

EGM-VORTEX-TRANSDUCER-TECHNOLOGY

Description and utilization concepts

Development resp. upscaling of a totally new environmental technology and energy technology where priorities - up to now - were set on:

- Σ Oil production and revalorization for the energy industry and transport combined with a reduction of CO₂-emission
- Σ Reduction of CO₂-emission affiliated with carburization of the water for power industry, environmental protection, farming, aquaculture, biotechnology
- Σ Oil diluted with water and exhaust fumes resp. CO₂
- Σ Effectiveness and improvement of biotechnological processes resp. replacement of trace elements particularly with aquacultures (algae-, fish- and shrimp-farming)
- Σ Purification of water and preservation for industry, agriculture, drinking water, shipping and spas
- Σ seawater desalination for water supply and agriculture
- Σ Exchange reactions for pharmacology, for chemical industry, for water and tap water technology
- Σ All kinds of compounds, especially with water, for the food industry

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1. Presentation of „*egm-vortex-transducer-technology*”

1.1. Introduction

A long-time research and development work led to a pilot installation, mature and completed and unique, using artificially the characteristics of a resonant and self-stabilizing vortex (Tornado principle) in an ubiquitous manner by integrating or unhitching substances in the water, generating new qualities, for example: generating or revalorizing, out of inorganic substances, (organic) hydrocarbon like oil.

“*egm-vortex-transducer-technology*’s” versatile attributes open commercial entry into a completely new, lasting circle with regard to the sectors production, environment and energy!

For the first time a closed circle between energy production / combustion and entire use of emission / recycling was made accessible. Moreover, on a grand scale, the dispose/lowering of accumulated and stored CO₂ gases is possible, which offers - a certain volume assumed - an economically interesting benefit within the currently upcoming CO₂-certificates trade.

egm international GmbH has patented in 2008 the basic principles and areas of application

1.2. Practical Application

The “*egm-vortex-transducer-technology*” ([annex 1](#)), a combination of hyperbolic cone and cylinder **manschette**, prefer to vortex water with various substances, for example CO₂-containing gases. Due to the *egm-vortex--transducer-technology* these substances/ elements/gases become incorporated permanently by being extracted from the environment.

An example therefore is the measurement of BTU-Cottbus ([annex 2](#)) where the exhaust fumes were inserted into the vortex and totally extracted from the atmosphere. This can be seen, measured and proved in the water.

During a longer vortexing process gradually an **oleaginous film occurs on the water surface** which shows (spectroscopic analysis) similarity with phytogetic oil resp. bio-diesel and which **is combustible** ([annex 2-4](#)): Expert’s report BTU-Cottbus, Prof. Freese and Institute Fresenius
This water enriched with C and N has promoted an enormous growing of plants resp. their root mass **(+ 30 % up to 50 %)**.

The quality (calorific value) of oil and kerosene increases considerably when the *egm-vortex-transducer* continues vortexing oil with CO₂ ([annex 3, 5](#))

The “*egm-vortex-transducer*” makes a dilution of oil with water and CO₂ up to 100 % possible, using (domestic) fuel oil as well as phytogetic oil.

The modification of the vortex-transducer into a symmetric double-system can result in a seawater desalination with multiple cascades!

The influx or emulsification of substances, gases or elements with the “*egm-vortex-transducer*” in excess permits for example preservation / purification of drinking water, process water or bath water with least effort and dosing.

1.3. Criticism to State-of-the-art / Patents

Numerous vortex-devices and patents are known from literature especially the one based on the principles from Viktor and Walter Schauburger (www.pks.de and annex 8-11) Both aimed for the improvement of water quality, so-called energizing, oxygen influx in water and eutrophication or improved mixture and emulsification of substances in water. Not known is scientific proof of such energizing or increasing quality when oxygen influx (physical solubility of gases) into the water is higher than usual, neither is there proof of rise in quality mentioned as oleaginous film out of vortexing the CO₂-gas in the water nor is there proof for the lasting carbon resp. organic carbonization in the water high above the physical solubility.

1.4. Distinctive features of the “*egm-vortex-transducer-technology*”

1.4.1. Configuration

The singularity of the “*egm-vortex-transducer*” lies in the characteristics and application mentioned in 1.2. suitable as a base for a completely new technology. New construction principles, calculations and manufacturing principles incl. selection of material form the basis for the hyperbolic cone and the way of the influx into the artificial vortex. The geometric design specification for the *egm-vortex-transducer* has taken into account the 3 fundamental constants as Pi (π), Euler’s number (e) and gravitational acceleration g . Due to above, inside the “*egm vortex-transducer*” highly rotating and accelerating vortices as stationary waves were formed, creating the particle velocity on a molecular and atomic level starting the a. m. exchange reactions.

1.4.2. Vortex - traditional theories

Water and vortices are subject to the law of hydrodynamic. Best researched system in hydrodynamic, similar to geometry and ancillary conditions of WWTS, is the Taylor-Couette-system (annex 12). According to the Taylor-Couette-System a fractal structure is formed, i. e. inside the spiral vortex flow another spiral vortex flow is formed, holding another spiral vortex flow and so on.... The Taylor microscale refers to the size of the smallest vortex. Depending on the conditions the Taylor-Couette-system forms different stable vortices. Following the conditions of the “*egm-vortex transducer*” a certain kind of vortex is expected (annex 12-14). Macroscopic let this form under the surface appear as a transparent multi-coiled rope helically wound around.

1.4.3. Vortex - alternative theories

Following Wilhelm M. Bauers theory (annex 15) the vortices generate an order when reaching a certain phase (anti-dissipative process) At first a free (irrotational) vortex is developing, as interpreted in the traditional vortex- physics (Taylor-Couette-research). In stage 2 the vortex’ inner flow resistance is reduced towards “0”, i. e. the vortex loss is aiming towards “0”. This 2. stage preferably occurs in case of turbulent eddies (as dominant in nature) Occurring inverse cascades can lead to a beginning slight self-acceleration of the vortex. Stage 3 is the formation of an inner vortex-layer, the Vazsonyi-layer. It looks like a coiled column and, when self-inforcing, seems to occur out of reasons of conservation of angular momentum – said by W. Bauer. - The matter in this layer is cooling down, thermal energy is transformed into kinetic energy. The energy balance of a vortex works acc. to W. Bauer via oscillation. Parts of the

vortex create vibrations, being reflected, other parts absorb this energy by resonant phenomena. W. Bauer allocates a vortex energy to the vortices, a "potential energy" inherent to all matter, set free when reaching the optimal vortex-form

Victor Schauburger corroborates the theorem of W. Bauers' vortex-model (annex 8):

- ▶ The viscosity of the medium is - as assumed in the hydrodynamic - no constant, material-dependent factor, but depending on instantaneous kinetic form, distribution of pressure and type of vortex.
- ▶ Free (irrotational) vortices are increasing depending on size and velocity, in mathematical aspect to say they show negative viscosity, proven by tests from Schaumberger (annex 8, www.pks.de)

Photos from inside tornados show explicitly an almost vertical form of a coiled column around the core (Vazsonyi-layer) and the evacuated axis seems to swirl around like ropes of pearls

2. Description of possible targets / technologies

Out of the variety of short term market-ready products of the "*egm-vortex-transducer-technology*" following product lines - according to their development status and market demand - shall have priority

2.1. Sustainable oil production and revalorization of existing oil types for energy industry and transport combined with a reduction of CO₂-emission resp. CO₂-certificates' buy

- Target:

The aim is the generation of phylogenetic-alike combustible oil generating out of the inorganic elements water and CO₂ and a simultaneous energy recovery from exhaust fumes or certificate trade in a closed circle.

- Economic advantages:

1. sales of generated oil
2. proceeds from "disposed" CO₂ resp. certificates trade
3. Utilization resp. sales of fertilizer-alike water, achieved from tap water and enriched with C, N, O

- Fundamental Layout

fundamental layout of "*egm-vortex-transducer*" incl. periphery for this and other applications see annex 1:

The principal item is the *egm-vortex-transducer* (6), consisting of hyperbolic cone with cylindrical part and affixed inlet-/outlet-ports for fluids and gases.

Agent for the oil extraction are fluids, preferred water (1), poured into the lower water container (2). The immersion pump (3) or an external pump is used to pump the water into the upper water container (4). The vortex arises (6) now in the cylinder of the vortex transducer using the tangential water influx (5) by gravitation.

The optimal operation condition of the vortex (stationary waves) is controlled and kept by influx, efflux and pressure inside the cylinder.

Emerging now - as described on page 3 - is the typical Vazsonyi-layer
Following next: the embedding of the CO₂-gas resp. CO₂-containing exhaust fumes/gas in a determined and proportional dosing resp. flow rate out of the pressure reservoir (7) via (8) into the "egm-vortex-transducer".

After a time period, for example 2-3 hrs, depending on quality and rate of gas, an oleaginous film, continuously increasing, occurs on the water surface of the lower container (2), which can be substracted discontinuously,

An optional conjunction (8) allows the emerged gases (H₂, O₂, CH₄...) and the surplus CO₂ of the closed container (2) to be led back into the vortex.

The oil coming out of the vortex-transducer is combustible showing characteristics of phytogetic oil. Demonstrations of this process had taken place in a number of institutes and the oil has been analysed also in a number of laboratories (annex 2-4)

- Estimation obtained oil in closed circuit (annex 16)

Considering the complete 100% stoichiometric implementation of the inserted CO₂ - gases theoretically from a unit mass CO₂, for example 1 ton of CO₂, 0,35 unit mass oil (oleic acid = olein acid) approx. 350 kg oil as oleic acid can be achieved. Ideal and complete combustion of this oil mass into CO₂ (1 l fuel oil is converted into 2,65 kg CO₂) generates another 0,93 t CO₂, i. e. for a continuous and constant production of 350 kg oil approx. 100 kg CO₂ per 350 kg oil had to be added ≈10 % of initial mass CO₂, in other words: approx. supply of 10 % of fuel is necessary for oil-, gas-burner or charcoal burner to provide continuously exactly the same calorific value.

- Upscaling for industrial applications (annex 17)

The development of the "egm-vortex-transducer" is well-engineered and completed in sizes of 16 cm and 32 cm. An Upscaling of the "egm-vortex-transducer" only is possible keeping straight to mathematical proportions and under consideration of the fundamental constants π, e and g

With a predetermined diameter of the cylinder d (multiple of π) the effective volume of vortex (water) is calculated as

$$V_w = \pi \times d^3 / 6 \times e \quad (e = 2,7183)$$

At a proportional ratio to this volume (inner vortex layers) increases the quantity of vortexable gas.

Following a. m. formula a cylinders diameter of d = 16 cm equals a vortex volume V_w = approx. 0,76 l which is equivalent - proven in practice - to gas influx of approx. 5 l /min.

A duplication of diameter d to 32 cm equals an effective vortex volume of approx. 6 l, i. e. factor 8, equals 8 x 5 l/min = 40 l/min gas influx

A diameter d = 1,26 m would be equal to an influx of 2,56 m³ of gas, equal 2000 t/year. Diameter d = 5,6 m results theoretically in an influx of CO₂ of 0,17 mio. t/p.a. This value is near the annual emission of a coal-burning power plant (= 4-8 Mill t CO₂ p.a.). The relation between diameter, volume, gas quantity etc. is shown on attached diagram (annex 18). Annex 18 a shows the theoretical calculation of CO₂-gas quantity for the afore mentioned cylinder diameter of 5,6 m on a 260 full time basis.

Calculation annex 18 a projects for a. m. coal-burning power plant with approx. 4 mio. t CO₂-emission and 360 full-time days approx. 5 units of vortex-transducer with a diameter of 8,48 m.

2.2. Reduction of CO₂-emission affiliated with carburization in the water for power industry, environmental protection, farming, aquaculture, biotechnology

- Target

of this product is primarily the disposal resp. the lowering of CO₂ out of directly produced or stored CO₂ of large-scale plants (power stations, all kind of burners) resp. certificate trade and the generating of phytogetic-alike and combustible oil for energy-recovery in a closed circle.

CO₂-gases are achieved in a lot of industrial processes, for example in breweries, in distilleries, bioethanol plants, biogas plant, ...

- Economic advantages:

1. proceeds from "disposed" CO₂ resp. certificate trade
2. sales of generated oil
3. Utilization resp. sales of fertilizer-alike water, achieved as tap water and enriched with C, N, O

-Fundamental Layout

fundamental layout of this "egm-vortex-transducer" is corresponding to item 2.1, as is generating of oil and upscaling

The development of the "egm-vortex-transducer" is well-engineered and completed in sizes of 16 cm and 32 cm.

2.3. Oil diluted with water and exhaust fumes resp. CO₂

- Target

of this product is to increase considerably the efficiency and exploitation of at least by 100 % when using oil. The calorific values of the oil/water substance, vortexed and firmly conjoined, were at least kept on the same level as the original oil. At the same time CO₂-containing gases were fixated and recycled

- Economic advantages:

1. Duplication of oil quantities/ exploitation and proceeds
2. proceeds from "disposed" CO₂ resp. certificate trade

- Fundamental Layout

In addition to the previous layout the influx of oil into the water is realised by an oil pump.

2.4. Effectiveness and improvement of biotechnological processes resp. replacement of trace elements particularly with aquacultures (algae-, fish- and shrimp-farming)

- Target

of this product is to increase efficiency and capacity of bio-technological processes Trace elements and vital substances can be replaced, health, vitality and lifetime of the cultures improved. Pro-biotic attributes would be expected and have to be analyzed.

- Economic advantages:

1. Higher capacity resp. exploitation
2. cost savings due to less necessary adding elements and pharmaceuticals
3. Raised durability

- Fundamental Layout

fundamental layout of this “*egm-vortex-transducer*” is corresponding to item 2.1, as is generating of oil and upscaling

The development of the “*egm-vortex-transducer*” in regard to this application is well-engineered and completed

In a first study of BTU-Cottbus the growth of plants, for example, could be increased by 30 % (annex 2), test series at an Arabian university have shown even 50 % more. The latest test at TU-Berlin with vortexed CO₂-water and 2 algae-cultures led to a duplication of the test-algae compared with the regular culture (annex 19).

The result of an analysis- by Potsdamer Wasser- and Umweltlabor GmbH - of a 5 month kept vortexed CO₂-water showed an increased oxidability from 1,3 mg O₂/l to 12,4 mg O₂/l and an increased value of TOC (total organic carbon) from 2-3 mg C/l to 35,9 mg/l (annex 20). This signifies a high bioavailability of carbon. The increased TOC had not led to an exceedance of microbiological parameters, unlike the water vortexed with helium, when the number of colonies exceeded by a great margin but without occurrence of *Escherichia coli*, coliform bacteria or enterococci (annex 21)

2.5. Purification of water and preservation for industry, agriculture, drinking water, shipping and spas

Subjective assumption therefore is: vortexed CO₂-water is germfree for a longer period, and lab analysis (objective evidence) shows that vortexed CO₂-water, openly stored for 5 month, contains all microbiological parameters as regulated by law (annex 20).

2.6. Seawater desalination for water supply and agriculture

Own series of experiments with the modified “*egm-vortex-transducer*” (symmetric concept) showed in principle a highly degree of desalination proved both optical and by measurement of conductivity.

For the desalination into drinking water quality several cascades, each with “*egm-vortex-transducer*”, are necessary.

Process optimization and upscaling for large systems has to be done.

2.7. Exchange reactions for pharmacology, for chemical industry, for water and tap water technology and food industry

Educated guess is that the “*egm-vortex-transducer*” could durably conjoin heavily emulsive resp. miscible substances.

3. Investment needs / economic efficiency

Annex:

1. Layout "egm-vortex-transducer" (1 p.)
2. Project report BTU Cottbus dated 23.06.08 (4 p.)
3. Report Abu Dhabi from BTU Cottbus dated 14.4.09 (7 p.)
4. Expert's report W-20-03-0162 from SGS Institut Fresenius GmbH dated 07.04.09 (10 p.)
5. Data sheet kerosene (1 p.)
6. Analysis calorific value of "diluted" fuel dated 19.03.09 (1 p.)
7. Analysis "diluted" phytogenic oil dated 12.05.09 (4 p.)
8. Franz Pichler: Victor Schauburger and the Turbulence of Water.
In: Olafur Eliasson: Surroundings Surrounded, ed. Peter Weibel, ISBN 3-92801-26-3, 2001
9. Schauburger, J. : Patent No. 272278 dated 23.10.1963 "Vorrichtung mit einer Reaktionskammer, zur Durchführung von physikalischen oder/und chemischen Prozessen".
10. Schauburger, W.: Patent-Offenlegungsschrift DT 1 557 213 dated 26.05.1967
"Verfahren und Vorrichtung zur Herstellung von Gemischen, Lösungen, Emulsionen, Suspensionen und dgl. durch Einbringung von beliebigen Zusatzstoffen in fluide Medien - insbesondere in natürliche Gewässer"
11. Schauburger, J. : Offenlegungsschrift DE 100 40 730 A 1 dated 17.08.2000:
"Vorrichtung zur Verwendung von Flüssigkeiten und Gasen und Verwendungen der Vorrichtung"
12. www.couette-taylor2001.nwu.edu/ct/program.htm
13. Arne Schulz: „Verzweigungen und Strömungen zwischen unabhängig rotierenden Zylindern“. Dissertation zur Erlangung des Doktorgrade der in der Mathematisch-Naturwissenschaftl. Fakultät der Christian-Albrecht-Universität zu Kiel, vorgelegt Mai 2000.
Online: http://e-diss.uni-kiel.de/diss_370/d370.pdf
14. Matti Heise: „Lokalisierungen und Defekte in einer Spiral-Wirbelströmung“ Dissertation zur Erlangung des Doktorgrade der in der Mathematisch-Naturwissenschaftl. Fakultät der Christian-Albrecht-Universität zu Kiel, vorgelegt Mai 2008.
Online: <http://e-diss.uni-kiel.de/diss>
15. Wilhelm M. Bauer: Die Welt der Wirbel und Atome Bd. 1 & Bd. 2
Der wissenschaftliche Nachlad von Dipl. Phys. Wilhelm Bauer. Delta pro Design und Verlag GmbH, Berlin 1997. ISBN 3-980 5355-2-5
16. Estimation mass balance CO₂ / phytogenic oil (2 p.)
17. egm-vortex-transducer - geometric upscaling (3 p.)
18. Interrelation egm-vortex-transducer diameter / volume (2 p.)
19. Study growth of algae with egm-vortex-transducer-water from TU Berlin dated 27.04.09 (2 p.)
20. PWU-lab report dated 10.06.09: CO₂ -vortexed water, 5 month stored (2 p.)
21. PWU-lab report dated 10.06.09: helium-vortexed water (2 p.)