Multiconsult

MEMO

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SUMMARY

This document provides an English summary of a Norwegian solar PV market assessment conducted by Multiconsult in May 2020.

1 Background

The Norwegian Solar Energy Cluster (*Solenergiklyngen*) and the Norwegian Water Resources and Energy Directorate (*NVE*) have commissioned Multiconsult to conduct a study on the Norwegian solar PV market in 2019.

The main goal of the study is two-fold: A sizing of new installations in Norway during the course of 2019 (volume), and a price benchmarking for new solar installations in the same period (price).

Similar studies have been conducted annually by Multiconsult since 2013. As energy regulator, and given the rise of solar PV installations in Norway in recent years, it is expected NVE will play an increasingly important role in compiling these figures in the future.

Multiconsult emphasizes the importance of this study to market players and authorities alike – not least because of the dynamic and fast-growing nature of the solar PV market. Figures developed in the study make up official figures for Norway also in international publications, such as in regional analyses published by SolarPower Europe.

2 Methodology

2.1 Segmentation

Solar PV installations are segmented as follows:

- *Residential* (up to 15 kWp, coinciding with the size eligibility ceiling employed by Enova[1] for small-scall solar subsidy payouts in Norway),
- *Commercial* (15-250 kWp),

[1] Enova SF is a state enterprise owned by the Ministry of Climate and Environment. Established in 2001, its task is to promote a shift towards more environmentally friendly energy consumption and production, as well as the development of energy and climate technology (*from regjeringen.no*).

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- *Industrial* (>250 kWp)
- *Building-integrated PV* (BIPV),
- *Offgrid systems* (in Norway typically pertaining to installations at cabins and lighthouses in grid-isolated areras, and as part of telecommunications other infrastructure systems)

This segmentation is established as part of a metodological framework – such clear-cut separation into market segments does not apply in real-world settings.

2.2 Sources

To date, no central entity tracks the overall Norwegian solar PV market with respect to volume and price. It is therefore necessary to consult several sources in order to conduct the analysis.

These sources include:

- Interviews with market players
- A market survey among installers of solar PV systems
- Elhub
- Statistics Norway
- Enova
- Previous market assessments

In particular, Multiconsult has relied heavily on figures obtained from Elhub in estimating annual additions for 2019. Elhub is a national system developed by Statnett (TSO) organizing data on grid-connected consumption and production. As such, its importance for solar PV market data is expected to increase going forward.

Because of the number of sources and assumptions underpinning the analysis, Multiconsult underscores the inherent uncertainty behind figures considered in this analysis.

3 Key findings

3.1 Volume

Multicosult estimates 51.4 MWp new solar PV capacity was added in 2019. This was more than double the 23.5 MWp installed in 2019 and more than any previous year. Additions in 2019 correspond to power comsumed by ~2,200 Norwegian households during the course of a year[2].

[2] Assumptions: Annual yield at 850 kWh/kWp x 51 400 kWp = 43 690 000 kWh. Annual consumption by Norwegian household at 19 600 kWh.

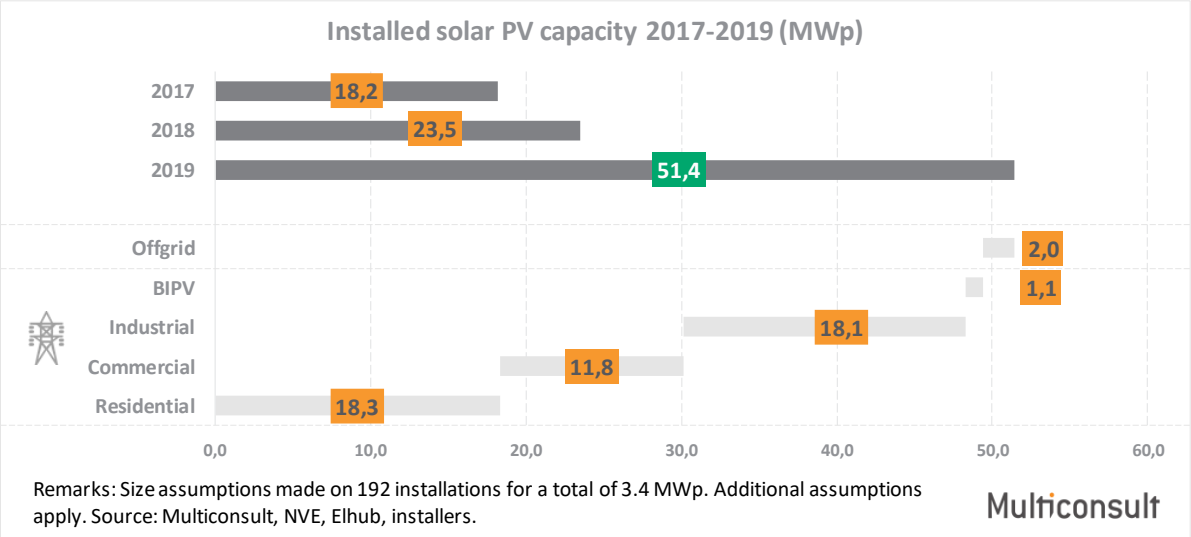

Figure 1 Installed solar PV capacity 2017-2019

The residential and industrial segments were similar in size, each at about 18 MWp or 35% of new additions. Commercial installations made up 12 MWp or 23% of new additions. Business segments (commercial + industrial + BIPV) together amounted to 31.1 MWp or 60% of all additions.

BIPV and offgrid solar remained niche segments, each accounting for 2 MWp or less. These two segments are fundamentally different in key respects despite this similarity in size.

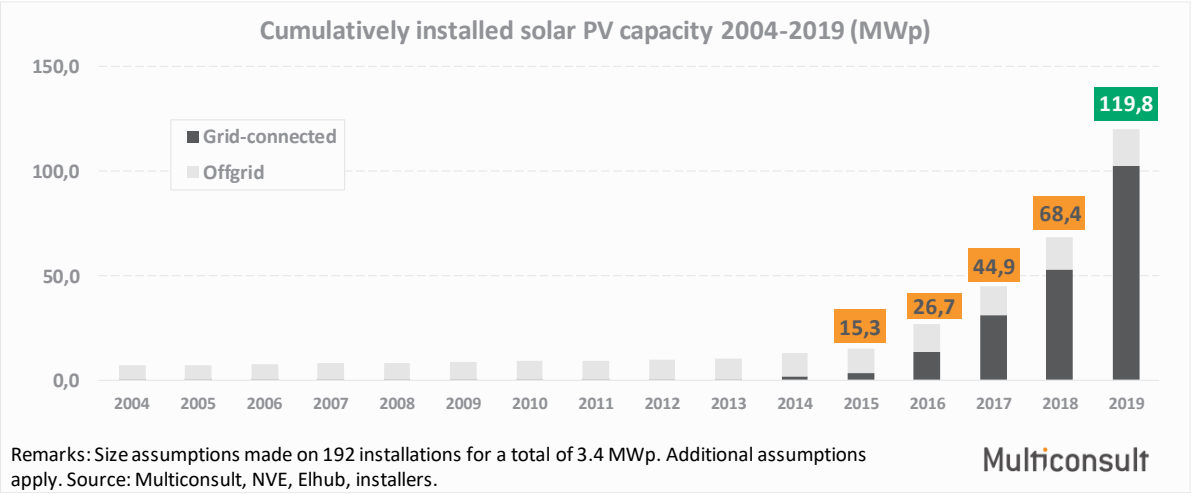

Figure 2 Cumulatively installed solar PV capacity 2004-2019

Cumulatively installed solar PV capacity in Norway reached 119.8 MWp at the end of 2019. Compared to the 15.3 MWp installed at the end of 2015, this means the market increased eightfold in the course of the last five years.

In early phases of the market, Norwegian solar PV additions were almost exclusively made up of offgrid installations. This changed in 2014 after which grid-connected installations account for the lion's share of new additions. At the end of 2019, grid-connected solar PV capacity made up 102.5 MWp, or 85% of the total market.

3.2 Price

Based on more than 60 price points collected in its market survey, Multiconsult finds that the median for residential, commercial and indutrial solar PV prices varies from 15 and 8 NOK/Wp, with prices decreasing with an increase in system size.

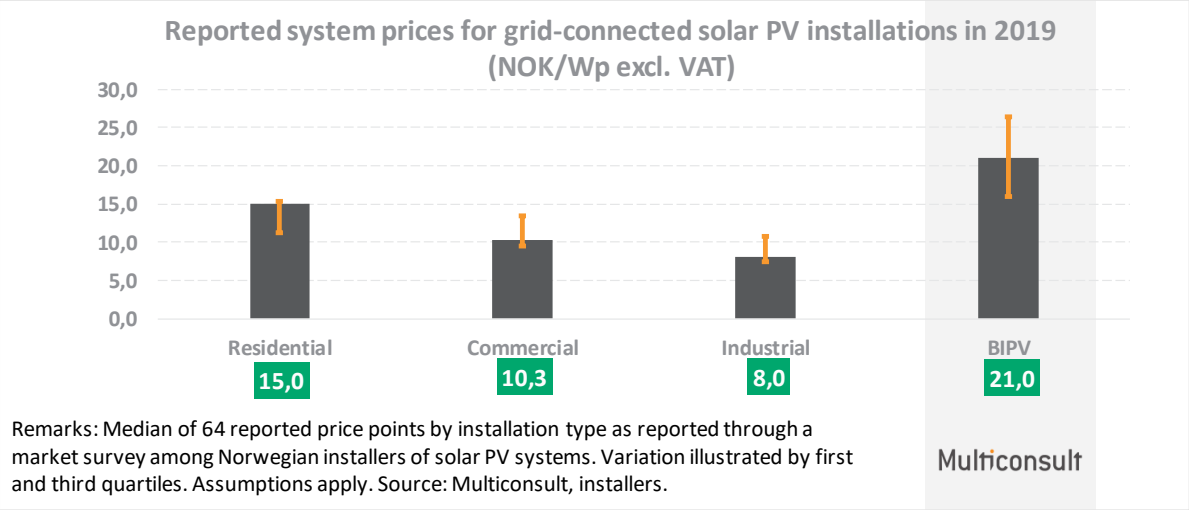

Figure 3 Reported system prices for grid-connected solar PV installations in 2019

However, system prices for new solar PV installations exhibit natural heterogeneity. This means prices vary naturally depending on a range of factors such as size, height/age/state/accessibility of hosting structure, and meteorological conditions (typically snow and wind loads). Prices presented in this analysis should thus be understood within this context.

In addtion, and particularly relevant to the Norwegian market, prices depend also on geography since supply-chains are genereally more developed in population centres, typically in the South and East of the county.

Collected price points are particularly dispersed for BIPV installations. This can in part be explained by esthethical and structural considerations in play for such systems. But BIPV installations typically replace alternative construction materials; the real cost for such installations is therefore considerably below the median 21 NOK/Wp displayed in Figure 3.

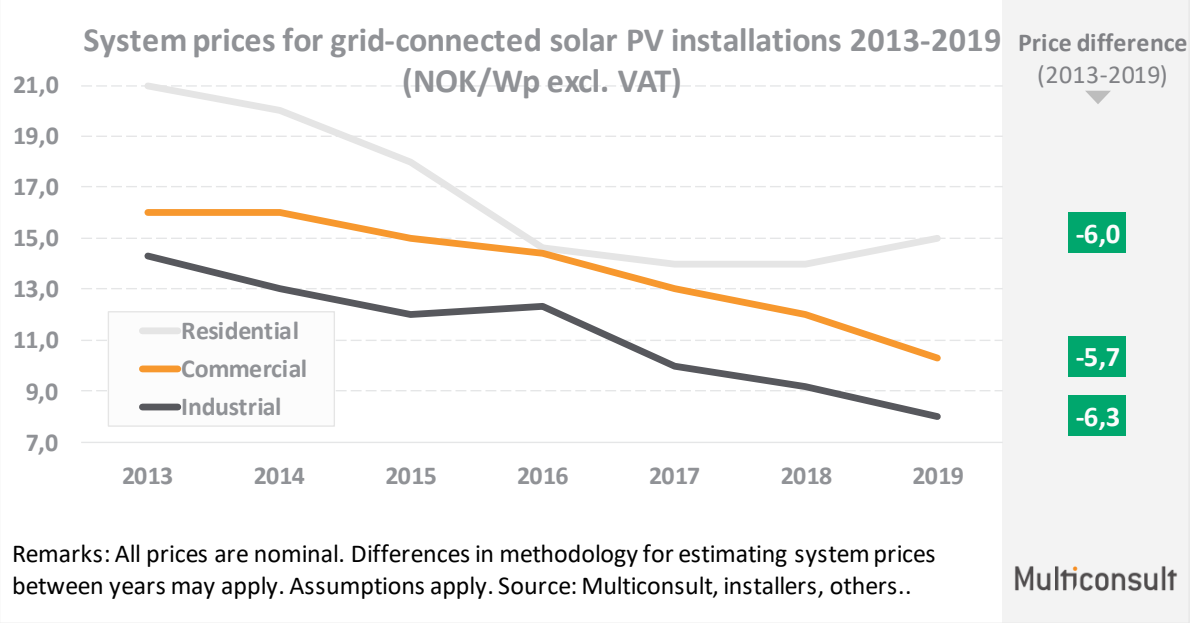

Figure 4 System prices for grid-connected solar PV installations 2013-2019

Comparing price points historically, Multiconsult finds that residential, commercial and industrial installations have each witnessed absolute price reductions of about 6 NOK/Wp since 2013.

Nevertheless, our figures suggest that while the price for commercial and industrial installations continue to shrink, the price for residential installations has stabilized in recent years. This may be explained by the different relative cost structure of equipment and labour, and more limited potential for economies of scale.

Multiconsult expects prices for solar PV installations in Norway to continue to evolve as the market matures further.

4 Observations about the market in 2020 and beyond

The Norwegian solar PV market has witnessed strong growth in the past few years. Accounting for more than 40% of cumulatively installed capacity, 2019 was a particularly important year for the market.

Some overarching drivers contribute to growth in all solar PV market segments. These include increased general awareness of the potential of solar PV systems, and cost declines for PV equipment in the global market.

National schemes such as *Plusskundeordningen*[3], subsidy payouts for small solar PV installations and easy-to-use internet platforms connecting end-customers and installers cement demand from households. In business segments, the prospect for more sustainable operations, and increased visibility on electricity spend, explain much of the demand.

Offgrid systems is largely a static segment of the Norwegian solar PV market with stable demand. On the other hand, Multiconsult observes increased interest in BIPV systems – and expect this trend to be reinforced with the commissioning of new such installations in the near term.

Yet the Norwegian solar PV market also finds itself facing several key challenges. Generally, and in the longer term, Multiconsult believes increased knowledge and more efficient operations be key for the market to fully exploit its potential.

[3] Regulatory scheme by which distributed <=100 kW systems can export surplus power onto the grid.

In the shorter term, firms along the value chain are currently forced to deal with specific challenges incurred by the ongoing coronavirus pandemic. Multiconsult finds that players are particularly struggling to cope with logistical challenges, such as supplies and movement of people and goods, and increased uncertainty on demand and as buyers delay their investment decisions.

Due to the import-driven nature of the Norwegian solar market, a weak Norwegian currency only exacerbates this challenging operational environment.

5 Acknowledgements

Further information about this study or its results may be obtained by contacting Multiconsult. Multiconsult wishes to complement inputs and views from commissioning partners Norwegian Solar Energy Cluster and NVE.