

# Flexibiliteit in de markt

Bert den Ouden, Voorzitter

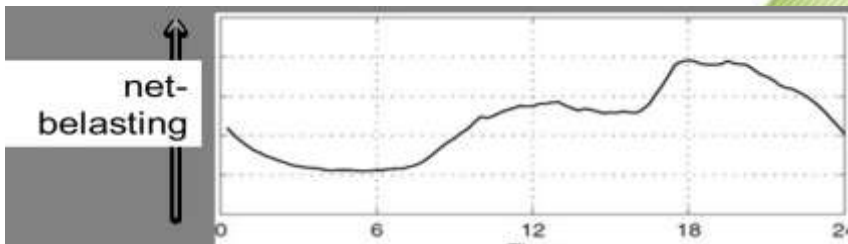
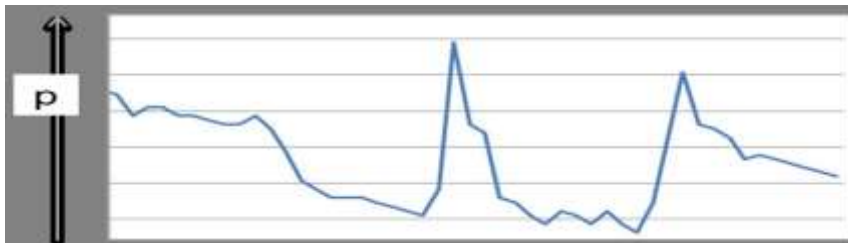
“Gezonde Energietransitie”,  
Dutch Power event, 15 maart 2018

Flexiblepower Alliance Network (FAN)

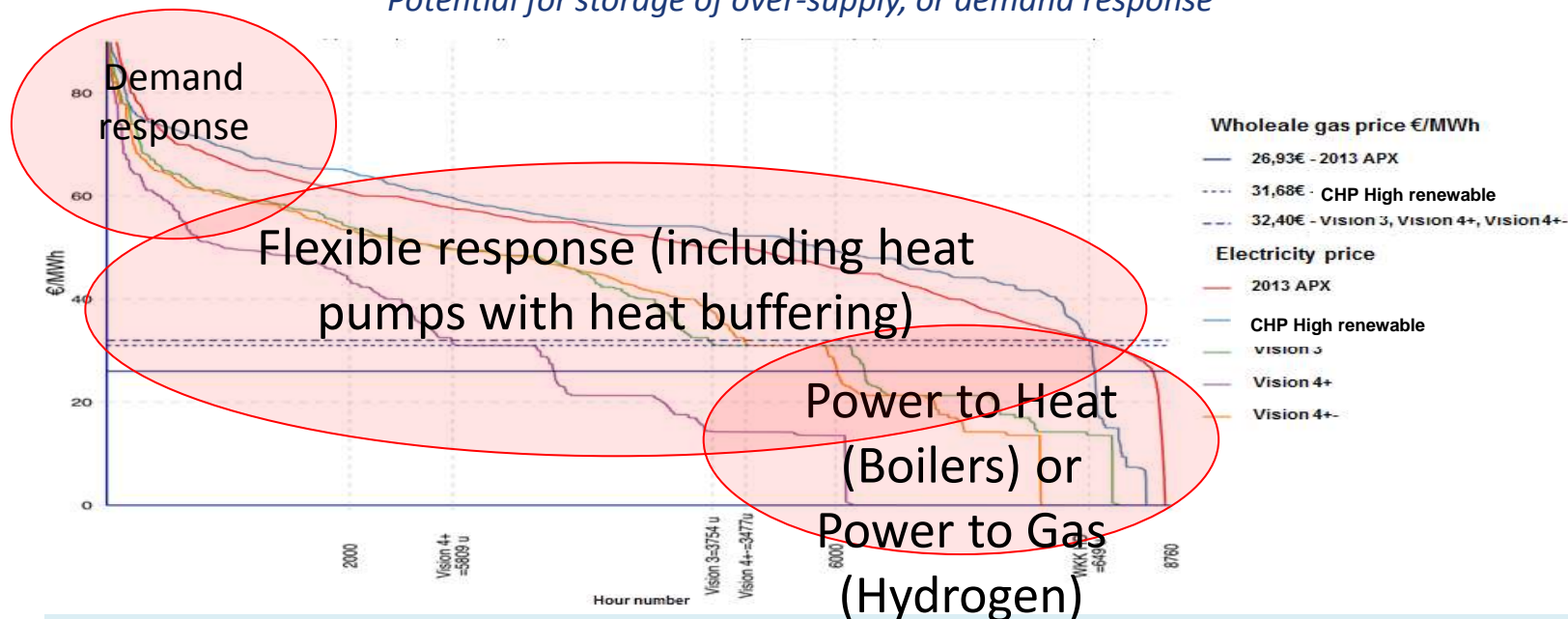


# Wat gaat er gebeuren in de energiemarkt?

**Meer duurzame bronnen (zon, wind) : volatiele productie**  
**Electrificatie (laadpalen, warmtepompen) : volatile vraag**

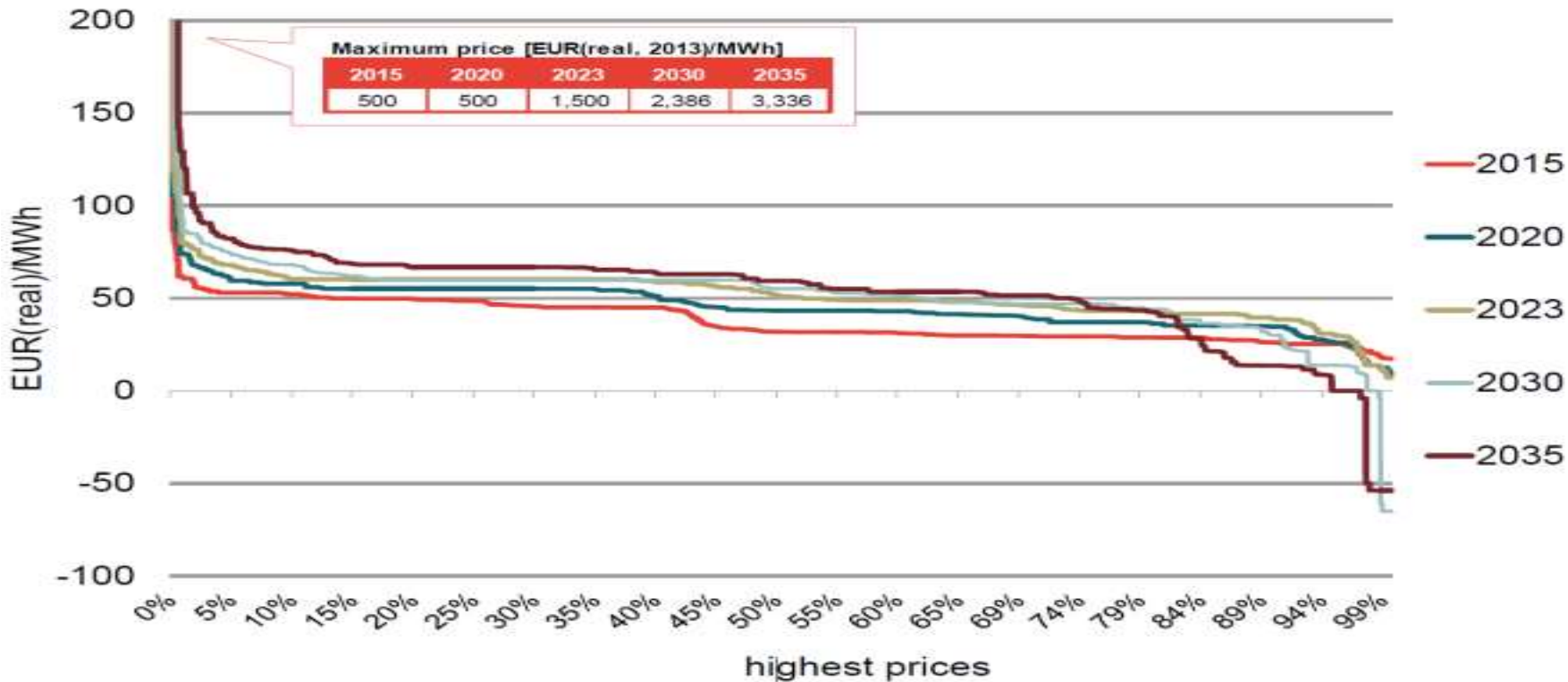


In scenarios 2030 projected in 2014 (wholesale market, day-ahead)  
*Potential for storage of over-supply, or demand response*



- Electricity price may become zero (potentially negative) for a considerable number of hours.
- Demand response already kicks in below gas price level (power-to-heat)  
→ If that happens in great volumes, prices will stabilize above zero level
- Will that influence the potential for flexibility, storage or power-to-gas (hydrogen)?

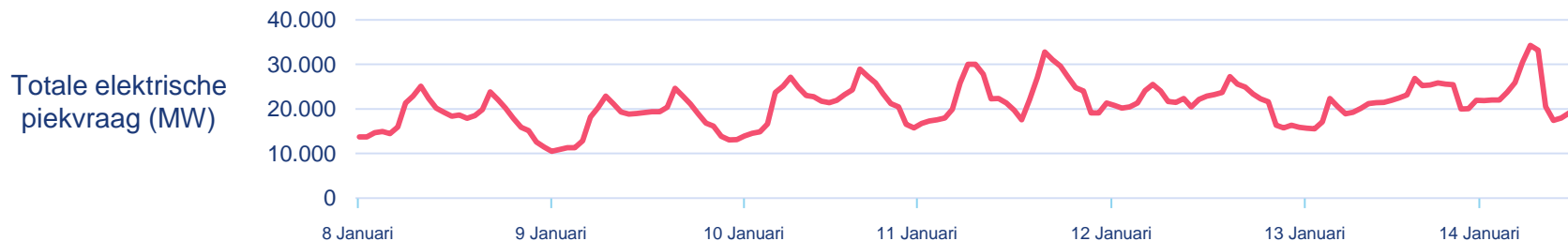
Newest scenarios : Commodity price (€<sub>2015</sub> / MWh) and price duration curve Frontier Economics (2015)



# Piekvraag elektriciteitsnet verdubbelt in all-electric scenario's bij koude winter - maar dat wordt veel minder bij flex (bijv. met hybride warmtepomp)

Flex warmtevraag wordt bij all-electric erg belangrijk om piekvraag te managen

— Visie 1 2050 cold snap

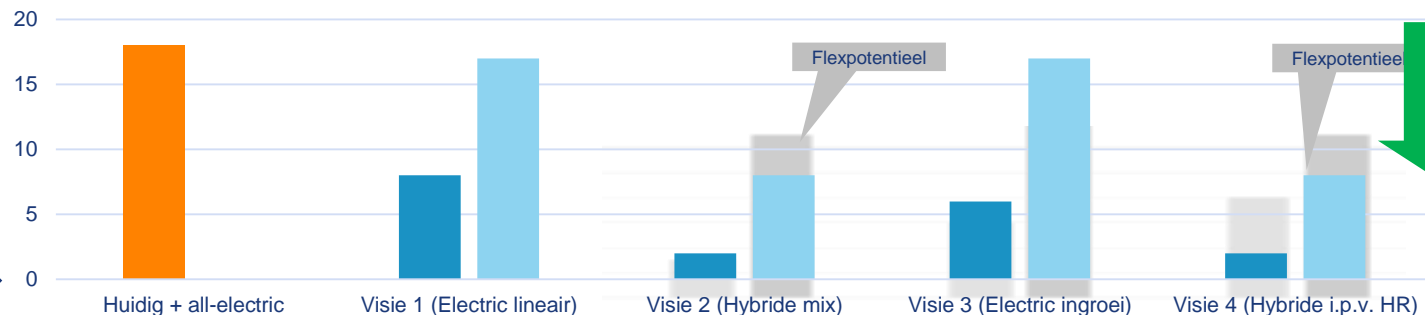


Simulatie winter 1987

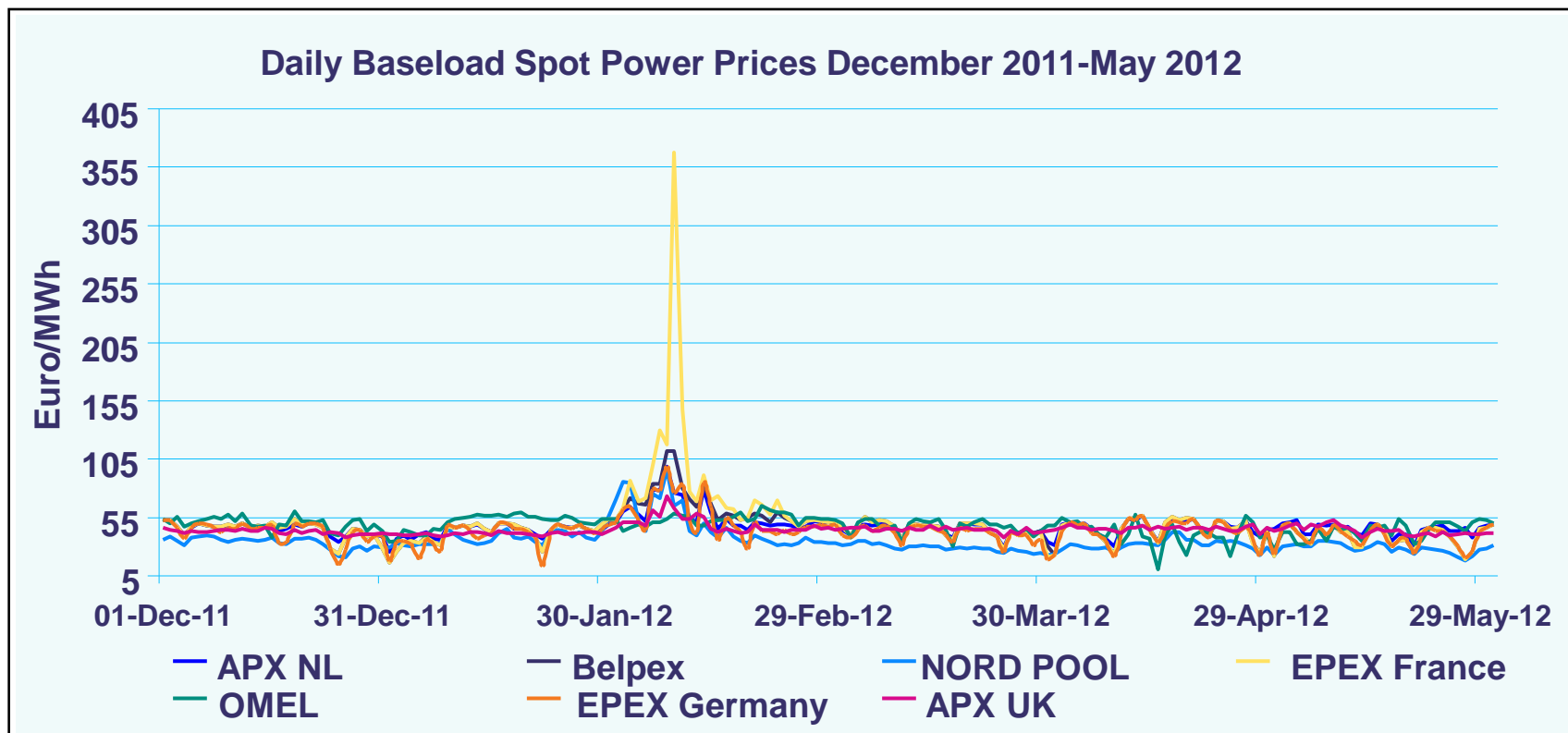
■ Huidig + all-electric 
 ■ 2035 
 ■ 2050

Extra elektrische piekvraag (GW)

Huidige piek 18 GW



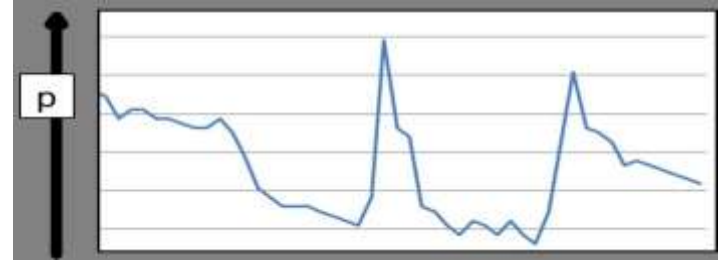
## Voorbeeld prijseffect koude winter: elektriciteitsvraag Frankrijk feb. 2012



# Oplossingen?



Meer koper?



Prijspieken en dalen?



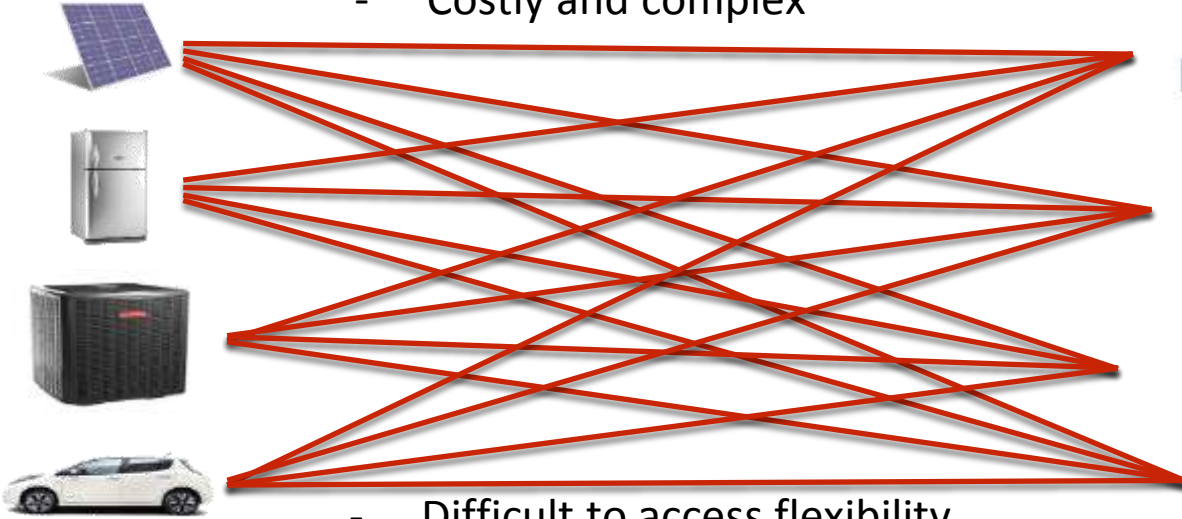
Flexibiliteit!



Vraagrespons!

# Flexibiliteit zonder standaard

- Proprietary solutions
- Costly and complex



Local energy community



Energy company X



Integrated Power Grid facility

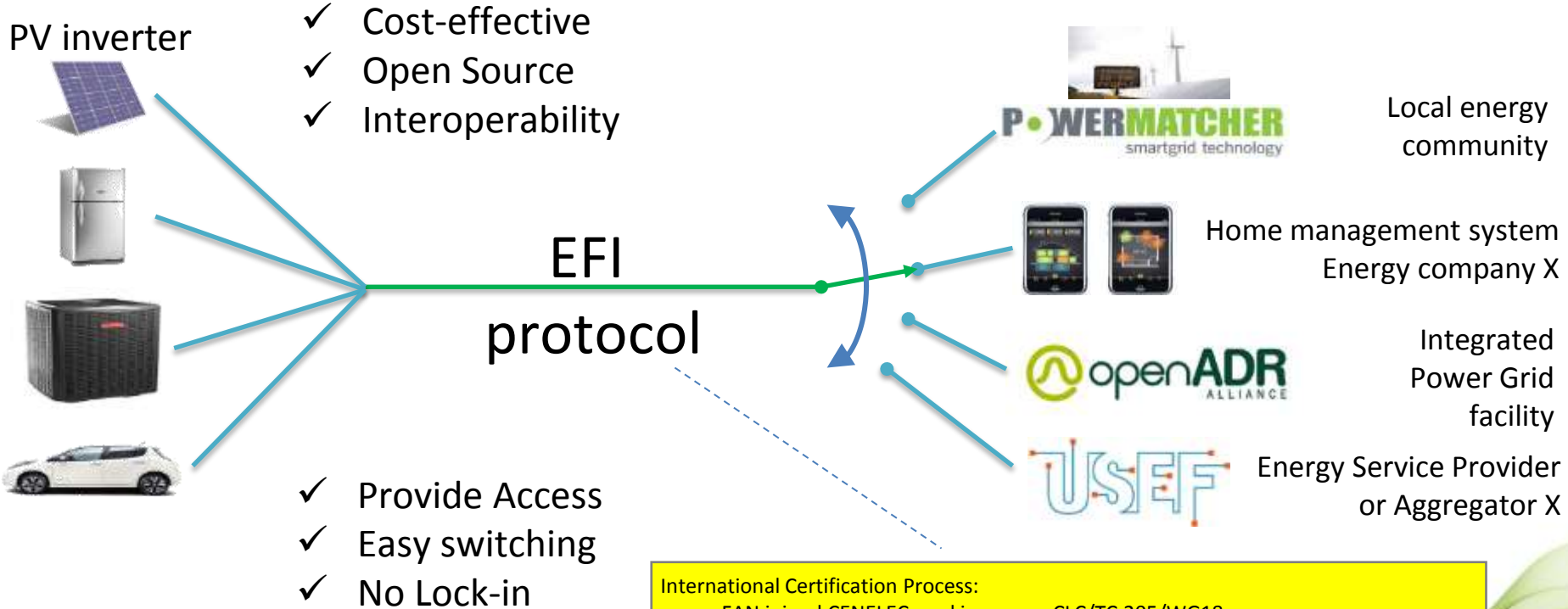


Energy Service Provider / Aggregator X

- Difficult to access flexibility
- Switching is cumbersome
- Customer lock-in



# Met Energy Flexibility Interface (EFI) protocol



**International Certification Process:**

- FAN joined CENELEC working group CLC/TC 205/WG18, Home and Building Electronics Systems
- Discussing principles in high level architecture and guideline

# Switchen zonder Sores....

- Ook met flexibele sturing
- Gebruik dezelfde sturing & communicatie bij:
  - Overgang naar een ander apparaat
  - Wisselen van providers
  - Verschillende providers (Leverancier en Aggregator)
  - Verhuizing
- Geen lock-in van flexibiliteit door fabrikanten of leveranciers
- Neem je flexibiliteit mee zoals je mobiele nummer!

## Open Source Protocollen en ICT referenties

Zie <https://github.com/flexiblepower>

Purpose	Protocol	Reference implementation
Flex messaging standard & interoperability	EFI: Energy Flexibility Interface (protocol)	EF-Pi en DEF-Pi (API)
Transactive Energy & flex optimization Including local / DSO demand response	Powermatcher (protocol)	Powermatcher 2.0 (software)

Organized by

## THE FLEXIBLEPOWER ALLIANCE NETWORK

TNO

alliantier

eXCE ENERGY EXCHANGE EXHIBIT

STEDIN

ECN

ENEXIS GROEP

DHPA  
DUTCH HEAT PUMP ASSOCIATION

Technolution

nieuwestroom  
vrijde energie

# Practical applications in local “Micro-Grids”

## Smart Grid Ameland

- Hybrid heat pumps
- Power base / Gas peak
- Avoid peaks & congestions

(In preparation)

## EFI & Heatmatcher



## Energy Supply Cooperative EVOHaus Germany

- PV panels + Heat pumps
- Smart steering

## EFI & Powermatcher



## Heerhugowaard:

Diversity of options:

- Steerable heat pump
- Micro CHP
- Solar PV-panel+heat boiler
- Solar PV switch

## EFI + USEF



## Managing energy in a residential environment

# SGSH (Standard Grid Smart Home) Project

# Met EFI interface

## Study and implement a feasible architecture using EFI interface

A collaborative project (Alliander & Belgian DSOs + University of Eindhoven, Technolution and ENGIE) to connect residential homes to the grid (using low-amps) and manage the electrical energy flow with local production, demand-side management and storage.

### Why

- New business: answer customer need for more autonomy
- Create competitive advantage: anticipate breakthrough and stay ahead of the competition
- Be prepared: insight in consequences for DSO, producer and user

### How

- 2014: Study possible architectures + consequences for stretching the 230V +/-10% limits
- 2015: Realize step towards industrialization
- 2015-2017: Survey on social household behavior and business cases
- 2016: Test and simulate feasibility in laboratory (Prove of Concept, Prototype) using Energy Flexibility Interface (EFI) protocol
- 2017-2018: Execute user test (5 to 20 households)



# Recent Flexibility Conference

**FLEXCON**  
CO-CREATE FLEXIBLE ENERGY

Amsterdam, 20 -21 november 2017



## INTERESTING TALKS ON:

Demand Response, Transactive Energy, Blockchain, Congestion, Flex trading, Grid Edge, Smart Home and more...

## FUNCTIONAL WORKSHOPS ON:

Unlocking Flex, Implementing standards, API's, Open Source tools, Simulations and more...

- ✓ *350 delegates*
- ✓ *National and International*
- ✓ *Market and Infrastructure parties*
- ✓ *Large & Small*



asic implementation of a

**Forecasting**

**Day ahead markets**      **Near real-time markets**      **New flexibility markets**      **Congestion managm.**

ETPA      USEF

**Market Connection / Trading**

natGAS      Jedlix      Autogrid      Voltalis      NUVVE

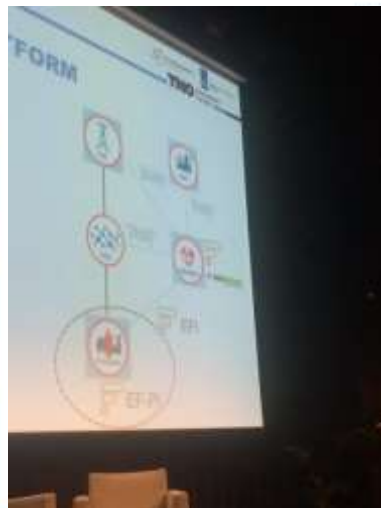
Senfal      EXE      Motionwerk      Procom      Sonnen Community

**DER Registries**

**Flex Aggregation Algorithms (real-time vs. planning)**

Siemens DEMS      Powermatcher

PNNL



**Local optimization**

OpenADR

**Energy Flexibility Abstraction**

EFI

**Enabling technology**  
(remote management / configuration, runtime, data analysis, security..)

CISCO

Siemens Mindsphere

OGEMA      ICT

dEFpi

Blockchain

IOTA

**Connection / IoT**

OCPP      VHPready      EEBus

**Industrial DERs**


Elestor

**Household appliances**

Heatpump      Sonnen

Tesla      Mcclimate      Nissan

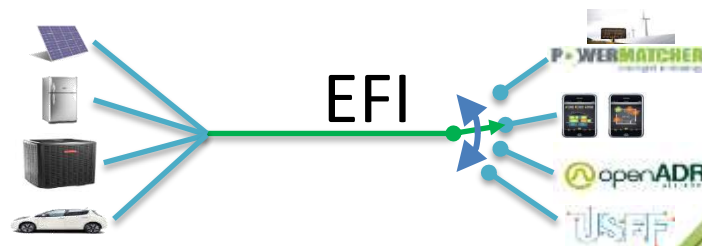
# FAN organiseert: Workshops in 2018

- Vergelijkbaar met functionele workshops Flexcon
    - Bijdrage van partijen met een message
    - Van strekking met algemeen belang
  - Drie workshops met de volgende onderwerpen:
    - Hacketon Enexis/Enpuls over flexibiliteit o.a. met EFl interface
    - Flexibiliteit van Hybride Warmtepompen
    - Workshop lokale markt (met Stedin)
- Datums worden binnenkort bekendgemaakt
- Stichting FAN opent speciaal membership voor start-ups
- 

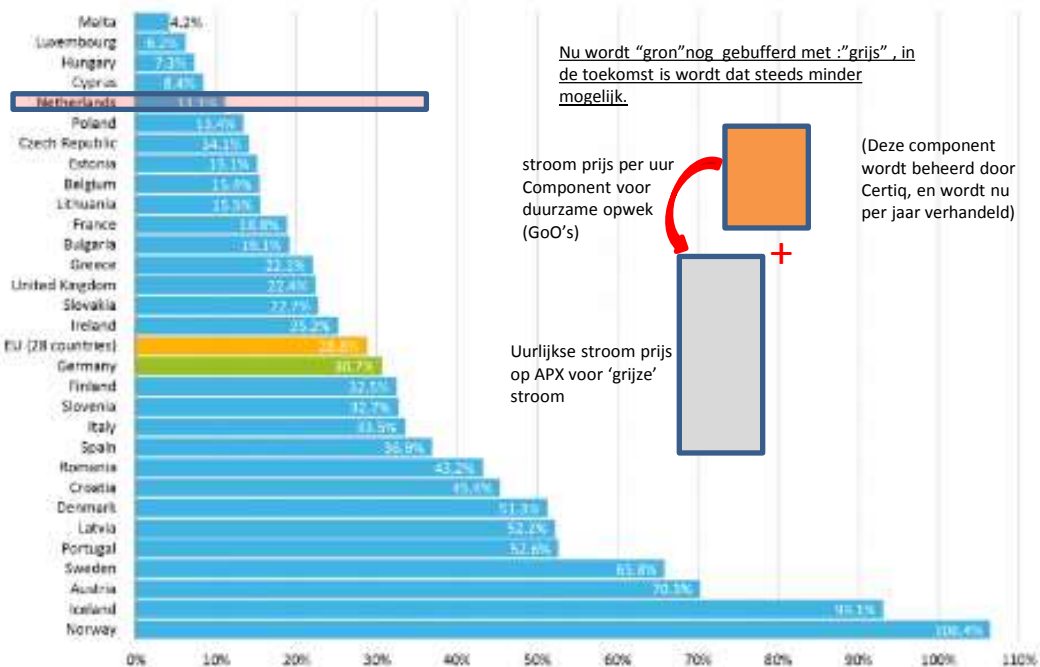


# Wensenlijst voor het “Klimaatakkoord”

- De toekomstige energiemarkt zal flexibiliteit nodig hebben
- Dus we hebben apparaten nodig met flexibele sturing, ...
  - **Interoperabiliteit om dit flexpotentieel te gebruiken**
  - for end-users, utilities, aggregators, installers, appliance manufacturers and all others here,
- Kom tot 1 protocol: switchen zonder sores, bijvoorbeeld voor:
  - PV panelen met stuurbare converters
  - (Hybride) warmtepompen
- Komt tot een marketontwerp wat daarvan maximaal gebruik maakt



# Marktontwerp voor meer duurzaamheid



## - Protocol (EFI) voor flex

Andere ideeën:

- Gelaagde markt (nationaal en lokaal) met lokale netincentives
- Tenders en LT contracten met variabele (beurs) prijs en flex: wegnemen belemmeringen
- Uurlijkse groene certificaten (op basis duurzame productie)
- Zachte landing van PV saldering met stimulans opslag en flex

# Doe mee met de discussie

Bert den Ouden, Voorzitter

- Workshops
- Lidmaatschap



Flexiblepower Alliance Network (FAN)

