PILOT INDUSTRIAL INSTALLATION FOR PRODUCTION

OF ENERGY AND MINERALS FROM SEA WATER :

MSc eng Chavdar Kamenarov
MSc eng Plamen Kamenarov
e-mail: chkamenarov@gmail.com
pkamenarov@yahoo.com

tel: +359899 882742
+359897 919217

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INTRODUCTION

Output of seawater energy is accomplished by electrolysis, in which water decomposes to hydrogen and oxygen. Two technologies for water decomposition are known in modern technology: one is the classic, open and proven by Michael Faraday, and the other, discovered and proven by the Bulgarian scientist Ilia Valkov, popular in the scientific circles with his English name, Jull Brown. Faraday's classical technology is relatively easy to achieve by providing a straight, constant current to electrode plates. When water decomposes, hydrogen and oxygen are released. During the electrolysis of this technology, in the cleavage of the water molecule, a process of recombination between the separated oxygen and hydrogen atoms occurs and they immediately bind to molecular oxygen and molecular hydrogen. This reaction is exothermic, heat is released, the electrolyte is heated, which makes the whole electrolysis process inefficient because of the high energy losses in the form of heat.

- In another technology, the technology found and applied by Ilia Valkav (Yull Brown), the electrolysis process is again performed from the right, but the pulsating current at a certain frequency, shape of the pulse and a certain distance between the pulses. When the frequency of the pulses fed by the pulsating current, which in this case acts as a forced frequency reaches the resonant frequency of the molecules or frequency odd own vibrations of water molecules, the water begins to decompose back into hydrogen and oxygen. But when the resonant frequency is now created conditions the separated atoms of oxygen and hydrogen to be stored in the atomic species, such as maintaining them in a stable condition exclusively depends on the stoichiometric ratio of hydrogen and oxygen, the atoms do not recombine, the water temperature does not rise and hydrogen and oxygen in atomic form are stored in a stable state. The process in this case is endothermic, with all the energy supplied to decompose the water, goes to the cleavage of the water molecule. It is relatively easy to establish first that the temperature of the water does not rise and secondly the different volume occupied by the molecular and atomic hydrogen and oxygen. This gas of atomic hydrogen and oxygen is known in science as Brown's gas bearing the name of its discoverer Yul Brown or Ilia Valkov.

- Apart from this difference, atomic hydrogen and oxygen or Brown's gas, in detonation, do not explode but implode. The difference is enormous. While in the explosion the wave vector is centrifugal, in the implosion, the vector is centered, which results in deep vacuum implantation, and when the explosion is back, the vessel is destroyed. The third difference between molecular hydrogen and oxygen, often referred to as GAS and atomic hydrogen and oxygen, so called Brown gas, is the huge difference in energy from combustion. To obtain 1 liter or kg of water when burned,

- the blowing gas delivers an energy of 3.72 kilowatts while at Brown's gas, the released energy is 14,278 kWh or about 3,84 times greater. So we can say that the throbbing gas is burning with a value of 0.26, while Brown gas is theoretically close to 100%, i. to decompose 1 kg of water requires energy from 14,278 kWh. But conversely, in the burning of decomposition product when we have a throbbing gas, we will get back only 3.72 kWh, whereas if the same gas is Brownian, we will get almost 14,278 kWh if we do not have any extra heat loss or we will get almost 100% return.
  We say almost because this process is not a perpetual mobile of the second generation, but is real and close but always less than 100%.

Obtaining of Brown’s gas from seawater

- The non-use of seawater so far as a source of "fuel" - hydrogen and oxygen is mainly for two reasons:
  The first reason is that every electrolysis is looking for a high energy efficiency of the electrolysis process, and it is directly related to the electrical resistance of the electrolyte, which in this case is an ionic-type electric conductor.

- In order to minimize this type of loss, the use of pure and distilled and deionized water with acid or base addition, KOH is usually used in the optimum ratio. Electrolyte dissociation is a spontaneous physicochemical process, disintegration of the electrolyte to charged particles (ions), which occurs as a result of the interaction of the electrolyte with the polar solvent molecules.

- The second most important reason for the untapped potential of seawater to date is that in every electrolytic process a large amount of sludge is released, which in a short time turns the electrolysis bath into an unusable vessel full of dense sludge separated from the water. With this technology, this disadvantage is overcome by creating a special separator separating the intensely released minerals from the water. The process is uninterruptible, and the separated aqueous emulsion is removed outside the electrolysis apparatus where the water is separated from the minerals

- which remain as a damp wet slurry and go for further drying, and the separated water returns to the bathtub with the addition of fresh water. Continuous bottom-up water circulation helps promote the separation of minerals as a foam, helping the electrolysis process itself by continuously removing the extracted solid mineral particles from the electrolysis plates. Simultaneously, ultrasonic panels are also installed to intensify the process of the water-absorbing apparatus, which further accelerates the decomposition of the water molecule.

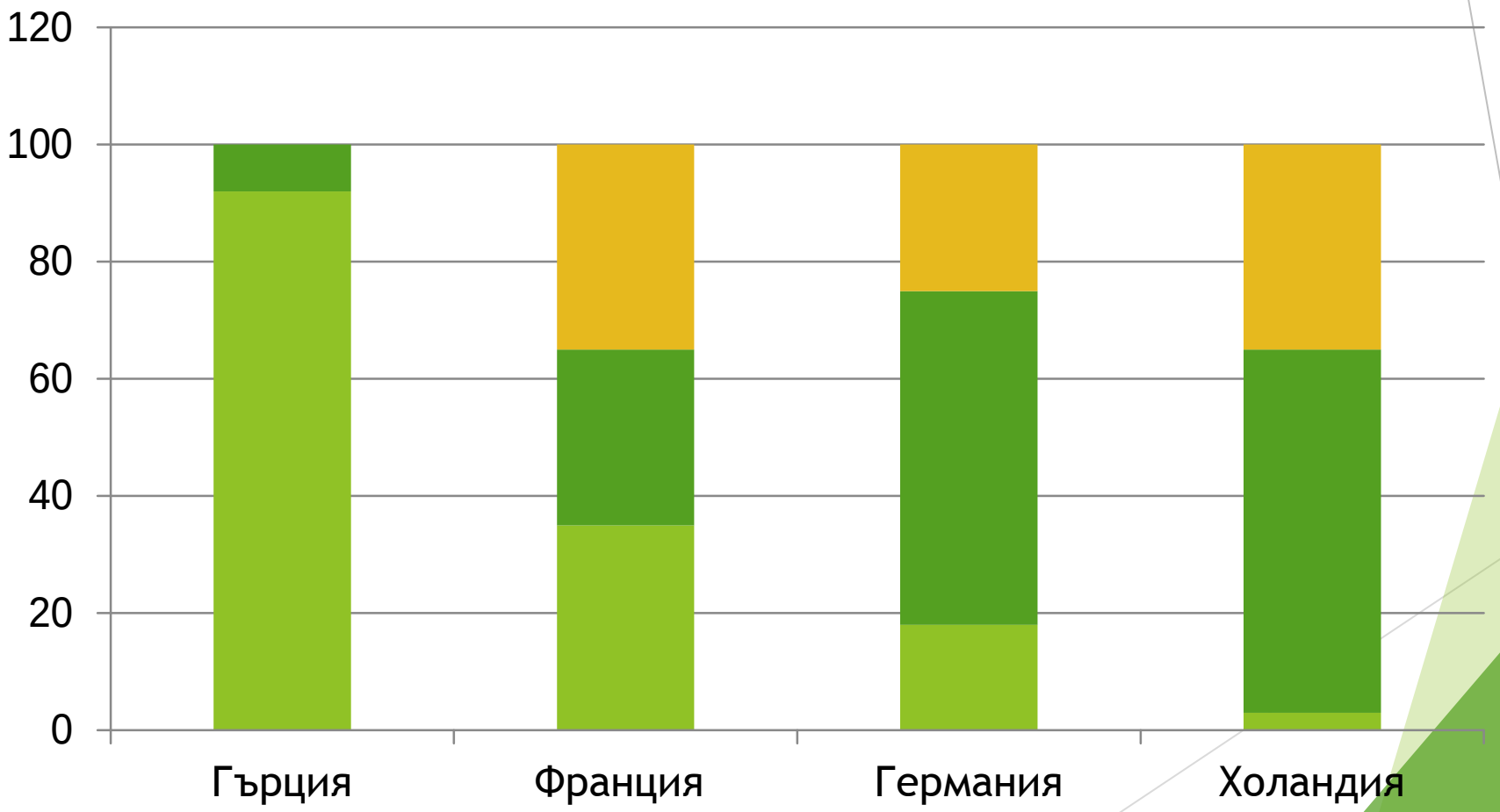
- This technology aims to use natural seawater as an electrolyte, as it has good electrical conductivity. This is also evident from the sea water tests, taking samples from the Black Sea in the area north of Burgas and from the Aegean Sea, in the area south of Alexandroupolis.

3. Energy content of household waste and price of energy produced

- Since the technology is protected by two useful models and a patent, one option has been developed for the production of heat and electricity through the so-called co-generation. However, since the energy input for electrolysis always exceeds that obtained from the burning of Brown's Gas according to the first law of thermodynamics, the installation is combined and adapted to the incineration of household waste, are a problem for all municipalities and across the EU as a whole.

- Since three types of technology are needed to destroy household waste - one, the oldest is the most common landfill, the other technology is recycled, and the third is by burning. This paper presents a survey of which countries by geographic belt to which technology they are targeting for the disposal of municipal waste. From the diagram shows that southern countries to which belongs and Bulgaria, are directed to waste disposal, and as there are more of the Nordic countries, the more targeted to both destruction - recycling and incineration.

Diagrams indicated separated countries what kind of preference they have for destroying household waste
blue color - landfill, red color - recycling and green-burning



- Also described as mass incineration or direct incineration, it is a destruction of waste for the production of heat for cooking, space heating, industrial processes for the production of electricity. Ash from the combustion process can also be sold for construction of buildings and roads in order to further reduce the amount of final waste. For direct incineration, dried waste is used, but dried sludge from the water treatment plant can also be used.

- On a large scale, solid waste (including farm and forestry wastes) can be incinerated in heat-generating furnaces for the heating of steam turbine-driven turbine generators. The size of the power plant is often limited by the availability of local inputs and is generally less than 25-40 MW.

For comparison, we will give data on different types of fuels.
The cost of methane from waste treatment is about 343.22 leva / 1000 m3 and the cost of the equipment is 450 euro / MW of equivalent power, making it possible to pay the plant for less than a year.

Prices of natural gas sold by Bulgargaz EAD to end users and customers connected to the gas transmission network

Period	Leva/1000 m3 без акциз и без ДДС	Лв/MWh without excise and without of VAT	Base of price of natural gas
1.10. to 31.12.2017	343,22	32,26	Commission of energy and water regulatory

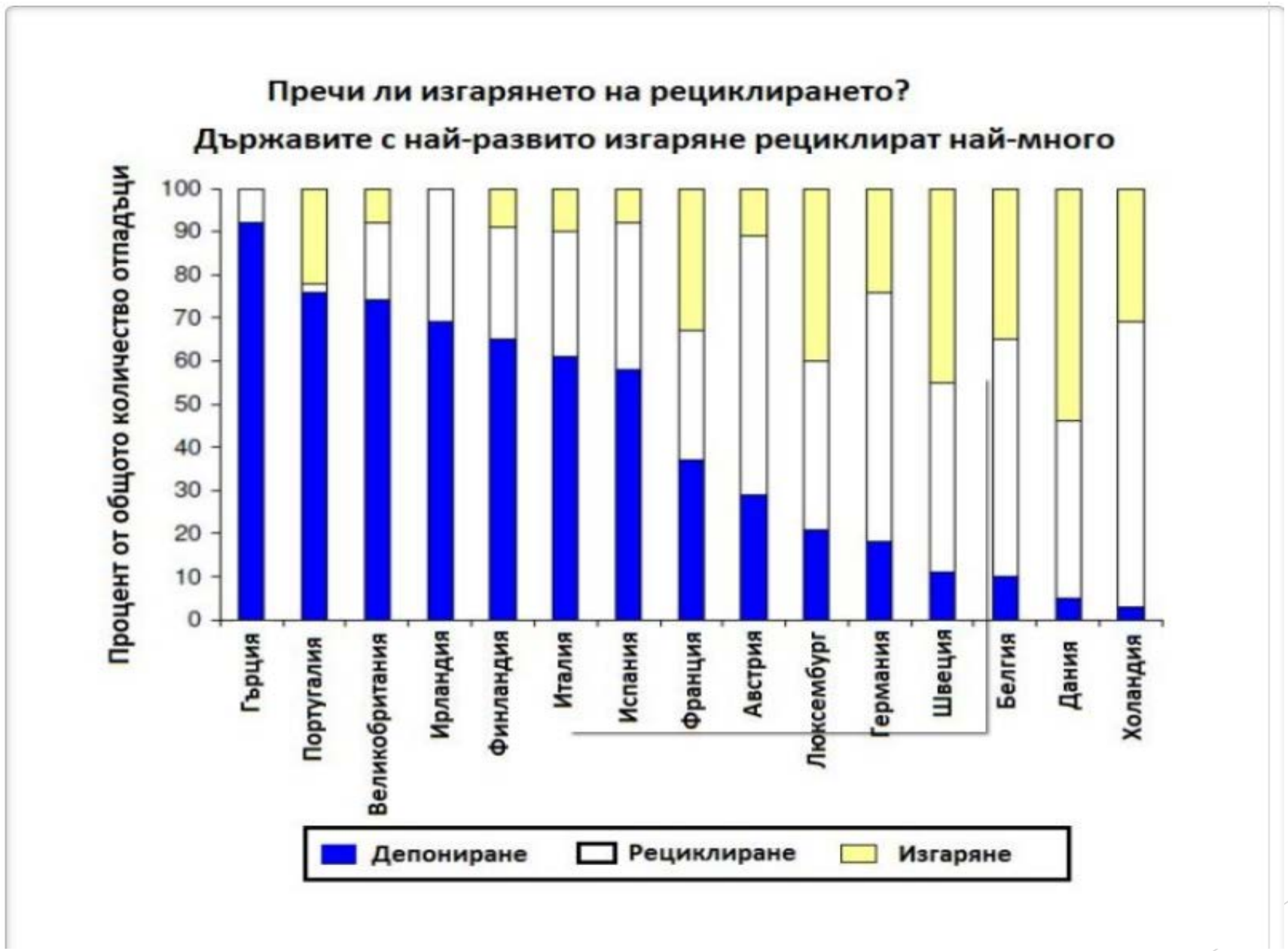
However, using dedicated sources of raw materials, such as the location of landfill incinerators, the volume can be increased to 50-75 MW, taking into account significant savings.

To illustrate the calorific value of municipal waste, a table is available for comparing the energy content of different types of fuels with those of municipal waste.

Table of energy content into different types of fuels

Type of fuel	Energy content MJ/kg
Въглища	30
Commercial wastes	28
Houshold wastes	**9**
Dry biology wastes	16
Fresh grass	4
Natural Gas (methane)	55
paper	17
Cooking oil	42
Straw baled	15
sugar cane residues	17
Wood green with 60% moisture	6
Wood dried on air to 20% moisture	15
Wood dried in furnace with 0%	

- Some companies have already reached the following parameters when using solid household waste:
  Every 1 tonne of solid waste receives 0.670 MWh of electricity.
  This achievement is too high because the municipal solid waste mass is 9 MJ / kg or 2.5 kWh / kg.
  This technology foresees the combustion of household waste to be stimulated and generated by the additional supply of Brown's Gas in the incinerator.


Пречи ли изгарянето на рециклирането?
Държавите с най-развито изгаряне рециклират най-много
Процент от общото количество отпадъци
100
90
80
70
60
50
40
30
20
10
0
Гърция
Португалия
Великобритания
Ирландия
Финландия
Италия
Испания
Франция
Австрия
Люксембург
Германия
Швеция
Белгия
Дания
Холандия
Депониране
Рециклиране
Изгаряне

- The diagram below shows that less developed countries prefer waste disposal - blue and with a low recycling rate - while richer northern countries prefer household waste to be primarily recycled and incinerated.


Цени за изгаряне на отпадъци в Дания
евро на тон
100
80
60
40
20
0
Инсталации без оползотворяване на енергията
Инсталации с производство само на електроенергия
Инсталации с производство на топлина и ел. енергия

6. Determination of the power output of the installation

- The proposed pilot plant is projected to be of low power, possibly on the seaside but industrial, to specify the parameters in industrial conditions. It is planned that the installation will satisfy the village with about 1,000 inhabitants or about 300 households. It is assumed that each household should be provided with an energy output of about 6 kW.

  or 300 X 6 = 1800 kW for households only.

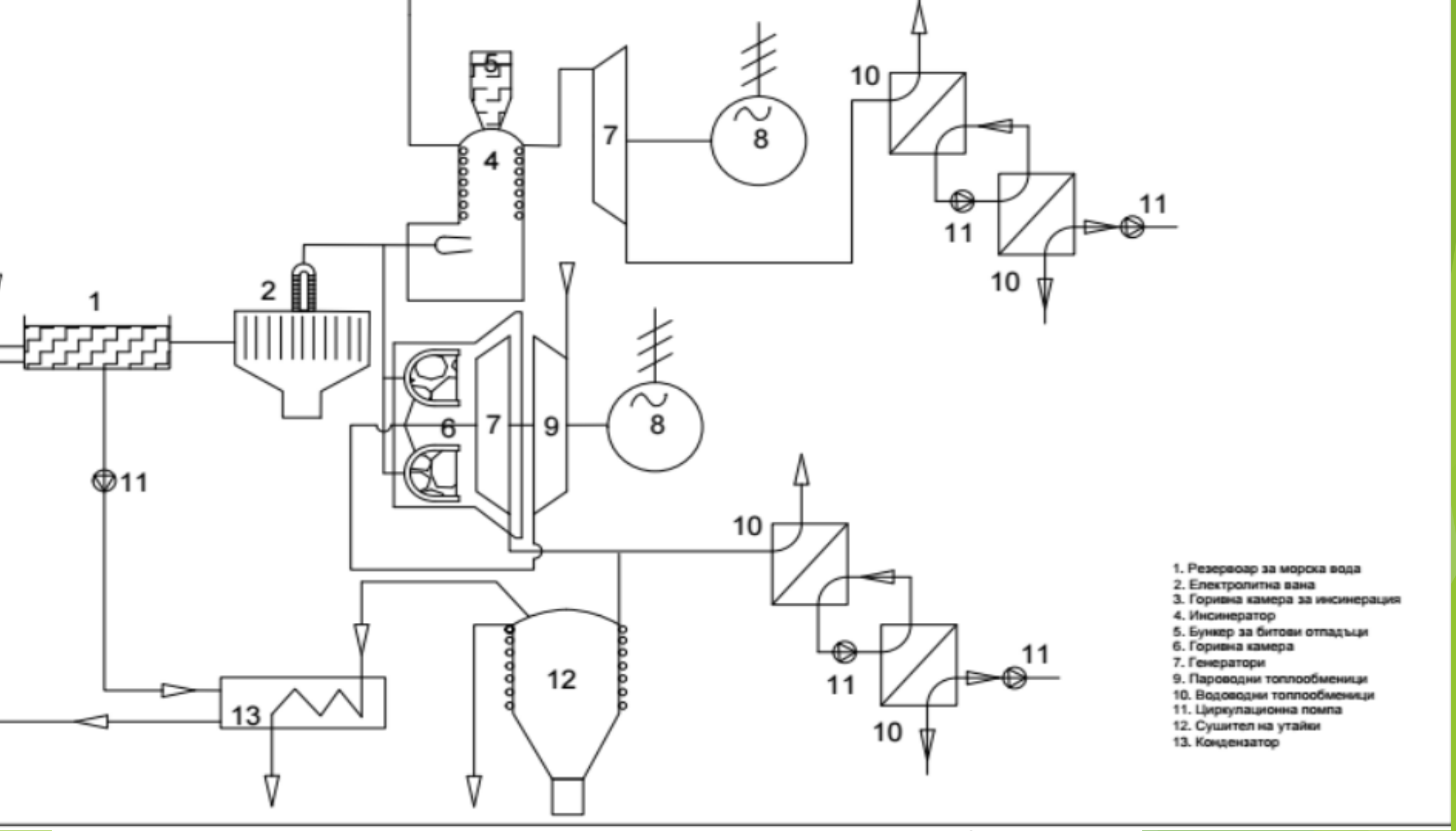
- About 50% of household spending is assumed to be for the needs of the municipality, especially for street lighting or total
  1800 + 900 = 2700 kW = 2,7 MW of power must provide the installation.
  For evaluation and comparison, a feasibility study is envisaged if the installation is powered by 3 different uses of the obtained Brown's Gas.

7. Technology for use of the obtained Brown's Gas for incineration of municipal waste and production of electricity and heat with co-generation

- The first feature of this technology is that a part of the obtained Brown's gas burns, with the exhaust gases driving a gas turbine, which in turn drives a compressor and a generator to produce electricity. After using the turbine energy, the exhaust gases are used to produce steam and hot water for industrial and domestic use, and the condensed Brown's gas is taken off as pure distilled water. Similar to the combustion of natural gas to propel the gas turbine, compressed air is compressed in the combustion chambers, compressed by a compressor driven by the gas turbine. Unlike natural gas, where air is needed for burning methane, when burning Brown gas, air is needed to cool the walls of both the combustion chamber and the exhaust gas temperature, the same depending on the quality of the turbine moves between 900 and 1200oC. Unlike methane, Brown gas has oxygen in its composition, so the incoming air only serves to cool both on the walls of the combustion chamber and the temperature of the exhaust gas driving the gas turbine.

- The other part of Brown's Gas is used to ignite and maintain combustion of household waste. Energy separated from waste incineration is used for steam generation, which drives a steam turbine, respectively a generator according to the classical scheme. The new one in this case is the combining and combining of the Combustion Gas combustion, in one case only for the maintenance of the combustion of the household waste and for the direct drive through the steam produced, of a steam turbine with a generator, and in the other for the direct propulsion of a gas turbine with a generator .

- Under this scheme we have two generators, with two turbines - gas and steam. After the two turbines, the exhaust gases are directed to steam-generating heat exchangers for heating water intended for substations for domestic and industrial use. Another feature of this scheme is that a part of the spent gas of Gas from the gas turbine heats in a special drying apparatus the mineral sludge for drying obtained from the production of Brown's Gas itself. The Brown’s gas condensate is plain pure water.



1. Резервоар за морска вода
2. Електролитна вана
3. Горивна камера за инсинерация
4. Инсинератор
5. Бункер за битови отпадъци
6. Горивна камера
7. Генератори
9. Пароводни топлообменици
10. Водоводни топлообменици
11. Циркулационна помпа
12. Сушител на утайки
13. Кондензатор

- The second feature of this scheme is that the evaporated seawater from sludge and then condensed into the condenser is recycled for gradual accumulation and transformation into heavy water. Here is the feature that Brown's Gas makes water much easier, while deuterium remains in the sediment as heavier and evaporates in the drier, then condenses and returns again to generate Brownow Gas in cages charged only from condenser of the dryer, to re-evaporation and condensation to a satisfactory concentration of heavy water. Here is also the difference in weight because heavy water is 11.11% heavier than normal and relatively easy to concentrate and separate.

8. Energy efficiency of the household waste incineration plant with co-generation and energy PRICE.

- The power of the entire plant is 3375 kW, and in one hour it will deliver an energy of 3375 kWh. For a 24-hour period, the plant will need to deliver an energy of 3375 x 24 = 81,000 kWh / day.

The energy produced from the incineration of household waste is 2500 kWh / day.
Therefore, the energy obtained only from sea water will be:
81000 kWh / day - 2500 kWh / day = 78500 kWh / day.
Or for 1 hour - 78500: 24 = 3270,83 kWh / hour
To get the flow of seawater pump:
3270,83 kWh / hour: 14,289 kWh / kg = 228,9 kg / hour or
the flow rate of the pump should be:

Q = 250 liters / hour

- With a seawater flow rate of 250 liters / hour or 250 kg / h
  250 kg / hour x 14,289 kWh / kg = 3572,25 kWh / hour
  Or 3572.25 kWh / hour x 24 hours = 85734 kWh / day.
  From this energy we assume that about 10% will go to keep combustion in the household waste incinerator or the remainder of the
  85734 - 8573.4 = 77,166.6 kWh / day
  It will be used to propel the gas turbine

  Since the power of the plant is 3375 kW, capable of delivering an energy of 81,000 kWh / day, summed up by the energy given by Brown's Gas, we will have:

  81000 + 85734 = 166,734 kWh / day

  For co-generation, the ratio of electricity to heat is approximately 1: 1 or

- 166 734 kWh / day: 2 = 83367 kWh / day of electric power and even more heat.
  If we assume that the installation will be powered only by starting from an external power source, in this case by an Electricity Distribution Company and after entering the mode, part of the generated energy will go to power the electrolytic baths, the resulting electric energy will be:

  83367 kWh / day - 85734 kWh / day = - 2367 kWh / day

  i. this is the energy to be added by an external source, in this case by any of the Energy Distribution Companies. But if the concept of own power from an additional renewable source - solar, wind or sea waves is adopted, the situation is radically changing.

9. Energy price

- If the concept is taken for the plant to be fully powered by an external source, then the revenues from energy production will be as follows:

  3473,625 kWh / hour - electricity received only at start-up for about 4 hours until it enters the facility mode and at the electricity price of BGN 0,20.

  3473,625 kWh / hour x 0,20 BGN = 694,725 BGN / hour x 4 hours = 2778,90 BGN / 4 hours

  After running for maintenance, you will need:

  2367 kWh / day x 0,20 BGN = 473,4 BGN / day

  or 473.4 BGN / day x 365 days = 172 791 BGN / yr. as an expense

- This is because instead of installing the power supply 83 367 kWh / day, uses an external source only 2367 kWh / day, because
  85 734 kWh / day of the energy produced is returned to power the plant.
  83367 kWh / day - heating energy
  With a heat price of 90.74 BGN / MWh = 0.09074 BGN / kWh we will have:
  83367 kWh / day x 0,09074 = 7564,72 BGN / day - revenue
  or only for the heating season and hot water
  7564.72 lv / day x 180 days = 1 361 649.60 lv / yr.

- and adding only for hot water over the other half of 185 days
  For 300 households, 5 cubic meters / month water = 1500 cubic meters / month
  and 1500 cubic meters. x 6 months = 9000 cubic meters of water
  9000 cubic meters. X 0,09074 = 816,66 BGN / 6 months
  Or total for heating and non-heating season:
  1 361 649,60 + 816,66 = 1 362 466,3 BGN / year

  By subtracting from the total amount the energy consumption for maintenance of the whole installation amounting to BGN 172,791 / yr. we will receive:

  1362 466,3 lv / yr. - 172 791 BGN / yr. = 1189 675.3 BGN / yr. earnings-only from earned energy, without any revenue from the sale of sludge, a raw material for metallurgy, especially for rare metals.

10. COST OF ALL INSTALLATION

- As highlighted in the above slides, the value of a plant for the production of methane from municipal waste, relative to kW of installed capacity, amounts to an average of about 450 € / kW.

  As the proposed plant has a capacity of 3375 kW, the estimated cost of the installation will be around
  3375 kW x 450 € / kW = 1 518 750 € or 3 037 500 BGN

11. THE COMPOSITION AND THE PRICE OF THE END PRODUCTION

- An important moment in the formation of the final price of Brown's gas is the price of the raw material from sludge for various metallurgical activities. For example, for uranium mining, the ore, which is essentially earth and rock, is finely crushed and uranium is enriched in a gravitational method. The uranium content in our field, which is about 30 in number, is from 0.01% to about 0.1%. According to the laboratory analysis, the content of uranium in the sludge generated during the production of Brownow Gas is of the same order - about 0.048% (0.481 mg / kg).
  The extraction of this type of metal in all cases necessitates its enrichment as it is in a relatively low composition in the ore. One of the well-known technologies for uranium ore enrichment is fine ore grinding, mixing with water and gravitational separation of uranium-rich dispersed particles. In this case, this process cycle for enrichment is shortened because the finished product is present - finely dispersed sludges that are ready or almost ready for separation.

- As a concurrent production of Brown's Gas extraction, sludge is drained, condensed and returned for reuse, so that gradually heavy water accumulates in this circle, which in this case is a technological waste but an expensive product of the nuclear energy market for peaceful purposes. The price varies around $ 7520 / kg of heavy water extracted from every 5 cubic meters of sea water. With 250 l / hour of sea water, the amount of intake per day will be 250 x 24 = 6000 l / day or almost 1 kg of heavy water a day or 365 kg / yr.

  365 kg / yr. x 7520 $ / kg = $ 2 744 800 / yr.

  Ie. only with heavy water, with a dollar exchange rate of 1.75 leva / $, the revenues are about 4 times higher than those for energy production.

- At $ 1.75 / $ exchange rate we will receive:

  2 744 800 $ x 1.75 lv / $ = 4 775 952 lv only from heavy water

  Summed up with the revenues from the produced energy we will have:

  1 189 675,3 BGN + 4 775 952 = 5 965 627,3 BGN / yr.

  One of the most expensive rare metals in the world, these are Osmium and California, which are probably also contained in seawater. For example, the price of 1 gram Osmium reaches up to 200,000 dollars, and 1 gram of California up to $ 6.5 million. However, due to the incomplete yet complete laboratory analysis of the largest possible number of rare metals, it is almost impossible to make any calculation.

  Below are some of the items for which there is information and data in tabular form.

- With existing uranium ore enrichment technologies, the price of 1 kg of enriched ore varies from $ 70 to $ 250 / kg.

  This is just one of the examples that highlight the great prospects for a drastic reduction in the cost of the produced Brownwood Gas, even more so that Brown’s Gas can itself be used as a direct metal energy in metallurgy. At present, only 14 elements in the sea are available, as there are no detailed studies. Please note NO detailed research has been done on the sludge from Brown’s Gas Extraction. Information on the content of metals and minerals in marine WATER is complete on the Internet, including data on sludge content, seabed sediments, different depths and sea basins. But these data are fundamentally different from those obtained from the sludge from Brown's Gas.

11.1. Composition of bottom sediments with heavy metal concentration with samples taken at 10 stations in the coastal

Station №	Zinc	Cadmium	Lead	Nickel	Copper	Chromium
1	10,9	0,1	4,8	2,9	2,0	4,8
2	6,7	0,1	4,9	2,4	1,0	1,5
10	1,5	0,1	4,0	1,3	1,3	-
13	1,6	0,1	6,4	3,4	1,0	1,0
14	3,4	0,1	10,4	4,1	1,2	1,0
17	1,9	0	12,3	3,3	1,0	1,0
50	13,4	0,1	9,9	5,7	4,4	6,1
51	8,5	0,1	14,8	4,3	3,8	7,0
52	43,9	0,1	20,6	15,9	14,5	14,5
53	12,2	0,1	11,1	6,4	2,5	4,0

AVERAGE VALUES

Станция №	Цинк	Кадмий	Олово	Никел	Мед	Хром
-	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
-	10,4	0,1	9,92	4,97	3,27	4,09

11.2. Concentration of heavy metals in the Black Sea water to a depth of 20 meters

Проба	Ni	Cu	Zn	As	Cd	Pb	Mn	Al	Cr	Na	K	Fe	Ba	U
-	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
suspenzi	3318	170	3,92	1,60	0,042	2,430	483	10,61	6966	5713	212	3090	0,932	0,481
КЕК	2750	161	3,26	1,41	0,048	1,079	164	9,82	8493	5115	181	2770	0,579	0,406

12. Formulation of important laws, POSTULATES in the production of Brown's Gas

- The important rules that appear to be the key to obtaining high energy in burning H and O are as follows:

  1. Hydrogen and oxygen should be stored in atomic form until they are incinerated.
  2. Molecular H2 and O2 are obtained in two cases:
  - in water intervention with a straight non-pulsating current.
  - if the amount of H or O is much higher than the required stoichiometric ratio in the obtained Brownish Gas, conditions for recombination of the atoms and an exothermic reaction occur, the atomic H and O atoms being bound and becoming molecular.

- 3. Atomic H and O are only obtained in pulsed, pulsed, direct current interference with a certain frequency and shape.
  4. The percentage ratio between the amount of atomic and molecular H2 and O2 depends on how much the shape and ripple of the direct current approximate to the instant shape and the resonance frequency of the water.
  5. The resonance frequency, shape and amplitudes of water frequencies depend on temperature, aggregate state and dispersed substances in the water itself.
  6. Indicators for obtaining Brown's Gas - atomic H and O are:
  - keeping the water temperature in the electrolysis process;
  - On ignition, implosion, not explosion.

- 7. At the ideal BRAUN GAS (atomic O and H), we can get up to 3.84 times more energy than that obtained by combustion of molecular hydrogen and oxygen.
  8. Brown’s gas is only obtained by impulse action on the water molecule. The amount of Brown’s Gas depends on the shape and frequency of impulses, and as much as this frequency is closer to the momentary resonance frequency of the molecules, and the shape of the pulses themselves corresponds to the natural vibration, the greater the amount of Brown's Gas is produced by the same input energy.
  10. When placed only in a potential pulsating field at resonance frequency, the water molecule undergoes a particularly agitated state due to the increased angle between the hydrogen atoms and their distance to the oxygen atom. An important indicator of this phenomenon is a sharp drop in water density.

- 11. As the shape of the pulse is more deformed, the more molecular hydrogen and oxygen are produced instead of the atomic ones. The ratio between the area of the rectangular impulse attributed to the area of the deformed gives us the percentage ratio of the obtained atomic and molecular hydrogen and oxygen. This is also a quantitative measure of the quality of the obtained Brown’s Gas, which can also be monitored electronically.

- 12. The production of Brown’s gas from seawater is associated with a particular phenomenon. Atomic hydrogen and atomic oxygen, although one is a strong reducer, and the other strong oxidant under conditions of a potential electric field pulsating in resonance with its own frequency and shape of the impulses of the water molecules, do not enter into chemical interaction with the continuously released sludge; act as a catalyst for REMOVING, COAGULATION, and CONCENTRATION of metal compounds in sludge. This is evidenced by the numerous experiments such as the phenomenal example of the case being that although the Black Sea is one of the lowest salinity water, the content of metals in the sediments formed in receiving Brown's gas is hundreds to thousands times higher with the natural bottom sediments precipitated millions of years at the bottom of the seas and oceans and commensurate with concentrations in nodules and concretions formed on the seabed for millions of years, accumulated at depths below sea level from 800 to 2500 m.

- 13. Since the ratio of normal hydrogen to isotope deuterium in nature is 5000: 1, the continuous production of Brownow Gas leads to accumulation and production of concentrated heavy water which is difficult to decompose and in this case is a waste product, such as every 5000 l (kg) of electrolyzed water will accumulate 1 l of heavy water in the tub. 1 liter of heavy water (with Deuterium) weighs 11.11% more than normal. Therefore, it can be formulated:
  11.11% is a measure or criterion for the percentage of Deuterium in the resulting heavy water.

- 14. The technology for producing Brown’s gas from seawater is the cheapest way to extract heavy water in large quantities, since heavy water is a waste product in this case.
  `15. Methane is about 30 times more contributing to the greenhouse effect than carbon dioxide. Brown's gas products when burned are pure pure distilled water, absolutely harmless, which can be used, including for drinking.

13. POSSIBLE OPTIONS FOR MANUFACTURING BROWN'S GAS

13.1 ENERGY Efficiency of Brown's Gas

- Since the energy obtained during the burning of the Brown's gas is always lower than the energy input, according to the energy conservation law, the ratio between the incineration and the applied for the decomposition of the water molecule is as follows:

  To decompose 1 kg of water at atomic H and 0, 14,289 kWh of energy is needed. In the burning of the atomic H and O, the energy obtained will be equal to the input, i. we will get 14,289 kWh of energy or energy will be:

- η_e = 14,289 / 14,289 = 1 or multiplied by 100 gives us 100% if only the atomic but not molecular hydrogen and oxygen in the obtained Brown gas.
  But if 14,289 kWh / kg of water are used for the decomposition of the water molecule and we get not atomic but molecular hydrogen and oxygen, then when they burn, we will get 3.72 kWh / kg of energy or the energy factor will be:
  η_e = 3,72 / 14,289 = 0,26 or multiplied by 100, we will get 26%

- Ie. the difference in energy efficiency in combustion of atomic and molecular hydrogen and oxygen is accurate

  14,289: 3,72 = 3,84 times

  This phenomenon allows the burning gas to burn incredible temperatures to about 6000 degrees Celsius. But these temperatures are achieved "selectively" according to the material to which the flame is directed.

- This makes it possible to heat at different temperatures when directing the flame to different materials. This is an incredible phenomenon that is only observed in Brown's Gas. This phenomenon could be used in the extraction of rare metals from polymetallic ores or, in the case of polymetallic "sludge", obtained from the extraction of Brown’s Gas from seawater. But this is yet to be explored in detail and proves.

13.3. Brown's Gas Industry Options

- From the options described under items 13.1 and 13.2 described above, Brown's Gas industrial production can be summarized as follows:
  1. Extraction of Brown's Gas
  2. Incineration of Municipal Waste
  3. Electricity production
  4. Extraction of valuable raw material for black, non-ferrous and rare metals metallurgy.
  5. Extraction of pure distilled water, which may also be used for drinking purposes. This option turns the technology into a desolate installation.
  6. Extraction of heavy water. Every 5,000 liters of seawater can get 1 liter of heavy water.

- The content of some metals in the sediment produced by Brown’s Gas extraction from seawater reaches more than 4,400 times the natural sediment of the seabed. This phenomenon is explained by the strong reductive and oxidative impact of atomic hydrogen and oxygen, whereby the process is transformed into a "flotation" concentrating plant for the concentration of metals in the sludge obtained.

- The content of some of the rare metals is commensurate with the content of the ore deposits and after their enrichment. The advantage of this technology is that it gives us a practical UNLIMITED source of extraction of black and rare metals.

13.2. It is possible that the energy obtained during the burning of the Brown Gas will be greater than the energy used for its production

- This option can be realized as described in item 7. According to the illustrated scheme in slide 31, the energy generated by the combustion of Brown's Gas is also added to the energy generated by the incineration of household waste in an incinerator, but the incinerator is converted into a boiler or steam generator to generate overheated steam for electricity generation. The necessary steam gas for steam generators is a small part of the total amount and is only to support the burning of household waste. The bulk of the produced Brown’s Gas goes to burning in a boiler and extracting electricity.

- In the aforementioned slide diagram 45 only one of the examples of heat conversion in electrical is shown. Another possible scheme is to use a fuel cell BLOCK instead of a steam turbine and a turbine generator, with Brown's Gas being used entirely to generate fuel cell fuel technology.

- With existing technologies, the only obstacle to using fuel cells on larger industrial scale is the lack of sufficient hydrogen and oxygen. Their industrial mining is an old-fashioned "recipe" from the time of the First World War, when the Germans produce hydrogen in large amounts of decomposition of methane, and in the present case the remainder of methane is converted to carbon dioxide - one of the main causes of the greenhouse effect after methane . Under the proposed new scheme with Brown's Gas, the only product that is produced from fuel cells other than electricity is pure distilled water, making this technology also a proprietary industrial desiccant for seawater.

13. SOURCES OF INFORMATION

- 1. Brown's Gas, Book 1 and 2, 2002 © 1995, Eagle-Research - George Wiseman, Canada.
  2. www.lsbu.ac.uk/water/vibrat.html
  3. www.keelynet.com/energy/docx.htm
  4.forum.mazeto.net/index.php?topic=519.0
  5.tehnomag.net/eshop.php?body=prodshop&gr=1&pod=3&pg=1&promo=&id=102
  6. http://internetreklama.com/products/w-gold/
  7. http://www.keelynet.com/energy/docx.htm
  8. www.panacea-bocaf.org/danieldinglewatercar.htm
  9. http://www.lsbu.ac.uk/water/vibrat.html
  10. www.ekozora.com/energy-all-around-us.html
  11.www.moew.government.bg/files/file/Waste/QUESTIONS

- 12. www.energia.elmedia.ne
- *13.* www.sokolovskisenvironment.com
- 14. www.kolektori.com/cheb.htm
- 15. www. ymlp.com/zAtqay
- 16. www.ecotechnika.bg/bg
- 17. www.geopowerbg.com/bg
- 18. www.energy-review.bg
- **19. Yull - Brown's Gas Hydrogen Welding Patent #4014777**
- **20. Patent Number** 4081656 Arc-assisted oxy/hydrogen welding Title of Patent Date Issued March 28, 1978
- 21. www.bulenergyforum.org
- 22. www. ecomaxbio.com