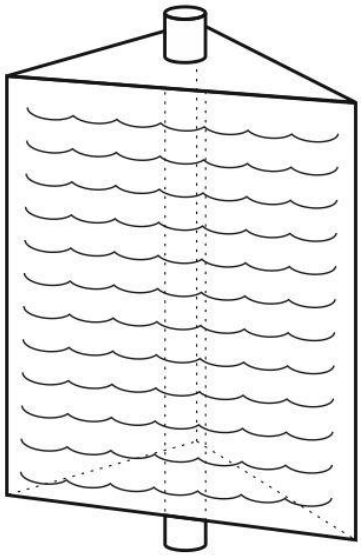
Below is an approximate design (future design might differ) of 1 generator cell (they might be stacked) containing 1kg of isotope. The height of the cell is 1 meter, the triangle is circled in the circle of 20cm radius.



$$P = A \times E; \quad (1)$$

(1) – Radiation power, where A – isotope activity in Becquerel, and E – energy of 1 disintegration in MeV

$$A \approx N \div T; \quad (2)$$

(2): N – amount of isotope atoms, a T – half decay period

$$N = \frac{m \times N_A}{M} \times 10^3; \quad (3)$$

(3): m – mass, Na – Avogadro constant, a M – isotope molar mass

Approximate calculations of power of decay of Uranium and Thorium: 716,7 Wt; 19,34 kWt.

This kind of mobile generators might be used in distant localities, MOE service and in the military. They would provide a high index of safety, durability, cut expenses on wire power transfer and improve the ecological condition of the environment.

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ELECTRICAL RESONANCE

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Electrical resonance is a resonance that occurs in RLC circuit at a particular resonant frequency when reactances cancel each other.

Series resonance occurs in series RLC circuit at a frequency ω_0 in which inductive reactance

$$X_L = \omega_0 \cdot L \quad (1)$$

and the capacitive reactance

$$X_C = \frac{1}{\omega_0 C} \tag{2}$$

are equal in magnitude and opposite in phase, so they cancel each other out. Meanwhile impedance

$$Z = R + \frac{1}{j \cdot \omega_0 C} + j \cdot \omega_0 L \tag{3}$$

decreasing, becomes completely active and equals R. As a result, according to Ohm's law

$$I = \frac{V}{R} \tag{4}$$

current reaches its maximum value. Thus, the voltage on the inductor and the voltage on the capacitor are equal and are of maximum value. The circuit current will be at its maximum and will be in phase with the supply voltage which is at its minimum. For a small active resistance R these voltages can be many times higher than the generator voltage.

Parallel resonance occurs in parallel RLC circuit. In this case, impedance reaches its maximum value, the values of capacitor current and inductor current are such that their phasor sum is in phase with supply voltage. Currents are circulating in the resonant circuit. Large current from the generator flows through the circuit only for a short amount of time after switching on, until the capacitor is charged. Further, the generator runs almost idle. As soon as the voltage appears at its terminals, exactly the same oppositely directed voltage appears across the capacitor and does not pass the current from an external source through the circuit.

Electrical resonance has a lot of applications in radio engineering and electrical engineering.

It is used in wireless communications technology such as radio, television, and cellular telephony. Transmitters used for wireless transmission of information contain circuitry to resonate at a specific frequency for each device, called the carrier frequency. With the transmitting antenna connected to the transmitter it emits electromagnetic waves at the carrier frequency. The antenna at the other end receives this signal and applies it to the receiving circuit for resonating at the carrier frequency. The antenna receives a lot of signals at different frequencies, not to mention the background noise. Due to the input on the receiver tuned to the carrier frequency of the resonant circuit the receiver selects the correct frequency, filtering out all the unnecessary ones.

Electrical resonance can be used as a band-pass filter, band-stop filter, low-pass filter or high-pass filter. The tuning application, for instance, is an example of band-pass filtering.

Electrical resonance can also be harmful and unwanted. For example, a sharp current increase which occurs in series resonance can destroy parts of circuit, measurement instruments, transformers and other elements of electricity grid. It also decreases the quality of voltage. There are various ways to prevent resonance or negative effects of it. For example, it is possible to add more resistance to the circuit to prevent elements from thermal destruction.

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CHALLENGES FACING ELECTRIC VEHICLE ADOPTION IN RUSSIA

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Nowdays electric cars gain popularity thanks popular idea of ecologically clean transport. But there are some challenges facing electric cars industry in Russia.

The first challenge is the lack of government's support. Some European counties and the USA encourage using electric cars and make some benefits for people who using it. Most countries have adopted incentive programs to stimulate demand for electric vehicles. These programs currently have limited funds; they range from approximately $3,000 per car purchased in China to approximately $7,500 per car purchased in France, Germany, the United Kingdom, and the United States. Certain Japanese programs offer up to $10,000 in electric-vehicle incentives. If these incentive programs continue to 2020, the TCO breakeven period for an electric vehicle-relative to an ICE-based vehicle in Western nations will fall from 9 to 15 years to 1 to 5 years. Electric cars have a chance to become popular in Russia, but it needs in support of government.

In Russia there is *the lack of an official dealer on the market*. There are some big electric car makers in the world. One of them is world-known company "Tesla". Tesla cars don't sale in Russia officially. People can buy different models of this electric car only from informal agents.

There are free *charging stations* in the countries where electric cars are popular. Charging in such stations is very fast and easy: full charge lasts about 1.5 hour and provides about 500 km of driving. Electricity for free stations usually generates by wind turbines, solar panels and by other generators working with renewable energy. In some places electricity generates by thermal power plants, so idea of clean transport is questioned. The lack of free charging stations is a big problem for owners of electric cars in some countries. The Russian electricity company Rosseti has installed a public EV charging station in a Moscow parking lot, the first of 150 that will be deployed in the city's public parking lots by the end of next year. Rosseti has al-