I , Hossein Akhavi, graduated in the field of HEAT AND FLUID MECHANICAL ENGINEER from the University of Science and Industry in 1986 . A professional expert and a project manager with 35 years of experience in designing , manufacturing , developing cooling towers and cooling systems . CEO of TAJANG ULTRA ENERGY Co. , designed and fabricated more than 150 great industrial cooling towers . We have two inventions in the field of COOLING TOWERS WATER SAVING. USPTO PATENTS : US 9,789,419 B2 Oct.17,2017 & US 10,322,356 Jun.18,2019

This invented technology used in wet cooling tower, restore outlet fog of cooling tower into collection basin and consequently cooling water cycle. This invention consists of three main components; pump and its pertaining piping, waterfall and micron fog eliminator. In the first stage, the air containing fog is passed through a waterfall before exhausting. This action causes some portions of fog to condensate and fall down, remaining droplets of the fog grow and together with air cross the fog eliminator blades. Fog's droplets are entrapped between blades, leave the air, and restore to the tower in distilled water mode and cause the amount of blowdown and basin waste water limit to zero . Humidity of exhausted air from tower will be effectively reduced. This invention is pertaining to improvement and modification of wet cooling towers. Specifically, subjected system used in wet type cooling towers, to restore cooling tower fog to collection basin and consequently water cycle in cooling tower. When the invented system is installed in cooling tower, about 75% of outlet fog can be restored to tower water cycle annually in distilled water mode and cause the amount of blowdown and basin waste water limit to zero . (more than 55% in summer and more than 95% in winter).

Choosing wet cooling towers for rejecting waste heat and transferring to atmosphere are the best choices in many branches of industries including exothermic process . There are lots of cooling towers in urban residential areas and great cooling towers in industrial areas like power plants , refineries , petrochemical plants and steel plants . In these towers, hot water is sprayed on tower fills from top to bottom and ambient fresh air meet water on tower fills from bottom to top (in counter flow wet cooling tower) or laterally (in cross flow wet cooling towers), which lead to lower temperature of water.

Deduction in water quantity necessitates adding make up water to the system, so proving extra water, leads to increase in costs, deduction in regional water resources, and impact to environment and even in the case of water shortage the whole system will become inefficient. Furthermore, water deduction due to evaporation and windage , increases water sediments, which results in some difficulties in pipes and pumps that it persuade us to blowdown and waste basin water . In addition, exhaled fog creates visual pollution in environment, increase the risk of freezing tower adjacent roads, and can precipitate of ice and rain around tower during cold seasons.Therefore, many efforts have been made to solve a problems regarding undesirable water evaporation, waste water and deduction or elimination of forming plums of water vapor (fog) produced by cooling towers. Utilizing Dry/Wet combination towers was considered as a solution (GEA paper for EPRI conference June 2005), but high cost of procurement and installing , commissioning and maintenance of such kind of towers up to 5 times more expensive and also need to great installation site surfaces for Dry tower prevent its wide application, so despite existence of fog in wet cooling towers, they still have the greatest application in cooling processes. Adiabatic cooling towers , decreasing humidity of incoming fresh air into tower , pre-cooling of inlet warm water before entering to tower in hybrid cooling towers and also usage of air to air heat exchangers for cooling outlet air of cooling tower by ambient air (Marley Co. patent No. US 6,663,087 B2 Dec.16,2003) , were subjected as four other solutions but complexity, high cost and low efficiency of water saving in this methods , have kept them away from universal applications.