

Social sustainability

►Indicator 3: Households with access to electricity

Vector Value Calculation:

We can consider 99% of Ukrainian population to have access to electricity. This figure hardly changed from 1990 to 1999.

Vector Value:

1990 vector $\sim 1-(99/100) \sim 0,01$

1999 vector $\sim 1-(99/100) \sim 0,01$

Ukraine has well-developed electricity distribution network which is covering all of the inhabited area. We can consider virtually all households to have access to electricity with minor exceptions.

From the early years of the USSR (which Ukraine was part of until 1991) industrialisation and development of energy system was priority for the government. "Communism is the power of Soviets plus electrification of the whole country" - this formula proposed by the leader of communist revolution became a pithy saying. As other reasons for developed electricity network we can mention high industrial capacity of Ukraine, transit role and extremely small number of the out-of-the-way places.

Length of Aerial power lines of the Ukraine Power ministry (1997)

Voltage, kV	ths km
800 (direct current)	0.10
750	4.08
500-400	0.64
330	12.46
220	3.18
154	7.52
110	30.87
35	61.90
20-3	327.58
0.5 and less	467.57

However, electrification can not be consider complete:

- There are settlements where few people (one-three houses) live and which are relatively far from the grid. Number of people living in such conditions is paltry when compared to the total population,
- There are territories in Ukraine declared to be zones of unconditional resettlement due to the high level of radioactive pollution caused by Chernobyl disaster. These territories are cut off the grid. However, some inhabitants refuse to live their hoses and keep living there.
- As a result of difficult economic situation and luck of culture, electrical wires and equipment are stolen every day to be sold as scrap metal. This leads to regular de-energising of areas.
- Finally, for years Ukraine experiences luck of electricity. In this situation energy distributors forced to do rolling blackouts through the regions. Thus, consumers are not able to use electricity despite being technically connected to the grid.

Centralised electricity supply has a role to play in electricity shortages experienced by consumers. There is a lack of energy sources independent from the centralised grid. Potential of the local small energy sources was ignored. In particularly, Ukraine has great potential for small-scale hydro, which was once in used but neglected last decades.

Transport of the electricity through the network in Ukraine lead to 19.97% loose in 2000 (30.9 TWh compared to gross consumption 154.7 TWh¹⁶). Naturally, these looses are reflected in the electricity price for final consumers.

¹⁶ Energy Today, by the Ministry of Fuel and Power (Olexander Dupak, 31.01.2001)

►Indicator 4: Investments in clean energy

Vector Value Calculation:

1990 fraction = 0.0, and 1998 fraction = 0.038. The length of the unit vector is $0.950 - 0.0 = 0.950$. Foreign investments in clean energy as a fraction of total power generation investments in 1998 we equal to $30 / (317+114++20+36+200+91) = 0.038$. The growth of investments in clean energy in 1998 represents a new position of the vector: $(0.950 - (0.038 - 0.0)) / 0.950 = 0.96$.

Vector Value:

The growth of investments in clean energy in **1998** represents a new position of the vector: $(0.950 - (0.038 - 0.0)) / 0.950 = \mathbf{0.96}$.

1990 = 1

1998 = 0.96

In the FSU investment policy in energy sector has been geared towards supplying energy rather than to DSM or "energy services." In Ukraine, the historical legacy of a centrally planned energy supply remains in the form of perverse incentives to invest in nuclear energy projects.

Table 4.1. Capital investments in Ukraine's fuel and energy sector in 1990, million KBV¹

Power generation	40
Coal industry	2592
Oil industry	396
Gas industry	1125
Renewables	0

Thus, in 1990 the fraction of "clean" energy investments was equal to 0.

Since 1994 Ukraine has proclaimed an introduction of new energy policies. The proclamations are often very general statements of policy, many of which refer to the importance of energy supply. Few of these policy statements, however, are backed up by specific legislation, obligations or resources. Many of the energy policies adopted and applied to date give little significance to the environmental impact of energy production and consumption, provide disincentives for investments in alternative energy sources and/or energy efficiency projects and set misleading and perverse economic signals. Unfortunately, Ukrainian policy makers tend to underestimate investments in clean energy mainly because of time lags. Very often it takes from 3 to 5 years or more to realise the environmental and economic benefits of clean energy investments, whereas political mandates of policy makers achieve much quicker results.

According to the National Energy Programme of Ukraine, Adopted by the Parliament in 1996, the total amount of investments needed for development of Fuel and Energy Complex had to be 8,631.8 trillion of karbovanets (KBV) ². Starting in 1995, these investments (in trillion KBV) had to be distributed in the following way –see table 4.2 next page.

¹ Ukraine: Energy & Economy. EC Energy Sector in Kiev. 1997.

² KBV 188,500 = US\$ 1 (Feb. 1996).

Table 4.2. Target investments in fuel and energy complex, ¹⁹

	trillion KBV	Fraction
Coal industry	3,380.42	39.3
Oil and gas industry	1,961.50	22.0
Oil refining	266.9	3.0
Power generation	1,557.0	18.0
Nuclear power	376.7	4.4
Alternative and renewable power	145.6	1.7
Machine building industry	76.647	0.9
Other		10.0
Total	8,631.8	100.0

As it follows from this table, the planned investments in clean energy as a fraction of total power generation investments had to be equal to $145.6 / 1,557.0 = 0.093$. In the past, Ukraine's investments in "clean energy" never exceeded 0.1% ²⁰. This year budget foresee 25 m of UAH for energy saving measures in country's economy ²¹.

The reason for such small fraction is quite obvious. In 1990 more than 45% of the capital stock in power sector appeared to be physically worn out and needed to be replaced. Now situation is much worse, as huge capital investments are needed to maintain main generating capacities on their current level, table 4.3.

Table 4.3. Ukraine capital stock in power sector in 2000.

Number of years in operation	Capacity, GW	Share, %
20-30	16.6	51.6
30-40	15.1	46.9
Over 40	0.5	1.5

Presently there is a growing tendency of dramatic investment reduction in Ukrainian power sector. During the last 5-7 years the Government was highly constrained as a source of capital. The state owned utilities have sold energy at prices substantially below the cost of production and cannot internally finance major new investments, even if these have attractive paybacks. One of the main barriers to energy efficiency investments in Ukraine is the risk that large industrial enterprises for whom energy efficiency would be extremely cost effective will not survive the overall privatisation and/or restructuring of the Ukraine economy.

This tendency of reducing investments into power generation, when taking into account the fact that main assets are becoming obsolete and worn out, can lead to the uncompensated withdrawal of a considerable part of its generating capacities, and their rehabilitation will require much more time and investments. Since Ukraine has built up huge debts importing gas from Russia and Turkmenistan, it has no money to invest in modernisation of energy infrastructure or "clean" generating capacities. As we mentioned above, a small amount of available money is used for nuclear reactors. Thus, Western help seems to be the only way out.

In accordance to these circumstances, the World Bank and other donors started their financial assistance with the rehabilitation of power generation, transmission and distribution. With the Electricity Market Development Project (\$317 million), the WB is supporting the restructuring, and rehabilitation of power sector enterprises, helping them

¹⁹ National Energy Programme of Ukraine, 1996.

²⁰ Serhi Bevez, Head of the Directorate of the State Committee on Energy Conservation of Ukraine. Personal Communication, February 2001.

²¹ UAH 5.43 = US\$1.0 (Feb. 2001).

to improve cost recovery, financial self-sufficiency and payment discipline. To improve the quality of power supply, the WB is financing the rehabilitation of hydropower plants through the ongoing operation (\$114 million).

Besides that, the World Bank and the EBRD are involved in financing projects to rehabilitate district heating systems in Lviv and Dnipropetrovsk (respectively USD 20 and 36 m). In Kyiv, the WB and EBRD are jointly financing modernisation of heat supply and distribution facilities of Kyivenergo (respectively \$200 and \$91 million).

We will consider all these projects as energy investments with some environmental dimension. At the same time we can classify the EBRD \$30 m loan for UkrESCO as investment in clean energy. If so, than foreign investments in clean energy as a fraction of total power generation investments in 1998 we equal to

$$30 / (317+114++20+36+200+91) = 0.038.$$