

Institutional Arrangements for reporting robust Greenhouse Gas (GHG) Inventory in Biennial Update Reports (BURs)

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Agenda

1. Reporting of Greenhouse Gas (GHG) Emissions
2. Institutional Arrangement for the GHG Inventory
3. UNFCCC Review Process

1

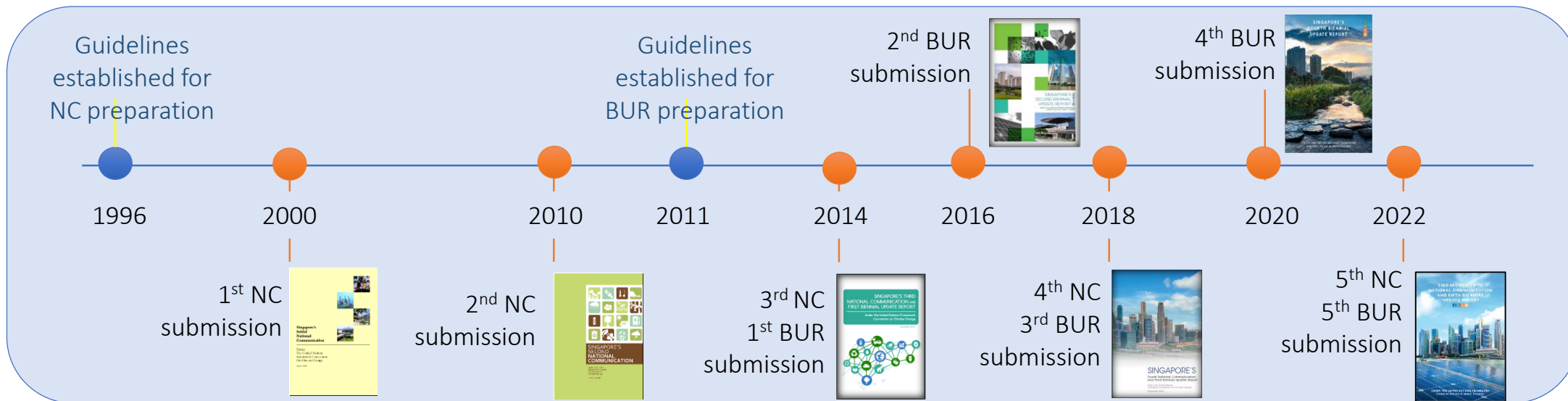
Reporting of Greenhouse Gas (GHG) Emissions

Reporting of Greenhouse Gas (GHG) Emissions

1. National Communications (NC) and Biennial Update Report (BUR)

- As a Party to the United Nations Framework Convention on Climate Change (UNFCCC), Singapore is committed to submitting NC and BUR to the UNFCCC
 - NC once every 4 years since 2000, 5th NC submitted in 2022
 - BUR once every 2 years since 2014, 5th BUR submitted in 2022

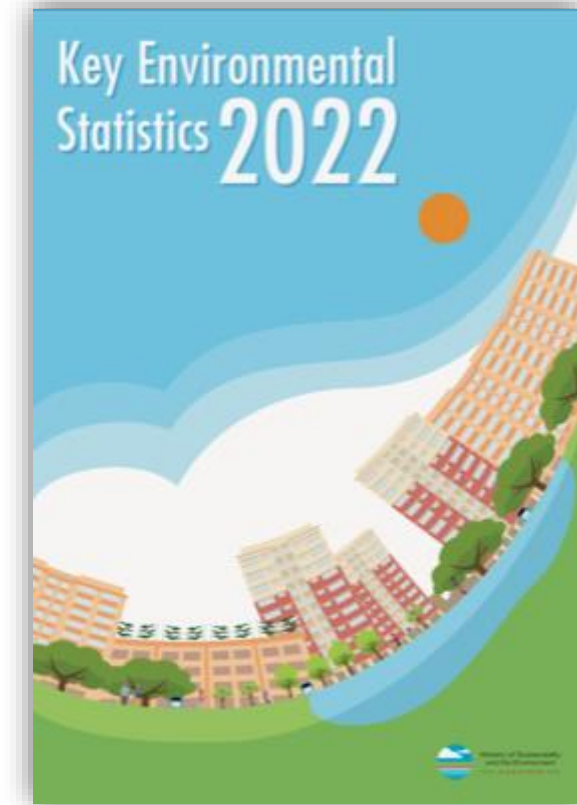
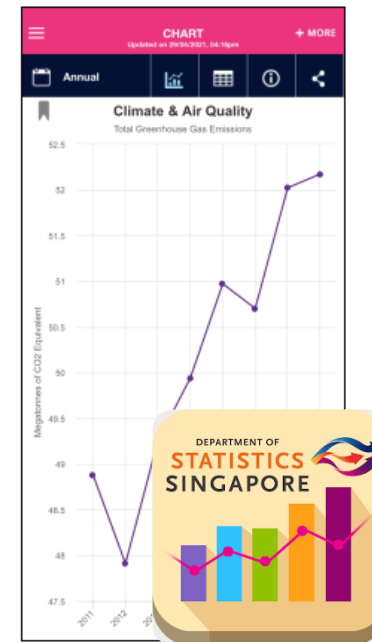
2. NC and BUR reports the country's mitigation measures and greenhouse gas emissions (GHGs)







Reporting of Greenhouse Gas (GHG) Emissions (cont'd)

2. Total GHG emissions also reported in other publications

- DOS's Singstat Table Builder/ Singstat Mobile App
- MSE's Key Environmental Statistics (KES)



Overview of Reporting of Greenhouse Gas (GHG) emissions

IPCC Sector	Source category
 Energy Sector	Energy Industries
	Manufacturing Industries and Construction
	Transport
	Commercial/Institutional
	Residential
	Fugitive Fuel Emissions
 Industrial Processes and Product Use (IPPU) ¹	Mineral Industry, Chemical Industry, Metals Industry, Use of Lubricants and Paraffin Wax, Electronics Industry, Use of HFCs/PFCs as Substitutes for ODS ² , Use of SF ₆ in electrical equipment, etc
 Agriculture, Forestry and Other Land Use (AFOLU) ³	Agriculture, Land Use, Land-Use Change and Forestry (LULUCF)
 Waste	Solid Waste Disposal
	Incineration and Open Burning of Waste
	Wastewater Treatment and Discharge

¹ For the full list of source categories, please refer to the Revised 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines, Volume 3.

² Ozone Depleting Substances (ODS)

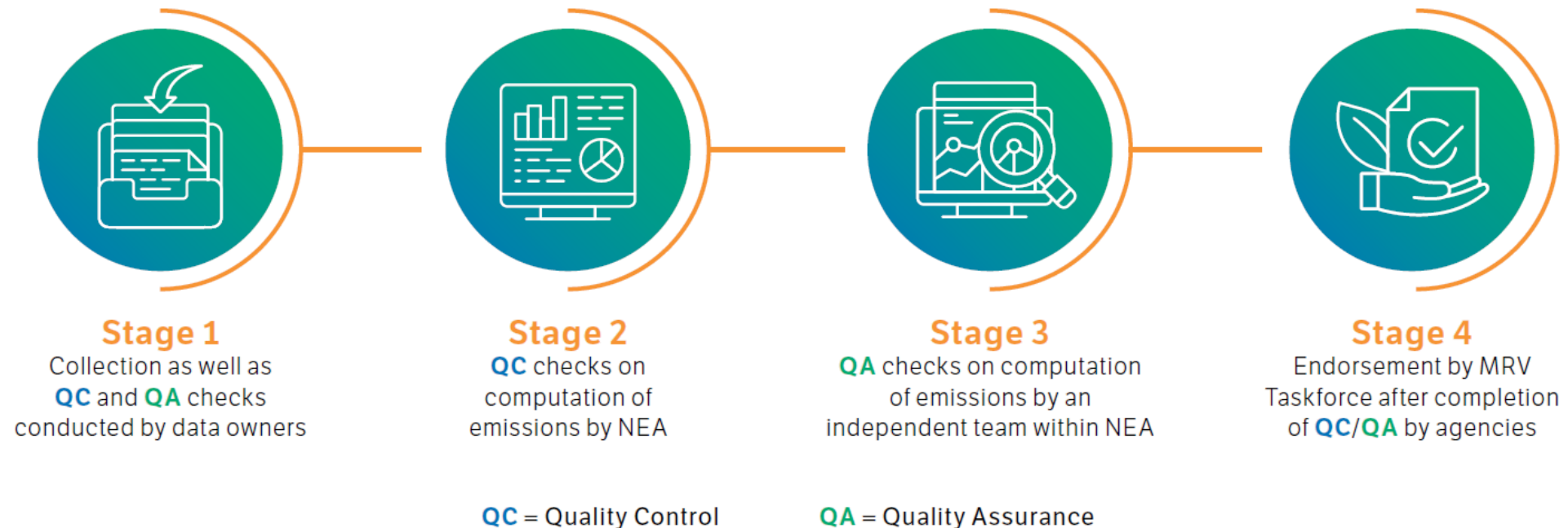
³ For the full list of source categories, please refer to the Revised 2006 IPCC Guidelines, Volume 4.

2

Institutional Arrangement for the GHG Inventory

Institutional Arrangement for the GHG Inventory

1. Preparation of the national GHG inventory is a multi-agency effort led by the NEA.
2. An overview of the four-stage GHG inventory preparation process is shown below.



Institutional Arrangement for the GHG Inventory (Stage 1)

1. QC/ QA for the Collection/Compilation of Data



- Data required for the national GHG inventory collected/ compiled through legislation and surveys administered by the various government agencies (data owners).

SOURCES OF DATA FOR GHG INVENTORY

IPCC Sector	Type of GHG	Data Owner
1—ENERGY		93.5%
1A - Fuel Combustion Activities		
1A1 Energy Industries	CO ₂ , CH ₄ , N ₂ O	Energy Market Authority National Environment Agency PUB, Singapore's National Water Agency
1A2 Manufacturing Industries and Construction		Energy Market Authority National Environment Agency
1A3 Transport		Energy Market Authority National Environment Agency Maritime and Port Authority of Singapore
1A4a Commercial/ Institutional		Department of Statistics Energy Market Authority
1A4b Residential		

Institutional Arrangement for the GHG Inventory (Stage 1)

1. QC/ QA for the Collection/Compilation of Data



- Data required for the national GHG inventory collected/ compiled through legislation and surveys administered by the various government agencies (data owners).

1B - Fugitive Emissions from Fuels		
1B2 Oil and Natural Gas	CO ₂ , CH ₄ , N ₂ O	National Environment Agency
2— INDUSTRIAL PROCESSES AND PRODUCT USE		
	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆ , NF ₃	National Environment Agency
3— AGRICULTURE		
	CO ₂ , CH ₄ , N ₂ O	Singapore Food Agency
3— LAND USE, LAND-USE CHANGE AND FORESTRY		
	CO ₂ , N ₂ O	National Parks Board
4— WASTE		
4A - Solid Waste Disposal		
	CH ₄	PUB, Singapore's National Water Agency
4C - Incineration and Open Burning of Waste		
Clinical Waste Incineration	CO ₂ , CH ₄ , N ₂ O	National Environment Agency
Hazardous Waste Incineration		
4D - Wastewater Treatment and Discharge		
	N ₂ O	PUB, Singapore's National Water Agency Food and Agriculture Organization of the United Nations (FAO)

Institutional Arrangement for the GHG Inventory (Stage 1 – cont'd)

2. QC for Data



- The quality control checks conducted by the data owners.

3. QA for Data



- Data collected is verified by an independent team within each agency, which is not involved in the data collection and compilation process.



- After these quality assurance checks, agencies will submit their quality control and quality assurance documentation together with their data to NEA for computation/ conversion to GHG emissions.

	QC Activity	Actions by Data Owner
Units	Check that parameter units are correctly recorded and that appropriate conversion factors are used.	Analysed and verified data trends for potential unit or conversion errors.
Database	Check that parameter units are correctly recorded and that appropriate conversion factors are used.	Analysed data trends. Highlighted deviations and outliers and verified them for potential data input errors and reference coding errors.
	Check the integrity of database files.	Verified data processed in the database against original data files to ensure consistency and data integrity.
	Check for consistency in data between source categories.	Verified the data mapping tables and files used to ensure that mapping and data consistencies between different source categories are maintained. Data mapping tables adopt Singapore's classification.
	Undertake completeness checks.	Streamlined and aligned data sources used. Included new data streams where applicable.
	Check methodological and data changes resulting in recalculations.	Re-processed updated data in the system and recompiled sub-totals and totals from the updated data. Analysed time series of totals to ensure data quality standards are achieved. Adopted appropriate splicing techniques to ensure a consistent time series.
Compilation	Check that the movement of inventory data among processing steps is correct.	Verified and checked sub-totals against totals when computing aggregated figures.
	Internal documentation.	Conducted regular data compilation reviews and documented these processes. Archived and stored the data in the EDMA system periodically.
Comparison	Compare estimates to previous estimates.	Analysed time series of totals to ensure data quality standards are achieved.

Institutional Arrangement for the GHG Inventory (Stage 2 – 4)

1. QC for the Computation of Emissions



- GHG emissions computed by the GHG inventory team within NEA based on the activity data provided by agencies. The quality control checks on emissions computed from source data are verified by persons who are not involved in the emissions computation.

2. QA for Computation of Emissions



- Verified by an independent NEA team not involved in the computation of the GHG emissions.
- Checked transcription of data between databases, verification of data, emission and conversion factors,
- Conducted review of the inventory compilation process. The review involves the verification of methods, data, processes, and assumptions for the preparation of the inventory, and recommendation of areas for improvement as necessary.
- Identified and planned institutional strengthening and capacity building needs to improve future work on the national GHG inventory.

3. Endorsement



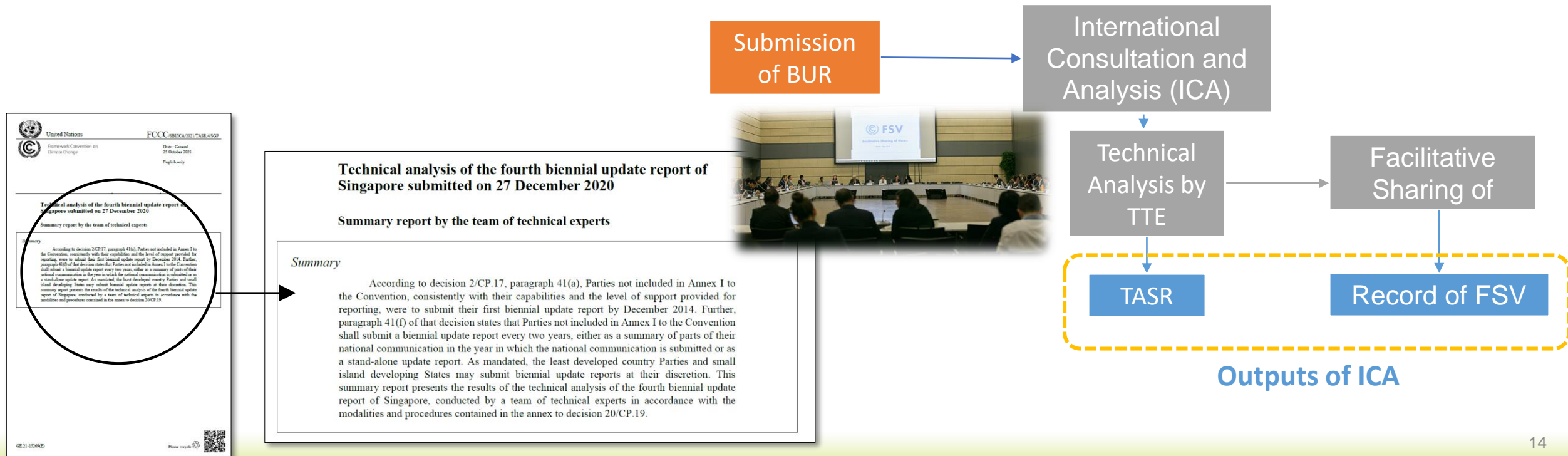
- An inter-agency working committee (MRV Taskforce) will review the quality control and quality assurance procedures conducted by agencies, and endorse the national GHG inventory.

3

UNFCCC Review Processes

International Consultation and Analysis (ICA) review process

- The ICA review process aims to increase the transparency of mitigation actions and their effects. It is triggered upon the submission of the BUR.
 - First step – Technical Analysis of Singapore’s BUR by a Team of Technical Experts (TTE), convened by UNFCCC. Review of information provided in the BUR against IPCC guidelines and UNFCCC reporting requirements to identify reporting gaps. Outcome captured in Technical Analysis Summary Report
 - Second step - Facilitative Sharing of Views (FSV) in the form of a UNFCCC workshop open to all parties. This entails a brief presentation by Singapore, followed by an oral Q&A by other parties



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