



# EMSD Practice on Asset Management with Open BIM



## About EMSD

The Electrical and Mechanical Services Department (EMSD) of the Government of the Hong Kong Special Administrative Region plays a pivotal role in engineering innovation, overseeing and maintaining critical electrical and mechanical (E&M) equipment for approximately 80 government bureaux, departments, and public bodies across the territory. Serving as both an engineering service provider and an advocate of smart city initiatives, EMSD is committed to delivering safe, reliable, energy-efficient, and digitally enabled solutions throughout the entire asset lifecycle.

EMSD has pioneered the adoption of Building Information Modelling (BIM) for building operation and facility management since 2014, and developed the first BIM-Asset Management (BIM-AM) system in Hong Kong. To address industry fragmentation and establish consistency across public works, EMSD published the EMSD BIM-AM Standards and Guidelines in 2017.

Leveraging decades of operational and maintenance (O&M) experience, EMSD is driving the next frontier of asset digitalisation: open and vendor-neutral interoperability across software platforms and stakeholders. This booklet encapsulates EMSD's journey, technical frameworks and hands-on experience – offering a practical reference for trade practitioners to help accelerating Hong Kong's transition into a world-class smart city.

## Open BIM Journey in EMSD

EMSD's digital transformation marks a strategic evolution from traditional maintenance regimes to an agile, data-centric asset management ecosystem. The department's forward-looking journey began in 2014, when EMSD began exploring the untapped operational value of BIM for E&M assets. Recognising that long-term facility operation accounts for the vast majority of an asset's lifecycle cost, EMSD committed to pioneering solutions that link 3D models and the associated assets directly to daily O&M practices.

To translate this ambition into systematic practice, EMSD developed and promulgated the *EMSD BIM-AM Standards and Guidelines*, in 2017. This framework established the operational benchmark for the industry, setting standardised parameters for asset naming conventions, equipment coding hierarchies and data handover protocols for downstream asset management systems.

### Open BIM Journey on ASSET MANAGEMENT



Asset



Lifecycle



System



Governance



Rather than remaining static, the guidelines evolved through progressive iterations:

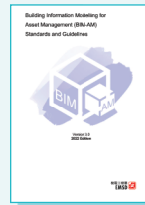
### Version 2.0 (2019)

Refined asset classification structures, expanded asset data dictionaries, and streamlined the correlation between physical E&M equipment and digital asset parameters.



### Version 3.0 (2022)

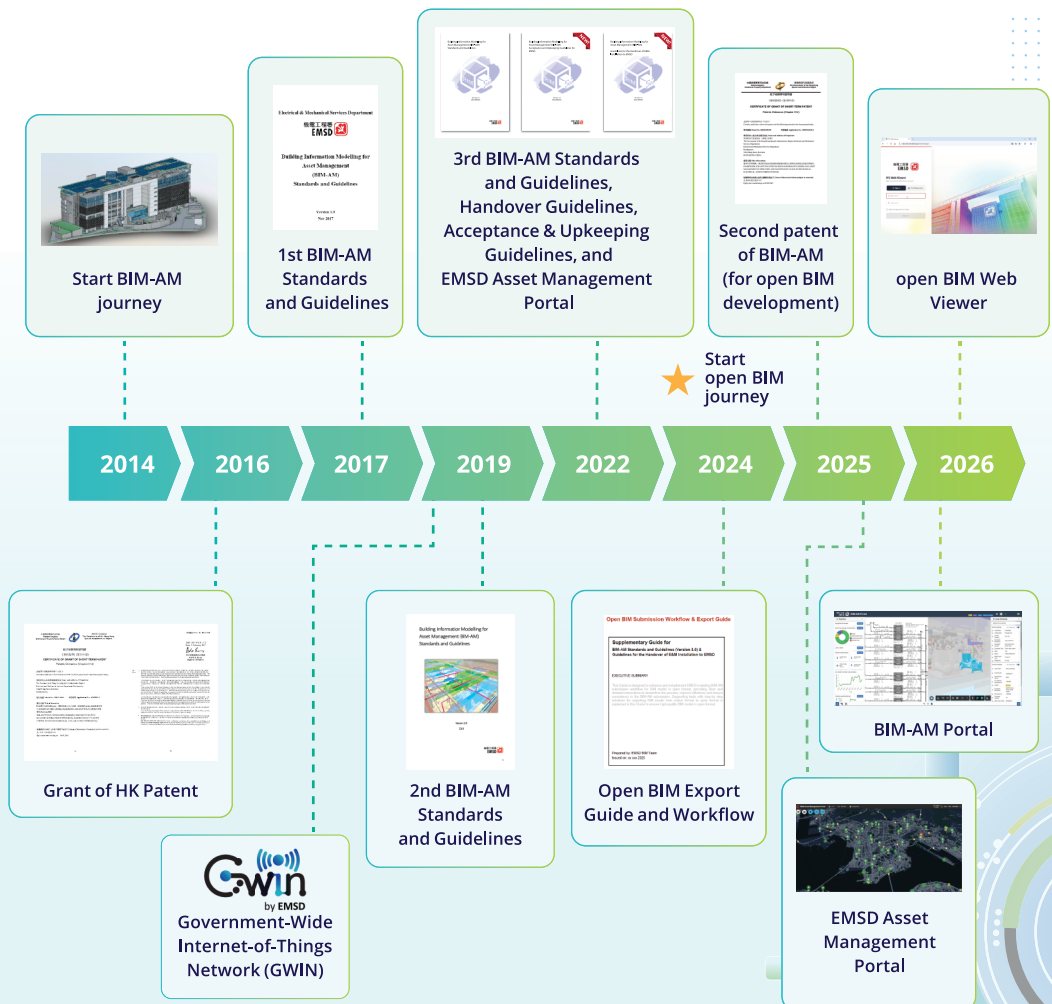
Codified Common Data Environment (CDE) management procedures, and established operational connectivity with the Government - Wide IoT Network (GWIN).



*Guidelines for the Handover of E&M Installation to EMSD, and BIM-AM Acceptance and Upkeeping Guidelines for EMSD* were also published in 2022 to facilitate the trade in adopting BIM-AM standard.



Today, EMSD's journey is advancing into the next transformative era: a strategic transition toward open BIM. By spearheading vendor-neutral workflows and developing EMSD open BIM Web Viewer with EMSD BIM-AM Portal, EMSD ensures that the vast digital assets information generated across decades of public sector investment remains accessible, adaptable, and sustainable.



In recent years, EMSD has accelerated its maturity from basic model-aided maintenance toward data-driven operations. By fusing real-time asset data from various IoT sensors and Building Management Systems (BMS), EMSD enables condition-based monitoring, predictive fault diagnosis, and remote performance optimisation across mission-critical public venues, including municipal complexes and government headquarters.

# What is Open BIM ?

Open BIM is a vendor-neutral, collaborative approach to the built asset lifecycle governed by open, internationally recognised standards. It enables project data to be authored, shared, and reused seamlessly across diverse software platforms, engineering disciplines, and lifecycle phases — eliminating dependency on proprietary file formats.

Traditional "closed" BIM confines data access to restrictive, single-platform environments. Data may become inaccessible when a legacy software is retired during a facility's multi-decade operation. Open BIM established a common data language, which enables data sharing among stakeholders and facilitates informed decision-making, ultimately optimises facility delivery and maintenance throughout its operational lifecycle, creating a more productive, sustainable, and future-proof digital environment.

One prevailing open BIM standard is ISO 16739-1:2024 — Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries. IFC provides structured, open schemas that is machine-interpretable, and enables automation of workflows.

To ensure high quality of data that stores inside IFC, Information Delivery Specification (IDS), which is a digital checklist in open format, is utilised for automated validation. While IFC provides the broad data structure, IDS allows project owners to define clear, machine-readable requirements for exactly what information must be delivered, by whom, and at what stage. By acting as an automated gatekeeper, IDS instantly validates incoming models against the predefined criteria, ensuring that data is complete, accurate, and fully compliant before it enters the asset lifecycle. This automated quality assurance eliminates human error and guarantees that the digital wealth generated is immediately ready for long-term operations.

# Key Benefits of Open BIM Applications

## In Building Construction Stage

- Allows interdisciplinary collaboration among architects and engineers to exchange detailed models
- Eliminates vendor lock-in and ensures future-proof data
- Supports automated clash detection and avoids costly rework on site by merging discipline models into a common environment
- Facilitates asset handover with standardised exchange formats
- Supports robust quality assurance and machine-interpretable issue tracking

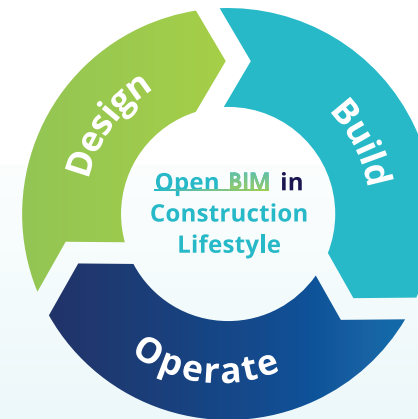
## In Asset Management Stage

- Creates a single source of truth for facility operators
- Increases the quality and efficiency of maintenance services through long-term data accessibility and interoperability
- Simplifies integration with systems such as IoT sensors and Building Management Systems (BMS)
- Supports smart building and digital twin initiatives
- Enables further connection with open GIS for smart city applications and potential AI applications

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# Open BIM in Design and Building Construction

Open BIM is being increasingly recognised and progressively explored in large-scale building construction projects, where it streamlines collaboration and communication among diverse stakeholders. By optimising operational efficiency, it establishes a solid foundation for the future of intelligent construction.



# Open BIM in EMSD Asset Management

Adopting open BIM in asset management is vital for EMSD, as vendor-neutral data formats ensure long-term accessibility, enhance interoperability among maintenance agents of multiple trades, and enable seamless integration of BIM models with external systems – such as enterprise resource planning system and maintenance management applications – throughout the asset management stage.

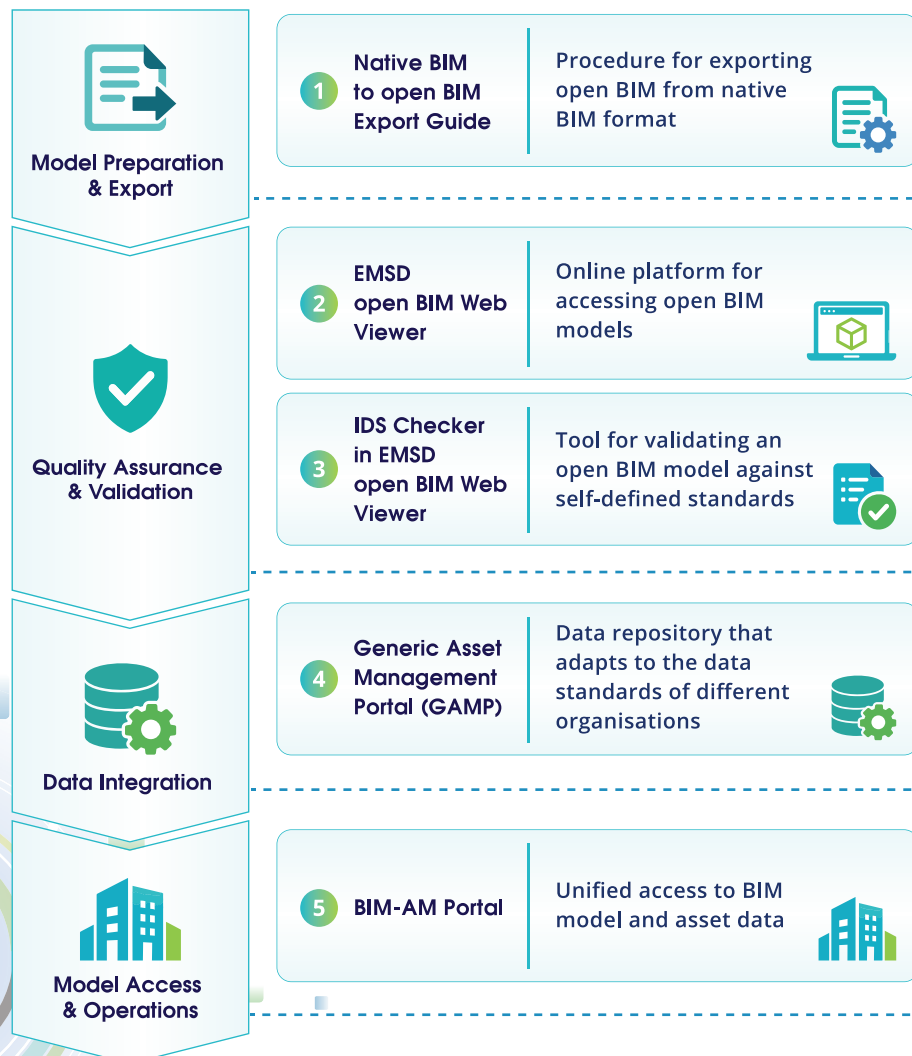
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# EMSD Open BIM Toolbox

EMSD has developed a toolbox of solutions to facilitate adoption of open BIM for E&M assets during BIM model submission and the subsequent asset management stage.

The toolbox consists of:



# Native BIM to Open BIM Export Guide

When exporting BIM models from their native format to an open format, users may encounter data loss issues such as incorrect object colour assignments, missing asset attributes, or object loss. To facilitate the trade in adoption of open BIM, EMSD has developed the *Notes for Exporting BIM Models to Open Format for Electrical and Mechanical Installations* to address these issues that can compromise model integrity and asset traceability.

The guide is downloadable via

[https://www.emsd.gov.hk/en/engineering\\_services/project\\_management\\_consultancy/highlights\\_of\\_work/bim\\_am/](https://www.emsd.gov.hk/en/engineering_services/project_management_consultancy/highlights_of_work/bim_am/)



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# EMSD Open BIM Web Viewer

The EMSD open BIM Web Viewer is an in-house, on-premises solution developed by EMSD to address the limitations of cloud products. Designed specifically for security-sensitive government venues where models cannot be uploaded online, this tool leverages open BIM standards to eliminate vendor lock-in. It significantly enhances system efficiency while maintaining strict feature parity with commercial alternatives.



EMSD open BIM Web Viewer

# Key Features of EMSD Open BIM Web Viewer

## Browser-based Model Viewing

Allows users to access IFC models directly through a clean and user-friendly web interface without installing heavy desktop software



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## Broad IFC Format Support

Supports IFC2x3, IFC4, and IFC4x3 models online



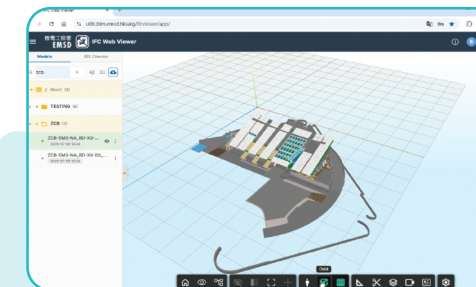
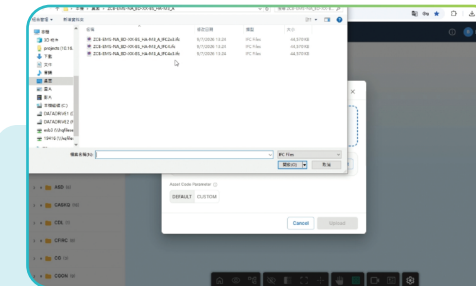
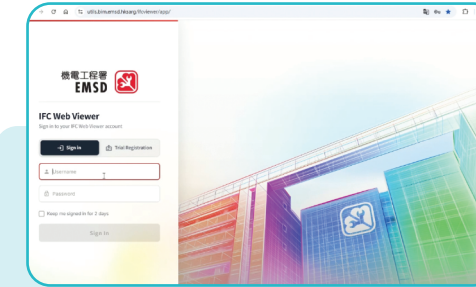
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## Smooth Model Navigation

Enables intuitive 3D model browsing with orbit, pan, and zoom functions

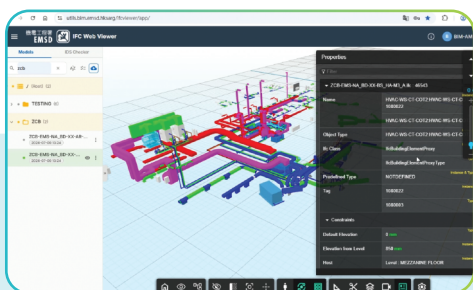


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## Key Benefits

- Remains vendor-neutral with no need to install dedicated applications
- Runs entirely in a browser on desktop or portable devices
- Provides an on-premises environment with secured login
- Reduces IFC file sizes up to 90% by a sophisticated model fragmentation technique
- Operates on mobile devices with relatively low computational power

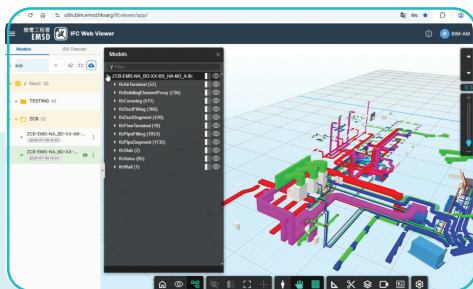


### Object Property Inspection

Allows users to click on model elements to view detailed **object attributes and properties**



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### Model Tree and Layer Filtering

Organises elements by **IFC class** for easy filtering and visibility control, allowing users to selectively show or hide categories such as ducts, pipes, fittings, and terminals



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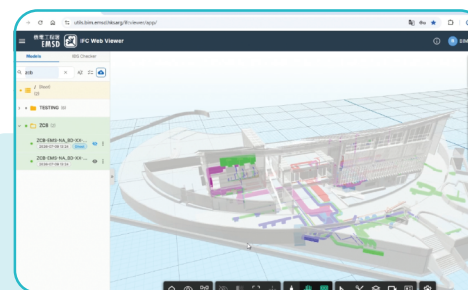


### Object Selection and Isolation Tools

Supports **show, hide, and isolate** functions to simplify model review and manipulation



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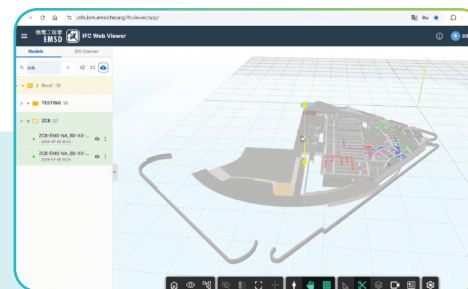


### Ghost Mode

Displays architectural elements in a **semi-transparent** manner to help users view internal building systems in context



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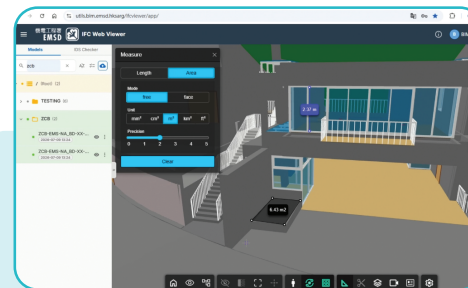


### Section Analysis / Slicing

Allows users to cut the model virtually along one or more planes for internal inspection



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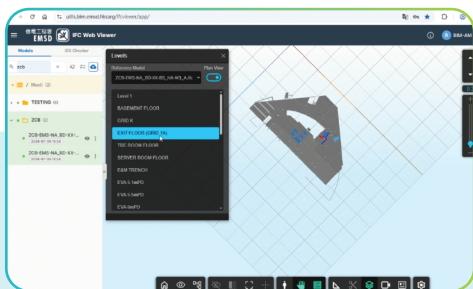


### Measurement Tools

Supports **length and area** measurement with selectable units and adjustable precision



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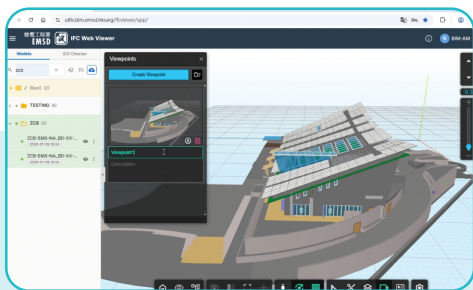


## Levels and Plan View

Enables selection of individual **storeys/levels** and includes a **2D plan view** for easier floor-based review



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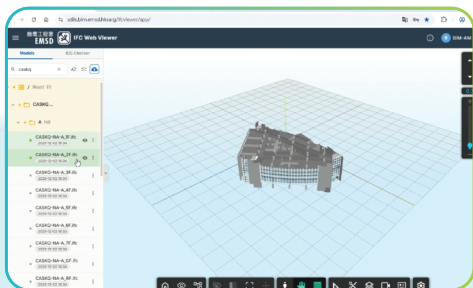


## Viewpoints

Allows users to create, name, save, and revisit predefined views



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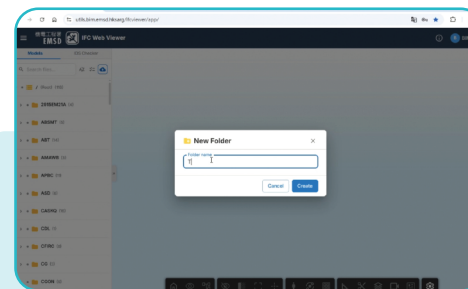


## Model Linking

Supports linking of separately stored models, such as by **floor** or **system**



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## Account, File, and Folder Management

Provides secure login and supports storing, listing, and loading BIM files from **internal servers**



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# IDS Checker in EMSD Open BIM Web Viewer

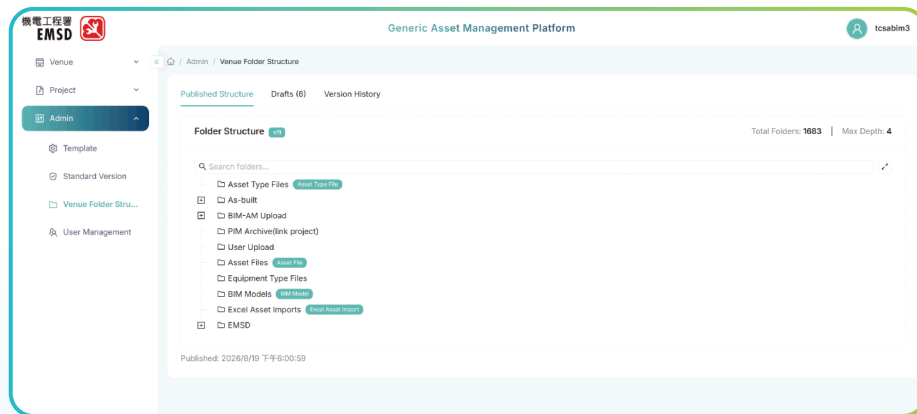
The EMSD open BIM Web Viewer is also equipped with an integrated IDS Checker. Users can upload an Information Delivery Specification (IDS) file to validate IFC model compliance, improving data quality and reducing submission errors to streamline the model review process.

# Start Your Free Trial of EMSD Open BIM Web Viewer

EMSD encourages trade practitioners to upload their BIM models and explore the features of EMSD open BIM Web Viewer. Please contact EMSD via e-mail [bimam-support@emsd.gov.hk](mailto:bimam-support@emsd.gov.hk) for details.



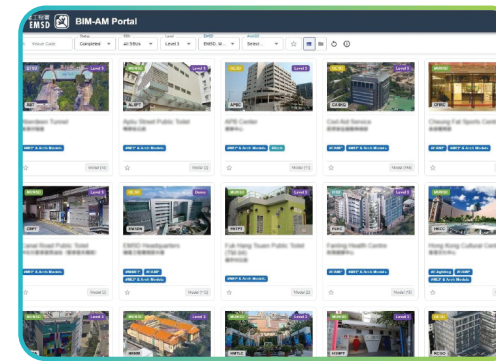
# Model-data Segregation Approach and Generic Asset Management Platform (GAMP)



Generic Asset Management Platform (GAMP) enables asset data management

EMSD is developing a Model-Data Segregation Approach for forthcoming BIM-AM Standards and Guidelines. By storing BIM geometry and asset data separately, rather than embedding all information in a single model, the approach simplifies data submission and makes subsequent amendments during the asset management stage more straightforward. It will be implemented through the generic version of the existing Asset Information Management Platform (AIMP) which has adopted the EMSD BIM-AM Standards and Guidelines, also known as Generic Asset Management Platform (GAMP) to adapt to the data standards and requirements of different organisations.

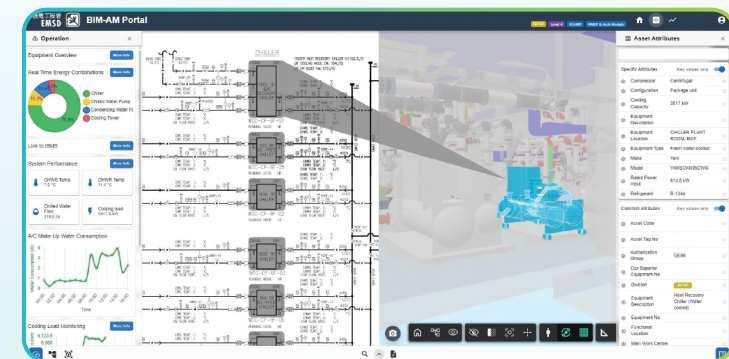
# EMSD BIM-AM Portal



EMSD BIM-AM Portal

To support thousands of government venues, the EMSD BIM Asset-Management Portal (BIM-AM Portal) is designed to provide an intuitive, user-centric interface that optimises and streamlines day-to-day operations and maintenance.

With EMSD open BIM Web Viewer being integrated as a core component, it allows users to select a building or system and instantly open the corresponding open BIM model without switching applications or installing specialised software.



2D and 3D synchronised view

Users can view objects alongside associated asset records, including properties, maintenance history and documentation, and cross-reference BIM models with 2D schematics for more efficient maintenance and troubleshooting, which operates on mobile devices with relatively low computational power.

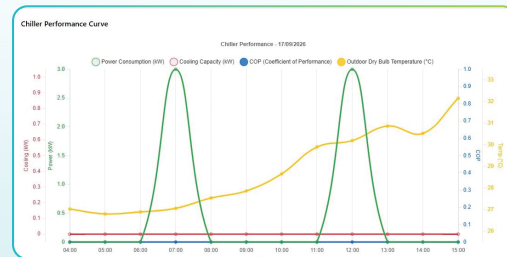


EMSD Asset Management Portal

By integrating live data streams from both GWIN and the integrated Building Management System (iBMS) directly into the BIM-AM platform, visualisation on real-time operational metrics could be achieved for energy consumption monitoring and analytics.

Artificial Intelligence (AI)-Driven predictive optimisation is also on the pipeline: Feeding combined iBMS operational metrics, ambient GWIN datasets, and historical maintenance logs into AI and machine learning engines enables dynamic load forecasting, automated chiller plant optimisation, and predictive maintenance — shifting asset management from reactive maintenance to automated, high-efficiency building stewardship.

At present, a BIM Bot has already been implemented to guide users on best practices and streamline asset management.



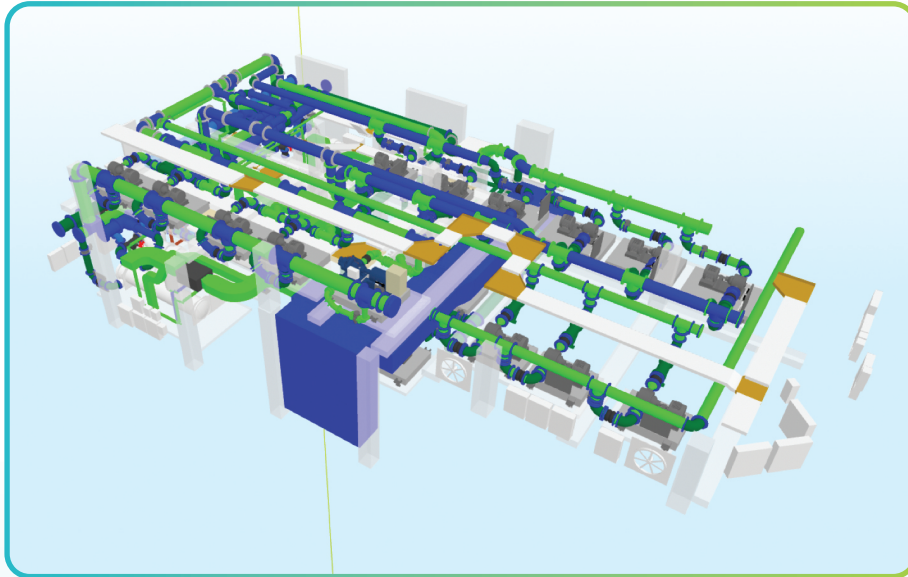
Visualisation of energy performance

# Applications of Open BIM and BIM-AM for Multi-trade Integrated Mechanical, Electrical and Plumbing (MiMEP) Projects

MiMEP refers to the off-site integration of mechanical, electrical and/or plumbing trade components, into a single volumetric assembly of prefabricated modules for transporting to the site for installations so as to enhance productivity and cost effectiveness. The benefits also extends to repair, maintenance, alteration and addition (RMAA) projects in existing buildings.

The integration of MiMEP with open BIM and BIM-AM in RMAA projects offers transformative advantages for the O&M industry. By leveraging open BIM's interoperability and standardisation, project teams can seamlessly exchange consistent, reliable information in a vendor-neutral environment throughout the asset lifecycle. This open-standards approach fosters transparency, flexibility, and scalability, enabling better decision-making and improved project outcomes. The synergy between these seamless integration, significantly improving the efficiency and productivity of O&M initiatives.

EMSD introduced a three-in-one solution that integrates MiMEP, open BIM and BIM-AM:



Open BIM model for MiMEP Project

### Planning Phase

The engineering team uses BIM to create a site environment model and simulate the transportation, lifting, and assembly processes of prefabricated modules.

### Handover Phase

The BIM model contains complete E&M asset information to help clients digitise asset management.

Using an open BIM data format ensures smooth communication and data sharing among engineering teams throughout the building O&M life cycle. It eliminates the need for users to invest in multiple software licences and related training costs, thereby further lowering the entry barrier for using BIM.

## Patents and Awards

EMSD's pioneering endeavors and contributions to digital construction have garnered significant recognition from both local industry bodies and prestigious international organisations.

The conversion guideline along with the open BIM validation and submission workflow earned EMSD the Grand Awards at both the Hong Kong openBIM / openGIS Awards 2024, and at the globally renowned building SMART International openBIM Awards (Handover Category).



Hong Kong openBIM/openGIS Awards 2024



buildingSMART International openBIM Awards 2024





The EMSD Asset Management portal has also earned the Bronze medal at the 50th International Exhibition of Inventions of Geneva, which served as recognitions to applying open BIM in asset management.



The open BIM based EMSD Asset Management portal was granted short-term patent by the Hong Kong Intellectual Property Department in 2025.

## Nurturing the Next Generation

To drive industry innovation, EMSD is committed to nurturing next-generation digital talents and advancing open BIM adoption. Events such as "YOUTH Got Open BIM" empower young talents to actively apply these digital tools and deepen their understanding of open BIM.



Highlights of open BIM activities

## Driving Industry-Wide BIM Excellence through Collaboration

EMSD is committed to advancing BIM development by fostering strong partnerships across government departments and the trade. Through collaboration with professional bodies and the Construction Industry Council (CIC), EMSD arranges and facilitates knowledge-sharing sessions that accelerate BIM adoption.



A sharing session with professional bodies

EMSD also facilitates E&M contractors in applying for the Construction Innovation and Technology Fund (CITF) and collaborates with stakeholders to enhance seamless sharing of digital data in Hong Kong.

By continuously aligning with industry needs, EMSD remains dedicated to pioneering BIM standards that serve as the vital backbone for Hong Kong's smart city and digital twin future.



# Promotion of BIM Use in EMSD

EMSD places a high priority on the learning and development of our engineering graduates in BIM. Structured training courses including practical workshops and hands-on BIM project are designed to equip engineering graduates with the skills necessary to embrace the use of BIM in their careers.



*An engineering graduate training session*

The BIM InnoCentre was established to host regular training workshops where staff can master BIM, open BIM, and BIM-AM software and experience the application of open BIM across design, construction, and asset management. It also offers guided tours for guests, introducing key features of the BIM-AM Portal, demonstrating the open BIM Web Viewer, and showcasing real-time operational practices.



*Interior of EMSD BIM InnoCentre*

To foster a culture of innovation, EMSD actively support staff at all levels in entering local and international BIM competitions. Regular opportunities are provided for attending international BIM symposiums, broadening our colleagues' global exposure and industry perspective.

# Looking Forward

EMSD is advocating a model-data segregation approach in the next version of BIM-AM Standards and Guidelines to further minimising the risk of data loss during conversion from native formats to IFC. Beyond establishing a single source of truth for asset information, EMSD is striving to strengthen open BIM support for national BIM software.

EMSD remains dedicated to pioneering open BIM standards that serve as the vital backbone for Hong Kong's smart city and digital twin future. By integrating AI and open BIM with real-time GWIN and IoT sensor data, EMSD will create a seamless network of connected devices that enhances smart city management and vastly accelerates emergency response capabilities. Through continuous digital advancement and industry collaboration, EMSD is paving the way for the next generation of sustainable, intelligent, and interconnected built environments.

## Reference

CIC BIM Standards-related Publications  
[https://www.bim.cic.hk/en/resources/publications\\_detail/117](https://www.bim.cic.hk/en/resources/publications_detail/117)

DEVB BIM Harmonisation Guidelines for Works Departments  
[https://www.devb.gov.hk/en/publications\\_and\\_press\\_releases/publications/devb-harmonisation-guideline/index.html](https://www.devb.gov.hk/en/publications_and_press_releases/publications/devb-harmonisation-guideline/index.html)

EMSD BIM-AM Theme Page and EMSD BIM-AM Standards and Guidelines  
[https://www.emsd.gov.hk/en/engineering\\_services/project\\_management\\_consultancy/highlights\\_of\\_work/bim\\_am/](https://www.emsd.gov.hk/en/engineering_services/project_management_consultancy/highlights_of_work/bim_am/)

Official Website of BuildingSmart International (bSI)  
<https://www.buildingsmart.org/>

For additional information, please contact [bimam-support@emsd.gov.hk](mailto:bimam-support@emsd.gov.hk)

A stylized graphic on a dark blue background. It features a central cluster of blue and white skyscrapers. To the left, a white box contains a 3D architectural model of a building. To the right, a blue box contains a circular progress chart. A large, glowing green and yellow diagonal line runs from the bottom left towards the top right, passing behind the city skyline. Various blue and white lines and squares are scattered around the central elements, suggesting a digital or networked environment.

Open **BIM**