

How to replace 5 Billion barrels of oil with true green energy every year

If you have ever watched smoke rising from a camp fire, you know that you got to enjoy only part of the heat the fire produced. Much of the heat was wasted, rising with the smoke. The immutable laws of physics make wasted heat a fact of life.

Industry loses as waste heat about 33% of the energy it consumes.

https://www.epa.gov/sites/default/files/2015-07/documents/waste_heat_to_power_systems.pdf

Electrical generation in the USA loses as waste heat about 65% of the energy it consumes.

<https://www.eia.gov/energyexplained/us-energy-facts/images/consumption-by-source-and-sector.pdf>

Cars lose as waste heat about 60% of the energy they consume.

<https://www.cnet.com/roadshow/news/nissan-e-power-gasoline-engine-50-percent-thermally-efficient/>

For discussion, I assume that overall 50% of energy used is lost as waste heat.

However, wasted heat presents us with opportunity. We have the technology to capture some of the waste heat and turn it into use able energy, true green energy.

If waste heat is hot enough, WHP (Waste Heat to Power) devices can convert 30% of waste heat into useful energy.

https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/Waste_Heat_to_Power_Fact_Sheet.pdf

I have some ideas on how to successfully capture more use able energy and at lower temperatures, but for discussion, I ASSUME the world can only convert 10% of waste heat into use able energy.

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A couple specific examples should make WHP clear.

Let's say a hospital heats their water with natural gas. Half the heat from the natural gas becomes waste heat going up the chimney. They install a WHP (Waste Heat to Power) machine to convert 10% of the waste heat into electricity used to help heat the water. By capturing 10% of the wasted half, the hospital will lower its gas usage and thus its gas bill by 5% forever.

Let's say a ship burns fuel oil to power its motors. By capturing 10% of the wasted half of the energy used, and immediately using resulting electricity to supplement the motor, the ship can drop its fuel oil usage by 5% forever.

Set's say an Internet Service Provider consumes 1,000 kWh per day for its servers. Again half, 500 kWh per day, are wasted as heat. By capturing 10% of the waste heat, they can reduce their electrical demand by 50 kWh per day forever.

Several companies have already developed and installed this technology. Do an online search for "Waste Heat to Power" to get more information.

I particularly like Kanin Energy (kaninenergy.com) because, as I understand it, rather than charge for a WHP installation, Kanin agrees to buy the waste heat and pays the customer in either cash or electricity.

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How much true green energy is available for capture?

Good question, I'm glad you asked.

Let us use the year of Our Lord 2018, to approximate global energy usage. Note that these numbers aggregate all energy used and report it in oil equivalent amounts.

The EU used 1,440 M toe (Million tons of oil equivalent) in 2018.

<https://ec.europa.eu/eurostat/databrowser/view/ten00122/default/table?lang=en>

The USA used 101.3 quadrillion British thermal units (quad Btu) in 2018

<https://www.eia.gov/todayinenergy/detail.php?id=39092>

Converting quad Btu to M toe,

$101.3 \text{ quad Btu} * 0.039652608749183 \text{ M toe/quad Btu} =$

The USA used 2554 M toe in 2018.

The World used 14,280 M toe in 2018.

https://iea.blob.core.windows.net/assets/1b7781df-5c93-492a-acd6-01fc90388b0f/Key_World_Energy_Statistics_2020.pdf

In summary :

The EU uses approximately 1,440 M toe/year.

The USA uses approximately 2,554 M toe/year.

The World uses approximately 14,280 M toe/year.

Because of the immutable laws of physics, about half the energy used all around the world is wasted, mostly as waste heat spewed into the atmosphere.

The EU wastes approximately 720 M toe/year.

The USA wastes approximately 1,277 M toe/year.

The World wastes approximately 7,140 M toe/year.

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ASSUMING 50% of energy used is lost as waste heat and ASSUMING 10% success in converting waste heat into useful energy:

The EU can capture approximately 72 M toe/year.

The USA can capture approximately 127 M toe/year.

The World can capture approximately 714 M toe/year.

At 7,142,857 boe (barrels of oil equivalent) per M toe:

The EU can replace 514 Million barrels of oil/year.

The USA can replace 907 Million barrels of oil/year.

The World can replace 5.1 Billion barrels of oil/year.

True green energy with ZERO carbon footprint can replace 5 Billion barrels of oil/year if the world installs currently existing Waste Heat to Power technology to convert waste heat into use able energy.

As a first bonus, by capturing heat on its way to the atmosphere, we will directly reduce the temperature of the environment.

As a second bonus the energy now used to extract, transport, refine, and distribute 5 Billion barrels of oil per year will no longer be needed.

May God bless us all, Phil
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For PDF version go to <https://joyfulcatholics.com/replace-5-b-barrels-of-oil/>