

Note: Requirements here are for development of EcoLeaf™ environmental labels. Use for any other purpose without consent of the EcoLeaf™ program office is strictly prohibited.

No.	Major key	Minor key	Class	Requirements
1	Preconditions	Target product	Description	The supply of electricity to consumers via the grid by electrical power producers authorized in accordance with Article 2 of the Electric Utility Law
2			Items to cover	Electricity supplied by the producers to the consumers
3		LCA	Target product lifecycle stages	<ol style="list-style-type: none"> The whole lifecycle Fuel supply, electricity generation (facility construction, generation, operation, decommissioning), electricity distribution (facility construction, operation, decommissioning) Construction and decommissioning of facilities for fuel supply are outside the scope.
4	Product data sheet (PDS) Input data for the LCI: Lifecycle inventory analysis	Production stage information (fuel supply)	Energy of fuel manufacture and transport	<p>Supply of fuel for electricity generation</p> <ol style="list-style-type: none"> Calculation of the impact associated with manufacture (mining, processing, transport) of fuel for electricity generation. Energy consumption (electricity, diesel, heavy oil, refined oil) and discharges (methane, CO₂) associated with manufacture are calculated in accordance with the model shown on exhibit 1 to 4. However, calculation by methods other than the above may also be used. The quantity of fuel consumed in the generation of electricity shall be based upon the actual performance of each producer.
5		Production stage information (electricity generation)	<p>Electricity generation facility materials</p> <p>Materials and energy input, consumed, and discharged</p>	<ol style="list-style-type: none"> Construction of facilities <ol style="list-style-type: none"> The materials and energy required for construction, and the energy required for decommissioning are calculated in accordance with the model on exhibit 1 to 4. However, methods other than the above may also be used. For materials written into product datasheets, steel and concrete are common, and each company can make additions as required. Electricity generation <ol style="list-style-type: none"> Items consumed <ul style="list-style-type: none"> List fuels used for electricity generation, such as coal, crude oil, heavy fuel oil, LNG, LPG, diesel, nuclear fuel, etc. For nuclear fuel, use either the “core input (new fuel)” or the “calculated value” obtained from design values, and list under “4. Others”. Discharge items <ul style="list-style-type: none"> CO₂, NO_x, SO_x, and COD are common values, and each company can make additions as required. For CO₂, the discharges for day and night and the averages over several years may be listed. List the time divisions for day and night, and the relevant

No.	Major key	Minor key	Class	Requirements
				<p>financial years for multi-year averages under “4. Others”.</p> <p>3. Operation (A) Items consumed Industrial water, ammonia, and limestone are common, and each company can make additions as required. (B) Waste</p> <ul style="list-style-type: none"> List the final disposal quantity (to be landfilled). Each company should list valuable or recyclable items if they consider it important. <p>List low-level and high-level radioactive waste.</p>
6		Distribution stage information (Electrical power distribution)	Materials for electrical distribution and transformers	<p>1. Construction of facilities (A) The materials and energy required for construction, and the energy required for decommissioning are calculated in accordance with the model on exhibit 1 to 4. However, methods other than the above may also be used. (B) For materials written into product datasheets, steel, concrete, copper, aluminum, and insulating materials are common, and each company can make additions as required.</p> <p>2. Operation (A) For waste, list the final disposal quantity (to be landfilled). Each company should list valuable or recyclable items if they consider it important. (B) List discharge quantity for SF₆.</p>
7		Usage stage information	—	This stage is not included, as electricity does not generate any atmospheric pollutants or other environmental loads at the point of use.
8		Disposal and recycling stage information	—	This stage is not included, as electricity does not generate any atmospheric pollutants or other environmental loads at the point of use.
9	Product environmental information declaration sheet (PEIDS)	Inventory analyses	LCI calculation rules	<p>1. The CO₂ emission due to consumption of Associated Gas in acquiring fuel is 2.74 kg/m³.</p> <p>2. For calculation of electricity consumption in overseas associated with fuel acquisition, relevant part of data in EcoLeaf basic units for “Electricity should be applied.</p> <ul style="list-style-type: none"> [Nuclear power] (CO₂: 0.46 kg/kWh, SO_x: 2.5 g/kWh, NO_x: 1.2 g/kWh) [Coal] (CO₂: 0.78 kg/kWh, SO_x: 2.6 g/kWh, NO_x: 2.4 g/kWh) <p>Source (both 1, 2): Central Research Institute for the Electrical Power Industry, Report No.Y99009, Evaluation of electricity generation technology by means of lifecycle CO₂ emissions and OECD statistics.</p> <p>3. Energy consumed during electricity generation is applicable to fossil fuel.</p>
10		Impact analyses	Additional impact category	Each company can make additions as required.

No.	Major key	Minor key	Class	Requirements
11	Breakdown data sheet (Product data sheet related)	Data processing	Allocation rule	<p>The environmental impact of electricity purchased from other companies should be dealt with as follows for the time being.</p> <ol style="list-style-type: none"> 1. If the environmental impact of electricity sold to general electricity power producers can be determined, it may be excluded. 2. The environmental impact of electricity purchased from other electric power producers shall be considered. 3. If the data for electricity from other electric power producers cannot be obtained, or if some own-company data (e.g., water quality related, etc.) cannot be obtained, then convert from the ratio of electricity generation. Converted value = Known value × Total electricity generation quantity ÷ Quantity of electricity, which data can be obtained
12		Data collection	Coverage	<ol style="list-style-type: none"> 1. For emissions associated with fuel consumption and environmental impacts associated with the operation of own-company facilities, as a rule measured values shall be used. However, for design values whose basis is clear, calculated values may be substituted. 2. As a rule, each type of data shall be yearly values.
13			Cut off rules	When a cut off is applied, this fact shall be made clear, and the reason shall also be made clear.
14	Breakdown data sheet (PEIDS related)	Database	Selection of basic units	<ol style="list-style-type: none"> 1. Fuel supply and electricity generation <ul style="list-style-type: none"> • For each type of fuel, adopt a basic unit using the necessary unit conversion. • For limestone, use 1/2 the value of “quicklime”. 2. Facility construction <ul style="list-style-type: none"> • For steel, adopt “cold rolled steel plate”; for copper, adopt “copper plate”; and for aluminum, adopt “aluminum plate”. • For insulating materials, adopt “PE (low density)”. • For concrete, adopt 1/5 the value of “cement”. <p>For the above basic units, refer to “List of EcoLeaf basic units”.</p>
15			Addition of basic unit	None
16			Addition of characterization factor	Each company can make additions as required.
17	Product environmental information	Product specification		Frequency, Capacity of electricity generation facility (for each type of electrical power source), Relevant fiscal year

No.	Major key	Minor key	Class	Requirements
18		Data disclosure		<p>1. Items to be included</p> <ul style="list-style-type: none"> • Essential items: Global warming impact, Acidification load, Energy consumption • Selectable items: The 7 items in the Guideline (Note: Clearly state the applicable financial year.) For CO₂ associated with electricity generation, daytime and nighttime values, and average values for several financial years may be listed. <p>2. Relevant lifecycle stage</p> <ul style="list-style-type: none"> • State the total value for all lifecycle stages. • For CO₂, present a bar graph with values for each lifecycle stage and the total value. <p>3. Usage condition setting No standard is set.</p> <p>4. Method of expression Text, tables, and graphs can be used.</p>
19	Other environmental information	Items to select		Each company to determine as appropriate.

[Cautions]

The lifecycle composition and its elements defined in this PSC differ in places from the content of the standard EcoLeaf format. For this reason, the item names and layout and so on of the standard EcoLeaf format 2. “PEIDS” and 3. “Product Data Sheets” have been partially changed for this PSC, and the special “Format 2 (AT)” and “Format 3(AT)” shall be used (those formats are included at the end of this document).

Exhibit 1

Lifecycle of nuclear power generation

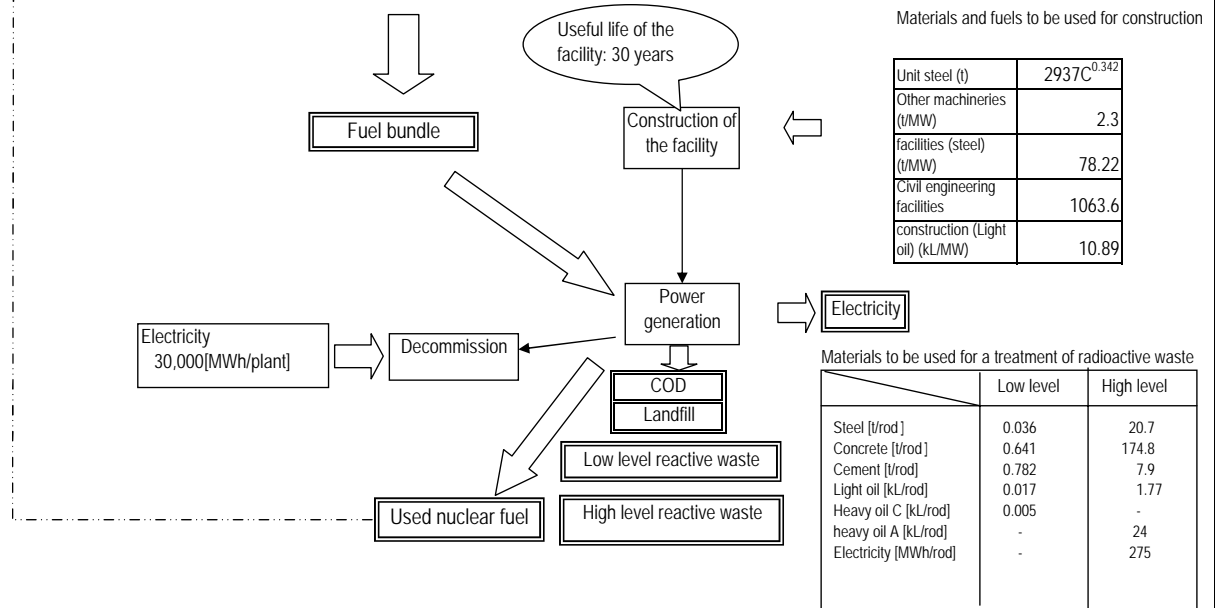
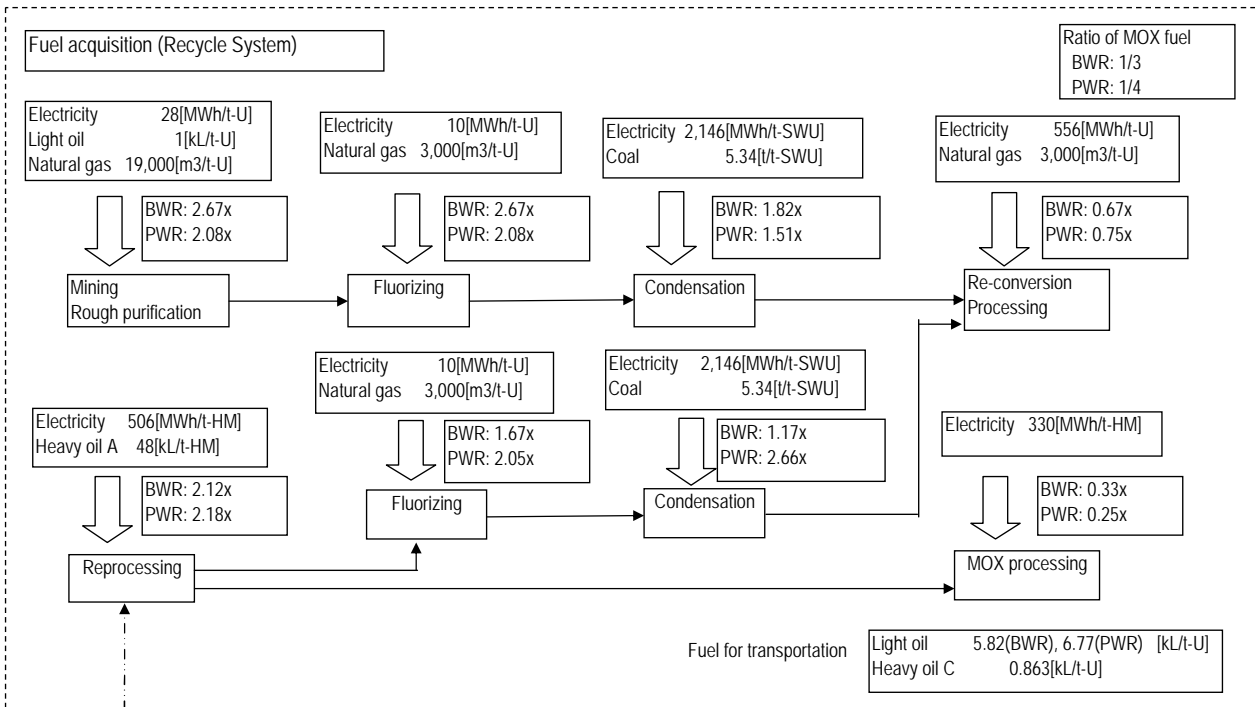
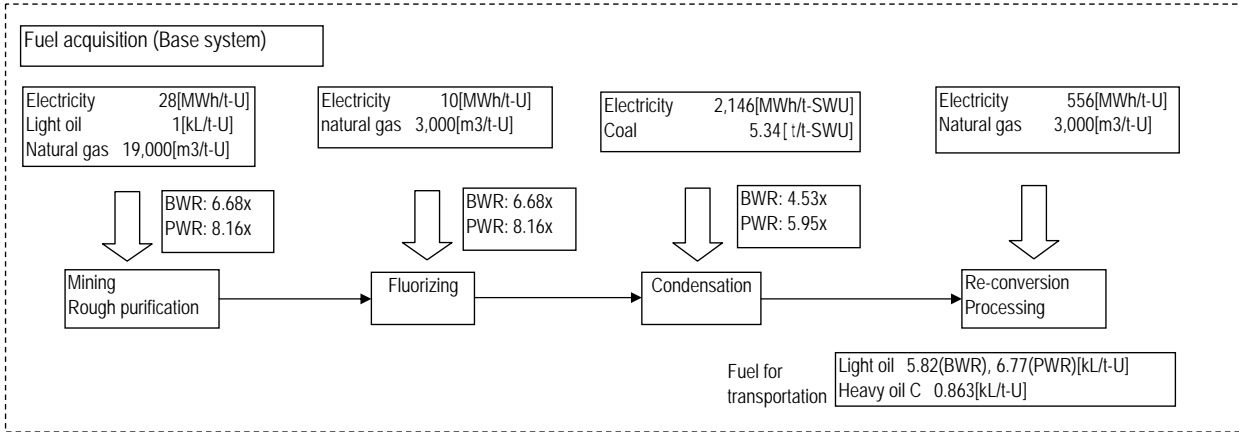
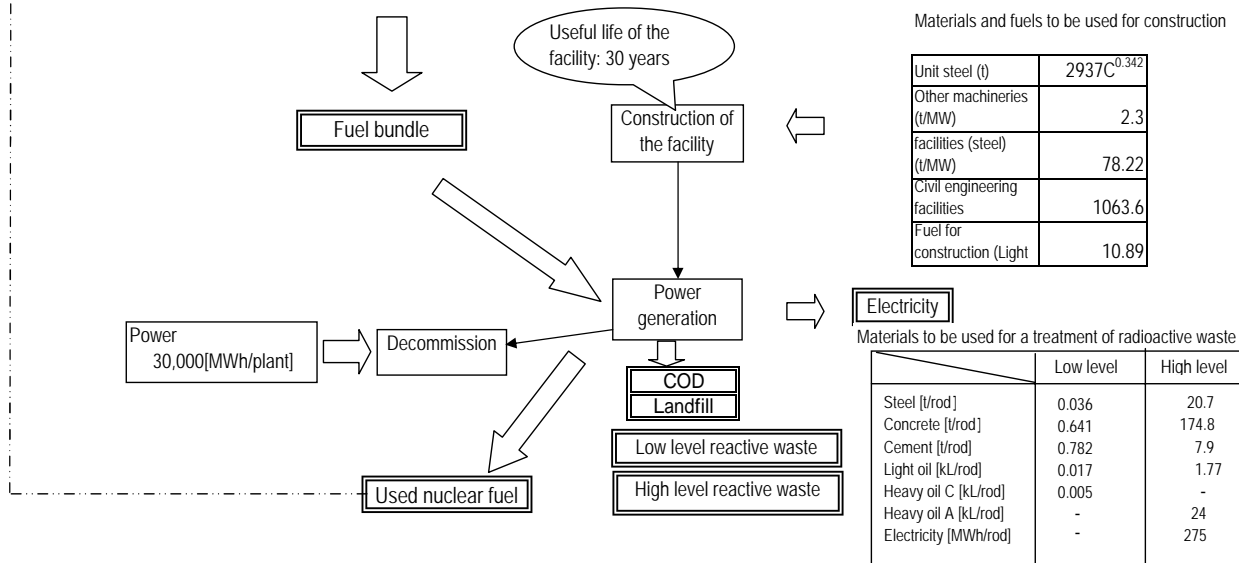
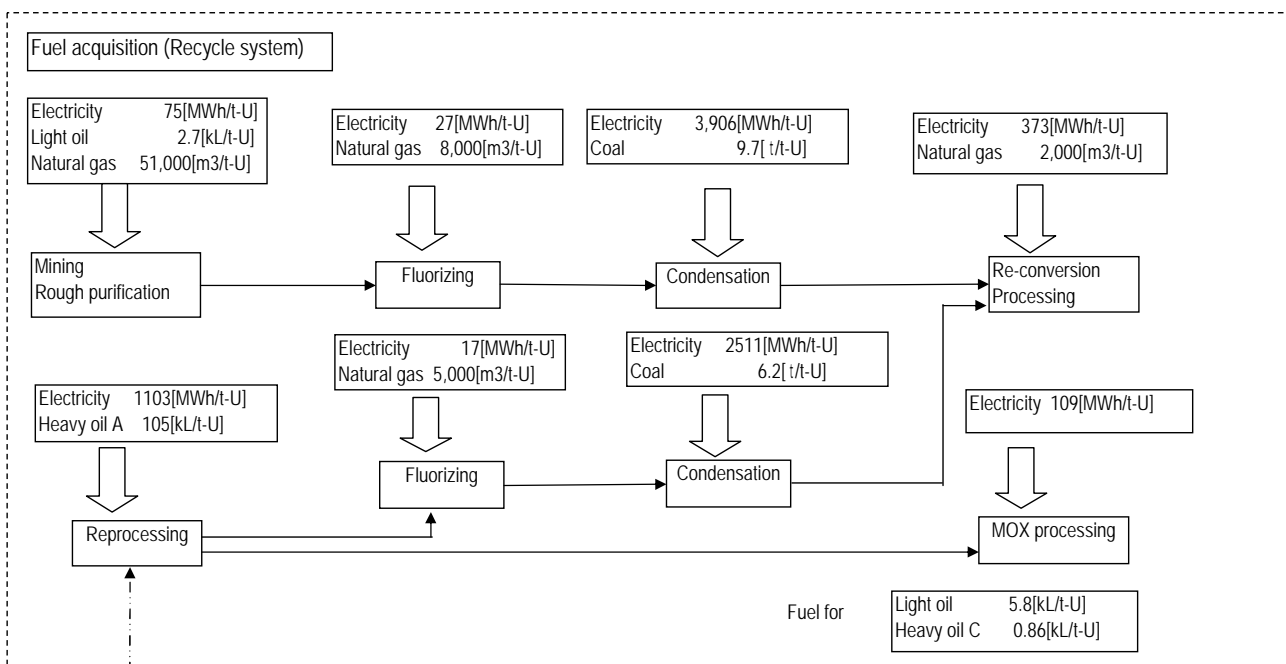
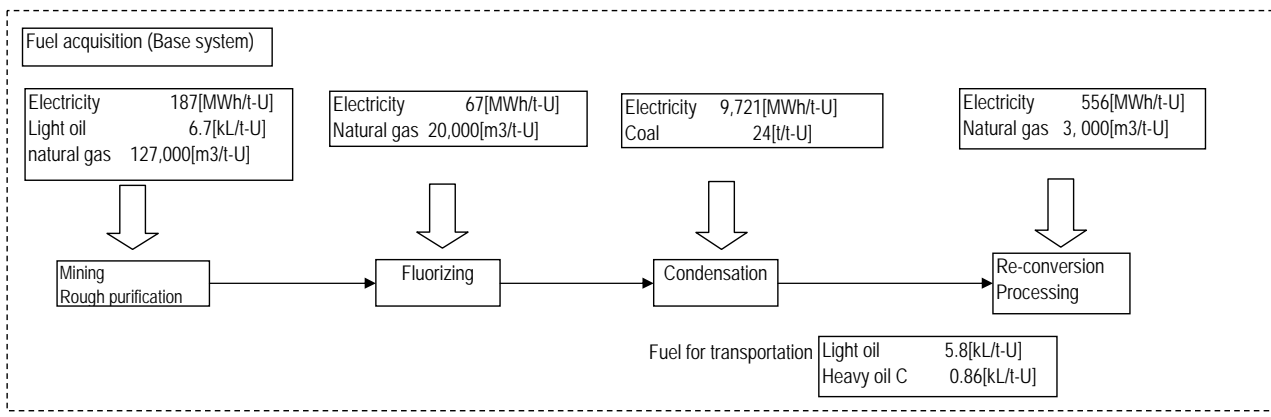


Exhibit 1-1

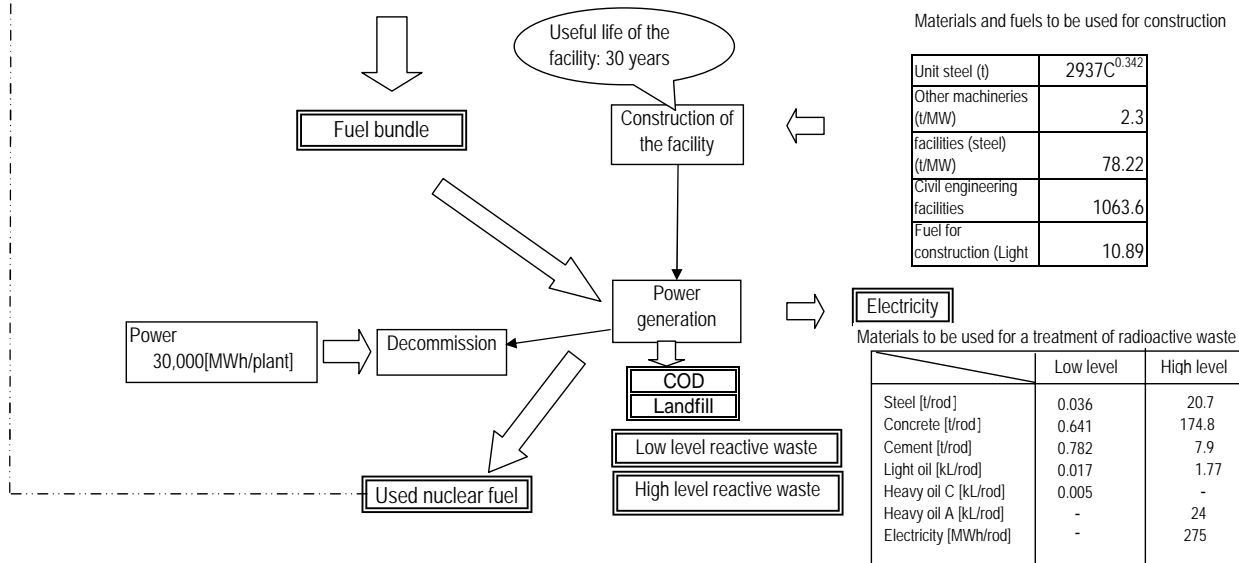
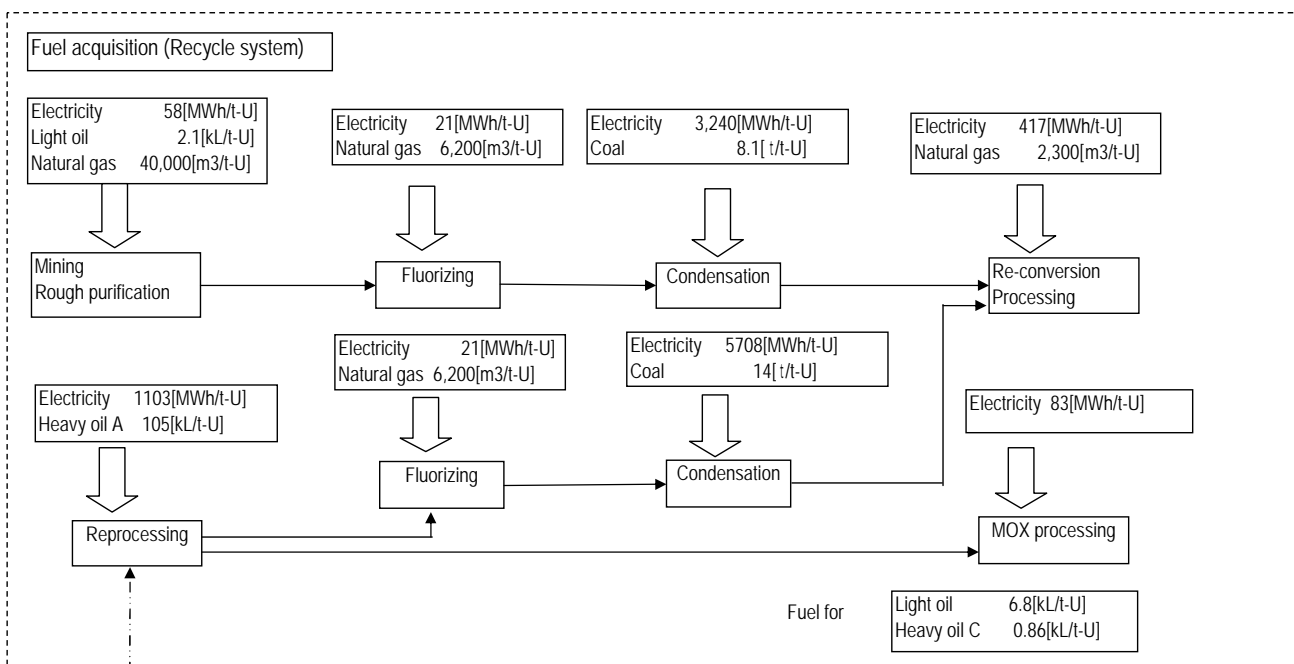
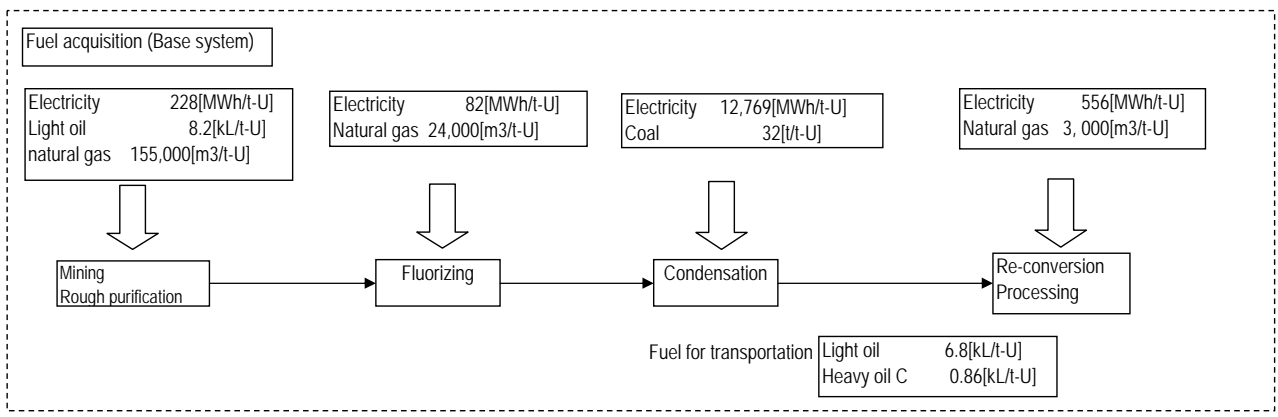
Lifecycle of nuclear power generation (BWR)



Note: Weight of fuel rod should be by actual data of each declaring company.

Exhibit 1-2

Lifecycle of Nuclear Power Generation (PWR)

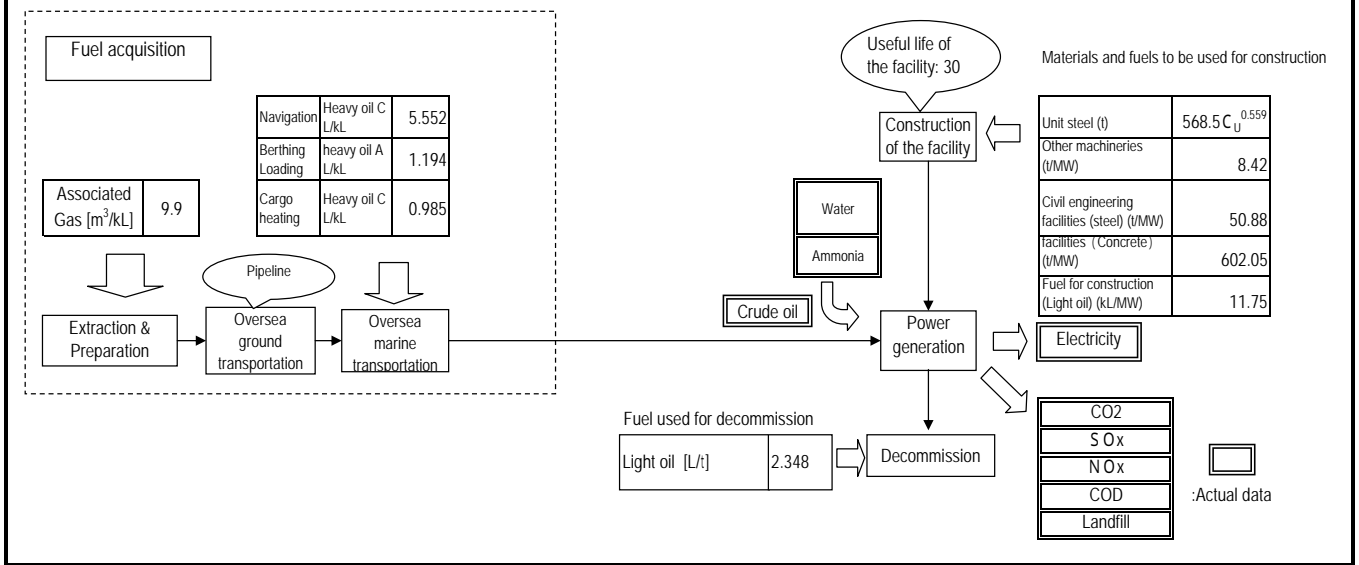


Note: Weight of fuel rod should be by actual data of each declaring company.

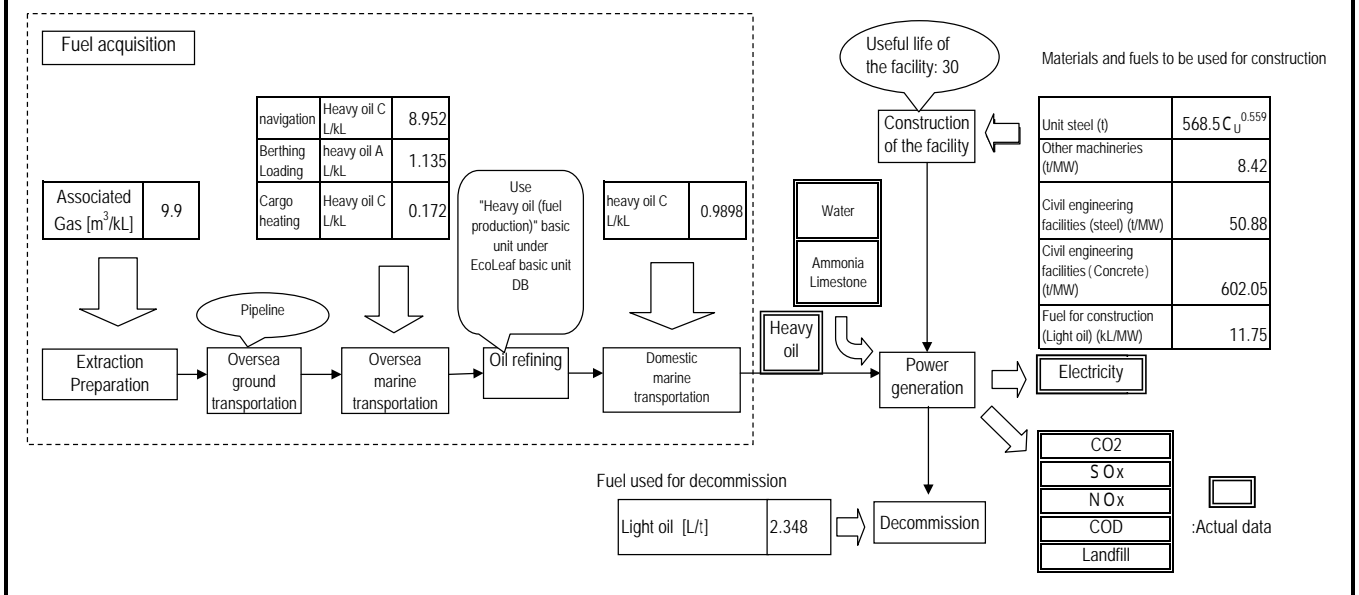
Source: Central Research Institute for the Electrical Power Industry (Report No.Y01006: Aug. 2001) Evaluation of nuclear power generation technology by means of lifecycle CO₂ emissions.

Exhibit 2

Lifecycle of crude oil-fired power generation



Lifecycle of heavy-oil powered power generation



Lifecycle of LNG powered power generation

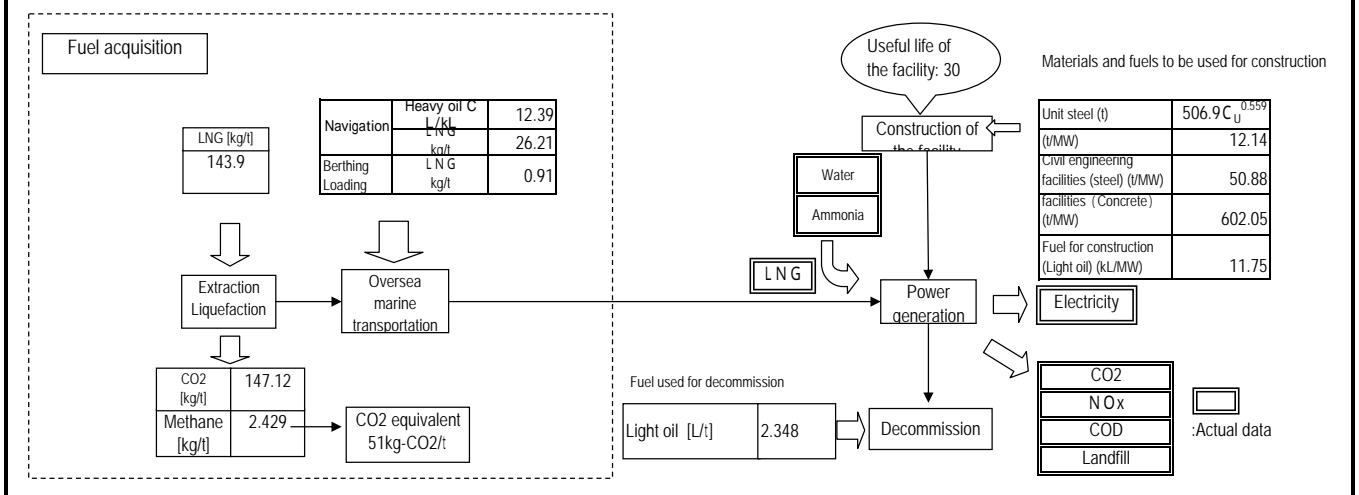
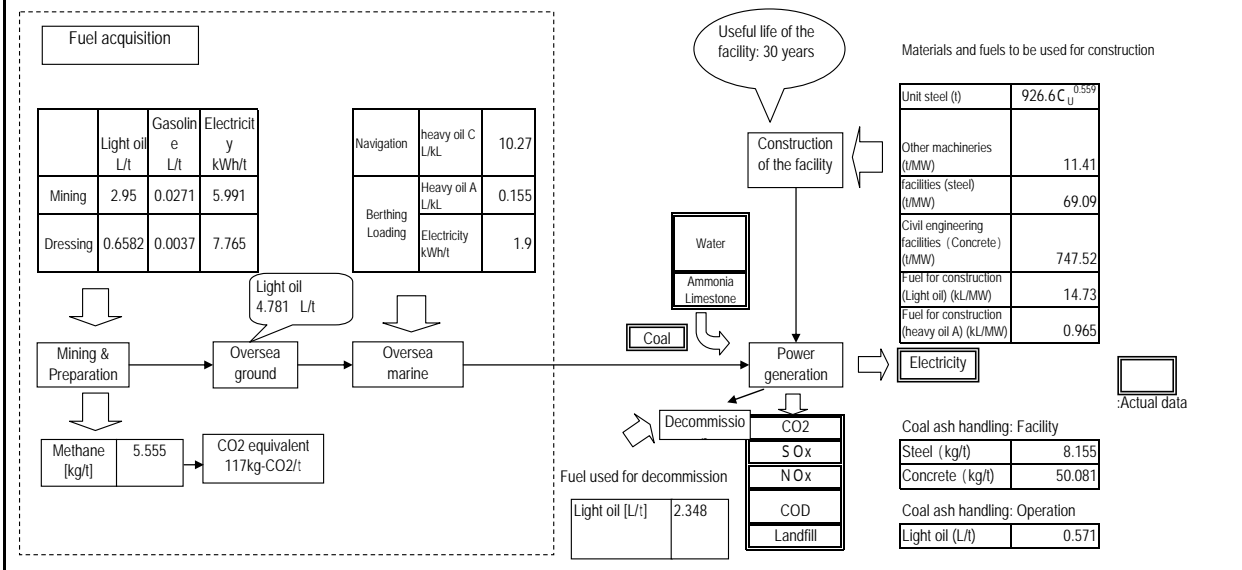
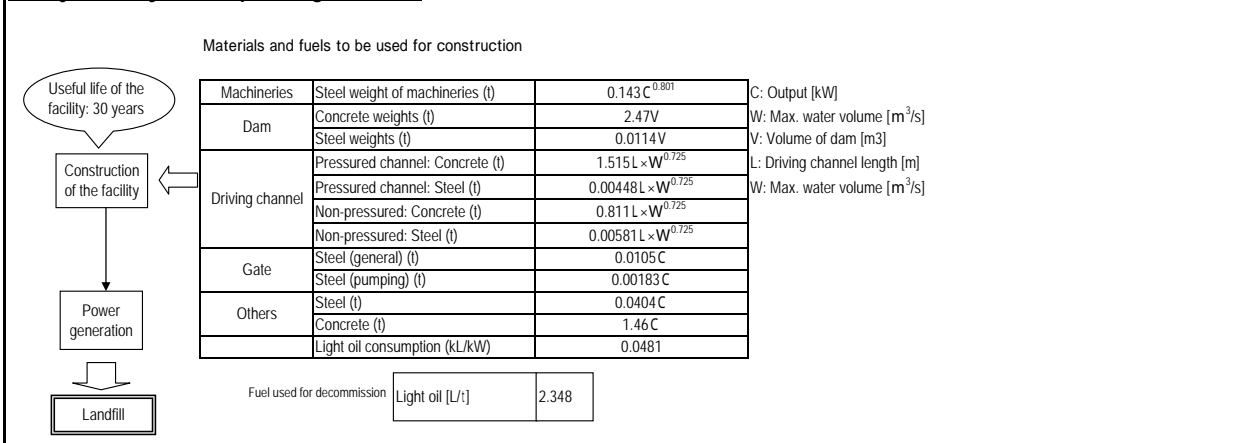


Exhibit 3

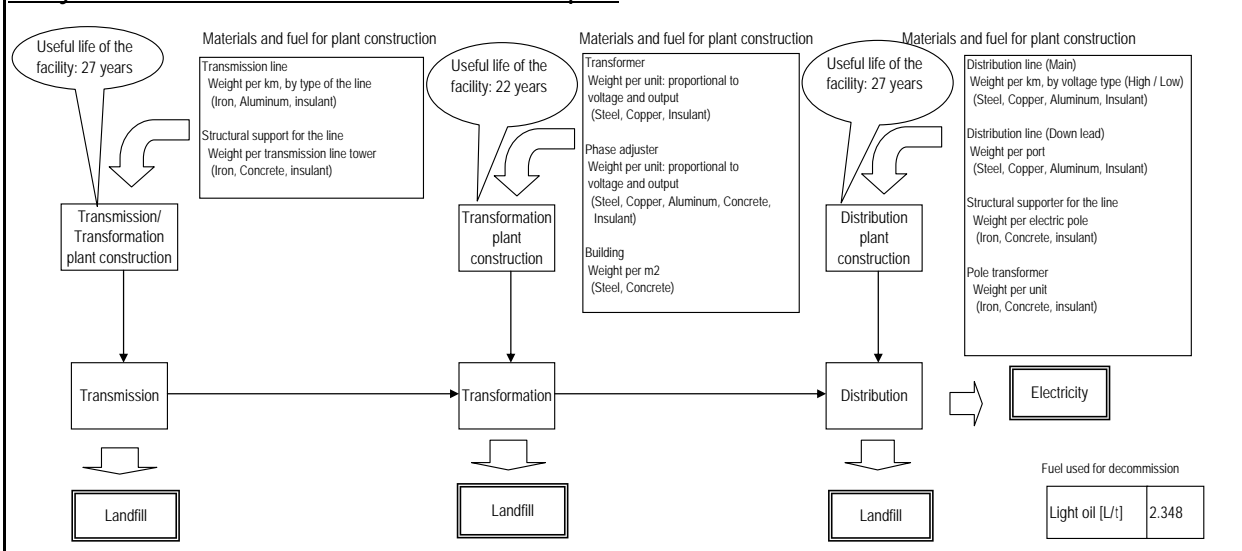
Lifecycle of coal-fired power generation



Lifecycle of hydraulic power generation



Lifecycle of transmission/transformation/distribution plant



Source:

Coal fired and hydraulic power generation:

Central Research Institute for the Electrical Power Industry (Report No.Y99009: March 2000) Evaluation of power generation technology by means of lifecycle CO2 emissions.

Transmission/transformation/distribution plant: by interviews to Central Research Institute for the Electrical Power Industry. Report by the institute (No. 38 of "Research of electricity and economy" Aug. 1997)

Exhibit 4

Material composition of transmission/transformation/distribution facilities

(1) Transmission

Voltage	Line type	Weight x Conductors	Cable (t/line-km)			Supporter (t/unit)		
			Steel	Aluminum	Insulant	Steel	Concrete	Insulant
500	TACSR	810×4	6.0	27.0	10.0	110.0	740.0	8.5
	TACSR	410×4	7.0	14.0	10.0	44.2	334.1	2.3
275 ~ 187	ACSR	410×4	7.0	14.0	6.0	44.2	334.1	2.3
	ACSR	410×2	3.0	7.0	6.0	14.9	121.4	0.7
154 ~ 110	TACSR	810×2	3.0	13.5	4.0	18.2	154.5	0.6
	TACSR	410×1	2.0	3.5	4.0	5.0	50.0	0.1
77 ~ 44	ACSR	410×1	2.0	3.5	2.0	5.0	50.0	0.1
	ACSR	240×1	1.3	2.0	2.0	1.4	16.2	0
33以下	ACSR	160×1	1.0	2.0	2.0	0.9	11.6	0

(2) Transformation

	Formula for weight (per unit)	Proportionate factor by material type				
		Steel	Copper	Aluminum	Concrete	Insulant
Transformer	$M=kV^{0.7}C^{0.75}$	0.0297	0.00532	-	0.0532	0.0126
Phase adjuster	$M=kC$	0.73	0.09	1.061	30.52	0.278

M: Weight [t] V: Voltage [kV] C: Capacity [MVA] k: Proportionate Factor

Building

Steel [kg/m ²]	188
Concrete [kg/m ²]	2321.8

(3) Distribution

Distribution line

	Distribution line (Main) (kg/line-km)				Distribution line (Down lead) (kg/port)			
	Steel	Copper	Aluminum	Insulant	Steel	Copper	Aluminum	Insulant
High voltage	46.6	255.2	215.6	126.6	11.4	2.1	2.3	25.7
Low voltage	63.9	175.0	185.1	109.8	4.0	3.5	0.0	2.0

Line supporter, Pole transformer

	Steel	Concrete	Insulant
Pole (kg/unit)	85.3	1033.3	9.9
Pole transformer (kg/unit)	140.0	53.0	82.0

Source: by interviews to Central Research Institute for the Electrical Power Industry.

Product Environmental Information Data Sheet (PEIDS)



Document control no.	F-02-01
Product vendor	
EcoLeaf registration no.	

EcoLeaf unit function DB ver.	
EcoLeaf characterization factor DB ver.	

PSC name	Grid Electricity		Product type	Power sold [1kWh]			
PSC code		Product weight (kg)	-	Package (kg)	-	Weight total (kg)	-

In/Out items	Life Cycle Stage	Unit	Fuel procurement	Production			Power distribution	Total	
				Facility construction	Power generation	Facility operation			
Inventory analysis	Energy Consumption	MJ							
		Mcal							
	Resource Consumption from the environment	Exhaustible resources	kg						
			kg						
			kg						
			kg						
			kg						
		Material	kg						
			kg						
			kg						
			kg						
			kg						
	Renewable resources	kg							
		kg							
	Emission/Discharge to the environment	to Atmosphere	kg						
			kg						
			kg						
			kg						
		to Water system	kg						
		to Soil system	kg						
kg									
Impact assessment		by Resource Consumption	Exhaustible resources	kg					
	kg								
	by Emission/Discharge to the environment	to Atmosphere	kg						
		kg							
	to Water system	kg							
		kg							

Notes:

Product data sheet

(Input data and parameters for LCA)



Document control no.	F-03-01
Product vendor	
EcoLeaf registration no.	

PSC name	Grid Electricity	Product type	Power sold [1kWh]
LCA/LCIA in units of:	Power sold [1kWh]	Product weight (kg)	-
		Package (kg)	-
		Weight total (kg)	-

1. Fuel procurement (per kWh of power sold) : List the energy required to produce and transport fuel

Consumption	Classification								
	Distribution								
	Quantity								
	Note								
Emission	Classification								
	Distribution								
	Quantity								
	Note								

2. Production (per kWh of power sold)

(1) Facility construction : Materials and fuel required to build power generation facilities

Consumption	Classification								
	Distribution								
	Quantity								
	Note								

(2) Power generation : List the amount of power generation fuel consumed and discharged .

*SOx and NOx data is converted respectively into SO₂ and NO₂ equivalents.

Consumption	Classification								
	Distribution								
	Quantity								
	Note								
	Classification								
	Distribution								
	Quantity								
	Note								
Emission	Classification								
	Distribution								
	Quantity								
	Note								
	Classification								
	Distribution								
	Quantity								
	Note								

(3) Facility operation : List the amount of power consumed and discharged in facility operation above and beyond (2).

*SOx and NOx data is converted respectively into SO₂ and NO₂ equivalents.

Consumption	Classification								
	Distribution								
	Quantity								
	Note								
Emission	Classification								
	Distribution								
	Quantity								
	Note								

3. Power distribution (per kWh of power sold) : Materials and waste associated with facility construction

Consumption	Classification								
	Distribution								
	Quantity								
	Note								
Emission	Classification								
	Distribution								
	Quantity								
	Note								

4. Others

Explanation: