Oslo

Energy and Charging Infrastructure

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Energy and charging Infrastructure

Why focus on energy and charging infrastructure?

The transition to zero-emission construction sites and fleets is changing how public authorities need to think about energy. For many years, access to electricity was largely taken for granted. As construction machinery, heavy vehicles, municipal fleets, and operational equipment become electrified, charging solutions and grid capacity increasingly become strategic planning considerations.

The same challenges arise whether a municipality is procuring a zero-emission construction project or replacing fossil-fuelled vehicles and machinery in its own operations. In both cases, successful electrification depends not only on purchasing electric equipment, but also on ensuring that sufficient charging infrastructure and grid capacity are available where and when they are needed.

As a result, energy is shifting from being a simple utility purchase to something that must be actively planned and managed by fleet owners, suppliers and even municipalities**.** Location, land availability, ownership structures, operational needs, project timelines, and organisational responsibilities all influence the choice of charging and energy solutions.

A key lesson from Oslo's experience is that available grid capacity and energy solutions should be assessed as early as possible. Early dialogue with grid operators helps identify opportunities and constraints, supports realistic procurement requirements, and reduces the risk of delays or additional costs during implementation. This is relevant for going into zero emission construction sites, but also relevant for municipalities looking to transition their own operations.

Purpose of this information

The information shared here is Oslo’s practical experience from implementing zero-emission construction sites, with a particular focus on how grid capacity can be assessed and communicated before procurement.

The purpose is to help cities, municipalities, and public project owners improve project planning, procurement processes, and risk management through early engagement with grid operators.

Here we will present key lessons learned, recommended practices, and considerations for providing grid-capacity information to the market. As conditions for grid access and electricity supply differ between countries and regions, approaches to securing power for construction sites will also vary. Norway’s highly electrified energy system has influenced both the opportunities and challenges encountered in Oslo, and readers should consider how local energy systems, regulatory frameworks, and grid constraints may affect the applicability of the recommendations presented in this guide.

Key definitions	
Current (A):	Flow of electric charge, commonly used when specifying cables, circuit breakers, and electrical installations.
Voltage (kW)	Electrical potential difference. Common construction-site voltages are 230 V and 400 V.
Power (kW)	Rate of energy use or transfer. Critical for charging infrastructure and grid-capacity planning.
Energy (kWh)	Total electricity consumption over time.
Power demand	The maximum power required during the most energy-intensive phase of a project.
Preliminary grid-capacity assesment	A grid operator's estimate of available capacity at a specific location and point in time. This capacity is typically not reserved and may change before a formal connection request is submitted.
Key stakeholders	
Developer/project owner	The project owner is responsible for defining project requirements and can significantly reduce uncertainty by assessing available grid capacity before launching the tender process.
Supplier/contractor	The contractor is responsible for planning the project's energy and power demand, establishing temporary electrical infrastructure, arranging grid connections, and evaluating any additional measures required to ensure sufficient energy supply.
Distribution system operator (DSO)	The distribution system operator manages the electricity network and provides information regarding available capacity, connection opportunities, and potential grid upgrades.
Regulatory authorities	Depending on national regulations, permits or approvals may be required for temporary substations or other electrical installations.

Complimentary guidelines

While the information shared here focuses on the client's role in assessing and communicating available grid capacity, Hafslund Rådgivning has developed two guidelines with the purpose to inform contractors who are planning and designing infrastructure for electrical construction projects, with a particular focus on charging infrastructure for construction machinery. They are intended to be useful tools in the process of sizing electrical installations and serve as a supplement to existing procedures and knowledge on project planning among contractors.

Guideline for Zero emission Construction Sites

- **Infrastructure and road construction**
  This guideline supports contractors in planning electrical infrastructure and charging solutions for infrastructure and road projects.

- **Guideline for Building Construction**
  This guideline supports contractors in planning for building construction projects, addressing the specific energy and charging requirements of building sites.

This information: project owner perspective

- Focuses on early assessment of grid capacity.
- Recommends dialogue with the local grid operator.
- Supports the inclusion of grid-capacity information in tender documents.
- Creates a common knowledge base for all bidders.

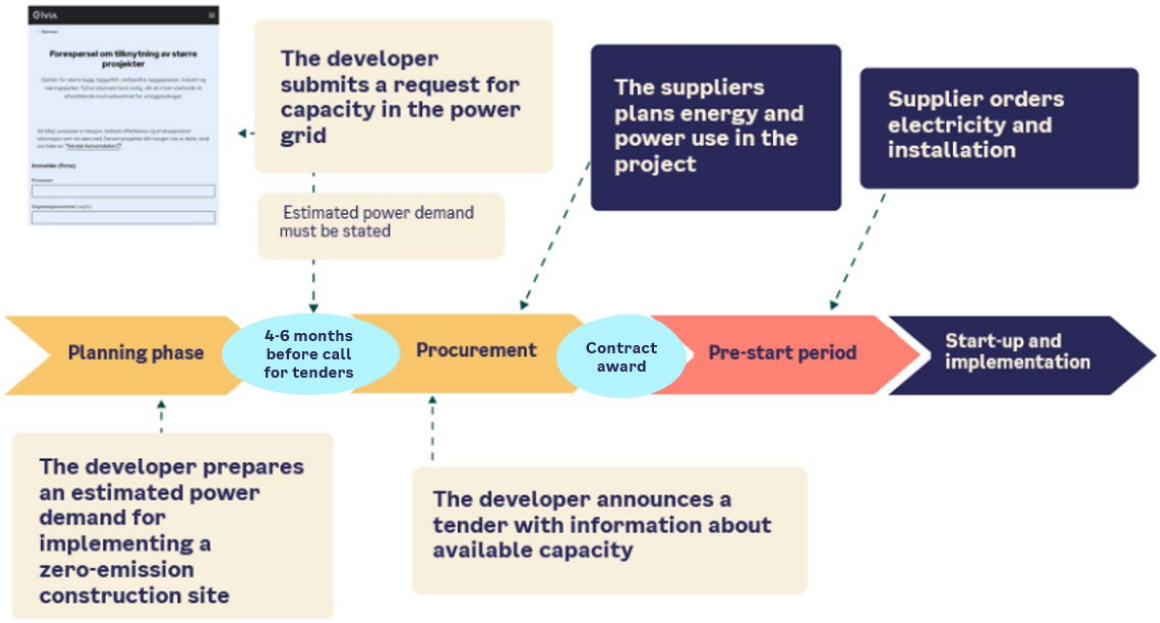

Figure 1 Process overview

Oslo's approach

The City of Oslo's approach is for the project owner/developer to obtain information on available grid capacity before procurement and share this information with the market through

the tender documents. This gives all bidders a common basis for planning energy demand, charging infrastructure, and any supplementary power solutions.

Standardising this process helps create predictability and transparency for contractors, grid operators, and other stakeholders involved in delivering zero-emission construction projects. Early access to grid-capacity information reduces uncertainty and supports more realistic project planning.

While Oslo has found this approach valuable, responsibilities and procedures may differ between cities and countries. Cities are therefore encouraged to work with relevant stakeholders to identify the process that best fits local conditions, regulations, and market practices.

Key principles:

1. Build internal capacity and understanding within the organisation. Delivering zero-emission construction projects often requires new planning processes, earlier engagement with energy stakeholders, and a different approach to risk management than conventional fossil-fuelled projects.
2. Define a locally appropriate process for assessing and communicating grid capacity.
3. Engage relevant stakeholders, such as grid operators, project owners, contractors, and permitting authorities, at an early stage.
4. Assess grid-capacity availability as early as possible.
5. Ensure that all bidders receive the same relevant information.
6. Communicate capacity constraints and uncertainties transparently.
7. Allow contractors to determine the most appropriate technical solution based on available capacity and project requirements.

If available grid capacity is limited, potential solutions may include grid upgrades, temporary substations, battery storage systems, or other mobile power solutions.

Why focus so much on grid capacity?

One of the key lessons from delivering zero-emission construction projects is that access to sufficient electrical capacity can be a critical success factor. Early assessment of local grid conditions provides both project owners and contractors with a more realistic basis for planning equipment, charging strategies, project schedules, and costs.

Our experience shows that providing information about available grid capacity during the procurement phase can:

- Allow the client and contractor to plan measures in advance and secure progress.
- Prevent multiple contractors from contacting the grid company with the same questions.
- Ensure a single point of contact and one consolidated inquiry creates predictability.

- Ensure predictability and equal competitive conditions in procurements.
- Give contractors a basis for realistic planning and pricing of zero-emission operations.
- Reduce the risk of delays and additional costs.

Early engagement with the local distribution system operator (DSO) also improves understanding of potential limitations and available solutions.

Estimating power demand

In Oslo's approach, the estimated power demand is based on the most power-intensive phase of the project. Fast charging of construction machinery often represents the largest share of peak demand, while site compounds, vehicles, and other equipment add to the total load.

The estimate is intended as a preliminary indication only and may be based on experience from similar projects. The contractor remains responsible for planning machinery, charging strategies, and site operations based on the actual grid capacity available at project start.

If available grid capacity is insufficient, it is the contractor's responsibility to assess and implement appropriate mitigation measures to secure the required power supply.

Experience from previous projects in Oslo

1. Small projects (1-2 construction machines): approximately 100 kW
2. Medium-sized projects (2-3 large construction machines and several smaller machines): approximately 250 kW
3. Larger projects (multiple large construction machines requiring simultaneous fast charging): approximately 500 kW

Key factors influencing power demand

- Project size and complexity
- Number of simultaneous energy-intensive activities
- Type and number of machines operating or charging simultaneously
- Extent of excavation and earthworks
- Additional loads such as site compounds, lighting, and vehicle charging