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► Price Regulation Hydroelectric Projects Index regulation from 01.01.1997 to 01.01.2024

We have considered the development of cost during the year 2023 and updated the indices which cover the time from 1.1.1997 to 1.1.2024.

Updated indices are as follow:

- | | |
|------------------------------|-------------------------|
| • Mechanical components | 2.19, increased by 5.0% |
| • Electrotechnical equipment | 2.08, increased by 5.5% |
| • Construction | 2.99, adjusted by -0.1% |
| • Tunnels | 3.01, increased by 1.9% |
| • Embankment dams | 2.65, increased by 2.4% |

Comments and justifications to the indicated indices are as follows:

Mechanical components - Cost development

The average bid prices from suppliers in the market indicate an increase in prices for turbines, pipes, valves and gates for hydropower. Market conditions significantly influence price trends.

This index adjustment is primarily based on Statistics Norway's (SSB) data:

- The Producer Price Index for the metal goods industry shows a 4.8% increase from the previous year for the domestic market and 5.9% for the export market.
- The Price index of first-hand domestic sales of iron and steel indicates an 8,8% decline for the domestic market and a 5.2% increase for the import market.
- The Industrial Wage Index has risen by 5.8%

Regarding turbines produced in Norway, we estimate that 80% of the price consists of labour costs, while 20% accounts for material costs. For gates in hydropower waterways, the ratio is 60% labour and 40% materials.

The exchange rate between the Norwegian Krone (NOK) and the Euro (EUR) is relevant for larger turbines, as approximately 90% of turbine equipment and about 40% of other mechanical components for power plants are produced outside Norway.

Over the past year, the Euro has appreciated by approximately 4.5% relative to the Norwegian Krone.

A deteriorating geopolitical situation leads to extended delivery times for mechanical equipment.

Based on the above information and the offers received for mechanical equipment in 2023, our assessment is that the price level for machine technology in hydropower projects has increased by approximately 5% during 2023.

Hence, the new index for mechanical equipment, effective from January 1, 2024, will be 2.19.

Electrotechnical equipment - Cost development

Throughout 2023, there has been a trend of upgrade and maintenance projects for existing power plants. Numerous projects involve replacing transformers as well as control systems. Additionally, there has been a significant number of feasibility studies for pumped storage hydro projects during the year.

In Norway, there is a significant investment in new production and green industry, coinciding with an increase in electricity consumption. The transmission grid and the distribution grids need to be upgraded and this trigger the establishment of new transformer stations. Many of the associated switchgear in these stations are being built as gas-insulated switchgear with alternative gases, which are more expensive than those using SF6 gas.

The price level of electrotechnical equipment and transformers is not perceived as stable over a calendar year, and the same holds for 2023. Variations throughout the year can be substantial and are reflected in indexes provided by Statistics Norway (SSB). However, these indexes also indicate that the increase over a calendar year is not as significant. It is observed that a considerable portion of tenders are issued in the spring and summer months, which may contribute to higher prices during these periods compared to the rest of the year.

Index adjustments are primarily based on SSB's statistical data. SSB's index for electrical machinery and apparatus shows a price increase of 5,7% in the domestic market and a rise in the domestic and import markets by 8,0%.

The index for iron and steel shows a decrease of 8,8% for the domestic market and close to zero for the domestic and import markets. The index for non-ferrous metals shows a more moderate decline, standing at 4.6% for the domestic market and 1,7% for the domestic and import markets this year. Metal prices have remained relatively steady throughout the year, with a slight increase during the summer. The decrease in the iron and steel index for the domestic market has largely occurred after the summer months, thus not affecting prices for most of the year.

The consumer price index for goods and services with labour as the dominant factor has increased by 3.5% in 2023. This is a lower increase compared to the previous two years. Nevertheless, a high consumer price index for 2023 has contributed to higher prices for electrotechnical deliveries.

There has been a high price development for electrical machinery and apparatus in 2023. Iron, steel, and other metals have remained relatively stable in price, peaking over the summer months, and experiencing some decline towards the end of the year. The price development has been on par with previous years. The exchange rate against the EURO remains consistently high, contributing to keeping deliveries produced in the EU at a high level.

Our assessment of price indexes and the market for hydropower projects suggests a price development of 5.5% in 2023.

The new index for electrotechnical components is therefore set to 2.08.

Constructions in general - Cost development

Like the few previous years, only a limited number of hydropower-related construction projects have been tendered in 2023. Further, the available prices are varying significantly depending on the location and the specific conditions at each site. This makes the statistical data of hydropower-related construction projects by which to assess the development in unit prices insufficient. Hence, we will rely on the Statistics Norway's (SSB) Construction cost index for concrete bridges (table 08662) for the assessment of the development in unit prices.

SSB's index for concrete bridges shows a decline of 0.1% from the 4th quarter of 2022 to the 4th quarter of 2023, compared to an increase of 14.7% the year before.

In SSB's index for concrete bridges, labour input constitutes 45%, materials 32%, machine and transportation 11% of the total cost, while other costs constitute 12%.

The cost of materials for concrete bridges has in the same period shown a quite unusual reduction of 4.0% compared with an increase of 11.4% the year before (2022). On the contrary, the total wages for workers in building and construction activities had a rate of increase of 5.7% in 2023 compared to 4.8% in 2022.

SSB's statistics of construction cost for residential buildings has a more detailed breakdown on construction materials. These materials are also relevant for hydropower projects. Their cost developments over the last four years have been as follows:

	Change from previous year (per cent) (from SSB)			
	2020-M12	2021-M12	2022-M12	2023-M12
Lumber	2.7	100.9	-19.4	-9.9
Concrete	-1.2	9.9	11.9	13.6
Concrete elements	-0.9	4.4	19.0	4.1
Reinforcement steel	-2.5	43.3	6.0	-16.6
Structural steel	10.2	43.9	0.0	-8.6

As can be observed from the table above, prices of lumber and steel had a strong growth in 2021 and remained high in 2022. Prices of lumber started on a reduction in pervious year (2022) and continued the downward trend also in 2023, whereas steel, particularly reinforcement steel, has a sharp reduction in 2023. The reduction in prices of reinforcement steel is the main factor contributing to the reduction in construction costs of concrete bridges.

We also observe from the SSB quarterly data that the cost development for construction of concrete bridges remained weak throughout the year. The material cost dropped in the third and fourth quarters by -3.0% and -0.3% respectively.

An overall assessment based on the considerations outlined above, indicates a cost development for construction work in hydropower projects in line with the indices. We chose therefore to use the index for concrete bridges from the SSB statistics as a representative "picture" of the cost development for the (civil) construction part of hydropower projects in 2023.

Based on price indices and the hydropower market, we suggest a cost development for the (civil) construction works of -0,1% for 2023.

Hence, the index effective from 01 January 2024 for general construction works will be 2.99 (unchanged).

Tunnels in rock - Cost development

In 2023, as for previous years, the statistical data by which to assess the development in unit prices is still insufficient due to a low number of assignments that include tunnels. Thus, to evaluate the price development through the period the Statistics Norway's "Construction cost index for road construction" (table 08662) is used.

The construction cost index for road tunnels increased by 1.9% from fourth quarter of 2022 to fourth quarter of 2023. In the same period the index for materials (i.e., materials used for tunnel interior) increased by 2.0%. This is a significant decrease compared to numbers from the previous year when growth was 15.1% for tunnels and 22.5% for materials for road tunnels respectively. Compared to the period 2010-2022, the price increase for 2023 is lower than average.

Construction prices are affected by several factors, and during the period, the following applied:

- The rise in prices for materials and labour has slowed down, and is only 2.0%
- Labor cost in the period have increased by 4.1%
- The fuel price has not risen and is roughly the same at the beginning and end of the period.
- Key interest rate has increased from 2.75 to 4.5%
- The pressure on the Norwegian economy has eased.
- The consumer price index was 5,8% last year and is 4,8% in 2023.

In both 2021, 2022 and the first half of 2023, the price increase for material index was significantly greater than the increase in tunnel index. In the latter half of 2023, there was a sharp correction in material costs, which means that on an annual basis the price change for tunnels and material for road tunnels is approximately the same, 1.9 and 2.0% respectively. The cost of materials is larger for road tunnels than hydropower tunnels due to a larger amount of materials needed for road tunnel interior such as concrete elements, electrical components, heating and so forth. Thus, the tunnel index is considered more relevant than the material index.

Based on price indices and the hydropower tunnel market we suggest a price increase of 1.9% for 2023. Hence, the rock tunnel index effective from 01 January 2024 is 3.01.

Embankment dams – Cost development

Work on embankment dams in Norway are mainly in the form of rehabilitation, with project costs in the order of 20 to 150 mill. NOK.

In 2023, the start of the construction work on one new large embankment dam for Statkraft was initiated. However, no similar project was under way during 2022, and it is therefore difficult to compare prices of individual projects.

The item prices for the different work specifications differs a lot due to the contractors' pricing philosophy, depending on how much lump sums are favoured over unit prices.

In this respect it will be more correct to use SSBs cost statistics to evaluate the rise of the costs for the different types of work during 2023. We are suggesting using the indices of the road works which includes the same type of works as for an embankment dam.

Each index for the three different work categories is given in the table, including the rise in costs in 12 months in%

The 3 indexes that will be used are (highlighted in the Table):

1. **Road construction, ex tunnel** (excavation, hauling, compacting)
2. **Concrete road bridge** (concrete works incl. materials)
3. **Road tunnel in rock** (cost of drilling/blasting, loading and hauling)

	Building cost index	
	2022Q4	2023Q4
Sum, road construction	219,8	224,3
Road construction, materials	281,3	283,5
Road construction, equipment	182,3	187,8
Road construction, labour	195,0	202,3
Road construction, ex tunnel	217,7	223,9 (+2,85%)
Concrete road bridge	223,2	222,9 (- 0,13%)
Concrete bridge, materials	303,2	291,1
Road tunnel in rock	222,4	226,7 (+ 1,93%)
Road tunnel, materials	265,7	271,0

Even if the cost index for roads includes a large part of works during winter, of which embankment dam works do not, the seasonal work for dams will be more intense requiring more equipment. Hence, it is suggested that the indices for road works are very similar to the work performed at embankment dams and will be used as they are given in the table.

However, the indices are suggested “weighted”, given as %-age, to obtain a total price increase as follows:

1. Embankment dam works (similar to road works): + 2,85 (70% of the total costs)
2. Concrete works, seepage measurements etc: - 0,13 (10%)
3. Works in the quarry: + 1,93% (20%)
4. **SUM: 2,36%**

We will suggest an increase of the cost index for embankment dams from 1st January 2023 to 1st January 2024 of 2.4%, increasing the index from 2.59 to 2.65.

Best regards
Norconsult Norge AS

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