

## WG13 Issues - CIM Issues #6616

### Add SubstationKind

11/30/2023 10:45 AM - Svein Olsen

<b>Status:</b>	New		
<b>Priority:</b>	Normal		
<b>Target version:</b>			
<b>Author/Contact Info:</b>	Svein Olsen	<b>Standard(s):</b>	61970-301; 61970-452
<b>Base Release:</b>	CIM17	<b>Version:</b>	
<b>Solution to be Applied To:</b>		<b>Clause:</b>	
<b>Solution Version:</b>		<b>Sub-Clause:</b>	
<b>Solution Applied By:</b>		<b>Paragraph:</b>	
<b>Completion Date:</b>		<b>Table:</b>	
<b>CIM Keywords:</b>	61968-AssetInfo, 61970-Core, 61970-DiagramLayout	<b>Originally Closed in Version:</b>	
<b>Breaking Change:</b>		<b>Origination Date:</b>	
<b>Breaking Change Description:</b>		<b>Origination ID:</b>	
<b>CIM Impacted Groups:</b>	None	<b>Originally Assigned To:</b>	
<b>Requestor:</b>			
<b>Description</b>			
There is a need to provide substation categorization. The IEC Electropedia is including different type of categories. There are different implementation extensions that include it. As part of TF 14 Part-7 Design work it is relevant to have a consistent categories for substation.			
<b>Proposed Solution</b>			
Attached document provide description of the current model, justification and proposed solution.			

### History

#### #1 - 11/30/2023 10:47 AM - Svein Olsen

- File CR CIM18 SubstationKind.docx added

#### #2 - 03/07/2024 01:20 PM - Richard de Groot

In response to the proposal of Svein for the definition of a SubstationKind enumeration.

I agree with Svein that the existing FacilityKind enumeration is not useful. Also, as a matter of detail, the enumeration name is poorly chosen as only substation kinds are listed. I suggest that "power plant", "energy storage plant" and "data centre" are also facilities. It is not entirely clear to me if the existing enumeration is to be modified or replaced, or if a new enumeration is to be defined. The latter option would lead to 2 enumerations for essentially the same and I suggest that calls for an action regarding the original enumeration. For example one could add to FacilityKind the existing values but without the word "Substation" resp. "Distribution", then deprecate the existing values.

The classification used by DOE is of little use, considering the terminology Svein proposes to avoid. Regarding the classification used by Stattnet, the classification is recognised but not convenient from my point of view.

- I understand that "environment" and "fictitious" can be ignored as not relevant.

- "Power", "transformer" and "coupling" imply that substations have a clear primary function. In my context that is often not the case and functionalities are truly mixed.

- "Step-up" and "step-down" imply unidirectionality of power. While those cases certainly exist, in my context bi-directional power flow is or will be the general case.

- I cannot comment on the "transition" substation in the case of DC cables. In the case of AC cables however, such locations would be designated as "riser" (Dutch: opstijgpunt). From a grid modelling perspective we now see it as a ConnectivityNode, at most a Junction.

- "Junction" is a must have. It is regrettable that it is not generally supported, as we have many tee-off junctions in our system.

Regarding the definitions of "substation" I note that they contain the words "buildings" resp. "housing". The tee-off junctions in our system would hence not qualify as substation as there is no building or housing (at most a fence). For our system we do need allowance of disconnectors and earthing devices at a junction.

In response to the proposed SubstationKind enumeration, I concretely suggest the following be considered.

- "transformer": change description to "a switching substation containing power transformers interconnecting two or more networks of different voltages"
- "junction": change description to "location where two or more line segment interconnect and may include switches, but not a circuit breaker. Typically, a representation of a T-junction. Also, not perse considered a substation."
- to add to the enumeration "main" with description "substation which has a major role in the grid"
- to add to the enumeration "secondary" with description "substation which has a limited role in the grid"
- to add to the enumeration "facility" with description "substation which is part of a connected facility. These substations are typically third-party owned."
- to reconsider the options "step-up" and "step-down" in view of my comments
- that the proposal state more clearly what the addition of the new enumeration SubstationKind means for the existing FacilityKind.

Kind regards,  
Richard de Groot

### #3 - 03/11/2024 05:46 AM - Richard de Groot

#### Svein's response added as [SHO:...]

In response to the proposal of Svein for the definition of a SubstationKind enumeration.

I agree with Svein that the existing FacilityKind enumeration is not useful. Also, as a matter of detail, the enumeration name is poorly chosen as only substation kinds are listed. I suggest that "power plant", "energy storage plant" and "data centre" are also facilities. It is not entirely clear to me if the existing enumeration is to be modified or replaced, or if a new enumeration is to be defined. The latter option would lead to 2 enumerations for essentially the same and I suggest that calls for an action regarding the original enumeration. For example one could add to FacilityKind the existing values but without the word "Substation" resp. "Distribution", then deprecate the existing values.

[SHO: This has not really been addressed in this CR]

ricgro: fair enough

The classification used by DOE is of little use, considering the terminology Svein proposes to avoid. Regarding the classification used by Stattnet, the classification is recognised but not convenient from my point of view.

- I understand that "environment" and "fictitious" can be ignored as not relevant.

[SHO: Correct, but it highlights the need for "other"]

- "Power", "transformer" and "coupling" imply that substations have a clear primary function. In my context that is often not the case and functionalities are truly mixed.

[SHO: That is the reason we have not been able to get a kind – it is not mean for a precise description. A substation would have a main purpose.]

- "Step-up" and "step-down" imply unidirectionality of power. While those cases certainly exist, in my context bi-directional power flow is or will be the general case. [SHO: Do not agree on this – yes on transmission and the case we do not really model the generation on their correct voltage.]

- I cannot comment on the "transition" substation in the case of DC cables. In the case of AC cables however, such locations would be designated as "riser" (Dutch: opstijppunt). From a grid modelling perspective we now see it as a ConnectivityNode, at most a Junction.

- "Junction" is a must have. It is regrettable that it is not generally supported, as we have many tee-off junctions in our system.

Regarding the definitions of "substation" I note that they contain the words "buildings" resp. "housing". The tee-off junctions in our system would hence not qualify as substation as there is no building or housing (just a fence). For our system we do need allowance of disconnectors and earthing devices at a junction.

In response to the proposed SubstationKind enumeration, I concretely suggest the following be considered.

- "transformer": change description to "a switching substation containing power transformers interconnecting two or more networks of different voltages"

[SHO: I suggest we keep to the IEC definition. I cannot see what added value it brings. ]

- "junction": change description to "location where two or more line segment interconnect and may include switches, but not a circuit breaker. Typically, a representation of a T-junction. Also, not perse considered a substation." [SHO: We have already agreed in WG13 that if it includes switches it is not an junction.]

- to add to the enumeration "main" with description "substation which has a major role in the grid"

- to add to the enumeration "secondary" with description "substation which has a limited role in the grid"

- to add to the enumeration "facility" with description "substation which is part of a connected facility. These substations are typically third-party owned."

[SHO: I agree that these should be addressed but not in the same enumerator. ]

- to reconsider the options "step-up" and "step-down" in view of my comments

[SHO: if it is both it shall be classified as transformer.]

- that the proposal state more clearly what the addition of the new enumeration SubstationKind means for the existing FacilityKind.

[SHO: Let first understand what a substation is.]

### #4 - 03/11/2024 06:57 AM - Richard de Groot

#### Richard's response to Svein's.

On addressing FacilityKind: fair enough if this is a follow-up action.

On the use of "power", "transformer" and "coupling": fair enough if SubstationKind is meant to indicate main use of a substation only.

On the use of "step-up" and "step-down": one is welcome to disagree. (Maybe our PV infeed per capita is different than in Norway.)

On the definition of "transformer substation": agree, keep IEC definition.

On the definition of "junction": okay, we can align to what was agreed in WG13.

On the definition of "facility substation": agree, this is a matter of ownership, not kind of substation.

**Files**

CR CIM18 SubstationKind.docx

767 KB

11/30/2023

Svein Olsen