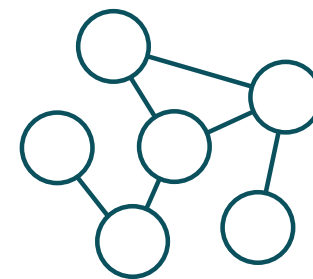
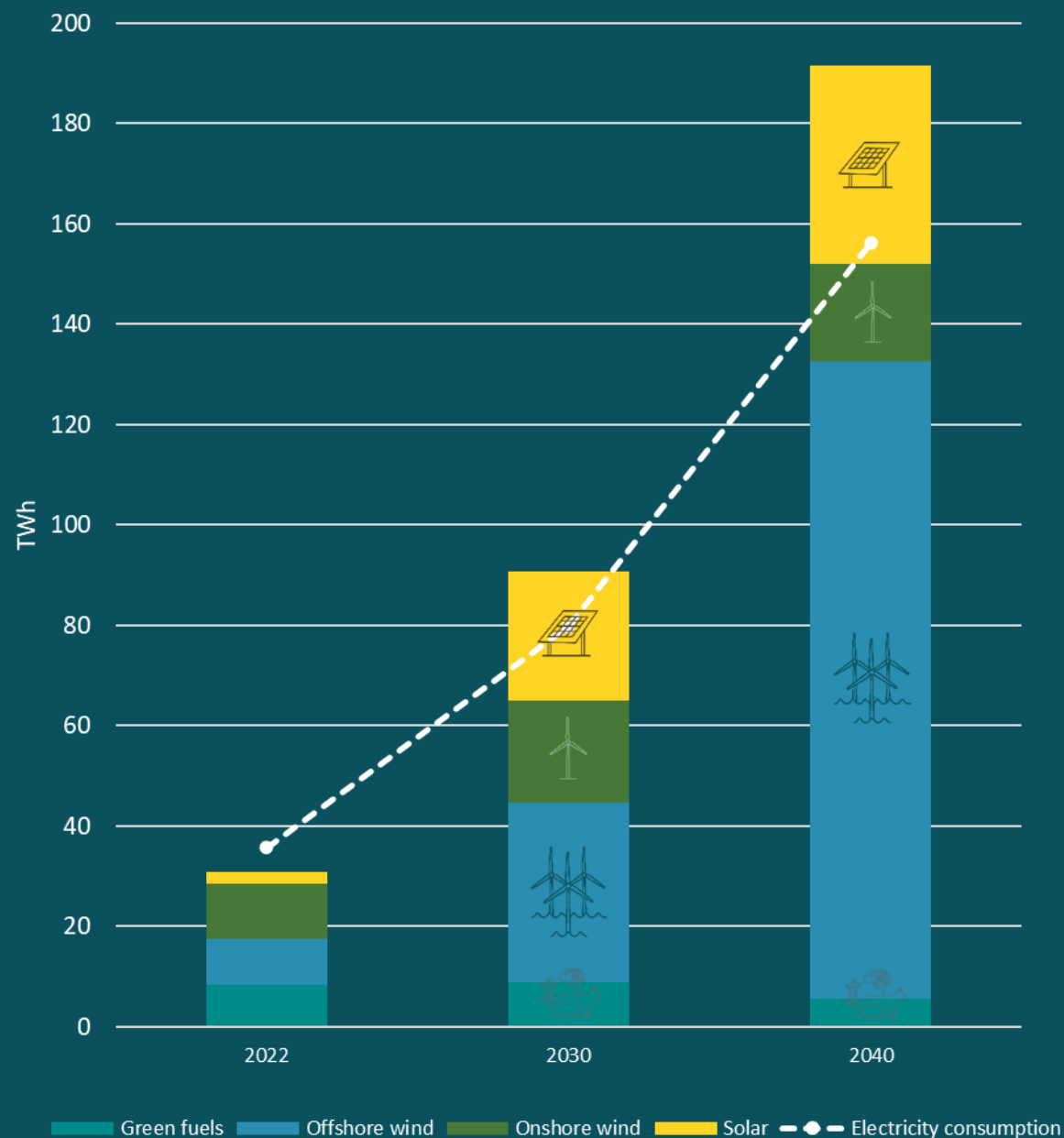


# PROJECT ORIGIN



Connecting the Dots from Energy  
Production to Consumption.

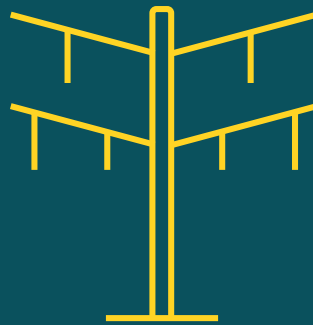
## RE production and electricity consumption (AF22)



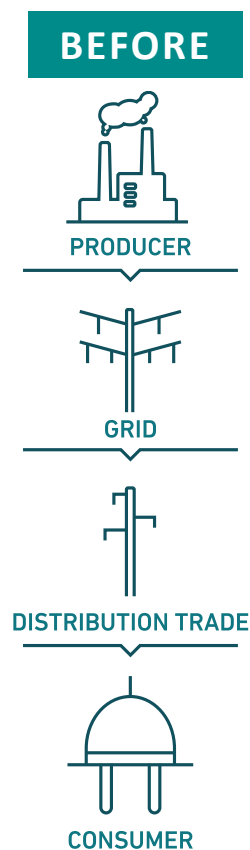
## DENMARK'S ELECTRICITY CONSUMPTION AND PRODUCTION FROM RE

- Solar PV is expected to increase by more than 10x by 2030
- The combined electricity production from RE is expected to increase by 3x in 2030 and 6x in 2040
- Offshore wind from energy islands is expected to be installed in 2030 (Bornholm) and 2033 (North Sea)
- The electricity production from green fuels, such as biomass, are expected to decrease towards 2040
- The increasing electricity consumption is dominated by direct electrification and indirect electrification of the energy system through PtX

WE NEED TO INTEGRATE  
>150 TERAWATT HOURS  
GREEN ENERGY BY 2040 IN  
DENMARK

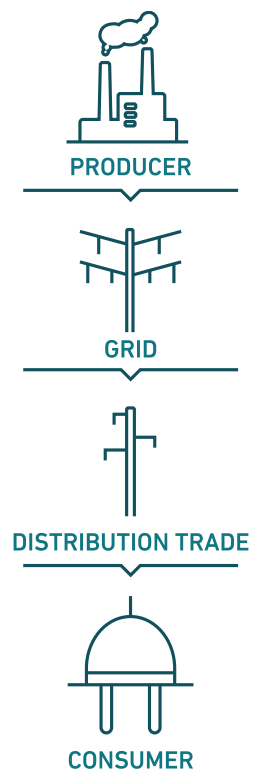


# DIGITALIZATION IS KEY FOR THE FUTURE INTEGRATED ENERGY SYSTEM

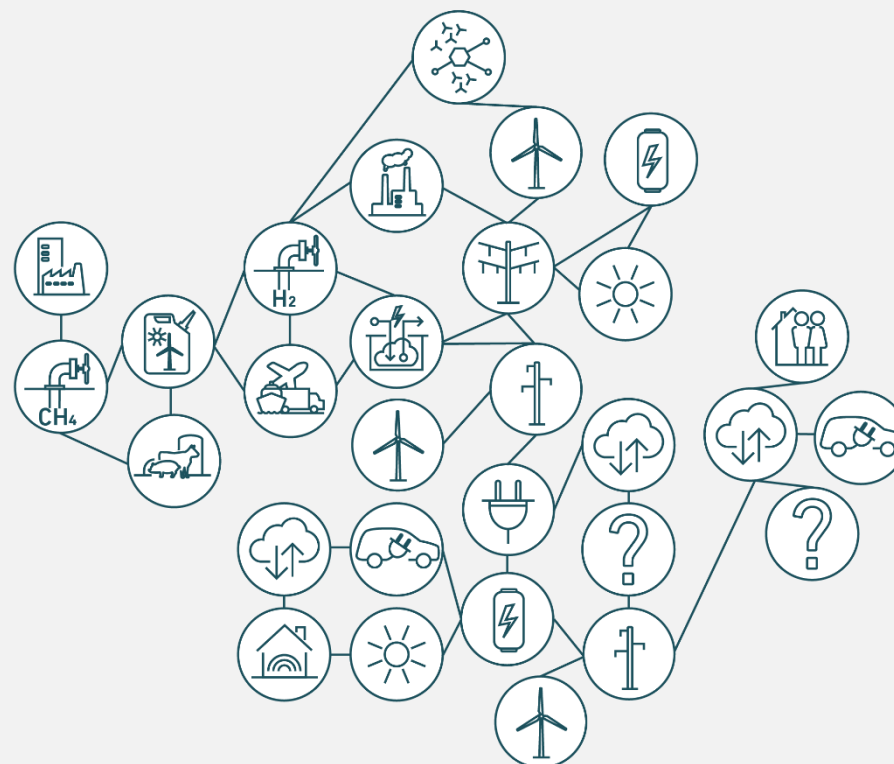


# DIGITALIZATION IS KEY FOR THE FUTURE INTEGRATED ENERGY SYSTEM

## BEFORE



## IN THE FUTURE

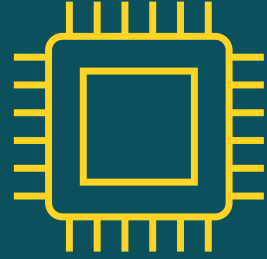


Electricity and gas consumers are  
~~passive (inflexible)~~ active and flexible

Electricity ~~cannot~~ can easily be stored economically

Green energy needs ~~no~~ subsidies to survive

Not everyone receives or wants  
~~Everyone receives~~ the same product in  
terms of security of supply

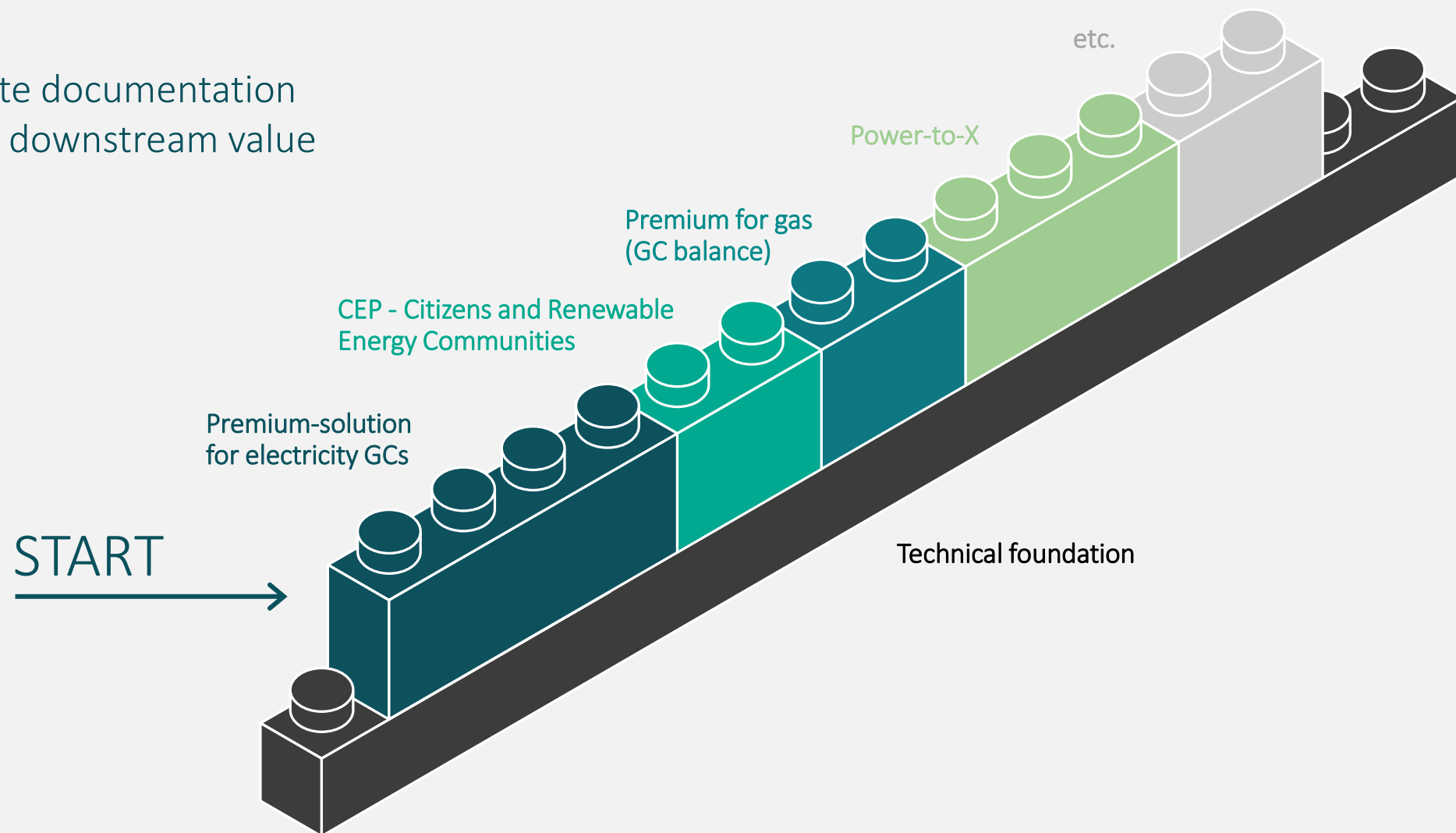


# DATA DRIVEN VALUE CREATION

Energy as a digital asset class i.e..

# VALUE PROPOSITION OF GC

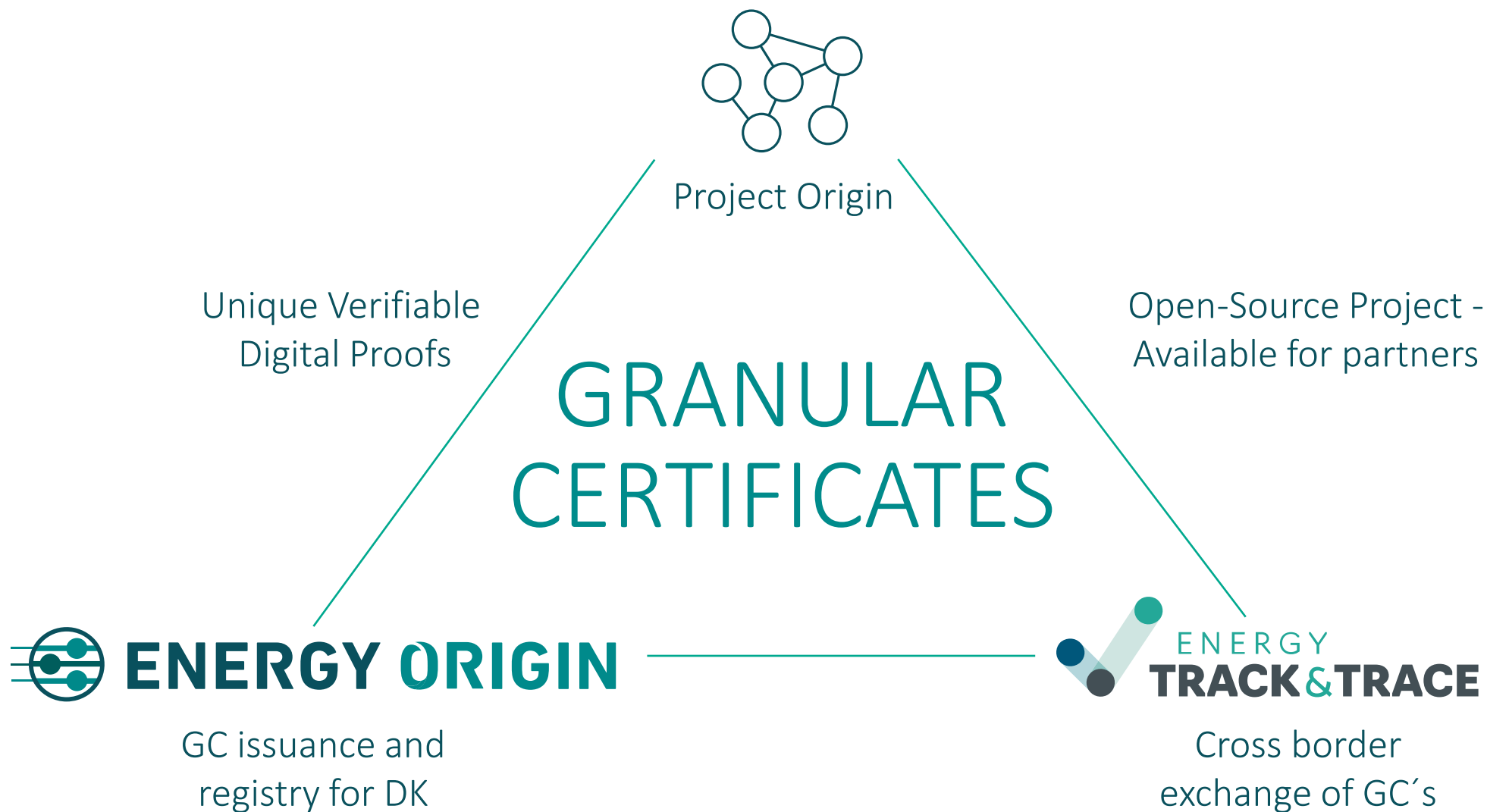
Granular Certificate documentation layer has multiple downstream value propositions.





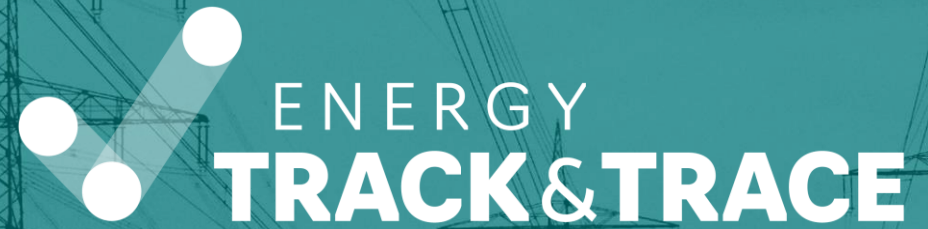
# GRANULAR CERTIFICATES

15 min aligned certification in Denmark will require issuance  
of 35040 certificates pr meter pr year



# ENERGY TRACK AND TRACE

- Energy Track and Trace (ETT) is a joint collaboration between 4 TSO's.
- ETT has developed a Granular Energy Certificate concept as well as a digital platform that enables the tracking and tracing of renewable energy from production to consumption.
- By decentralization of the infrastructure and convergence to a standard for certification and communication to make Granular Certificates a digital asset for consumers and producers across Europe.



# ENERGY ORIGIN

- Evolved from eloprindelse.dk and is a data access provider for Danish producers and consumers across energy carriers as well as the host of the first registries for Granular Certificates.
- Energy Origin is the natural next step in tracing the origins of electricity, as it will be a platform for tracing the origins of all energy forms, now and in the future.
- The goal of Energy Origin is to utilize the possibility of following the energy from the source of the production to the outlet – hour by hour – so that you may consume with a green conscience. it will also be possible to monitor your CO2 outlet.



# PROJECT ORIGIN

Project Origin is focused on securing registries of certificates, databases or eventstores ,with unique and verifiable digital proofs using:

- **Merkle proofs** – that hashes millions of transactions into a single entry using the blockchain as a validation mechanism for the registries.
- **Pedersen commitments** to create a transparent and secure system that allows for the verification of uniqueness and ensuring privacy of sensitive data.
- **Issuing stateful certificates** that are sound and trustworthy to leverage the inherent trust of TSO's across the Energy Track and Trace (ETT) infrastructure.
- **Developed with commercial partners in an Open-Source collaborative effort.**



Project-Origin

# PROBLEM SPACE

## CHALLENGE:

- **Create a trustworthy data system** which can verify and certify RES by location and time of production
- **Enable layer-2 data-handling** that takes millions of transactions into a single data-entry, eliminating limitations in the scalability of the blockchain and reducing cost of operations.
- **Secure transfer and settlement** of certificates and change of ownership without revealing sensitive data.
- **Enabling independent 3. party auditability** without breaching GDPR.

## APPROACH:

- **Develop a registry in an with external partners** with expertise and insight which can be implemented into Energy Origin, as a dependency developed in parallel.
- **The Open-Source approach will enable other TSO's and market service providers** to co-implement, use and integrate the solution thereby ensuring the infrastructure has the scaling, standardization and adoption necessary to bootstrap a market for Granular Certificates.
- **Implement a federated network of independent registries** based on Project Origin technology in order to bootstrap a European wide marketplace for granular certificates through the Energy Track and Trace collaborative effort..

# INNOVATIVE FEATURES

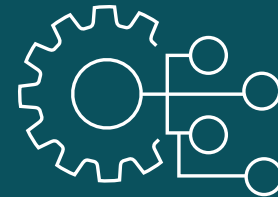
## Merkle Proofs

- Uniqueness, immutability and auditable.
- Millions of events are hashed in one entry and published to a log or blockchain.
- Each transaction can be validated independently.
- Registries are tamper-evident.



## Pedersen Commitments

- Non-retrievable quantities ensures privacy of consumption and production data.
- Ensures double claims are not possible.
- Zero-knowledge proofs for ease ( of operation ) of registries



# NEXT STEPS



## GOALS

- **Evaluation** of the registry functionality on different performance criteria.
- **Contributing** the trust-enabling features of Project-Origin to the EnergyOrigin platform for granular certificates.
- **Communicating** the value-creation of the functionality clearly and activate an open-source community around it



HOW TO PARTICIPATE

# ENERGY ORIGIN

## PUBLIC DATA ACCESS PLATFORM

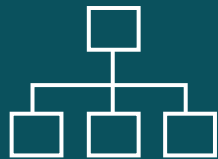
- Energy Origin is maintained and developed by Energinet
- Kubernetes infrastructure for scalability
- All available on github



code



docs



API



# ENERGY TRACK AND TRACE

## COLLABORATIVE SPACE FOR TSO'S

- Energy Track and Trace (ETT) is a collaborative endeavour for TSO's towards an aligned GC infrastructure.
- Harmonizing digital solutions.
- Communicate with a single voice.



webpage



publications



contact



# PROJECT ORIGIN

## OUR MISSION TO MARS

- Open access to a working prototype of the solution.
- Run your own instance, contribute if you like and fork it if you do not.
- All available on github



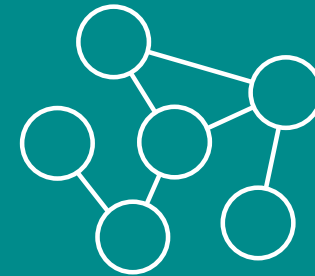
code



docs



discussion



Project-Origin



QUESTIONS?

# THANK YOU FOR YOUR ATTENTION



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