

## People's Hearing on Climate Action

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I will talk about a big danger for Earth's atmospheric greenhouse and consequent very probable decay of the entire life on the planet. These are the emissions of the methane gas from Arctic territories.

I. Arctic East Siberian seas (ESS) leak in form of bubbling huge quantities of methane gas.

1. The cause is melting of the permafrost in seafloor.
2. This permafrost had represented till today a firm and impermeable cover against these emissions.

II. The gas bubbling comes from deep ancient stocks, from below of the permafrost layers.

1. The western science and governments, following reports of IPCC, admit small Arctic methane emissions, only as the result of decomposition of organic material, contained inside the slowly melted permafrost.
2. The methane from melting permafrost can be distinguished by isotope patterns in CH<sub>4</sub> molecules from the methane from free deep stocks.
3. With acoustic recording the Russian scientists measured from 2016 forward several times the fluxes of methane bubbles around 1 kg of gas through the surface of 1 m<sup>2</sup> in 1 day (kg/m<sup>2</sup>.day). Even much more, too.
4. Methane emissions from melted permafrost can never reach so large quantities and can never produce bubbles. They are happening on molecular level with immediate releasing into the water.
5. Only the molecular and completely absorbed methane in the seawater can be decomposed by marine bacteria.

III. The second source of methane bubbling is decomposition of methane hydrates in the marine sediments.

1. Methane hydrate is a mixture of ice and methane molecules. At temperatures around 0 deg. C the hydrate needs high external pressure 20 to 30 bars to stay in such form (stable).
2. Some of this pressure generates the weights of the water and sediments above, but not enough.
3. The additional pressure is caused by the free gas in the sediment under the permafrost, which came from depths or from partial decomposition of hydrates themselves.
4. When permafrost begins to leak the underneath gas, this pressure falls and hydrates begin to decompose and release their own methane.

IV. The deep gas brings with the warmth energy, which causes much faster permafrost melting from the bottom side.

1. Measured speeds of melting permafrost from top was around 15 cm/year.

2. Acoustic records of upper layers in seafloor show that margin of the free gas advances upwards even by 5 to 10 meters/year.

3. Additionally to the gas pressure drop, this energy helps to melt methane hydrates. Disappeared hydrates create wider channels for faster travelling of gas through the sediment.

4. Newer acoustic records reveal appearing and advancing "gas chimneys", pillars in sediments, where the permafrost quickly melts from bottom upwards, as well as many already melted-through gas paths to the sea water. These entirely open chimneys widen and join into entire areas of disappeared permafrost.

5. This is the quickest and most dangerous positive feedback for amplification of Earth's atmospheric greenhouse. The entire frozen layer might in ESS disappear in period of a decade and even faster.

V. Estimated surfaces of so much damaged permafrost to leak so strong emissions in 2016 were 10 % of ESS, together around 60,000 km<sup>2</sup>.

1. Multiplying the quantities, surfaces and time gives over 20 billion tons (Gtons) of gas into atmosphere each year.

2. Reports from later expeditions revealed increasings of emissions in power and in surfaces at all known strong bubbling sites.

3. Its own add also smaller emissions on much wider areas. Comparing acoustic photos from an earlir expedition it was possible to estimate even three or four times larger influence of smaller emissions.

VI. Methane is at least 150 times stronger greenhouse gas as CO<sub>2</sub>.

1. IPCC calculates, on the base of methane degradation in atmosphere and for the period of 100 years, its Global Warming Potential (GWP) value of around 30 (times stronger GHG as CO<sub>2</sub>).

2. Because the methane quantities in atmosphere are really only rising, together with its entire decomposition, only its short term GWP value is important. We can interpolate the GWP values of known time intervals back to zero ( 1 year) and get the short term values from 150 to 250.

VII. What are actual dangers of Arctic methane emissions?

1. For evaluation of a GHG effect, the scientists use a parameter named Equivalent to the CO<sub>2</sub>. It is simply with its GWP (according to CO<sub>2</sub>) multiplied quantity of a GHG.

2. That means that human methane emissions have already larger effect to atmospheric greenhouse, as human emissions of real CO<sub>2</sub>.

3. The entire atmosphere GH effect today equals to approx. 12.000 Gtons of CO<sub>2</sub> equivalent.

4. If we emit with further burning fossil fuels the same quantities of CO<sub>2</sub> in the air, or if we further develop the alternative energy sources (and even replace all classic fossil fuels with them), the Arctic methane will further escape.

5. If only less than half of Arctic gas escapes: 1.000 Gton \* 150 = equivalent of 150.000 Gton CO<sub>2</sub>. That means the 50-fold of today's CO<sub>2</sub> quantity in atmosphere. Dividing both equivalents (150.000 Gton / 12.000 Gton = 12,5), we get more than 10 times increased power of the atmospheric greenhouse.

6. The currently estimated Arctic emissions bring out two times more heating energy as the humanity is using annually. From this comes one possible solution - using Arctic methane emissions instead today's fossil energy

#### VIII. What are possible solutions to prevent Arctic emission?

1. For covering big surfaces above methane seeps a special Chinese foam is promising, which drowned into the water absorbs only the gas. Covering above the sea level is impossible due the sharp winter conditions.

2. With capturing, using for energy and transformation of methane stocks into CO<sub>2</sub> we would release from 2.000 Gton of methane into atmosphere only 5.500 Gton of additional real CO<sub>2</sub> (the ratio of molecular masses CO<sub>2</sub>/CH<sub>4</sub> = 44/16), what would directly increase the common atmospheric greenhouse effect only for around 45 %. This is the only green solution for the planet.

3. The other possibility is a hermetic cover of the seafloor, which must be stronger to hold from the bottom side the gas pressure, which will rise to the level of 20 to 30 bars and which will be enough high to stabilize the methane hydrates again. We must create some kind of artificial permafrost.

4. Maybe injecting oil or bitumen dispersions into sediment layers could be even more efficient. This would somehow glue the sand particles and make a kind of Canadian tar sand, another sort of artificial permafrost.

#### IX. Political responsibility for the climate genocide

1. In 2021, a hundred of national and institutional leaders all over the world have been informed and appealed to join and start working toward the solutions. Without any serious response and ignoring the problem before the COP26 in Glasgow.

2. Must be really the current lawsuit of 6 Portugal youngs against all European governments at EU Court for human rights the only model to save the planet ?? Also in all this time the Arctic methane