Solving the energy problems by circumventing the Carnot's limit

SUMMARY: Patent authorities are granting me patents for heat engine systems that operate with over 90% thermal efficiency using small temperature differences. These devices can be also build to be big.

So, in autumn 2022 I was granted a patent (FI20210007A1) for an invention which allows obtaining electricity or motive power from small (~10 degrees) temperature differences with a very high (over 90%) thermal efficiency.

In Mars 2024 I applied for a new patent(FI20240015), which enables those similar (over 90%) thermal efficiencies for fuel consuming vehicles and power plants. Patent authorities (not same main examiner) have already accepted the technical usability and novelty of that second patent application.

Taken together, the first invention is supposed to make lots of very cheap electricity. Part of this cheap electricity can then be used for the production of hydrogen or various synthetic fuels for vehicles and power plants. I think this may be the main invention that makes the green transition to happen. Could you please verify / disprove that I've found a way to circumvent the Carnot's efficiency limit.

To make your ”disproving task” really easy, I provide you these key materials.

1) Proof-of-concept device picture

2) KEY 1: Cooling of the condensed liquid, makes its vapor pressure to escape the Carnot's limit

3) KEY 2: Article and pictures that show the heat engines being powered by pressure not heat

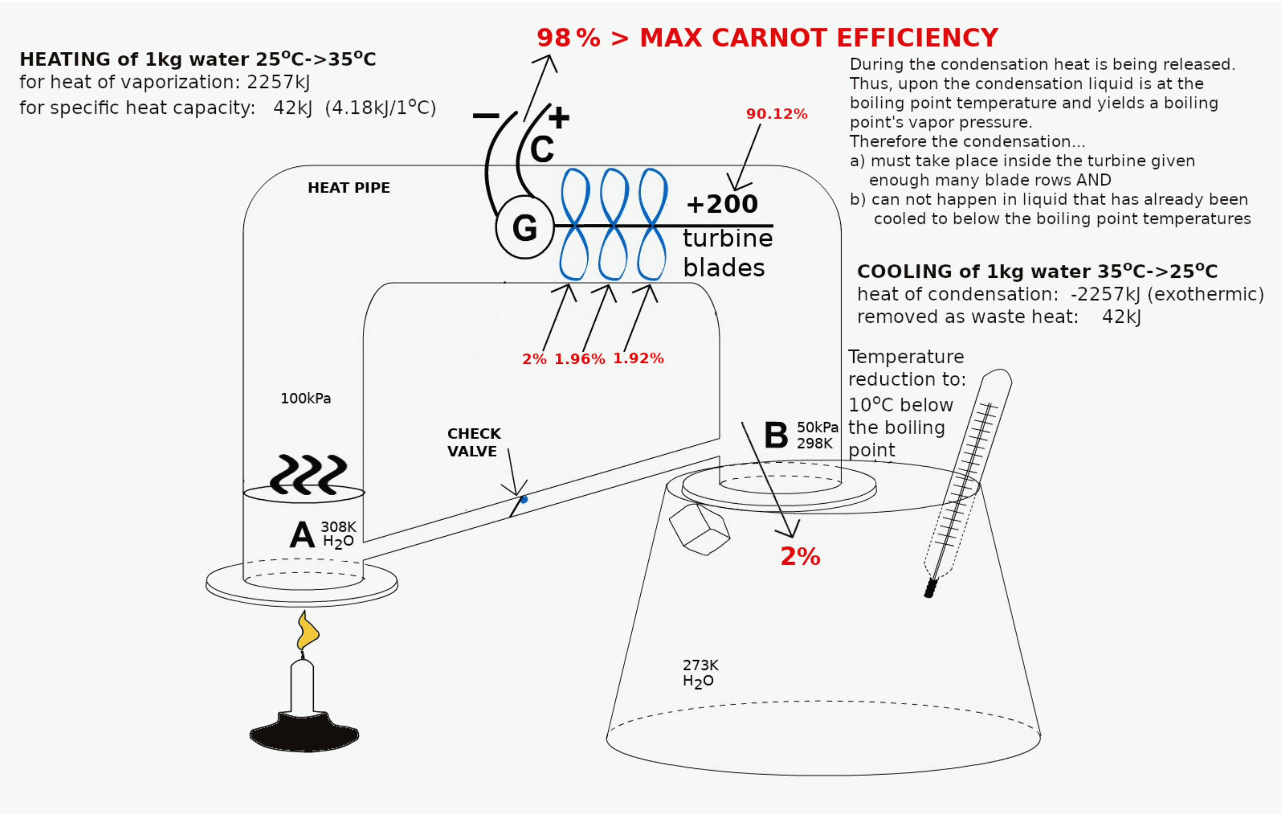
Or if you want to watch me showing the thing on video… here it is
https://www.youtube.com/watch?v=zSyoBTyzCXA

And in this video you find even more more information about the physics in it...

https://youtu.be/RUiD1R5ql9A

1) The proof-of-concept device

The picture below shows a *proof-of-concept* device. Try to make it to obey Carnot's efficiency limitations. If you think you have succeeded, then imagine cooling down the condensed fluid at ”B” by additional 20 temperature degrees.

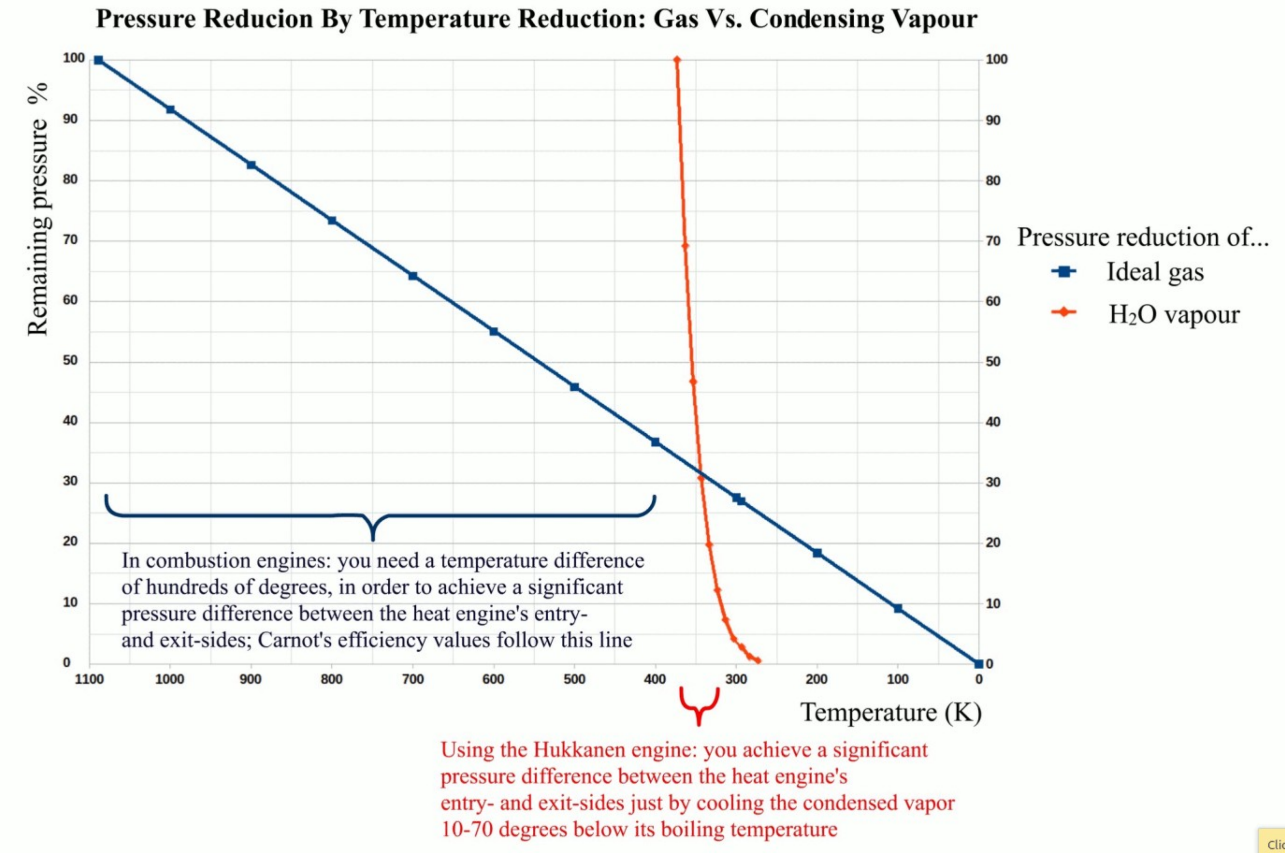


Picture 1: Proof of concept device

Observe that these things can be build big - into megawatt scale

2) First key: Cooling of the condensed liquid, makes its vapor pressure to escape the Carnot’s limits

The picture below compares the ideal gases Vs condensing water's vapor pressure inside a closed container. Observe how the ideal gases pressure decreases linearly towards the absolute zero.



Picture 2a: Pressure reduction of a condensing water vapor, as a function of temperature reduction, is more drastic than the ideal gases pressure reduction.

Calculations are here. Observe that the Carnot efficiency values follow the blue line. For example…

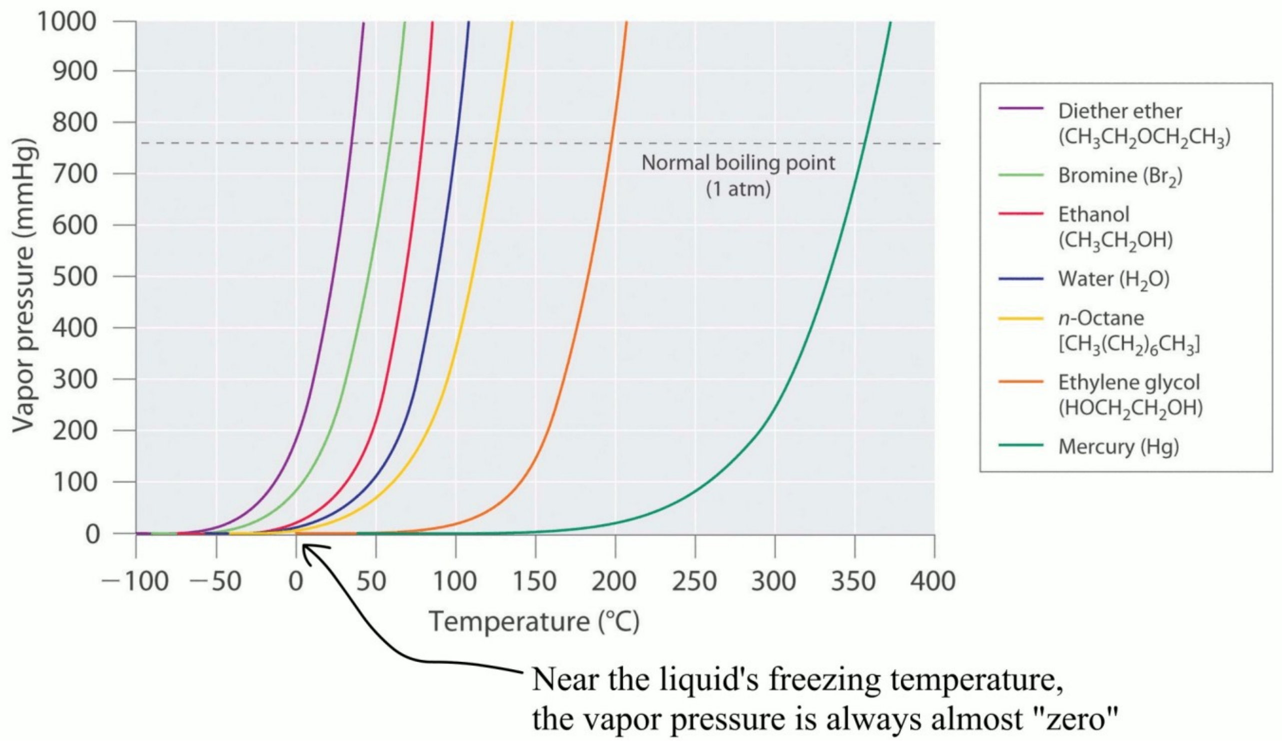
- the ideal gases pressure reduction from 1089K to 294K leads to a pressure reduction by 73%

- the Carnot' efficiency for a heat engine system with a *hot container* temperature of 1089K and a *cold container* temperature of 294K is 73%

Various video experiments show this drastic pressure reduction. If that barrel in that video had contained ideal gas, the barrels volume had been reduced by (far) less than 20%.

Relevant to the *proof-of-concept* device, when the cooling of the already condensed fluid is done inside a heat pipe, the water's vapor pressure reduction is even more drastic as the water's boiling temperature can be for example 308K and at the water's vapor pressure is already almost zero at its freezing temperature (~273K) .

The picture below shows the water's vapor pressure reduction in comparison to many different liquids (potential fluid substances) being quite similar.



Picture 2b: Water's vapor pressure reduction in comparison to many different liquids. Picture is slightly modified from the original picture provided by the Howard University's (CC3.0,SA,NC)

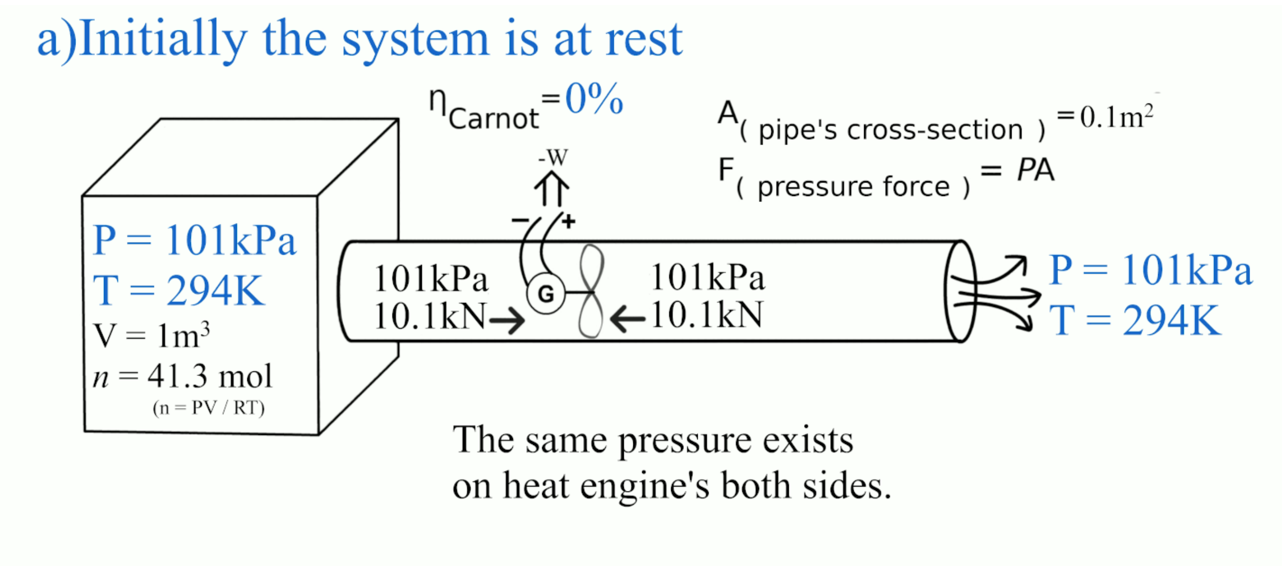
3) Second key: Heat engine's entry- and exit-side pressures determine its maximum efficiency – not the hot and cold temperatures

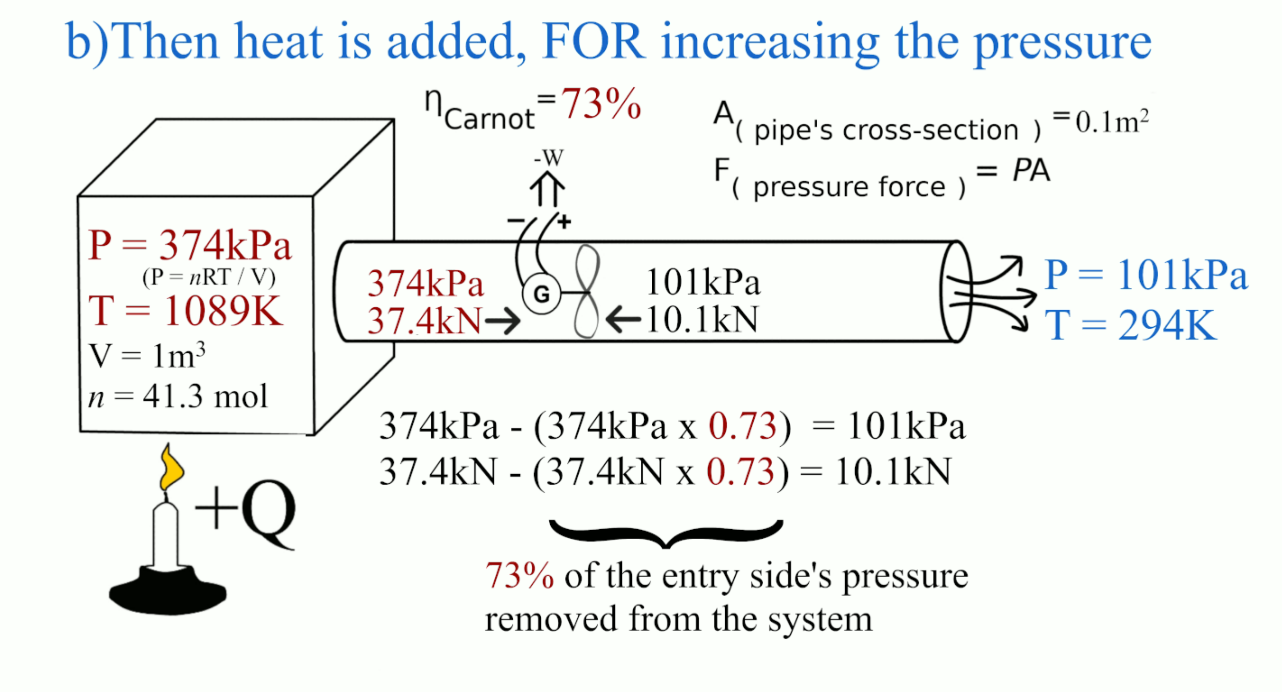
Firstly, consider if you really know:

- What is the physical basis of Carnot's efficiency values ?

- Why the Carnot's efficiency limit exists ?

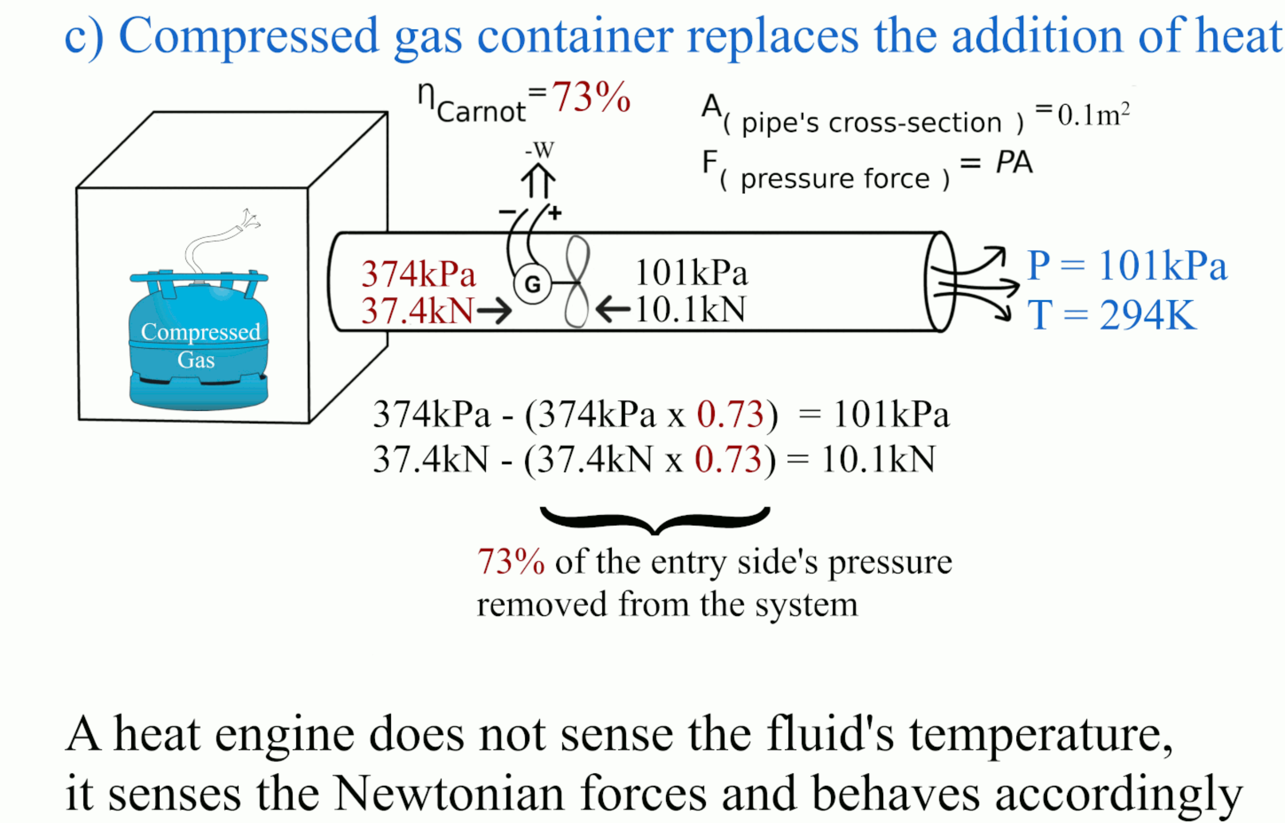
ANSWER: I've discovered ! that when a heat engine is operating with a maximum efficiency, it can lower its entry-side's over-pressure **precisely** to the pressure level that exists at its exit-side. A simple proof of this is shown below; in picture 3a.





Picture 3a: Heat engines use heat for creating an entry-side's over-pressure. A heat engine operating with a maximal Carnot efficiency can lower its entry-side's over-pressure to the pressure level that exists at the heat engine's (cold) exit-side.

But what if the pressure in heat engine's entry-side is not achieved by heating, but instead the entry-side's over-pressure that comes from a cold compressed gas containing container? This situation is shown below in picture 3b.



Picture 3b: When a compressed air powered heat engine has lowered it's entry-side's over-pressure to its exit-sides pressure level, it has then removed as many percentages of its entry-side's over-pressure as if the entry-side's over-pressure had been created using heat energy.

An experiment by Zeng and Xu(2019) does also demonstrate that a compressed air powered four-stroke engines are powered by the entry-side's over-pressure and not by the added heat, because the heating of the compressed air did not improve the gases ability to power the heat engine.

This a real science discovery and I wrote an article about it. In that article I show that ”heat engines” are really ”pressure engines” powered by Newtonian forces. I also show that the same Carnot efficiency values can also be obtained from heat engine's entry- and exit-side pressures using the equation:

η (max) = 1 - P (exit-side) / P (entry-side)

The article also shows that under some circumstances the Carnot's temperature based efficiency values differ from those maximum efficiency values that can be obtained using heat engine's entry- and exit-side pressures. In those cases, the maximum efficiency value that is calculated using the heat engine's entry- and exit-side pressures gives the right answer of the heat engine's maximum efficiency value.

Furthermore, and relevant to this this invention(”Hukkanen engine”), I show that the heat engine’s exit-side pressure reduces the maximum efficiency which the heat engine can have. If no pressure (or temperature) exist at the heat engine’s exit-side, in theory, the heat engine can operate with a 100% efficiency. Thus, **if** in the *proof-of-concept* device the heat engine’s exit-side pressure gets drastically reduced by cooling the exit-side’s condensed fluid into a temperature that is below the fluids boiling temperature**, then** the heat engine’s maximum efficiency also drastically increases.

For example, the Carnot efficiency value to the proof-of-concept device shown in picture 1 would be only 3.25%; assuming hot reservoir at 308K and cold reservoir and 298K.

η(max) = η(Carnot) = 1 – (T (cold reservoir) / T (hot reservoir))

η (max) = η(Carnot) = 1 – (298K / 308K)

η (max) = η(Carnot) =3.25%

But if that proof-of-concept device’s maximum efficiency would be calculated using the heat engine’s entry- and exit-side pressures, then it’s maximum efficiency would be 50%

η (max) = 1 - (P (exit-side / P (entry-side))

η (max) = 1 – (50kPa / 100kPa)

η (max) = 50%

By continuing to cool down the proof-of-concept device’s already condensed fluid (at ”B”) to near the fluid’s freezing temperature, the fluid’s vapor pressure can be further reduced, to lets say, 5kPa level. In that case there would be a significant vacuum at ”B” and an enormous pressure force difference at different sides of the heat engine. This pressure difference would, according to my equation, allow the heat engine to operate with a 95% maximum efficiency; as shown by the following calculus:

η (max) = 1 - (P (exit-side / P (entry-side))

η (max) = 1 – (5kPa / 100kPa)

η (max) = 95%

In contrast, if the same maximum efficiency value would be calculated using the Carnot’s temperature based equation, it would only give the system a 11% maximum efficiency; assuming following temperatures hot reservoir = 308K and cold reservoir = 274K.

$\eta(\text{max}) = \eta(\text{Carnot}) = 1 - (T\ (\text{cold reservoir}) / T\ (\text{hot reservoir}))$

$\eta\ (\text{max}) = \eta(\text{Carnot}) = 1 - (274K / 308K)$

$\eta\ (\text{max}) = \eta(\text{Carnot}) = 11\%$

So, now its your turn to show that I and the Finnish patent authorities have been mistaking and the traditional Carnot’s efficiency values can’t be exceeded ;-)

Good Luck

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