
THE RAIN MACHINE
THE RAIN MACHINE ©

contents

Rain is the only primary source of water known to man. The water for ***rain*** comes from the oceans of this world. Simply put, rain is formed by the action of the sun's heat on ocean water. If there is no ***rain***, everything dries up. Groundwater and glaciers, rivers and lakes, even entire inland seas, the secondary sources, empty out. ***the rain machine©*** translates the principle of natural ***rain*** into the technical world, i.e. into a machine. If you have rain at all times, and this ensures ***the rain machine©***, then you have ***water and hydro-power*** (means electrical power) at all times. The following advantages result from the properties of this solution:

advantages / properties

the rain machine© ...

- produces *power* and *water* or – in alternative versions – *power* or *water* only
- is based on physics of rain
- converts any kind of heat to power and distills any kind of water
- e.g. is fed by (solar-)heat and (sea-)water only.
- is scalable for all needs
- matches peak and base loads (24/365)
- contains a storage module for energy
- is able to use heat even from very low temperatures
- therefore is able to recycle used energy
- has an efficiency of almost 100%
- is not a perpetuum mobile because it needs to be fed to continue its cycle
- no need for transmission power grid because it is used completely decentralized
- supplies area-wide
- does not pollute the environment because it does not produce CO_2, NO_x, radioactive and nuclear waste
- does not destruct the environment
- is not noisy and is inconspicuous.

disadvantages (???)

the rain machine© ...

- is a declared opponent of energy saving, because there is enough energy in the form of heat that can be converted
- is a declared opponent of droughts, because it distills rainwater from all water sources in the world
- is a declared opponent of the use of fossil energy sources
- is a declared opponent of the use of nuclear energy, whether nuclear fission or nuclear fusion
- is a declared opponent of any consumption of nature by overhead power lines, wind turbines and photovoltaic fields

explanation

To most people, ***rain*** means bad weather. It should always be sunny and warm. But what these same people also like to have and have in abundance is water and energy, because that is luxury and a way of life; we have become accustomed to that.

Rain, however, is the only primary source of usable water. Glaciers, rivers, lakes and groundwater need precipitation in the form of ***rain*** or ***snow*** in order not to disappear. Thus, ***rain***, if it can be traced and controlled in a technical process, is the source of all that mankind desires: ***water*** and ***power***. If this is then cleverly combined with a storage system for energy, then you also have security of supply at night or in other dark times.

I guess that would be perfect!

Let us analyze the challenge and develop the solution!

The overwhelming source of ***rain*** is the sun's radiation on the world's oceans - nothing else. However, development does not work without understanding the framework described by physics. That of gravitation, that of the properties of the atmosphere and gases, and that of the properties of water in its various states of aggregation; these are the necessary components.

If the heat of the sun has now dissolved a water molecule (H_2O) out of the liquid, it sets off on its journey. In short, it is 'pumped' upwards via the chimney effect, driven by the heat it has

picked up, where under favorable conditions it meets other water molecules, drops are formed and these form clouds. That's it!

Now all that's missing is that the clouds move over land and it rains there. If we're lucky, it rains in the mountains, where we can collect it and feed it to a hydroelectric plant in a controlled manner. Just a reminder: The process just described is the distillation of water.

A machine, or better a converter, which reproduces this natural process ***rain*** should be very compact and at the same time meet all ecological requirements. Ideally, such a machine would be as self-contained a system as possible, a small independent world into which only the necessary operating resources are fed and from which only the results come out, i.e. as completely isolated from the environment as possible.

Before we now turn to the actual construction, let us recall what happens in nature. From the sun comes a radiation with a temperature of approx. 5778 Kelvin, that is approx. 5505° Celsius on the earth. If there were no cooling transformation processes within our atmosphere, we would have much higher temperatures; Venus gives us a good example.

If we now look at the earth, however, we only measure temperatures in a range of approx. -70° C to +70°C and not approx. -150°C to +150°C. ---Why? --- Well, there are two main processes that perform the conversion of the irradiated solar energy. One is the cooling by wind or convection by means of the gases of the atmosphere – this we observe e.g. in deserts, where sand and stones predominate (the sand or stones can also reach higher temperatures in

the process, but the air does not get as hot in the mixture), and the second and most essential transformation process is the evaporation/evaporation of the water. This process of keeping temperatures moderate is the one we are interested in here.

And now comes the essential part: If the earth would not directly re-radiate this energy irradiated and transformed by the sun, there would be a constant heating up. We have known this for some time, it is the ultimate greenhouse effect.

Thus, we can state that if we look at the Earth from the outside, we see a planet that has a constant temperature radiation in the range of about -70°C to about +70°C.

After this insertion, one should have internalized the basic role, the importance of the weather phenomenon of ***rain***. And exactly this so fundamental process is the basis for today's life on this planet – outside the sea water.

Also, everyone now probably realizes that if we control the principle of ***rain*** in a technical process, that we can fulfill all our wishes regarding ***energy*** and ***water*** at any time.

If we summarize everything that has been said so far in short form, we can see the usefulness of the principle of ***rain***, because it cools, it provides us with the transformation of heat into water vapor, which condenses at a high altitude and is then available to us as ***water*** for a hydroelectric power plant and also still as ***rain*** or ***drinking water***. The principle ***rain*** feeds, even frozen as ***snow*** for example, the glaciers, fills the groundwater and then also the rivers and lakes.

And this principle, the ***rain***, is now available to us in the form of ***the rain machine©***. ***Cooling***, ***water*** and ***hydropower*** anytime, anywhere.

the machine / technical details

If one wants to control the natural process of ***rain***, then one must have appropriate equipment for the individual sequences in the process. So, you need an evaporator, a chimney in which the steam rises, a condenser and a down pipe in which the water flows to the water turbine. All controlled and as already noted in an encapsulated world. But that's not all, because now you have to think about the physics of water.

The main thing to think about is the heat of vaporization, that is, the energy that does not contribute to a temperature increase, but which is needed to make the transition from liquid to gas. This is also released again when the water vapor condenses later.

To throw away this energy at the moment of condensation is foolish, because it represents the predominant portion of energy in the entire process. It is imperative that this energy be recovered and reused.

The trick used for this is derived from the physics of water. The temperature at which the water boils, depends on the pressure (examples: pressure cooker, Mount Everest). We now boil the water at low pressure, then increase the pressure by means of a compressor – this

gives us a higher temperature of the steam, this is the heat pump – and then condense this vapor at these higher temperature/pressure conditions. Since the heat of evaporation is now also released again in the case of condensation, and this also at higher pressure and, as in our case, also at higher temperatures, we can use it to heat a medium which can then, transported into the low-pressure range, be used for evaporation. The now cooled medium is then returned to the condensation area, where it again, being cold enough, absorbs the heat of evaporation. This means that the evaporation heat, which also only has to be fed into the system once at the beginning, is completely reused; nothing is lost. Thus, the biggest challenge has been solved.

So now we have liquid water at a level we specify. So it has been ***raining***, we have distilled water. Now a hydroelectric power plant comes into play. The pressure is then reduced in the turbine. The part of the pressure that the compressor has built up and that is now recovered as energy by the turbine, we use again to drive the compressor. And the part of the pressure created by the water's gain in altitude we extract as electrical energy for our benefit. Now we have low pressure again and the water can be evaporated again. However, because it has cooled down due to the chimney effect, it must be supplied with new heat to compensate for the temperature loss. This is best done here directly after the turbine, where it is *'coldest'*.

And we install yet another trick so that the heat that is fed in only has to be at the lowest possible temperature: We install yet another heat exchanger, which is responsible for bringing down the high temperature at high pressure. We then inject the heat extracted in this way

back into the water, after the turbine and the external heat influx. In the case that we remove the distilled water after the turbine, we balance the removed portion with an appropriate quantity and ensure that the resulting dirt concentrate is fed to an environmentally compatible after-treatment.

The measures described so far result in the property that energy once consumed, which always results in an increase in temperature, can be reused by clever collection measures. Also, we can clean all the polluted water and also reuse the heat contained in it.

The next point on the way to construction that needs our attention is the energy flows. If one leaves aside the desired and used energy flows, in and out and circulating inside, and assumes, as in this case, an otherwise closed system, then actually only heat flows from the inside through the walls to the outside remain. The higher pressure inside (pressure is also a form of stored energy) would then have to escape through a mechanical leak, but then the machine would be broken. Thus, a sufficient insulation layer is needed for the escaping heat.

If you now look more closely at the final design, you realize that under certain conditions it is even possible to capture any heat loss from the machine, feed it back into the system, and convert it. --- Thus, a solution is also available for this challenge.

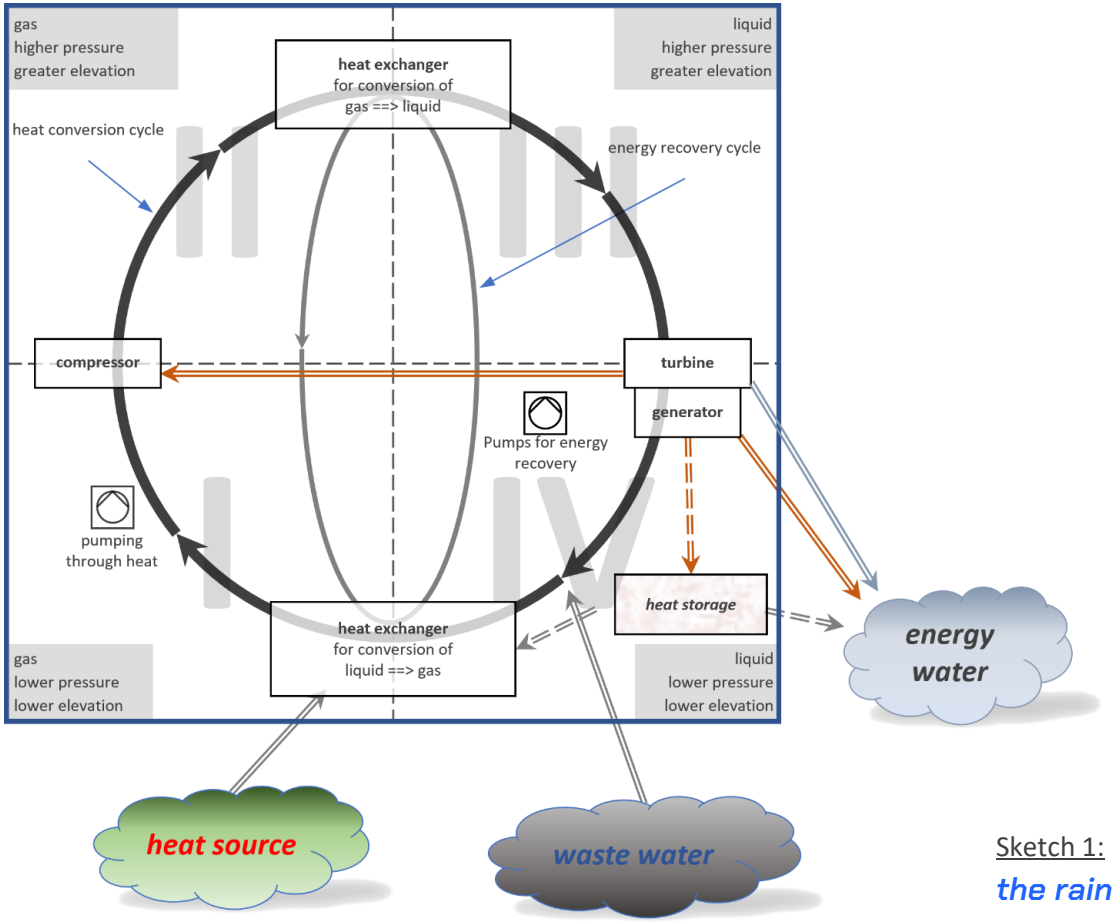
This solution results from the fact that due to the pressure drop in the turbine, the water comes out colder than it went in. If we use this water as a jacket around the machine and set the temperature of the water in this jacket lower than that of the environment, then any heat

that still escapes through the existing passive insulation, as well as additional heat from the environment, flows into this water, and we then feed it, thus heated, back into the circuit of the machine. Conclusion: No energy escapes! All energy is converted! And yet the efficiency is less than one, because the machine consumes energy: it ages. In any case, the actual conversion process is at 100% efficiency.

Are there any other significant issues that are outstanding? --- No! --- Except that the machine is finally presented.

The surprising thing is, if you put all the pieces of the puzzle together, you will find a well-known machine. However, it must be modified and supplemented in several points in order to meet the task. It is the universally known heat pump, which you know from the refrigerator or heaters.

Two sketches will illustrate this. One describes in a quadrant diagram the basic physical processes for ***the rain machine©*** **...**

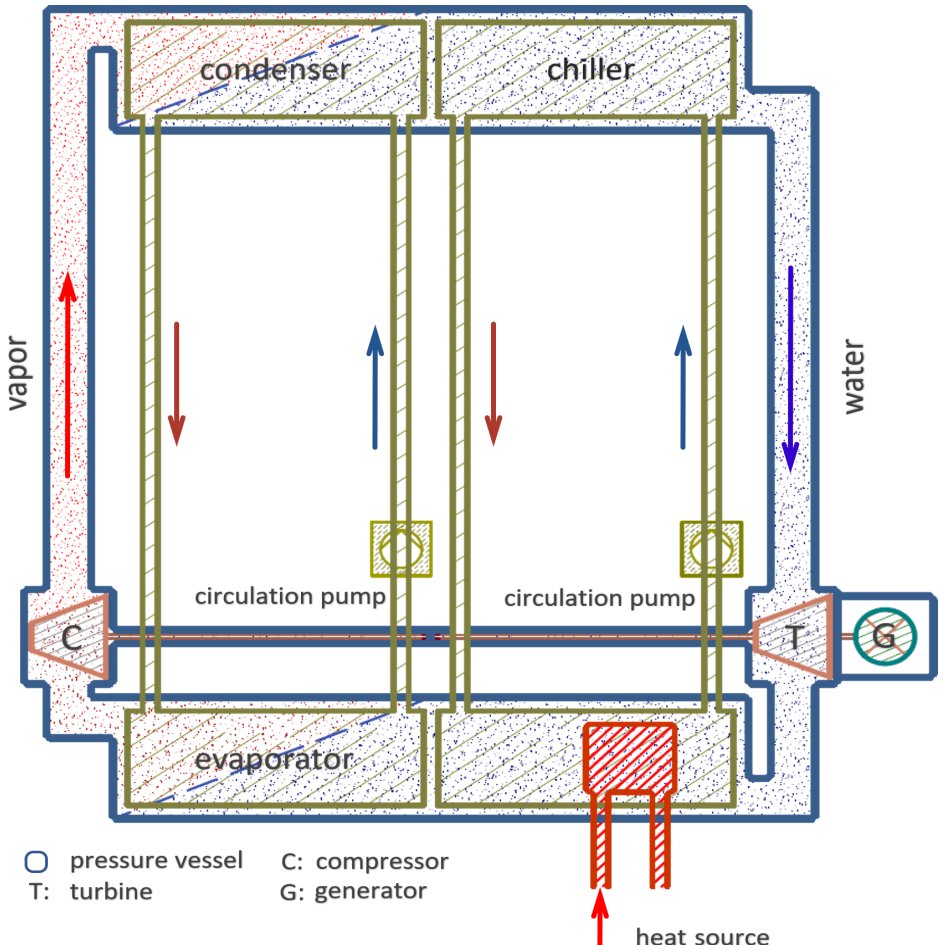


Sketch 1:

the rain machine©

(quadrant diagram)

and the other shows, using the example of pure energy production, a functional example:



Sketch 2:

the rain machine©

(energy generation / schematic diagram)

applications

In this section, we look at some of the core features and their implications for deployment.

- *The unmatched efficiency of the process* of converting heat into electrical energy.
- This results in sustainable energy recycling.
- The heat supplied for conversion can also be that with temperatures below the freezing point of the water. Every process, every activity that we carry out in our lives with devices of any kind, even our own body heat, the heat that we, but also all other living beings, generate ourselves every second of our lives, leads to the provision of heat and in interaction with it to a local temperature increase in each case. By means of simple design measures, it is now possible to (re)convert thermal energy generated in this way and thus made available into electrical energy. The effect that ***the rain machine©*** makes use of is the passive transfer of heat when there is a corresponding temperature gradient. If this is thought through to the end, it leads to the conclusion that, assuming consistent application, there is no more consumed energy and only peripheral losses have to be compensated.
- A factory hall, a hospital, an administration, a data center, full of people and machines. You want light, heating or cooling and the machines should run. This requires electrical energy. (The switch from heating with fossil fuels to electric heating is assumed). The operation of all equipment causes the temperature to rise, people working also heat and the buildings themselves are solar collectors. These are the best conditions for the

operation of the ***the rain machine©***. --- The much-cited energy-intensive glass industry, the iron and steel industry, the cement industry, the chemical industry, the automotive industry or the aluminum industry can also be converted from fossil-provided process heat or from the supply of electricity by fossil-fueled power plants to electrical supply by ***the rain machine©***. The waste heat from these industries no longer heats up the environment, as was previously the case, but is made directly available to the processes again as recycled energy. Here, too, the supply to these industries is entirely decentralized, entirely local.

- The *absolute decentralization* also leads to a hardening of the energy supply in case of unexpected/unpleasant events. Each community, each village, each city, each industry is independently supplyable, is self-sufficient.
- The *fractional distillation*, which provides absolutely clean water. The same property can also be used for wastewater treatment, as a sewage treatment plant. A nice side effect is that the heat from the wastewater also serves as a heat source for energy generation. And the residual materials can be recycled as raw materials by providing process energy through ***the rain machine©***.
- The *arbitrary scalability*. If one uses the property of distillation to provide ***rainwater***, then one can pump any amount of water into the land if there is access to seawater. The energy to drive the pumps is supplied by ***the rain machine©***, as needed, along the way into the country.

- If one wants to irrigate e.g. the area of the Federal Republic of Germany (rounded up 360,000 km^2) per m^2 with 1000 liters (= $1m^3$ = 1m water column on the m^2), the following calculation applies ($1km^2$ = 1000m x 1000m = $1{,}000{,}000m^2$):

  (360,000 x 1,000,000 x 1) m^3 / (365 x 24 x 3600) s = 11,415.53m^3/s.

  This rounded 12,000m^3/s of water may sound like a lot at first, but it is relatively little and, moreover, easily covered by ***the rain machine©***.
- For comparison: Imagine the Rhine, the Elbe or the Danube, width 100m, depth 10m, then there is this amount of water in 12m river length. If these rivers now flow sluggishly at a walking speed of 3.6km/h = 1m/s, then it would take 12 seconds for this amount of water to flow past them. In the technical process, in a pipeline or in a pipeline network to supply the republic, completely different flow rates and also quantities can now be realized, so that now, without going too deep, the feasibility is apparent.
- But that much is not needed at all. The annual water consumption of Germany is currently (2022) about 5.1 billion m^3 drinking water. This is (divided by 365, by 24, by 3600) rounded up 162 m^3 per second. So only about 1.35% of the previous example calculation. Another comparison of quantities/sizes can be made using the example of the (small) Herdecke pumped-storage power plant. There, approx. 110 m^3 per second flow through a single water turbine (corresponds to approx. 68% of the 162 m^3, a rescaling is easily imaginable).

- *Taking heat* from the environment *means cooling*. If this heat is now converted into electrical energy using the ***the rain machine©***, then once all the tasks of supply and storage have been fulfilled, it can also be used to operate infrared radiators. Infrared light emitted by radiators opens up the possibility of radiating this energy into space, for example, and thus cooling the planet. Or there is the possibility to provide this energy to a neighboring station.
- *Urban mining* – through the decentralized provision of process energy by ***the rain machine©*** it is possible to process and dispose of waste landfills. Waste whose reprocessing would have entailed high energy costs and which was therefore classified as non-recyclable can now be treated as a valuable resource. The raw materials obtained in the process can be reintroduced into the recyclable materials cycle.

(These are excerpts of some of the areas of application)

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