Schweizerische Eidgenossenschaft
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Bundesamt für Energie BFE
Office fédéral de l'énergie OFEN
Ufficio federale dell'energia UFE
Swiss Federal Office of Energy SFOE

Accounting for EVs in EU CO_2-regulation from a Swiss perspective

Christian Bühlmann

Policy Analyst

Swiss Federal Office of Energy SFOE

ICCT Workshop, Bruxelles
June 30, 2011

Situation in Switzerland

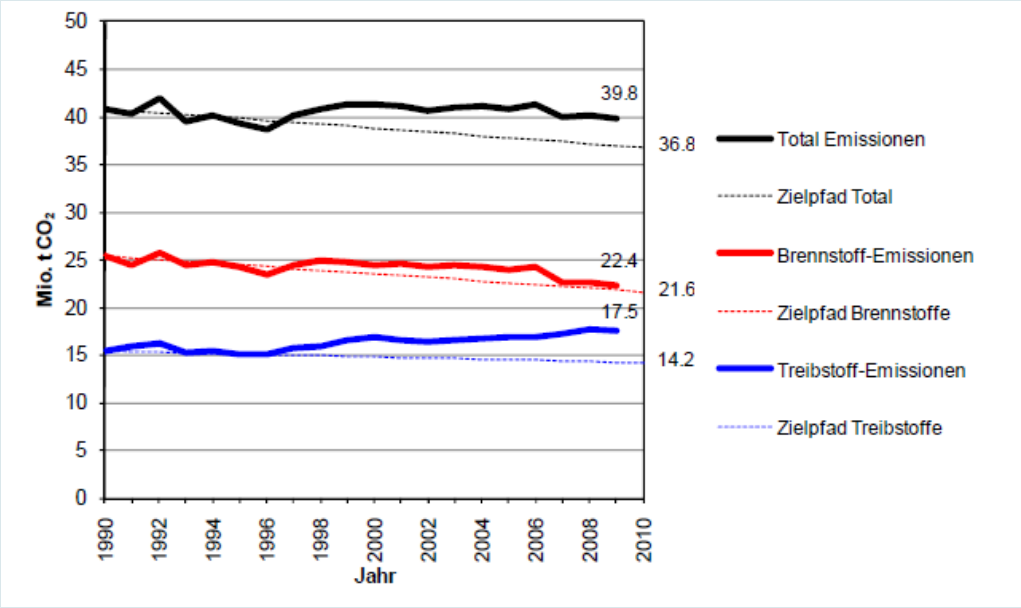
- Small non-EU-country with no car manufacturers
- Introduce CO_2-Regulation independently would be imprudent
- „Dependent“ on European legislation

13.8 Mio. new registrations
Average 145 g CO_2/km

266 ‘000 new registrations
Average 161 g CO_2/km

Situation of Climate Policy in Switzerland

- Switzerland does not achieve CO_2-targets on fuels
- To meet Kyoto target, additional certificates must be bought
- Switzerland needs more instruments to reduce CO_2-emissions from cars
- Planned CO_2-Reduction of -20% (only domestic reductions!) until 2020



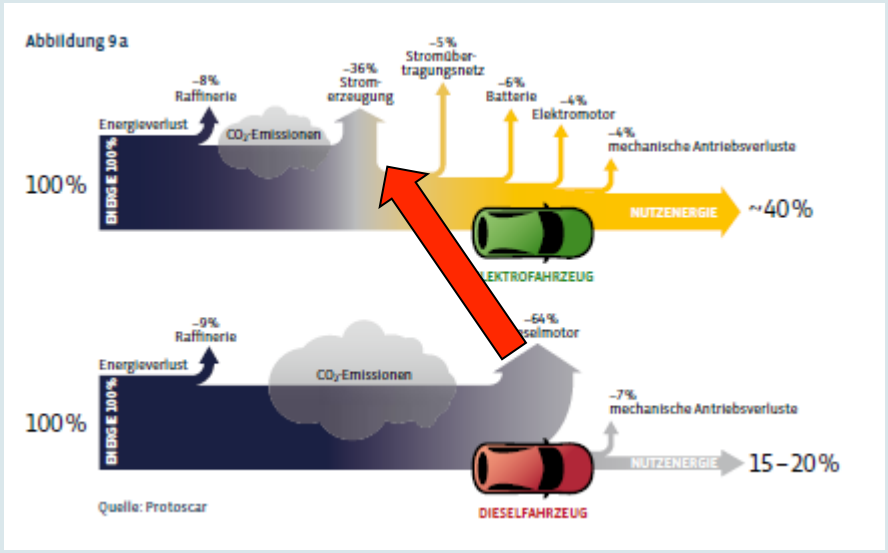
Climate Policy on cars

- Parliament adopted law on 130 g target in March 2011
- Implementation will follow EU as close as possible
- SFOE is working out the ordinance
- Due to public consultation processes, start must be postponed to April 2012

Integration of EV into CO_2-regulation

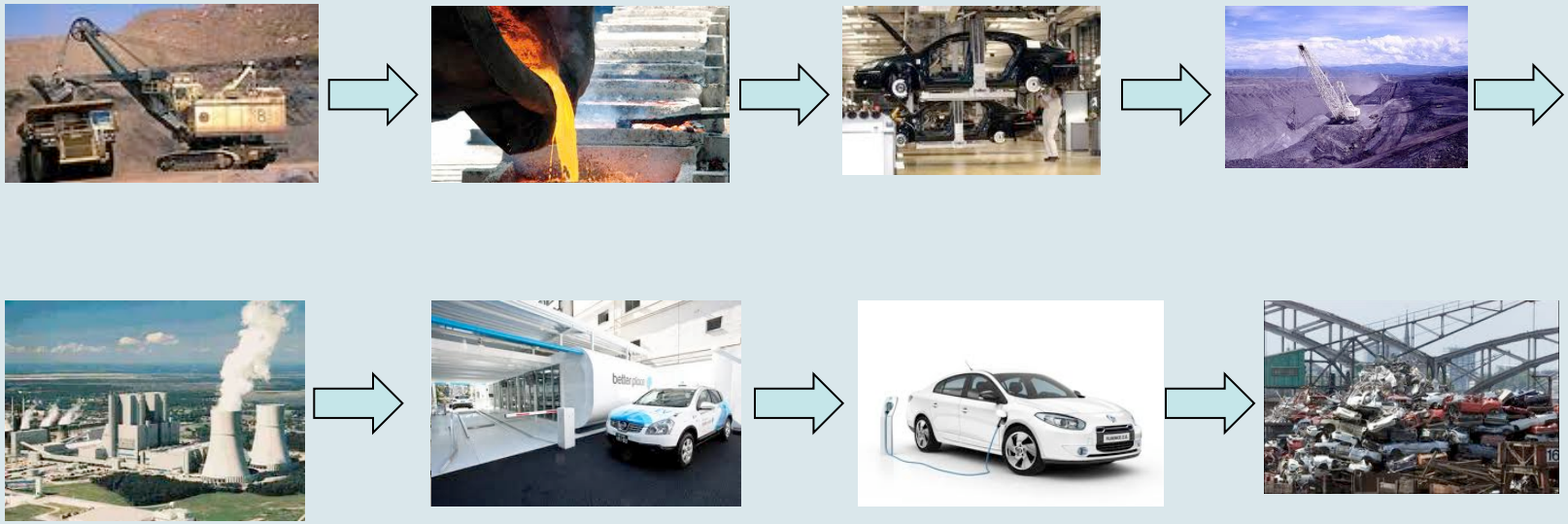
- EV are not Zero Emission Vehicles!
- Emissions in the production chain are shifted one stage up

Zero Emission



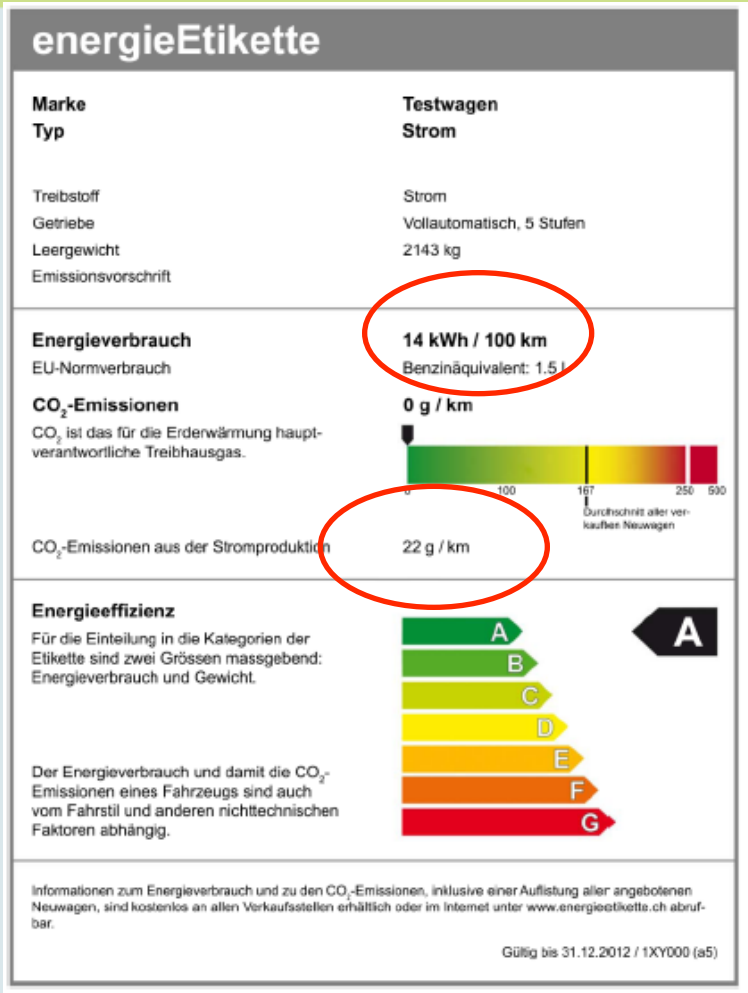
Integration of EV into CO_2-Regulation

- Emissions of electricity production must be considered
- Optimally emissions of the whole life cycle of the car will be considered



Revised Swiss Energy Label for Cars
(Approved from the Federal Council in May 2011)

- Classification cars into Energy Efficiency Categories A – G considering Primary Energy Demand
- Calculation with Primary Energy Factors from Swiss Centre for Life Cycle Inventories „Ecoinvent“
- Indication of CO_2-Emissions implied in the Swiss Electricity Consumption Mix
- Primary Energy CO_2-Emission data for all fuels would be available from Ecoinvent centre
- Integration of these data into Energy Label haven ‘t got a political majority



Primary Energy Factors Used

Fuel	Gasoline equivalent [l]	Cumulative Energy Demand [MJ-eq/kg]	Primary Energy Factor [MJ-eq/MJ]	Primary Energy Gasoline equivalent [l]
Gasoline [l]	1.00	57.16	1.37	1.00
Diesel [l]	1.12	54.147	1.29	1.06
CNG [m^3]	1.04	57.44	1.16	0.88
LPG [l]	0.77	53.927	1.21	0.68
E-85 [l]	0.79	93.43	2.94	1.71
Electricity [kWh]	0.11	*	2.90	0.24

Source: Ecoinvent Database (www.ecoinvent.ch)

Carbon intensity of Swiss Electricity

- Ecoinvent Processes
  - # 612: electricity, low voltage, production CH, at grid CH

    24.1 g CO_2/kwh electricity

    (includes emissions from power plant construction, dam construction, electricity network construction, transformation losses to low voltage etc.)

  - # 11363: electricity, low voltage, consumer mix, at grid CH

    126.7 g CO_2/kwh electricity

    (production mix – exported elecricity + imported electricity)

Pros and Cons of revised Energy Label

+	-
Possibility to compare different fuels on an equal basis	Carbon emissions for EVs on a W-t-W-Basis. Carbon emissions for other fuels on a T-t-W-Basis
Integrated approach to carbon emissions	Data Qualitiy (Old Life Cycle Inventories, Costly renewal of data)
Show the consumers the carbon emissions of EVs	Complexity of calculation (consumer needs easy information)

Thank you for your attention!

christian.buehlmann@bfe.admin.ch

Energy Efficiency Category Formula

2.7 Energieeffizienz

2.7.1 Die Energieeffizienz eines Personenwagens ist mit Hilfe der Bewertungszahl zu bestimmen.

2.7.2 Die Bewertungszahl errechnet sich zu 70 Prozent aus dem absoluten Energieverbrauch und zu 30 Prozent aus der relativen Energieeffizienz. Der absolute Energieverbrauch bezieht sich auf die Primärenergie und wird in Primärenergie-Benzinäquivalenten angegeben. Die relative Energieeffizienz ist der Quotient aus absolutem Energieverbrauch und Leergewicht.

2.7.3 Die Bewertungszahl (BWZ) wird nach der folgenden Formel berechnet:

$$BWZ_i = \left\{ \left[(1-r) \cdot E_i' + r \cdot EE_i' \right] + 5 \right\} \times 100$$

Wobei:
- r: Relativierungsparameter 0.30
- E_i' : normierter absoluter Energieverbrauch des Fahrzeugs i in Liter Primärenergie-Benzinäquivalent pro 100 Kilometer;
- EE_i : normierte relative Energieeffizienz des Fahrzeugs i.

Primary Energy Factors of different Electricity Mixes

Primärenergiefaktoren

Energiequelle	Solar	Wasser	Wasser	Wasser	Wasser	Wind	Nuklear	Gas	Mix	Mix	Mix	Mix
Erzeugungsart	Photovoltaik	Wasserkraftwerk	Pumpspeicherkraftwerk	Speicherkraftwerk	Laufwasserkraftwerk	Windkraftwerk	Kernkraftwerk	Gas- und Dampfkraftwerk (57.5%)	Konsummix (inkl. Zertifizierten Strom)	Zertifizierter Strom	Verbrauchs-mix (ohne zertifizierten Strom)	Produktions mix
Prozessname	electricity, production mix photovoltaic, at plant, CH	electricity, hydropower, at power plant, CH	electricity, hydropower, at pumped storage power plant, CH	electricity, hydropower, at reservoir power plant, CH	electricity, hydropower, at run-of-river power plant, CH	electricity, at wind power plant, CH	electricity, nuclear, at power plant, CH	electricity, natural gas, at combined cycle plant, best technology, RER	electricity, low voltage, consumer mix, at grid, CH	electricity, low voltage, certified electricity, at grid, CH	electricity, low voltage, at grid, CH	electricity, low voltage, production CH, at grid, CH
Prozessnummer	1759	928	964	980	984	2294	1454	1375	11363	11367	752	612
Einheit	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh
cumulativ energy demand/biomass [MJ-eq/kWh]	0.029716	0.00026156	0.086125	0.0003031	0.0002128	0.0025896	0.0015845	0.00115	0.076974	0.10712	0.074199	0.020737
cumulativ energy demand/fossil [MJ-eq/kWh]	0.95813	0.038337	2.3148	0.041308	0.034848		0.095344	7.3823	1.6832	0.11835	1.8273	0.36755
cumulativ energy demand/nuclear [MJ-eq/kWh]	0.23913	0.010613	9.8204	0.013325	0.0074286		12.865	0.011797	7.015	0.026197	7.6585	5.9558
cumulativ energy demand/primary forest [MJ-eq/kWh]	8.3636E-06	5.5914E-08	1.3123E-06	6.4517E-08	4.5814E-08		2.2706E-07	6.0586E-06	1.0181E-06	2.6381E-07	1.0875E-06	5.5191E-07
cumulativ energy demand/solar [MJ-eq/kWh]	3.8504	1.9647E-06	0.0016622	2.4038E-06	1.4492E-06		4.2602E-06	2.9644E-06	0.0023827	0.014184	0.0012962	0.001161
cumulativ energy demand/water [MJ-eq/kWh]	0.15911	3.7929	1.7985	3.7936	3.792		0.005699	0.010138	1.6385	4.1846	1.4041	2.3312
cumulativ energy demand/wind [MJ-eq/kWh]	0.0037593	0.000059156	0.023222	0.000065285	0.000051961		0.00016122	0.00029706	0.020175	0.04015	0.018169	0.0010374
cumulative energy demand total [MJ-eq/kWh]	**5.24**	**3.84**	**14.04**	**3.85**	**3.83**		**12.97**	**7.41**	**10.44**	**4.49**	**10.98**	**8.68**
Umrechnungsfaktor [kWh/MJ]	0.27777778											
Cumulative Energy Demand Total [MJ-eq/MJ]	**1.46**	**1.07**	**3.90**	**1.07**	**1.07**		**3.60**	**2.06**	**2.90**	**1.25**	**3.05**	**2.41**