TESLA TECHNOLOGIES

BRIDGE TO THE FUTURE

CASCADING HYDRO POWER PLANTS IN TURKEY

2019

Innovative hydropower plants in Turkey with a possible setting, partially under existing hydroelectric power plants with accumulations and into the existing riverbed!
They use a water column of 1.5 m to 4 m, the ratio of the hydroelectric power plant in the river is shown in the table below.

The project would be developed for the territory of Turkey! Cascade hydroelectric power plants could be built on numerous larger and smaller rivers, with water flows above 5 m^3 / s!

There is no competitive technology in the world; it is unique for the use of the potentials of the Lowland Rivers, and for the need of generating electrical power. With construction positioning and altering the water level in the river bed together with the flow of water for the needs of the hydroelectric power plant, as well as for regulation of the water level in the urban settlement, and a soil melioration is regulated.
With the realisation of the project, there is no flood of coastal land, and agricultural land is easily supplied with canal water!

Expected installation of cascade hydropower plants in Turkey could achieve annual production of 20,000 GWh, and more! With a market value of 60 euros / MWh, produced electricity is mainly in the day mode when the need for power is higher, but more could be produced in the night regime if needed!
The price is very competitive concerning today's investments in renewable energy plants!
The time of construction and repayment of the investment is planned for up to 7 years!
Seven years is the time of the present preparation and construction of a classical hydroelectric power plant with a dam!
Construction of the first cascade hydropower plant can be realised within six months from the time of the signed contract and first payment!

20,000,000 MWh / year x 375 euro = 7,500 million euro of potential investments in Turkey, and more!

Expected operation of cascade hydropower plant is up to 50 years with regular maintenance and overhauls!

The complete renovation is roughly 500,000 to 700,000 euros / MW, when technology is used, while the construction remains the same!

Maintenance and employee costs are planned below 15% of the gross income from HPP!

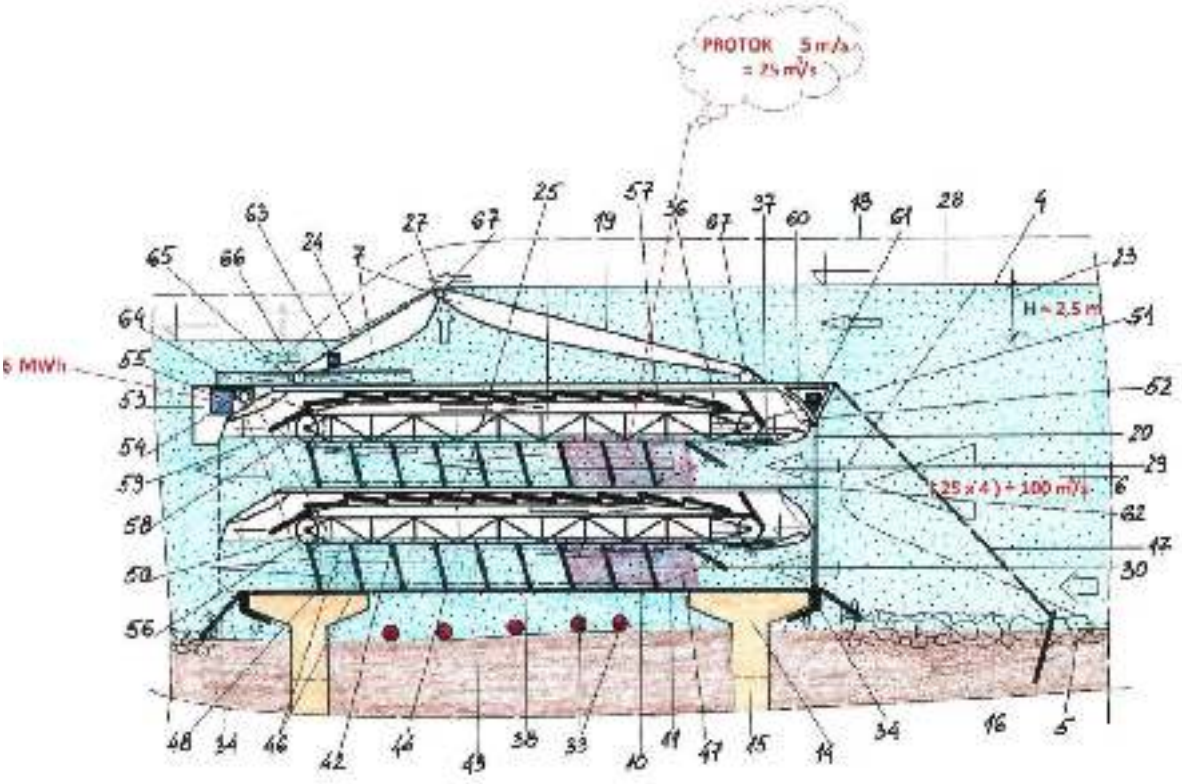
In full capacity, the project will employ thousands of workers, both in the production sector of turbine construction, as well as in designing and constructing cascade hydropower plants, their maintenance and overhaul.
Employees in Turkey will have a steady job in the next 15 to 20 years, guaranteed for the duration of patent rights!

The return of investment of 20,000,000 euros would have followed up to 3 years with the construction of cascade hydropower plants with an installed power of 150 to 200 MW

Turkey currently produces 260,000 GWh, of which coal production is 30% and 50% on imported gas!

Adopted measures are an additional construction of 35,000 MW in the next 5 to 10 years!
Current ownership of power plants in Turkey, about 70% in private ownership!

Tesla Innovative Cascading Hydro Power Plant



In this solution, the hydropower plant can operate as local generator connected to a local power grid.

Production of electrical energy from cascading hydropower plant is realized in this way: Pylons (15) are fixed to the river bed (5), on them are laid band foundations (14). Two cascading turbines are interconnected (10) and laid on band foundations.(14). Achieved water height difference “H” (23) creates pressure to cascading power plant. Regulators (20), gradually leak water (6) towards pipes

(29) of the turbine with rate of inflowing water (6) Water (6) in pipes (29) accelerates, blades (38) of the turbine utilize it to convert to a mechanical energy. Pressure of trapped air (25) prevents water penetration (6). This way, flowing water (6) is directed thru pipe (29) of the turbine where is utilized on turbine blades (38).

The turbine blades (38) on return path are moving thru air almost without any undesirable environmental resistance. Direction of the movement of turbine blades (38) is achieved by "U" profiles (46) and guides (47). Such relation is balanced and stabilized with overflowing (27) water over barrier (19). In this way we accomplish stable RPM on electric energy generator (55).

In total, pipes (29) have several times bigger volume than planned utilization of water flow (6) per second in the river.

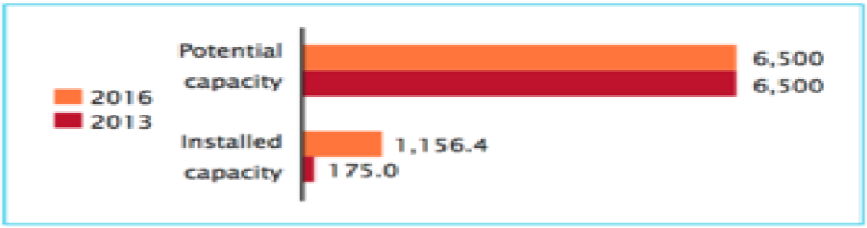
This enables that water flow potential (6) is maximally utilized almost to the turbine standstill by using software control.

When cascading plant is in operation, one can observe overflow of a small amount of water like a waterfall, while the majority of water is directed through the turbine. Casades are regulated by the building of an embankment made of metal net filled with local stone. Reduction is not necessary, energy is transferred directly to a generator shaft.

Small hydropower capacity is only 18 % according to 2013-2016 reports (in MW)

FIGURE 6

SHP capacities 2013-2016 in Turkey (MW)



Source: Various[5,18,19,20]
Note: The comparison is between data from *WSHPDR 2013* and *WSHPDR 2016*.

To see or download full report please follow the link:
http://www.smallhydroworld.org/countries/turkey/detail/

In proportion to the water flow in the observed river (m³/s) !

Water flow in the river	Height of the cascade	1.5 m	2 m	2.5 m	3 m	3.5 m	4 m
5 (m³/s)			0.07 MWh	0.08 MWh	0.10 MWh	0.12 MWh	0.14 MWh
10 (m³/s)		0.10 MWh	0.14 MWh	0.17 MWh	0.21 MWh	0.24 MWh	0.28 MWh
20 (m³/s)		0.21 MWh	0.28 MWh	0.35 MWh	0.42 MWh	0.49 MWh	0.56 MWh
30 (m³/s)		0.31 MWh	0.42 MWh	0.52 MWh	0.63 MWh	0.73 MWh	0.84 MWh
40 (m³/s)		0.42 MWh	0.56 MWh	0.70 MWh	0.84 MWh	0.98 MWh	1.12 MWh
50 (m³/s)		0.52 MWh	0.70 MWh	0.87 MWh	1.05 MWh	1.22 MWh	1.40 MWh
60 (m³/s)		0.63 MWh	0.84 MWh	1.05 MWh	1.26 MWh	1.47 MWh	1.68 MWh
70 (m³/s)		0.73 MWh	0.98 MWh	1.22 MWh	1.47 MWh	1.71 MWh	1.96 MWh
80 (m³/s)		0.84 MWh	1.12 MWh	1.40 MWh	1.68 MWh	1.96 MWh	2.24 MWh
90 (m³/s)		0.94 MWh	1.26 MWh	1.57 MWh	1.89 MWh	2.20 MWh	2.52 MWh
100 (m³/s)		1.05 MWh	1.40 MWh	1.75 MWh	2.10 MWh	2.45 MWh	2.80 MWh
150 (m³/s)		1.57 MWh	2.10 MWh	2.62 MWh	3.15 MWh	3.67 MWh	4.20 MWh
200 (m³/s)		2.10 MWh	2.80 MWh	3.50 MWh	4.20 MWh	4.90 MWh	5.60 MWh
250 (m³/s)		2.62 MWh	3.50 MWh	4.37 MWh	5.25 MWh	6.12 MWh	7.00 MWh
300 (m³/s)		3.15 MWh	4.20 MWh	5.25 MWh	6.30 MWh	7.35 MWh	8.40 MWh
400 (m³/s)		4.20 MWh	5.60 MWh	7.00 MWh	8.40 MWh	9.80 MWh	11.20 MWh
500 (m³/s)		5.25 MWh	7.00 MWh	8.75 MWh	10.50 MWh	12.25 MWh	14.00 MWh
600 (m³/s)		6.30 MWh	8.40 MWh	10.50 MWh	12.60 MWh	14.70 MWh	16.80 MWh
700 (m³/s)		7.35 MWh	9.80 MWh	12.25 MWh	14.70 MWh	17.15 MWh	19.60 MWh

Cascade Hydroelectric Power Plant produces electricity in one-hour mode (MWh) !