

CFC System Guide

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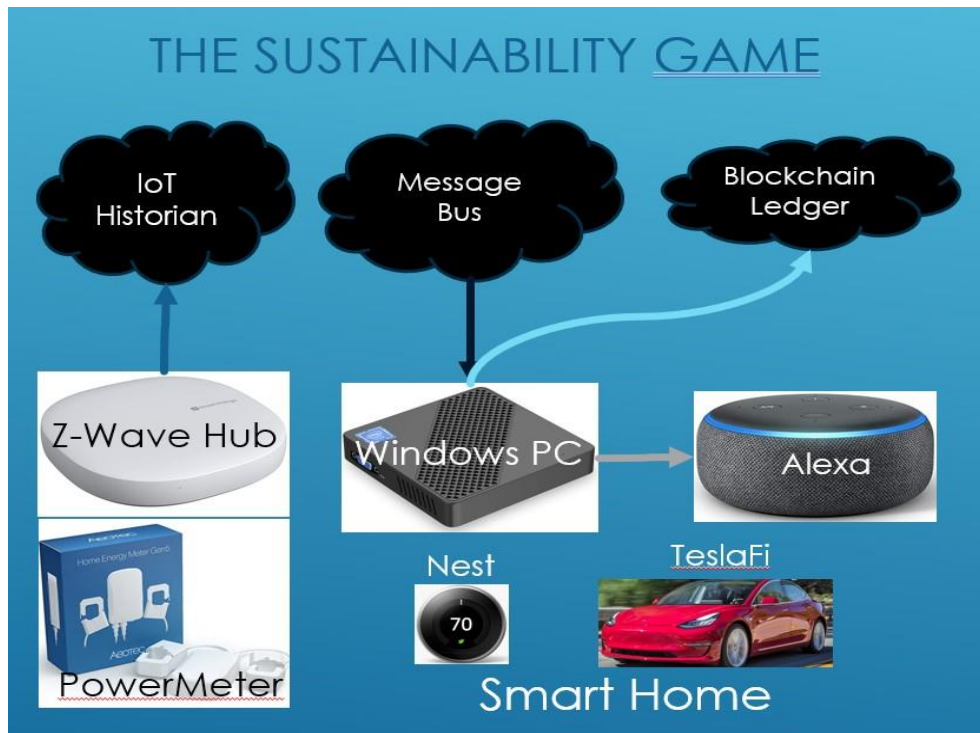
"CurrentForCarbon" Real-time Demand Response Gaming

System Guide

This guide is for administrators and those who desire a deeper understanding of the CurrentForCarbon game.

An administrator is responsible for setting appropriate game awards and initiating a game event. This is usually done in coordination with an electric utility or demand response aggregator on behalf of an electric utility.

System Architecture and Design



The game system consists of four separate but integrated subsystems; 1) power monitoring, 2) player software agent, 3) data distribution and 4) distributed ledger. Each subsystem was designed to be independent, scalable, extensible and replaceable to allow the system to grow and adapt to a variety of different energy environments.

Power Monitoring System



The power monitoring system consists of an Aeotec Z-Wave whole-house power meter paired to a Samsung Smartthings hub. The meter sends power data to the hub every 30 secs. A SharpTools Rule forwards the power data to the MATLAB ThingSpeak cloud real-time database where it can be viewed graphically online or using the ThingView app on a smartphone.

The power monitor is connected to the house electric panel using clip on current transformers.

Player Agent Software Service



The player software agent runs on a player's Windows 10/11 personal computer and assists the player by detecting when a game starts, turning off house devices using home assistant voice control, monitoring the power usage during the game, calculating the power saved and notifying the player of the awards earned.

Once activated and started, the player agent runs continuously as a Windows service. It will restart automatically after reboot.

Configuring the player agent consists of registering the agent with the game player database, configuring agent access to the data distribution system and distributed ledger and copying the configuration file to the players PC after player agent software installation.

Data Distribution System

The data distribution system consists of an open, cloud-based messaging service that uses the standardized MQTT (Message Queuing Telemetry Transport) protocol for publishing and subscribing to messages that are exchanged between the subsystems.

Similar messaging services are available from a variety of 3rd party providers based on scalability, availability and other application requirements.

Distributed Ledger System

The distributed ledger system consists of an Ethereum blockchain smart contract that maintains the game player, game event and game results ledgers. Game data is available for download by the administrator. Players are identified in the ledger

using opaque identifiers. All confidential and personal player data is held offline and is not externally accessible.

User Interface

PC applications provide the following functions. Administrative apps are not shown.

1. Currentforcarbon.exe -

The primary game player interface. This form enables a player to activate, start, stop and deactivate the game agent software.

Cluster VOLTA_BETA1
Version 0.6.9
Service CurrentForCarbon

Current For Carbon, The Game
Game Player

Activate Player **Start Playing** **Stop Playing** **Deactivate Player**

Player Name: Jack Spearo
Player Street: 10 Cherry Grove Road
Player City: Chesapeake City
Player State: MD Player Zipcode: 21777
Player Identifier: 3c25612fad17df011d2a698c1ef3cc40a943a2e4d0f0xxxxxxxxxxxxxxxxxxxx
Player Electric Co: Delaware Electric Coop
Player Time Zone: America/New_York
Ethereum Address: 0x47b03cb6a335A15a87Fb63AE2xxxxxxxxxxxxxxxx
Ethereum Key: 0x0949a8d20891952dbc52ec59a2aaf36dcd97b5a11410xxxxxxxxxxxxxxxx
Data Connect String: channelID=1118xxxx,fieldID=1,readKey=USIxxxxxxxx

1. Get My Game 2. Log My Statistics Get My Awards
YTD Points YTD Awards

2. GameStarter.exe -

The app used to configure game event parameters and initiate the game. The app sends a message to all player game agents letting them know when the next game will start, how long it will run and how many points will be awarded. Awards are classified as Bronze, Silver and Gold.

The app allows messages to be targeted to all players or players in a specific zip code, city or state. Other filter criteria can be added as needed.

CurrentForCarbon, The Real SaveThePlanet Game

Cluster BETA1
Version 0.6.9

CurrentForCarbon, The Game

Game Starter

Game Start Time: "09-17-2021 06:43:12" DurationInMinutes: 60

GridZone	ALL	DollarPerPoint	.001	Bonus Points	10
GameName	Baccarat	PointsPerWatt	1.0	Bonus Pool	10
GameType	SHEDPOWER	PointsPerPercent	0.064		
GameAwardRank	GOLD	PreStartAlert	true		

GameID: Game637675009921086270

Create JSON

Start Game

Game Awards

A player receives an award equal to the (number of points per watt)*(dollar value per point)*(number of watts reduced).

Total awards paid per game to the players is equal to the sum of all player awards. This total should equal the value of reducing power demand to the grid during the game event. The value of this "demand response" action needs to be determined by the grid operator or aggregator officiating in the game.

Analyzing Game Results

The administrator can download game results from the game ledger and import them into an Excel spreadsheet or MySQL database. The database tables allow the administrator to view and analyze the game results per player as well as the game result totals, player result totals and player year to date totals. This data can be used to identify inconsistencies and anomalies as well as aid in tuning game event parameters such as points per watt.

