Photovoltaic's policy in Switzerland: short presentation of the legal framework.

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Summary

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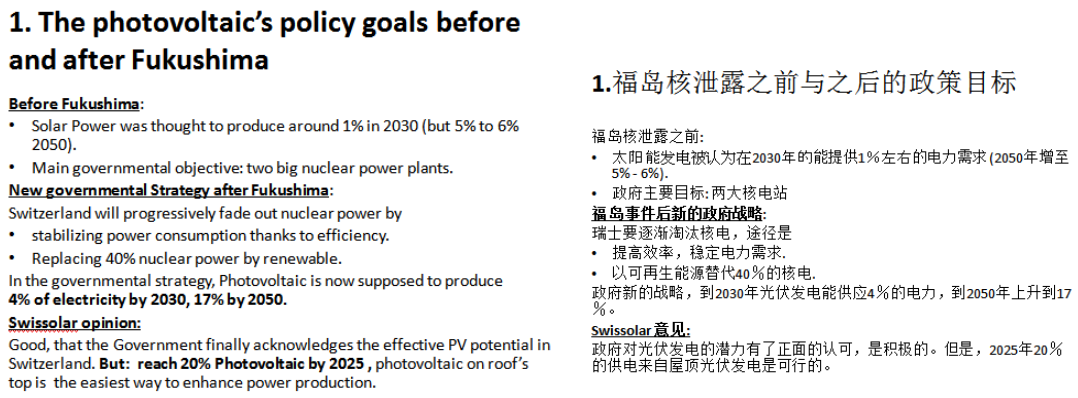
1 The photovoltaic's policy goals before and after Fukushima



1. The photovoltaic's policy goals before and after Fukushima

Before Fukushima:
- Solar Power was thought to produce around 1% in 2030 (but 5% to 6% 2050).
- Main governmental objective: two big nuclear power plants.

New governmental Strategy after Fukushima:
Switzerland will progressively fade out nuclear power by
- stabilizing power consumption thanks to efficiency.
- Replacing 40% nuclear power by renewable.

In the governmental strategy, Photovoltaic is now supposed to produce **4% of electricity by 2030, 17% by 2050.**

Swissolar opinion:
Good, that the Government finally acknowledges the effective PV potential in Switzerland. **But: reach 20% Photovoltaic by 2025 ,** photovoltaic on roof's top is the easiest way to enhance power production.

1.福岛核泄露之前与之后的政策目标

福岛核泄露之前:
- 太阳能发电被认为在2030年的能提供1%左右的电力需求(2050年增至5% - 6%).
- 政府主要目标:两大核电站

福岛事件后新的政府战略:
瑞士要逐渐淘汰核电，途径是
- 提高效率，稳定电力需求.
- 以可再生能源替代40%的核电.

政府新的战略，到2030年光伏发电能供应4%的电力，到2050年上升到17%。

Swissolar 意见:
政府对光伏发电的潜力有了正面的认可，是积极的。但是，2025年20%的供电来自屋顶光伏发电是可行的。

Before Fukushima: The 2007 Energy Bill intended to implement 10% "new renewable electricity"* until 2030 (additional to 60% existing hydropower). **Solar Power was thought to produce around 1% in 2030 (but 5% to 6% 2050).** The Feed-in Tariff system is was conceived for reaching this modest goal. The main governmental objective was the construction of two big nuclear power plants to replace the 5 old ones.

*"New renewable electricity": Biomass, wind, solar, geothermal.

New governmental Strategy after Fukushima: **Switzerland will progressively fade out nuclear power.** No new nuclear plant is going to be built. Existing plant will be progressively shut down at the end of around 50 years of exploitation (i.e between 2020 and 2034). The principle of this strategy was approved by the National Council (low chamber of Parliament), but was not yet discussed by the Senate. The detail legislative framework will definitively be adopted only by 2015 (with possibility of popular referendum).

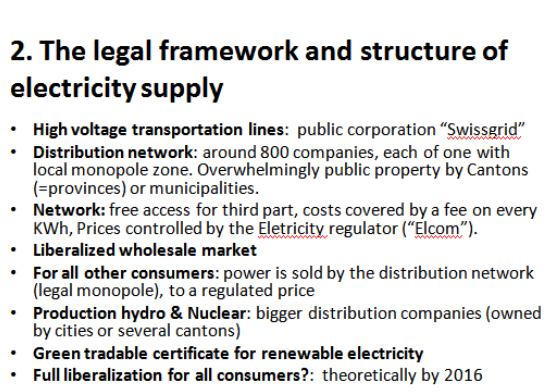
Main pillars of the post-Fukushima strategy are:

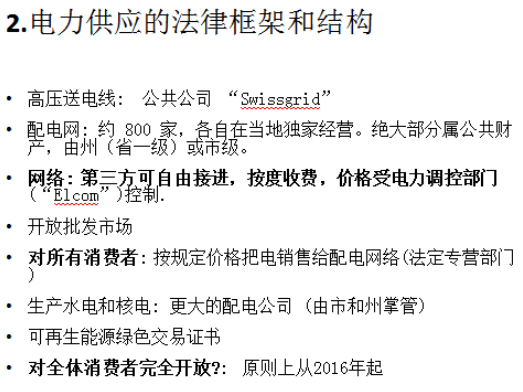
- Increase of efficiency in use of electricity, in order to stabilize power consumption to the actual level (instead of 1 or 2% yearly increase). The potential of efficiency gain estimated over one third.
- Developing of renewable power for replacing nuclear power (by now 40% of electricity): 7% additional hydro, 37% additional "new renewable electricity".

In the governmental strategy, Photovoltaic is now supposed to produce 4% of electricity by 2030, 17% by 2050.

Our Point of view (Swissolar): good, that the Government finally acknowledges the effective PV potential in Switzerland. **But: we propose to go much faster, to reach 20% Photovoltaic by 2025** (since prices are breaking down and there is enough space on roofs). For a densely populated country with high concurrence for the use of space and landscape (industries, agriculture, houses, infrastructures, tourism, esthetical aspirations…), photovoltaic on roof's top is the easiest way to enhance power production.

2 The legal framework and structure of electricity supply





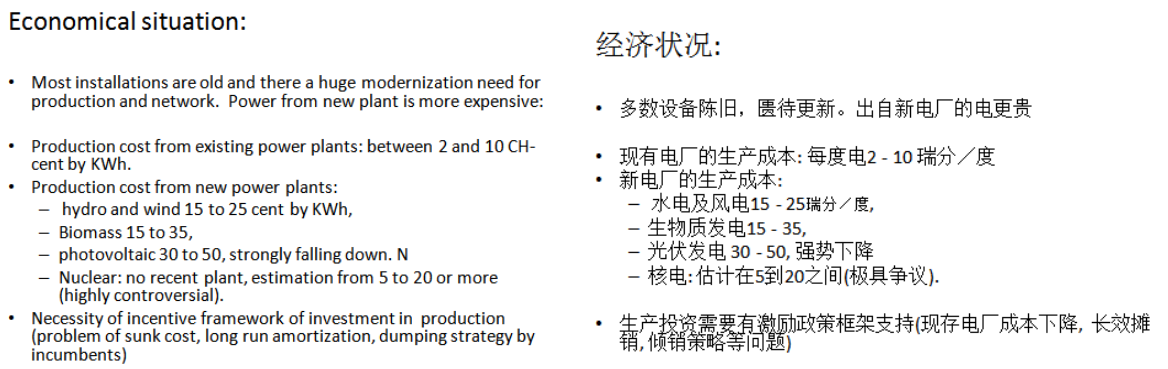
In order to understand the policy tool used to promote photovoltaics, an overview of the structures and organization of the electricity sector is necessary. Until 2007, there was no national regulation of electricity (except technical safety rules).

Actual economical and organizations rules and structures:

- **High voltage transportation lines**: public corporation "Swissgrid" (established by Law) with monopole status. Free access for third part, cost are covered by a fee on every KWh sold in Switzerland.
- **Distribution network**: around 800 companies, each of one with local monopole zone. Overwhelmingly public property by Cantons (=provinces) or municipalities. Free access for third part. Costs are covered by a fee on every KWh sold in Switzerland. Prices are controlled by the Eletricity regulator ("Elcom").
- **Liberalized wholesale market** for consumers over 100 MWh/Year, producers and distribution networks companies.
- **For all other consumers**: power is sold by the distribution network (legal monopole), to a regulated price, based on real production cost (for the power produced by the distribution company) or wholesale prices (for the power purchased by the distribution network). Prices are controlled by the Electricity regulator ("Elcom").

- **Production**: bigger distribution companies (owned by cities or several cantons) are also producer of hydropower and nuclear power. Accounting and legal separation between production and distribution subsidiaries.
- **Green tradable certificate for renewable electricity**
- **Full liberalization for all consumers?**: theoretically by 2016, but highly uncertain. There is strong political opposition, but full liberalization seems to be necessary for full market integration in European Union (strong physical and wholesale integration already exists).

Economical situation:



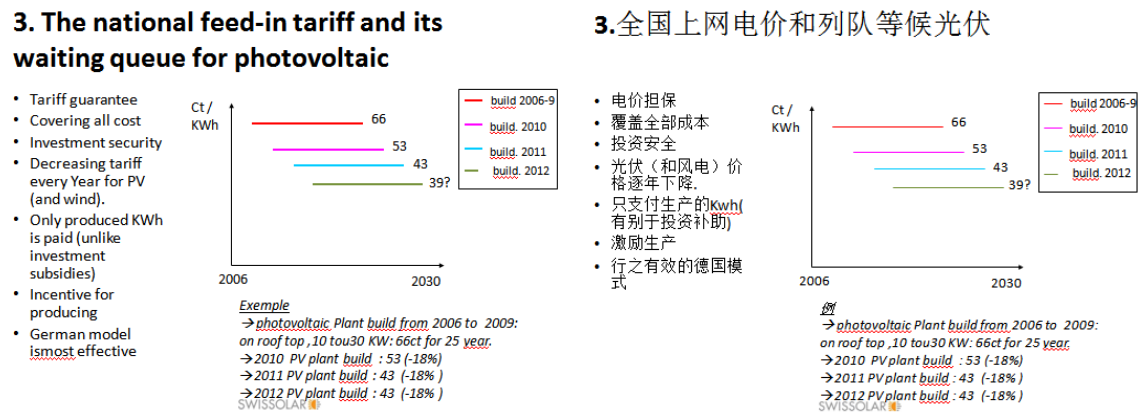
Most installations are old and there a huge modernization need for production and network. Prices for transportation and production will rise, since we enjoy now low prices due to fully amortized installations.

Power from new plant is more expensive:

- Production cost from existing power plants: between 2 and 10 CH-cent by KWh.
- Production cost from new power plants: hydro and wind 15 to 25 cent by KWh, Biomass 15 to 35, photovoltaic 30 to 50, strongly falling down. Nuclear: no recent plant, estimation from 5 to 20 or more if full cost calculation including insurance cost, storage and decommission (highly controversial).

➔ Necessity of incentive framework of investment in network (already implemented) and production (problem of sunk cost, long run amortization, dumping strategy by incumbents)

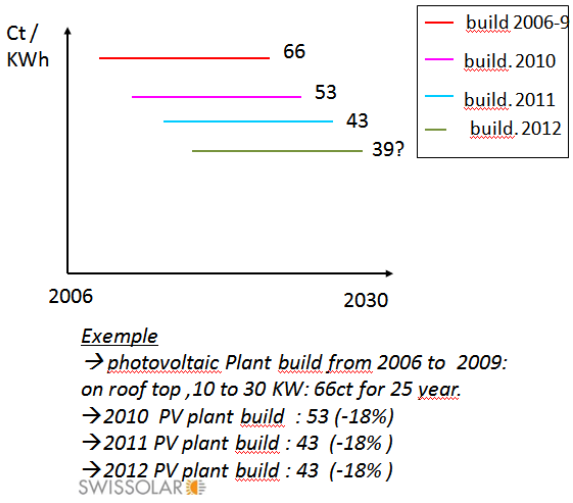
3 The national feed-in tariff and its waiting queue for photovoltaic

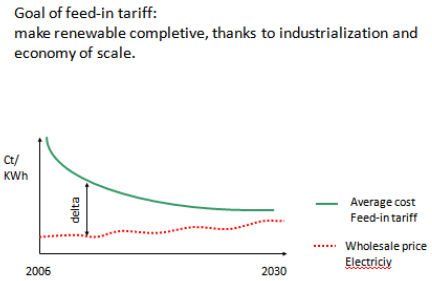


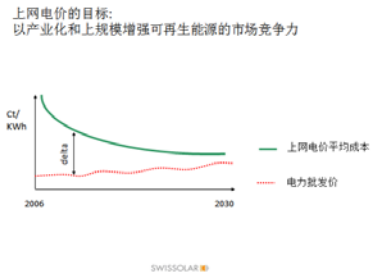
Switzerland has a central feed-in tariff for renewable electricity.

Feed-in tariff: every KWh from a new renewable power plant has to be accepted by the network and paid to a tariff which covers all cost of an efficient production (differenced by technology, including adequate interest on capital). This purchase guarantee at a foreseeable price is in force for many years. It gives security for investors and banks. Only effective produced KWh is purchased by the State. If the installation doesn't work, no money flows (unlike by investment subsidies). Feed-in tariff (based on the german model) are worldwide the most effective system to push renewables. Feed-in tariffs for new plants are supposed to lower every year reflecting the decreasing prices of new plants (as technology progress).

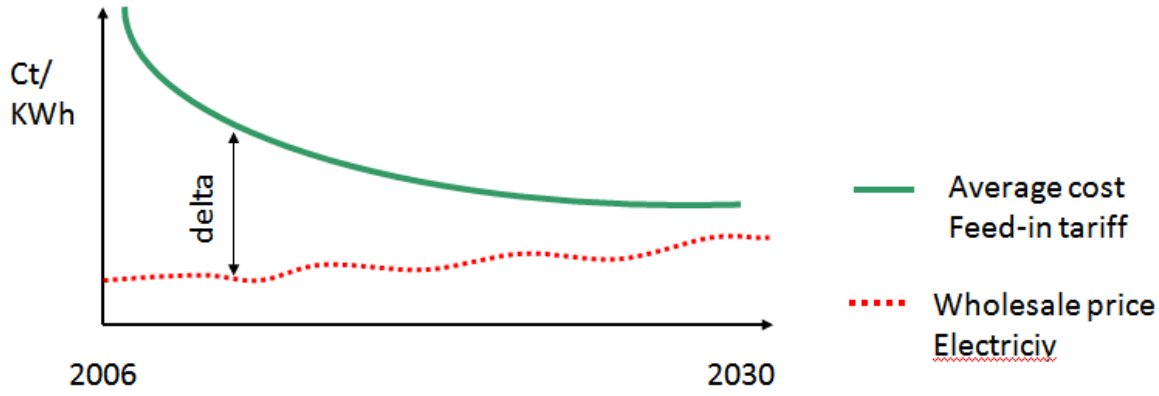
Example Feed-in tariff







Goal of feed-in tariff: make renewable completive, thanks to industrialization and economy of scale.



Characteristics of the Swiss feed-in tariff:

➔ The High-voltage public company "Swissgrid" is managing the system.

➔ The cost-delta of renewable in comparison to wholesale market prices is covered by a financing fee charged on every KWh sold in the Switzerland. But the financing fee is limited by law, in order to reach only the modest goals of the pre-Fukushima policy (1 CH-cent / KWh, by electricity retail prices included transport around 20 cents).

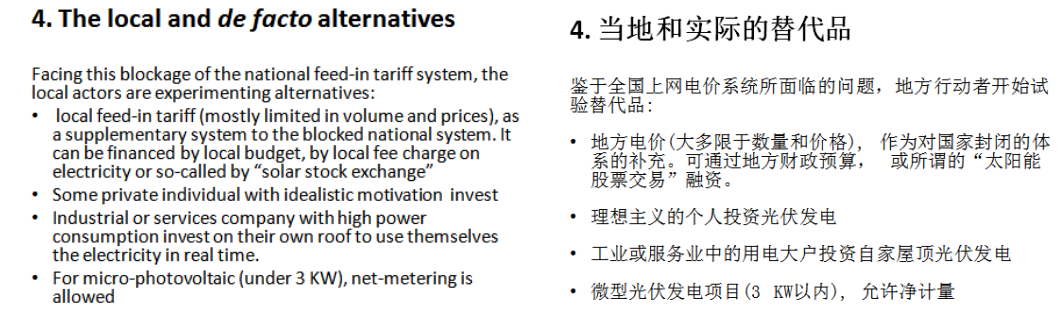
➔ Furthermore, because of initially higher cost, there was a special limitative quota for photovoltaic.

➔ Therefore, there is since the beginning a huge waiting-queue. By now, about 3'500 photovoltaic plants get the feed-in tariff, over 8000 are still waiting. Since Fukushima: 1000 more plant are coming in the queue every month. Private individual, private investment company and public electrical company are enthusiastic to invest.

➔ The system is blocked for new plants, since if every plant accepted in the feed-in system get build, the available money will be fully engaged.

Conclusion: the financing fee has to be substantially increased if Switzerland wants to switch from nuclear to renewable electricity. If there is no legislative revision enforced by 2013, the investments will brutally stop since no new plant will get the feed-in tariff (unproductive stop-and-go policy). By now, I'm trying to get this decision in anticipation, and not to wait until 2015 for the comprehensive legislative framework on fading-out nuclear energy.

4 The local and de facto alternatives



Facing this blockage of the national feed-in tariff system, the local actors are experimenting alternatives:

➔ Some local authorities (municipalities, cantons) have introduced a local feed-in tariff (mostly limited in volume and prices), as a supplementary system to the blocked national system. It can be financed by local budget, by local fee charge on electricity or so-called by "solar stock exchange" (consumers voluntarily pay a supplement on the electricity bill for getting green power).

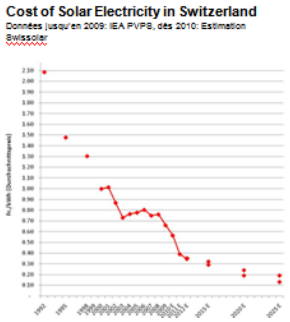
➔ Some private individual with idealistic motivation invest without seeking rentability.

➔ Industrial or services company with high power consumption invest on their own roof to use themselves the electricity in real time. Thereby, they avoid not only cost of buying electrical energy (about 8 cent / KWh), but also network cost and feed (7 or 10 cent/ KWh). The fast falling cost of photovoltaic make this model attractive. First companies make this choice.

➔ For micro-photovoltaic (under 3 KW), net-metering is allowed: the electric meter turn back when you feed in your power surplus: "feed-in tariff" = "consumer price of electricity". If big or numerous installation, there is a rising problem for financing the network, because "smart-meters" pay less or even get money from the network company.

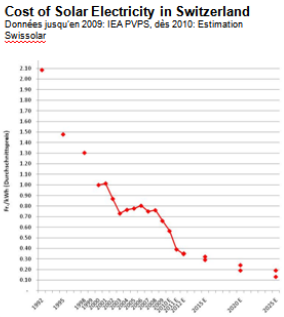
Cost of Solar Electricity in Switzerland

Newest trends



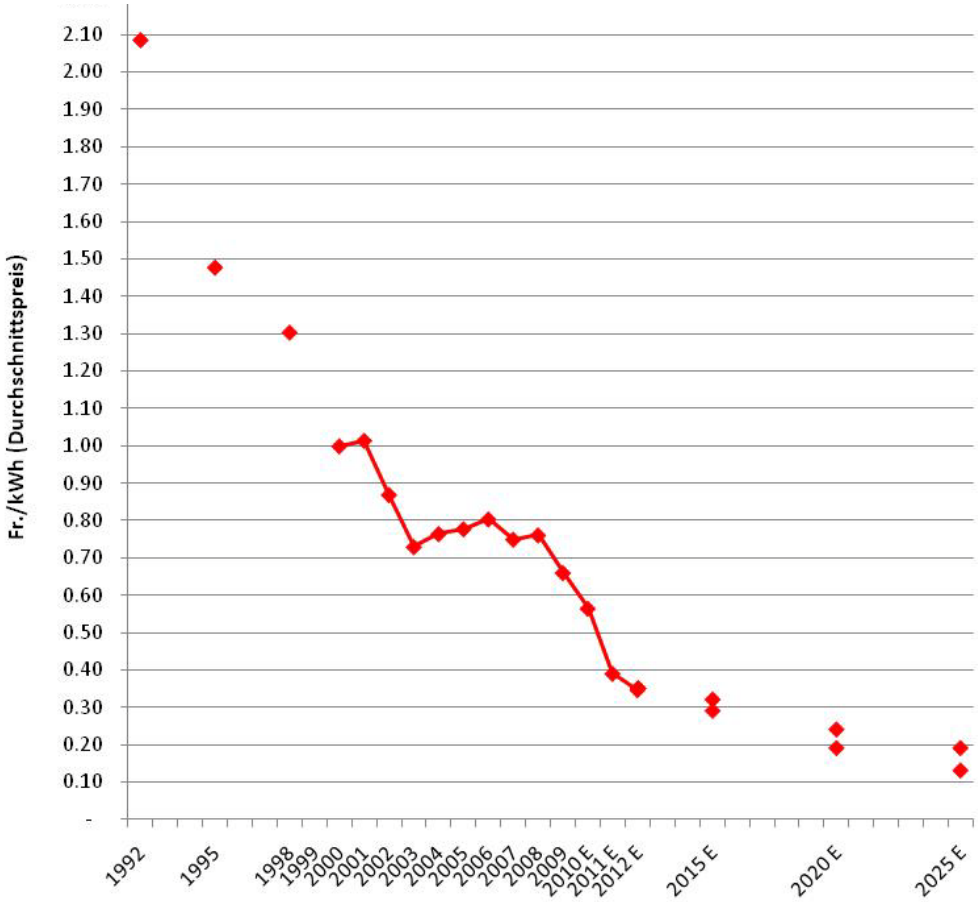
- Local distribution companies **invest themselves** in order to become more self-sufficient. They are allowed to charge the cost of photovoltaic energy in the electricity regulated price for the consumer (in the not-liberalized segment).
- Next? **Hypothesis of a fast lane with low cost**: reactivating the old obligation for network to accept injection of renewable power and to pay for it "the market price of equivalent energy". Attractive in combination with income tax abatement.

新趋势



- 当地配电公司对**自己投资**以提高自给自足。公司回消费者按电力规定的价格收费，收回光伏发电的成本 (在非开放部门)。
- 下一步？低成本快车道假说：重启网络的义务，接进可再生能源，支付"能当量的市场价"。配合免所得税就更有吸引力

Données jusqu'en 2009: IEA PVPS, dès 2010: Estimation Swissolar



Newest trend:

Local distribution companies invest themselves in order to become more self-sufficient and depend less on purchase by biggest (nuclear) companies. A few years ago, distribution companies were reluctant. They are more and more changing opinion, because photovoltaic become cheaper and they are very easy to build (no long administrative trial).

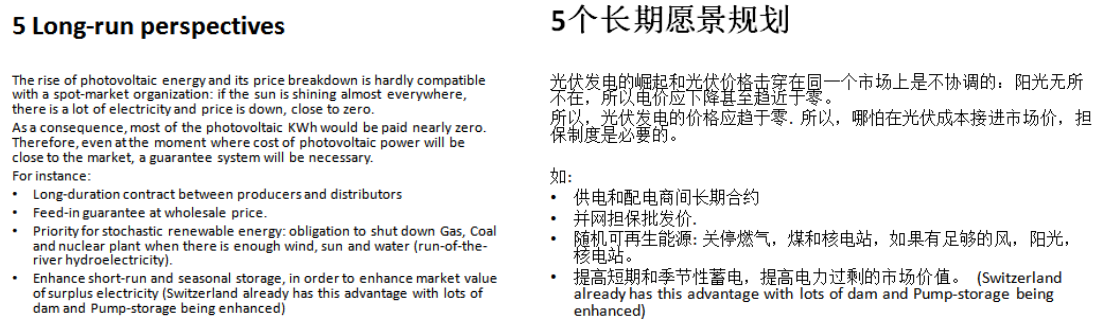
They are allowed to charge the cost of photovoltaic energy in the electricity regulated price for the consumer (in the not-liberalized segment). This is implicit and not clearly written in the Law. The electricity regulator should make a public communication.

Hypothesis of a fast lane with low cost:

1998, during the precedent revision of the Energy Bill, an interesting § was introduced: distribution network companies have the obligation of accepting decentralized injection of renewable power and to pay for it “the market price of equivalent energy”. By now, the § is not in use, since the wholesale price of power is lower than the one of renewables. But a new interpretation of the word “equivalent” could offer promising way to overcome the blockage: renewable power is not “equivalent” to fossil or nuclear power. Market price for renewables is higher (around 25 ct/KWh). Therefore, the distribution network company should pay injected renewable power around 25 ct (and obtain the corresponding green certificates). Since it is an obligation, the additional cost compared to non-renewables can be included either in the legally admitted network fee or in the cost for captive consumers.

This system could be especially interesting for private individuals for mounting photovoltaic on their existing houses, since they get tax abatement: ecological investment are deducted from the taxable income. With a marginal tax rate of one third, this reduces the net cost of solar investment by one third. It will then be rentable.

5 Long-run perspectives



By now, the whole market for electricity is a mix of

- long-duration contract between producers and distributors
- short-term spot-market.

The rise of photovoltaic energy and its price breakdown is hardly compatible with a spot-market organization: if the sun is shining almost everywhere, there is a lot of electricity and price is down, close to zero. If it is cloudy, natural gas power plant are giving the market price for electricity.

As a consequence, most of the photovoltaic KWh would be paid nearly zero. Therefore, even at the moment where cost of photovoltaic power will be close to the market, a guarantee system will be necessary. For instance:

- Long-duration contract between producers and distributors
- Feed-in guarantee at wholesale price.
- Priority for stochastic renewable energy: obligation to shut down Gas, Coal and nuclear plant when there is enough wind, sun and water (run-of-the-river hydroelectricity).
- Enhance short-run and seasonal storage, in order to enhance market value of surplus electricity (Switzerland already has this advantage with lots of dam and Pump-storage being enhanced)

Paru aux éditions Favre (oct. 2010) ***/ Bei Orell Füssli Verlag erschienen (mai 2011)***

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