

**Energy future of Switzerland:  
A way to meet greenhouse gas emission reduction targets  
and to substitute nuclear power until 2030?**

In his book "Saving Energy, Climate-Change Targets: Illusion or Reality?", recently published in German, the author, Hans Ulrich Kunz, discusses the challenge of meeting emission reduction targets of greenhouse gases and of filling the energy gap caused by a possible move away from nuclear power. Based on systematic research and evaluation of available energy sources, the book includes a preliminary model of a likely scenario. The intention of the book is to stimulate further thought about the subject.

Today withdrawal from nuclear energy is big topic. Almost forgotten in the aftermath of the Fukushima disaster is the need to reduce greenhouse gas emissions from fossil fuel combustion. European governments, including Switzerland, committed themselves to reach a reduction of 20 or 30% from the 1990 level by 2020. So far, emissions have remained broadly the same as they were in 2000. Switzerland, with the advantage of 50% of its electric power from hydraulic sources in the Alps, would be in prime position to achieve energy sustainability.

As described in the book, pros and cons of different energy sources were analyzed and many puzzle-like trials made to combine different energy sources to achieve synergies. The goal: to produce the outline of a concept to achieve greenhouse gas reduction and at the same time to reach energy substitutions for a possible nuclear withdrawal before 2030. Three novel insights emerged:

1<sup>st</sup>: Nuclear withdrawal and emissions reduction should be examined together, and not separate, for reasons of possible synergies.

2<sup>nd</sup>: In urban areas, renewable energies can be harvested more efficiently operating district heating systems, compared to many small individual units installed in buildings.

3<sup>rd</sup>: House owners in urban areas should be dissuaded from installing exigent energy harvesting equipment, thus freeing money to invest in thermal building insulation.

The author's proposal is that every year, over a period of 10 years, 100 regional district heating systems should be built to supply heating and warm water to a population of 2,000, plus the same amount of energy for industrial and small business purposes. Small Cantons should build up to four systems a year, larger ones up to 15 systems. Operating regional heating systems is common business practice for energy suppliers. Combining various energy sources by means of co-generation plants is a new but proven challenge. These energy sources include renewables from solar collectors, from shallow-depth geothermal sources and from seasonal storage of local solar energy with geothermal probes. The possibility of switching combustion energy sources between local available biomass, oil and gas is a large

advantage of co-generation plants feeding district heating systems. Co-generation situated in individual buildings are unable to exploit renewable sources to the same degree.

The energy balance of the proposed 1000 district heating systems to be built in a period of 10 years: For electricity, a harvest of 8 TWh/a from co-generation plants, 2 TWh/a from photovoltaic, 7 TWh/a from better apparatus in homes and in industry and 5 TWh/a imported electricity. For heating: 3 TWh/a from solar collectors, 5 TWh/a from geothermal probes, 10 TWh/a from thermal building insulation. Together with other measures discussed in the book, this would result in a reduction of 30% in fossil energy imports, compared to the 1990 level.

Cost: The principal cost is for the regional heating systems with co-generation plants. Energy suppliers are experienced in running regional heating systems at optimal cost. For home owners, in-house installations could be leased or financed with contractual arrangements.

Propositions:

- Energy suppliers should offer a “complete energy package” to their customers. Currently they supply electricity. Tomorrow it could also be heat and refrigeration.
- The easiest and most logical way to save energy is to insulate buildings built before 1990, which comprise about 80% of the total building stock. Efficient building hull insulation and modern heating installations can save 40 to 50% of energy with relatively modest investment.
- The ways in which governments have tended to encourage greater use of renewable energy with subsidizing practices are a large financial burden and are not substantial enough to trigger the necessary investment volume. Forcing investment in thermal building insulation and in renewable energy by new laws and regulations takes a long time to show the necessary results. To initiate enough investment in renewable energy a more business-oriented, financially attractive approach is needed. In the preliminary model of a likely scenario, discussed here, the author suggests a Win-win approach in which Government goals, the needs of home owners and the commercial needs of energy supply companies are all satisfied.

The author proposes that the present preliminary model should be recalculated and that dynamic computer modeling and/or test marketing should be undertaken, if possible with an interested community or city. The model calls for more jobs in local business, spurs industrial innovation and unburdens the national balance of payments of about a billion CHF every year, depending from oil prices. Switzerland could be the first European country to achieve emission reduction targets and to replace nuclear power with renewable energy before 2030.

The book *Energiesparen, Klimaziele: Illusion oder Wirklichkeit?* (original title) by Hans Ulrich Kunz, ISBN 978-3-033-02860-9, was published in March, 2011.