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The Viability of Screams as a Power Source

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Abstract
This paper investigates the feasibility of using screams to meet the energy requirements of Britain. The concept is inspired by the Disney and Pixar animated film *Monsters, Inc*. where their world is powered by the screams of children. This paper uses this concept and applies it to the whole population of Britain in order to assess the viability of screams as a power source. By assuming, everyone in Britain can scream at the highest possible level for a human (129 dB) and that the screams last for on average 2 seconds. It was found that to meet the energy requirements of Britain, all the residents of Britain would be required to scream 2.8 x 10^8 times a day and have the energy produced stored.

Introduction
In the Disney and Pixar animated film *Monsters, Inc*. a world populated by monsters and powered by the screams of children is portrayed. Monster workers called "scarers" venture into the children's bedrooms (usually at night) in order to scare them and collect their screams. The louder the child's scream the more energy is stored by the scream collecting cans shown in the film. This paper investigates the viability of screams as a power source for a modern civilisation. The modern civilisation used in this model will be Britain.

Energy requirements of the Britain
The average person in Britain uses 125 kWh per day [1] which is the equivalent of 4.5x10^8 J per day (1 kWh = 3600000 J). To find the energy requirements of the population of the Britain per day, 4.5x10^8 J was simply multiplied by the population [2] to give:

$$4.5 \times 10^8 \times 64.1 \times 10^6 = 2.88 \times 10^{16} J$$

Using Screams as a Power Source
To provide an upper limit of power generation, it will be assumed that the population of the UK can scream at a loudest recorded level for a human which is 129 dB [3]. This sound level was converted to sound intensity using the equation [4] below:

$$I = I_0 \times 10^{L_I/10} \ Wm^{-2} \ [1]$$

where L_I is sound level and I_0 is reference intensity in Wm^{-2} (Note: sound levels in dB are expressed relative to a reference intensity level of 10^{-12} Wm^{-2}). The intensity of a scream was found to be 8 Wm^{-2}:

$$I = 10^{-12} \times 10^{129/10} = 8 \ Wm^{-2}$$

The energy of each scream must be stored in order to be used by the population. Assuming the scream last for on average 2 seconds per person and area of the apparatus storing the scream energy is 1 m^2. The energy stored from the scream will be 16 J.

Powering Britain with Screams
If the energy requirements of Britain are 2.88x10^{16} J and the average energy produced by a person screaming at the world record volume, for 2 seconds, is 16 J then the number of people it would take to fulfil the energy requirements of Britain can be found:

$$Number\ of\ people\ required = \frac{2.88 \times 10^{16}}{16}$$
$$= 1.8 \times 10^{15}\ people$$

This is a magnitude of 10^9 times the population of the Britain which makes powering this civilisation using a single scream from each person an unfeasible method of meeting the energy requirements of Britain. By dividing this number by the population of Britain, the number of screams the

average person would have to complete in a day in order to meet the daily energy requirements of Britain is:

$$\frac{1.8 \times 10^{15}}{64.1 \times 10^{6}} = 2.8 \times 10^{8}$$

The average person would have to scream 2.8x10^{8} times, at the highest volume possible for a human, every day in order to meet the daily energy requirements of Britain. This makes screams an extremely unviable method of provide energy to Britain.

Limitations

The limitations of this model are most prevalent in the assumption that the average British resident can scream at the highest volume possible for humans. This is very likely to be untrue especially for males. However it allows the model to portray one of the best outcomes of powering Britain with screams.

Conclusion

In conclusion, meeting the energy needs of Britain using screams is an extremely unviable method of energy production, as it would require the cooperation of everyone in the Britain and a commitment of screaming 2.8x10^{8} times a day at the highest possible volume for humans, with each scream lasting 2 seconds.

References

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