CarbCoin

From waste to clean energy and materials

Whitepaper

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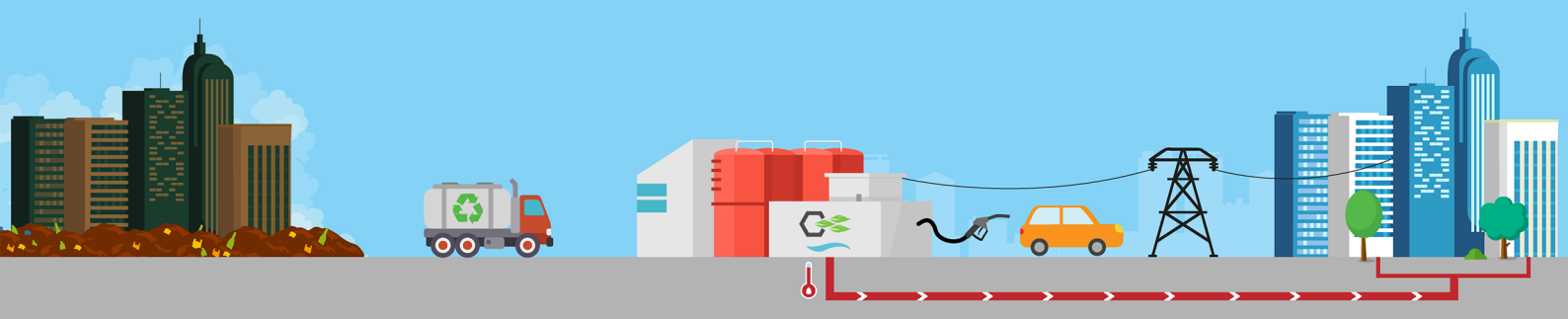

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Overview

CarbCoin is a blockchain based LTC technology promoting system, where investors to Low Temperature Conversion technology can participate and get rewarded.

Project CarbCoin will have great and positive consequences to World ecology and will improve the quality of our lives – in a natural and safe way!

Low Temperature Conversion (LTC)

The LTC process is a patented method for the recovery of energy from waste materials, such as **plastic, used tires, sewage sludge, household waste, biomass, sludge, brown coal** and similar materials as well as lignite coal, impure coal and lopping mixed with waste wood, and using extracted gases for the generation of power, heating gases and fuels.

The goal of this process is the use of conversion technology for the efficient processing of solid and liquid raw materials and waste. The materials are recycled through **thermal decomposition** into conversion gas that is then **turned into electricity or fuel oil**.

- Low temperature conversion is a thermos-catalytic decomposition process in a closed system and a **"soft" method compared to incineration**. The materials to be converted are indirectly heated by an infrared heating system and brought in gentle manner to the respective specially required conversion temperature. The conversion temperature lies below 600°C (in conventional incineration plants it is approx. 1000-1200°C or higher).
- Thermo-catalytic decomposition refers to **the temperature breakdown of organic substances** in a hermetic system that is sealed off from outside, with subsequent modification of the resulting gas phases to salvaged gas (similar to natural gas) and subsequent conversion to electricity by means of turbines/engines.
- **No toxic gases**, such as dioxins, furans etc. arise. Inorganic materials such as metals are not overheated, they pass through the LTC plant without generating any pollutants. The molecular structure of heavy metals is not broken down, but instead remains solidly together and thus difficult to dissolve.
- Pollutants in the gases are leached out, precipitated in the plant and can be recycled in industry as salvaged materials in powder form.
- Depending on the material input into the system, **disposal site compliant material**, fertilizer or high-quality raw materials remain as the waste product.

The progressive thermos-catalytic material gasification with integrated gas purification is carried out in an entirely closed-off plant system. The individual slipstreams are conducted in riser pipes over intermediate stages so that rich or power gases arise whose constant compositions are material-specific. Because of the different chemistry of various input materials, the LTC plant systems are designed individually for each group of materials.

Efficiency of the LTC-Process

The efficiency is the ratio between the work done and the supplied power. Basically, the efficiency achievable in all energy/work-coupled plants in practice clearly lies below the theoretical values. This law also applies to conversion plants. Input-material-dependent efficiencies of up to 40% concerning electricity generation are intended to be achieved.

In the process, the plant itself only needs a few moving components, whereby the susceptibility to interference is accordingly low. Maximum security in all process areas is understood. Concrete plants are planned and calculated for individual customer desires.

All modern gas power stations require high-quality and expensive energy sources, such as natural gas, heavy oil etc. The LTC process, on the other hand, refines various “fuels”—biomass, waste material etc.—into conversion gas, which is subsequently converted as rich gas into electricity in gas engine or turbine.

The LTC process thus produces electrical power from low-grade fuels and waste, with high efficiency and minimal heat losses.

The following characteristics distinguish the LTC process from other, similar systems, e.g.

- control mechanisms
- lower operating temperature
- influence on end products
- significantly higher level of efficiency in electricity production
- lower emission levels that are similar to natural gas

In the process, the plant itself uses few moving components, whereby the susceptibility to interference is accordingly low. Maximum safety in all process areas is understood.

General Technical Specifications

Plant Size

Plant	Conversion plant including electricity generating unit (from the point where the input material is deposited in a collection bunker)
Housing	Industrial building, base area approx. 300 [m^2], minimum height 9 [m] plus Conversion section outside
Dimensions	25 [m] length x 20 [m] width x 9 [m] height
	Distribution of weight according to the mounting diagram! This diagram is worked out under consideration of the local building code after the general set-up is defined in the licensing procedure.
Subsoil	stabilized plane ground adequate for loading conditions of industrial plants location. General set-up is defined according to the licensing procedure.

General Process Parameters

Gas Volume Flow	Variable control factor dependent on heating value of input material (25 – 100%)
Gas Temperature	According to process step
Working Temperature	350 – 550 °C
System Pressure	+/- at under pressure
CO_2 Emissions	< 0,5 [kg/kWh] electricity output
Generator Performance	Hourly output approx. 2-3 MW depending on material caloric value
Dwell period	2,5 sec. in high temperature zone
Process Control	Fully automated sensor controlled system control including remote operation monitoring and material inspection (SPSS or equivalent)

Construction

Plant Construction	Stainless steel quality according to requests of acid-fastness
	thermal insulation
Industrial Housing	Sheet steel insulated
Foundation	Armored concrete

Working Parameters

Yearly operating hours minimum	8.000 [h/y]
Yearly Maintenance Standstill	2 weeks/year
Staff requirements	Approx. 4+2 persons in total 3 shifts

Process Map

Process Description

Conversion is defined as the **synthesis of dry distillation, low temperature carbonization, mid-temperature gasification and hydration**. Based on this definition, new conversion technologies are:

- indirectly heated rotary furnace according to “Stenau”
- spiral tube reactor according to Bayer
- riser tube reactor LTC process

The progressive thermos-catalytic material gasification with integrated gas purification is carried out in an **entirely closed-off plant system**. The individual slipstreams are conducted in riser pipes over intermediate stages so that rich or power gases arise whose constant compositions are material-specific. Because of the different chemistry of various input materials, the LTC plant systems are designed individually for each group of materials.

The LTC waste to Electricity process generally consists of the following sub-processes/sections:

1. Drying of the material
2. Low-temperature carbonization
3. Solids gasification
4. Gas deducting units
5. Catalytic carbon hydrogen splitting process
6. Heat exchanger
7. Gas Cleaning
8. Gas Turbine

Chemistry

Low Temperature Conversion

Depending on composition and temperature, the heating of organic substances without oxygen results in:

- Conversion coal (unreacted carbon and inorganics)
- Conversion gas (carbon monoxide, hydrogen, water vapor, methane, higher hydrocarbons)

Solids gasification

Transformation of carbon with water vapor:

The LTC process provides full splitting of the conversion products into CO and H_2.

Water gas reaction:	C + H_2O	⇨	CO +	H_2	H_{298} $\triangleq$ 119kJ.mol^{-1}
Carbon splitting:	CH_2- + H_2O	⇨	CO +	$2H_2$	
Methane splitting:	CH_4 + H_2O	⇨	CO +	$3H_2$	H_{298} $\triangleq$ 205 kJ.mol^{-1}

Including output streams of thermal energy used for drying the material and heating the process next to electricity the **total energy efficiency is min. 70%** based on the caloric value of the input material!

Cryptocurrency

A cryptocurrency (or crypto currency) is a digital asset designed to work as a medium of exchange using cryptography to secure the transactions and to control the creation of additional units of the currency. Cryptocurrencies are a subset of alternative currencies, or specifically of digital currencies.[1]

Blockchain technology

A blockchain, originally block chain, is a continuously growing list of records, called blocks, which are linked and secured using cryptography. Each block typically contains a hash pointer as a link to a previous block, a timestamp and transaction data. By design, blockchains are inherently resistant to modification of the data. The Harvard Business Review describes it as "an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way." For use as a distributed ledger, a blockchain is typically managed by a peer-to-peer network collectively adhering to a protocol for validating new blocks. Once recorded, the data in any given block cannot be altered retroactively without the alteration of all subsequent blocks, which requires collusion of the network majority.

Blockchains are secure by design and are an example of a distributed computing system with high Byzantine fault tolerance. Decentralized consensus has therefore been achieved with a blockchain. This makes blockchains potentially suitable for the recording of events, medical records, and other records management activities, such as identity management, transaction processing, documenting provenance, food traceability or voting.

The first blockchain was conceptualized in 2008 by an anonymous person or group known as Satoshi Nakamoto and implemented in 2009 as a core component of bitcoin where it serves as the public ledger for all transactions. The invention of the blockchain for bitcoin made it the first digital currency to solve the double spending problem without the need of a trusted authority or central server. The bitcoin design has been the inspiration for other applications.[2]

[1] Cryptocurrency, Wikipedia
https://en.wikipedia.org/wiki/Cryptocurrency

[2] Blockchain, Wikipedia
https://en.wikipedia.org/wiki/Blockchain

Ethereum network

Ethereum is a decentralized platform that runs smart contracts: applications that run exactly as programmed without any possibility of downtime, censorship, fraud or third party interference.

These apps run on a custom built blockchain, an enormously powerful shared global infrastructure that can move value around and represent the ownership of property. This enables developers to create markets, store registries of debts or promises, move funds in accordance with instructions given long in the past (like a will or a futures contract) and many other things that have not been invented yet, all without a middle man or counterparty risk.

The project was bootstrapped via an ether pre-sale during August 2014 by fans all around the world. It is developed by the Ethereum Foundation, a Swiss non-profit, with contributions from great minds across the globe.[3]

CarbCoin token

CarbCoin tokens will be issued on the Ethereum network and will be freely traded on the open market. Ethereum is an open-source project which allows creation of smart contracts and provides users with a secure and fast transaction system.

Presale period

Presale period will start at 00:00 on December, 25th 2017 and will last until 24:00 on January, 6th 2018 (GMT+1).

Within this period, investors will have the opportunity to invest larger amounts than $100,000.00 in CarbCoin Token Sale at the presale price of $0.054501413 and gain presale bonus x 10.

[3] Ethereum
https://www.ethereum.org/

Token Sale period

Token Sale period will start at 00:00 on January, 06th 2018 and will last until 24:00 on April, 22th 2018 (GMT+1) – Earth Day[4].

Within this period, investors will have the opportunity to invest at price of $0.054501413.

The results will be published on the official CarbCoin website.

Issuance of tokens

CarbCoin tokens will be issued on the Ethereum protocol.

We are raising:	$18.5 M
Total amount of issued CarbCoin tokens:	743,100,000[5]
Payment methods:	Bitcoin (BTC), Ethereum (ETH)

Trading of tokens

CarbCoin tokens will be available to trade on as many marketplaces as possible. This process will start 15 days after Token Sale completion.

Conclusion

CarbCoin is an experiment designed to combine the best features of cryptocurrencies and the environmental healing solutions to fundamentally change the way that people handle with waste. CarbCoin presents great opportunities for those who may have a great value on the waste management market but just can't catch those values in because of the way such systems are currently designed.

[4] Earth Day
https://en.wikipedia.org/wiki/Earth_Day

[5] European population
https://www.google.si/search?q=european+population&oq=eurpoean+populatiopn&aqs=chrome.1.69i57j0l5.8899j0j4&sourceid=chrome&ie=UTF-8 , 25.12.2017

Development calendar