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Singapore Emission Factors Registry Expands By 94 Emission Factors to Boost Singapore's Carbon Data Infrastructure; New Study Provides Actionable Carbon Reduction Measures for Three Service Sectors

Thursday, 22 January 2026 [Singapore]

The Singapore Emission Factors Registry (SEFR), the nation's single reference point for localised emission factors (EF), has been expanded with 94 new EFs to strengthen Singapore's carbon data infrastructure and support more accurate emissions reporting by businesses. EFs are scientific multipliers that convert business activity data into carbon emissions data. The latest expansion includes three new EFs for cleaning, security, and professional services, five new EFs for information and communications technology (ICT), as well as 86 new EFs for industry processes and product use (IPPU), refrigerants, purchased energy and building materials. With the addition, SEFR has 319 EFs that covers 100% of emissions reporting for Scope 1 and 2, as well as for four out of fifteen Scope 3 categories¹. See Annex A for the full list.

Pioneering ground-up study identifies where cleaning, security and professional services can cut carbon emissions

2. From financial year (FY) 2026, reporting of scope 3 emissions will be mandatory for Straits Times Index (STI) companies. While reporting remains voluntary for non-STI companies, many organisations are proactively adopting Scope 3 disclosures, as these emissions typically make up the largest share of a company's carbon footprint and are increasingly scrutinised by investors, customers, and other stakeholders. To improve carbon reporting accuracy, SEFR has added three new locally relevant EFs for cleaning, security, and professional services. Their development was prioritised following public consultations conducted by the Singapore Business Federation (SBF), which identified these services as essential to most companies in Singapore.

3. International databases and methodological frameworks often rely on environmentally extended input-output (EEIO) models, which provide aggregated, economy-wide EFs that may not fully reflect the operational diversity and local variations found in service delivery. To address this gap, the Agency for Science, Technology and Research (A*STAR) established the Lifecycle Environmental Assessment Framework (LEAF), a methodological framework² for

¹ SEFR will enable most businesses to calculate all their emissions for the following Scope 3 categories: Category 4 (Upstream transportation and distribution), Category 6 (Business travel), Category 7 (Employee commuting), and Category 9 (Downstream transportation and distribution).

It also provides substantial data for businesses to calculate part of their emissions for the following Scope 3 categories: Category 1 (Purchased goods and services), Category 2 (Capital goods), Category 5 (Waste generated in operations), Category 11 (Use of sold products), and Category 12 (End-of-life treatment of sold products).

² Developed by A*STAR, LEAF is expected to be presented at an international academic conference this year, contributing Singapore's insights to global discussions on quantifying greenhouse gas (GHG) emissions.



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developing market-average³ EFs for services. LEAF is grounded in life cycle assessment (LCA) principles and incorporates guidance from the Partnership for Carbon Transparency (PACT) methodology and ISO 14067 standards, ensuring both scientific rigour and local relevance.

4. Using this framework, A*STAR and SBF worked with local businesses and trade associations and chambers (TACs), including the Environmental Management Association of Singapore (EMAS), Security Association Singapore (SAS), Singapore Academy of Law (SAL), and Institute of Singapore Chartered Accountants (ISCA), to develop three new service-specific EFs. These are based on real activity data from Singapore's business community and enable more representative and comparable Scope 3 emissions reporting. See Annex B for full list of contributors.

5. Beyond improving reporting accuracy, A*STAR's analysis of sector-specific activity data provides detailed and practical insights into emissions hotspots, activity drivers, and patterns of resource use across the following sectors. See Annex C for full details.

6. These findings provide businesses with clearer visibility of where targeted actions can deliver meaningful carbon reductions.

i. Cleaning services

- a. Finding: Emissions are largely driven through the use of materials and equipment.
- b. Decarbonisation opportunity: Use greener supplies and more energy-efficient machinery.

ii. Security services

- a. Finding: Approximately 14% of emissions come from local business transport, including on-site patrolling and fleet operations.
- b. Decarbonisation opportunity: Fleet electrification and improved driver behaviour.

iii. Professional services

- a. Finding: Major emission contributors include local business transport and IT equipment use.
- b. Decarbonisation opportunity: Extend the lifespan of IT assets through refurbishment instead of replacement, or by leasing IT devices from device-as-a-service providers.

7. By pursuing these opportunities, companies in these sectors can lower both carbon emissions and operating costs, while strengthening organisations' appeal to customers that

³ Results represent market-average conditions at the time of data collection and may not capture the full variability across individual contracts or service providers.



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increasingly prioritise sustainable procurement. A case study illustrating how SEFR data can be used to quantify emissions and identify reduction opportunities is provided in [Annex D](#).

8. Mr Kok Ping Soon, CEO of SBF, said, “Cleaning, security, and professional services are used by almost every company in Singapore. To report Scope 3 emissions properly, businesses need EFs that reflect local conditions, rather than rely on overseas averages. These new Singapore-specific factors fill an important gap. Beyond reporting, they help companies see more clearly where their emissions are coming from and what they can realistically do about them. This is not only about meeting sustainability requirements, but also about running businesses in a manner that is smarter, more cost-effective way and more appealing to B2B customers. SEFR gives Singapore companies a straightforward and credible tool to take real, practical action on decarbonisation.”

New EFs for ICT

9. As businesses increasingly adopt cloud services, tracking and managing associated emissions has become more important. [The Infocomm Media Development Authority \(IMDA\) and the National University of Singapore Energy Studies Institute \(NUS-ESI\) have jointly developed five new Singapore-specific ICT EFs to help organisations measure emissions from cloud services more accurately](#). In tandem, a new carbon calculator has been rolled out to help businesses develop mitigation strategies and digital infrastructure decisions, such as choosing between on-premise and cloud deployments or comparing emissions across vendors and service types. Both the EFs and calculator are available online at the [SEFR website](#). See IMDA's press release for full details.

Additional EFs for IPPU, Refrigerants, Energy, and Buildings

10. [SEFR has added 86 new EFs covering IPPU, refrigerants, purchased energy and building materials](#). These data were provided by the National Environment Agency (NEA), Energy Market Authority (EMA), and Singapore Green Building Council (SGBC).

11. In total, 94 EFs have been added to the SEFR – all EFs can be viewed on the [SEFR website](#).

12. “Since its launch in October 2024, SEFR has benefitted more than 800 Singapore businesses by helping them report all aspects of Scope 1 and 2 emissions, as well as some aspects of Scope 3 emissions, more conveniently, representatively, and consistently,” said Mr Lee Chuan Seng, Chairman of the SEFR Governance Committee. “With nearly 320 EFs now, we are confident that SEFR will empower even more businesses to track their emissions, which is critical to help them decarbonise. We thank the businesses, TACs, and government agencies who have contributed to the SEFR's development. We will continue to expand SEFR's reach and impact and welcome all businesses, regardless of size or sector, to contribute to our national net zero transition effort through transparent and reliable carbon accounting.”



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About Singapore Business Federation (新加坡工商联合总会)

Singapore Business Federation (SBF) is the apex business chamber with over 32,000 members across diverse industries. With a vision to advance Singapore towards a globally competitive and sustainable economy, SBF mobilises the business community to be future-ready and magnify transformation opportunities through policy advocacy, partnership platforms and capability programmes.

For more information, please visit: www.sbf.org.sg

About Singapore Emission Factors Registry

SEFR was co-developed by the Singapore Business Federation (SBF) and A*STAR, with voluntary contributions from Singtel and PwC Singapore, and is supported by the Ministry of Trade and Industry, Ministry of Sustainability and the Environment, Enterprise Singapore, and the SBF Foundation.

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Annex A – Overview of 94 EFs added to SEFR

EF category	Number of additional EFs	Examples of additional EFs (non-exhaustive)	Data owner
Services	3	<ul style="list-style-type: none"> Procurement of cleaning services Procurement of security services Procurement of professional services 	<ul style="list-style-type: none"> Agency for Science, Technology and Research (A*STAR)- Singapore Institute of Manufacturing Technology (SIMTech) SBF
Information and communications technology (ICT)	5	<ul style="list-style-type: none"> Cloud computing – virtual machine Cloud computing – cloud storage 	<ul style="list-style-type: none"> Infocomm Media Development Authority (IMDA) National University of Singapore- Energy Studies Institute (NUS-ESI)
Industrial processes and product use (IPPU)	31	<ul style="list-style-type: none"> Ethylene oxide production Flaring in thermal oil production 	<ul style="list-style-type: none"> National Environment Agency (NEA)
Greenhouse gases	49	<ul style="list-style-type: none"> Refrigerant blends 	<ul style="list-style-type: none"> NEA
Purchased energy	4	<ul style="list-style-type: none"> Upstream fugitive methane 	<ul style="list-style-type: none"> Energy Market Authority (EMA)
Building materials	2	<ul style="list-style-type: none"> Production of cross laminated timber Production of glue laminated timber 	<ul style="list-style-type: none"> Singapore Green Building Council (SGBC)



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Annex B – List of contributors

The SEFR sincerely thanks the voluntary contribution of the following organisations for the development of new EFs.

Aeterni.eco	Mainguard Security Services (S) Pte Ltd
AETOS Holdings Pte Ltd	ISEMS Pte Ltd
Allen and Gledhill LLP	ISS Facility Services Private Limited
APRO Asian Protection Pte Ltd	KPMG Singapore
BDO Singapore	Master Clean Facility Services Pte Ltd
CBM Pte Ltd	PwC Singapore
Certis CISCO Security Pte Ltd	Re Sustainability Limited
Chye Thiam Maintenance Pte Ltd	RSM Singapore
CLA Global TS	Sands Global Pte Ltd
Clean Solutions Pte Ltd	Security Association Singapore (SAS)
CPG Corporation	Singapore Academy of Law (SAL)
Deloitte & Touche	Singapore Management University
Dentons Rodyk & Davidson LLP	Sun City Maintenance Pte Ltd
Deva Preservation Services Pvt Ltd	UEMS Solutions Pte Ltd
Drew & Napier LLC	William Secure Solutions Pte. Ltd.
Environmental Management Association of Singapore (EMAS)	WongPartnership LLP
Gold Dust General Cleaners & M&E Services Private Limited	Institute of Singapore Chartered Accountants (ISCA)



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Annex C – Sector-specific insights on key emissions trends and opportunities

A study by A*STAR and SBF finds that emissions across service sectors are fundamentally shaped by how services are delivered, resulting in three distinct operational emission profiles:

- Cleaning services exhibit a materials-intensive profile, with cleaning consumables and equipment accounting for approximately 45 per cent of total emissions, followed by employee commuting at 21 per cent. High-traffic commercial buildings typically require more frequent and intensive cleaning, which increases manpower needs and commuting emissions.
- Security services demonstrate a technology-intensive profile, where continuous electricity consumption from surveillance and monitoring systems contributes around 47 per cent of emissions, followed by embodied emissions⁴ of security-related equipment at 37 per cent. This technology shift ensures consistent coverage and quality, particularly for large-scale sites where traditional manpower-only models are less efficient.
- Professional services reflect a service delivery-driven profile, with client-facing activities resulting in local business transport accounting for 57 per cent of emissions, followed by embodied emissions from IT equipment used for office-based activities at 43 per cent.

Together, these findings underscore that emission reduction strategies and opportunities must be aligned to the dominant drivers specific to each service sector. Examples of emission reduction strategies and opportunities include optimising operations through data-driven insights, deploying energy-efficient equipment, and extending the lifespan of existing assets.

⁴ Embodied emissions refer to the upstream greenhouse gas emissions associated with producing a product, such as raw material extraction, manufacturing, and transportation.



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Annex D – Case study

In the security sector, the use of SEFR through digital Measurement, Reporting, and Verification (dMRV) tools or carbon accounting platforms such as CO2 Connect's CO2X has enabled AETOS Holdings to achieve more than 45% reduction in its carbon dioxide equivalent (CO₂e) emissions across its four-wheeler vehicular fleet.

This was achieved through a synergistic partnership between AETOS and CO2 Connect that involved the amalgamation of IoT-enabled fleet telematics solutions and an ISO-validated and certified carbon accounting platform (with application of methodologies in conformance with ISO 14064-1 and ISO 14083 & GLEC Framework).

With the business intelligence and actionable insights provided through CO2X, AETOS was able to achieve these emission reductions by implementing policy and operational procedure changes to improve fleet usage efficiency, reduce fuel cost, and reduce GHG emissions in its day-to-day operations at the organisation level.

Taking these actions has enabled AETOS to demonstrate significant emissions reduction at the transport fleet level. AETOS and CO2 Connect, through its partnership with SEFR, could potentially open opportunities for more precise and granular reporting of its GHG emission intensities down to the service level.