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caloriecoin

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## CAL – Rewards Good Health

*An ecosystem backed by blockchain  
for daily calorie control and exercise*

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*Vision Paper March 2018*

CLC FOUNDATION

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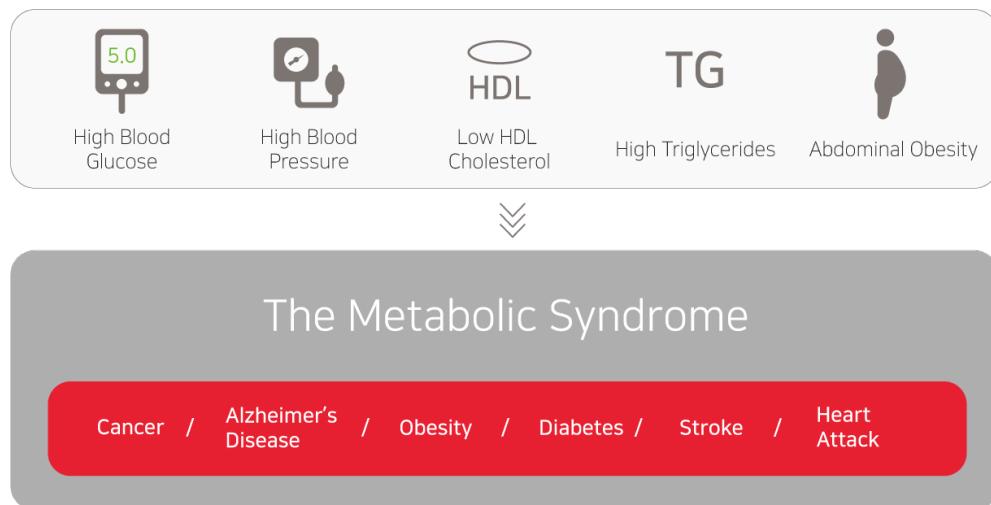
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# Motivation

## One of the Most Serious Problems We are Facing Today: The Metabolic syndrome

Over the last 40 years, the world has seen a new trend emerging: an explosion of chronic diseases categorically called the “Metabolic syndrome”. In the US, 52% of the entire population is believed to have the syndrome.<sup>1</sup> The Metabolic syndrome is accounted for 75% of \$2.7 Trillion US health care budget in 2014 and is expected to grow. In the rest of the world, many countries are already in a similar situation, and if not so, are catching up very fast. This is a slow-moving disaster in a worldwide scale that has never been experienced before.

**Figure 1. Flow of Metabolic Syndrome Encapsulated in one Picture<sup>2</sup>**



## 5 Buckets of Deaths

The following quotation is retrieved from the paper written by CrossFit, a health organization based in California.

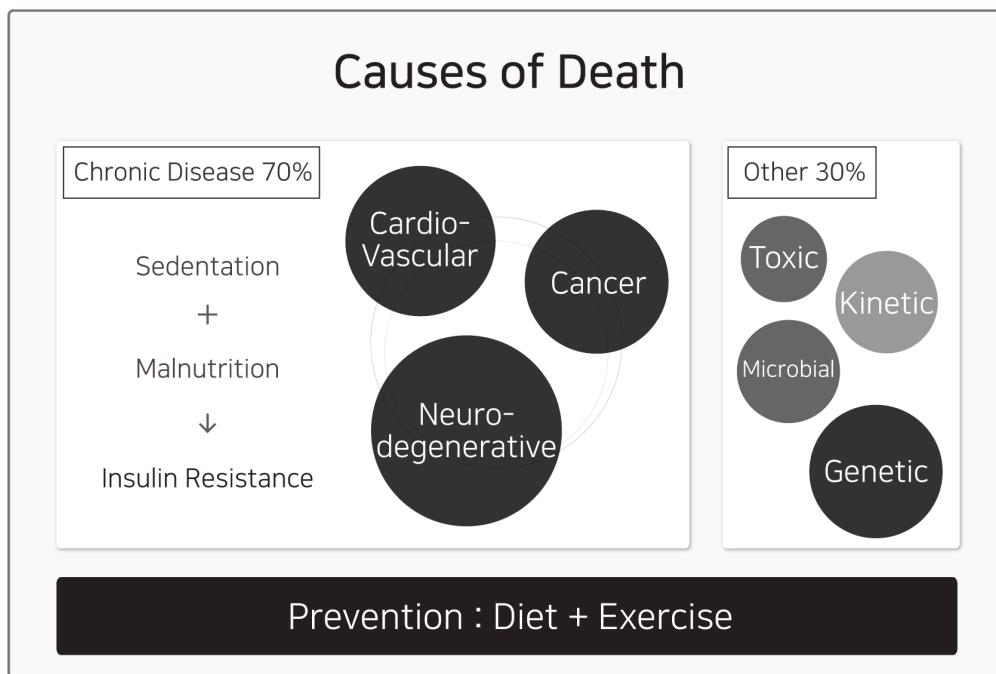
<sup>1</sup> Dr. Robert Rustic, lecture on Frontiers of Science, November 6, 2014, <https://www.youtube.com/watch?v=uIIXUZwpB-U>

<sup>2</sup> Source from Dr. Peter Attia's lecture - An Advantaged Metabolic State: Human Performance, Resilience & Health, <https://www.youtube.com/watch?v=NqwvcrA7oe>

"Seventy percent of deaths in the United States are attributable to chronic disease. Of the 2.6 million people who died in the United States in 2014, about 1.8 million died from chronic disease. This pattern of increasing deaths due to chronic diseases also holds in countries that are ravaged by infectious disease. The numbers are rising, and when we finally add the positron-emission-tomography-positive cancers in, the number might be 80-85 percent in the United States.

It is estimated by the Centers for Disease Control (CDC) that the United States could have up to a hundred million diabetics in 2050. That will affect everyone. You will not go into the emergency room for something as simple as a broken arm: You will be seeing heart attacks on every corner. Medicine has no solution; you do."<sup>3</sup>

**Figure 2. Causes of Death, 70% Attributed to Chronic Disease in 2014 in the US**



*70% of all deaths in US in 2014 are attributed to chronic disease. Major causes of the chronic disease have been sedentation and malnutrition. The most significant internal measurement is known to be the level of "insulin resistance".<sup>4</sup>*

## Astounding Facts about Cancer Today

The following is an excerpt from Dr. Mike VanDerschelden on "The Ketogenic Diet and Cancer".<sup>5</sup>

<sup>3</sup> [http://library.crossfit.com/free/pdf/CFJ\\_2016\\_08\\_Luck-Glassman-V7.pdf](http://library.crossfit.com/free/pdf/CFJ_2016_08_Luck-Glassman-V7.pdf)

<sup>4</sup> Dr. Ted Naiman lecture, Insulin Resistance, <https://www.youtube.com/watch?v=Jd8QFD5Ht18>

<sup>5</sup> <https://www.youtube.com/watch?v=Q9socQcwPIs&t=96s>

"Each and every day, 1,600 people die of cancer in US today. We are spending billions and billions of dollars into the cancer research. You would expect the more you put money into the system, the less percentage of people would get cancer. Not so."

"These are stat's: In 1900, one in 20 people got diagnosed with cancer. In 1940, one in 16. In 1970, one in 10. Today in 2016, one in 3 will."

"Literally our cancer rate is exponentially increasing, and the money is exponentially increasing. But we are still not close to any type of cure or nothing."

"As we push through billions of dollars into the cancer system, we are not going to look at the preventive strategies, because there is no money in them."

"It was found that completely reversing cancer from a nutritional therapy alone is possible.[2] We don't know if it hardly costs anything, and not many doctors are recommending that."

## About Diabetes

The following is the excerpt from Dr. Peter Attia's speech at TED: What if we're wrong about diabetes.<sup>6</sup>

"A few nights after in the same ER, I saw a woman who was obese and had type 2 diabetes. As I decided that the patient needed an amputation in the leg, why was I holding her with such a bitter contempt?"

"In the hubris of my youth, I thought I had her all figured out; she ate too much, got unlucky, and she got diabetes. The case closed."

"When it came to a disease like diabetes, that kills Americans eight times more frequently than melanoma, I never once questioned the conventional wisdom. I actually just assumed that the pathologic sequence of events was a settled science."

"Three years later, I found out how wrong I was. But this time I was the patient. Despite exercising three or four hours every single day, and following the food pyramid to the ladder, I have gained a lot of weight, and developed something called metabolic syndrome. I had become insulin resistant."

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<sup>6</sup> <https://www.youtube.com/watch?v=UMhLBPPtIrY>

“Once you are insulin resistant, you are on your way to getting diabetes. Now your blood sugar level starts to rise, the entire cascade of pathologic sequence of events sort of spirals out of control that can lead to heart disease, cancer, even Alzheimer’s disease, and amputations just like the woman a few years earlier.”

“With that scare, I got busy changing my diet radically, adding and subtracting things most of you would find almost assuredly shocking. I did this and I lost 40lbs weirdly while I was exercising less. As you can see I am not overweight any more and more importantly I am not insulin resistant.”

“Most importantly, I was left with the three burning questions that would not go away. How did this happen to me if I was supposedly doing everything right? If the conventional wisdom about nutrition had failed me, was it possible it was failing somebody else? In underlying these questions, I became almost maniacally obsessed in trying to understand the real relationship between the obesity and insulin resistance.”

And he went on and asserted that obesity is not the cause of diabetes, it is a symptom of insulin resistance. The one way and best way out of it is to practice an extreme control in diet and paying attention to nutrition. It will get you out of the circle of the Metabolic syndrome.

## Internet & Blockchain

The advent of Internet has brought a new era and paradigm of information and knowledge sharing to the humanoid, and it has changed our daily lives so profoundly in a way that no one had ever imagined prior to the Internet, and we have become a different species, “Internoid”.

Perhaps, we are witnessing the second round of such revolution repeating in less than a 20-year period; it is now what we call “Blockchain”. As William Mougayar puts it in his book [1]: “The Blockchain cannot be described just as a revolution. It is a tsunami-like phenomenon, slowly advancing and gradually enveloping everything along its way by the force of its progression. Plainly, it is the second significant overlay on top of the Internet, just as the Web was that first layer back in 1990. That new layer is mostly about trust, so we could call it the trust layer.”

## Exercise & Rewards

There are two main reasons when people engage in controlled diet and exercise: for better health and for better look. In both cases, diet and exercise are considered as a critical factor in achieving the desired goals. Clearly diet and exercise are the perhaps the only way to lose weight and gain health back from the metabolic preconditions and diseases, assuming that the person stays within dietary modesty and away from other undesirable activities.

## Measurement & Rewards: Calorie Intake and Consumption

The subject of this White Paper is an ecosystem, where participants would measure the number of calories consumed in which the reward will be the CAL, a cryptographic token based on blockchain

There are many ways how which calorie consumption can very easily be measured, especially when you work out. The most prevalent ones are the smartphones with the intrinsic health-o-meter and pedometer functions. Also, there are the wearable smart devices, available on the market with more rigorous and precise measurement functions.

## CAL: Rewards to Whom Manage Calorie & Exercises

The motivation for our project “CAL” is to reward people who manage their calorie consumption and exercise. Weight control and exercise are beneficial to our health, but they are also beneficial to the society, as this translates into billions of dollars of savings in medical bills. Promoting and rewarding calorie management seems to be a mission of justice and substance for people and the health service providers all alike. So, it makes sense to reward those who exercise and manage calories daily and continuously.

CAL is a crypto coin to be distributed as rewards to individuals by measuring caloric consumption and monitored in real time through the CAL Blockchain network. Just like any other cryptocurrencies, CAL can be traded or used as payment method to endorsing shops and services. CAL coin can be kept as an investment as we expect the CAL coin value to rise with the increasing adoption and use cases expansion.

## In a Nutshell

Today, the chronic diseases are considered to be metabolic disorders, of a relatively new and modern kind. The proliferation of this affliction is crushing the society in all advanced nations globally

The major causes of the disorder are the excessive calorie intake and the lack of mobility. Calorie restriction is also known to increase longevity and expands healthy lifespan for humans and animals alike. CAL is a crypto coin to be awarded to those who control their calorie intake and exercise, in the form of a digital token. As its usages and the acceptance level grow, the CAL Ecosystem will be formed where CAL will circle in.

At this first stage of the CAL project, the focus will be on the consumption of calories by clients, leaving the calorie intake management side to the second phase.

# 1. CAL's Vision

## A Cryptocurrency for Your Health & Longevity

We cannot be simpler about the goal of CAL: CAL is born to motivate and reward people who practice calorie restriction and exercise for a longer and healthier span of life. Health is everything; you lose your health, you lose everything, as a well-known phrase puts it.

Yet, calorie control and exercise are somehow what most people procrastinate on until the next day or skip altogether. The reason could be that it has to become a lifestyle and habit, and this requires a long term and continuous commitment. CAL project can nudge people to get up and go.

Some recent studies show that with a pedometer, people would walk 25% more. How much more would they walk with CAL?

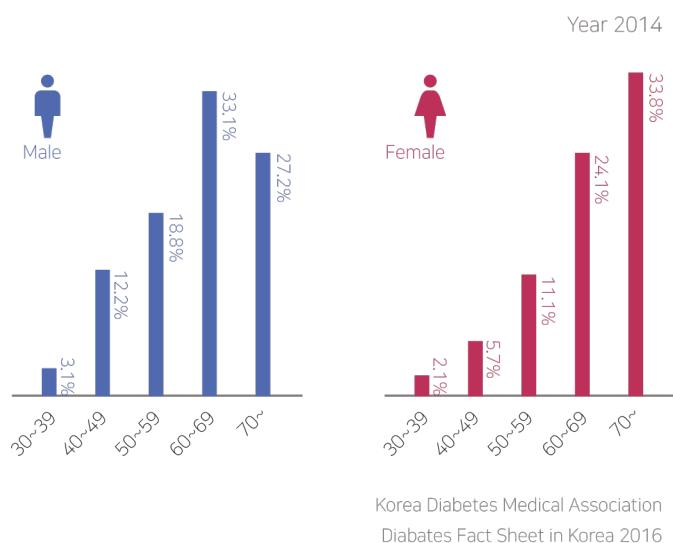
CAL coin is only the first stepping stone of a much bigger ecosystem. For a cryptocurrency to be viable, it must have an intrinsic value. The ecosystem will support to boost its value. So, in the next section we will describe how the ecosystem will interconnect and give value to CAL and the participants.

## The Birth of Calorie Coin

During the past two years, the CLC Foundation has been reviewing various business models related to blockchain. By combining the Blockchain technology with the healthcare field, the CLC Foundation has determined that it can address the biggest problems facing mankind, obesity and metabolic syndrome. Just like mining Bitcoins by solving a mathematical problem, you can get a calorie coin by exercising.

This reward coin has the primary goal of motivation with health care, but it will secondarily lead towards medical cost reduction.

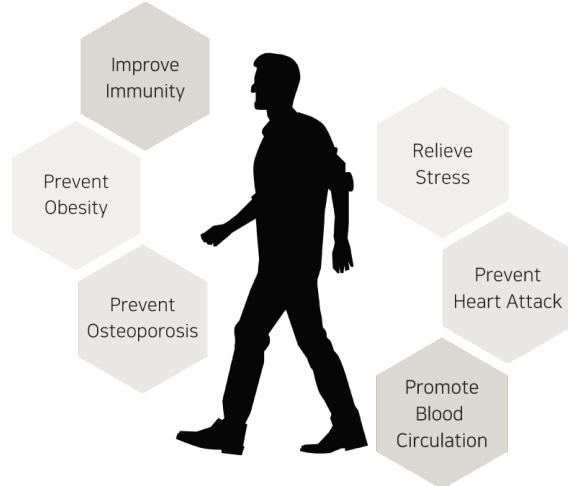
**Figure 3. Statistics of Korean Male and Female Diabetes**



*The worst in Asian countries, Korea's diabetes patients demand 65% of the national health insurance budget. We are convinced that even with a walk of 10,000 steps a day that consumes 300 Kcal, this number can be reduced to less than half.*

**Figure 4. Benefits of Walking**

*"It seems that the psychological goal of filling up the numbers in pedometer makes people more active," says Dr. Brabata of Stanford University. "Even if you do not scorch your pedometer, you would be more active than before," he said. "If you walk 2,000 steps a day, your physical health will improve 27%, which can be a great help for people who do not move as much."*



## Other Side of Coin: Value to Industries and Society

There always are two sides of a coin, and so has CAL: the generation side of CAL, and the consumption side of CAL. The generation side of CAL is rather personal in nature as CAL is distributed when people move. But on the consumption side of CAL, multiple industries, societies and nations will be deeply involved in the CAL project and will profoundly benefit from it

There is a whole slew of products that people need to go exercising. These products can endorse CAL because it makes sense for vendors to carry & accept CAL, and in doing so, the product will be easily purchased by the ones who spend CAL.

Will the health insurance companies and national health services benefit from a better preventive public health? Yes, in a big way, as they should carry and adopt CAL as part of their premiums. The reasoning behind it is two-fold: first, as people exercise more using pedometers and with the motivation been kindled by CAL, the insurance company's burden on medical reimbursements should decrease. In the long run, we are hoping that this downturn in medical costs will be a life-saver for the advanced societies, where the medical costs are skyrocketing.

Second, CAL's personal information is expected to give insurance companies good resources at the demographic level. This may also be used as a basis for calculating personal premiums when it comes to calculating the discount rates for CAL members.

The society will benefit from the financial offload of the medical costs. As a result, nations it will become more efficient. Thus, the virtuous cycle begins; as CAL circulates into the ecosystem, the better the personal health becomes, the stronger the industrial turnaround and growth gets, which will allow national health systems to become more efficient and so on.

## The CAL Ecosystem: Where All Participants Win.

In this section, a more detailed look into CAL ecosystem is presented. All participants are being driven by incentives and intrinsic merits. There are a few major components in CAL ecosystem, illustrated in the following picture

**Figure 5. A Picture of the CAL Ecosystem Structure**



## The CAL Clients

The CAL Client Side is where CAL is rewarded as the individuals perform exercise. The smart devices that individuals wear will measure the number of calories consumed. Thus, the ability of the client device to measure the calories to a certain degree of precision, and to detect the genuine nature of the motions by the client is critical to maintain the integrity of the ecosystem. A well-balanced algorithm will calculate the amount of CAL to be awarded.

Prospective contributors and participants are:

- Smartphones and smart wearable devices for the measurement of calories consumed
- Pedometer and health apps developers
- The CLC Foundation, which is expected to provide:
  - ✧ Caloriecoin Wallet: receives and stores CAL in the wallet, and provides UI to owners for CAL management
  - ✧ Coinstep: app for viewing daily steps taken
  - ✧ CAL Card: a debit card synchronized with Caloriecoin Wallet, and CAL Card can be accepted at affiliated offline and online stores

## The CAL Reserve & Exchange

The CAL Reserve & Exchange is where CAL is generated, distributed, exchanged, and traded:

- Blockchain for CAL transactions
- Backend servers for all CAL operations
- CAL Exchange and Trade

## The CAL Affiliates

The CAL Affiliates are the ones which will accept CAL, and incentivize their customers using CAL. Whether or not to accept CAL will be their business decision. When they do, they will become a member of the CAL Ecosystem, and play a vital role in providing necessary financial backing to the ecosystem. The affiliates will accept CAL as part of payment for their products and services.

The CAL collected can be exchanged to fiat money or other currencies at CAL Reserve & Exchange. The CAL affiliates are as follows:

- Health insurance industries
- National health plan
- Health & sports equipment vendors
- Diet foods and supplements manufacturers
- Outdoors equipment manufactures
- Online/offline health dietary shops
- Gyms & obesity management shops
- Smartphones and smart wearable devices

## The CLC Foundation: The Administrative Body for the CAL Ecosystem

The CLC Foundation, a nonprofit organization, has been established to oversee the fair and productive growth of the CAL Ecosystem. The CLC Foundation will administer the CAL supply and the CAL Reserve & Exchange. It will also provide support and tools for CAL services to operate more easily within the ecosystem. Ultimately, the CLC Foundation will facilitate the entire ecosystem's transition to a fully decentralized and autonomous network.

## Summary

Through the CAL Ecosystem, we envision that a symbiotic cycle of CAL will start from individual participants' diligence in mindful calorie control & exercise and in physical activities. CAL is then awarded to the individual automatically and can be later used as money at affiliated services and products. Eventually, the honoring affiliates will benefit from increasing revenue and creating value to the end user completing the CAL cycle.

The CAL Ecosystem is expected to be a decentralized, self-sustaining, and autonomous system based on CAL cryptocurrency. It also is expected to grow geographically wise and across diverse industries worldwide. The CAL playground is wherever people are concerned for their health and enjoy exercising, wherever industries coexist to support them. The CAL Ecosystem is a symbiotic space where those people and corporations can meet and help each other.

The CAL Ecosystem will be made very easy to connect to get all the participants connected with simple and open APIs. Any vendors or shops interested in joining the ecosystem should be able to do so thanks to Web based APIs, without a highly technical expertise required.

Most of affiliated participants will gain financially and businesswise, and the individuals will have a better health and happiness. As a long-term effect, our society will become more efficient, fitting and robust in many aspects.

Through a series of economic and technological transformations, and based on a new cryptocurrency called CAL, the CLC Foundation will work toward creating the first open

and sustainable ecosystem of digital services for our daily lives. The economic incentives at the core of this ecosystem will ensure that all participants – users, founders, and digital service partners – will ultimately benefit from this work.

The CLC Foundation will encourage a network effect for CAL by becoming its first large adopter and sponsor. It will also establish the CLC Foundation as the custodian of the CAL Ecosystem.

Over time, the CLC Foundation will oversee the transition of the CAL Ecosystem to a fully decentralized model that can operate with no assistance from CLC Foundation or any other entity. The decentralized CAL Ecosystem will emerge as a sustainable, autonomous economy that can empower the CAL, individual efforts in exercises, affiliated and endorsing merchandises and services, while building a platform for the best user experiences.

## 2. The CAL Cryptocurrency

### CAL: Cryptographic Token

CAL, a cryptographic token built on top of the blockchain landscape, is the unit of reward for calorie management, to be accumulated in the user Caloriecoin Wallet.

In character, CAL is a pure cryptocurrency of fixed supply. It is fractionally divisible and long-term non-inflationary. However, as described below, only a small portion of the CAL supply will become liquid in the near future, as most of the CAL supply is reserved for the CAL Reserve & Exchange.

Like other cryptocurrencies, units of CAL are fungible and transferable, and they will be expected to be traded on other established cryptocurrency exchanges.

### Implementation: Ethereum and ERC223

CAL will be implemented on the public Ethereum blockchain as an ERC223 token.<sup>7</sup>

The Ethereum blockchain is currently the industry standard for issuing custom digital assets and smart contracts. The ERC223 token interface allows for the deployment of a standard token that is compatible with the existing infrastructure of the Ethereum ecosystem, such as development tools, wallets, and exchanges. Ethereum's ability to deploy Turing-complete trustless smart contracts enables complex issuance rules for cryptocurrencies, digital financial contracts, and automated incentive structures

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<sup>7</sup> ERC20 is the Ethereum token standard. <https://github.com/ethereum/EIPs/issues/20>

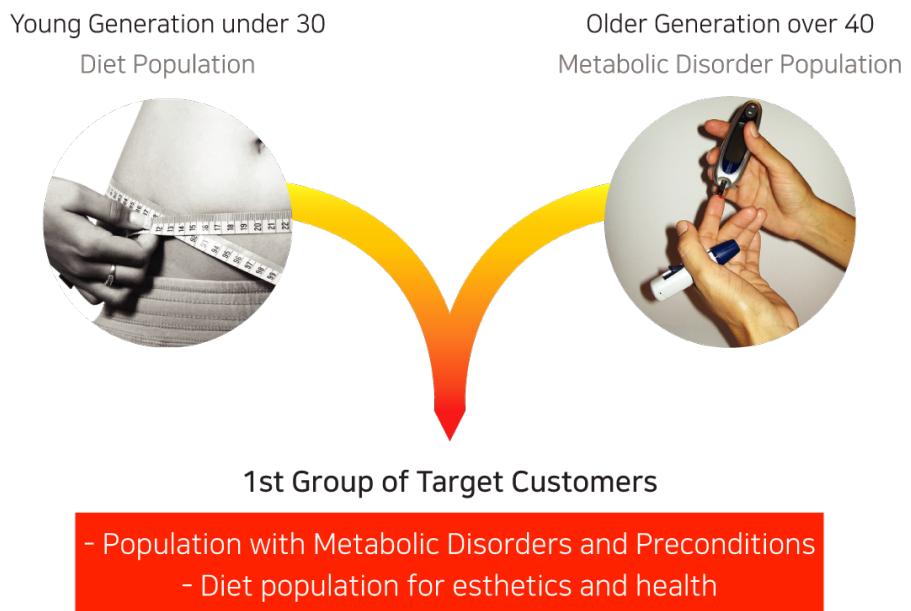
## 3. The CAL Clients

The CAL Client Side is where CAL is rewarded as an individual controls calorie consumption and work-outs. In this section we will take a close look at:

- What clients will carry with them:
  - ✧ Caloriecoin Wallet for everyday CAL
  - ✧ Coinstep, pedometer smartphone app
  - ✧ CAL Card for shopping
- How CAL is earned
  - ✧ Exercise, walk, run, and other calorie consuming activities
- Client devices for measurement of calories consumed
  - ✧ Smartphone and Caloriecoin Wallet
  - ✧ Smart wearable devices
  - ✧ Workout equipment
- The KYC Process
- Security considerations

## The Target Population of Calorie Coin

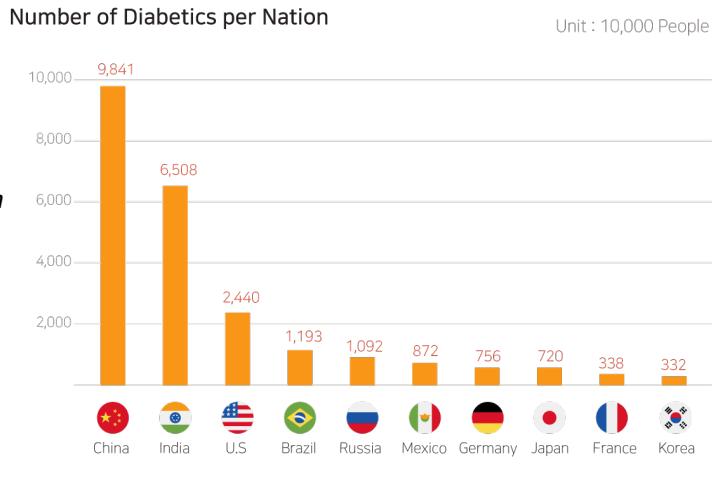
Figure 6. The 1<sup>st</sup> Group of Caloriecoin Target Population



As the above picture shows, the first group of Calorie Coin's target population will be the young generation of 30s or younger with the needs for diet needs for esthetics and health management, and the older generation of 40s or older who suffers from metabolic disorder or in precondition of it.

Figure 7. Number of Diabetics per Nation in 2013

*According to the International Diabetes Federation (IDF), China leads the world in terms of the number of diabetes in 2013 with 98 million people, followed by India with 65million, and the US with 24 million. Regionally, the western Pacific region which spans over Australia, China, and Japan boasts ranked as number one region in the world as the most diabetes plagued area with 138 million diabetes.*



## Caloriecoin Wallet for Everyday CAL

Your first entry to the CAL land is Caloriecoin Wallet. The user experience of CAL starts when you download Caloriecoin Wallet. The users should find it easy-to-use and simple. There should be no barriers nor intimidation for an average person with smartphone.

The main functions are:

- Get CAL: calorie control detection by connecting with the internal pedometer and reporting to server, CAL request, reception, and storage
- CAL Balance, transaction records
- Sell CAL: send to someone else, exchange, trade CAL to cash, and other virtual coins.
- Go to Market: purchasing of products and services with CAL

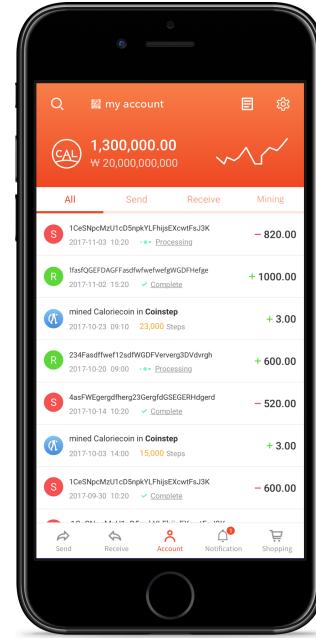
**Figure 8. Caloriecoin Wallet Landing Page**



*The picture shows the main page of Caloriecoin Wallet, where you can get, check balance, sell CAL, and go to market to purchase affiliated services and products*

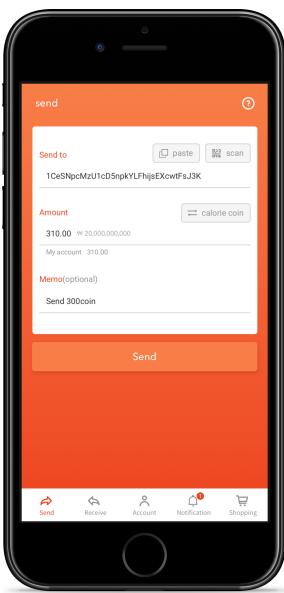
**Figure 9. Wallet History and Balance Page**

The picture on the right shows the wallet page for the of the CAL transactions history, and the current balance in CAL.



**Figure 10. Caloriecoin Wallet Wire Transfer Page**

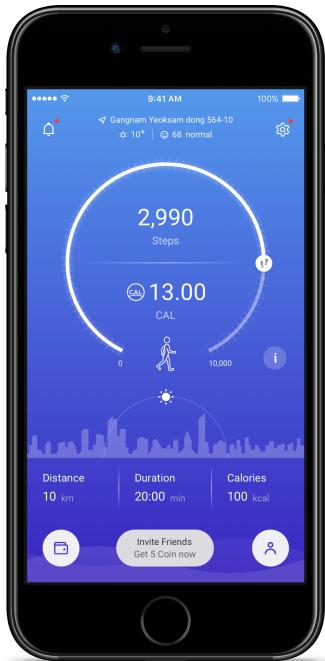
The picture on the left shows the wallet page for transferring CAL to someone else



## The CAL Pedometer

The picture below shows an example of a pedometer that works with Caloriecoin Wallet.

**Figure 11. Example of the CAL Pedometer**



The CAL pedometer will provide the following functions:

- Statistical data of pedometer measurements
- CAL earnings via collaboration with Caloriecoin Wallet
- Finding friends

*The picture on the left shows an example of the pedometer main page. The pedometer will provide actual walking data of clients to the Caloriecoin wallet, so that the wallet can receive CAL.*

## Client Devices for Calorie Consumption Measurement

Smartphones are limited when detecting people's various activities. There are many other devices and machines that people can use to burn energy and to better monitor their calorie consumption.

### Smart wearable devices

One good example is a smart wearable device, which comes with measurement functions of calorie, heart beat rate, travel distance, and altitude change, etc. Thus, this type of devices can measure calories more precisely than a smartphone pedometer so more CALs can be rewarded.

To support CAL, Wearable devices need to communicate with the Caloriecoin Wallet running on smartphone, and thus requires software upgrade. The CLC Foundation will supply the necessary APIs to the participating vendors.



*Smart wearable devices such as the one shown on the left can communicate with Caloriecoin Wallet running in smartphone, and measure and report calorie consumption in a more precise fashion.*

## Fitness Equipment

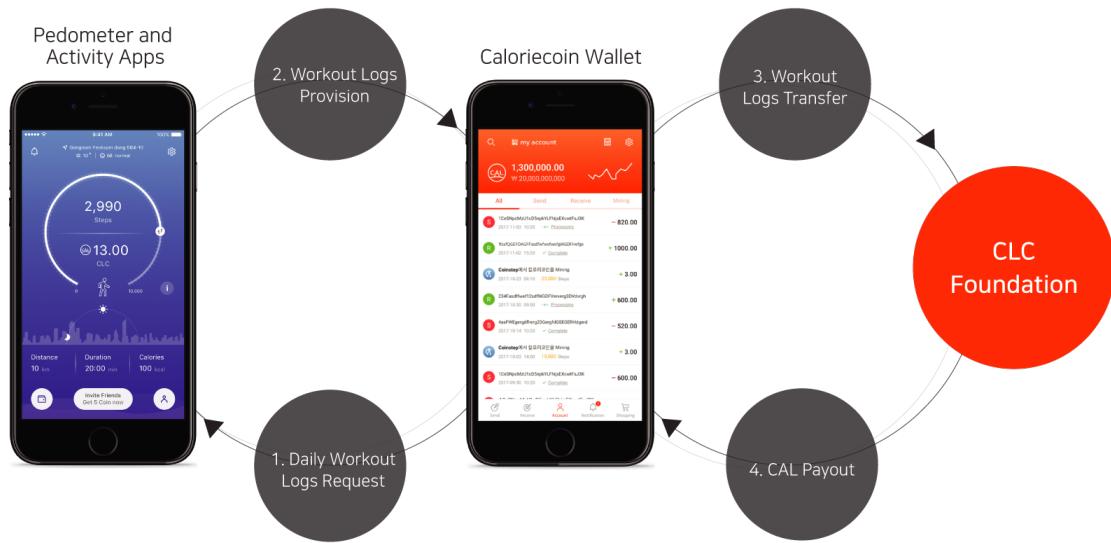
There are many types of workout equipment in fitness centers and homes. These machines can be made CAL enabled by attaching a CAL oMeter, a small smart device that can communicate with Caloriecoin Wallet and measure the workout. A reference design of CAL oMeter will be furnished by the CLC Foundation.



*Various types of workout machines can be CAL enabled by attaching a small smart device, CAL oMeter. Workout enthusiasts will earn CAL coins after every session, and you don't need a lot of imagination to believe that those folks will enjoy workout and CAL.*

## The CAL Distribution

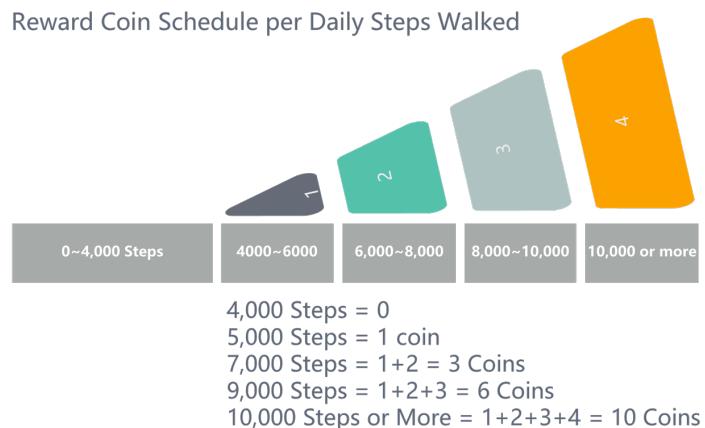
The picture below shows how a client will earn CAL. We expect that this process will take place automatically once a day when the client exercises or walks more than the daily default number of steps. The CAL Distributor refers to the server group which is in the background and manages CAL distribution including the blockchain for CAL.



**Figure 12. The CAL Distribution Process**

In the above picture, the pedometers and activity apps include the pedometer that we provide called “Coinstep”, and all the other pedometers and activity apps in the market today. The apps from third parties need to be upgraded to communicate with our Caloriecoin Wallet.

**Figure 13. Daily Number of Steps and CAL Reward Schedule (a Referential Model)**



This picture shows a referential model of daily CAL reward schedule where a client will start to earn CALs when one walks more than 4,000 steps, and one will earn a maximum of 10 CALs when one walks more than 10,000 steps on a day.

## The KYC Process

Facing the complexity of raw cryptocurrency technology is typically onerous for most consumers. Issues of transaction fees, private keys, and alphanumeric addresses create usability barriers for mainstream users, including the common requirement to hold cryptocurrency in the first place in order to obtain and utilize other tokens. CAL will aim to significantly reduce these onboarding frictions. The onboarding process for users will not require prior expertise with cryptocurrencies before being able to interact with CAL.

The first comers will need to register in Caloriecoin Wallet via the CAL KYC process. The KYC (Know Your Customer) process will be all online and quick requiring only about 3 minutes to complete. It will require users to record a video of themselves holding a valid ID card, passport or driving license and transmit it to the server. At the server, this video will be analyzed by a recognition software, and the user will be registered.

Our mobile onboarding & KYC solution could be built with Jumio. Jumio delivers the next-generation in digital ID verification, enabling businesses to reduce fraud and increase revenue while providing a fast, seamless customer experience. Jumio uses computer vision technology to verify credentials issued by over 200 countries in real-time web and mobile transactions.

Caloriecoin Wallet is expected to be implemented as a soft wallet, where most of the critical resources, such as coin and private key, are saved in the server. That way, if you lose your phone or password, you will be able to recover them easily.

## 4. The CAL Reserve & Exchange

The CAL Reserve & Exchange is the place where CAL is generated, distributed, exchanged, and traded:

- Interface to Ethereum public chain for CAL generation & ledger
  - ✧ CAL generation & reserve management
  - ✧ CAL distribution control
  - ✧ CAL transfer transaction management
- CAL Exchange & Trade for clients and affiliates
  - ✧ CAL exchange to other cryptocurrencies and fiat currencies
  - ✧ Trading of CAL into other cryptocurrencies and fiat currencies
- CAL Ecosystem membership management



**Figure 14. The CAL Reserve & Exchange Structure**

## Ethereum Public Chain for CAL Generation & Ledger

The average blocktime of Ethereum network on August 30, 2017 came out to be 24 seconds. The Ethereum network currently operates on a Proof of Work blockchain and is therefore limited in throughput, though future versions of Ethereum will work toward enhanced throughput and scalability. The current average confirmation time, or block time is approximately 25 seconds at the time of writing this paper. For technical reasons, the block time will marginally increase. Nevertheless, it remained smaller than 30 seconds as of August, 2017.<sup>8</sup>

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<sup>8</sup> <https://www.ethnews.com/vitalik-buterin-on-ether-price-affecting-the-metropolis-update>

The number of daily transactions on the Ethereum network has been growing steadily. Daily transactions increased from 38,730 to 400,220 (1033 percent) from the starting to the ending day of August 2017<sup>9</sup>. Currently, the number of daily transactions is as high as 400,000, and this volume is expected to continue increasing as new applications and users continue to enter the Ethereum ecosystem.

The current throughput of Ethereum is approximately 8.56 transactions per second, or approximately 740,000 daily transactions. The Ethereum network will also adjust to higher volume conditions for additional throughput. For long-term, Vitalik's scalability paper says over 100,000 tx/sec may be possible, but that's with some fairly radical future changes, not the current system.<sup>10</sup>

There are two other issues that suggest that a purely on-chain architecture may not be optimal at the outset. The first issue is that Ethereum transaction confirmation times result in significantly delayed responsiveness than users typically expect from consumer applications. The second issue is that Ethereum blockchain requires fees to be paid for every transaction. Fees are paid in Ether cryptocurrency, creating an adoption barrier for the average user.

Given these barriers, the CLC Foundation will initially implement a semi-centralized hybrid on-chain and off-chain Transaction Service for scalable interactions with the CAL cryptocurrency. At the core, the transactions in CAL will be settled on the Ethereum blockchain. However, the CLC Foundation will develop and host a centralized off-chain ledger with an API available to all CAL affiliate partners. This will (1) improve user experience due to latency, (2) avoid network fees when transacting between users, and (3) avoid stress on the public network due to large transaction volumes.

## On-Chain and Off-Chain Tradeoffs

This hybrid solution creates a semi-centralized system in which end users will enjoy a standard user experience insulated from some of the complexity of blockchain systems. However, this approach also has the typical drawbacks of a centralized system, such as having to rely on trust between participants. In the long term, the CLC Foundation will move onto migrating the transactional infrastructure to a fully decentralized system while retaining a low friction user experience.

To enable highly scalable, low latency, and cost effective decentralized systems, and to eliminate the need for semi-centralized approaches, significant advances will need to

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<sup>9</sup> <https://etherscan.io/chart/tx>

<sup>10</sup> [https://github.com/vbuterin/scalability\\_paper/blob/master/scalability.pdf](https://github.com/vbuterin/scalability_paper/blob/master/scalability.pdf)

be made in blockchain technology. Progress is already being made with projects such as the Ethereum Foundation's ongoing Casper research,<sup>11</sup> the Raiden network,<sup>12</sup> Tendermint/Cosmos,<sup>13</sup> and Graphene<sup>14</sup> in the areas of throughput scalability, sharing, efficient payment channels, and decentralized governance protocols. The CLC Foundation would welcome the opportunity to work with the blockchain technology community on accelerating the required advances and testing them in production by integrating them into CAL transaction services.

## The CAL Exchange & Trade

The CAL Exchange & Trade is the service for CAL users and affiliates where they can request and receive CAL, pay and be paid in CAL. The CAL can be exchanged to other cryptocurrencies at CAL Exchange & Trade services.

The security of the service will need to be implemented in accordance with the utmost and rigorous security guidelines.

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<sup>11</sup> <https://blog.ethereum.org/2015/08/01/introducing-casper-friendly-ghost/>

<sup>12</sup> <https://raiden.network>

<sup>13</sup> <https://cosmos.network>

<sup>14</sup> <https://docs.bitshares.eu/>

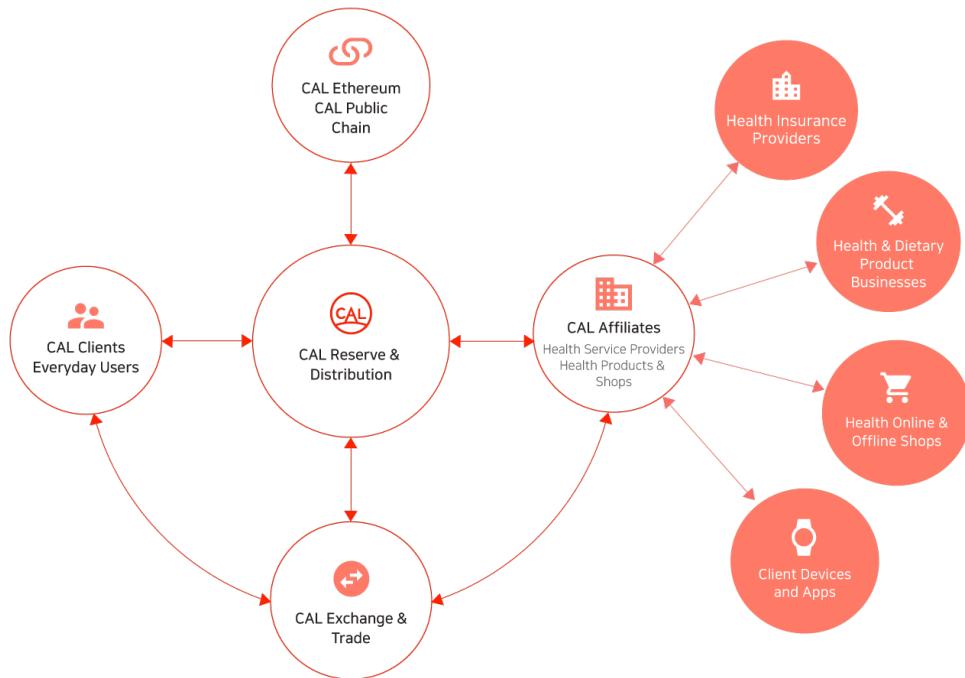
## 5. The CAL Affiliates

### The CAL Affiliates

The CAL Affiliates are the group of services and entities, where CAL is promoted and incentivized. The affiliates will accept CAL, as in its pure form before being converted to any other currencies, as part of payment for their products and service.

Also, the affiliates are the eventual beneficiaries of CAL from the savings in expenditure in medical and health maintenance costs and from the increase in revenue directly and indirectly from CAL clients. They, in the long run, will supply the everlasting fuel to the longevity of CAL by proving the necessary financial ammunition to CAL and the CAL Ecosystem.

**Figure 15. CAL Affiliates Are Positioned to Serve CAL Clients**



Some of the prospective affiliates are the entities involved in health and diet as their main business and the ones who sell products tightly related to health, such as:

- Health insurances
  - ✧ Health insurance industries
  - ✧ National health plan
- Health & dietary product businesses
  - ✧ Health & sports equipment vendors
  - ✧ Dietary foods and supplements manufacturers
  - ✧ Outdoors equipment manufactures
- Online/offline shops
  - ✧ Online/offline health & dietary shops
  - ✧ Gyms & obesity management shops
- Client devices and apps
  - ✧ Smartphones and smart wearable devices
  - ✧ Health and pedometer app vendors

## CAL Software Components & APIs for Affiliates

The CLC Foundation has implemented different services and will continuously improve the software components for the affiliates. The Services are:

- CAL token and CAL token Exchange & Trade
- Caloriecoin Wallet and CAL Card
- CAL backend server
- CAL affiliate software and APIs

CAL Standard Open APIs will be defined and developed for affiliates **to** easy connections and enable the CAL Ecosystem. They will define the external interface functions such as:

- Devices and apps interface for CAL Client Side
- CAL payment modules for CAL Affiliates

# 6. The CLC Foundation

## Overview

The CAL Ecosystem is envisioned as a community of ecosystem partners that adopt the CAL cryptocurrency. The CLC Foundation is intended to be an independent, nonprofit, and democratic governance body for the members of this ecosystem.

The CLC Foundation will establish the long-term policies and important decisions in the following matters:

- Technical support for the implementation and the development of the CAL Ecosystem
- Issues related to all membership of the ecosystem
- CAL Reserve & Exchange operations

The CLC Foundation's long-term goals are:

- To furnish the open environment where the ecosystem will expand to empower all the members with CAL
- To enable developers to develop, deliver, and enhance those services and attract users, in an open and sustainable platform.

In order to fulfill its mission, the CLC Foundation will dedicate its resources to three specific goals in relation to research, development, and governance as described below.

## Governance Goals

The CLC Foundation will commit resources to establish fair and transparent governance and processes, taking into account the opinions and circumstances of all participants in the ecosystem. This open management model determines and oversees the following:

- Policy and decisions regarding CAL Reserve & Exchange operations
- Membership process and participation eligibility and rules
- Analysis and Responses to legal issues
- Analysis and Responses to industry standards compliance
- Determination of other key aspects of the CAL ecosystem

## Development Goals

The Foundation will direct and fund the development of tools that give to the ecosystem partners the ability to build, grow, and create value for one another. The CLC Foundation will further this work by engaging development teams to continuously improve the technology supporting the CAL Ecosystem. The foundation will maintain the CAL Open Standard APIs for the benefit of the ecosystem participants.

# The CAL Project Milestones

## Technical Background of Team ——



- Implementation of credit card system based on cryptocurrencies
  - PoC(Proof of Concept) project undertaken by the team
  - The project sponsored by one of major credit card companies
- 
- Patent filed for use of blockchain based coin for health management
  - Caloriecoin brand registered
  - Caloriecoin white paper version 1 completed
- 
- Patent filed for use of blockchain based coin for health management
  - Caloriecoin brand registered
  - Caloriecoin white paper version 1 completed
- 
- Caloriecoin business plan completed
  - Caloriecoin wallet & Coinstep planning document completed

*These figures show the past CAL Ecosystem milestones and background of the engineering team, as well as the project milestones in the near future.*

## Roadmap for Implementation ——



# 7. The CAL Token Issuance Scheme

## The CAL Hard Cap & Daily Rewards Credits

**Table 1. The CAL Generation & Allocation Plan**

	Total Generation Amount	Token Sale Amount	Reserve	Team & Adviser	Community Group & Strategic Partners	CLC Foundation	HealthCare Kit Distribution
CAL coin	100%	10.0%	2.0%	3.0%	5.0%	15.0%	65%
Amount	10,000,000,000	1,000,000,000	200,000,000	300,000,000	500,000,000	1,500,000,000	6,500,000,000

The table above shows the total CAL generation and allocation plan. The hard cap for CAL has been fixed at 10 billion tokens. The initial token event has been planned to generate the initial fund for the project and the amount for the token event is set at 10% of the total CAL volume.

The allocation of the tokens, as is shown in the Table 1, will be rigorously adhered for the sake of the transparency of the project.

The CLC Foundation's allocation will be used for three objectives: 1) to administer the CAL token supply and CAL Reserve & Exchange, 2) for marketing, and 3) for operational costs.

- **1) CAL Reserve & Exchange Operations:** The CLC Foundation will administer the rewards mechanism used to incentivize participation in the CAL Ecosystem, as described previously.
- **2) Marketing:** A reserve of supply used for generating a starting balance for partnerships integration.
- **3) Operational Costs:** The CLC Foundation is established to ensure the independent governance and growth of the CAL Ecosystem. A small portion of CAL rewards will be allocated to fund ongoing operational, legal, and development cost.

## Token Distribution Event

The Foundation will commence the token distribution event once the CLC Foundation has completed the technology upgrade to integrate the CAL Ecosystem and the cryptocurrency to be used functionally within CAL.

**Table 2. The CAL Token Sale Schedule**

	1st Pre Sale	2nd Pre Sale	ICO or Private Sale
CAL coin	200,000,000	300,000,000	500,000,000
Coin/ETH	40,000 Coin/1ETH	30,000 Coin/1ETH	20,000 Coin/1ETH

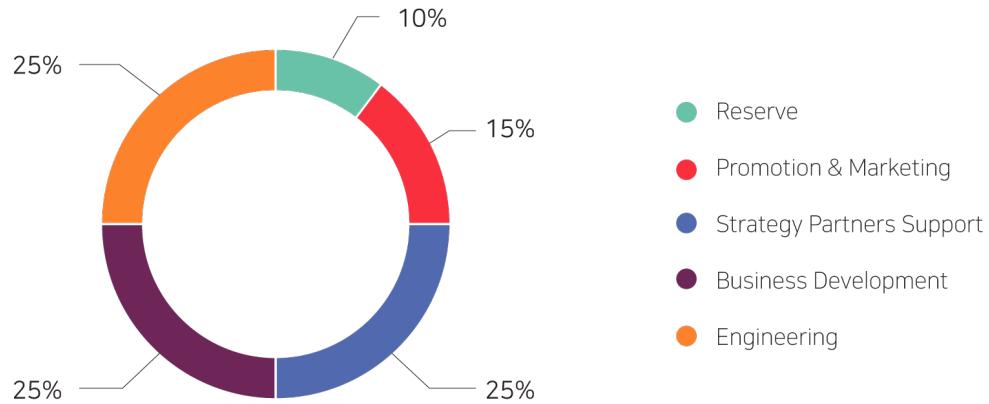
In order to finance the CAL roadmap, the CLC Foundation will conduct a token distribution event that will offer 1 billion out of the 10 billion-unit total supply of CAL. The proceeds of the token distribution event will be used to fund CAL operations and to finance the CLC Foundation. A portion of the funds raised in the token distribution will be used to execute the roadmap of additional feature development planned for the CAL integration into the CAL Ecosystem.

To be notified of updates regarding the token distribution event, participants are invited to provide their email address at <https://www.calorieco.in>. The pre-registration process may require a proof of identity and residence for larger purchases in order to ensure regulatory compliances at the time of the token distribution event. Further announcements regarding the timing and structure of the sale will be communicated through the portal.

## How Will the Proceeds Be Used?

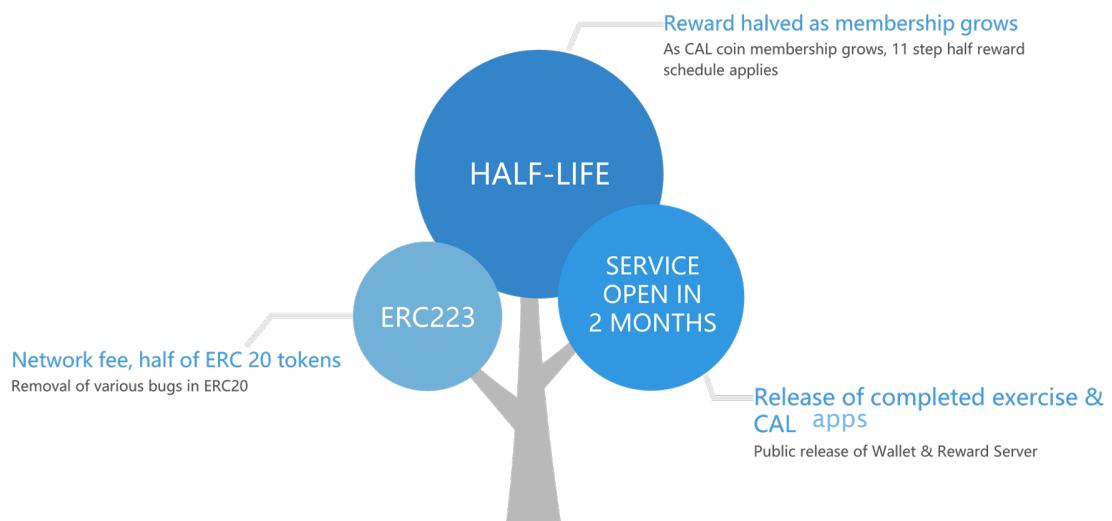
Upon the completion of the token distribution event described in the previous section, the proceeds are expected to be used by CLC Foundation as shown in the diagram below.

**Figure 16. How the Proceeds from the Token Distribution Event Will Be Used**



### 3 Major Advantages of CAL

**Figure 17. 3 Major Advantages of CAL**



As shown in the picture above, the CAL coin has three advantages:

1. The CAL coin is an Ethereum Token based on the ERC223 standard, which charges one half the transfer fee compared to other ERC20-based coins and will also solve many of the problems that the ERC20 had. It will also provide a better coin transaction environment.

2. Coinstep, an exercise app tightly coupled with CAL, has been already developed at the time this Whitepaper is authored. Caloriecoin Wallet and Reward Servers are expected to be completed within the next two months, and the CAL coin service will be provided to general users.
3. As the number of CAL subscribers doubles, the CAL's distribution algorithm is designed to halve the number of CAL reward coins, consequently the value of each CAL will be doubled. This half-life arrangement takes account of the absolute cap of the CAL issuance, 10 billion CALs. A practical half-life algorithm will be implemented to reflect the effect of the membership growth, and to determine a meaningful CAL rewards amount.

## The Nature of CAL Distribution: Half Life & Double Value

**Table 3. The Characteristics of the CAL Distribution Algorithm**

CAL Coin Half-Reward Schedule: As memberships double, the amount of reward coins shrinks by half, but the value of the CAL coin doubles

	Memberships Amount	Expected Reward Coin Volume - Daily Average	Expected Reward Coin Volume - Monthly Average	Total Month Reward Coins	Total Annual Reward Coins
1	300 000	5	150	45 000 000	540 000 000
2	600 000	2,5	75	45 000 000	540 000 000
3	1 200 000	1,25	37,5	45 000 000	540 000 000
4	2 400 000	0,625	18,75	45 000 000	540 000 000
5	4 800 000	0,3125	9,375	45 000 000	540 000 000
6	9 600 000	0,15625	4,6875	45 000 000	540 000 000
7	19 200 000	0,078125	2,34375	45 000 000	540 000 000
8	38 400 000	0,0390625	1,171875	45 000 000	540 000 000
9	76 800 000	0,01953125	0,5859375	45 000 000	540 000 000
10	153 600 000	0,009765625	0,29296875	45 000 000	540 000 000
11	307 200 000	0,0048828125	0,146484375	45 000 000	540 000 000

The time span for each step is expected to vary between 1~3 months

As shown in the picture above, CAL coins will be distributed on an average of 5 coins per member per 300,000 members, but if the number of members increases to 600,000 per day, the average daily distribution amount per member is reduced to 2.5 coins. So, we will distribute 540 million coins per year, and after 11 years we will complete the coin distribution (6.5 billion coins) for the upcoming Health Care Kit (reward coin for exercise customers)

## 8. Conclusion

### **The Dark Side of Economy, Where We Live In Now**

When we buy a health insurance policy, we expect that the insurance company will pay for the medical bills when we get sick. The insurance company cannot have us to do anything particular for our health under the insurance policy. The contract puts no weight whatsoever on what we do to improve or deteriorate our health. The insurance company believes that we are all good people and trusts that we stay healthy as long as we live.

But the reality is dark. Our medical bills have been staggering, and so has our health insurance premium been. The saddest fact is that our health as a demography has been deteriorating. We call this “the dark side of economy”, and we have been living in the dark side of economy so far. There seems to be no end to this rabbit hole.

### **The Bright Side of Economy, Where We Want to Be**

Our vision is to build a new paradigm of economy, what we might call ‘the bright side of economy’. There, people would be under a contract, a voluntary one, in which it stipulates that you will be paid for the deeds you have planned and finished. You will be paid in CAL in our ecosystem. The contract will be written in Ethereum smart contract under the CAL Ecosystem.

In this bright side of economy, you execute what you have planned to improve your health and you will be paid as you become healthier. We will guide you and work with you to get there. One example is your weight. When your target is to lose weight,

you will get paid when you have actually lost your weight. This is what you might call the best preventive medicine. We are hoping that your medical bill will not jump; and your insurance premium costs will not jump either.

In that perspective, we will be providing insurance companies your personal data, only when you have agreed to do so.

## The National Health Plan, the Same Story Applies

For the national health plan, we could implement the same program. When the national health plan recognizes that your health has improved, they can pay you Real money, so there would be no need for reimbursement. This would be called “the personalized medical incentive”, where people would be paid when they accomplish goals planned beforehand. This is in contrast to the normal situations where you would be reimbursed only when you get sick.

## The Technological Innovations Have Made It Possible

The recent advancements of information technologies, most prominently of the smart phone, and of the blockchain & smart contract, have set the stage for the true amalgamation of this notion of the bright side of economy.

The bright side of economy can be implemented painlessly and quickly using the blockchain and smart contract technologies. That is our vision, and this paper is all about going towards it. We hope that every participant in the CAL Ecosystem will be healthier and happier in the long run with CAL.

## 9. The CAL founding team

### The CAL Executive Team



**Charles Chung**  
Founder and CEO, CLC Foundation

In 2015, Charles co-founded Blockchain Lab, the first company builder in Korea with focus on blockchain technology.

Over the past 20 years, he has assisted about 30 startups from inception, and has been continuously creating new ventures for himself. His main interests have been in establishing new business models in the areas of electronic payment, electronic guarantee, authentication, and remittance.



**Jay Ahn**  
COO, CLC Foundation

During his last decade, Jay has served as COO at CrossCert, where internet security, and public key infrastructure were the keywords. In the last two years, he has been very actively involved in developing new business models and teams in the blockchain arena.

He holds MS in Computer Science from the Ohio State University, worked as MTS in UNIX kernel at Bell Labs, and as director for UNIX server engineering team.



**Charles Lee**  
CTO, CLC Foundation

Charles Lee is the cofounder, and the chief technology officer at CLC Foundation, and is leading the CAL coin development into the CAL community. Prior to joining CAL, he also founded and served as the president at iSoft, and as CTO at Future Systems. In the last couple of years, his main interest has been in blockchain and cryptocurrencies, and has been a key player in the company. He graduated from KAIST with computer science master's degree.



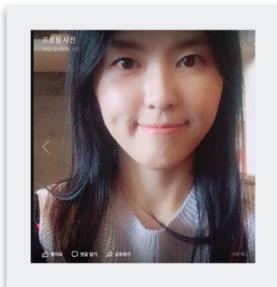
**Hansu Ethan Lee**  
CLC Foundation, Director

Ethan is a director at CLC Foundation, and is leading the engineering team of CAL. Prior to joining CAL, he was the CTO at LinkZen, and he worked at Samsung Electronics as software engineer. Prior to that, he worked as a software developer at TG Payment Gateway Corp. He holds MS in Computer Science from KAIST. Very recently, he has completed a Hyperledger project where he implemented the payment layer for a major credit card company in Korea.



**Andrew Oh**  
Director, CLC Foundation

Andrew is a director in strategic planning at CLC Foundation. Prior to joining, he was leading the service planning team at TG Corp, and Hyundai Information Technology. He graduated from KyungHee University holding Bachelor's degree in Computer Science. Very recently, he participated in a project for a major credit card company, where he implemented the payment layer using Hyperledger.



**Eunice Know**  
CMO, CLC Foundation

Eunice has been actively working as CMO of CLC Foundation and has been proven as one of the most valuable members of the team. Before joining the foundation, she has founded TeamW.e, and served as CEO of the company. She graduated Duksung Women University as bachelor and acquired her MBA degree from Sungkyunkwan University.

## Advisors



### Jinseok Kim

BS from Korea University  
Worked at Dacom  
CEO at CJ Hello Vision  
Advisor at CJ Hello Vision  
Chairman in Smart Contract Subcommittee at  
Blockchain Academic Foundation



### Youngduk Kim

BS in Computer Engineering, Seoul National University  
MS in Information & Communication, POSTEC University  
CTO at Interpark, and Gmarket  
Head of Research Center at Lotte Information Systems  
VP at Lotte Acceleration Center



### Ben Hur

BS from Seoul National University  
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CTO at eNet  
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## Sanghan Lee

Ph.D in Technology in Ventures from Kunkook University  
eBay Korea  
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CEO at Gigalinks  
Korea Country Manager at Music Genome  
Head of KBIPA (Korea Blockchain Industry Promotion Agency)

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