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Digitization of methodologies

Web-based generation of project design documents

CDM EB 100

Bangkok, Thailand, 27 to 31 August 2018

Procedural background

Mandate

- CDM Executive Board workplan 2018
    - Project 256 Digitization of methodologies
    - Progress report: EB100: Info

- Decision 3/CMP.12, para. 9

- At EB 96, the Board decided to proceed with digitization of one methodology (ACM 0002) and to road-test the use of the same.

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- The questionnaire incorporates the logic of:

  - Methodology ACM0002

    - New power plants of types:

      - Hydro, wind, solar, tidal

  - Tools used by the methodology:

    - Tool to calculate emission factor of an electricity system

    - Additionality tool, along with tools on:

      - First-of-its-kind
      - Common practice
      - Investment analysis

- Capabilities of the digitalized version
    - Presents menu of questions to the user:
        - Text, numeric values, images, documents
        - Data files (Excel files)

    - Based on user inputs:
        - Determines the next questions (branching)
        - Calculates parameters/ factors from data provided
        - Inserts responses, calculated values, tables, equations into the PDD form template
        - Generates PDD in Word file that the user can download

Key issues and proposed solutions

Benefits demonstrated

- Facilitates PDD preparation: user can focus on the technical design of the project without having to go through a large number of documents (methodologies/ tools/ guidelines)

- Improves user experience and efficiency:
  - Data is asked only once, although may be presented in different places in the document/ process
  - Data is validated at input time: avoids erroneous data from entering the process
  - Complex calculations are performed automatically, including use of applicable default values

- Enhances quality, consistency and coherence of the PDD generated

Potential benefits of (upon mainstreaming)

- Standardize/ structure data capture: amenable to analysis, can help improve standards
- Facilitate streamline the work of project validation/ assessment;
- Prompt methodologies/tools to be modularized/ restructured/ streamlined/ harmonized/ debugged
- Facilitate maintenance/updating of methodological requirements: single point of update (the user always sees the current version)

Recommendations to the Board

The Board may:

- Take note of this update
- Provide feedback/guidance on the next stage of this work

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- Road-testing the tool with the stakeholders

Thank you!

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Data vintage year Y1 (YYYY)

2014

Data vintage year Y2 (YYYY)

2015

Data vintage year Y3 (YYYY)

2016

Upload data file
Select File

Choose File   test_data_1.xlsx

Available template: grid_data_template.xlsx ⬇

Last file: test_data_1.xlsx ⬇

Calculated EF_OM

0.8757 tCO2e/MWh   (method: Simple OM, Option A)

Calculated EF_BM

0.6712 tCO2e/MWh   (set of units: CDM included, 10-yr olds not included)

Data error

No errors found

Data validation status

Data validated

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BROWSE

① ————————————————————————— ② ———————————————————————————
Main   Review

①	Main	⌄

Name of the grid

Northern grid

Brief description of the grid

New grid old grid clean grid

Data vintage year Y1 (YYYY)

2014

Data vintage year Y2 (YYYY)

2015

Data vintage year Y3 (YYYY)

2016

Upload data file

test_data_1.xlsx

Data error

No errors found

Data validation status

Data validated

Data completion status

Data had no missing values

Calculated EF_OM

0.8757 tCO2e/MWh   (method: Simple OM, Option A)

Calculated EF_BM

0.6712 tCO2e/MWh   (set of units: CDM included, 10-yr olds not included)

Click on "Generate" to download your resulting proposal or click on "Save" so that you can return to your proposal later to finalize it.
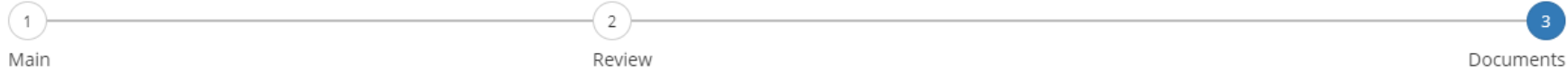
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Clean Development Mechanism

🏠 Home   📋 Proposals

PDD

frdfg

1 — Main ————— 2 — Review ————— 3 — Documents

Design documents and forms

Design documents and related monitoring report forms. Outcome is derived basing on the answers in the previous questions.

template_1_v23.docx   ⬇

Attached document files

All documents files are based on the answers in the previous questions.

Choose DOE ▼   **Send to DOE**

The design documents of your programme of activities will be sent to an accredited Designated Operational Entity (DOE) of your choice for evaluation.

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Calculation of grid emission factor

Electricity system (grid)

Title: Northern grid

Description: New grid old grid clean grid

Data vintage:

Years: 2014, 2015, 2016

Power generation summary

Total installed capacity:	8.985 GW
Non-renewables:	6 GW (67%)
Renewables:	2.985 GW (33%)
Total power generation:	54,106.777 GWh
Non-renewables:	43,621.052 GWh (81%)
Renewables:	10,485.725 GWh (19%)
Average capacity factor:	0.6874
Non-renewables:	0.8299
Renewables:	0.4010

Emission factors:

$EF_{OM} = 0.8757$ tCO2e/MWh   (method: Simple OM, Option A)

$EF_{BM} = 0.6712$ tCO2e/MWh   (set of units: CDM included, 10-yr olds not included)

Calculations are summarized in table 1 and table 2 below.

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Table 1 Summary of operating-margin emission factor calculation

Year	Power units	Total nom. cap.	Elect. gen. non-fuel	Elect. gen. LCMR	Elect. gen. non-LCMR	Elect. gen. tot.	Emissions tot.	EF_OM
2014	12	2,995	3,302,870	3,302,870	14,340,495	17,643,365	12,275,911	0.856
2015	11	2,995	3,418,654	3,418,654	15,194,706	18,613,360	13,152,108	0.8656
2016	12	2,995	3,764,201	3,764,201	14,085,851	17,850,052	12,772,966	0.9068
Total	-	-	10,485,725	10,485,725	43,621,052	54,106,777	38,200,985	0.8757

Table 2 Summary of build-margin emission factor calculation

Data year: 2016	Power units	Total nom. cap.	Elect. gen.	Emissions	EF_BM
Fuel-burning units	1	600	4,899,458	4,403,143	0.8987
Non-fuel-burning units	4	495	1,660,369	-	-
Total	5	1,095	6,559,827	4,403,143	0.6712

The data used in calculation, including filled-in default values, are presented in appendix 1.

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Table A2 Unit-wise power generation data

Plant-Unit ID	LCMR	Nom. cap.	Op. year	Fuel type	Fuel cons.	Elect. gen.	Fuel NCV	Fuel EF	Conv. effi.	Rem.
P001-U1	No	50	2014	Coal: anthrac.	169,965	397,718	23.5	94,600	na	
P001-U3,4,5	No	150	2014	Coal: BC briq.	701,154	1,146,971	15.1	87,300	na	
P001-U2	No	50	2014	Oil: diesel oil	86,964	400,033	41.4	72,600	na	
P001-U1,3,4,5	No	200	2015	Coal: anthrac.	731,526	1,711,770	23.5	94,600	na	
P001-U2	No	50	2015	Oil: diesel oil	89,656	412,418	41.4	72,600	na	
P001-U1,3,4,5	No	200	2016	Coal: anthrac.	590,863	1,382,619	23.5	94,600	na	
P001-U2	No	50	2016	Oil: diesel oil	72,695	334,399	41.4	72,600	na	
P002-U1	No	120	2014	Gas: nat. gas	69,799	710,433	46.5	54,300	na	
P002-U1	No	120	2015	Gas: nat. gas	88,276	898,503	46.5	54,300	na	
P002-U1	No	120	2016	Gas: nat. gas	98,427	1,001,825	46.5	54,300	na	
P003-U1	Yes	40	2014	na	na	204,688	na	na	na	
P003-U1	Yes	40	2015	na	na	209,508	na	na	na	
P003-U1	Yes	40	2016	na	na	204,685	na	na	na	
P004-U1	Yes	90	2014	na	na	330,798	na	na	na	
P004-U1	Yes	90	2015	na	na	345,568	na	na	na	
P004-U1	Yes	90	2016	na	na	336,166	na	na	na	
P005-U1,2	No	230	2014	Coal: coking c.	671,632	1,746,243	24	87,300	na	
P005-U1,2	No	230	2015	Coal: oth. bitu.	846,468	1,824,843	19.9	89,500	na	
P005-U1	No	50	2016	Coal: oth. bitu.	175,844	379,090	19.9	89,500	na	
P005-U2	No	180	2016	Coal: coking c.	441,464	1,147,806	24	87,300	na	
P006-U1	No	800	2014	Coal: lignite	4,850,080	5,422,656	11.5	90,900	na	
P006-U1	No	800	2015	Coal: lignite	5,594,690	6,255,176	11.5	90,900	na	
P006-U1	No	800	2016	Coal: lignite	5,118,970	4,940,654	11.5	90,900	na	
P007-U1	Yes	500	2014	na	na	1,610,980	na	na	na	
P007-U1	Yes	500	2015	na	na	1,769,247	na	na	na	
P007-U1	Yes	500	2016	na	na	2,103,832	na	na	na	
P008-U1	Yes	150	2014	na	na	337,815	na	na	na	
P008-U1	Yes	150	2015	na	na	331,748	na	na	na	
P008-U1	Yes	150	2016	na	na	293,679	na	na	na	
P009-U1	No	600	2014	Coal: anthrac.	1,881,850	4,516,441	22.8	94,600	na	
P009-U1	No	600	2015	Coal: anthrac.	1,704,998	4,091,996	22.8	94,600	na	
P009-U1	No	600	2016	Coal: anthrac.	2,041,441	4,899,458	22.8	94,600	na	
P010-U1	Yes	215	2014	na	na	818,589	na	na	na	
P010-U1	Yes	215	2015	na	na	762,583	na	na	na	
P010-U1	Yes	215	2016	na	na	825,839	na	na	na	
Remarks										

Remarks
A: Column 'fuel_cons': default value used
B: Column 'fuel_NCV': default value used
C: Column 'fuel_EF': default value used

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Calculation of grid emission factor

Electricity system (grid)

Title: Eastern grid

Description: Old grid big grid

Data vintage:

Years: 2014, 2015, 2016

Power generation summary

Total installed capacity:	176.663 GW
Non-renewables:	122.685 GW (69%)
Renewables:	53.978 GW (31%)
Total power generation:	893,055.546 GWh
Non-renewables:	689,117.419 GWh (77%)
Renewables:	203,938.127 GWh (23%)
Average capacity factor:	0.5771
Non-renewables:	0.6412
Renewables:	0.4313

Emission factors:

EF_{OM} = 0.7124 tCO2e/MWh   (method: Simple OM, Option A)

EF_{BM} = 0.4282 tCO2e/MWh   (set of units: CDM not included, 10-yr olds not included)

Calculations are summarized in table 1 and table 2 below.

Table A2 Unit-wise power generation data

Plant-Unit ID	LCMR	Nom. cap.	Op. year	Fuel type	Fuel cons.	Elect. gen.	Fuel NCV	Fuel EF	Conv. effi.	Rem.
P001-U1	No	10	2014	Oil: waste oil	5,216	57,113	50.73	74,630	na	
P001-U1	No	10	2015	Oil: waste oil	5,307	58,105	50.73	74,630	na	
P001-U1	No	10	2016	Oil: waste oil	5,207	57,016	50.73	74,630	na	
P002-U1	Yes	450	2014	na	na	1,595,314	na	na	na	
P002-U1	Yes	450	2015	na	na	1,576,752	na	na	na	
P002-U1	Yes	450	2016	na	na	1,571,208	na	na	na	
P003-U1	No	20	2014	Biomass: oth. b.	36,658	112,917	14.42	101,094	na	
P003-U1	No	20	2015	Biomass: oth. b.	36,884	113,612	14.42	101,094	na	
P003-U1	No	20	2016	Biomass: oth. b.	36,867	113,561	14.42	101,094	na	
P004-U1	No	1,000	2014	Coal: oth. bitu.	1,892,194	5,609,266	25.47	95,632	na	
P004-U1	No	1,000	2015	Coal: oth. bitu.	1,956,957	5,745,870	25.47	95,632	0.415	AD
P004-U1	No	1,000	2016	Coal: oth. bitu.	1,865,461	5,530,018	25.47	95,632	na	
P005-U1	No	400	2014	Coal: sub-bitu.	969,605	2,284,631	18.85	97,581	na	
P005-U1	No	400	2015	Coal: sub-bitu.	953,111	2,245,768	18.85	97,581	na	
P005-U1	No	400	2016	Coal: sub-bitu.	964,442	2,272,467	18.85	97,581	na	
P006-U1	No	1,500	2014	Coal: anthrac.	2,247,865	8,510,231	21.6	96,404	na	B
P006-U1	No	1,500	2015	Coal: anthrac.	2,280,982	8,635,608	27.15	96,404	na	
P006-U1	No	1,500	2016	Coal: anthrac.	2,263,227	8,568,390	27.15	96,404	na	
P007-U1	No	100	2014	Biomass: wood/w	164,953	351,808	7.9	95,000	na	BC
P007-U1	No	100	2015	Biomass: wood/w	166,124	354,305	19.34	112,346	na	
P007-U1	No	100	2016	Biomass: wood/w	161,912	345,322	19.34	112,346	na	
P008-U1	Yes	100	2014	na	na	349,725	na	na	na	
P008-U1	Yes	100	2015	na	na	348,118	na	na	na	
P008-U1	Yes	100	2016	na	na	357,702	na	na	na	
P009-U1	No	200	2014	Coal: BC briq.	503,575	1,143,337	23.42	97,390	na	
P009-U1	No	200	2015	Coal: BC briq.	506,611	1,150,230	23.42	97,390	na	
P009-U1	No	200	2016	Coal: BC briq.	512,119	1,162,736	23.42	97,390	na	
P010-U1	No	750	2014	Biomass: wood/w	956,705	4,344,780	19.44	113,678	na	
P010-U1	No	750	2015	Biomass: wood/w	962,088	4,369,225	19.44	113,678	na	
P010-U1	No	750	2016	Biomass: wood/w	956,843	4,345,408	19.44	113,678	na	
P011-U1	No	500	2014	Biomass: oth. b.	897,686	2,835,400	14.43	101,045	0.788	AD
P011-U1	No	500	2015	Biomass: oth. b.	897,959	2,836,262	14.43	101,045	0.788	AD
P011-U1	No	500	2016	Biomass: oth. b.	898,125	2,861,988	14.43	101,045	na	
P012-U1	No	15	2014	Oil: waste oil	14,337	79,315	49.79	72,688	na	
P012-U1	No	15	2015	Oil: waste oil	14,273	78,964	49.79	72,688	na	
P012-U1	No	15	2016	Oil: waste oil	14,015	77,534	49.79	72,688	na	
P013-U1	No	800	2014	Oil: naphtha	732,777	4,142,869	44.15	73,057	na	
P013-U1	No	800	2015	Oil: naphtha	727,760	4,114,504	44.15	73,057	na	
P013-U1	No	800	2016	Oil: naphtha	726,678	4,108,387	44.15	73,057	na	
P014-U1	No	450	2014	Oil: diesel oil	278,340	2,567,343	42.3	74,847	na	
P014-U1	No	450	2015	Oil: diesel oil	277,635	2,560,833	42.3	74,847	na	
P014-U1	No	450	2016	Oil: diesel oil	281,141	2,593,172	42.3	74,847	na	
P015-U1	No	800	2014	Gas: nat. gas	520,366	4,237,339	47.9	55,499	na	

P110-U1	No	1,000	2016	Coal: anthrac.	2,123,644	5,722,985	26.8	98,042	na	
P111-U1	No	3	2014	Oil: waste oil	1,560	16,868	50.41	73,030	na	
P111-U1	No	3	2015	Oil: waste oil	1,571	16,981	50.41	73,030	na	
P111-U1	No	3	2016	Oil: waste oil	1,559	16,858	50.41	73,030	na	
P112-U1	No	12.5	2014	Gas: nat. gas	6,811	71,202	47.94	56,150	na	
P112-U1	No	12.5	2015	Gas: nat. gas	6,803	71,120	47.94	56,150	na	
P112-U1	No	12.5	2016	Gas: nat. gas	6,843	71,530	47.94	56,150	na	
P113-U1	No	1	2014	Oil: naphtha	1,327	5,208	43.75	73,055	na	
P113-U1	No	1	2015	Oil: naphtha	1,312	5,152	43.75	73,055	na	
P113-U1	No	1	2016	Oil: naphtha	1,350	5,298	43.75	73,055	na	
P114-U1	No	15	2014	Oil: naphtha	9,335	86,817	43.48	71,521	na	
P114-U1	No	15	2015	Oil: naphtha	9,353	86,980	43.48	71,521	na	
P114-U1	No	15	2016	Oil: naphtha	9,495	88,307	43.48	71,521	na	
P115-U1	No	70	2014	Oil: RF oil	45,636	402,394	40.54	77,093	na	
P115-U1	No	70	2015	Oil: RF oil	45,936	405,038	40.54	77,093	na	
P115-U1	No	70	2016	Oil: RF oil	45,636	402,397	40.54	77,093	na	
P116-U1	No	50	2014	Gas: nat. gas	31,976	261,577	47.27	55,809	na	
P116-U1	No	50	2015	Gas: nat. gas	31,685	259,190	47.27	55,809	na	
P116-U1	No	50	2016	Gas: nat. gas	32,268	263,967	47.27	55,809	na	
P117-U1	No	2,250	2014	Coal: lignite	8,410,052	12,788,606	13.72	103,634	na	
P117-U1	No	2,250	2015	Coal: lignite	8,428,559	12,816,748	13.72	103,634	na	
P117-U1	No	2,250	2016	Coal: lignite	8,340,820	12,683,329	13.72	103,634	na	
P118-U1	Yes	375	2014	na	na	1,297,442	na	na	na	
P118-U1	Yes	375	2015	na	na	1,266,444	na	na	na	
P118-U1	Yes	375	2016	na	na	1,296,397	na	na	na	
P119-U1	No	150	2014	Biomass: wood/w	272,580	526,541	19.7	115,421	na	
P119-U1	No	150	2015	Biomass: wood/w	275,543	532,265	19.7	115,421	na	
P119-U1	No	150	2016	Biomass: wood/w	273,197	527,734	19.7	115,421	na	
P120-U1	No	300	2014	Oil: diesel oil	385,481	1,697,087	42.04	73,207	na	
P120-U1	No	300	2015	Oil: diesel oil	384,404	1,692,348	42.04	73,207	na	
P120-U1	No	300	2016	Oil: diesel oil	386,923	1,703,435	42.04	73,207	na	
Remarks										

Remarks

A: Column 'fuel_cons': default value used

B: Column 'fuel_NCV': default value used

C: Column 'fuel_EF': default value used

D: Column 'conv_effi': default value used

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PDD

tree

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Main   Review

①	Main	⌄

Name of the grid

gssgh

Brief description of the grid

gfdfhjde

Data vintage year Y1 (YYYY)

2014

Data vintage year Y2 (YYYY)

2015

Data vintage year Y3 (YYYY)

2016

Upload data file

test_data_1_err_fc_v_gen.xlsx

Data error

Error: column 'elect_gen' or 'nom_cap', row: 6: capacity factor out of range

Data validation status

Data completion status

Calculated EF_OM

Calculated EF_BM

Click on "Generate" to download your resulting proposal or click on "Save" so that you can return to your proposal later to finalize it.

[Generate]   ☁ Save

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PDD

gdsdfr

①———————————————②————————————————
Main   Review

①	Main	⌄

Name of the grid

Grid XPQ

Brief description of the grid

Northeastern grid

Data vintage year Y1 (YYYY)

2014

Data vintage year Y2 (YYYY)

2015

Data vintage year Y3 (YYYY)

2016

Upload data file

test_data_1_err_dup.xlsx

Data error

Error: duplicate data: row 25 is same as row 11

Data validation status

Data completion status

Calculated EF_OM

Calculated EF_BM

Click on "Generate" to download your resulting proposal or click on "Save" so that you can return to your proposal later to finalize it.

[Generate]   ☁ Save

plant_ID	latitude	longitude	plant_name	unit_ID	date_commi	tech_type	is_LCMR	is_CDM	nom_cap	op_yr	fuel_type	fuel_cons	elect_gen	fuel_NCV	fuel_EF	conv_effi
P001	34.56456	75.23419	Plant X	U1	25/06/2006	Coal: subcritical	No	No	50	2014	Coal: anthracite	169965	397718	23.5	94600	na
P001	34.56456	75.23419	Plant X	U3,4,5	25/06/2006	Coal: subcritical	No	No	150	2014	Coal: brown coal briquettes	701154	1146971	15.1	87300	na
P001	34.56456	75.23419	Plant X	U2	25/06/2006	Oil/natural gas: reciprocal gas engine	No	No	50	2014	Oil: gas/ diesel oil	86964	400033	41.4	72600	na
P001	34.56456	75.23419	Plant X	U1,3,4,5	25/06/2006	Coal: subcritical	No	No	200	2015	Coal: anthracite	731526	1711770	23.5	94600	na
P001	34.56456	75.23419	Plant X	U2	25/06/2006	Oil/natural gas: reciprocal gas engine	No	No	50	2015	Oil: gas/ diesel oil	89656	412418	41.4	72600	na
P001	34.56456	75.23419	Plant X	U1,3,4,5	25/06/2006	Coal: subcritical	No	No	200	2016	Coal: anthracite	590863	1382619	23.5	94600	na
P001	34.56456	75.23419	Plant X	U2	25/06/2006	Oil/natural gas: reciprocal gas engine	No	No	50	2016	Oil: gas/ diesel oil	72695	334399	41.4	72600	na
P002	23.45434	71.65349	Plant A	U1	01/01/2009	Cogeneration: gas turbine	No	No	120	2014	Gas: natural gas	69799	710433	46.5	54300	na
P002	23.45434	71.65349	Plant A	U1	01/01/2009	Cogeneration: gas turbine	No	No	120	2015	Gas: natural gas	88276	898503	46.5	54300	na
P002	23.45434	71.65349	Plant A	U1	01/01/2009	Cogeneration: gas turbine	No	No	120	2016	Gas: natural gas	98427	1001825	46.5	54300	na
P003	18.34233	78.43451	Plant B	U1	16/09/2011	Hydro: without reservoir	Yes	No	40	2014	na	na	204688	na	na	na
P003	18.34233	78.43451	Plant B	U1	16/09/2011	Hydro: without reservoir	Yes	No	40	2015	na	na	209508	na	na	na
P003	18.34233	78.43451	Plant B	U1	16/09/2011	Hydro: without reservoir	Yes	No	40	2016	na	na	204685	na	na	na
P004	19.45641	69.43234	Plant Z	U1	24/02/2012	Solar: concentrated solar thermal	Yes	No	90	2014	na	na	330798	na	na	na
P004	19.45641	69.43234	Plant Z	U1	24/02/2012	Solar: concentrated solar thermal	Yes	No	90	2015	na	na	345568	na	na	na
P004	19.45641	69.43234	Plant Z	U1	24/02/2012	Solar: concentrated solar thermal	Yes	No	90	2016	na	na	336166	na	na	na
P005	16.34587	65.33469	Plant W	U1,2	02/05/2002	Coal: subcritical	No	No	230	2014	Coal: bituminous: coking coal	671632	1746243	24	87300	na
P005	16.34587	65.33469	Plant W	U1,2	02/05/2002	Coal: subcritical	No	No	230	2015	Coal: other bituminous	846468	1824843	19.9	89500	na
P005	16.34587	65.33469	Plant W	U1	02/05/2002	Coal: subcritical	No	No	50	2016	Coal: other bituminous	175844	379090	19.9	89500	na
P005	16.34587	65.33469	Plant W	U2	02/05/2002	Coal: subcritical	No	No	180	2016	Coal: bituminous: coking coal	441464	1147806	24	87300	na
P006	15.78654	78.44623	Plant V	U1	24/06/2004	Coal: subcritical	No	No	800	2014	Coal: lignite	4850080	5422656	11.5	90900	na
P006	15.78654	78.44623	Plant V	U1	24/06/2004	Coal: subcritical	No	No	800	2015	Coal: lignite	5594690	6255176	11.5	90900	na
P006	15.78654	78.44623	Plant V	U1	24/06/2004	Coal: subcritical	No	No	800	2016	Coal: lignite	5118970	4940654	11.5	90900	na
P007	32.54692	65.43745	Plant C	U1	20/08/2006	Hydro: with reservoir	Yes	No	500	2014	na	na	1610980	na	na	na
P007	32.54692	65.43745	Plant C	U1	20/08/2006	Hydro: with reservoir	Yes	No	500	2015	na	na	1769247	na	na	na
P007	32.54692	65.43745	Plant C	U1	20/08/2006	Hydro: with reservoir	Yes	No	500	2016	na	na	2103832	na	na	na
P008	22.56764	60.56454	Plant D	U1	15/03/2013	Solar: photovoltaic	Yes	Yes	150	2014	na	na	337815	na	na	na
P008	22.56764	60.56454	Plant D	U1	15/03/2013	Solar: photovoltaic	Yes	Yes	150	2015	na	na	331748	na	na	na
P008	22.56764	60.56454	Plant D	U1	15/03/2013	Solar: photovoltaic	Yes	Yes	150	2016	na	na	293679	na	na	na
P009	28.54674	67.33498	Plant E	U1	20/01/2009	Coal: circulating fluidized bed combustion	No	No	600	2014	Coal: anthracite	1881850	4516441	22.8	94600	na
P009	28.54674	67.33498	Plant E	U1	20/01/2009	Coal: circulating fluidized bed combustion	No	No	600	2015	Coal: anthracite	1704998	4091996	22.8	94600	na
P009	28.54674	67.33498	Plant E	U1	20/01/2009	Coal: circulating fluidized bed combustion	No	No	600	2016	Coal: anthracite	2041441	4899458	22.8	94600	na
P010	24.77643	64.78435	Plant F	U1	28/05/2011	Wind	Yes	Yes	215	2014	na	na	818589	na	na	na
P010	24.77643	64.78435	Plant F	U1	28/05/2011	Wind	Yes	Yes	215	2015	na	na	762583	na	na	na
P010	24.77643	64.78435	Plant F	U1	28/05/2011	Wind	Yes	Yes	215	2016	na	na	825839	na	na	na

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Paragraph 23 of the annotated agenda

Title

calc_EF

Description

calculate EFs and output these

Variable List	← Output	→ Input

→ EF_DATA
→ Y1
→ Y2
→ Y3
← ERR_MSG_SHOW
← VAL_STATUS_SHOW
← COMPL_STATUS_SHOW
← T0
← T1
← T2
← TA1
← TA2
← EF_OM_SHOW

+ Add variable

Calculation board

```
1305
1306        # compute percent_lcmr_gen
1307        tot_gen = lcmr_gen + non_lcmr_gen
1308        percent_lcmr_gen = lcmr_gen / tot_gen * 100
1309        percent_lcmr_gen = Math.round(percent_lcmr_gen * 100) / 100
1310
1311        # compute lcmr and non_lcmr em
1312        lcmr_em = 0.0
1313        for i in [0...DATA.length]
1314            lc_str = DATA[i].is_LCMR
1315            if isFoundIn(lc_str, Y_LST) and DATA[i].fuel_type != "na"
1316                a = DATA[i].fuel_cons
1317                b = DATA[i].fuel_NCV
1318                c = DATA[i].fuel_EF * 1e-6
1319                lcmr_em = lcmr_em + a * b * c
1320                lcmr_em = Math.round(lcmr_em)
```

Agenda item 4.1.

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← COMPL_STATUS_SHOW 🗑	
← T0 🗑	
← T1 🗑	
← T2 🗑	
← TA1 🗑	
← TA2 🗑	
← EF_OM_SHOW 🗑	

+ Add variable

Calculation board

```
115      "EF_h": 115000,
116      "EF_l": 90900
117    },
118    {
119      "fuel": "Coal: anthracite",
120      "EF_h": 101000,
121      "EF_l": 94600
122    },
123    {
124      "fuel": "Coal: bituminous: coking coal",
125      "EF_h": 101000,
126      "EF_l": 87300
127    },
128    {
129      "fuel": "Coal: sub-bituminous",
130      "EF_h": 100000
```

https://app-eff78ffabc4ef4.app.unfccc.org/tools/cdm/UNFCCC_CDM/Pages/Default.aspx

Agenda item 4.1.

Paragraph 23 of the annotated agenda