

# EV FLEXIBILITY WITH RADIUS

Charlotte Sand, CEO & Founder  
March 28, 2022

7 AFFORDABLE AND  
CLEAN ENERGY



11 SUSTAINABLE CITIES  
AND COMMUNITIES



12 RESPONSIBLE  
CONSUMPTION  
AND PRODUCTION



13 CLIMATE  
ACTION



# AGENDA

- True Energy's system
- Learnings
- Perspectives

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# SYSTEM

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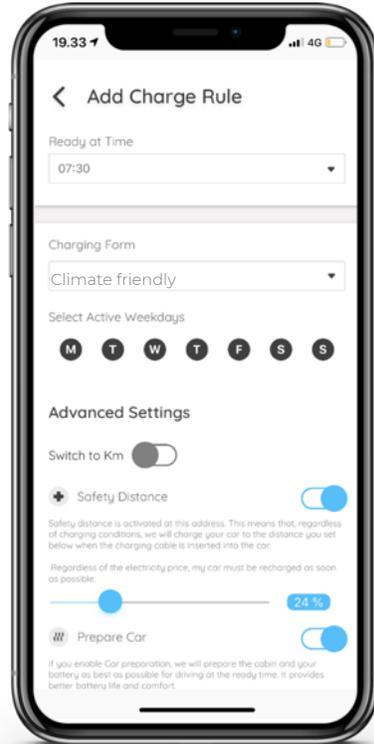


13 CLIMATE  
ACTION



truve

# PREREQUISITE: SMART CHARGE YOUR EV WITH TRUE ENERGY APP



PERSONAL PREFERENCES



CHARGE PLAN



STATE OF CHARGE

EV OWNERS SAVE MONEY & CO2

SET & FORGET

WE SUPPORT EVERY CAR BRAND and MODEL



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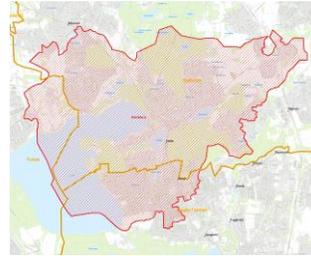


13 CLIMATE ACTION



# REGIONS

- DSO provides data about relevant areas/regions
- Regions created in system



True Mail Dashboard Events Logout

Hello, cbs@trueenergy.io.  
I hope you are having a great day!

Region	Chargers
Region Casper	83 Chargers
Norway	662 Chargers
Region 1	22 Chargers
Region 2	32 Chargers
Super Region	1985 Chargers
Little Region Casper	24 Chargers
Agder Energi	177 Chargers
Virtual Craig	161 Chargers



# OPERATOR DASHBOARD

True Max Dashboard **Events** Logout

Hello, cbs@trueenergy.io.  
I hope you are having a great day!

<b>Region Casper</b> 83 Chargers	<b>Norway</b> 662 Chargers	<b>Region 1</b> 22 Chargers	<b>Region 2</b> 32 Chargers	<b>Super Region</b> 1985 Chargers	<b>Little Region Casper</b> 24 Chargers	<b>Agder Energi</b> 177 Chargers	<b>Virtual Craig</b> 161 Chargers
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**Create events**

- Start and end time: Now or later
- Regions incl fall back region
- Power (volume)
- Reason
- Notes

True Max Dashboard **Events** Logout

Events in the Future

Events in the Past

2021-08-10 09:00	2021-08-10 10:00	0.002	Sell	Norway	Modify
2021-08-09 15:00	2021-08-09 16:00	0.002	Sell	Virtual Craig	Modify
2021-08-09 15:00	2021-08-09 16:00	0.002	Sell	Norway	Modify
2021-02-11 04:00	2021-02-11 05:00	0.6	NyaText1	Region 1	Modify
2021-02-06 16:00	2021-02-06 17:00	0.3	NyaText2	Region 1	Modify
2021-03-06 04:00	2021-03-06 06:00	0.6	NyaText1	Region 1	Modify

Add New Event

Start Date: 21-06-2021 13:46

End Date: 22-06-2021 13:46

Region: Region Casper

Fallback regions:  
 Region Casper  
 Norway  
 Region 1  
 Region 2  
 Super Region  
 Little Region Casper  
 Agder Energi  
 Virtual Craig

Power (MW):

Reason:

Notes:

Submit



# EVENT: PEAK LOAD SHAVING

- Event in the system triggers **all EVs in region to stop charging**
- Charging will start again when event has finished
- User can see charge plan in App: Red column for blocked charging
- Exeptions: Cars on safety and manual charging (EV owners trust car will always be fully charged according to individual preferences)

Start Date  
19-01-2022 17:00

End Date  
19-01-2022 18:00

Region  
Region 1

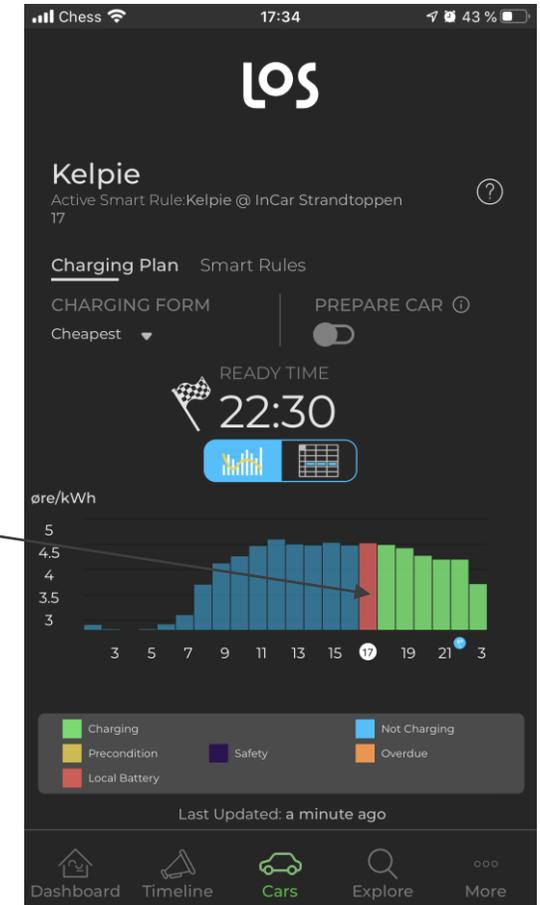
Fallback regions

- Region Casper
- Barbu
- Bjorbekk
- Kristiansand
- Bjorendal
- Engene
- Eydehavn
- Fjære
- Norway
- Region 1
- Region 2
- Super region
- Little Region Casper
- Agder Energi
- Virtual Craig
- Frikstad
- Grimstad
- Kragenes
- Moen
- Timenes
- Torbjørnsbu
- Arendal sentralnettspunkt

Power [MW]  
1,00

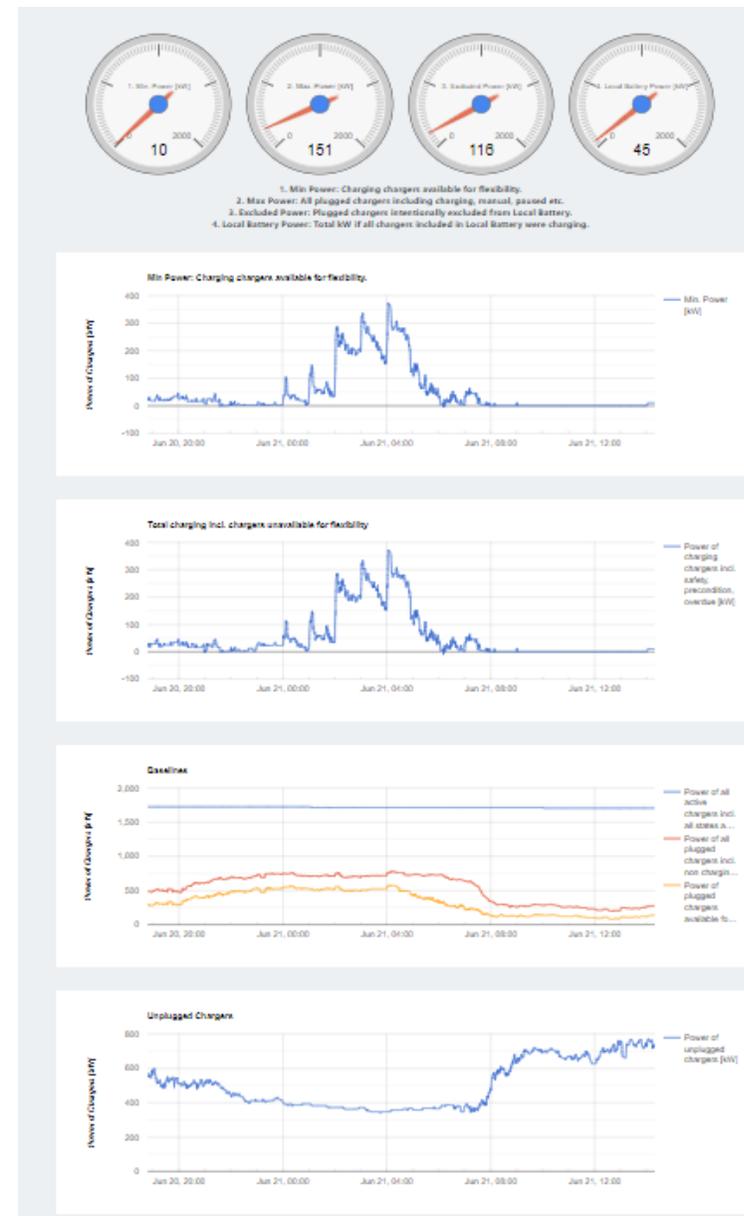
Reason  
Maintenance

Notes  
Planned maintenance according to Department Service&Operations



# DASHBOARD AND LOGS

- During event charging activities can be followed on dashboard
  - Charging chargers available for flexibility
  - Power of plugged charges available for flexibility (charging or paused)
  - Total charging incl. unavailable for flexibility (incl. safety, precondition, overdue)
  - Power of all chargers incl. unplugged
- Log/reports can be generated after event and used for validation



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# WHAT'S IN IT FOR THE USER/EV OWNER?

- Cable Discount
- Paid out by True's partner or True

Tesla

Smart Charge Big Battery Toplister Elpriser

**NUVÆRENDE STØRRELSE PÅ DIN KABELRABAT (TM)**

**0 DKK**  
Optjent kabelrabat™  
Næste Big Battery:  
00:00 - 02:00 tirsdag

I dag 7 dage Måned **Al tid**

**172 DKK**  
Optjent kabelrabat™

**3h 0m**  
Deltagelse

**Tidligere deltagelse**

Dato	Bil & ladeboks	Samlet deltagelse	Besparelser
17/08	Tesla InCar Agern Alle 5A	3h 0m	2.59 DKK

Del

Dashboard Tidslinje Biler **Explore** Mere



# LEARNINGS



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# The happy ones

- System worked fine
- EV owners willing to participate
  - Or didn't care...
  - Prioritize EV owners' needs (car always charged)
- Challenges and needs are the same across countries
  - Market for scalable solutions
- Radius: Forward looking and action oriented
  - Need to develop solutions *now* when grid is not challenged in order to be prepared for future needs
  - Players like True needs funding from buyers



## The happy ones

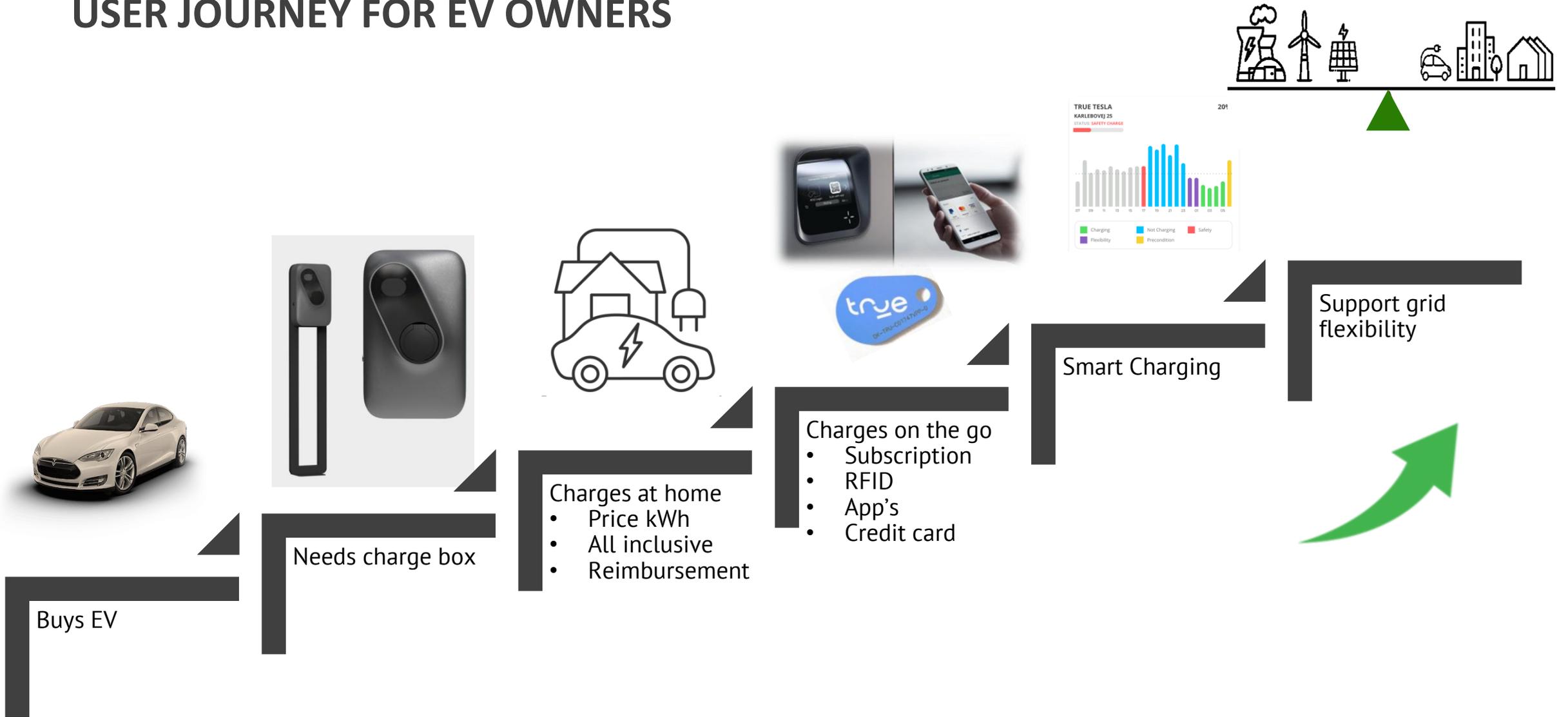
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## The harder ones

- GDPR
- Baseline (and payment models) to True and EV owners
- Cannibalization: New solutions must be defined and valued in relation to SmartCharge (spot price and time-differentiated tariffs)
- Volume of cars
  - Corona lockdowns
  - Recruit cars locally
  - More flexible user engagement agreements
  - Customer journey (time works for us)



# USER JOURNEY FOR EV OWNERS



# PERSPECTIVES



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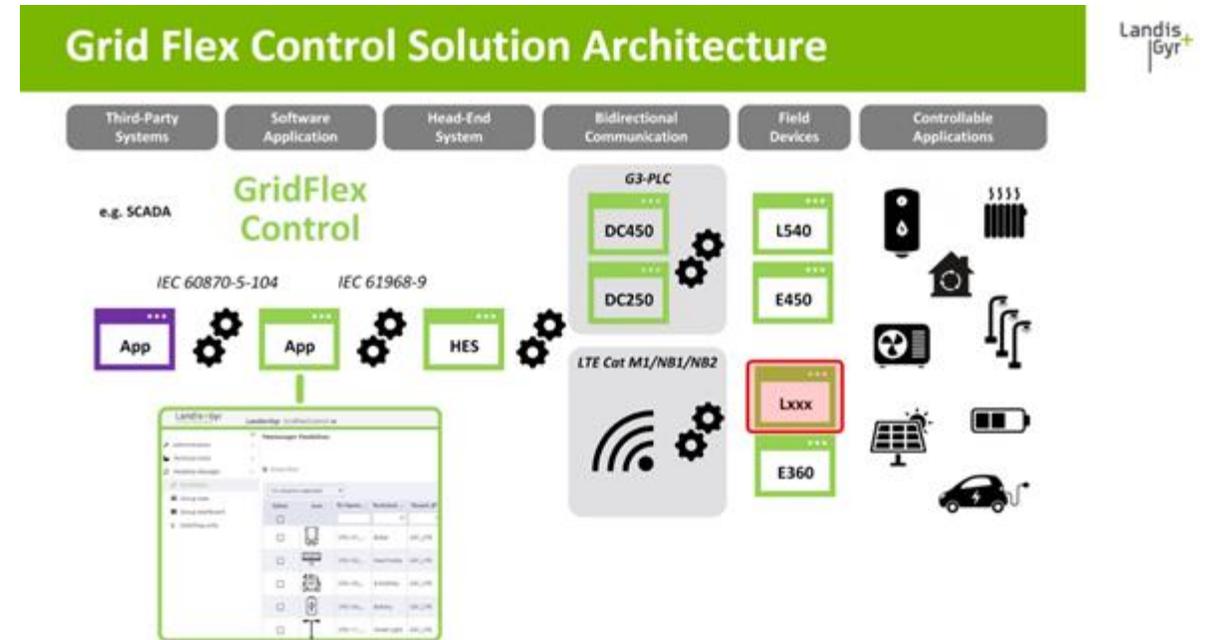
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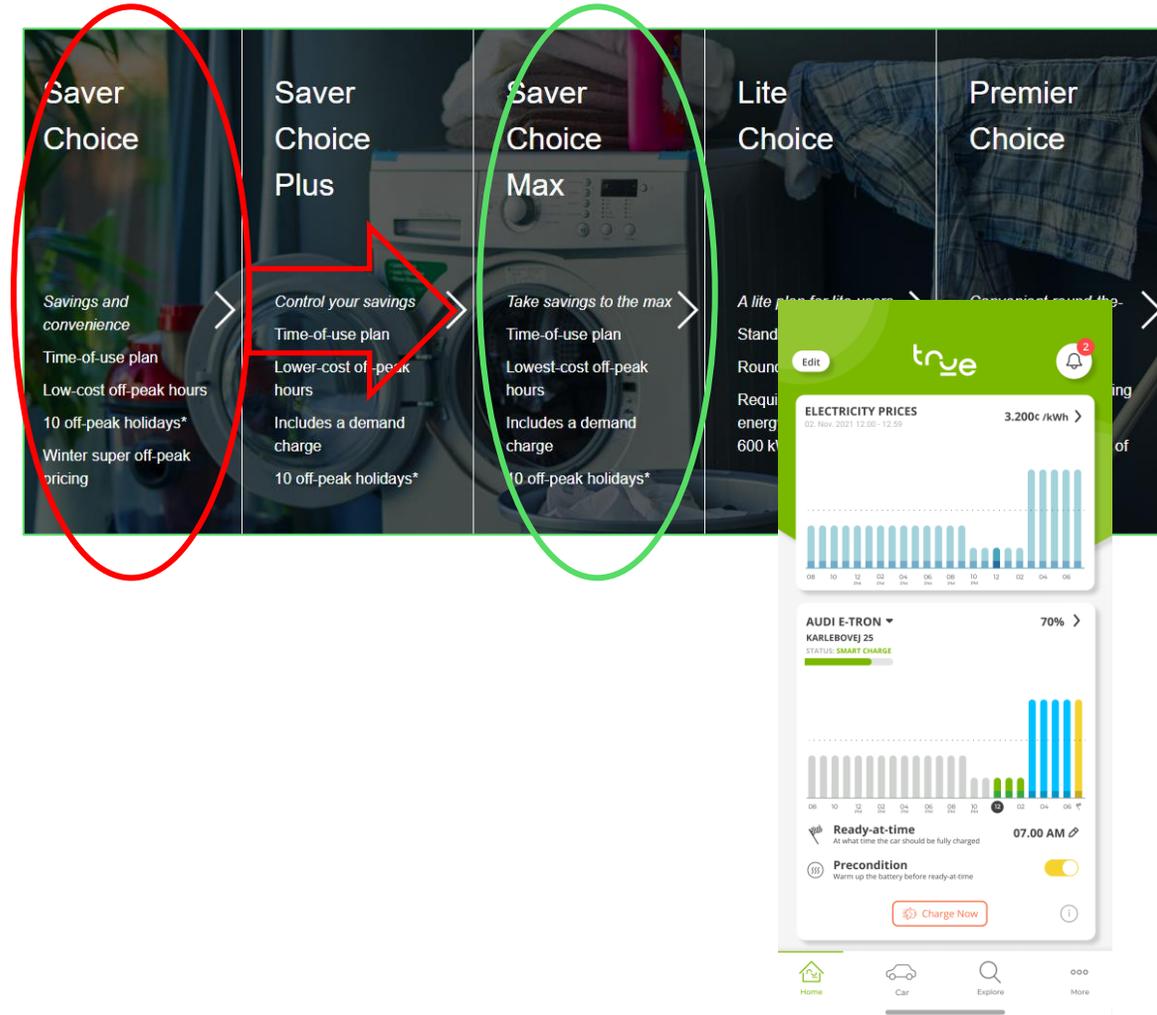
# Grid flex in Switzerland: Mandatory relays in meters and DSO control

- Concept:  
Control of heating pumps and boilers via mandatory relay in meters
- System:
  - Edge computing in each meter.
  - Each household has weekly schedules based on profile: Heating pumps and boilers switched on and off through relays to flatten out total household consumption
  - DSO has access to switching off assets in specific local areas in case of emergencies
  - Controls a total of 1,2 mio assets
- Business model:  
DSO Pays Landis+Gyr for service and software
- Running since:  
1945 and onwards...
- Barriers for use in Denmark:
  - Lack of meters with relay that can control outputs
  - Permissions to control output



# Arizona flex: Advantage of integrated value chain

- Concept: Price signals controls consumption based on transmission and distribution grid needs.
- Arizona Electricity is vertical integrated (production, grid and retail in same company).
- Needs, revenue, customer relations in same company
- No spotprice, but tariffs that change during the day. 3 seasons and 13 holidays with different tariffs.
- System:
  - True Energy app => control of EV charging
  - Flatten out consumption by tariffs (~SmartCharge)
  - Transmission grid: If unusual/urgent need for load increase: Change tariff.
  - Decentral grid: Risk of overload of transformer or local bottlenecks => Local Battery stops charging in local area
- Business model / payments:
  - SaaS (DSOs pays True)
  - Arizona Electricity provides charge boxes at discounted prices if EV owner accepts flexible charging. And electricity at cheaper prices.
- Running since: 2022est
- Barriers for use in Denmark: Decoupling



# Norflex in Norway: Subsidized market

- Concept
  - Local peak load shaving delivered by several suppliers based on different assets.
  - Agder Energi (DSO) buys best bid
- System & business model:
  - Nodes delivers market platform
  - Each seller (aggregator or plant owner) bids available assets at their desired price
  - Buyer (DSO) accepts bid
  - Market platform collects baselines, activates event in supplier's system and provide logs
  - Suppliers' system run the event
  - Market platform bills buyer and pays seller
- Running since: 2021
- Barriers for use in Denmark?
  - Subsidised: Public funded payments to sellers. To be consideren when volume is still small
  - No market place (system) and substantial efforts in recruiting sufficients players

The screenshot displays the NODES platform interface. The top navigation bar includes links for HOME, FLEXIBILITY MARKET, TRADES, PORTFOLIOS, and LONGFLEX. The user profile is identified as True Energy, Charlotte Sand. The main content area is titled "Grid Areas" and lists several active grid areas, each with a DSO and a status of "Active":

DSO	Grid Area	Status
Ellevio City	Ellevio City	Active
Energa DSO	Energa_I	Active
Haugaland Kraft Nett	Haugaland Kraft Nett	Active
Glitre Energi Nett	Glitre Energi Nett 1	Active
Glitre Energi Nett	Glitre Energi Nett 2	Active
Glitre Energi Nett	Glitre Energi Nett 3	Active

To the right of the list is a map of Europe with Norway highlighted in blue. The "agder energi" logo is overlaid on the map.



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# Impossible to do in Denmark???



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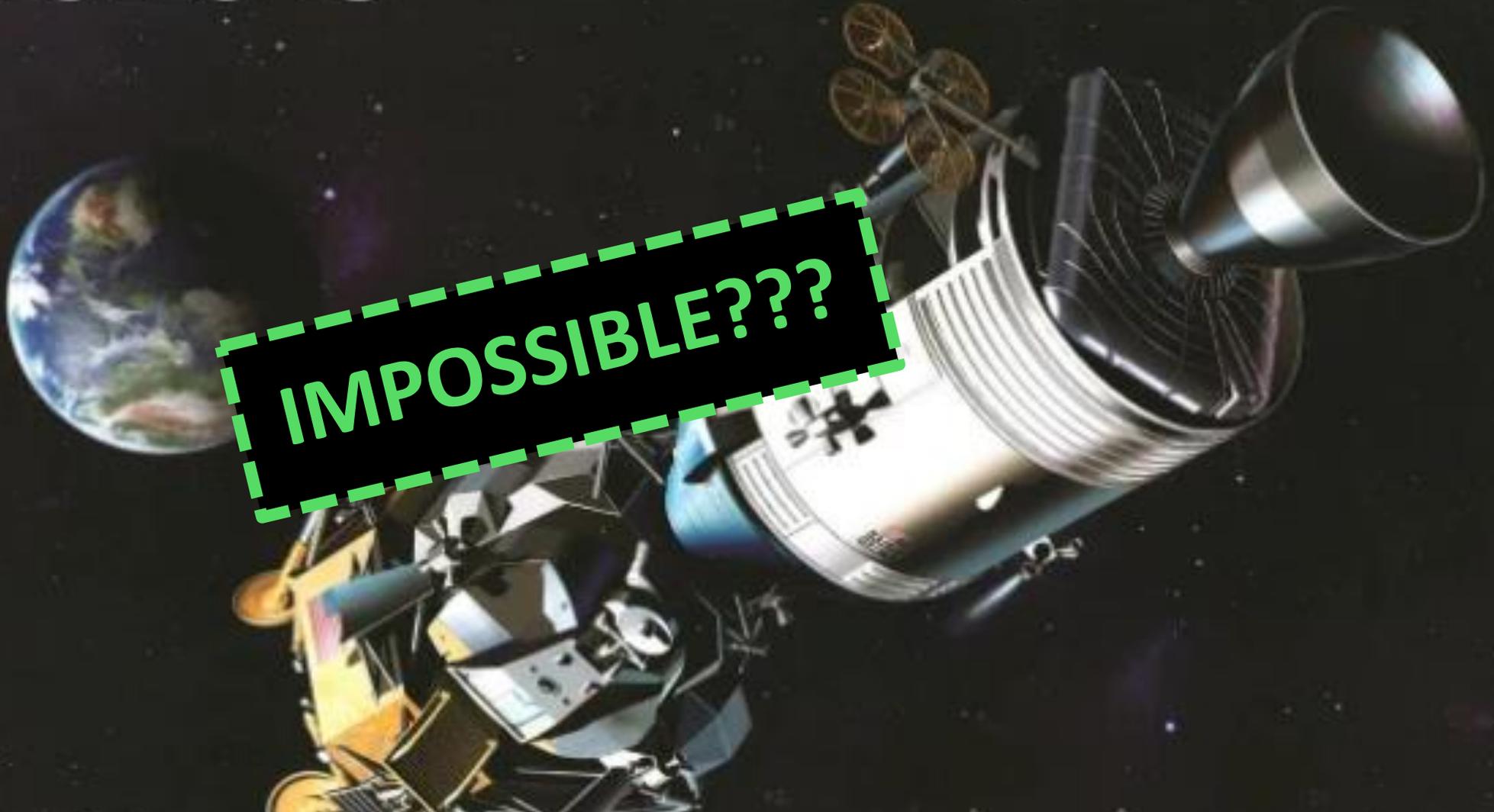


truve



# "Houston, we've had a problem"

## APOLLO 13



IMPOSSIBLE???



Electricity grids of Ukraine and Moldova were switched from Russian to European grids in March 2022

”...doing a year’s work  
in two weeks...”

Commissioner for Energy Kadri Simson

**IMPOSSIBLE???**

Commission européenne  
European Commission

# Grid flex in Switzerland: Advantage of mandatory relays and DSO control

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Control of heating pumps and boilers via mandatory relay in meters
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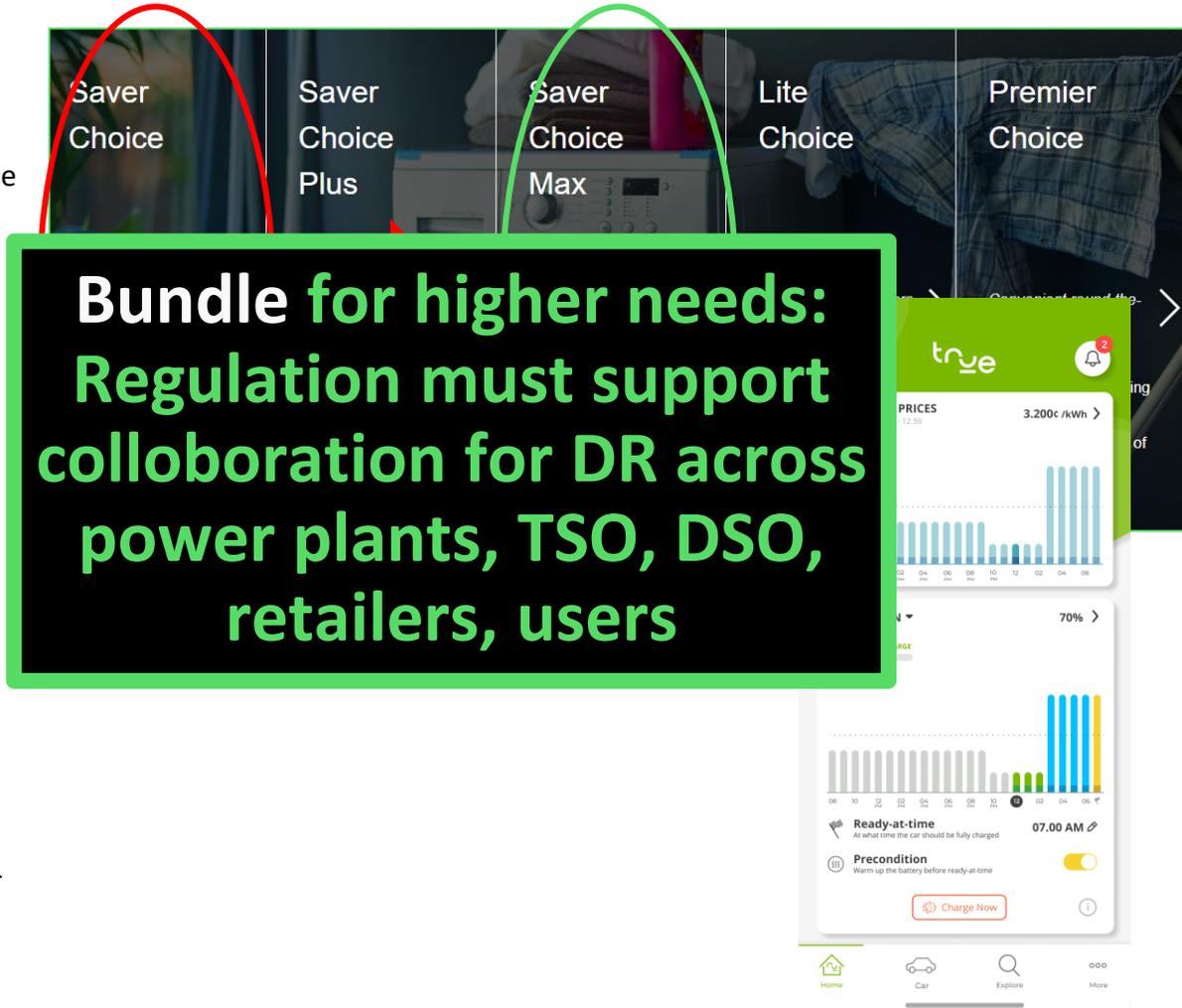
**Change regulation and make heating pumps, EVs etc interruptible (relays in meters as part of tenders; compensate with lower tariffs)**

**Engage users and pay them for each interruption – take advantage of App's, automation, individual behaviour**



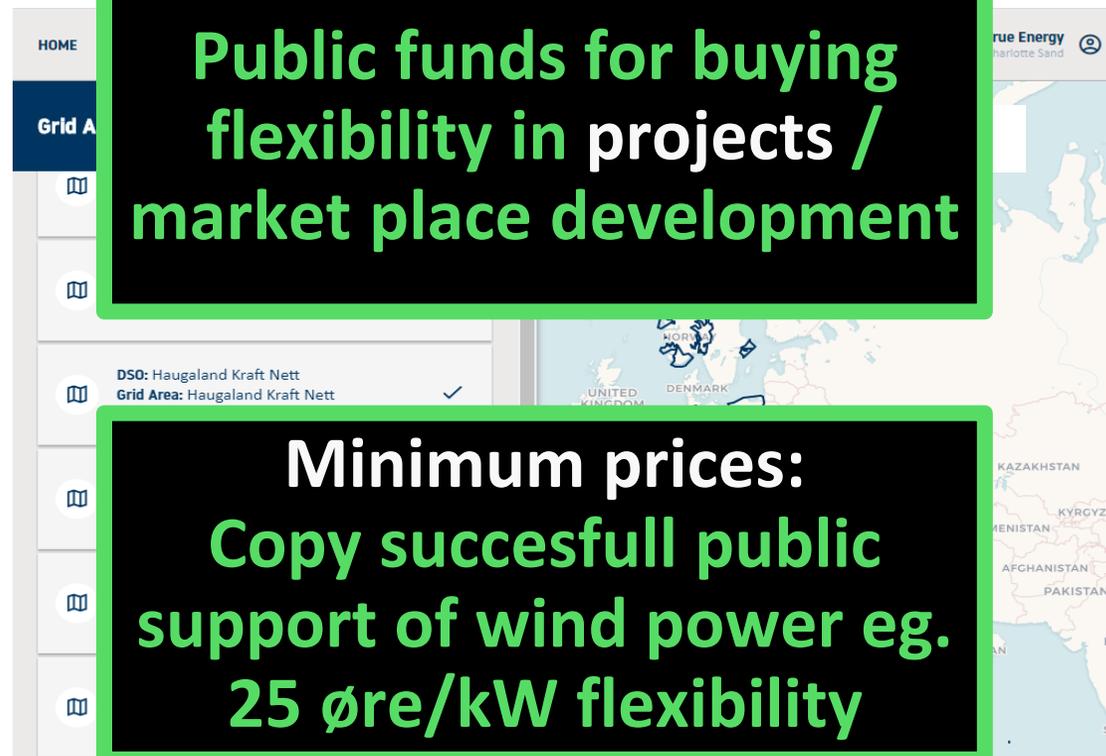
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✓ **System works**

➤ **Volume**

User uptake, recruitment, GDPR

Communication, engagement,  
individual flexibility

➤ **Payment**

Compensation to suppliers and  
users

Baselines & Validation of  
deliveries

**MOVING  
FORWARD**

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**true**

Questions?  
Thank you 😊



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