

Network Planning

2.1.1 Master Plan

Target of a Master Plan

- guideline for the development/ restructuring of the infrastructure of a country/region
- infrastructure inputs; political targets (e.g.: electrical, heating, use of gas or oil, ..)
- orientation for long term planning
- fixation of strategies
- ecological, economical and technical influences
- estimated or planned development of industrial plants, housing areas or extension of cities

Insecurities of long term input data

- development of population
- change of household structure (extended family → singles)
- change of political targets
- development of specific energy consumption
- restriction of energy availability
- change of energy sources
- change of consumption behaviour
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Output for utilities

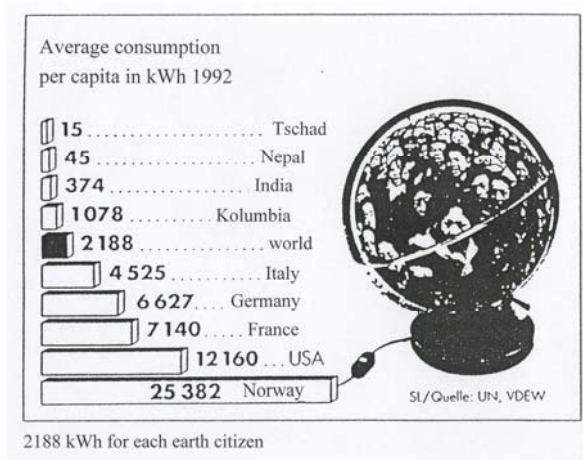
- optimising areas for power plants, traces for UHV and HV Overhead Lines
- long time horizon of about 25 .. 35 years
- comparison of different technical, economical and ecological solutions (variants)
- reservation of suitable areas for power plants, UHV/HV lines and switchyards
- options for several different developments concerning the assumptions
- adaptation about every ten years: development compared with the assumptions; depends of the speed of the developments and the deviation from the basic inputs

Master Plan for distribution networks

- distribution networks normally only considered qualitatively
- determination of power injection points
- fixation of optional areas for switchyards
- basic definitions (e.g.: OHL or UGC, injection points, ...)
- definition of voltage levels and rated power of transformers
- orientation for dimensioning conductors and number of outgoing feeders
- adaptation to the development in time distances of about 15 .. 20 years, depends from the speed of the development

Master Plan and power system extension planning

- planning is orientated at the expected peak load and near to the time of the need
- considers time to order, build and install the needed equipment
- detailed measures to install equipment without endangering the supply reliability
- MV networks principal fixation about 10 years, LV networks about 5 years
- actual decision to realize detailed measures every year considering the last load, technical and economical reasons (e.g.: street repairing to lay UGC as part of it, MV and LV lines on the same trace, connecting a MV customer, increase of the load at special points, across LV lines to reduce charge of high loaded lines, ..)
- considering peak load and load shape of feeders and transformers



Energy Consumption Worldwide in (1992) 2004			
Country	Mio. kWh	Pop./Mio.	kWh/p.c.
World	16.330.000	6.640,0	(2.188) 2.460
Norway	116.200	4,5	(25.382) 23.240
USA	3.717.000	280,6	(12.160) 13.228
France	482.400	59,8	(7.140) 8.040
Germany	587.900	83,3	(6.627) 7.080
Italy	321.000	57,7	(4.525) 5.534
UK	345.200	59,8	5773
Kolumbia	46.050	41,0	(1.078) 1.123
India	524.600	1.046,9	(374) 501
Nepal	2.464	25,8	(45) 96
Tschad	78	9,0	(15) 87
Iran	140.300	66,6	2.107
Mongolia	2.726	2,7	1.001
China	2.494.000	1.284,3	1.942
Russia	940.000	145,0	648