Sweden

Information on Sweden's energy transition comes from the updated Integrated National Energy and Climate Plan (NECP).

Targets

Sweden targets 100% fossil-free electricity production by 2040 and 50% improvement in energy efficiency from a base year of 2005 by 2030.[1] Sweden does not have a national renewable target but keeps to the EUs common target of 42.5% renewable energy by 2030. Though, it has developed a reference scenario, where renewable energy is expected to comprise 67% of energy production by 2030.[2] Fossil-free power sources will at the same time make up 78% of the energy production.[3] One of Sweden's main targets is to build around 2.5 GW of nuclear capacity by 2035 (around two large reactors) and by 2040, Sweden should build out new nuclear capacity equivalent to about 10 large reactors.[4] Sweden does not have any number targets for specific renewable energy sources, this is to be controlled by market forces but the government has supplied a base-scenario. The expected capacity is by this reference scenario expected to increase from 41 GW in 2020 to 67 GW by 2030.[5] Wind capacity is expected to grow by 14 GW between 2020 and 2030 (total = 24 GW), and solar capacity is expected to increase by 8 GW (total ~ 9 GW).[6] The basis scenario assumes that about 10% of Sweden's solar capacity comes from large scale solar farms, while the rest is roof mounted or near buildings.[7]

Energy demand projections

The Swedish government expects that by 2045, Sweden's electricity demand will be at least 300 TWh.[8] The projections are shown in Table 1. The table includes columns marked as EU. These are corrections and comments from the EU Commission, which

[1] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 10.
[2] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 47.
[3] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 48.
[4] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 19.
[5] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 49.
[6] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 50.
[7] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 240.
[8] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 15.

the Swedish government finds to underestimate actual energy demand.[9] Breakdown for sector can be found in Table 2. The NECP also includes another column which shows the primary energy consumption based on EU calculations, however, this has been adjusted up by the Swedish government,[10] and I have decided to not include it.

Table 1: Projections for energy demand (TWh)[11]

	Final Energy Consumption EU	**Primary Energy Consumption EU**	**Final Energy Consumption**	**Primary Energy Consumption**
2022[A]	360 TWh	496 TWh	360 TWh	494 TWh
2023	352 TWh	484 TWh	359 TWh	492 TWh
2024	344 TWh	475 TWh	358 TWh	490 TWh
2025	336 TWh	465 TWh	356 TWh	488 TWh
2026	328 TWh	455 TWh	355 TWh	486 TWh
2027	320 TWh	446 TWh	354 TWh	484 TWh
2028	312 TWh	436 TWh	353 TWh	482 TWh
2029	304 TWh	427 TWh	351 TWh	480 TWh
2030	296 TWh	417 TWh	350 TWh	479 TWh

A: 2022 is based on observed values.

Table 2: Final energy consumption per sector (%)[12]

	2022	**2030**
Industry	38%	44%
Households	23%	20%
Services and others	15%	14%
Transport	24%	21%
Communications and data	1%	1%

[9] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 53–56.
[10] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 55.
[11] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 54–55. From Table 5 and 6.
[12] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 56. The NECP includes another table (Table 42, page 272), which shows projections based on planned measures. This shows a much higher final energy consumption, and I am not sure why it increases as much as it does. This should be considered.

Transportation

Air and maritime transport seem to be included in Sweden's definition of the transport sector.[13] In Sweden's basis scenario, use of renewable electricity in the transport sector will increase by 7 TWh between 2020 and 2030.[14] Sweden sees electrification of the vehicle fleet as an important contribution to the energy transition,[15] however, the country does not seem to have any concrete target for vehicles or infrastructure.

Heat pumps

For industrial heat pumps in district heating, the renewable electricity demand is expected to be almost 1 TWh for the whole period (2020-2030).[16] Heat pumps seem to also be important for household energy efficiency, but there are no stated targets.

Hydrogen and batteries

The Swedish government plans to start work on a hydrogen strategy. This is mainly to build out capacity for green steel production,[17] but also for use in transportation and energy storage.[18] It is projected that the production of hydrogen will drive the use of electricity in the industry sector, with demand going from 136 TWh in 2020 to 231 TWh in 2040.[19] Batteries are expected to become more important, however, there are no concrete targets.

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[13] The Government of Sweden, 'NECP Updated Draft Sweden', 42.
[14] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 228–29.
[15] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030'; Sveriges Regjering, 'Regjeringens Klimathandlingsplan - Helavägen Til Nettonoll'.
[16] I am unable to say if this is for each year or the whole period seen as one, but I think it is for each year (Klimat- och näringslivsdepartementet, 238).
[17] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 71–72.
[18] Klimat- och näringslivsdepartementet, 'Sveriges Uppdaterade Nationella Energi- Och Klimatplan För 2021–2030', 20–21.
[19] Sveriges Regjering, 'Regjeringens Klimathandlingsplan - Helavägen Til Nettonoll', 246.