Power2peer: Annuel Report 2023

The year 2023 ended with the significant changes in the solar energy marketplace. The prices of the solar panels dropped significantly from $0.32 / watts to almost $0.22 /watt.

The distributed energy resources are making big comeback for powering EV and standalone applications. Power2peer in the process of focusing attention on the growing carbon credit market and working with the solar projects generating carbon credits.

Accomplishments in 2023:

1. Reorganization of the power2peer in Rochester, NY
2. Power2peer joined the NextCorp incubator in Rochester.
3. Received the RG&E grant of $25,000 for the development of blockchain demonstration.
4. Power2peer engaged with University of Buffalo and Prof. Bina Ramamurthy for the development of the Ethereum based demonstration of the transaction engine.
5. Developed the software for the designing of solar power systems for commercial and residential units and measuring production of clean energy kilowatts.
6. Power2peer was awarded CEIS STAR PROGRAM grant from Rochester Institute of Technology $10,000 in collaboration with Prof. Santosh Kurrinec
7. The research paper was presented at the RIT IEEE conference as the poster presentation.
8. The paper developed with Power2peer CEIS funding received the best-paper award for the intern Andrew Lyon (Master student at RIT)
9. The full paper will be published in a peer reviewed journal.
10. NSF accepted concept paper.
11. Whitepaper published in November 2023

Goals for 2024

1. Develop Carbon Credit calculator for distributed ledger.
2. The blockchain platform to connect with the public ledger.
3. Apply NSF phase I funding.

Power2peer Concept Paper Summary:

For renewable energy to flourish, the clean energy industry needs a marketplace equipped for high volume clean energy transactions. The cost of clean kilowatts is falling, and the time is ripe to create such a marketplace—one that enables the convenient transaction of clean kilowatts around the world. Combining an easy-to-use blockchain-secured mobile application and cutting edge solar technology, with the launch of the **P2PConnect** platform Power2Peer is doing just that**.**

Solar is in a unique position to capture the clean energy market: a staggeringly large portion of the earth's surface lies near the equator and is perfectly suited to convert the abundant energy of the sun into electricity. World electricity needs are now approaching 1.7 terawatts per day; an amount that could be generated by a solar farm of 324 square miles in sub-Saharan Africa!

*Figure 1: P2PConnect^{TM} The Clean Energy Market Place*

So, what is keeping us from going completely carbon-free and saving the planet from global warming? Besides the resistance of the traditional energy industry (which has been built upon gas-fired, coal-fired and nuclear power plants), producers and would-be consumers of clean energy face the need for a secure, efficient, and

scalable trading platform to better utilize the abundant energy of the sun. So Power2Peer developed a user-friendly, blockchain-secured mobile application to meet that need: **P2PConnect.**
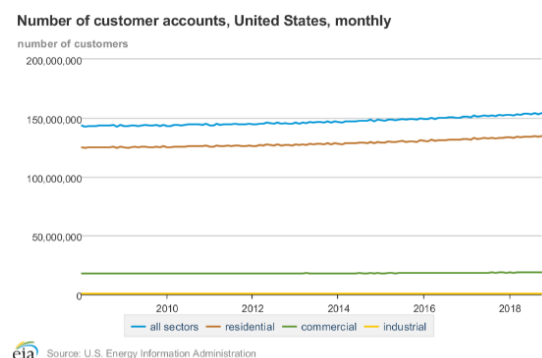
Market Size and Pricing of Kilowatts

Right now in the U.S. alone, there are over 130 million residential customers, 18 million commercial customers and over 838,000 million industrial customers connected to the grid (source: US Energy Information Administration). (See Figure 2) The total price of electricity for residential sector varies from $0.20/kWh to $0.30/kWh. This cost has two components: supply and distribution. The

Figure 2 The Market Size for Electricity in USA

residential and commercial sectors have an electricity supply cost of 46% with a distribution cost of 54%.
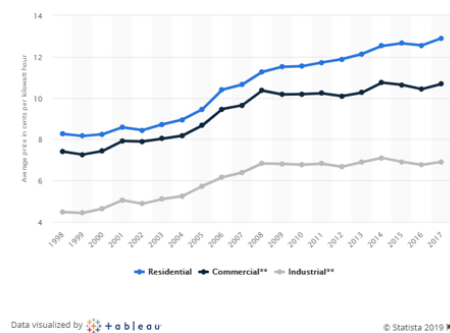
Moreover, the supply cost per kWh has been increasing in recent decades, from $0.08 in 1998 to $0.14 in 2017 (see Figure 3). The distribution cost is growing at the same rate; this is a fee collected by the big utility companies (e.g. Eversource and National Grid) who own and operate the

Figure 3 The growth of electricity supply price 1998-2017

physical wires that run power to your home or company. With distributed microgrids and nanogrids, the distribution charge is minimal, since the kilowatts are generated by renewable energy systems locally. Hence cost is reduced for both the supply and distribution of clean energy kilowatts. Many federal and state subsidies further reduce those costs. All of the financial indicators reflect what a massive opportunity lies before us**.**

Addressable Market

Price fluctuations are common in the residential sector and vary by state. The addressable market for the P2PConnect platform will be both residential and commercial, which is currently reaching $0.23/kWh. The residential sector is now deregulated in most U.S. states for the supply side. Because of this, solar in particular can play a big role in the clean energy marketplace as shown in Figure 2. The cost to supply solar kilowatts has fallen to $0.03/kWh (LCOE). With the P2PConnect platform, solar producers can offer solar kWh at a lower rate than the grid (say $0.15/kWh), offering a savings of 30-40% to end-users and a 30% profit margin for the producer. Local producers can also trade excess kilowatts

that are generated by rooftop nanogrids, community microgrids, wind farms, and other clean energy sources.

The P2PConnect clean energy marketplace will facilitate millions of transactions over its blockchain-secured platform. With transaction fees ranging from 1.5-2.5% this will be a significant source of revenue for Power2Peer. Granting even a minor market penetration of a trillion dollar residential and commercial electricity market segment, the revenue potential for P2PConnect is considerable.

P2PConnect Clean Energy Marketplace Vision

Power2Peer's vision is to create a scalable blockchain-secured distributed energy platform that will enable the purchase and sale of millions of clean energy kilowatts between producers and consumers. Power2Peer is dedicated to creating the first resilient and adaptive peer-to-peer energy trading platform for consumers anywhere in the world to

Figure 4: Power2Peer™ Blockchain Software Architecture

receive clean energy from producers using a mobile app (See Figure 1). A minimum viable product (MVP) of P2PConnect platform is near completion which will demonstrate the viability of the commercial product.
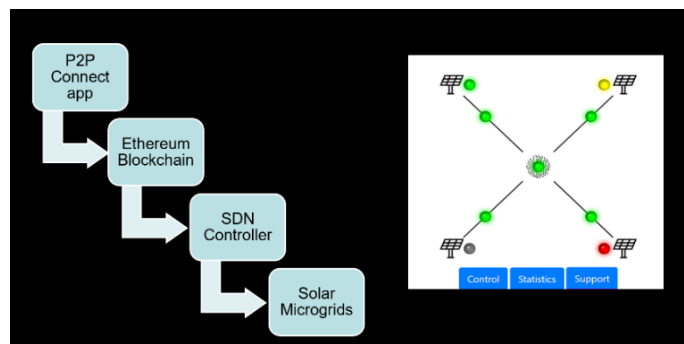
The **P2PConnect** platform MVP uses a mobile app to register producers and consumers. All energy transactions are logged in the blockchain ledger. The software defined network controller (SDNC)

creates optimal connections between clean energy sources and end-users (see Figure 4) to facilitate transmission.
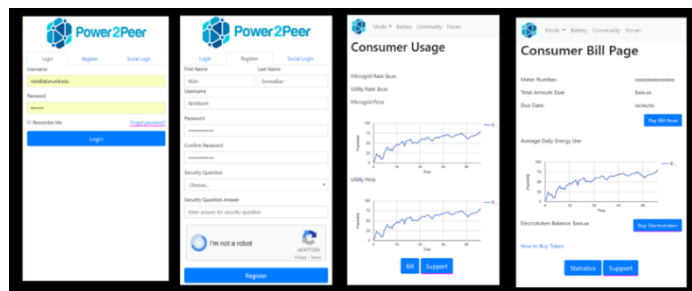
P2PConnect is a free downloadable app that is designed to bring consumers clean energy at the best price by reducing the transmission and

Figure 5: P2PConnect™ Platform Mobile UI/UX

management costs of the kilowatts delivered. Customers will have access through the app to a ledger of all transactions on the blockchain as well as their billing and usage statistics (see Figure 5).

It's time to modernize our grid. Learn more about the Power2Peer vision today by reading our white paper!

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