

STROMDAO

A consensus system for
energy markets

Thorsten Zoerner



REVOLUTION





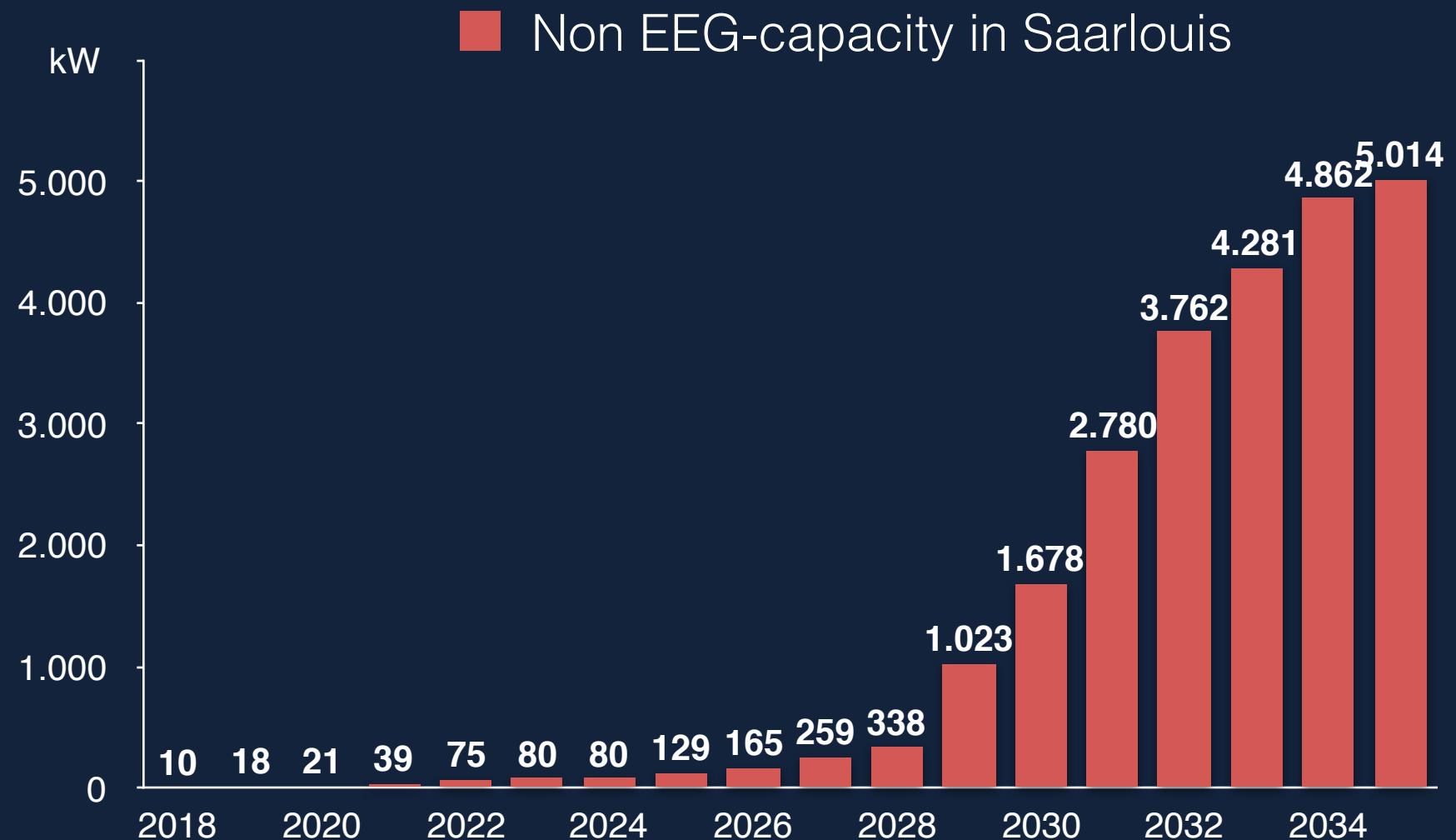
A distributed energy revolution: decentralised, autonomous, electric.

In world without subsidies, millions of solar households and businesses will become true market participants as active co-producers of energy.

Blockchain technologies help to integrate the new, distributed actors into energy markets – without a central organisation.

Solar without subsidies becomes a reality.

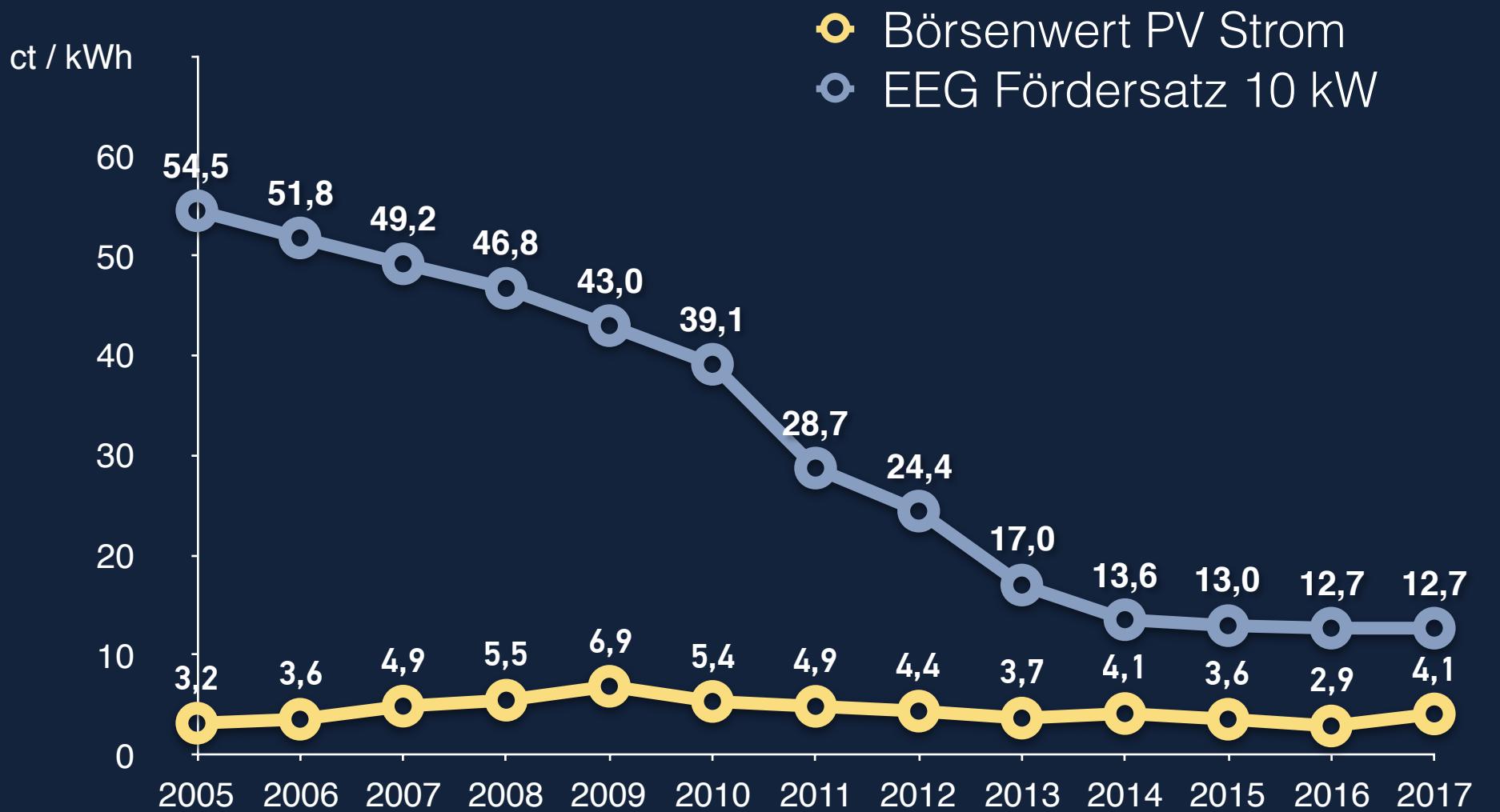
2035 there will be five megawatt of solar without feed-in tariffs just in the German city of Saarlouis (40,000 inhabitants).



Feeding solar into the grid at current market rates really sucks.

With the market price hovering at around 3 ct / kWh, feeding solar into the grid is not attractive.

This is a big problem because all that post EEG solar capacity is needed running. There is no back-up.



A photograph showing a man and a woman standing on a roof. They are surrounded by numerous solar panels. The man is on the right, wearing a light-colored shirt, and the woman is on the left, wearing a white top and a blue headscarf. They appear to be examining or installing the panels.

End-users who want to actively engage with their energy system.

People demand greater agency in shaping their energy and supply systems.

From self-consumption, e-mobility, electric heating to peer-to-peer trading: There is a latent but increasing desire to more actively engage with energy markets.

Collaborative networks of co-production.

Blockchain technology will be the transactional backbone
of energy systems of the future.

Linking consumers, producers, service providers
and everyone in between into networks of
co-productive peers.

A consensus machine for energy transactions.

A machine designed establish and maintain irrevocable consensus among market participants.

Blockchain technology can be utilised to facilitate and enshrine any kind of energy market transaction.

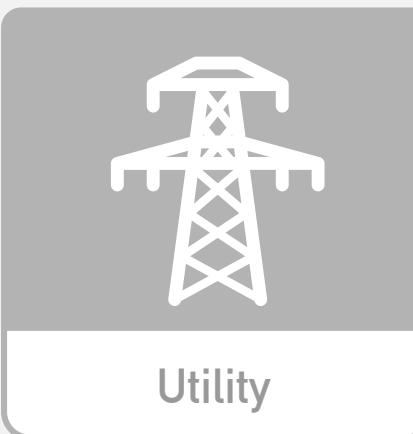
StromDAO Ledger



Debit
00,00 €

Credit
00,00 €

Balance
00,00 €



StromDAO Ledger



Electricity Ledger

Debit

53,12 €

Credit

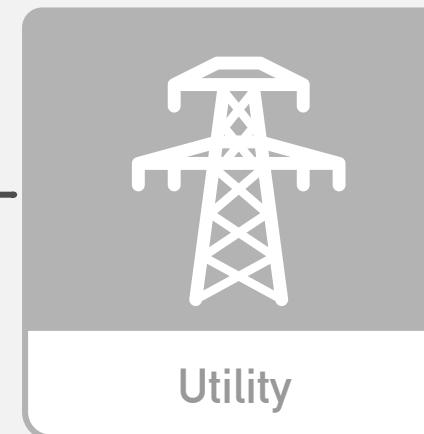
00,00 €

Balance

-53,12 €

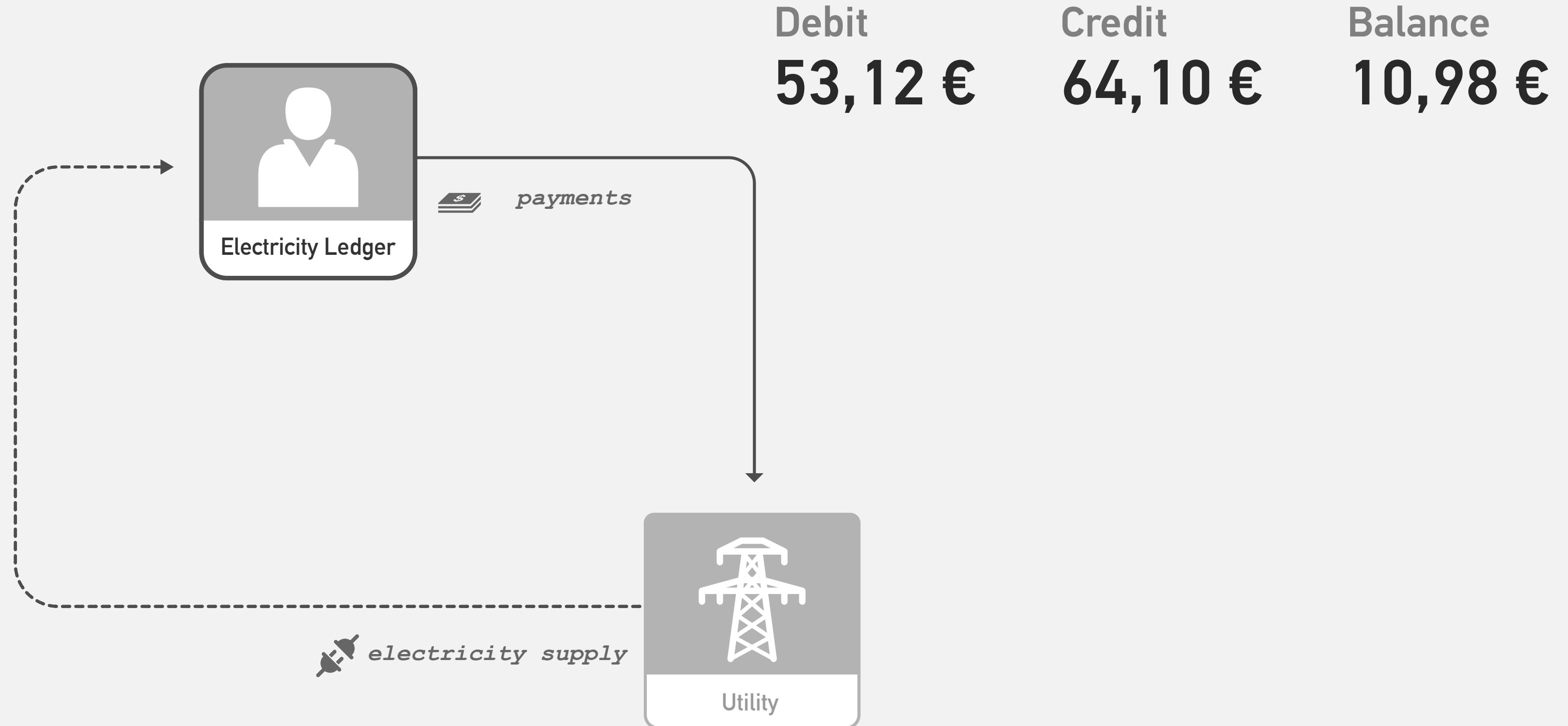


electricity supply



Utility

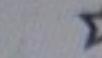
StromDAO Ledger

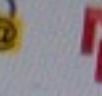


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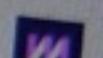
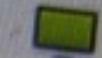
C

Secure

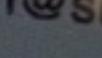
https://app.stro... 



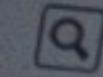
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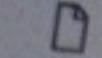
ds



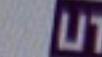
Apps



DevDocs/CSS



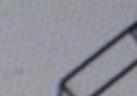
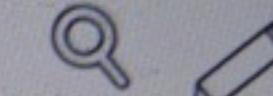
Baseliner - keyes.ie



Unicode® character...



git/github guide



StromDAO

Stromkonto: Mieter X

- Soll (Abbuchungen)

3.348,57 €

GrünStrom

 **35,0 K**

+ Haben (Einzahlungen)

3.355,02 €

GrauStrom

 **46,4 K**

=Saldo (Kontostand)

6,45 €

Nachhaltigkeit

43%

» **Ablesung**

Entnahme

Letzte Ablesung

HYBRID POWER

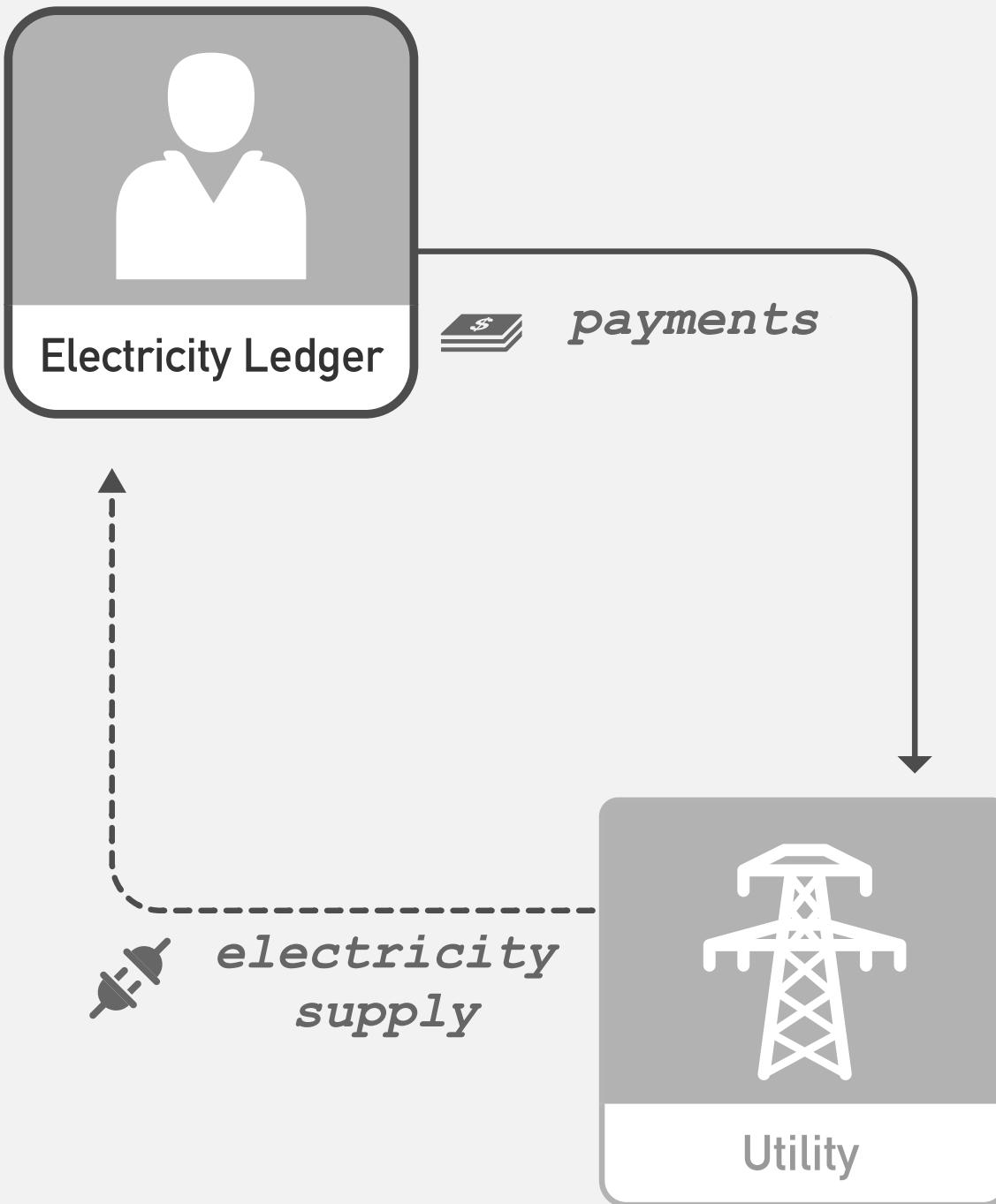
A photograph of a complex electrical pylon structure made of dark metal against a vibrant sunset sky. The sky transitions from deep blue at the top to bright orange and yellow near the horizon. The pylon's intricate lattice framework and multiple power lines recede into the distance.

Virtual self-supply via a Hybrid Power Market.

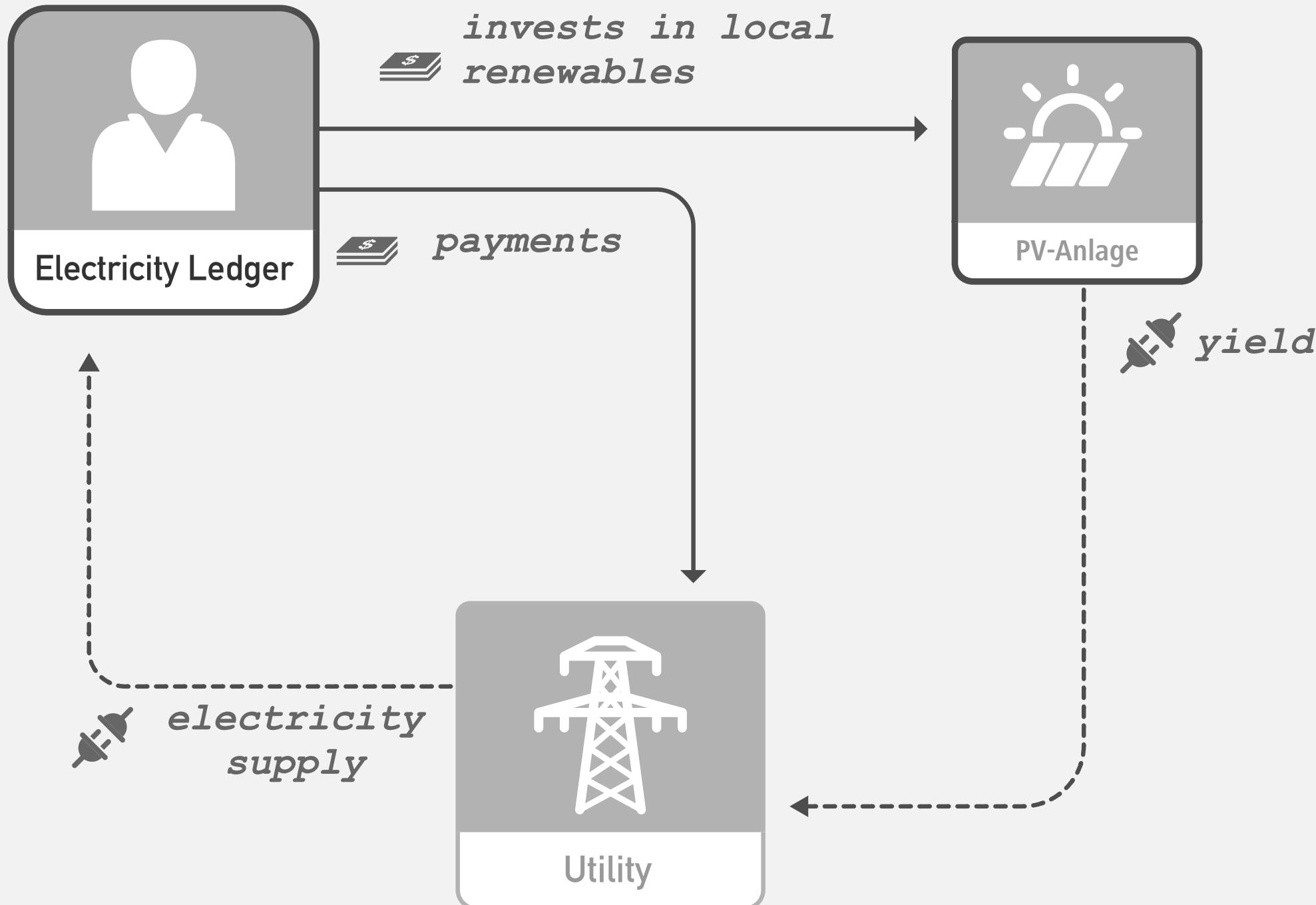
A hybrid energy market enables end-users to procure renewable capacity longterm and offset supply imbalances via a spot market at the same time.

This allows for completely novel usage models, such as self-supply via private virtual power plants.

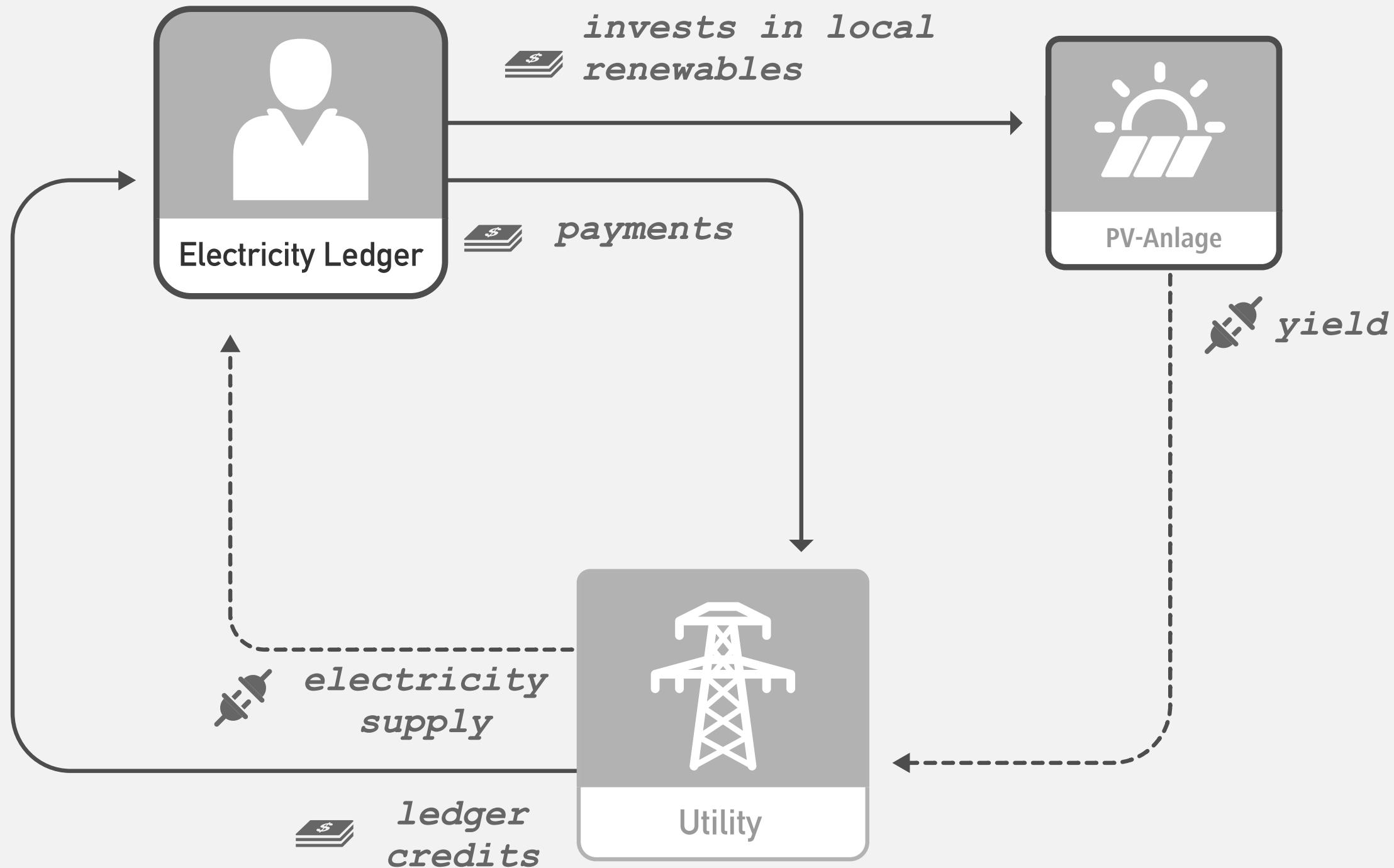
Hybrid Power



Hybrid Power



Hybrid Power



PARTICIPATION

1. INTEGRATE

Our partners leverage StromDAO technologies to advance their products and services.

2.CO-CREATE

StromDAO works in tandem with individuals and organisations to help create new blockchain related assets and products.

3. PARTICIPATE & DETERMINE

StromDAO is a decentralised organisation.

Customers and business partners can participate in and influence all tactical and strategic decision making by obtaining StromDAO voting rights.

An aerial photograph of a city at night, showing a dense network of illuminated streets and buildings. The lights form a grid-like pattern, with more concentrated areas of light along major roads and in specific neighborhoods. A prominent red light source is visible in the lower center. The overall scene conveys a sense of urban density and nighttime activity.

A platform.

STROMDAO

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What is a grid connection?

1. Forget bilateral activities
2. Forget Entity Relation Model

Transactions are activities that alter the consensus.

Only that what matters for everyone, matters.

Who gets to play on the grid?

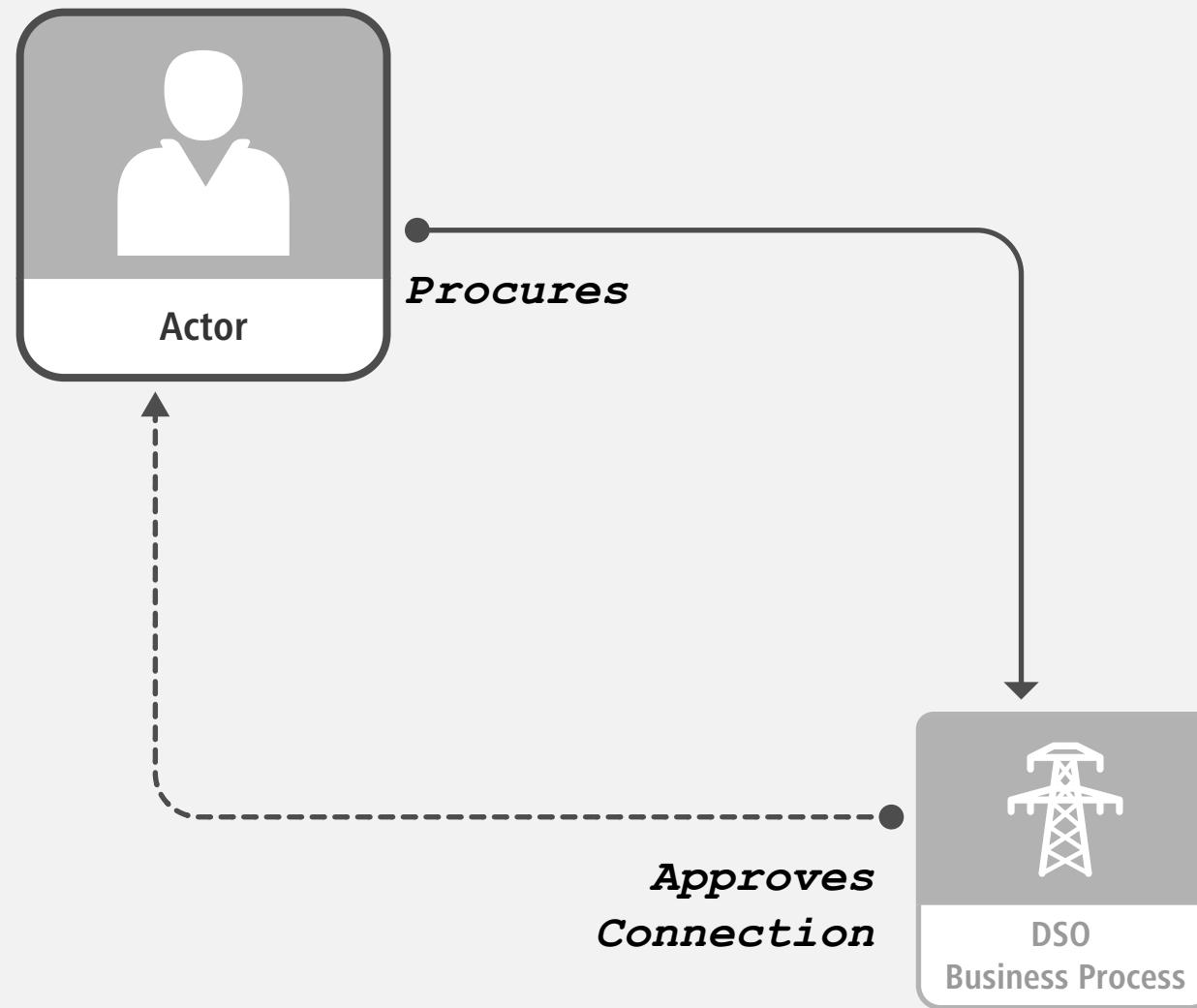
An entity qualifies as a *Grid Actor* only,
if there is *proof* that:

1. A *trusted* Distribution Service and
2. A *trusted* Meter Point Operation

are being provided.

Only what matters for all, matters at all.

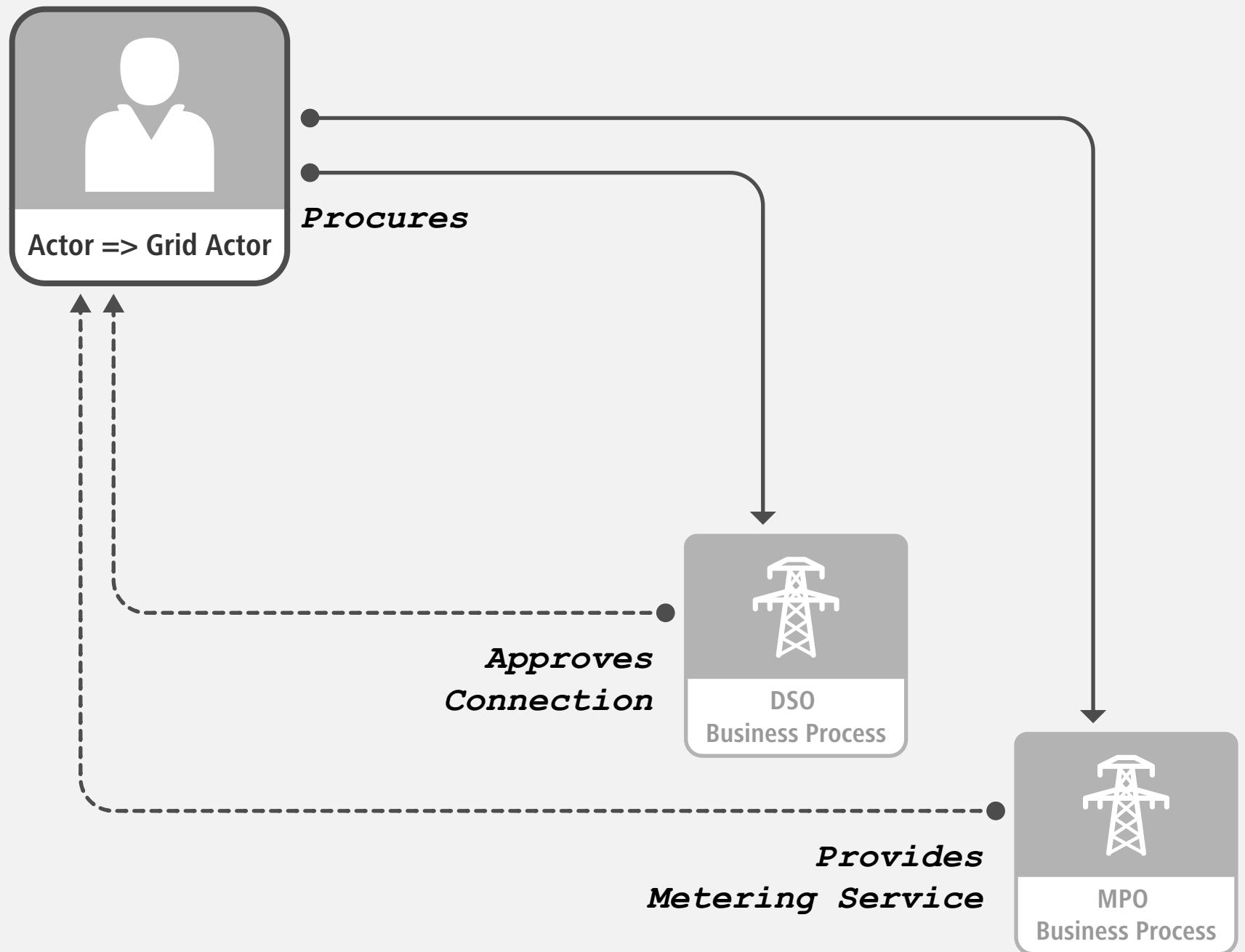
There are processes that Distribution Service and
Meter Point Operators comply with.



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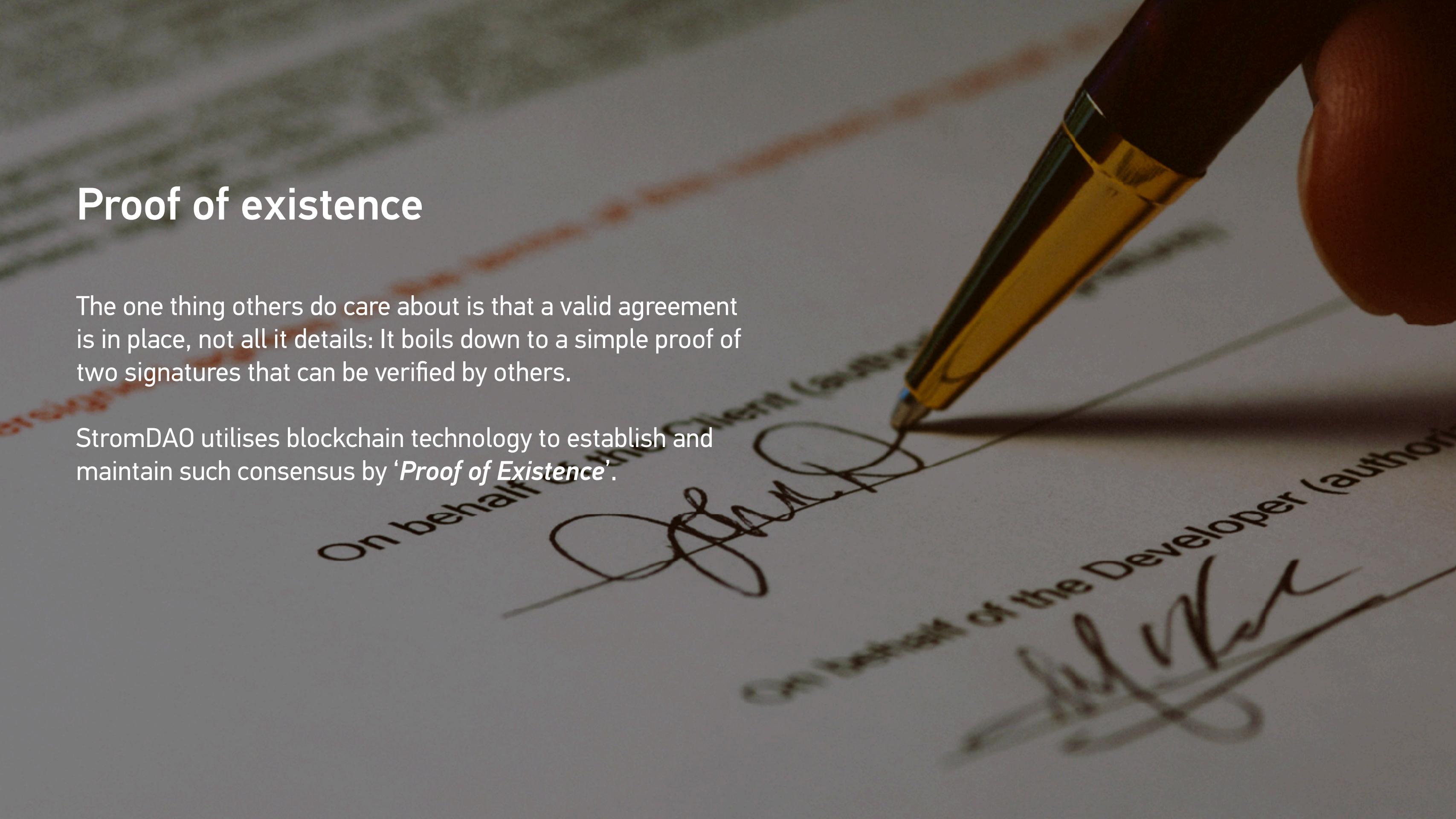
But it is all bilateral: No one else actually cares about this.



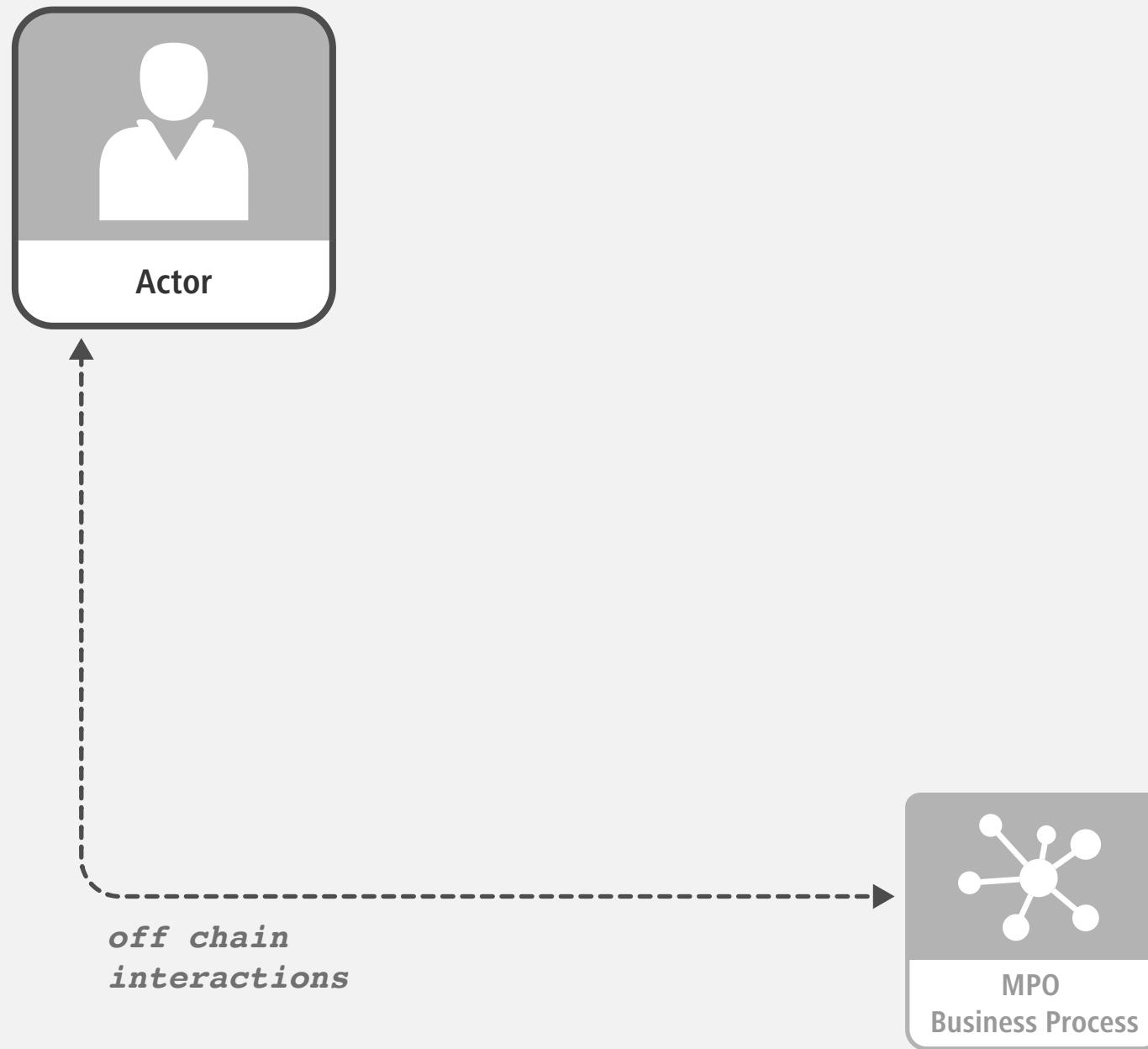
Proof of existence

The one thing others do care about is that a valid agreement is in place, not all its details: It boils down to a simple proof of two signatures that can be verified by others.

StromDAO utilises blockchain technology to establish and maintain such consensus by '*Proof of Existence*'.

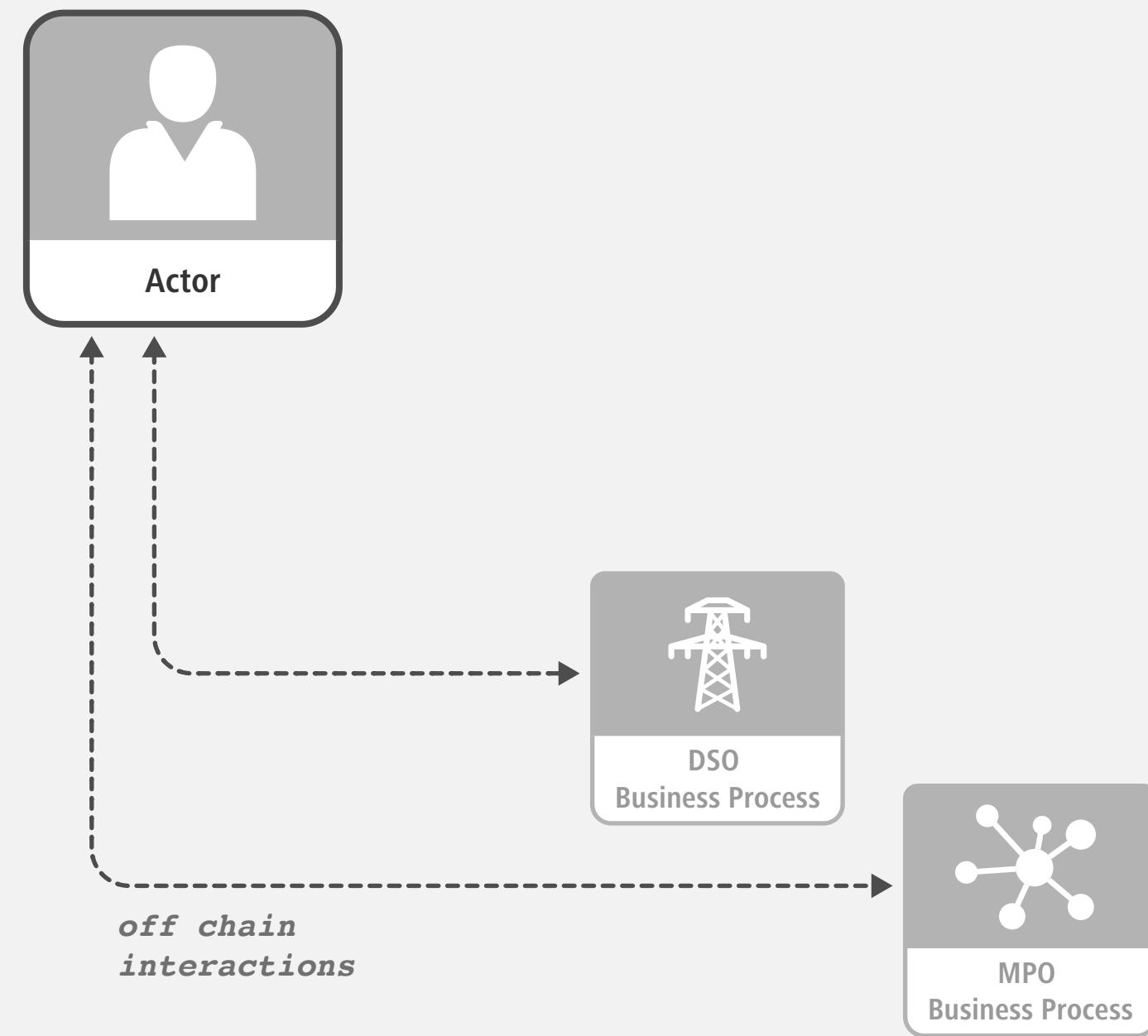


Forget bilateral processes.

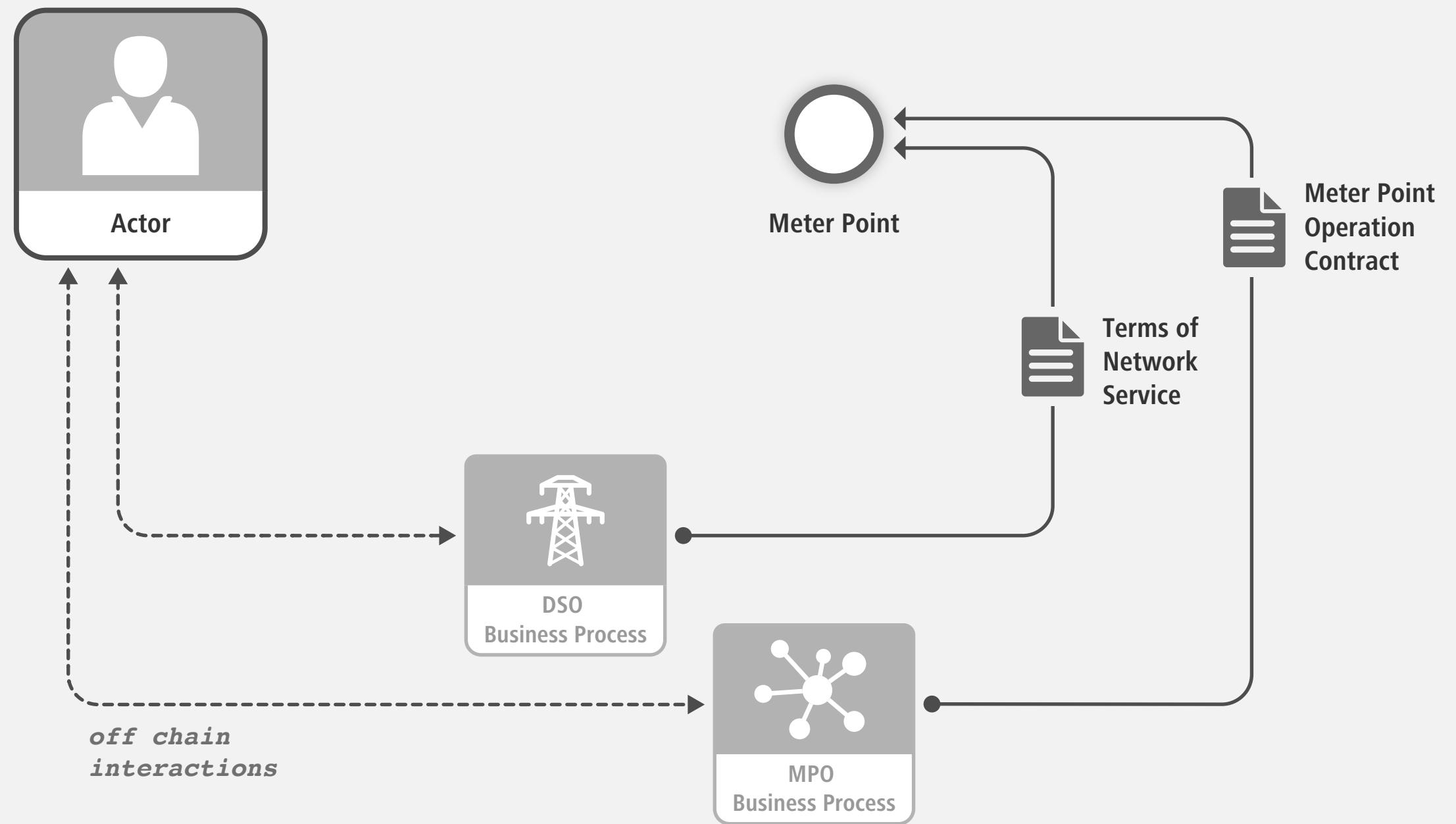


Forget bilateral processes.

Don't worry about entity relations.

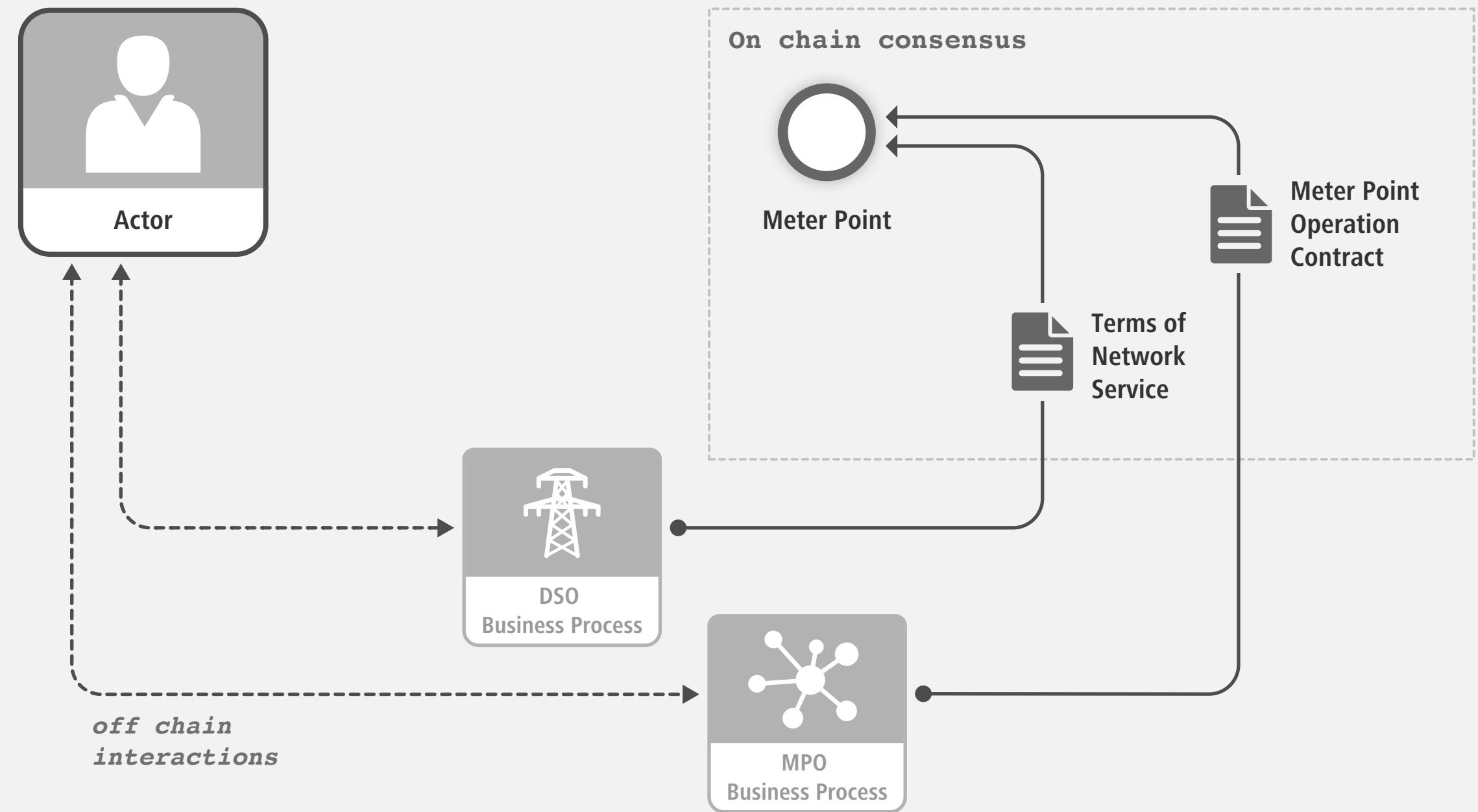


Instead, think about stateless
self enforcing agreements...



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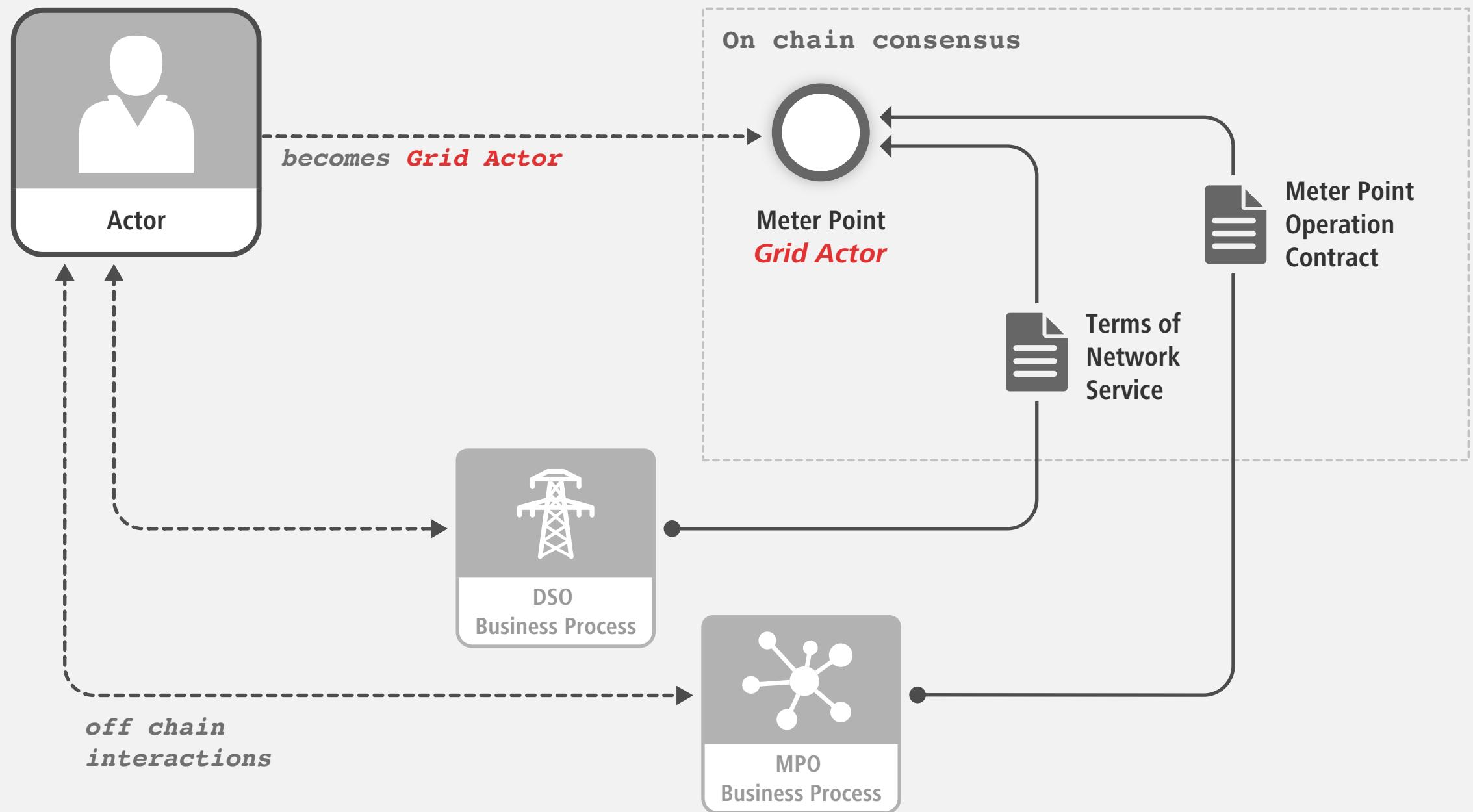
...what matters is verifiable proof that mutual agreement has been established, not what it details.



Instead, think about self enforcing agreements...

...what matters is verifiable proof that mutual agreement has been established, not what it details.

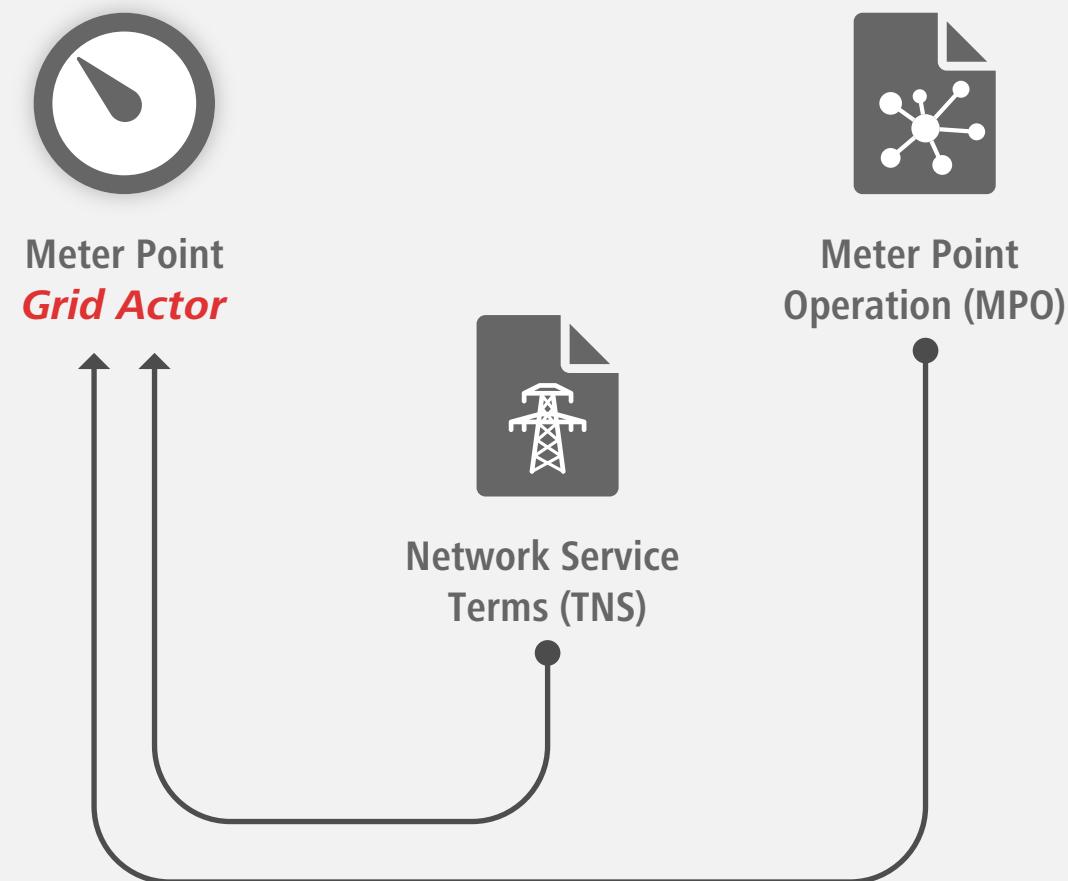
Proof of existence is sufficient.



Gridborne

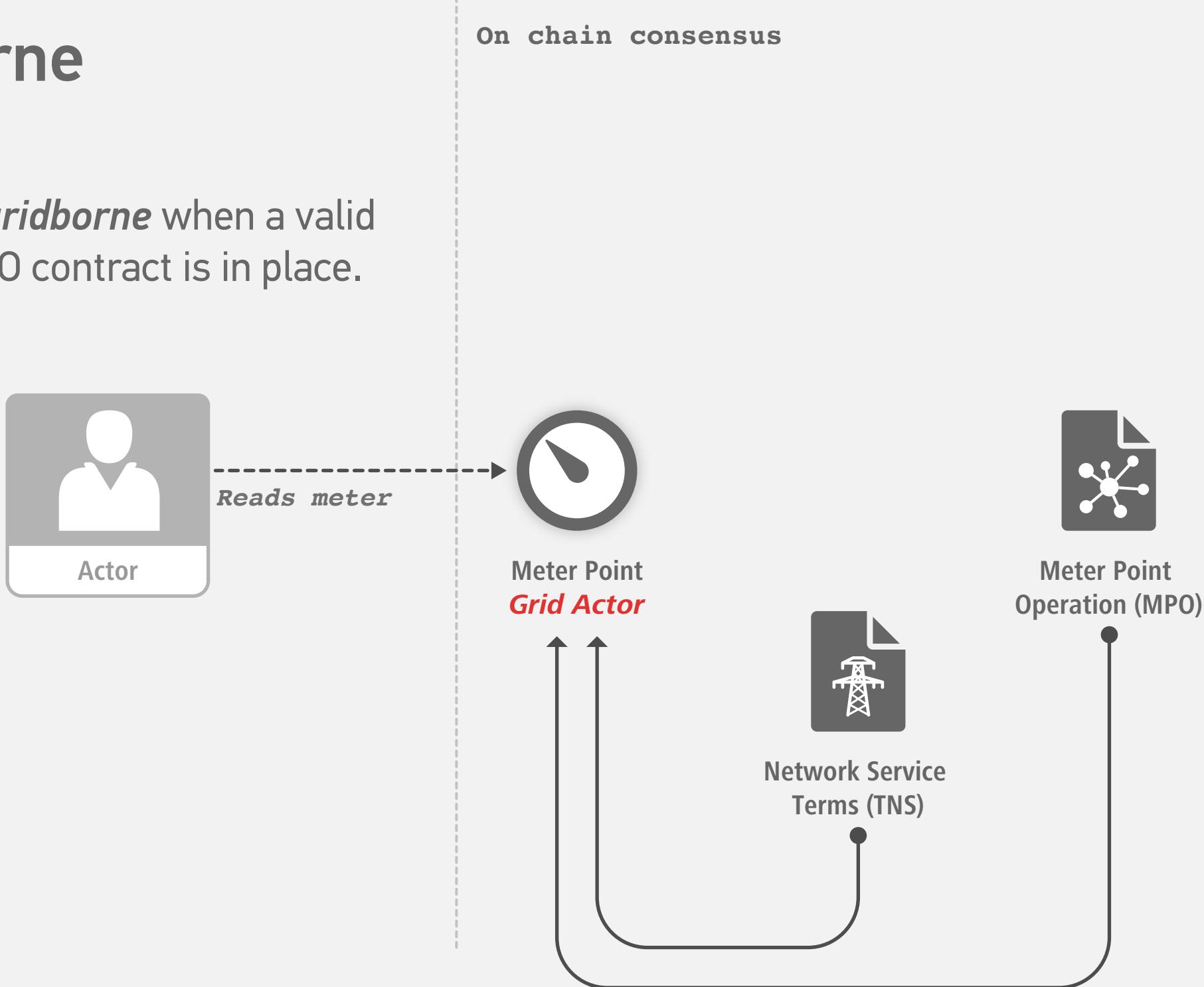
An actor is *gridborne* when a valid TNS and MPO contract is in place.

On chain consensus



Gridborne

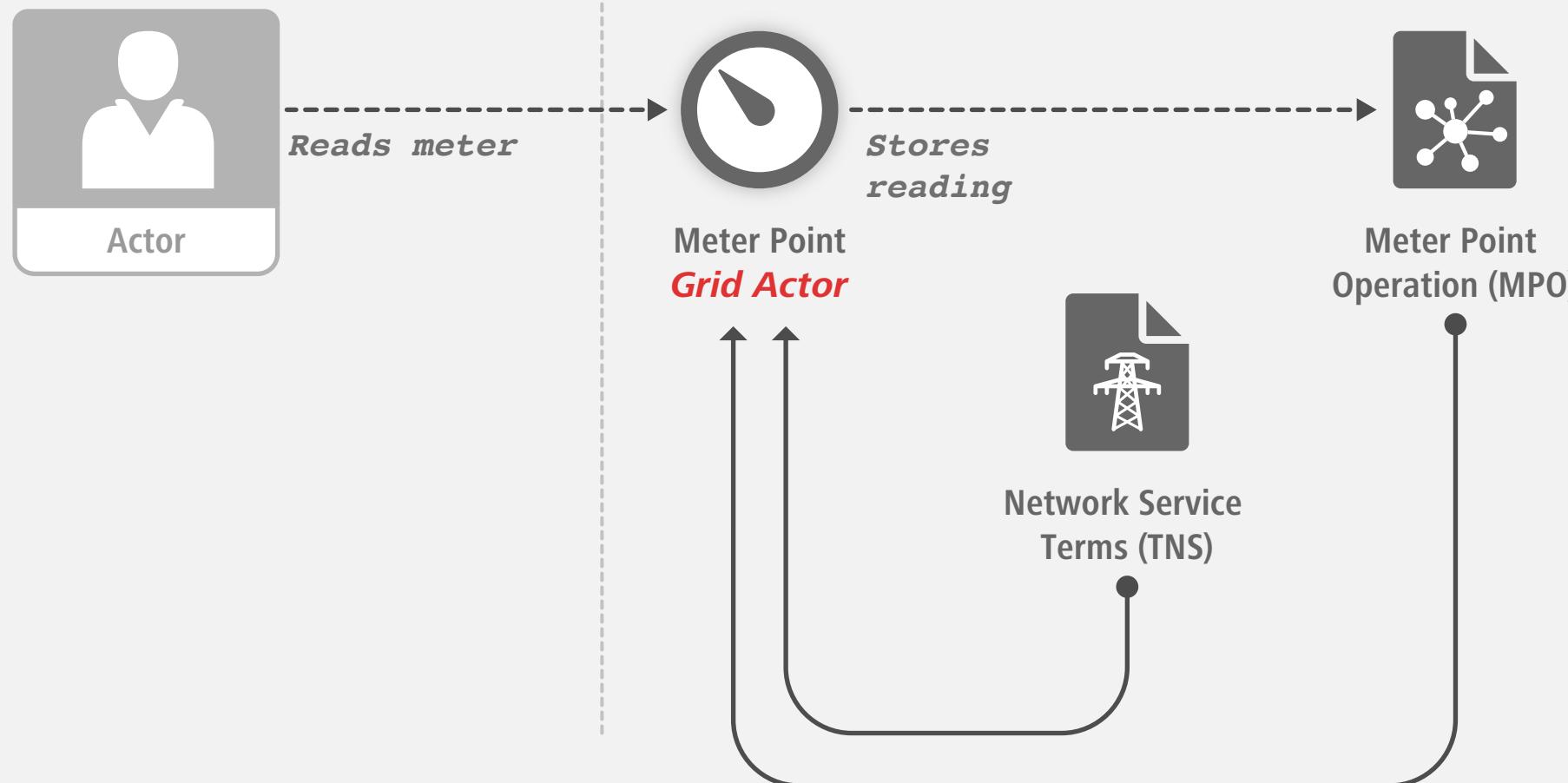
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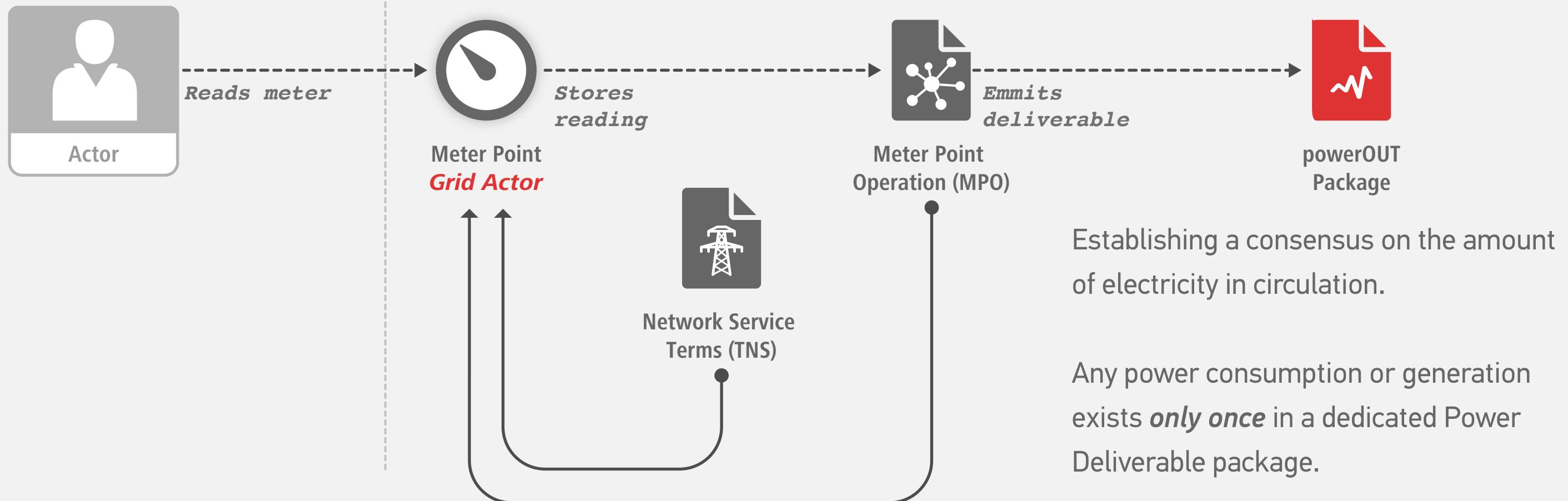


The MPO contract is now *authorised to underwrite* power deliverables with any meter reading provided.

Gridborne

An actor is *gridborne* when a valid TNS and MPO contract is in place.

On chain consensus



Ownership

The notion of ownership is an important concept in blockchain terminology.

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It is being utilised to correlate individual Actors with Power Deliverable packages.



powerOUT
Package

```
contract Delivery is owned {  
    address public owner;  
    address public dso;  
    uint256 public role;  
    uint256 public startTime;  
    uint256 public endTime;  
    uint256 public power;  
    address public resolution;  
    ...  
}
```

Ownership

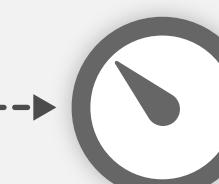
Ownership is utilised to correlate Actors with Power Deliverables.



Reads meter

Actor

On chain consensus

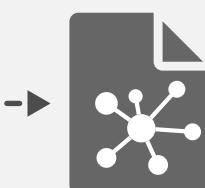


Meter Point
Grid Actor

Stores reading



Network Service
Terms (TNS)



Meter Point
Operation (MPO)

Emmits deliverable



powerOUT
Package

Assigns to owner



Assigns to owner

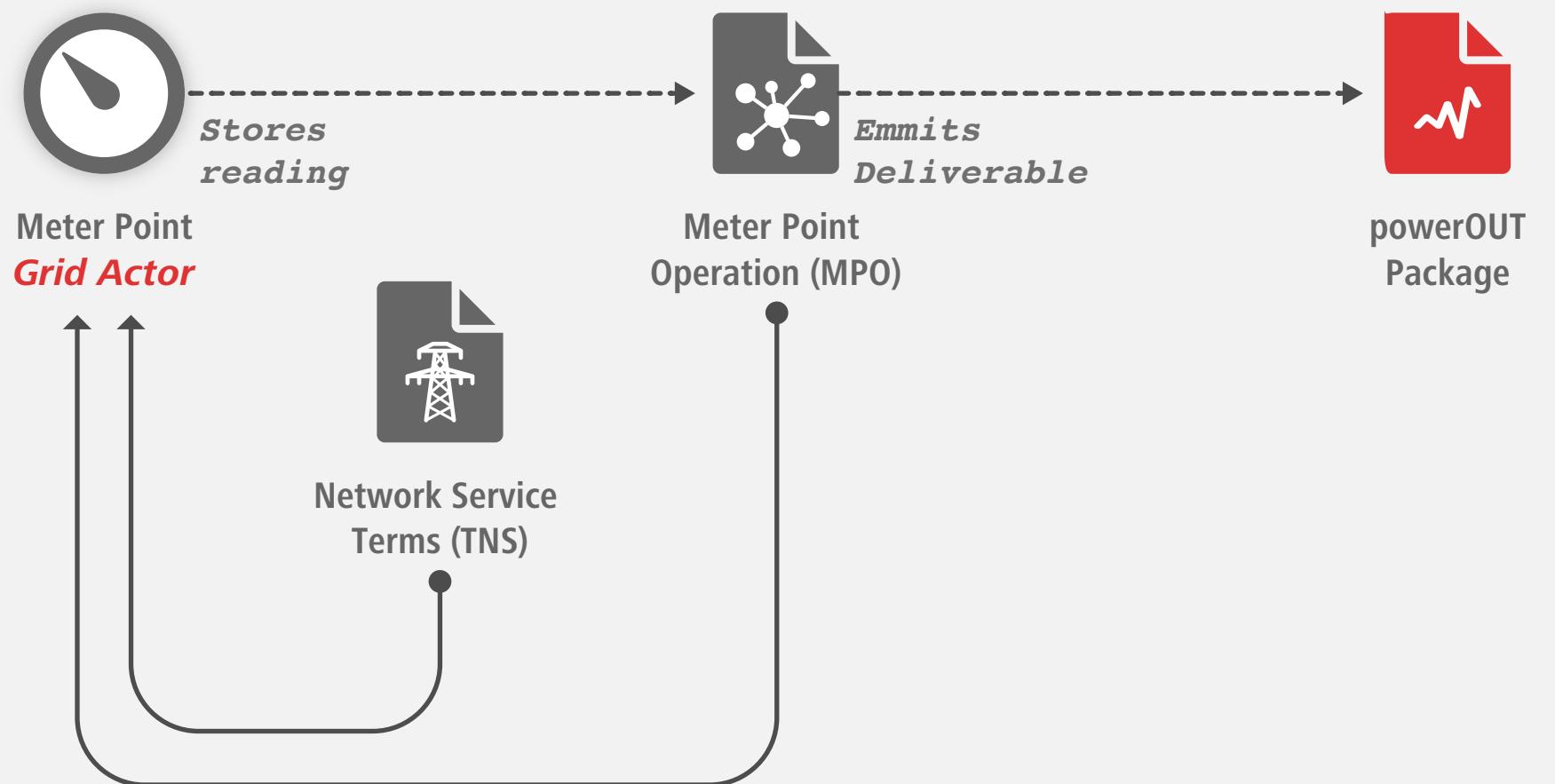


Assigns to owner

**What if the actor doesn't
want to care about it?**

Delegating ownership

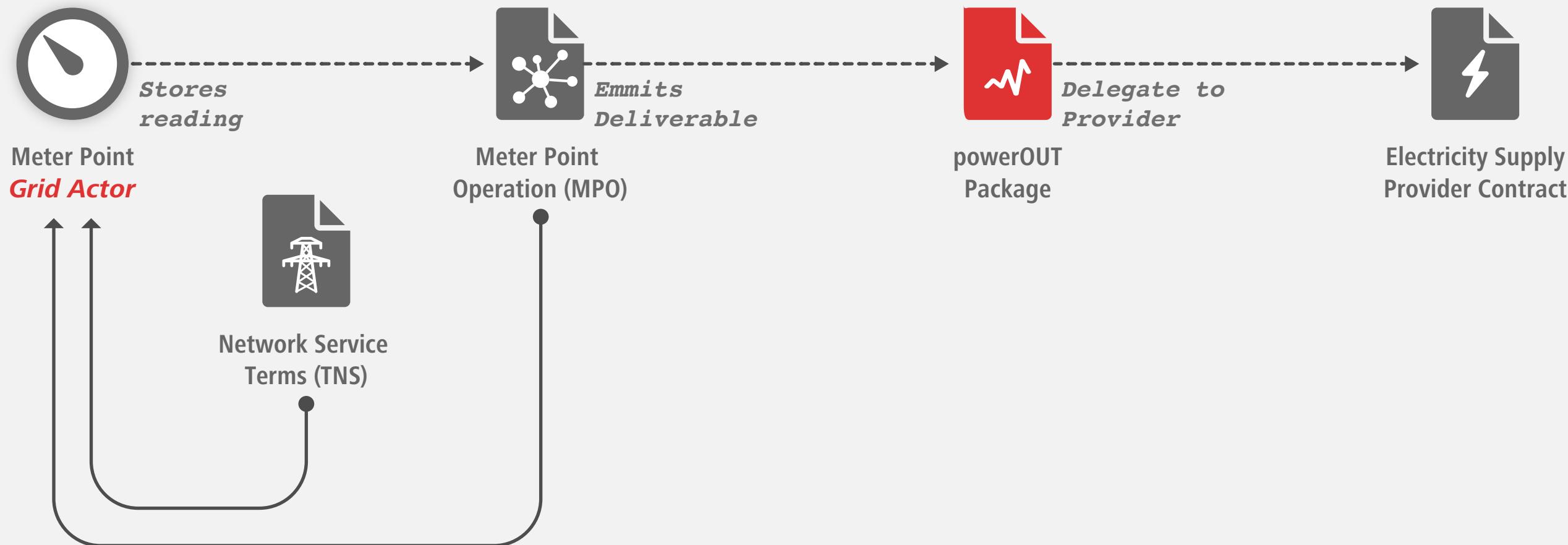
Power Deliverable packages may be delegated to a *third party* for aggregation and clearing.



Delegating ownership

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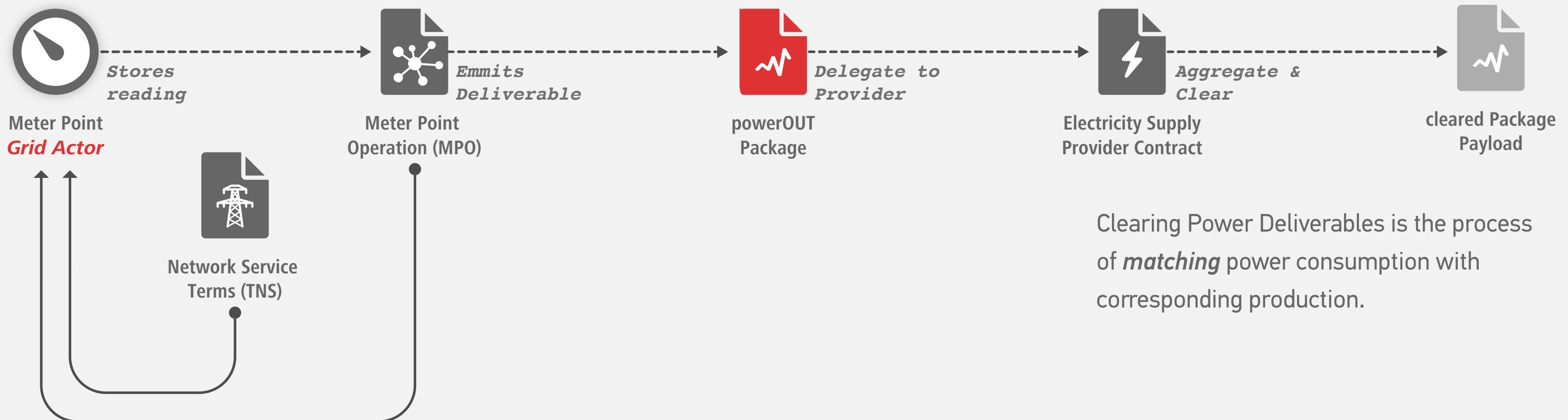
Packages can be delegated to an appropriate Electricity Supply Provider Contract.



Delegating ownership

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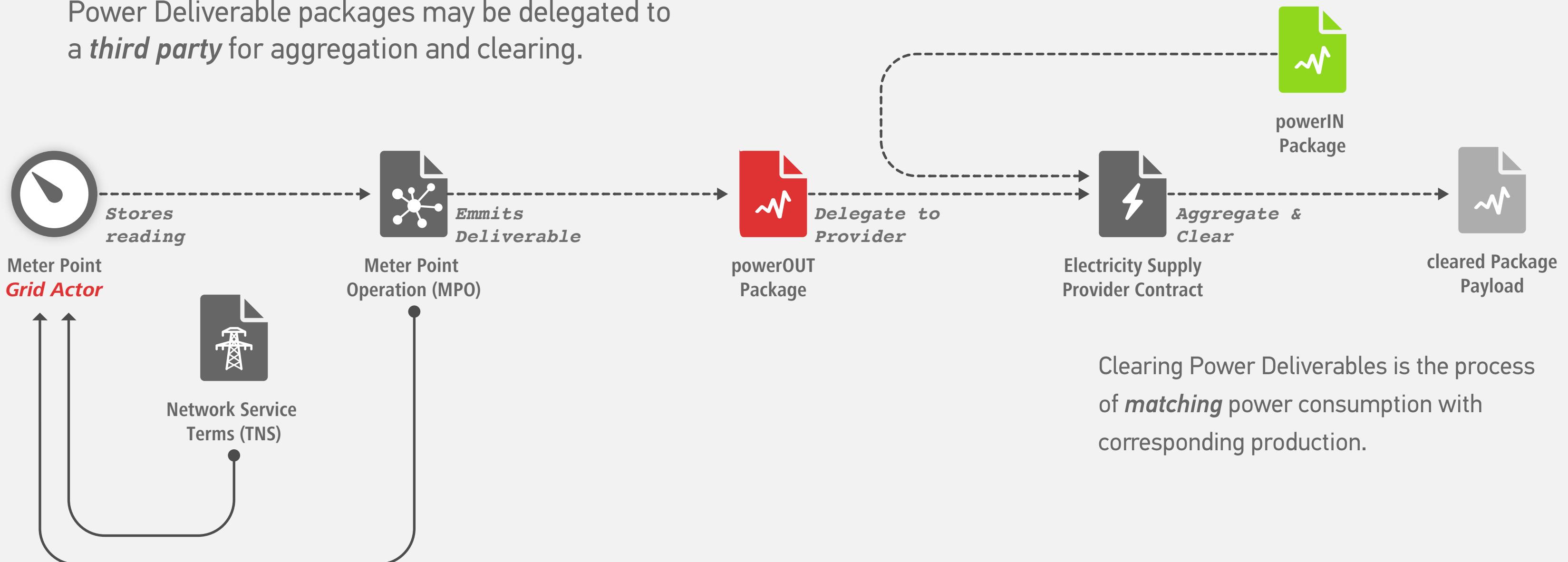


Clearing Power Deliverables is the process of *matching* power consumption with corresponding production.

Delegating ownership

The responsibility of sourcing appropriate sets of *corresponding* Deliverables is delegated to the Provider Contract.

Power Deliverable packages may be delegated to a *third party* for aggregation and clearing.



TODO

TODO TODO TODO.

LET'S DO IT...

1. Create a new actor
2. Ensure Meter-Point-Operation Contract is signed
3. Ensure DSO-Contract is signed
4. Push some Readings
5. Check creation of Deliverables

>>[Start Business-Object Demo](#) (localhost:8000)

TODO

TODO TODO TODO.

START YOUR (LOCAL) ENV...

```
git clone https://github.com/energychain/BusinessObject-Demo.g  
cd BusinessObject-Demo  
npm install
```

Starting...

```
npm start
```

Open <http://localhost:8000/> in your browser.