

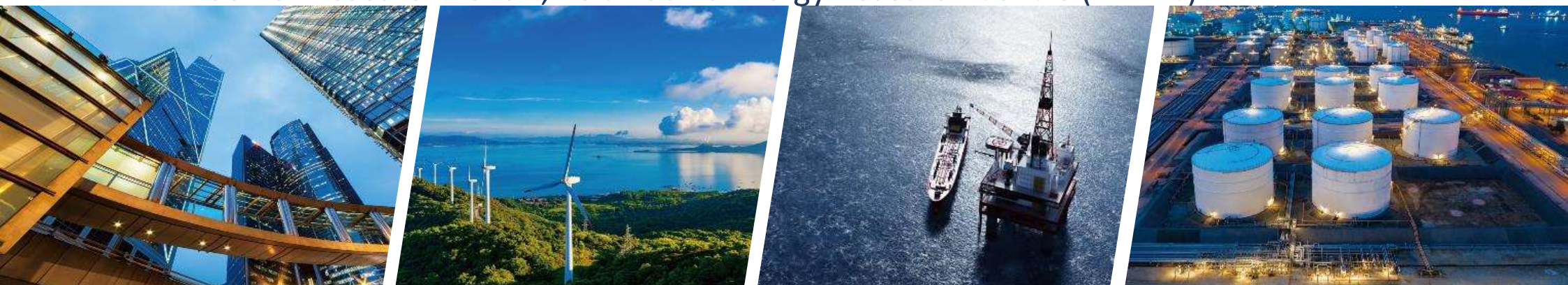
7A. Data collection on new energy products and technologies

**The 35th Meeting of APEC Expert Group on Energy Data and Analysis (EGEDA)
Hong Kong, China; 17-19 January 2024**

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Presentation outline

- Background
- Revision of the Standard International Energy Classification (SIEC)
- District cooling data
- Hydrogen production and utilization data
- Grid-scale battery storage
- Consumption of electric, hybrid and hydrogen vehicles

Background

- New developments in the energy sector require more data
- Energy transition/Carbon-neutrality/Net-Zero policies are looking into the utilisation of new energy products and technologies to achieve environmental goals
 - Energy modelers need information on these new products and technologies to quantify their impacts
- APEC energy ministers were considering new energy targets to achieve global climate goals and were discussing the following:
 - Decreasing methane emissions
 - Increasing the share of carbon-free and decarbonized electricity
- APEC leaders declared to pursue and encourage efforts to triple renewable energy globally by 2030

Revision of Standard International Energy Classification (SIEC)

- The United Nations Statistical Commission (UNSC) requested the Committee on International Statistics Classifications to revise the Standard International Energy Product Classification (SIEC) to improve harmonization with the Central Product Classification (CPC)
- A Task Team on the Standard International Energy Product Classification (TT-SIEC) was established to support the revision of SIEC
- An initial list of issues identified for SIEC revision were produced, among them are:
 - Classification of hydrogen and ammonia
 - Classification of oil shale and oil sands
 - Review of the definition of coal
 - District cooling
 - Definitions of biofuels
 - Industrial and municipal wastes
 - Overall review of renewable energy products

Data collection in district cooling



Data collection on district cooling (DC)

- The EGEDA secretariat started collecting district cooling data from non-OECD members during the collection of 2017 data
- China (Japan and Korea too) mentioned in an APEC workshop on energy statistics that district cooling data is included in their heat data.
- No non-OECD economies can report although there were known installations in Malaysia, Singapore, and the Philippines.
- As of the latest data collection (2021 data); only Hong Kong, China is able to report (since 2019)
- Malaysia may be able to start data collection this year

District cooling - template

Chilled water⁴ production (Table 1c)

Unit: select unit

		Thermal			Hydro	Nuclear	Geo-thermal	Other renewable energy							Others ³	Total	
		Coal	Oil	Gas				Solar	Tide, wave, ocean	Wind	Biomass	Industrial wastes ¹	Renewable municipal solid waste	Non-renewable municipal solid waste			Biogas ²
		A	B	C				D	E	F	G	H	I	J			K
Main Activity Producers																	
Gross chilled water production	1	0	0	0		0	0	0			0	0	0	0	0	0	
District cooling plants	2															0	
Cooling and power plants	3															0	
Own Use by Plant	4	0	0	0		0	0	0			0	0	0	0	0	0	
District cooling plants	5															0	
Cooling and power plants	6															0	
Net chilled water production	7	0	0	0		0	0	0			0	0	0	0	0	0	
District cooling plants	8	0	0	0		0	0	0			0	0	0	0	0	0	
Cooling and power plants	9	0	0	0		0	0	0			0	0	0	0	0	0	
Autoproducers																	
Chilled water sold	16	0	0	0		0	0	0			0	0	0	0	0	0	
District cooling plants	17															0	
Cooling and power plants	18															0	

The template is an addition to the electricity and heat questionnaire

Consumption – similar to heat

		Electricity	Heat	Chilled water
		GWh	ktoe	ktoe
		A	B	C
Industry sector	30	0	0	0
Iron and steel	31			
Chemical (incl. petrochemical)	32			
Non-ferrous metals	33			
Non-metallic minerals	34			
Transport equipments	35			
Machinery	36			
Mining and quarrying	37			
Food, beverages and tobacco	38			
Pulp, paper and printing	39			
Wood and wood products	40			
Construction	41			
Textile and leather	42			
Not elsewhere specified	43			
Transport sector	44	0		
Domestic air transport	45			
Road	46			
Rail	47			
Inland waterways	48			
Pipeline transport	49			
Not elsewhere specified	50			
Other Sector	51	0	0	0
Residential	52			
Commercial and public services	53			
Agriculture	54			
Fishing	55			
Not elsewhere specified	56			

Hydrogen, ammonia and e-fuels template



Hydrogen, ammonia and e-fuels production

APEC format for annual Hydrogen data

Table 1a. Production and supply

Unit: Terajoules (Net calorific values)

		Energy input		Energy Output			
		Product	Quantity	Hydrogen	Ammonia	e-fuels	Total
		A	B	C	D	E	F
PRODUCTION	1		0	0	0	0	0
1. From Thermal process	2		0	0	0	0	0
Natural gas reforming	3	Natural gas	0	0	0		0
<i>With CCS</i>	4						0
<i>Without CCS</i>	5						0
Petroleum products reforming	6	Petroleum products	0	0	0		0
<i>With CCS</i>	7						0
<i>Without CCS</i>	8						0
Coal gasification	9	Coal	0	0	0		0
<i>With CCS</i>	10						0
<i>Without CCS</i>	11						0
From renewables (including renewable waste)	12	Biomass, biofuels and renewable waste	0	0	0		0
<i>With CCS</i>	13						0
<i>Without CCS</i>	14						0
From non-renewable waste	15	Non-renewable waste	0	0	0		0
<i>With CCS</i>	16						0
<i>Without CCS</i>	17						0
2. From Electrolytic processes	18		0	0	0	0	0
Electricity exclusively from renewables	19	Electricity	0	0	0	0	0
<i>Geothermal</i>	20	Electricity					0
<i>Solar (Thermal)</i>	21	Electricity					0
<i>Solar (PV)</i>	22	Electricity					0
<i>Wind</i>	23	Electricity					0
<i>Hydro</i>	24	Electricity					0
<i>Biomass</i>	25	Electricity					0
<i>Other renewables</i>	26	Electricity					0
Electricity exclusively from nuclear energy	27	Electricity					0
Electricity exclusively from fossil fuels	28	Electricity					0
Electricity from grid	29	Electricity					0
Electricity - Others							0
3. From Other processes	30		0	0	0	0	0
Solar-driven processes	31	Solar energy					0
Biological processes	32	Other energy (specify)					0
Others	33	Other energy (specify)					0

• Production

- **Without CCS** – include production without CCS technology plus the part produced while not capturing carbon in installations with CCS (for example 30% of production in installation with 70% capturing). Also include here the production via CCUS (Carbon Capture, Use and Storage) where present.
- **With CCS** – include the production proportionate to the part captured. It could be up to 95%, however the CO₂ created to produce the steam used in some process will probably be not counted.

Transformation

Table 2. Consumption in the transformation and energy sectors

Unit: Terajoules

		Hydrogen	Ammonia	e-fuels	Total
		A	B	D	E
TOTAL TRANSFORMATION SECTOR	1	0	0	0	0
Main activity producer	2	0	0	0	0
Electricity plants	3				0
CHP	4				0
Heat plants	5				0
District cooling plants	6				0
Autoproducer	7	0	0	0	0
Electricity plants	8				0
CHP	9				0
Heat plants	10				0
District cooling plants	11				0
Natural gas blending plants	12				0
Gas works plants	13				0
Coke ovens	14				0
Blast furnaces	15				0
Natural gas liquefaction	16				0
LNG regasification	17				0
Gas-to-liquid plants	18				0
Oil refineries	19				0
Petrochemical industry	20				0
Hydrogen compound production (e.g.: hydrogen to ammonia)	21				0
Hydrogen reconversion (e.g.: ammonia to hydrogen)	22				0
e-fuels production (hydrogen to e-fuels)	23				0
Other transformation	24				0

- This table requires the hydrogen, ammonia and e-fuels that are used in the transformation sector
- Transformation means that the products are converted into other energy products
- Hydrogen compound production is when hydrogen is transformed into ammonia, e-fuels, MCH, etc
- Hydrogen reconversion is when ammonia or other compounds is transformed into hydrogen

Consumption

Table 3. Final Energy Consumption
Unit: Terajoules

		Hydrogen			Ammonia			e-fuels		
		Energy use	Non-energy use	Total	Energy use	Non-energy use	Total	Energy use	Non-energy use	Total
		A			B			D		E
FINAL ENERGY CONSUMPTION	1	0	0	0	0	0	0	0	0	0
TOTAL INDUSTRY SECTOR	2	0	0	0	0	0	0	0	0	0
Iron and steel	3			0			0			0
Chemical and petrochemical	4			0			0			0
Non-ferrous metals	5			0			0			0
Non-metallic minerals	6			0			0			0
Transport equipment	7			0			0			0
Machinery	8			0			0			0
Mining and quarrying	9			0			0			0
Food, beverages and tobacco	10			0			0			0
Pulp, paper and print	11			0			0			0
Wood and wood products	12			0			0			0
Construction	13			0			0			0
Textile and leather	14			0			0			0
Not elsewhere specified	15			0			0			0
TOTAL TRANSPORT SECTOR	16	0	0	0	0	0	0	0	0	0
Domestic air transport	18			0			0			0
Road	19			0			0			0
Rail	20			0			0			0
Inland waterways	21			0			0			0
Pipeline transport	22			0			0			0
Not elsewhere specified	23			0			0			0
TOTAL OTHER SECTOR	24	0	0	0	0	0	0	0	0	0
Commercial and public services	25			0			0			0
Residential	26			0			0			0
Agriculture	27			0			0			0
Fishing	28			0			0			0
Not elsewhere specified	29			0			0			0

Grid-scale battery storage



Electricity questionnaire revised to collect data required

Electricity production (Table 1a)

Unit: GWh

		Thermal			Hydro		Nuclear	Geo-thermal	Other renewable energy							Battery electricity storage	Others ³	Total	
		Coal	Oil	Gas	Pure Hydro	Pumped-storage			Solar	Tide, wave, ocean	Wind	Biomass	Industrial wastes ¹	Renewable municipal solid waste	Non-renewable municipal solid waste				Biogas ²
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Main activity producers																			
Gross electricity production	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity plants	2																		
CHP plants	3																		
Own use by plant	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity plants	5																		
CHP plants	6																		
Net electricity production	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity plants	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHP plants	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Autoproducers																			
Gross electricity production	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity plants	11																		
CHP plants	12																		
Own use by plant	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity plants	14																		
CHP plants	15																		
Net electricity production	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity plants	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHP plants	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Additional table for capacities and electricity stored and supplied

Electricity Storage (Table 7)

Main activity producer

		Rated power capacity (MW)	Storage capacity (MWh)	Electricity used for storage (GWh)	Electricity supplied to the grid (GWh)
		A	B	C	D
Pumped-storage hydro	1				
Battery storage	2	0	0	0	0
<i>Below 1 MW</i>	3				
<i>1 MW to 10 MW</i>	4				
<i>Above 10 MW to 100 MW</i>	5				
<i>above 100 MW</i>	6				
Total	7	0	0	0	0

Autoproducer

		Rated power capacity (MW)	Storage capacity (MWh)	Electricity used for storage (GWh)	Electricity supplied to the grid (GWh)	Electricity supplied for own consumption (GWh)
		A	B	C	D	E
Pumped-storage hydro	1					
Battery storage	2	0	0	0	0	0
<i>Below 1 MW</i>	3					
<i>1 MW to 10 MW</i>	4					
<i>Above 10 MW to 100 MW</i>	5					
<i>above 100 MW</i>	6					
Total	7	0	0	0	0	0

Energy consumption of electric and plug-in hybrid vehicles (EVs and PHEVs)

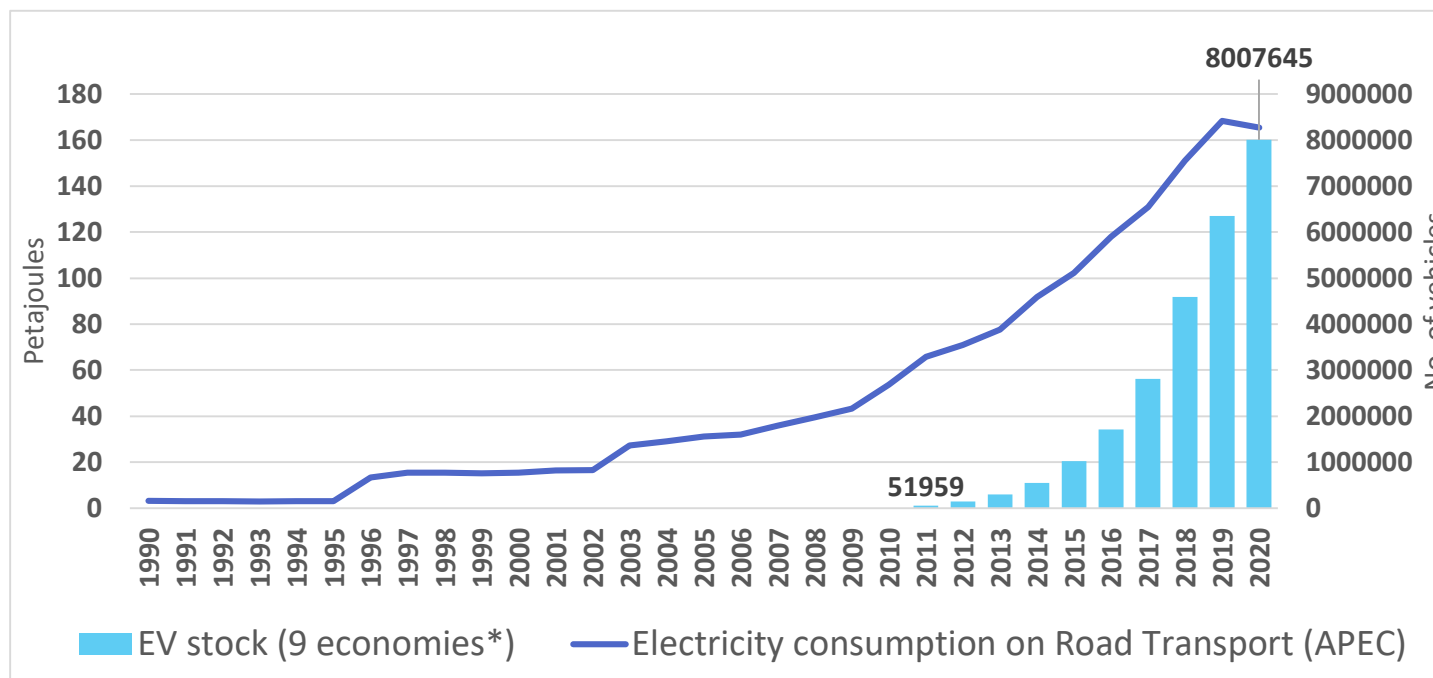


Electricity consumption of EVs

To be reported in the electricity and heat questionnaire

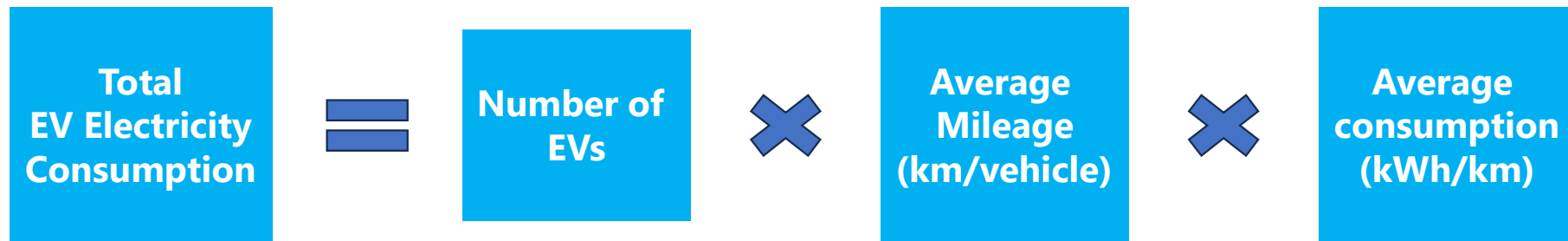
		Electricity	Heat	Chilled water
		GWh	ktoe	ktoe
		A	B	C
Industry sector	30	0	0	0
Iron and steel	31			
Chemical (incl. petrochemical)	32			
Non-ferrous metals	33			
Non-metallic minerals	34			
Transport equipments	35			
Machinery	36			
Mining and quarrying	37			
Food, beverages and tobacco	38			
Pulp, paper and printing	39			
Wood and wood products	40			
Construction	41			
Textile and leather	42			
Not elsewhere specified	43			
Transport sector	44	0		
Domestic air transport	45			
Road	46			
Rail	47			
Inland waterways	48			
Pipeline transport	49			
Not elsewhere specified	50			
Other Sector	51	0	0	0
Residential	52			
Commercial and public services	53			
Agriculture	54			
Fishing	55			
Not elsewhere specified	56			

Electricity consumption in road transport and EV stocks

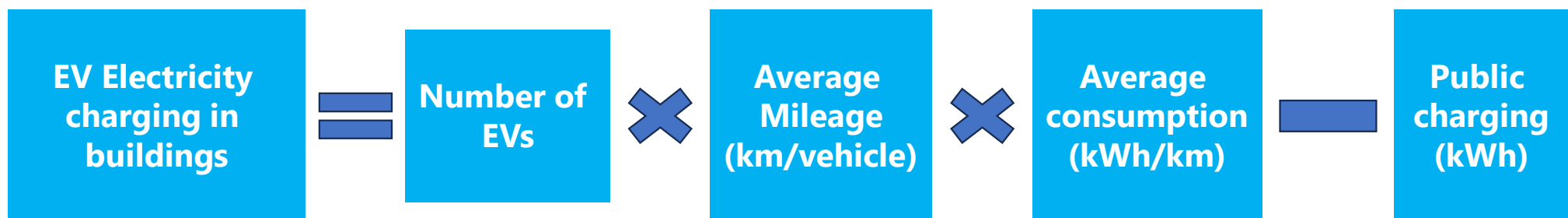


- There are more than 8 million EV stocks in 9 economies (Australia, Canada, Chile, China, Japan, Korea, Mexico, New Zealand, and US) in 2020.
- EV stocks include Cars, Trucks, Vans, and Buses.
- Only the partial data on electricity consumed by EVs are reflected in the EGEDA database.

Calculating EV consumption



- Only for electric and plug-in hybrid vehicles; hybrid and fuel cell vehicles are excluded
- Consider electric charging data from public charging facilities
- Separate EV electricity use from buildings (residential and commercial sectors)



GHG emissions



Fugitive methane emissions and CO₂ sequestration

Imperatives

- APEC energy ministers are discussing two new energy goals
 - Reducing methane emission by 50% by 2030 from 2020 levels
 - Increasing the share of decarbonized and carbon-free electricity to 60%

Additional data requirements

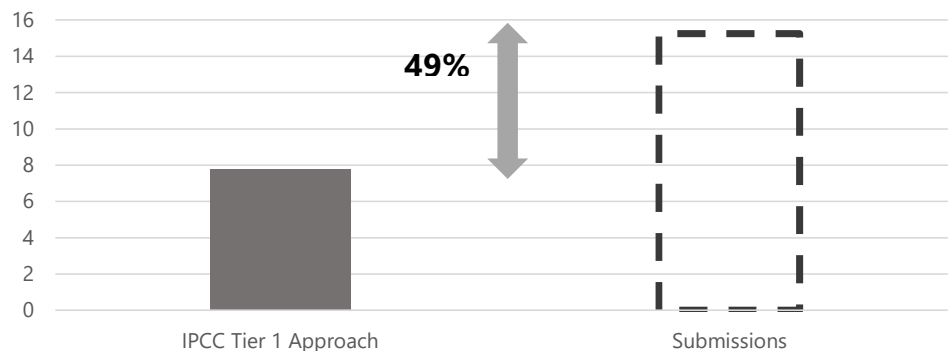
- Fugitive methane emissions from energy use (for the methane reduction goal)
- Electricity generation from renewables
- Electricity generation from fossil fuels with carbon capture and storage

Data collection of 2021 data

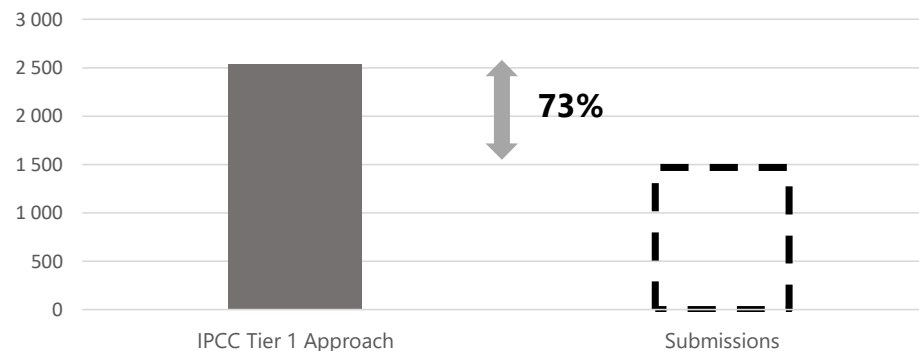
- UNFCCC submissions from 6 Annex 1 countries
- Submission from 3 economies
- Calculation for 12 economies but there are large uncertainties for fugitive emissions
- CO₂ sequestration cannot be calculated from energy balance data
- Issues
 - Only Tier 1 calculation can be done
 - Huge differences between Tier 1 calculations and submissions to UNFCCC
- Therefore, EGEDA secretariat should not calculate fugitive emissions

Large differences between reported and Tier 1-based fugitive CH₄ emissions in selected member economies

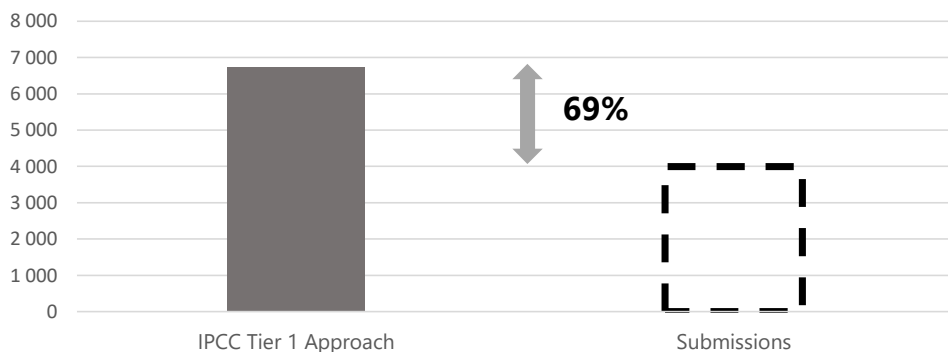
2021 - Brunei (thousand tonnes)



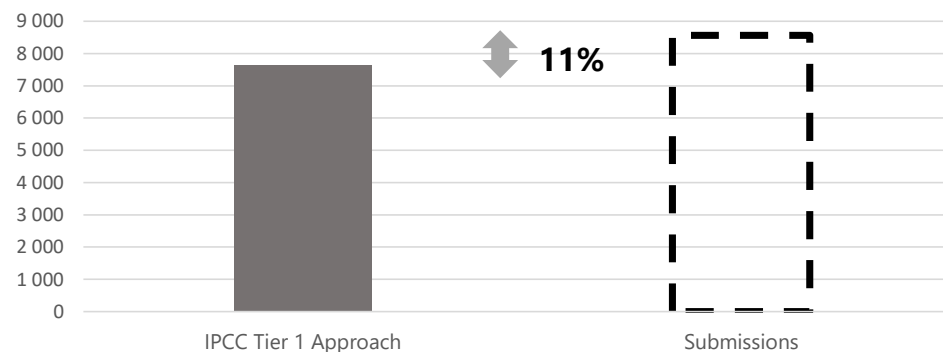
2021 - Canada (thousand tonnes)



2021 - Russia (thousand tonnes)



2021 - United States (thousand tonnes)



Source: IPCC, UNFCCC (2023) and APERC calculation.

GHG emission template

GHG Emission Table			
Member Economy Name:	Select		
	CO ₂	CH ₄	N ₂ O
	thousand tonnes	thousand tonnes	thousand tonnes
1A. Fuel combustion			
1. Emission by energy	0	0	0
1.1 Coal & coal products			
1.2 Crude oil & petroleum products			
1.3 Gas			
1.4 Other fossil fuels			
2. Emission by sector	0	0	0
2.1 Transformation sector	0	0	0
2.1.1 Main activity producer			
2.1.2 Autoproducers			
2.1.3 Gas processing			
2.1.4 Loss & own use			
2.2 Final energy consumption sector	0	0	0
2.2.1 Industry sector			
2.2.2 Transport sector			
2.2.3 Residential & commercial			
2.2.4 Other			
1B. Fugitive emissions from fuels	0	0	0
1. Solid Fuels			
2. Oil and natural gas			
1C. CO₂ transport and storage	0		
1. Electricity generation			
2. Others			

- CO2 emissions template was changed to GHG emission template as CH4 and N2O were added
- The secretariat request data from 1990 to the latest year
- Although fugitive emissions from fuels can be calculated using energy balance data and IPCC Tier 1 methodology, the secretariat prefers that these are reported by member economies.
- As shown earlier, calculated and reported data have huge differences
- The agency in-charge of national communication to UNFCCC might have official data that EGEDA focal points can obtain.

Conclusion

- New developments in the energy sector require additional data to be collected
- The EGEDA secretariat is trying its utmost to collect the data
- Kind cooperation of focal points is hereby requested

Thank you.

<https://aperc.or.jp>

<https://www.egeda.ewg.apec.org>

