

Claudio Lima, Ph.D.

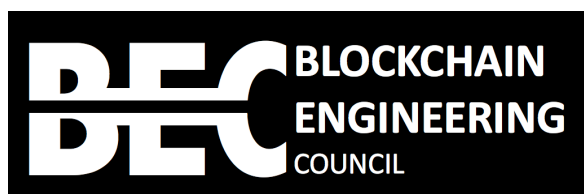
Chair IEEE Blockchain Transactive Energy Initiative

The leading global event
for power system expertise

cigre
PARIS SESSION 2022

Transactive Energy

with Blockchain DLT



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August 31st, 2022

Blockchain Distributed Ledger Technology (DLT)

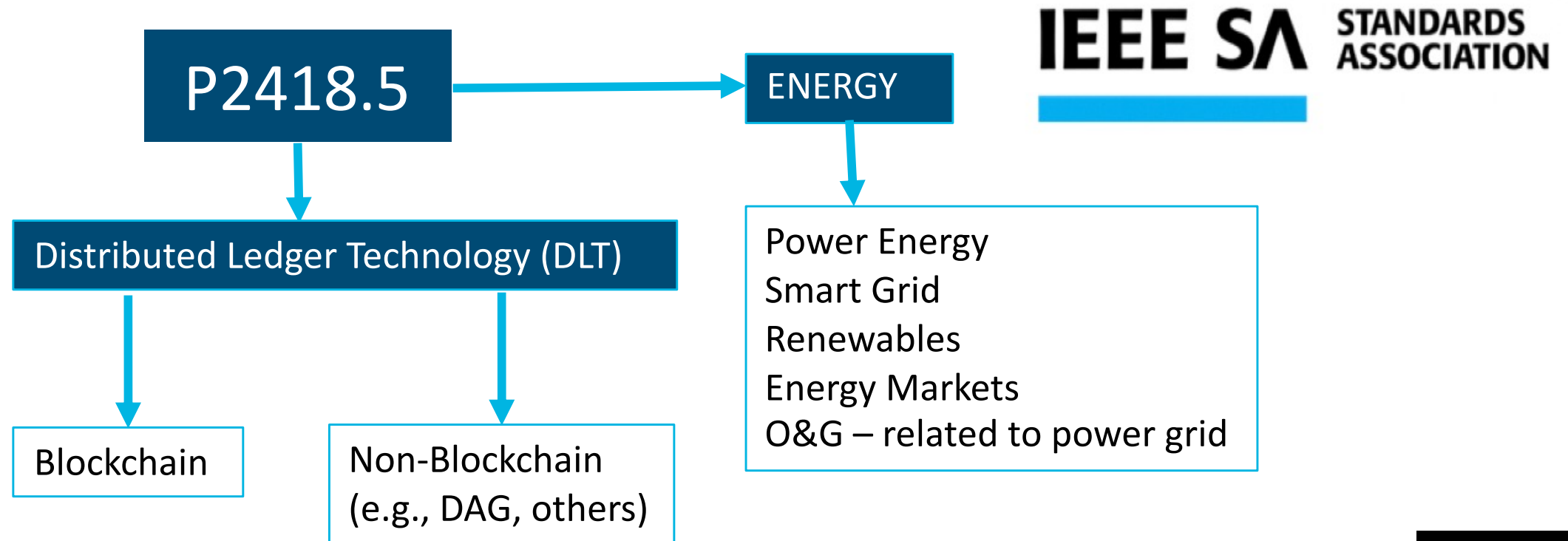
Data Properties & Benefits



source: BEC

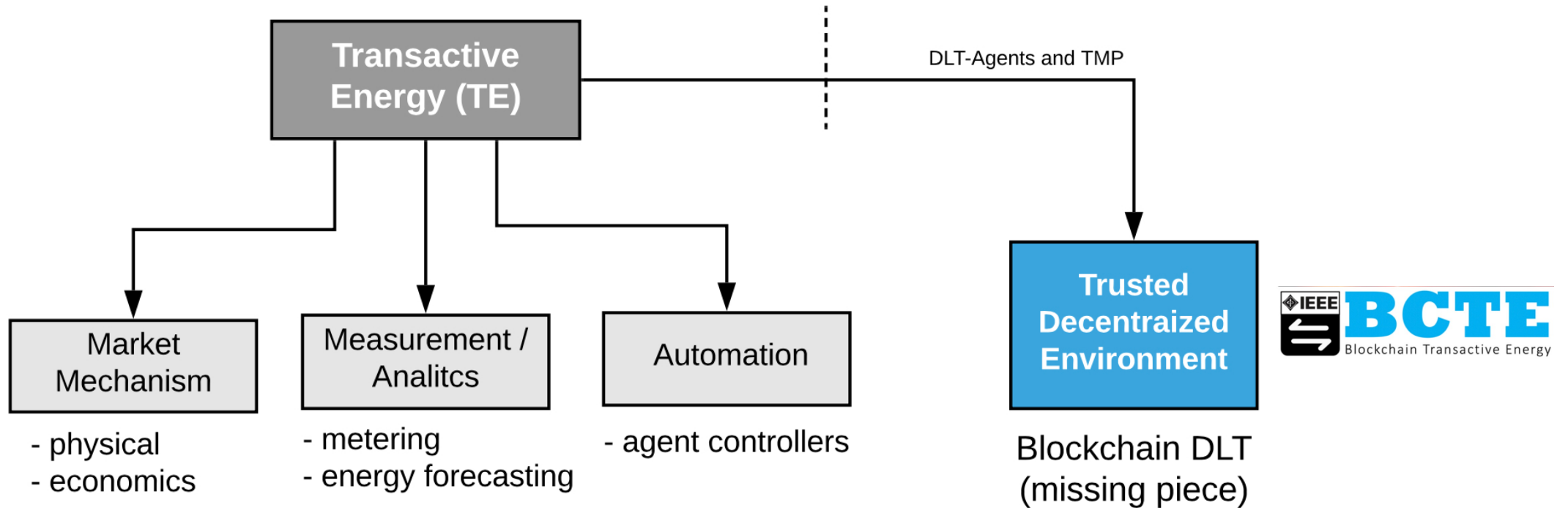
IEEE Blockchain in Energy Standards, P2418.5

- ✓ **P2418.5 is primarily a DLT standard.** Blockchain is used because is the most popular use of DLT, but other DLTs shall be considered.
- ✓ **P2418.5 is an Energy standard** and shall cover all related power and energy grid definitions.



Blockchain in Transactive Energy

The Missing Component



DLT-TES is built upon existing TE system, adding another layer of trustability, traceability and transparency

The Blockchain Transactive Energy (BCTE) is a new layer that adds trustability, traceability, and transparency to the existing TE layer . **This layer was missing!**

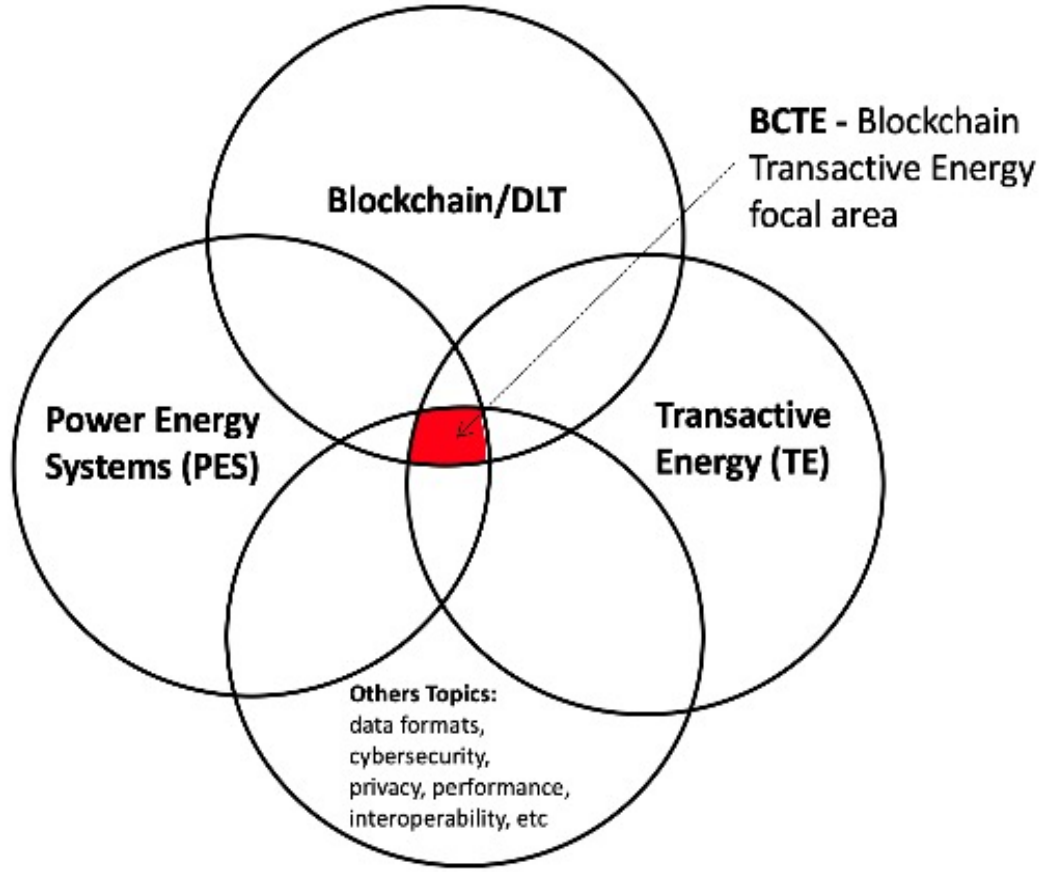
Blockchain Transactive Energy Definition

BCTE is an IEEE framework used for the design, and implementation of **Distributed Ledger Technology (DLT)/Blockchain in Transactive Energy systems.**

It is composed of a modular architecture that interfaces with existing distribution energy systems and intersects with other existing technologies components.

Areas of standardization

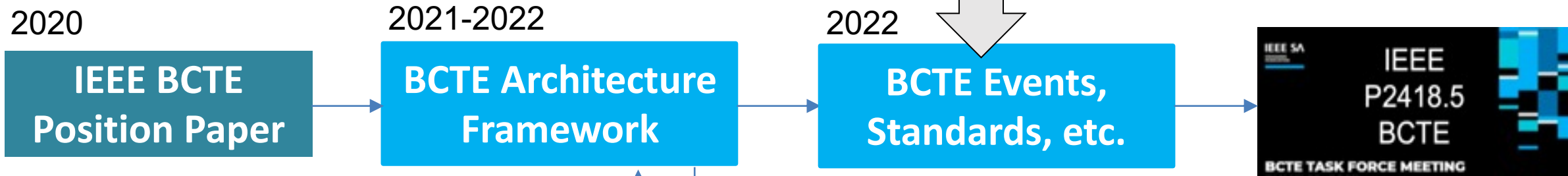
- Data formats
- Consensus algorithms
- Governance models
- Cybersecurity
- Smart contracts framework
- Interoperability



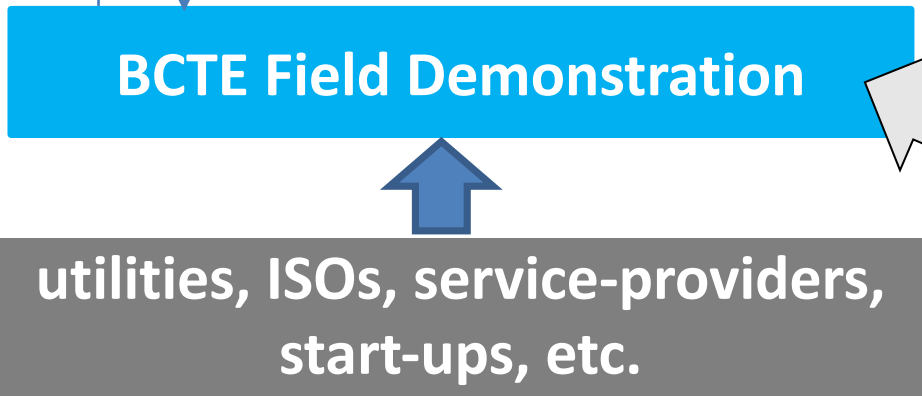
IEEE Blockchain Transactive Energy (BCTE) Initiative



- IEEE-CIGRE 2020, 2021, 2022
- IEEE PES 2019, 2020, 2021
- IEEE ISGT 2019, 2020, 2022
- IEEE-Ethereum Hackathon
- IEEE Blockchain Energy Workshop, 2022



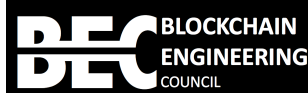
IEEE P2418.5 standards



18x U\$10K Global Awards for BCTE project demonstration in 2021-2022



participating partners




IEEE Blockchain in Energy Standards, P2418.5

IEEE SA
STANDARDS
ASSOCIATION

**IEEE BLOCKCHAIN IN ENERGY WG
STANDARDS P2418.5**

Claudio Lima, Ph.D.
IEEE P2418.5 Blockchain Energy WG Standards, Chair
Blockchain Engineering Council, BEC, Co-Founder



IEEE P2418.5, D 1.9, AUG19th, 2020
Draft<opt_Trial-Use><Gde./Rec. Prac./Std.> for <P2418.5>

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**Draft<IEEE P2418.5 Blockchain in
Energy Standards>**

Sponsor
<CAG>
of th
IEEE <Society Name>

Approved <Date Approved>

IEEE-SA Standards Board

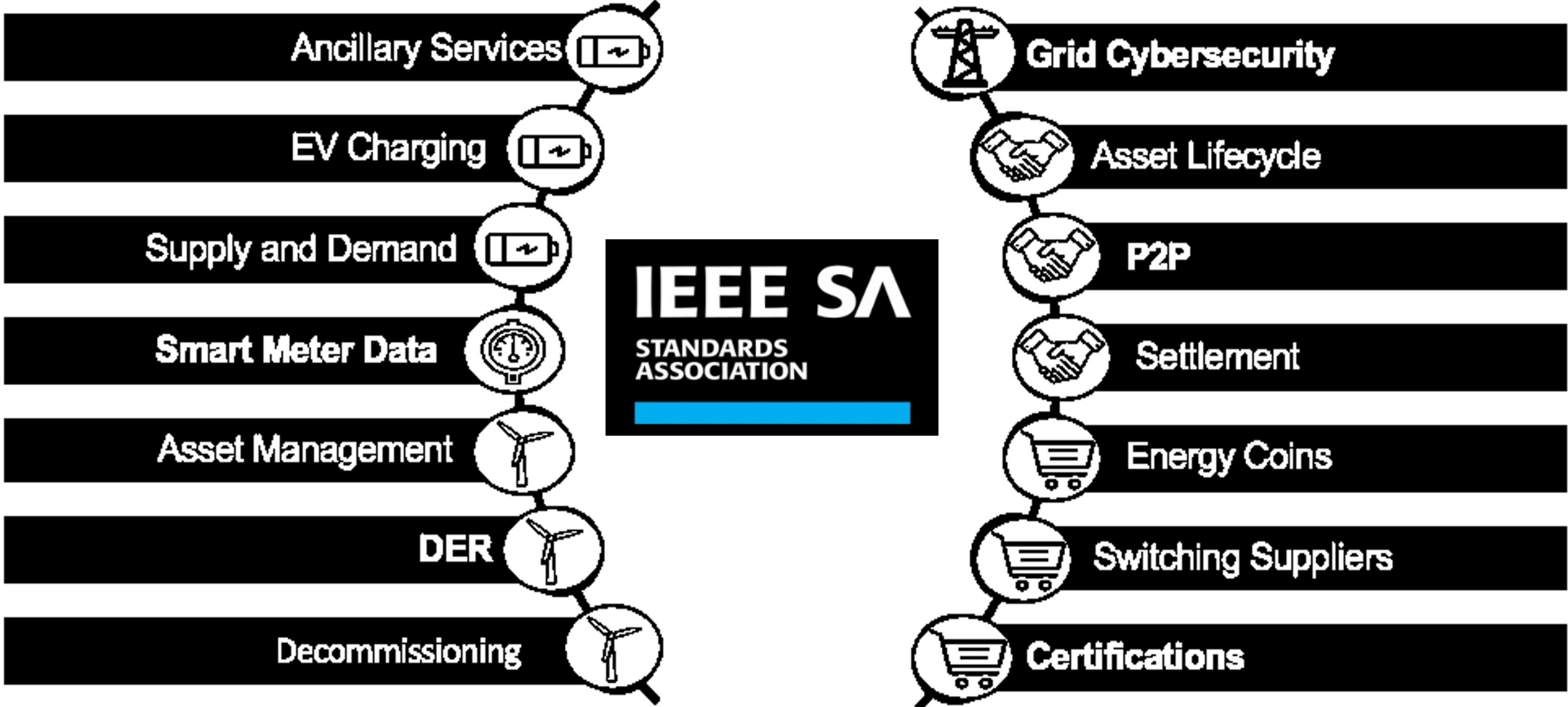
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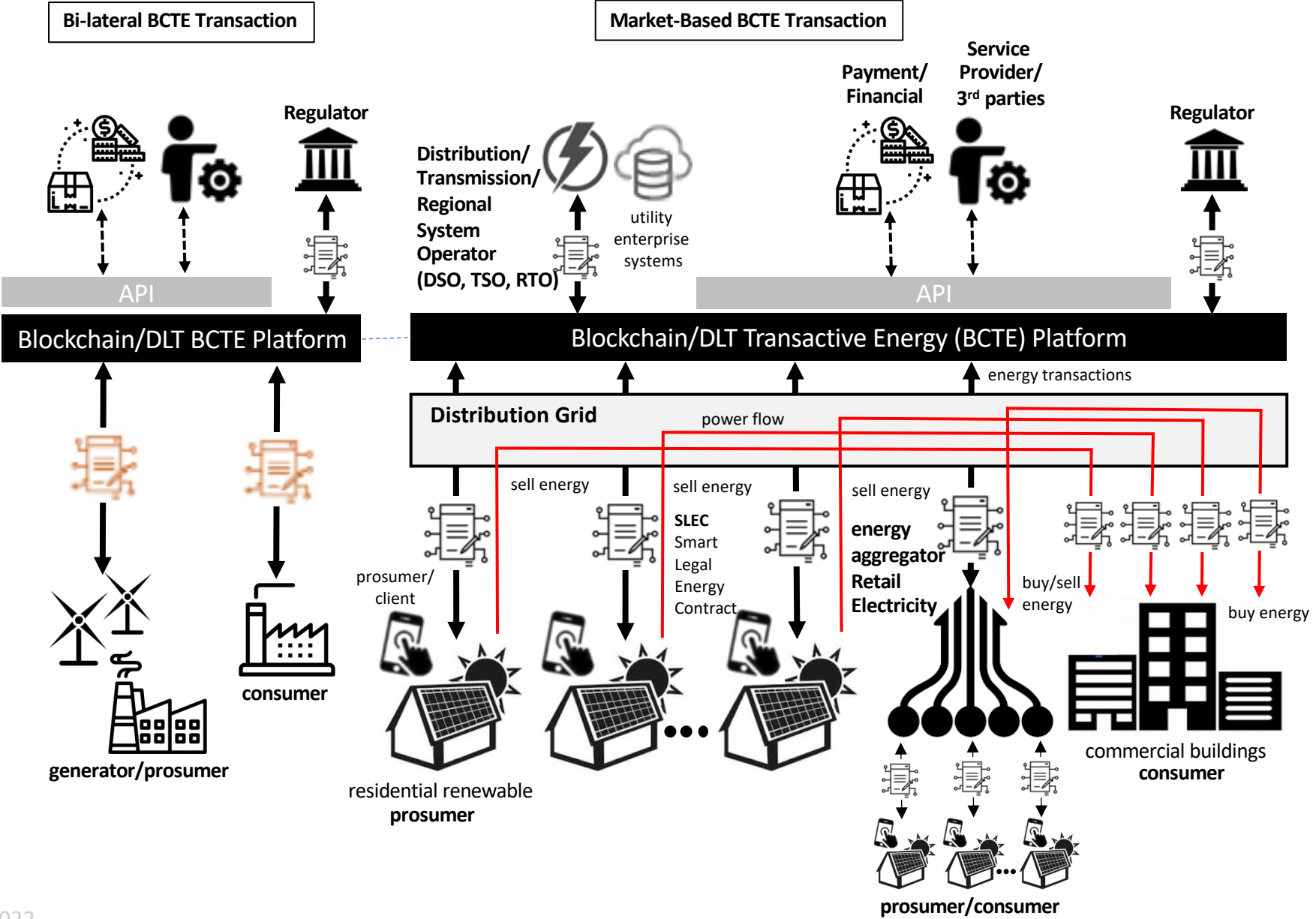
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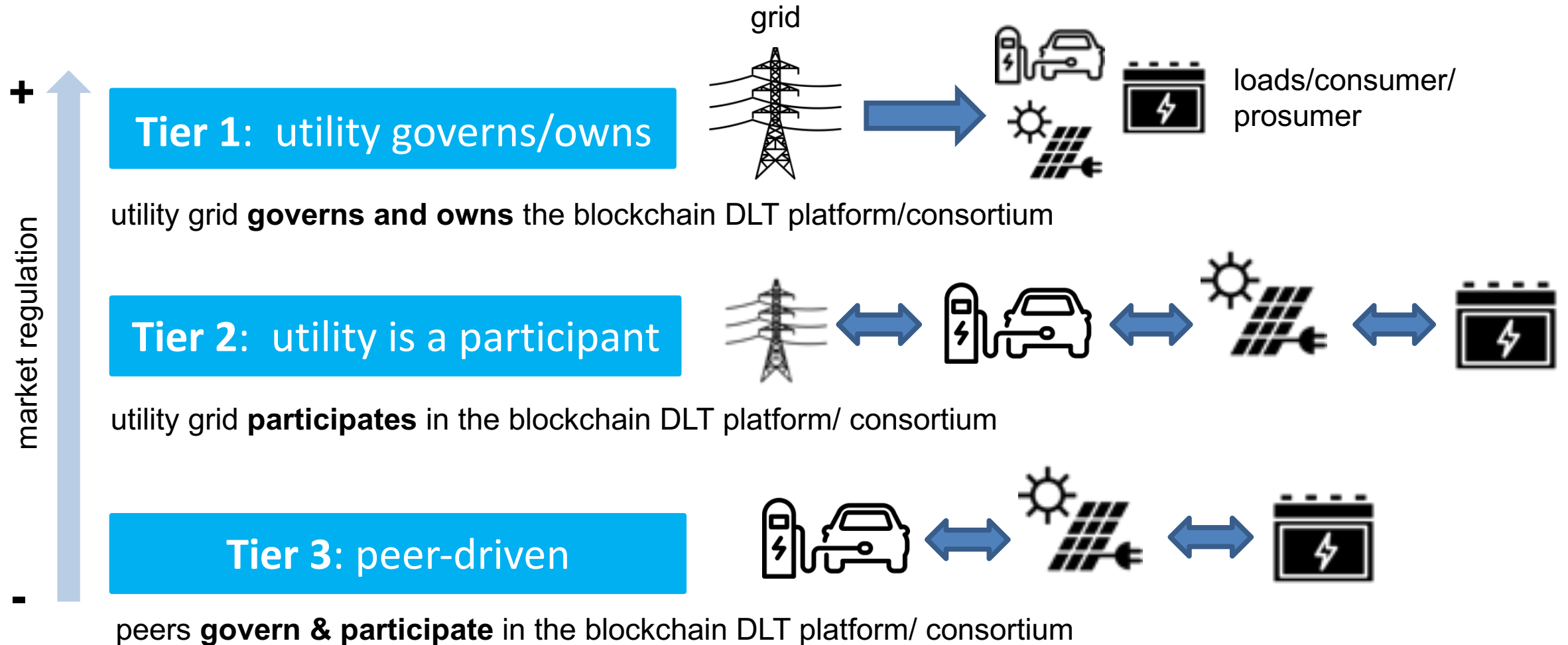
IEEE P2418.5 DLT for Energy Use Cases



High Level Blockchain Transactive Energy Framework

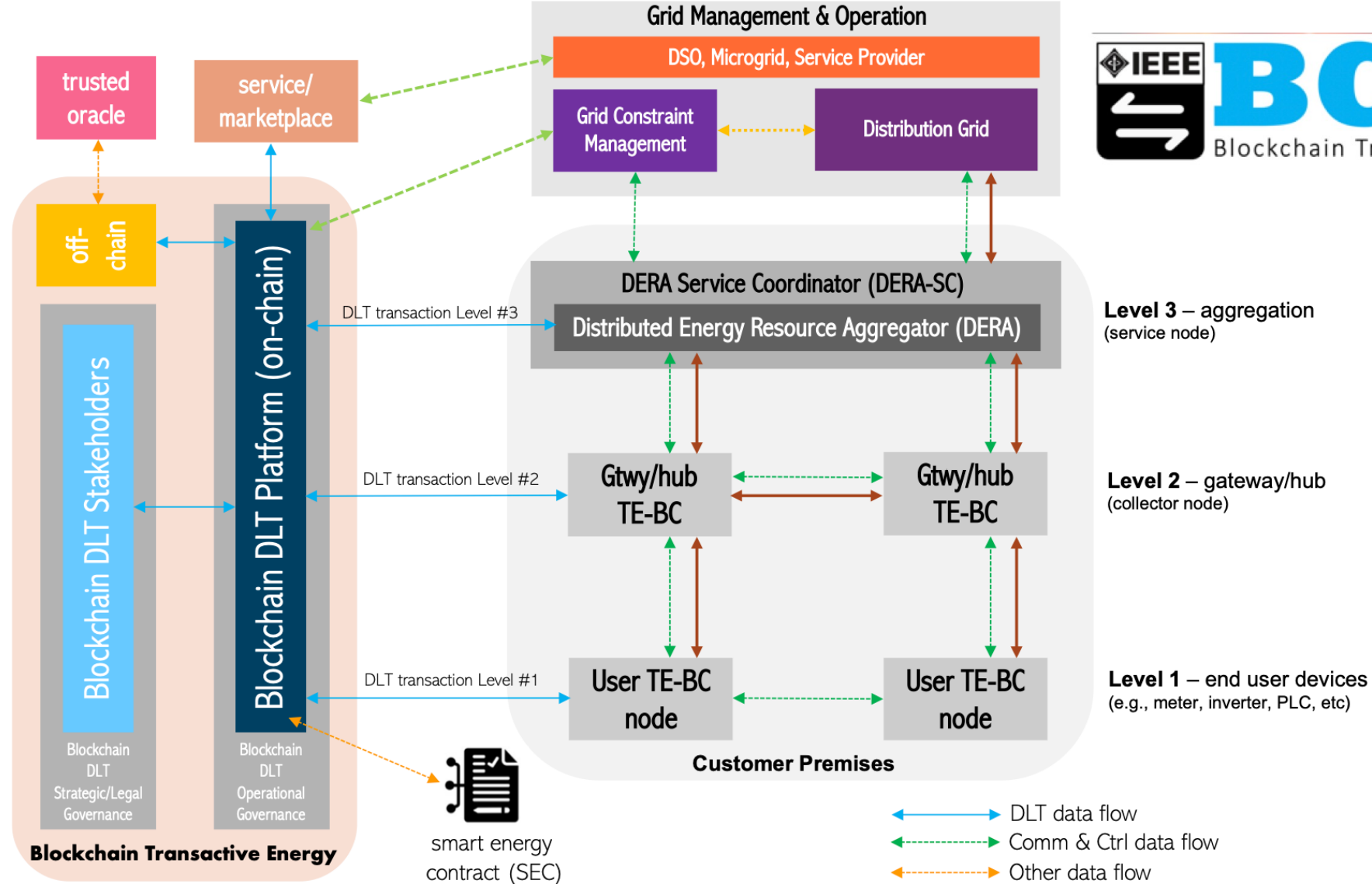


Tiers of Transactive Energy Blockchain/DLT Governance



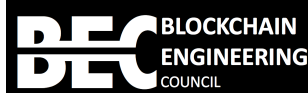
Utilities can benefit from implementing Blockchain/DTL in tiers 1 and 2

IEEE Blockchain Transactive Energy Framework

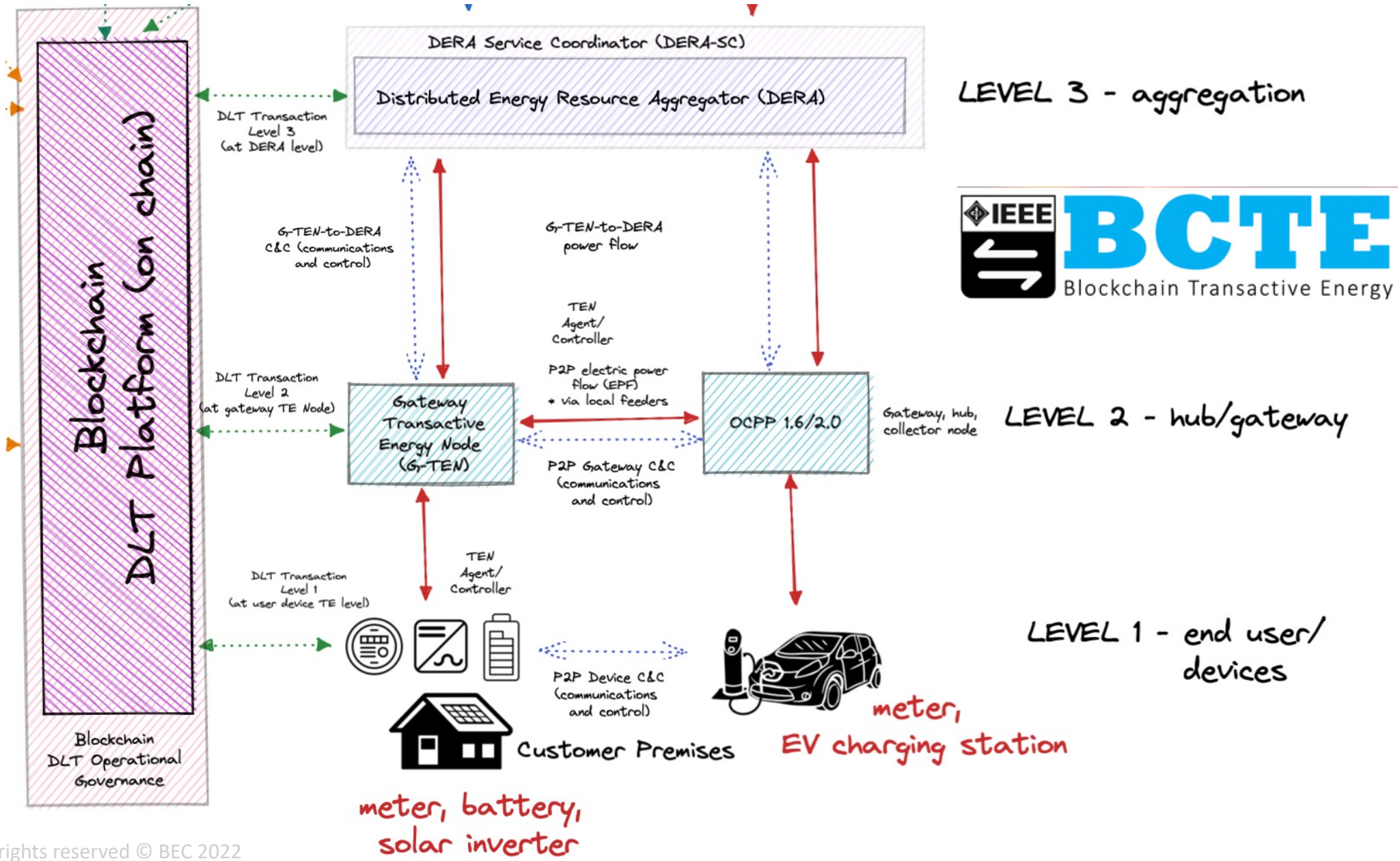


- DLT data flow
- Comm & Ctrl data flow
- Other data flow
- Energy flow

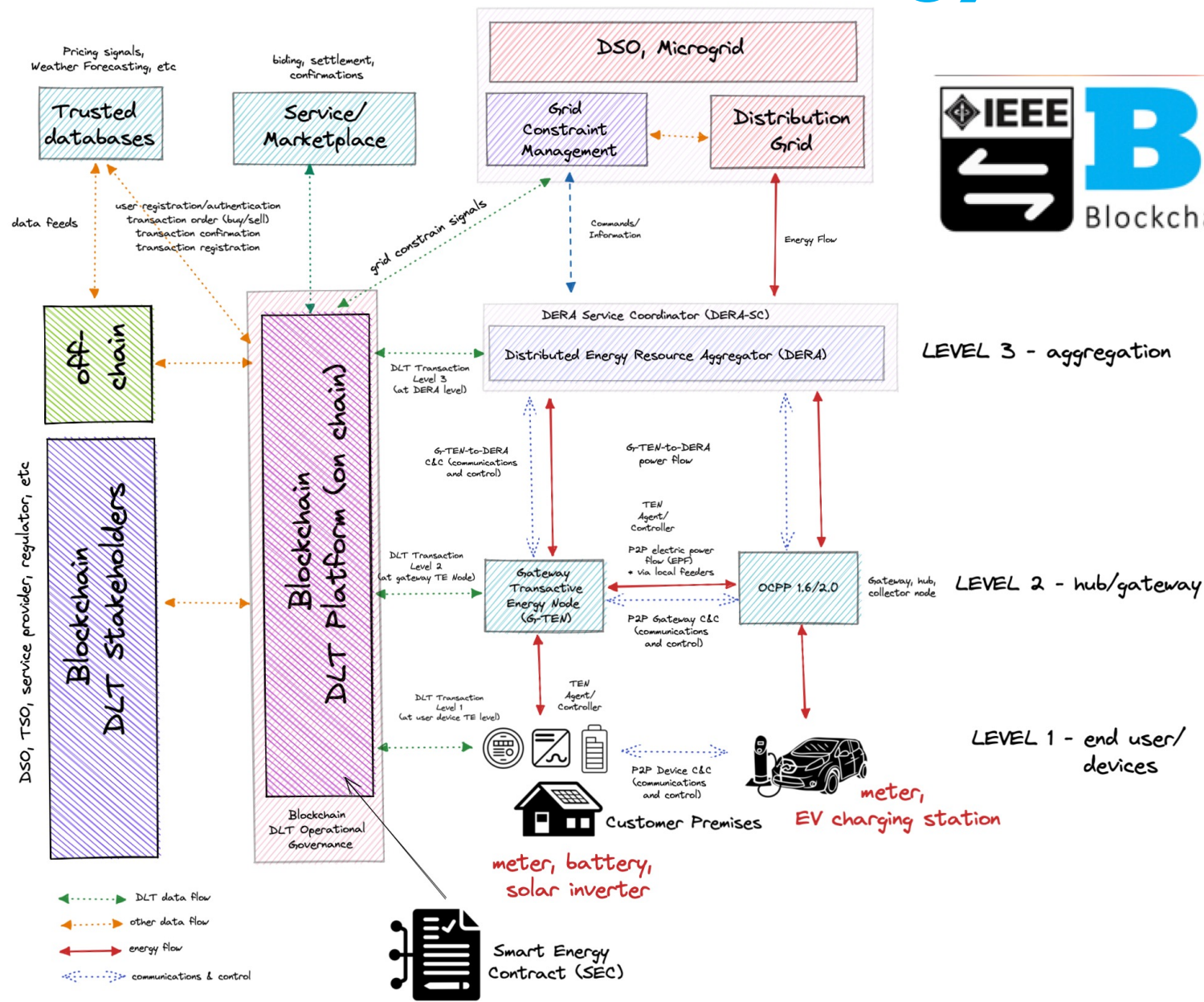
BCTE Architecture v. 1.8, April 21st, 2022
(working in progress)



IEEE BCTE Framework with Electric Vehicle



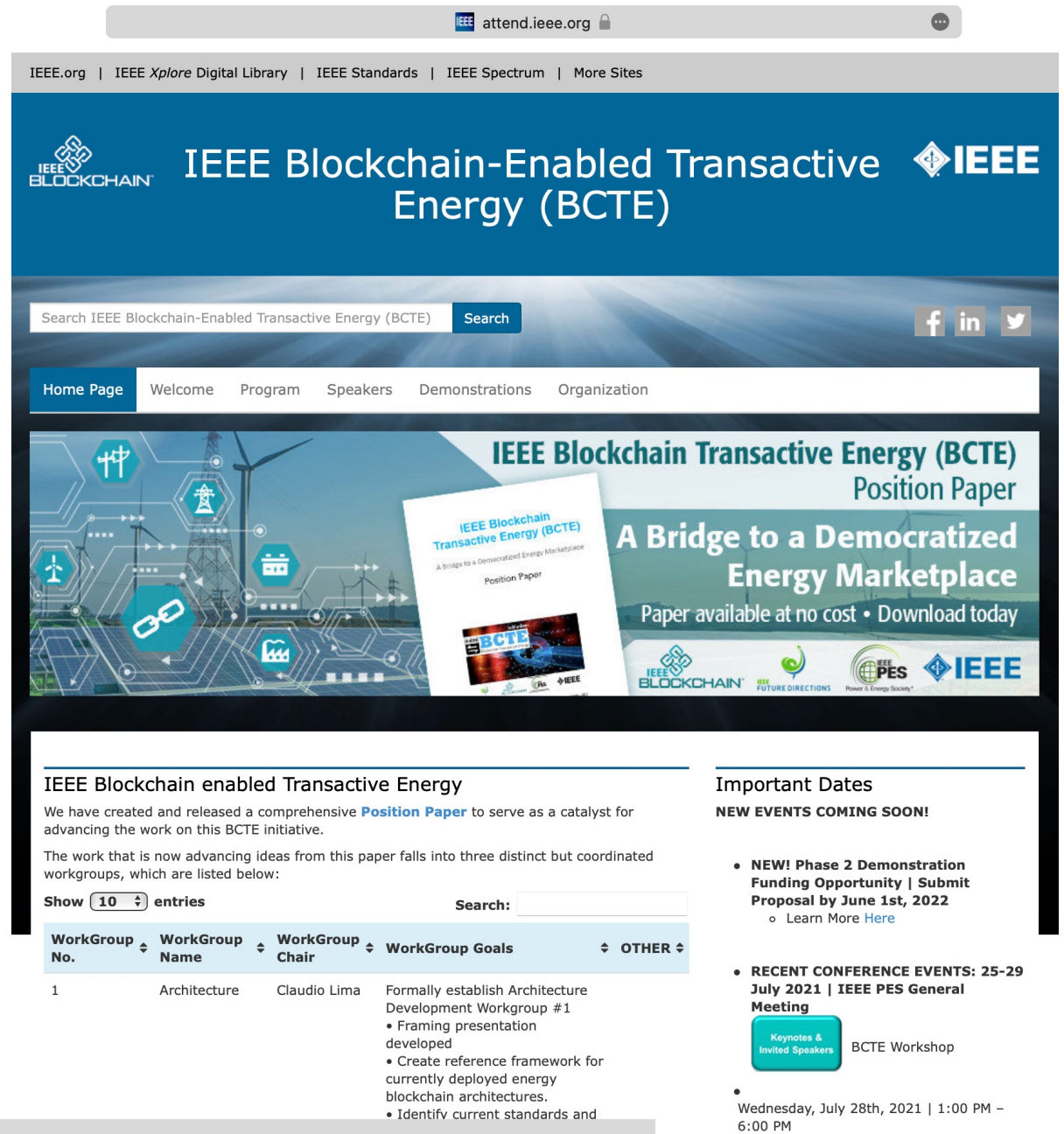
IEEE Blockchain Transactive Energy Framework



Thank You!

Claudio Lima

clima@blockchain-eng.org



The screenshot shows the IEEE Blockchain-Enabled Transactive Energy (BCTE) website. At the top, there is a navigation bar with links to IEEE.org, IEEE Xplore Digital Library, IEEE Standards, IEEE Spectrum, and More Sites. The main header features the IEEE Blockchain logo and the title "IEEE Blockchain-Enabled Transactive Energy (BCTE)". Below the header is a search bar and social media icons for Facebook, LinkedIn, and Twitter. A navigation menu includes "Home Page", "Welcome", "Program", "Speakers", "Demonstrations", and "Organization". The main content area features a large banner for the "IEEE Blockchain Transactive Energy (BCTE) Position Paper" with the subtitle "A Bridge to a Democratized Energy Marketplace". The banner includes a call to action: "Paper available at no cost • Download today". Below the banner, there is a section titled "IEEE Blockchain enabled Transactive Energy" with a brief introduction and a list of workgroups. To the right, there is a section for "Important Dates" with "NEW EVENTS COMING SOON!".

IEEE Blockchain enabled Transactive Energy

We have created and released a comprehensive [Position Paper](#) to serve as a catalyst for advancing the work on this BCTE initiative.

The work that is now advancing ideas from this paper falls into three distinct but coordinated workgroups, which are listed below:

Show entries Search:

WorkGroup No.	WorkGroup Name	WorkGroup Chair	WorkGroup Goals	OTHER
1	Architecture	Claudio Lima	Formally establish Architecture Development Workgroup #1 <ul style="list-style-type: none">• Framing presentation developed• Create reference framework for currently deployed energy blockchain architectures.• Identifv current standards and	

Important Dates

NEW EVENTS COMING SOON!

- **NEW! Phase 2 Demonstration Funding Opportunity | Submit Proposal by June 1st, 2022**
 - [Learn More Here](#)
- **RECENT CONFERENCE EVENTS: 25-29 July 2021 | IEEE PES General Meeting**
 - [Keynotes & Invited Speakers](#) BCTE Workshop
- **Wednesday, July 28th, 2021 | 1:00 PM – 6:00 PM**

<https://attend.ieee.org/bcte/>

About the Speaker



Claudio Lima, Ph.D.

- *Executive and thought leader in advanced blockchain, IoT, and AI technologies*
- *Expertise in energy (utilities, oil, and gas), smart city, and telecom/IT digital transformation*
- *Distinguished Member of Technical Staff at Sprint Advanced Technology Labs in Silicon Valley, California.*
- *Co-founder of the Blockchain Engineering Council (BEC)*
- *Chair of IEEE Blockchain Transactive Energy (BCTE) Initiative*
- *Chair of the IEEE Blockchain Standards*
 - *Chair IEEE P2418.5 Blockchain Energy WG*
 - *Vice Chair IEEE P2418.1 Blockchain IoT WG*
- *Member ISO DLT for Power Standards*
- *PhD in Electronic Engineering, University of Kent (UK) (1995).*

clima@blockchain-eng.org