

“The physical limits of wind and sun cannot be levered out by laws”

by Ueli Gubler*



Ueli Gubler.
(Picture ma)

(CH-S) On 9 June 2024, a federal referendum on four proposals will take place. The first three proposals concern a decision on three popular initiatives on healthcare issues.

The fourth proposal is about the acceptance or rejection of the “Federal Act on a Secure Electricity Supply with Renewable Energy Sources” passed by Parliament in autumn 2023. A committee has launched a referendum against this law and collected the necessary 50,000 signatures within three months. As a result, this federal law is now up for a vote.

Ueli Gubler has analysed the content of this law on “secure electricity supply” and sets out his considerations for the “Swiss Standpoint” in the following article.

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Will the proposed Electricity Supply Act be able to correct or even prevent the technical shortcomings of the energy transition?

The new law is based on the *Energy Strategy 2050*, which was approved by voters in 2017. The most important goals are: Phasing out nuclear power, expanding renewable energies and increasing energy efficiency.

Switzerland should be able to supply itself with renewable energy within 30 years. In concrete terms, this means moving away from fossil fuels (petrol, diesel, heating oil and gas) and replacing them with hydropower, wind, and solar energy.

The new law now under discussion is the first step towards implementing the *Energy Strategy 2050*. To find your way through all the reports

Explanation of terms

Performance:

In energy supply, this term is not used in the same way as in everyday life. In power supply, power is understood as the capacity. A large crane has a greater capacity than a small one. However, this says nothing about the number of loads it has lifted within a certain time. For a car engine, this corresponds to horsepower. With electricity, we speak of: Kilowatts (kW), megawatts (MW), gigawatts (GW), etc.

Quantity of electricity

If a power is used for a certain amount of time, this results in the amount of electricity (or working current) that the electricity meter measures and for which we are billed. Example: One kilowatt used for one hour equals one *kilowatt hour* (1kWh).

Units of measurement:

The basic unit for electricity is watt. Multiplied by a factor of 1000, you get kilowatt. The next steps are *megawatts*, *gigawatts* and *terawatts* (1,000,000,000,000 watts). For a household the unit of measurement kilowatt is appropriate, for a country's electricity supply it is gigawatt (GW) or terawatt (TW; 1 TW = 1000 GW).

and consultations, a few terms need to be clarified and explained (see box).

Switzerland's energy requirements (fossil fuels + electricity)

The country's total energy requirement is 191,000 GWh. Of this, 20,000 GWh is nuclear power and 130,000 GWh is supplied by fossil fuels. In the long term, 150,000 GWh must therefore be replaced by alternative energy sources. The remaining 41,000 GWh is mainly supplied by hydropower, with a small proportion from solar and wind power.

A wind turbine generates 6-8 GWh per year, a solar installation of 100,000 m² 23 GWh per year.

This means that around 20,000 wind turbines or 6,500 solar installations of 100,000 m² would be needed. The federal government is remaining vague about the additional expansion of hydropower. There is talk of 15 projects with undeter-

* Ueli Gubler is an engineer HTL and freelance journalist. He likes to get to the bottom of allegations and speculations. As an engineer he takes a close look at certain laws and figures.

Ueli Gubler, Lettenstrasse 23, 9507 Stettfurt |
ueli.gubler@outlook.com | 052 376 41 37

mined capacity. The number of wind turbines or solar plants would be reduced accordingly.

Only half of Switzerland's 41,000 square kilometers can be used for wind turbines. 50% is either topographically inaccessible or residential area. This means that there would be one wind turbine per square kilometer of usable area. The 6500 solar installations (650 km²) spread across the 2100 municipalities in Switzerland equate to 3 installations of 100,000 m² per municipality. In practice, there will be a mix of wind turbines and solar installations. This makes little difference to the space required. A myriad of mini solar systems on roofs is difficult to handle. The randomly generated, renewable electricity must be regulated centrally and precisely to the second to the actual requirements. This cannot be done with an incalculable number of electricity suppliers and therefore creates a lot of losses.

From the content of the federal law to be voted on

Wind and solar energy

A new 35 TWh of renewable energy (excluding hydropower) is to be created by 2035 and 45 TWh by 2050. This would mean 5000 wind turbines by 2035 or 7000 by 2050, and 1520 or 1950 large-scale solar installations. The obligation for solar installations above a certain building area is being discussed.

The main aim is to accelerate solar energy. It is hoped that there will be less resistance. The crux of the matter is that in Winter only a fifth of solar energy is generated compared to summer. The annual sunshine duration is 1700 hours. That represents 19% of the hours in a year. The dams and reservoirs are supposed to reduce their production in summer to be able to fill the gaps in winter. This is not what the hydropower plants were built for. Dams and pump storage reservoirs have different functions. They can only be used in combination to a limited extent. Currently, there are only three pump storage reservoirs with any significant capacity.

Accelerated authorisation procedures

Production facilities above a certain size are classified as objects of "national interest", like railways and motorways. This means that nature conservation and objection possibilities are restricted. The intention is to process authorisation procedures for such facilities within



One wind turbine per square kilometre on the 20,000 km² of usable land in Switzerland? (Picture ETH Zürich)

6 months to prevent them from being delayed for years.

Efficiency

Energy efficiency is to be driven forward to such an extent that per capita consumption is halved compared to the year 2000. That's a bit like halving your monthly salary or pension without realising it. (!)

Due to the free movement of persons, the population has increased by one million over the last 20 years. That's around 15%. An end to this increase is not in sight and does not seem to be an issue. It will take a considerable effort just to compensate for the permanent population increase.

When we talk about energy efficiency, we only refer to consumption, not production. Wind and solar energy have a low efficiency, especially when they start to play an effective role. Corrective intervention in the grid is then required more and more often. Every intermediate step from production to consumer is associated with losses. Intermediate steps are necessary to make the randomly generated electricity meet demand. The diversions via a pumped storage basin causes a loss of 50% and that via hydrogen a loss of 80%. The European electricity grid has a loss of 30%. Batteries are only a solution for small consumers.

Electricity shortage

When planning measures in the event of an electricity shortage, doubts arise as to whether the new federal law will contribute to a "secure energy supply with renewables". Failure is already expected. It would be more trustworthy to develop a concept that prevents emergency measures, as we have known since the introduction of electricity 120 years ago.

On 21 February 2024, the federal government published a fact sheet regulating the "Measures

in the event of an electricity shortage". Depending on the shortage situation, it provides for: appeals to save energy, restrictions or bans on the use of non-essential appliances or systems, as well as rationing and grid shutdowns for a few hours. This doesn't exude confidence.

Grid expansion

The expansion of the grid remains unmentioned. If fossil fuels are replaced by electricity, the amount of electricity will increase by a factor of 3 from 59,000 GWh to 169,000 GWh. The electricity grid is not designed for this amount. This will not only be noticeable in the transmission cables, but above all in the residential areas due to heat pumps and charging stations for electric cars.

To clarify: electricity and road grids are comparable. They function smoothly during the day. If traffic increases during off-peak hours (work traffic) or on public holidays (e.g. Easter), congestion occurs. If wind and sun suddenly set in without a corresponding demand, the grid is overloaded. Vehicles can wait – electricity cannot. Due to the lack of storage options, it must be disposed of immediately. Germany spends 4 billion euros a year on this.

Conclusions

Doubts are justified as to whether the energy transition, which is ideologically hoped for but poorly planned, can work. Because no country in the world has yet made any significant progress with the energy transition. The climate summit in Dubai in December 2023 unexpectedly triggered a boom in nuclear power. This has gone unnoticed in our country.

The physical limits of wind and sun cannot be levered out by laws, not even by a planned economy.

- The unrealistically large number of wind turbines and solar installations will lead to resistance that cannot be easily overcome politically. Forcing projects through against the will of the majority will lead to political tensions. This has a regulating effect, without any further intervention.
- The will to revitalise hydropower is positive. It is effective and meets the demand.
- The intention to simplify the objection procedure is positive. Throughout Switzerland over

30 organisations under private law (not public law) have the right of appeal. Their boards of directors can use this to prevent sensible projects from being realised for years against the will of the population.

The *Energy Strategy 2050* was approved in 2017, partly because of the promise in the referendum message that the energy transition would cost CHF 40 per year for a household of four.

Simonetta Sommaruga opened the 2021 referendum campaign on the CO2 Act by announcing that the energy transition would cost CHF 100 billion. That's CHF 48,000 per household. If honest information had been provided from the outset, the Energy Strategy 2050 would have already been rejected. However, it also shows that the consequences of the energy transition were not and still are not fully grasped.

The title of the law, "Secure electricity supply with renewable energies", is a deception. What we need is a clear concept that shows what specifically needs to be created in terms of power plants, storage facilities and grid expansion. Only then does it make sense to pass a corresponding, targeted law, if it is still necessary.

Germany has been our pioneer in the energy transition for 20 years. On 7 March 2024, the *Federal Audit Office* issued a press release on the current situation.¹

The report's conclusion already applies to some extent to Switzerland:

"In addition, there are gaps in knowledge about the environmental impact of the transformation and no concept to combat high electricity prices. At the same time, it lacks an integrated monitoring of the energy transition that takes all energy policy goals into account."

We are not there yet – but we are well on the way.

(Translation "Swiss Standpoint")

¹ <https://www.bundesrechnungshof.de/SharedDocs/Pressemitteilungen/DE/2024/energiewende.html>

Further articles by Ueli Gubler:

<https://swiss-standpoint.ch/news-detailansicht-engesellschaft/the-energy-crisis.html>

<https://swiss-standpoint.ch/news-detailansicht-engesellschaft/wind-energy-nothing-but-hot-air.html>

<https://swiss-standpoint.ch/news-detailansicht-engesellschaft/over-40-years-of-wrong-predictions.html>

<https://swiss-standpoint.ch/news-detailansicht-enschweiz/ideologies-bring-no-solutions.html>