buildingSMART International (2022)
391-ASSET Asset Management using openBIM

BIM, Asset Management & Safety

NBwbjByJ

Entrant details

Role or Job Title on the Project	Project Manager
Employer	.
Employer Role	Public Sector Owner/Client
Are you or your employer a member of buildingSMART?	No

Entry details

Entry Details

By checking this box I understand and acknowledge that this awards program is to assess information about openBIM, and that openBIM is not only about the use of solutions. openBIM is about setting up an environment where every party in a team can work in the optimal way ("how they prefer") without putting limitations on others. It is about freedom to take control over your data and workflows, while keeping that freedom for others as well. Full use of open standards is not mandatory for this mission.	✓
Website	https://www.terna.it/en

Location

Terna Headquarters is located at:

Viale Egidio Galbani, 70 - 00156 Roma
Italy

Submitting Party and Stakeholder Logos (compiled into one .ppt/pptx file for upload)

PPT	The Power of BIM_stakehol... (673 KiB download)

Entry Description

Terna is one of Europe's main electricity transmission grid operators, managing the high voltage Italian transmission grid, one of the most modern and technologically advanced in Europe. Terna plays a central role, as directors in the transition of the electricity market towards the use of environmentally friendly sources, guaranteeing a secure and efficient supply to households and businesses.

The Terna group is the owner of the Italian national transmission grid (NTG) for high and extra-high voltage power and is the largest independent electricity transmission system operator (TSO) in Europe. Terna has a public service role, crucial to ensuring the country's power supply and enabling the entire Italian electricity system to function.

Terna also plays a decisive role in the integration of Europe's main electricity networks. The objective is to create an increasingly secure and efficient continental system at the service of the public and industry. This is why, over time, synergies have been developed with European and international system operators to establish cooperation agreements in areas of common interest and create a broad, interconnected and sustainable network system.

While this may seem a different area than the usual buildings and linear infrastructures, Terna shares the same basic needs as anyone else in different domains: the Asset Management needs.

Terna is also investing a lot in innovation and digitalization and openBIM is key strategy for digitalization and asset management. With the project presented at the Awards, Terna wanted to bring openBIM to the energy sector, where it is not yet developed as other sectors but there is growing needs and requests about it.

The objective is twofolded:

1. From one side, Terna has the need of digitalizing their existing power plants in openBIM, in a fast, reliable and accurate way.
2. On the other hand, Terna needs to gather the results of such digitalization process and use the produced models, but also documentation, drawings, etc., for better Asset Management processes aswell as other possible process improvements and automatizations that are possible thanks to such digitalization process. Not only improve existing processes already in use, but also think about new ones unlocked by the power of openBIM and digitalization.

This project will show the advancements that have been already done for the digitalization, and how, all of this, helps Terna in setting up a digital strategy in order to improve the Asset Management of their existing and new assets in a relatively new field for the openBIM, solving some common use cases for the energy domain.

What stage of completion is the entry content representing?	The project is in an advanced POC (Proof of Concept) stage.

Stakeholder Statements

"The provided tool is very powerful and already solves some of the problems present within our company." Raffaele Vaiano, Asset Management - Terna S.p.A

"The stations tool was the tool that allowed us to digitize the two stations currently in our test scenario in just a few steps, reaching a level of detail that truly reflects the real stations." Salvatore Di Pirro, ICT Solutions - Terna S.p.A

"It is exciting to experience how openBIM can be applied in the most disparate scenarios and bring added-value services to end-users and make a strong contribution to improving safety." Guido Cianciulli, ACCA software CEO

"Personally it is one of the most innovative projects I have had the pleasure of leading." Giuseppe De Meo, Project Manager - ACCA software S.p.A.

"It is a unique experience to experiment how an openBIM / open minded approach guarantees interoperability between different technologies and all this translates into usefulness even for the non-professional users" Giovanni Esposito, BIM Manager ACCA.

Upload a 2 minute video to show the scope of the entry.

MP4	Introduction.mp4 (49.0 MiB download)

openBIM Claim

Detailed description of openBIM used on the project or initiative

For the digitalization of Terna assets, BIM is the natural way, and openBIM, is key. Terna needs to manage BIM based tenders, sharing deliverables produced with external operators to manage such BIM tenders in line with ISO 19650. Using open data, and being able to require the needed model and related informations via specific requirements in the IFC openBIM format, allows Terna to collaborate with any stakeholder involved in the BIM Tender process with maximum transparency. One important requirement of this process of digitalization, is to manage the internal design and subsequent tender addressed to external economic operators. In order to do so, a BIM Object Library for the Energy market in open format has been created, with classes and information already aligned to the IFC standard. This way, it is possible to adopt in each phase and for each need solutions that communicate through standard protocols (APIs) and support open and interoperable formats.

A dedicated BIM Tool called “Stazioni” allows to quickly digitalize existing assets in IFC according to the aforementioned BIM Object Library and client needs and requirements.

Result of digitalization is not only the IFC models but also all the deliverables produced and made available to all project participants on a Common Data Environment with connection between IFC model entities and related informations, documentations, and so on.

The digitalization process is not the end of the story, rather, it is just the beginning. It is, in fact, needed, that the implemented technologies that operates on openBIM formats must be integrated with the customer's application park and innovate legacy systems already in place.

The dynamic connection of the CDE, and hence the IFC models, with all the related documentation, aswell as the connection with existing legacy systems, is in fact creating the Digital Twin of the asset.

Such Digital Twin can have the most disparate usages. Any use case that can be thinked of, can be realized, exactly because the data available is in open format, and this means that, even if software solutions does not exist yet for that particular purpose, it can be developed by anyone interested.

The presented Safety use case, is an example of how one can think out of the box and realize important use-cases with the use of solutions that operates on open data. To achieve this goal, not only BIM is involved: GIS, CDE, BIM Visualization Services, Live Chat, Web Meeting, QR Code and IoT systems needs to be connected each other to accomplish this task. Backbone of this integrated technologies is the model in open data format, which allows any system to query, update and use the needed informations from the models.

While all of this may be achieved with proprietary formats aswell, the vendor lock-in that would result by this choice would mean that, for every further use-case that needs to be developed and addressed, there would be no other choice of software solutions for the stakeholder, ultimately resulting in a very bad BIM digitalization strategy.

"We were able to innovate using openBIM."

Innovation is key objective of this project, and openBIM is at the foundation of such innovation. Bringing BIM and in particular openBIM in the energy sector, is not trivial, not because it is not required (it is, in fact, absolutely needed) but because it is quite new in this area. This may seems to be a bad thing, but, in fact, it gives the true possibility of innovation, because one can think out of the box and is not constraint by existing and maybe obsolete solutions. One can think about their needs and use-cases that needs to solve, and solving them with the use of openBIM assures that many different tools and solutions can be developed to satisfy such needs. Connection with Facility Management and Asset Management existing systems, use of new technologies such as connection with IoT

(Internet of Things), Security, and many other use cases, can be expressed and solved with the use of openBIM after the digitalization process of the existing assets, as this is the starting point for everything else.

openBIM methods used	✓ IFC 2x3 ✓ IFC 4 ✓ BCF
Have you used bSDD to add additional extensions on top of IFC?	No

Were there other regional or open standards used other than those listed above?

Terna uses it's internal company standard which is called "Progetto Unificato Terna" (Terna Unified Project).

Terna has always pursued the approach to standardization, which is why it has structured over time, what in technical jargon, are called UNIFIED PROJECTS.

The unified projects consist of an organic collection of graphical documents and table data that support Users in the design phases of a StandardPower Station.

Level of Collaboration	✓ Several domains within an organization

Information Requirements

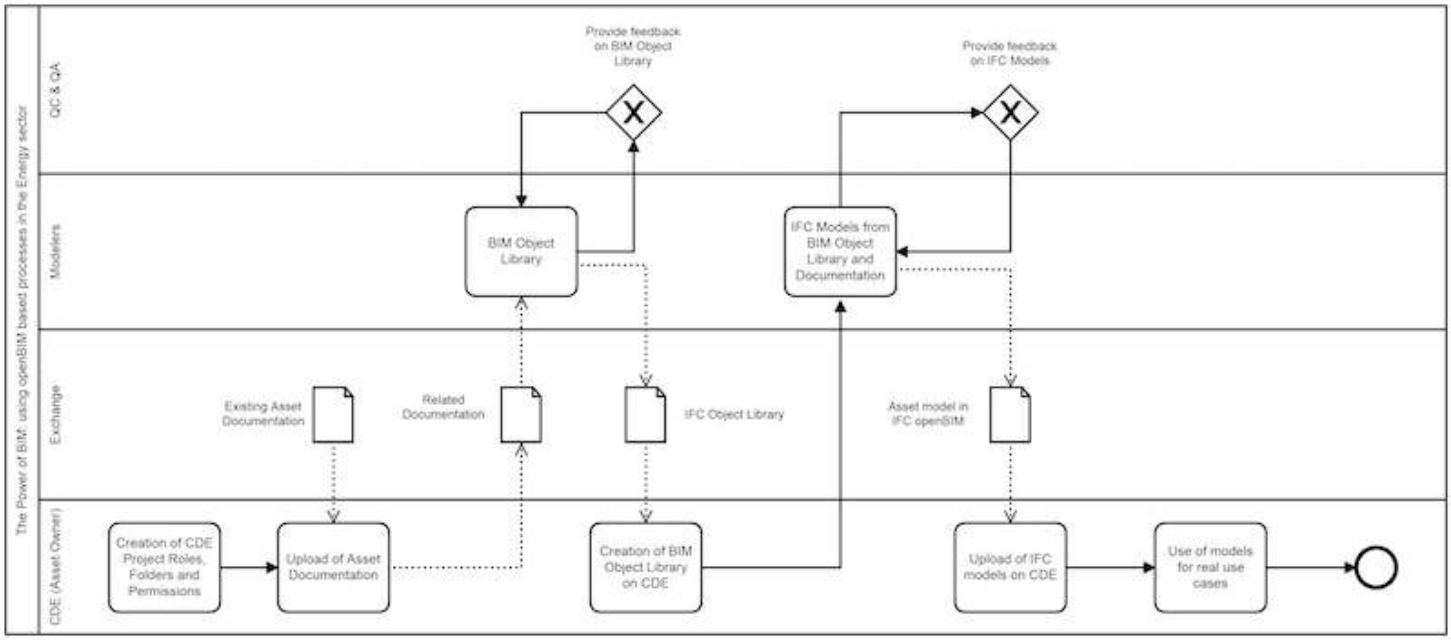
PDF	The Power of BIM_Informat... (1.4 MiB download)

openBIM Evidence

Software Ecosystem Map

PDF	The Power of BIM_ software... (267 KiB download)

Process Maps



openBIM Data Metrics Summary

PDF	The Power of BIM_DataMetr... (1.0 MiB download)

Additional openBIM Supporting Evidence

PDF	The Power of BIM_UseCase_... (315 KiB download)

Lessons Learned

> This project is a POC that represents a baseline for more similar projects to come next. It is a starting point to prove that with openBIM technologies and methodologies one can realize, in practice, any use case that is needed for their business. The foundation is the process of digitalization of existing and new assets, and thanks to openBIM, it is possible to manage BIM based tenders, in order to acquire models created from external operators and to manage the BIM tenders in line with the ISO-19650. openBIM means also the possibility to create a BIM Object Library for the Energy market with classes and information aligned to the IFC standard. Such libraries are reusable for different digitalization processes and, being in open format, usable by any project participants without limits on the choice of software solutions for the participants. Such digitalization process can undergo QA & QC automated processes, in order to guarantee that the models contain exactly the information needed for the purposes they are created for. Once the digitalization process is completed, again, everyone can act on the model, being in openBIM, using any combination of software of choice, in order to accomplish the most disparate use cases. The Security use-case presented, in particular, is paramount to show how out of the box thinking can be then fastly prototyped and implemented, partially automatizing and helping in solving a real and daily processes that would otherwise take more time to be accomplished, lowering risks, and ultimately saving money and time for the company. If there is one big lesson learned, is that, thanks to openBIM, the focus shifts from the current software capabilities, to the value of the open data. Being wise in how and what open data is requested, allows to think about any possible use cases that needs to be accomplished, as even if there is no software with such capabilities, open standards allows anyone to create application to use such data and solve crucial and specific use cases.

"We were able to identify where we need openBIM to develop further."

> openBIM in the Energy sector in quite new, and this fiels has some peculiarities that open standards needs to carefully look at. The related openBIM standards, especially IFC, not always have all the classes and structures needed for this domain, and sometimes, shortcuts needs to be taken. Still, in the end, a proper IFC model, which represents the digitalization of the asset in openBIM format, can be created, and this is the starting point for every further usage of the model and use case. An extension of IFC, similar to what has been done with the IFC4X3 version, thanks to the IFC Rail and IFC Infra projects, which extended the IFC schema and data structures based on the need of the Rail, Road, Bridge, and other infrastructures domain, based on the stakeholder needs and expressed use-cases. Other than this, IFC itself can be extended with the use of bSDD, using project and common standard that can be specific for the energy domain. This is also an aspect that is under experimentation from our side, and buildingSMART can further standardize this process of publishing and consuming information on the bSDD for unusual domains such as can be the Energy one.

Upload .ifc file(s) or other technical files to support validation of the research results.	https://service.usbim.com/link/62a05c608df9e66c07e5e2bd

Share any instructions for accessing the .ifc or other technical files for review.

> Access is granted to anyone who has a free account on usBIM, and shows one example Terna transformer station as digitalized in IFC. You can select objects and check the entity properties as required. Similar examples will be shown in the video, showing also federations, documents attachment, and other uses of the IFC model for the Securty use-case.

Use Cases

BIM Uses were defined on the project	✓

BIM Uses formed an integral part to how the project was delivered | ✓

I agree to be contacted for more information about the project BIM uses outside of this awards program. | ✓

Documentation on use case(s) as a single file upload

PDF	BIM-AMS-UseCaseDocumentat... (4.8 MiB download)

Log in to awards.buildingsmart.org to see complete entry attachments.

PDF

Type of attachment
Presentation

BIM-AssetMana... 5.3 MiB

MP4

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Video

Terna_presentaz... 629.6 MiB

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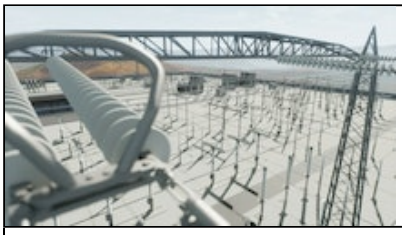

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