス暖房システム利用の促進	○燃料用化石燃料購入量が削減される。	○プロジェクト評価報告書	バイオマス原料の国内安定確保
【プロジェクト目標】 「モ」国対象サイト(主に公共教育施設)において、バイオマス暖房システムが定着する	○供与設備の稼働率が高い	○プロジェクト評価報告書	二次側施設が存在し続ける
【成果】			
Task-1　ボイラーの維持管理ができる	○プロジェクト管理者の資源・能力に対して、40サイト(40ボイラ)のプロジェクト管理に必要な人材レベル、機材、ルール等のインフラが整備される。 ○報告ルールが計画通り運用される。 ○プロジェクト管理体制維持のための財政的裏付けが整備される。	○プロジェクト評価報告書 ○運転日誌・月報・年次報告書 ○積算熱量計データ	通信環境が確保される
Task-2　ペレット製造設備の維持管理が行えるようになる	○報告ルールが計画通り運用される。 ○プロジェクト管理体制維持のための財政的裏付けが整備される。 ○モデル対象地域としたペレット燃料流通のサプライチェーンが作成される。 ○供与するペレット設備において、ペレット燃料に関する教育研修ができるようになる。	○運転日誌・月報・年次報告書	バイオマス原料の域内安定確保 (干ばつなどによる影響がない)
Task-3　バイオマス利用のメリットが認知される	○バイオマスボイラーに関する普及啓蒙情報を提供するホームページが立ち上がる。 ○供与するボイラーの二次側施設受益者に対する環境教育が行われる。	○ホームページアクセス統計 ○環境教育アンケート	関係者のIT普及率 二次側施設受益者が存在する

添付資料－1：本活動の Project Design Matrix (PDM) 2／4

【活動】		【投入】(モルドバ側)	【投入】(日本側)
Task-1	ボイラーの維持管理ができる		
	○情報収集・管理システムの構築 ・プロジェクト評価内容、モニタリング方法の習得 ・同システムの操作/維持管理/利用能力開発	○情報収集・管理システム構築 ・2KR-PIU　モニタリング専門家、2KR-PIU　設備管理担当者、Energy efficiency agencyモニタリング専門家 ・サイト情報通信システム維持管理/更新費並びに通信費	○情報収集・管理システム構築 ・コンサルタント(ソフコン／モニタリング、システム、施設専門家) ・現地Arc-GIS　操作・運用講師 ・現地ITシステムインテグレーター (システム開発)
	○ボイラー報告ルール研修プログラム並びにマニュアル作成 ・プロジェクト評価とこれに準ずるモニタリング方法、情報共有プラットフォームの内容と共有情報に基づいて、2KRモニタリング専門家並びにJICAコンサルタントが中心となって報告システムに関する研修プログラム並びに報告実務マニュアルを作成する。 ・作成にあたってはシステム納入業者のこれまでの知見も活用する。	○ボイラー報告ルール研修プログラム並びにマニュアル作成 ・2KR-PIUモニタリング専門家	○ボイラー報告ルール研修プログラム並びにマニュアル作成 ・コンサルタント(ソフコン／モニタリング、システム、施設専門家) ・現地ITシステムインテグレーター(資料作成助言) ・資料作成費(作成、翻訳、印刷、製本)
	○ボイラー管理者向け報告システム運用実務研修(0.5日研修) ・CAFにおけるボイラー単体検収時に実施 ・各サイトから村長並びに暖房対象施設管理者の2名(＋運転手1名) ・宿泊はキシナウNTC ・1回あたり8サイト程度をまとめて実施(計4回) ・講師は2KRモニタリング専門家並びにシステム納入業者が実施 ・初回(JICA専門家滞在時)は最初の8サイト関係者に加え、以下が教育対象者として加わる: － 2KR機材管理者、エンジニア － NTC希望者 － 機材/資材納入事業者並びに代理店 － 政府(農業食品産業省)や関連機関(Energy Efficiency Agency等)	○ボイラー管理者向け報告ルール運用実務研修(0.5日研修×3回程度)参加及び研修参加費用負担 ・2KR-PIUモニタリング専門家　2名(研修生兼講師) ＜初回のみ研修＞ ・2KR-PIU関係参加者　8名程度 ・代理店エンジニア　10名程度 ・研修参加費用 ＜各回研修(8サイト／回として)＞ ・村長8名＋二次側施設管理者8名(＋運転手8名) ・研修参加費用	○ボイラー管理者向け報告ルール運用実務研修(0.5日研修×1回) ・コンサルタント(ソフコン／モニタリング、システム、施設専門家) ＊Central Assembling Factory (CAF)で行うボイラー単体検収と同時に開催 ・現地ITシステムインテグレーター(講師指導)
	○ボイラー実務者向け報告システム運用実務研修(0.5日研修) ・各ボイラー設置サイトで実施 ・講師は2KRモニタリング専門家が実施 ・主な対象者: － ボイラー運転要員(3名を想定) － 暖房施設実務管理者(1名を想定) － 村の総務担当者(1名を想定) ＊管理者向け報告システム運用実務教育参加者も参加を必須とする。	○ボイラー実務者向け報告ルール運用実務研修(0.5日研修×25回)参加及び研修参加費用負担 ・2KR-PIUモニタリング専門家(講師)、2KR運転手兼エンジニア(講師補佐) ＜研修対象＞ ・運転要員　3名程度×25サイト ・二次側施設管理者＋二次側施設管理実務担当者　計2名程度×25ヶ所 ・村長＋総務担当者　計2名程度×24サイト ・2KR－PIU責任者＋総務担当者　計2名程度 ・研修参加費用	○ボイラー実務者向け報告ルール運用実務研修(0.5日研修×最大5回) ・コンサルタント(ソフコン／モニタリング、施設専門家) ＊各サイトで行うボイラー引渡し時の運転指導と合わせて開催 ・コンサルタント参加時の各サイトへの移動費用
	○教育ルールの運用状況モニタリング ・ソフトコンポーネント内容の実施状況並びに改良点等の確認 ・報告ルール等のアップデート	○報告ルール実施状況モニタリング(25サイト) ・2KR－PIU　モニタリング専門家、2KR－PIU　エンジニア兼運転手 ・モニタリング費用 (移動費等)	○報告ルール実施状況モニタリング(25サイト) ・コンサルタント(ソフコン／モニタリング) ・コンサルタント参加時の対象サイトまでの移動費 ＊成果3. 内の“二次側施設利用者・住民への説明”を同時に実施。

添付資料－1：本活動の Project Design Matrix (PDM) 3／4

【活動】		【投入】(モルドバ側)	【投入】(日本側)
Task-2	ペレット製造設備の維持管理が行えるようになる		
	○ペレット製造設備報告ルール研修プログラム並びにマニュアル作成 ・プロジェクト評価とこれに準ずるモニタリング方法、情報共有プラットフォームの内容と共有情報に基づいて、2KRモニタリング専門家並びにJICAコンサルタントが中心となって報告システムに関する研修プログラム並びに報告実務マニュアルを作成する。 ・作成にあたってはシステム納入業者やペレット製造設備納入業者のこれまでの知見も活用する。	○ペレット製造装置報告ルール研修プログラム並びにマニュアル作成 ・2KR-PIUモニタリング専門家　2名	○ペレット製造装置報告ルール研修プログラム並びにマニュアル作成 ・コンサルタント(ソフコン／モニタリング、システム、施設専門家) ・現地ITシステムインテグレーター(資料作成助言) ・ペレット製造装置納入事業者(資料作成助言) ・資料作成費(作成、翻訳、印刷、製本)
	○ペレット製造設備報告システム運用実務研修(0.5日研修×1回) ・ペレット製造設備やペレット販売量、品質並びに価格情報の共有に向けた報告ルール ・CAFにおけるペレット製造設備設置完了時に実施 ・講師は2KRモニタリング専門家並びにシステム納入業者が実施	○ペレット製造装置報告ルール運用実務研修(0.5日研修×1回) 参加及び研修参加費用負担 ・2KR-PIUモニタリング専門家(研修生兼講師) ＜研修対象者＞24名程度 ・2KR-PIU関係参加者　8名程度 ・代理店エンジニア　5名程度 ・政府関係者等　5名程度 ・NTC管理者及び担当者2名程度、2KRプラント管理担当者1名程度、ペレット製造装置運転要員3名程度 ・研修参加費用	○ペレット製造装置報告ルール運用実務研修(0.5日研修×1回) ・コンサルタント(ソフコン／モニタリング、施設専門家) ＊ペレット製造装置の引渡し時訓練と同時に開催 ・ITシステムインテグレーター(講師)
	○サプライチェーンモデルの計画立案 ・モデル地域(＝無償供与機材同導入地域)でのサプライチェーン計画立案 ・日本におけるペレット燃料サプライチェーンの実態視察	○サプライチェーンモデル計画立案 ・ペレット製造装置管理者、ペレット製造装置主任担当者 、2KR-PIUモニタリング専門家	○サプライチェーンモデル計画案 ・コンサルタント(ソフコン／モニタリング、施設専門家) ・モ国の日本招聘費用(3名分、2週間程度) ・プログラム／資料作成費
	○二次教育実務研修(1.5日研修) ・モデル導入するペレット製造設備のショーケース化並びにペレット製造や品質に関する教育 ＊上記報告システム運用実務研修に続いて実施 ・宿泊はキシナウNTC施設を利用 ・CAFにおけるペレット製造設備設置完了時に回実施 ・講師は施設専門家並びにシステム納入業者が実施	○二次教育実務研修(1.5日研修×1回)参加及び研修参加費用負担 ＜研修対象者＞24名程度 ・2KR-PIU関係参加者　8名程度 ・代理店エンジニア　5名程度 ・政府関係者等　5名程度 ・NTC管理者及び担当者2名程度、2KRプラント管理担当者1名程度、ペレット製造装置運転要員3名程度 ・研修参加費用	○二次教育実務研修(1.5日研修×1回)及び資料作成 ・コンサルタント　(ソフコン／モニタリング、施設専門家) ・ペレット製造装置納入事業者　(講師) ・資料作成費(作成、翻訳、印刷、製本)

添付資料－1：本活動の Project Design Matrix (PDM) 4／4

【活動】		【投入】(モルドバ側)	【投入】(日本側)
Task-3	バイオマス利用のメリットが認知される		
	○専門ホームページの立上げ ○ホームページ維持管理能力開発、運用マニュアル作成 ○プロジェクト広報の為のワークショップ開催 ○ホームページ内に"簡易ボイラー計画サイト"や"テスト"の作成 ○二次側施設利用者への講習、住民説明会の実施 ○説明資料作成	○広報戦略 ・企画者(2KR-PIU、農業食品産業省、Energy Efficiency Agency) ○ワークショップ参加(50名×1回)及び参加費用 ・企画者(2KR-PIU、農業食品産業省、Energy Efficiency Agency) ・設備導入代理店、他ドナー、大学、政府関係者 ・ワークショップ参加費用 ○二次側施設利用者・住民への説明(0.25日×25サイト) ＊報告ルール教育効果モニタリングと同時に開催 ・2KR－PIU　モニタリング専門家、エンジニア兼運転手 ・学童裨益効果：10,421名 ○説明資料、計画サイト等の企画 ・企画者(2KR-PIU、農業食品産業省、Energy Efficiency Agency) ○【立上げ以後】 ・内容更新/サーバー維持管理費	○広報戦略 ・コンサルタント(ソフコン/モニタリング) ○ワークショップ開催(1回) ・コンサルタント(ソフコン／モニタリング、情報システム) ・ワークショップ開催費(会場費、通訳費等) ・資料作成費(作成、翻訳、印刷、製本) ○二次側施設利用者・住民への説明(0.25日/サイト×25サイト立会い) ・コンサルタント(ソフコン／モニタリング) ○説明資料、計画サイト等の企画 ・現地ITシステムインテグレーター(サイト制作) ・資料作成費(作成、翻訳、印刷、製本)