Schweizerische Eidgenossenschaft
Confédération suisse
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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

Switzerland's „New Energy Policy"

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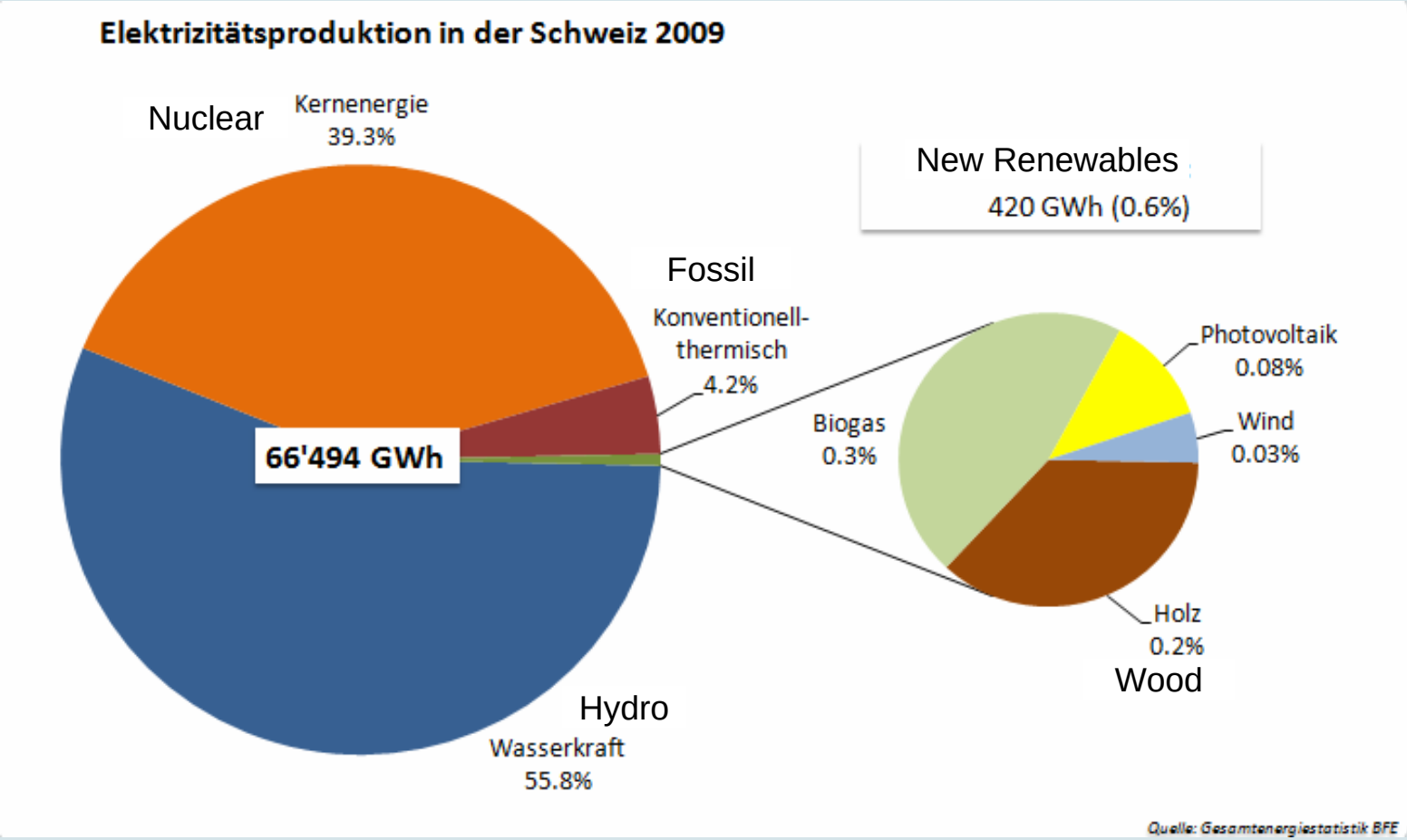
Geneva Environment Network – 6 July 2011

Looking back….

- Nuclear Energy Law (2005): NPP licence subject to facultative referendum. 3 NPP licence applications filed. Referendums foreseen in 2013.
- February 2011: Consultative referendum in Canton Berne on new Mühleberg NPP: 51.2% in favor.
- 11 March: Fukushima
- 14 March: Federal Council (Gvt) suspends licensing procedure for 3 new NPPs
- 23 March: Gvt orders revisiting long-term energy strategy and to examine 3 Scenarios: 1) BaU (early NPP closure only if required by safety + new NPP); 2) NPP phase-out at end of lifetime, no replacement; 3) early closure.
- 25 May: Gvt adopts Scenario 2 (endorsed by Lower House; Upper House debate in autumn)

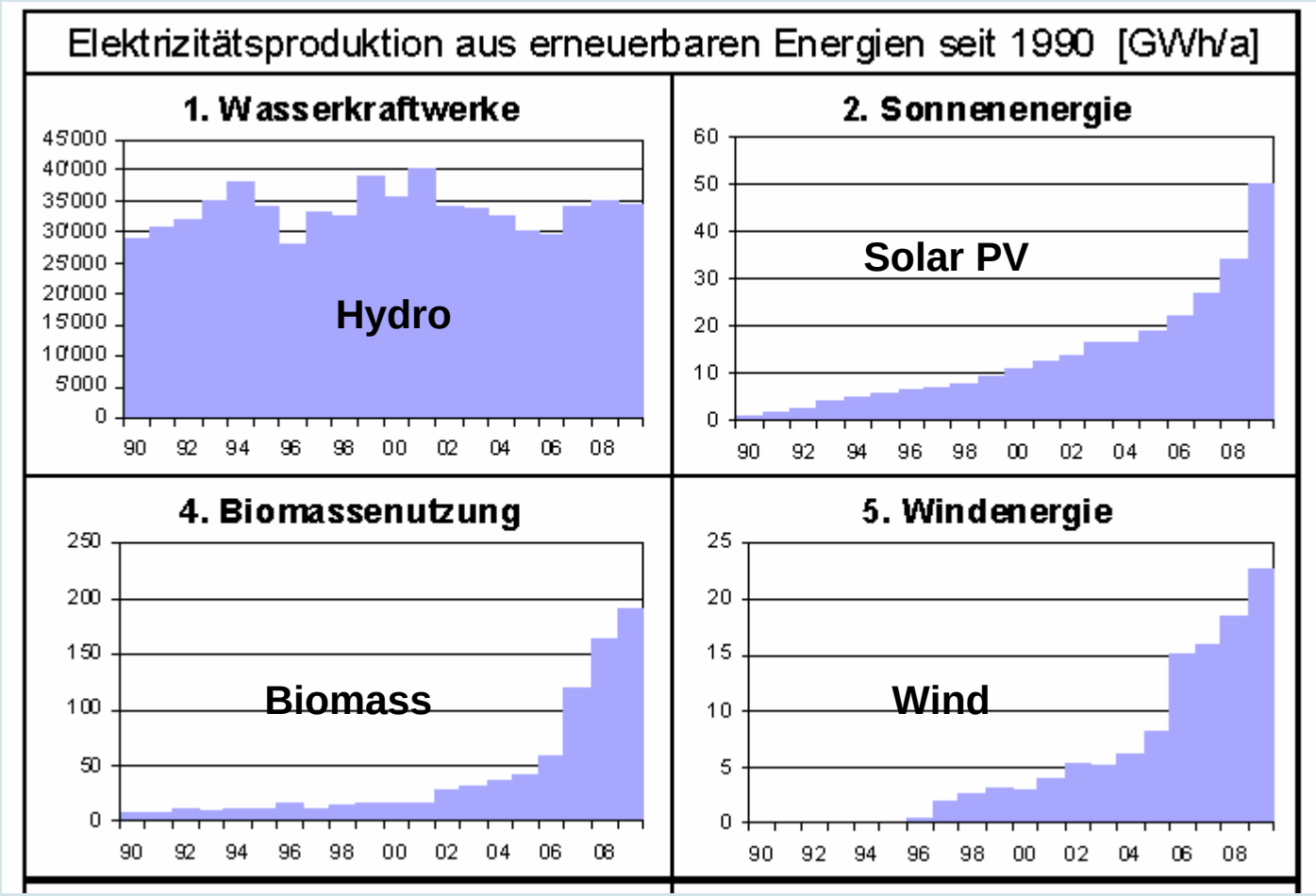
Electricity Generation 2009



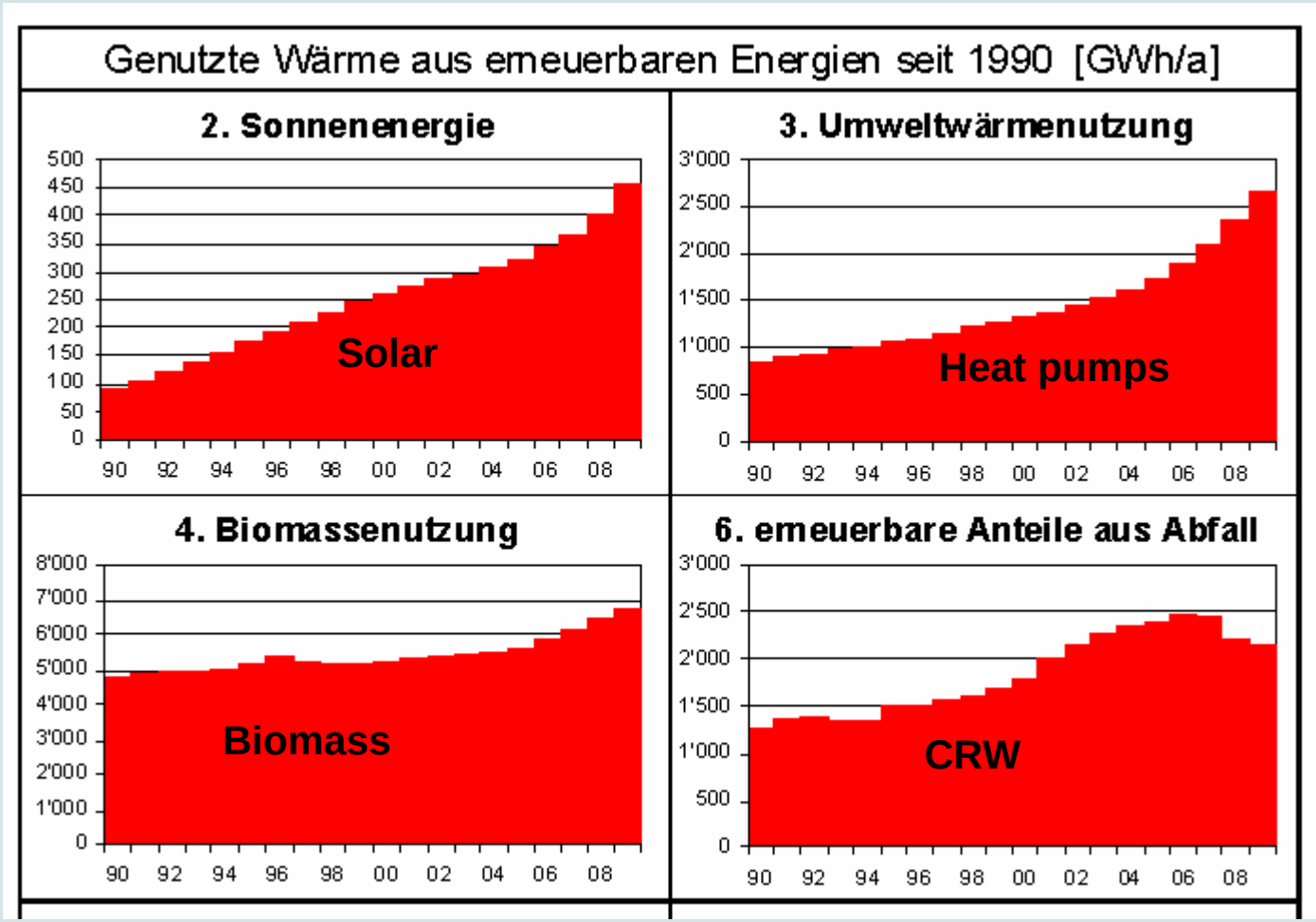
Current Policies

- Feed-in tariffs for renewable electricity
  - Target: +5.4 TWh (+10% share) additional renewable electricity by 2030
  - Capped at 0.45 ct/kWh, ab CHF 270M p.a, PV sub-cap
  - Cap may rise to 0.9 ct/kWh by 2013. Debate about lifting cap.
- Biofuels exempted from oil tax, but no market uptake due to consumer skepticism – no biofuel quota like EU
- Building refurbishment program, CHF 200M p.a. from earmarked share of CO2 tax on stationary fuels (CHF 32/tCO2) + CHF 100M from cantons
- Efficiency: Tightened building codes, avg car fleet emission standards in line with EU, appliance standards, etc…

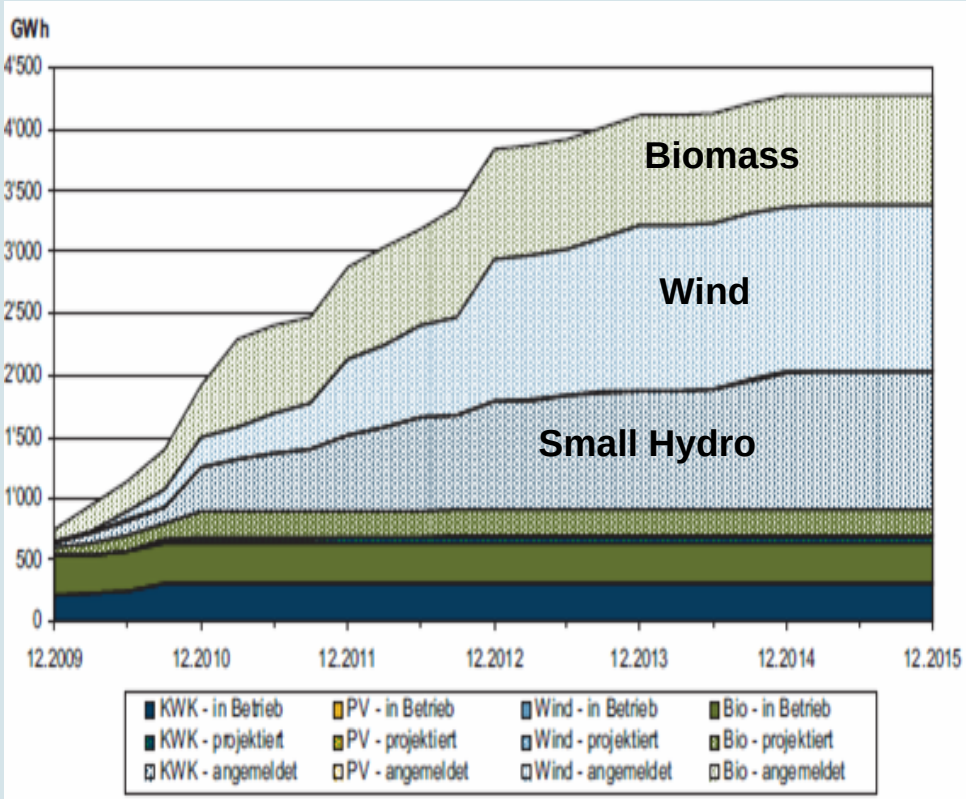
Renewable Electricity: Evolution since 1990



Renewable Heat: Evolution since 1990

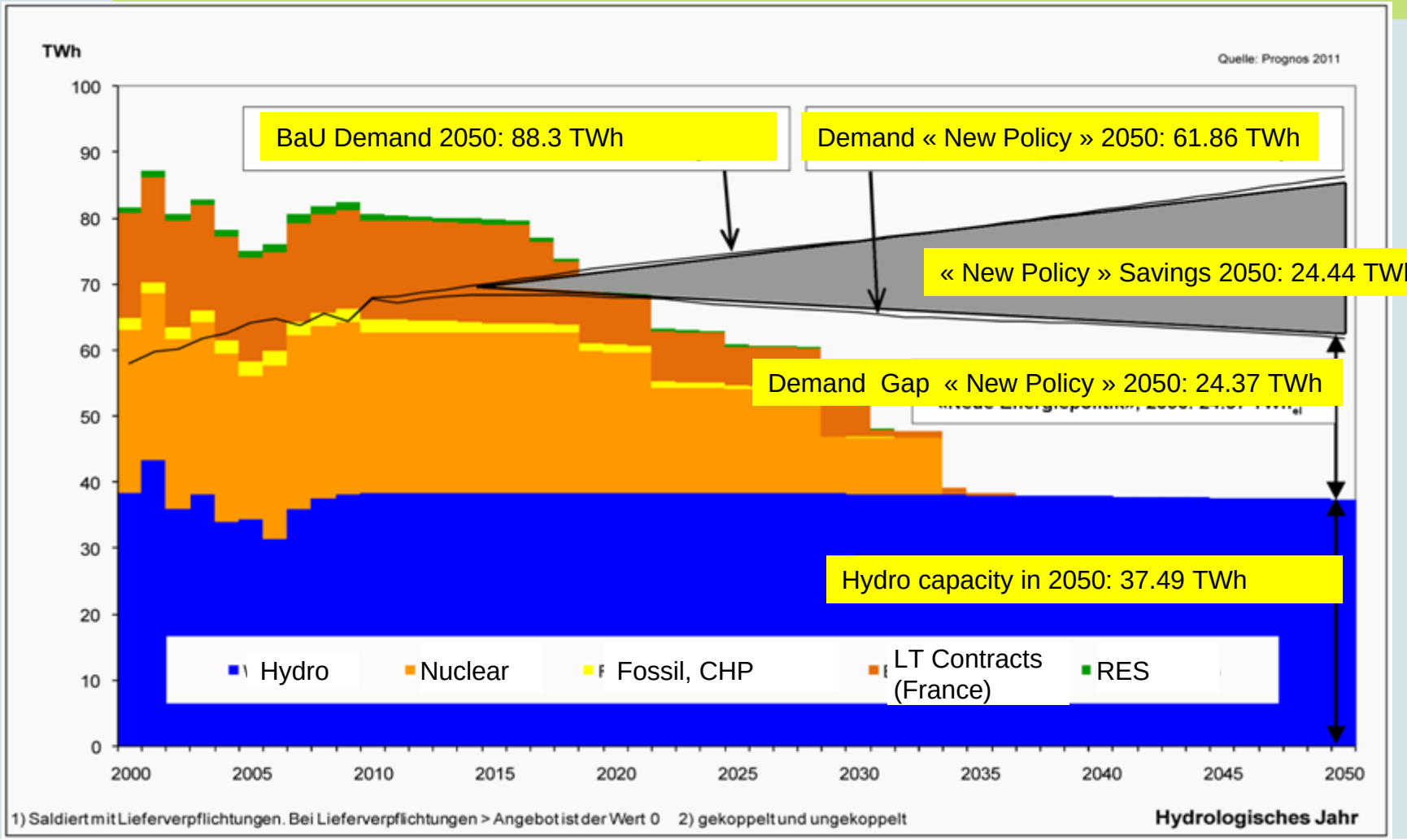


Electricity Feed-In Tariff: Project Pipeline



Planned Production MWh (April 2011)	**Operating**	**Under Con-struction**	**Qualified for Tariff**	**Waitlist**
Biomass	352'724	485'248	104'653	951'288
Geothermal				12'787
PV	24'389	1'975	221	220'697
Small Hydro	360'182	68'505	1'048'332	1'031'150
Wind	49'361	1	1'315'326	2'023'445
Total	786'656	555'729	2'468'532	4'239'367

Electricity Demand, Assured Supply and „Looming Gap“



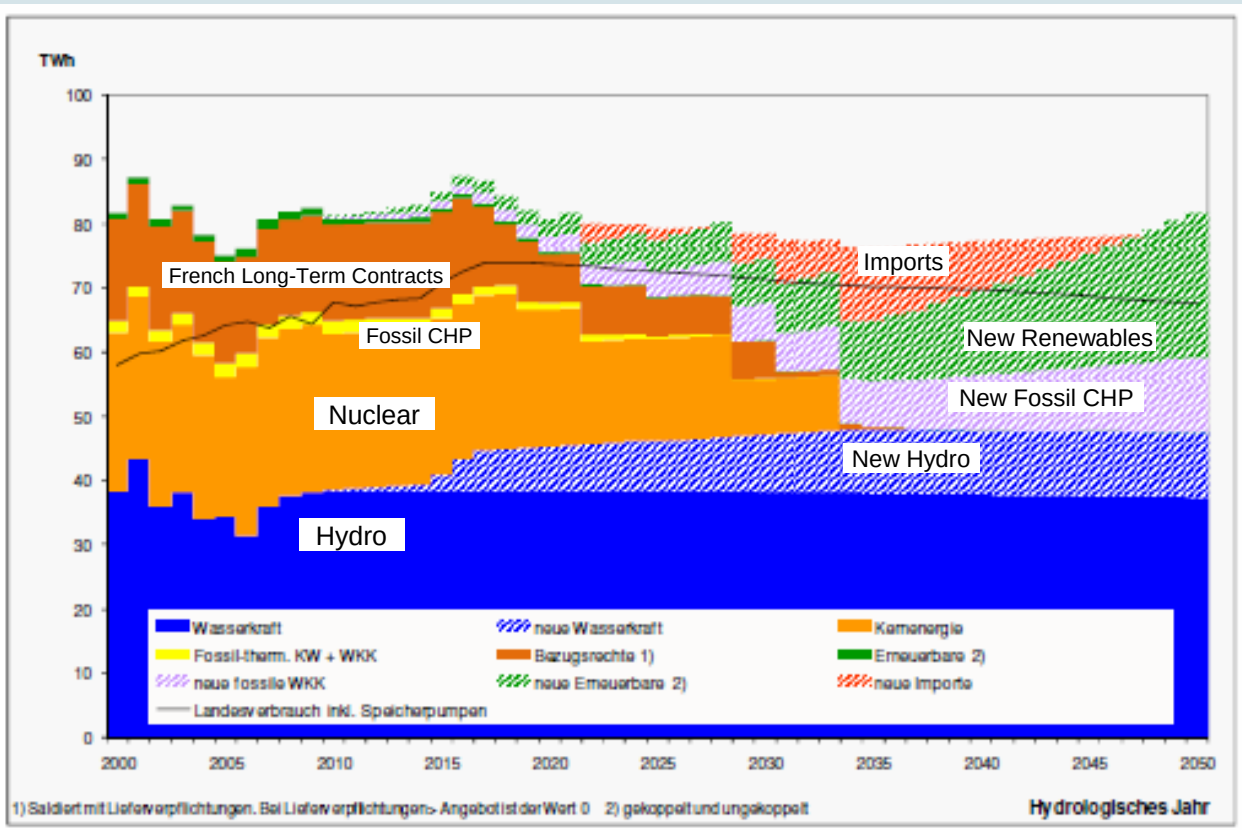
Swiss Energy Policy

Quelle: Prognos 2011

Filling the Gap: 3 Supply Sub-Scenarios

1. CCGT + Renewable
2. Decentralized CHP + Renewable
3. Decentralized CHP + Renewable (domestic / imports)

Example:
Decentralized CHP + Renewable



Quelle: Prognos 2011

New Energy Policy (1)

Electricity Priorities

- Improve efficiency
- Develop hydro (target: +10 TWh by 2050; w/o 4 TWh pump-storage)
- Develop new renewables (target: +22.6 TWh by 2050)
- Residual demand to be covered by fossil – primarily small CHP (target: +8.2 TWh by 2050), subsidiarily by CCGT and imports

Policies & Measures

- Grid development (Smart and Supergrid)
- Boost R&D
- Leading by example (public procurement)
- „Beacon“ projects
- International cooperation (e.g. pump-storage + intermittent RES)

New Energy Policy (2)

Renewable Policies & Measures (to be examined)

- Feed-in tariff reform (lift cap, possible quota system)
- Simplified permitting, zoning regulations
- Integrate renewables in building refurbishment regulation
- District heating systems (renewable-based)

Cost

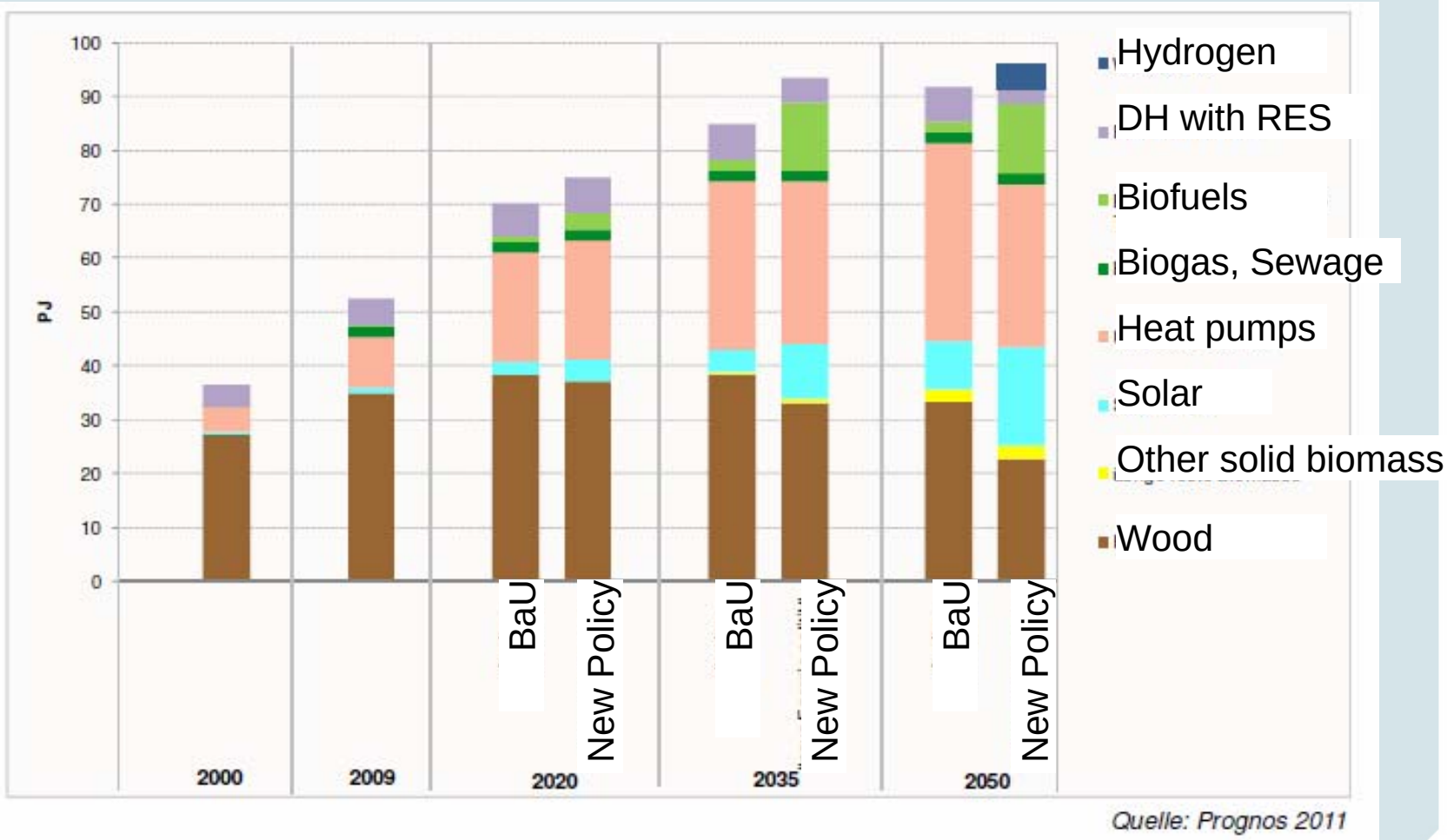
- Incremental costs vs BaU by 2050: +0.4-0.7% of GDP p.a.

Renewable Electricity Generation (GWh/year) Sub-Scenario E (Renewables)

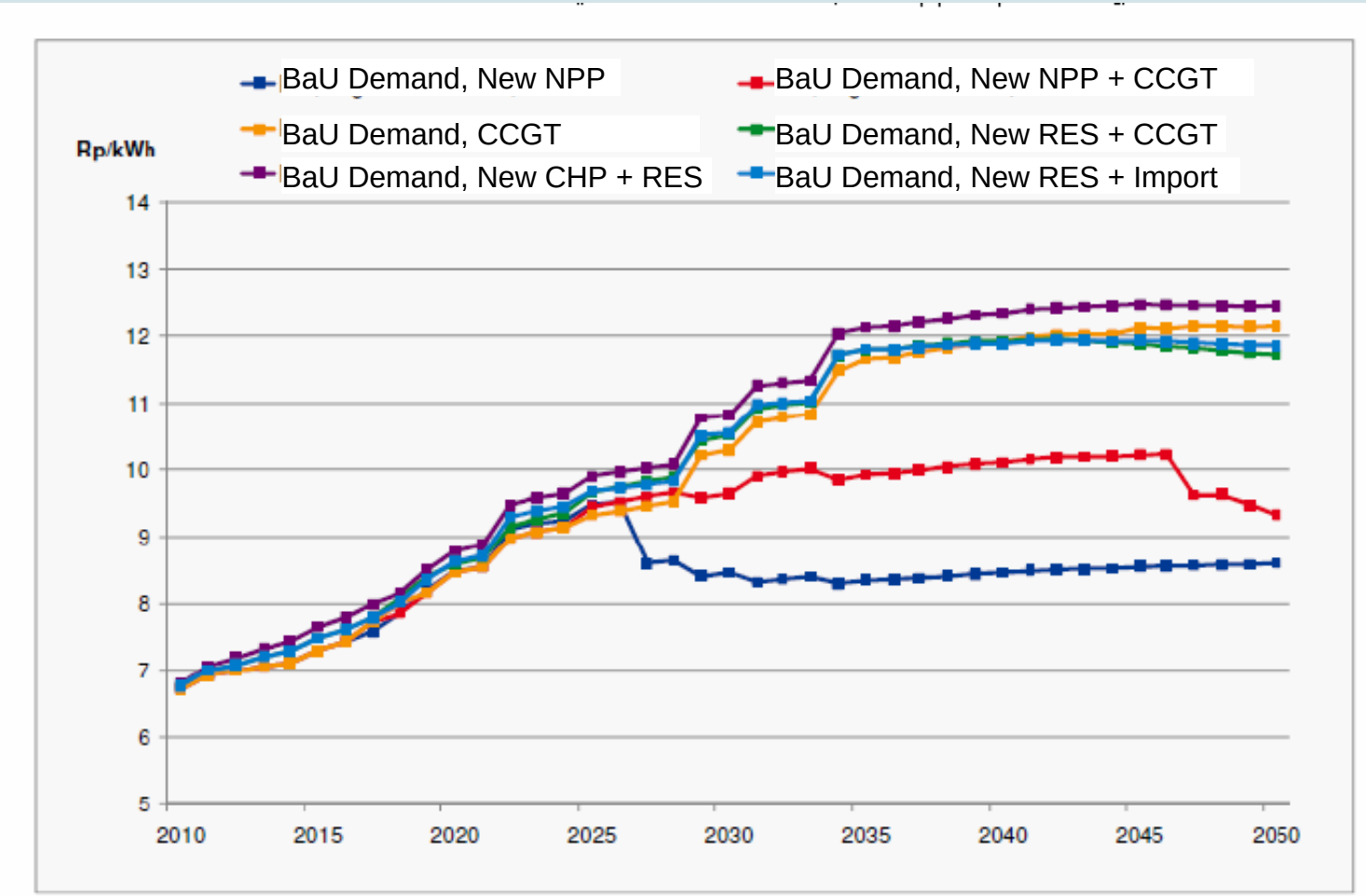
Erzeugung - Hydrologisches Jahr	2000	2009	2020	2035	2050
ungekoppelt					
Photovoltaikanlagen	11.04	17.60	534.78	2'929.47	10'397.00
Windenergieanlagen	2.98	12.40	583.60	1'492.08	4'000.00
Biomasse (Holzgas)	0.00	0.00	0.00	0.00	0.00
Geothermie	0.00	0.00	276.16	1'084.27	4'378.29
gekoppelt					
Biomasse (Wood)	10.47	34.23	470.75	1'105.00	1'105.00
Biogas	12.02	16.90	605.37	1'430.00	1'430.00
ARA Sewage plant	93.99	107.20	129.35	300.00	300.00
KVA (50% EE-Anteil)	642.10	728.93	438.44	997.80	997.80
Deponiegas	44.25	28.51	0.00	0.00	0.00

Challenge: two thirds of PV production in summer; storage options?

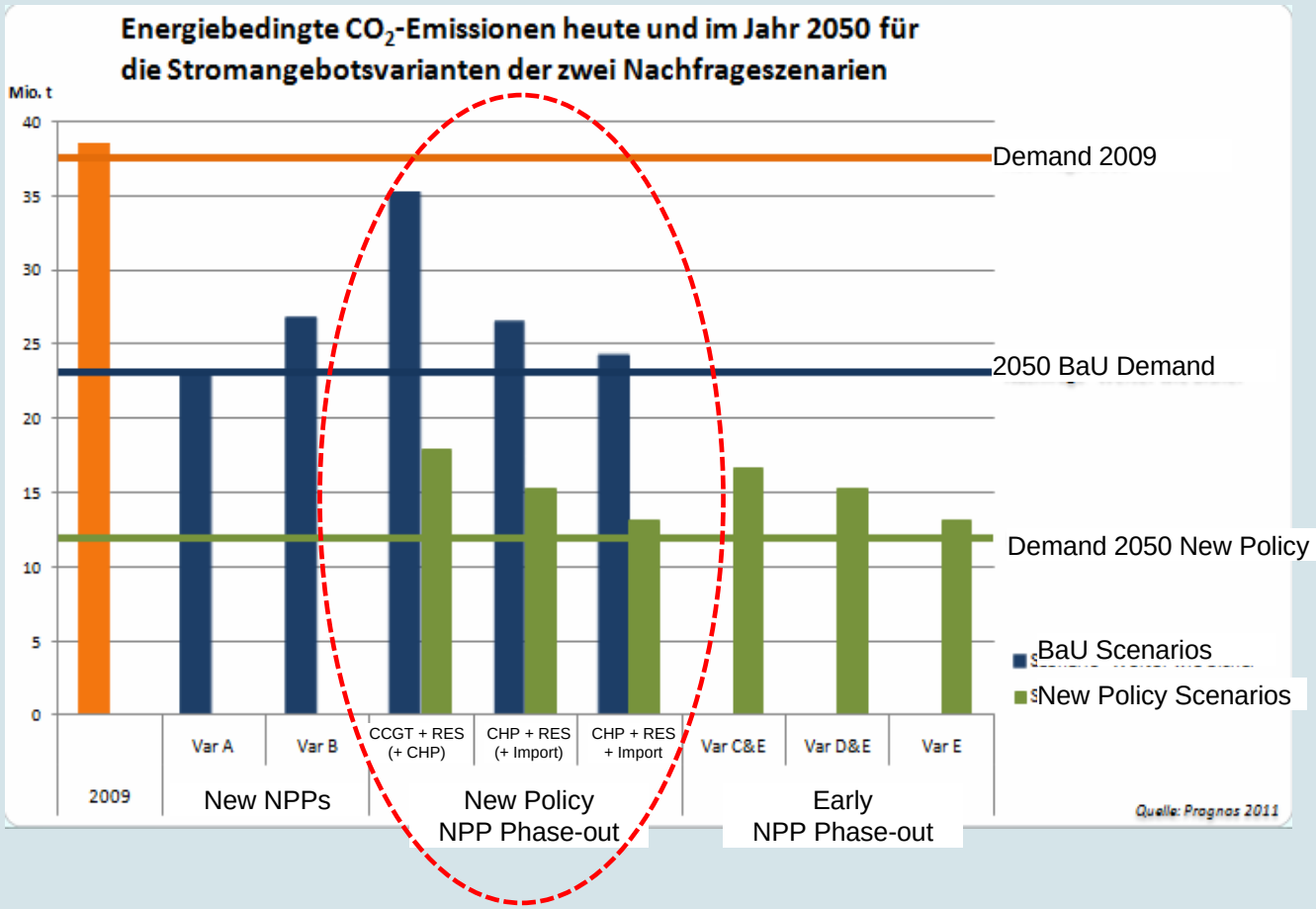
Renewable Heat & Transport Fuel Scenarios



Electricity Generation Cost



CO2-Emissions Scenarios



Back-up Slide: Basic Parameters

Rahmendaten	Einheit	2000	2009	2020	2035	2050	2050/2000 Δ %	2050/2009 Δ %
Bevölkerung	Mio.	7.2	7.8	8.4	8.9	9. 4	25.4	15.9
BIP real, 2009 = 100	Mrd. CHF	467.8	535.3	619.1	701.3	802.2	71.5	49.9
Wohnflächen (EBF)	Mio. m^2	416.5	479.2	562.9	630.5	661.7	58.9	38.1
Verkehrsmengen Personenverkehr	Mrd. Pkm	106.2	118.2	137.6	145.4	143.6	35.2	21.5
Verkehrsmengen Güterverkehr	Mrd. tkm	22.7	26.3	32.3	35.9	39.9	75.8	51.7
Rohöl Weltmarktpreis real, 2009 = 100, Szenario „Weiter wie bis-her“	US$/b	34	60	99	113	116	241.3	91.6
Rohöl Weltmarktpreis real, 2009 = 100, Szenario „Neue Energiepolitik“	US$/b	34	60	90	90	83	244.8	137.4
CO_2-Preis aus ETS real, 2009 =100, Szenario „Weiter wie bisher“	$/t CO_2		22	38	50	56	-	154.5
CO_2-Preis aus ETS real, 2009 =100, Szenario „Neue Energiepolitik“	$/t CO_2		22	45	120	137		623

Quelle: Prognos 2011, BFS 2010, BFE 2010, IEA 2010

Quelle: Prognos 2011

Back-up Slide: Electricity Supply Sub-Scenarios

Stromangebotsvari-ante Bundesrat	**1**		**2**			**3**		
Angebotsvariante Perspektiven 2035	A	B	C & E	D & E	E	C & E	D & E	E
Nachfrageentwicklung „Weiter wie bisher“	4 KKW: 47,22 TWh_{el}	5 GuD: 7,77 TWh_{el} 3 KKW: 35,41 TWh_{el}	9 GuD: 34, 65 TWh_{el} EE: 22,6 TWh_{el}	WKK:11,5 TWh_{el} EE: 22.6 TWh_{el} Import: 17,2 TWh_{el}	WKK:3,8 TWh_{el} EE: 22.6 TWh_{el} Import: 25,9 TWh_{el}			
Nachfrageentwicklung „Neue Energiepolitik“			5 GuD: 15,4 TWh_{el} WKK:3,8 TWh_{el} EE: 22,6 TWh_{el}	WKK:11,5 TWh_{el} EE: 22.6 TWh_{el}	WKK:3,8 TWh_{el} EE: 22.6 TWh_{el} Import: 5,6 TWh_{el}	7 GuD: 11,55 TWh_{el} WKK:3,8 TWh_{el} EE: 22,6 TWh_{el}	WKK: 11,5 TWh_{el} EE: 22.6 TWh_{el}	WKK: 3,8 TWh_{el} EE: 22.6 TWh_{el} Import: 5,6 TWh_{el}

Quelle: Prognos, 2007 und 2011

Varianten:
- A: Nuklear
- B: Fossil-zentral und Nuklear
- C & E: Fossil-zentral und Erneuerbar
- D & E: Fossil-dezentral und Erneuerbar
- E: Erneuerbar

Back-up Slide: Investment Cost per kW Capacity & CO2 Price

	Coûts en francs par kW de puissance				Changement en % par rapport à 2010				Indice 2010 = 100			
	2010	**2020**	**2035**	**2050**	**2010**	**2020**	**2035**	**2050**	**2010**	**2020**	**2035**	**2050**
Coûts des investissements pour l'énergie éolienne	2150	2018	1858	1770	0,0	-6,1	-13,6	-17,7	100	94	86	82
Coûts des investissements pour le photovoltaïque	4488	2884	1628	1471	0,0	-35,8	-63,7	-67,2	100	64	36	33
Coûts des investissements pour la géothermie	6916	6065	5049	4556	0,0	-12,3	-27,0	-34,1	100	88	73	66
Coûts des investissements pour les centrales nucléaires	4250	4250	4250	4250	constant							
Mise à l'arrêt et modification des centrales nucléaires	1650	1650	1650	1650	constant							
Coûts des investissements des centrales GuD	1015	1015	1015	1015	constant							
Coûts des combustibles pour les centrales GuD (sans le CO_2), francs par kW_{th}	0,045	0,058	0,069	0,074	0,0	29,3	53,0	65,2	100	129	153	165
Prix du CO_2 (francs par t)	24,3	37,4	42,9	41,4	0,0	53,7	76,2	70,3	100	154	176	170

Source: Prognos, 2011

Back-up Slide: Electricity End-Use Trends & Projections (PJ)

	2000	2009	2035		2050	
			„Poursuite de la politique actuelle“	„Nouvelle politique énergétique“	„Poursuite de la politique actuelle“	„Nouvelle politique énergétique“
Chauffage	18.5	21.0	22.2	17.2	22.2	14.1
Eau chaude	8.8	8.6	9.2	5.5	9.1	3.1
Cuisine	4.2	5.2	5.3	5.3	5.2	5.1
Chaleur industrielle	21.1	21.9	32.1	22.5	35.1	21.6
Eclairage	18.5	20.1	22.5	15.1	23.5	12.7
Climatisation, vent. & install. domestiques	17.8	20.8	31.5	22.0	34.9	13.2
I&K, médias de loisirs	3.9	4.5	8.0	6.2	14.0	8.8
Moteurs, processus	82.9	89.4	107.2	90.0	112.9	92.7
Transports	9.5	11.0	16.8	24.5	25.0	28.1
Divers	3.4	4.5	3.9	2.3	3.2	3.1
Total	**188.5**	**206.9**	**258.6**	**210.6**	**285.1**	**202.6**

Source: Prognos, 2011