Power mix (IEA)

- Solar PV: 1%
- Wind: 0%
- Oil: 0%
- Gas: 1%
- Biofuels: 1%
- Waste: 3%
- Nuclear: 39%
- Hydro: 55%
The Swiss Nuclear History

Experimental
- 10 MW, SAPHIR, 1957 – 1993
- 30 MW, DIORIT, 1960 – 1977
- 30 MWt, 7 MWe, Lucens 1966-1969

Commercial
- 365 MWe each, Beznau 1 and 2, 1965 and 1971-present
- 373 MWe Mühleberg, 1972-present
- 1,020 MWe Gösgen, 1979-present
- 1,220 MWe Leibstadt, 1984-present

Proposed and cancelled
- 950 MWe, Kaiseraugst, cancelled 1988
- 1140 MWe, Graben, cancelled 1988
What will be closed in 2017?

**Beznau**
- Beznau 1 is possibly the oldest operating nuclear power plant in the world.
- Currently not running while a review of the pressure vessel safety is carried out.
- Beznau 2 has been cleared for operation
- Both are operated by Axpo, a company wholly owned by the cantons of Northeastern Switzerland and their cantonal utility companies

**Mühleberg, 1972-present**
- The operator BKW decided in 2013 to close the plant in 2019
- BKW is owned by the canton of Bern (52.54%) and the German utility EON (20.99%)

**Gösgen and Leibstadt** will be closed 45 years after commissioning under the proposal (2024 and 2029 respectively)

**Gösgen** is owned by Alpiq (private, 40%), Axpo (public, 25%), CKW (91% public, 12.5%), the city of Zurich (15%), and Energie Water Bern (7.5%)

**Leibstadt** is owned by Atel (27%), NOK (23%), CKW (14%), EGL (16%), BKW (10%), AEW energy AG (5%) – a mix of public and private ownership
A loss of 1000 MW of nuclear is equivalent to most imports from France, half from Germany or 30% of exports to Italy.
The complexity of CH electricity sector

- **> 800 distributors** (1 per every 10'000 Swiss)
- 2 Parallel systems: competition vs monopoly
- **56%** Of GVA electricity coming from EU (95% certified renewable)
- **100%** Electricity suppliers must publish the source of their electricity
- **87%** Of electricity generation owned by Cantons & Communes
3 of the oldest 7 operational nuclear power stations in the world are in Switzerland.

<table>
<thead>
<tr>
<th>OLDEST REACTORS IN OPERATION</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switzerland – Beznau 1</td>
<td>1969</td>
</tr>
<tr>
<td>United States – Nine Mile Point 1</td>
<td>1969</td>
</tr>
<tr>
<td>United States – Point Beach 1</td>
<td>1970</td>
</tr>
<tr>
<td>United States – Dresden 2</td>
<td>1970</td>
</tr>
<tr>
<td>United States – Robinson 2</td>
<td>1970</td>
</tr>
<tr>
<td>Switzerland – Mühleberg</td>
<td>1971</td>
</tr>
<tr>
<td>Switzerland – Beznau 2</td>
<td>1971</td>
</tr>
<tr>
<td>Russia – Novovoronezh 3</td>
<td>1971</td>
</tr>
<tr>
<td>Sweden – Oskarshamn 1</td>
<td>1971</td>
</tr>
<tr>
<td>Canada – Pickering 1</td>
<td>1971</td>
</tr>
<tr>
<td>Pakistan – Kanupp</td>
<td>1971</td>
</tr>
<tr>
<td>United States – Dresden 3</td>
<td>1971</td>
</tr>
<tr>
<td>United States – Monticello</td>
<td>1971</td>
</tr>
<tr>
<td>United States – Palisades</td>
<td>1971</td>
</tr>
</tbody>
</table>

Source: IAEA
What are the alternatives?

- Under the 2050 energy strategy wind, wood, biogas and geothermal are due to increase significantly by 2020.
- Support for renewables could be accelerated
Renewable energy is held up by a struggling system of feed-in tariffs

- There are feed in tariffs available for hydro, PV, wind, biomass and energy from waste
- There are currently 37,000 projects waiting for funding from the ‘feed-in remuneration’, a system of tariffs based on benchmark values (Swiss Energy Foundation)
- Only Slovenia, Slovakia, Hungary and Latvia produce less wind and solar energy per inhabitant than Switzerland
- Grants are available for small (<30kW) projects
End
Solar: filling the gap?

- The global average cost of solar is projected to fall from 0.13 USD/kWh to 0.06 USD/kWh by 2025 (IRENA)
- EPFL estimate potential of 37% of all electricity from solar roofs by 2050
# CH electricity market: the two sides of the coin

Consumers >100 MWh/year  
**Liberalized market**

- Consume around 50% of electricity in CH
- Free choice of electricity supplier, including international (EDF, RWE, Vattenfall, ….)
- Price defined by contract. Maximum visibility: 3 years (markets) + spot market (EPEX)
- Focus on price – competitive market

Consumers <100 MWh/year  
**“monopoly”**

- Consume around 50% of electricity in CH
- Local distributor supplies electricity, no possibility to change
- Price defined by regulated tariffs (ElCom)
- Focus on services and “quality” of energy: growing interest for certified electricity