



# COPENHAGEN METRO, M1+M2

## Asset Condition Assessment. Scope of Service

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**Issued by:** Metroselskabet I/S

**Approved by:** CJC

Christopher J. Cox

**Checked by:** TBR

Thomas Bech Roskjær

**Prepared by:** DLB

Dorte-Lene Bacher

**Pages:** 6

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## 1 Background

The Copenhagen Metro M1+M2 has been in operation for nearly 15 years. It is running with high Service Availability (SA) and with a customer satisfaction level which exceeds that of other both domestic and foreign public transportation companies. The Copenhagen Metro M1+M2 is in line with the best public transportation systems in the world.

The demand for public transportation in Copenhagen is growing and the existing metro system is aging. Metroselskabet is consequently facing new challenges of maintenance and renovation of the assets in the Copenhagen Metro M1+M2 in order to ensure a continuously high level of SA and customer satisfaction.

The metro system is gradually changing from being perceived as a new system to having the status of being an embedded system, where replacements and renewals have to be done more frequently and the scale and complexity of the activities increase over time.

Replacements and renewals have so far been focused on assets with a technical estimated lifetime of between 5 and 15 years. These assets include revenue and traffic information systems as well as safety and control systems. They are characterized by having a relatively short technical service life and the replacement/renewal activities can usually be handled with minimal impact on daily Metro operations. Replacement/renewal of these assets is typically completed within a year from the initial decision to replace/renew.

Over the coming 10 to 15 years, another type of assets needs to be replaced or renewed. These assets are the ones which are expected to have a technical service life of 16 to 35 years, and include Metro stations at above ground level, the ATC-system, traction power supply and rolling stock. Replacing/renewing these assets may have severe impact on the daily Metro operation, and the time from initial decision to complete installation is relatively long.

Due to the fact that critical assets within the existing metro system are expected to expire within the next decade, the board of directors of Metroselskabet decided in December 2016 to initiate the project *Strategy for renovation of the Copenhagen Metro M1+M2*.

A central objective of the strategy is to establish an optimal portfolio of renovation activities expected to be carried out during the period of 2019 to 2030. Optimal portfolio criteria include:

- Cost efficiency
- Minimum impact on daily Metro operation and
- Customer satisfaction.

Metroselskabet will renew or replace an asset if the:

- Condition of the asset indicates that expected service level is no longer achievable, and/or

- Costs of maintenance of the asset exceed costs for renewals or replacement, and/or
- Calculations of Whole Life Cycle Cost imply that renewal/replacement from a long term perspective is optimal.

Additional factors are relevant when deciding whether to renew or replace an asset. These include changes in market conditions imposing problems with obsolescence of assets, or approaches to executing renewal and replacement projects which provide financial benefits when bundling activities.

Metroselskabet expect to use all of the above approaches to evaluate renewal and replacement activities in the development of the optimal renovation portfolio for 2019 to 2030.

It is essential to Metroselskabet in developing the optimal portfolio to receive an impartial assessment of the condition of selected assets within the Copenhagen Metro M1+M2. The condition assessment is to be used as an input to the comprehensive task of defining the previously described renovation portfolio.

Below the Consultant refers to the company which Metroselskabet appoint for the service. The Employer refers to Metroselskabet.

The specific assets selected for assessment are defined and described in *Attachment 1A: Asset list, doc. no. MS-X-DA-INVEST STRAT-0097* and *Attachment 1B: Supplement to Asset list, doc. no. MS-X-DA-INVEST STRAT-0093*.

## **2 Requirements to deliverables**

The Consultant is to perform an impartial assessment of the condition of selected assets within the Copenhagen Metro M1+ M2. The purpose of the condition assessment is to provide estimates of the remaining service life of the selected assets and related aspects hereof.

The condition assessment and adjoined aspects must be delivered to Metroselskabet by means as follows:

- A filled-in EXCEL-file with information on condition, remaining service life etc. An EXCEL-template is provided by Metroselskabet and must be applied when delivering the assessment. The template is found in *Attachment 3: EXCEL-file for output, doc. no. MS-X-DA-INVEST STRAT-0096*.
- A documentation report, which includes:
  1. A description of the applied assessment method
  2. An evaluation of the data quality presented in the EXCEL-fileA summary of the assessment which includes an overall conclusion of the condition of the Copenhagen Metro M1+M2 covering the selected assets. The conclusion must be provided for each of the category of assets, cf. *Attachment 3: EXCEL-file for output, doc. no. MS-X-DA-INVEST STRAT-0096*

- A presentation of the condition assessment results for the CEO and other relevant parties, held at the premises of Metroselskabet.

Metroselskabet expect to make references to the EXCEL-file and the documentation report for external communication purposes.

All deliveries must be made in English.

When referring to assets the Consultant must use names and IDs as stated in the asset list, cf. *Attachment 1A: Asset list, doc. no. MS-X-DA-INVEST STRAT-0097*.

#### 2.1.1 Option: Maintenance Status

The maintenance of the Copenhagen Metro M1+M2 is provided by an O&M Provider and regulated through an O&M Contract. Currently the O&M Provider is Ansaldo ASTS/Metro Service. The current O&M Contract will expire by the end of 2018.

The O&M Provider is required to maintain the assets of the Copenhagen Metro M1+M2 according to best practice of maintenance within similar systems. The contract requires that both corrective and preventive maintenance is conducted, and performance is measured through penalty schemes related to registered maintenance activities. Maintenance activities are recorded in SAP.

As part of the Strategy for Renovation of Copenhagen Metro M1+M2, Metroselskabet will consider insights into the maintenance conducted as relevant. An option which covers an evaluation of the asset condition relative to the requirements of maintenance within the current O&M Contract is therefore tendered. The Consultant is required to make this evaluation.

The *Maintenance Status* option includes the following deliverables:

- A report including an evaluation of the condition of the selected assets relative to the required maintenance
- Relevant documentation which supports the evaluation of the condition relative to the required maintenance

The selected assets are defined in *Attachment 1A: Asset list, doc. no. MS-X-DA-INVEST STRAT-0097*. When referring to assets the Consultant must use names and IDs as stated in the asset list. **All deliveries must be made in English.**

#### 2.1.2 Option: Additional assets

The Strategy for Renovation of the Copenhagen Metro M1+M2 requires insights into the condition of the assets described in the asset list, cf. *Attachment 1A: Asset list, doc. no. MS-X-DA-INVEST STRAT-0097*. However, impartial insights into condition of other assets are valuable to Metroselskabet for comprehensive purposes. An option for assessment of the condition of additional assets is therefore tendered.

The option includes an assessment of the condition of the following assets:

- Tunnel ventilation

- Cable ducts (in tunnels and underground stations)
- Water proofing (in tunnels and underground stations)

The option *Additional assets* include the following deliverables:

- An assessment of the condition of the tunnel ventilation, cable ducts (in tunnels and underground stations) and water proofing (in tunnels and underground stations) assets. Information on condition can, but is not required, to include the same information as stated in the file in *Attachment 3: EXCEL-file for output, doc. no. MS-X-DA-INVEST STRAT-0096*. No separate EXCEL-file is available for these assets.
- Relevant documentation which supports the assessment of the condition of the tunnel ventilation, cable ducts (in tunnels and underground stations) and water proofing (in tunnels and underground stations) assets.

**All deliveries must be made in English.**

### **3 Metroselskabet provides**

As part of the tender and to support the Consultant in the assessment of the asset condition, Metroselskabet provides Consultant with:

- Various data describing the performance and maintenance of the selected assets, c.f. *Attachment 2: Asset data, doc. no. MS-X-DA-INVEST STRAT-0098*. The attachment includes samples of extracts from SAP. If other data extracts are needed, Metroselskabet may provide the Consultant with access to the SAP system
- Resources for interviews, work-shops etc. if needed
- Resources for supporting inspections or the like if needed

Note that resources from Metroselskabet will be only partially available in July 2017.

### **4 Employer's Time Schedule**

<b>Activity</b>	<b>Date</b>
Tender deadline	March 30, 13 o'clock (Danish time)
Clarification/negotiation meetings	April 3-7
Deadline for revised tender with marked changes	April 18, 13 o'clock (Danish time)
Awarding of tender	April 24
Date of delivery of all specified deliveries	Week 34