

# Internet of Energy Storage $\leftrightarrow$ Sharing

**Delft, 11 may 2017**

Jos Blom, Alliander Strategy

# Jos Blom



life

Info



Energy



€

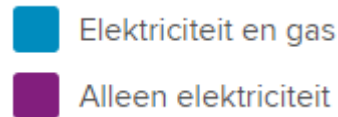


# Alliander

Alliander is a 'separated' DNO  
Shareholders: provinces / cities

## Vision

We stand for an universal access  
to reliable, affordable and  
sustainable energy

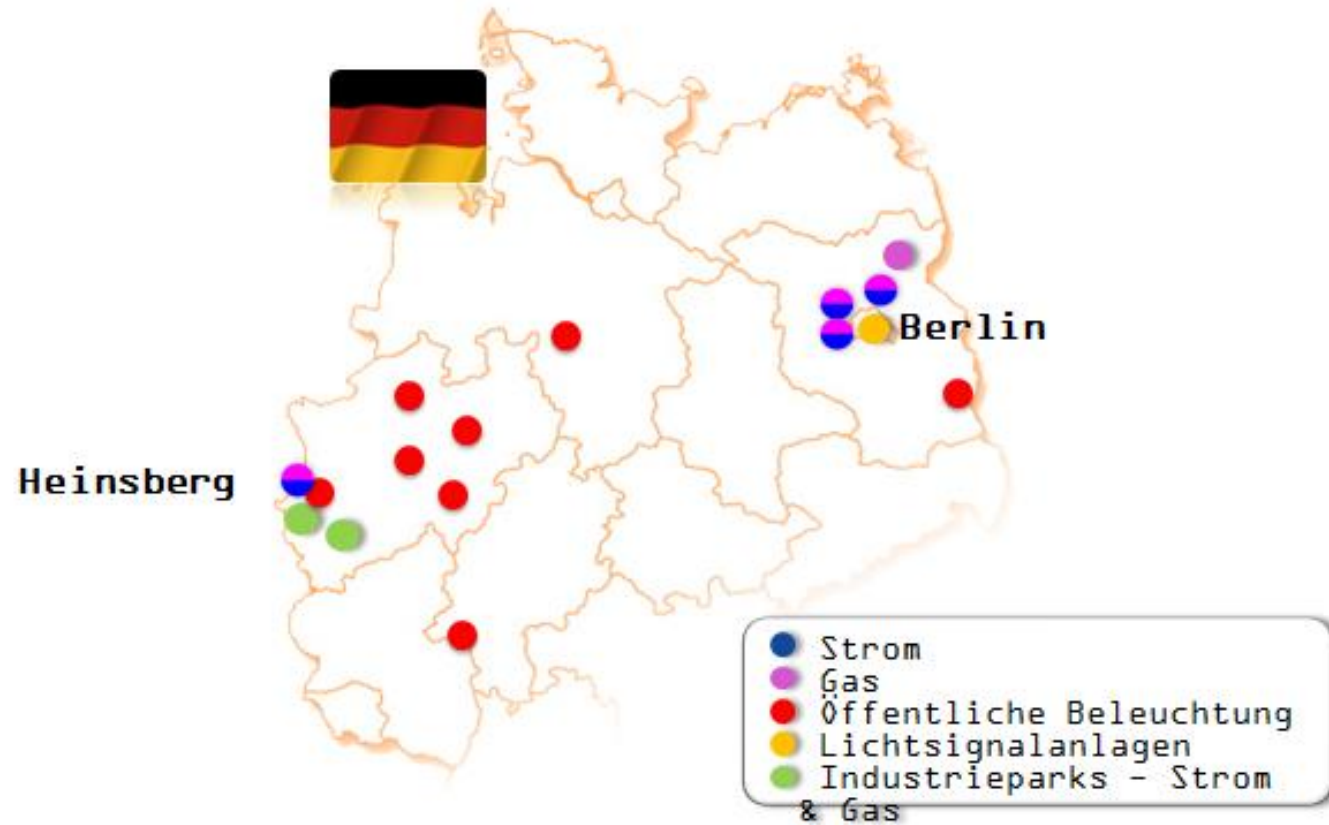


## Strategy

Support customers in their choices  
Invest in new open markets  
Digitize  
Excellent network management

+ German  
networks

# Alliander Germany



# Alliander new activities



Open Charge infrastructure



Open Heat Networks



Upgrade homes: Insulation / PV / ....



Collaboration platform



Open IT platform connecting devices



Local → Island energy solutions



Open Flex trade platform

# Mayor Trends



## Trend 1: society electrifies

More Electric, Less Natural Gas Grids  
The end of fire: Transport and Chemical  
process electric with a growing role of H2

## Trend 2: bottom-up drive towards more renewable energy

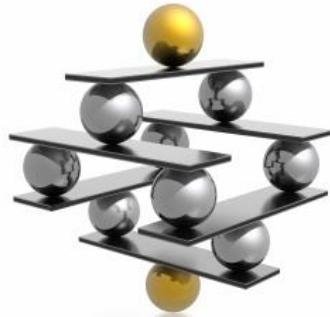
Local solutions, more than energy  
Solar / Wind / Green gas / Heat  
Grid Defection

## Trend 3: crucial role for information technology and data

New Opportunities  
Privacy / Security / Cryptography / Digital ID  
Trust / Democracy  
Big / Open / Quality Data  
Gamification / New Processes



# Flexibility - Balance



Conversion  
P2G / H / L



Production

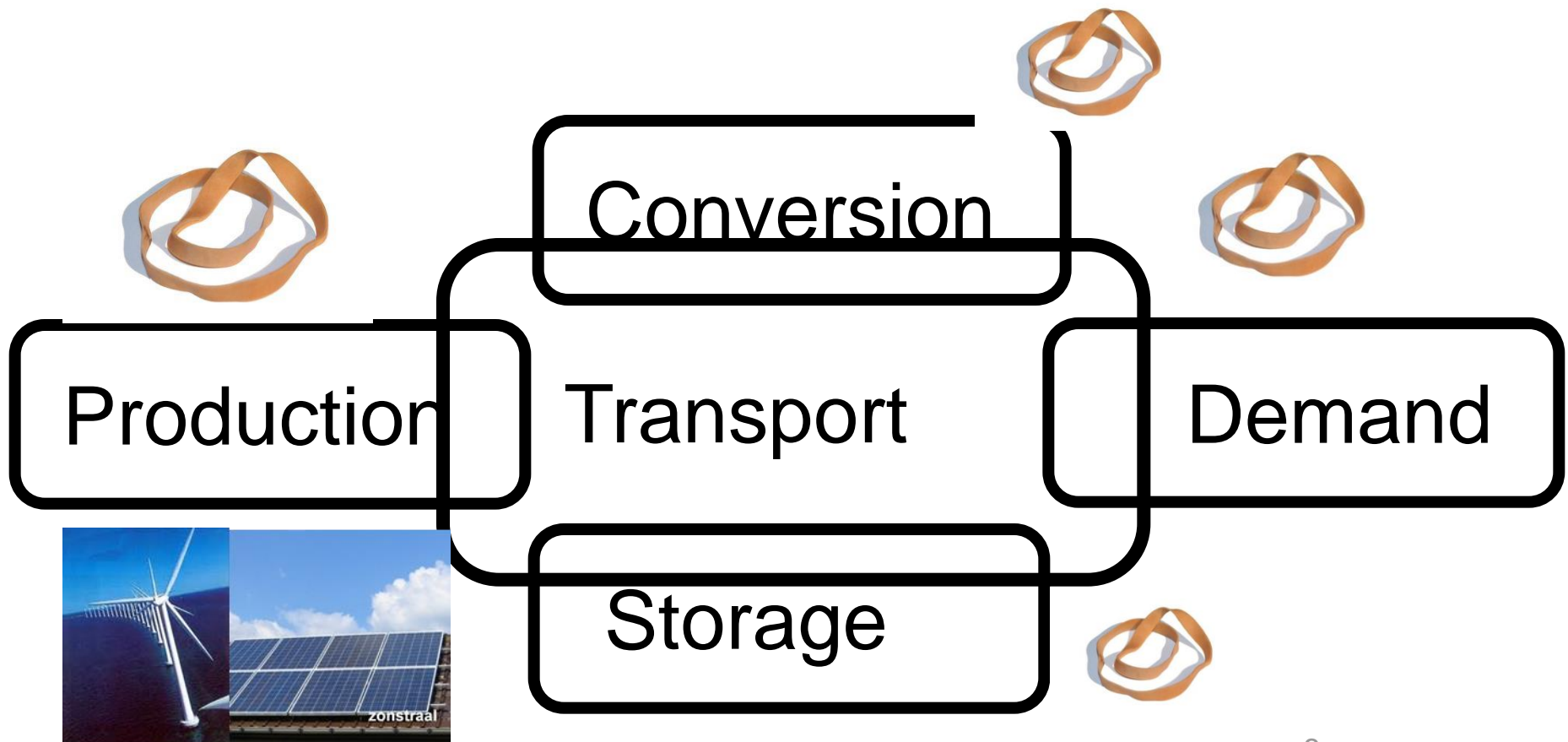
Transport

Demand

Storage

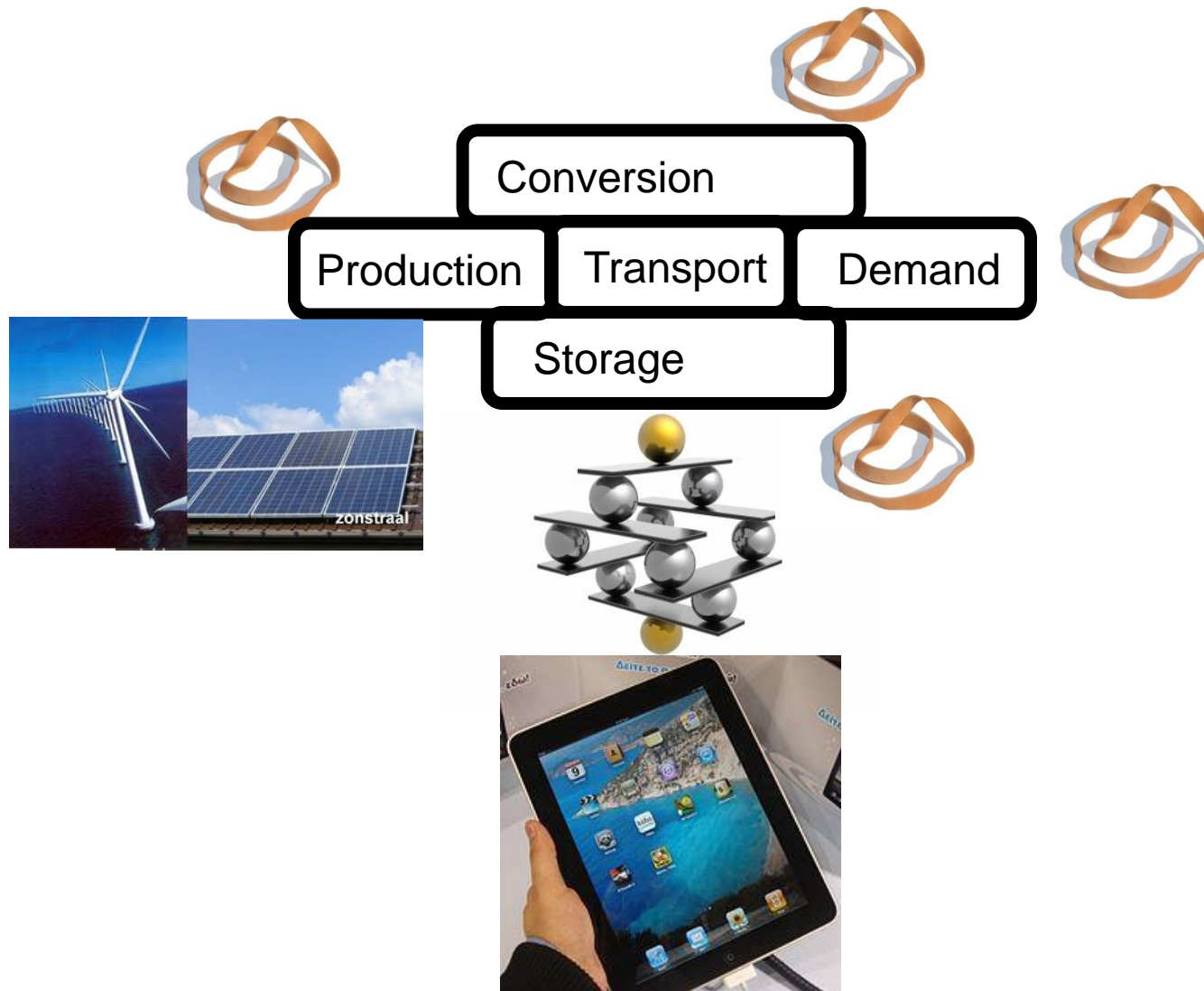


# Flexibility - Balance

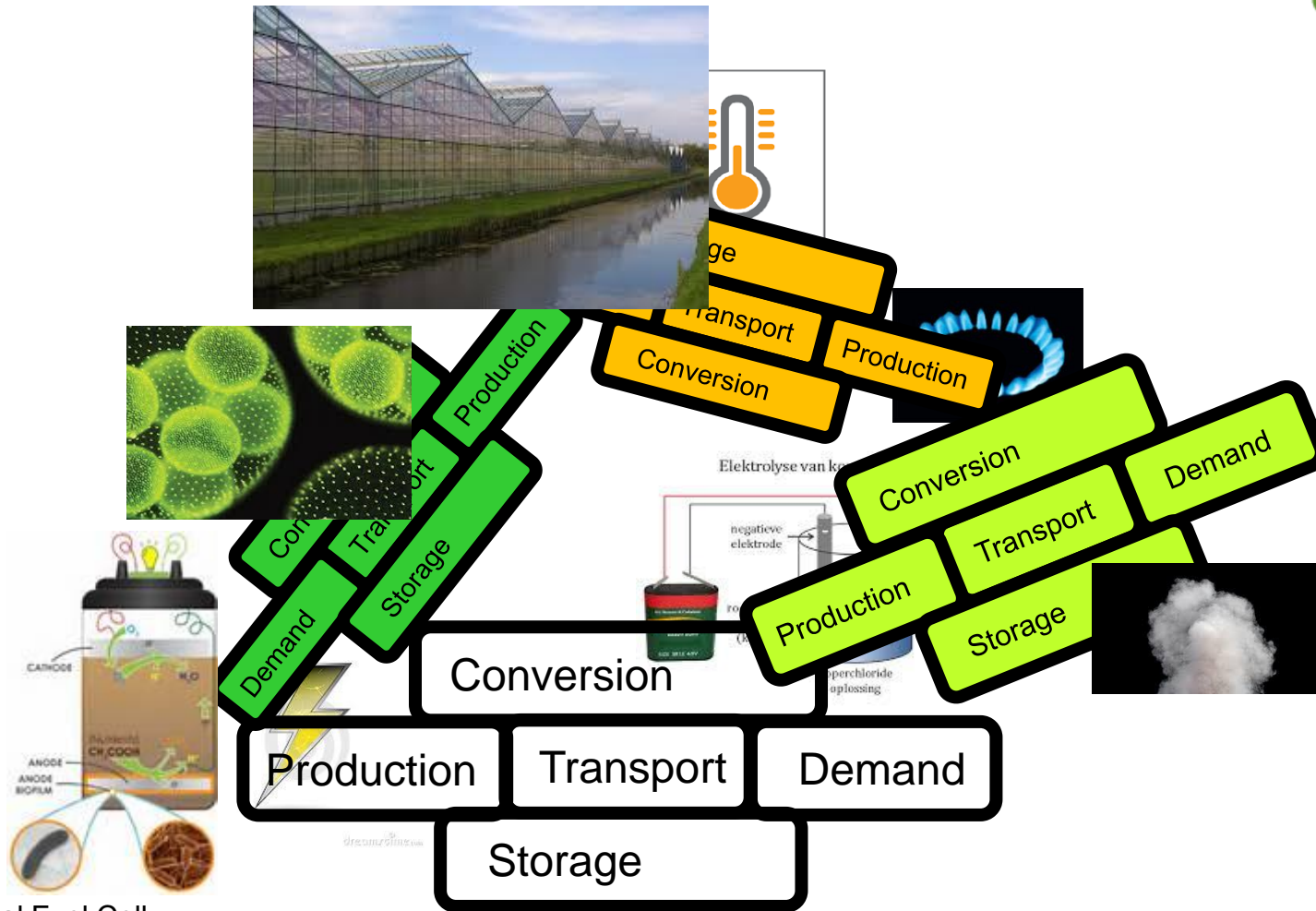




# Flexibility - Balance

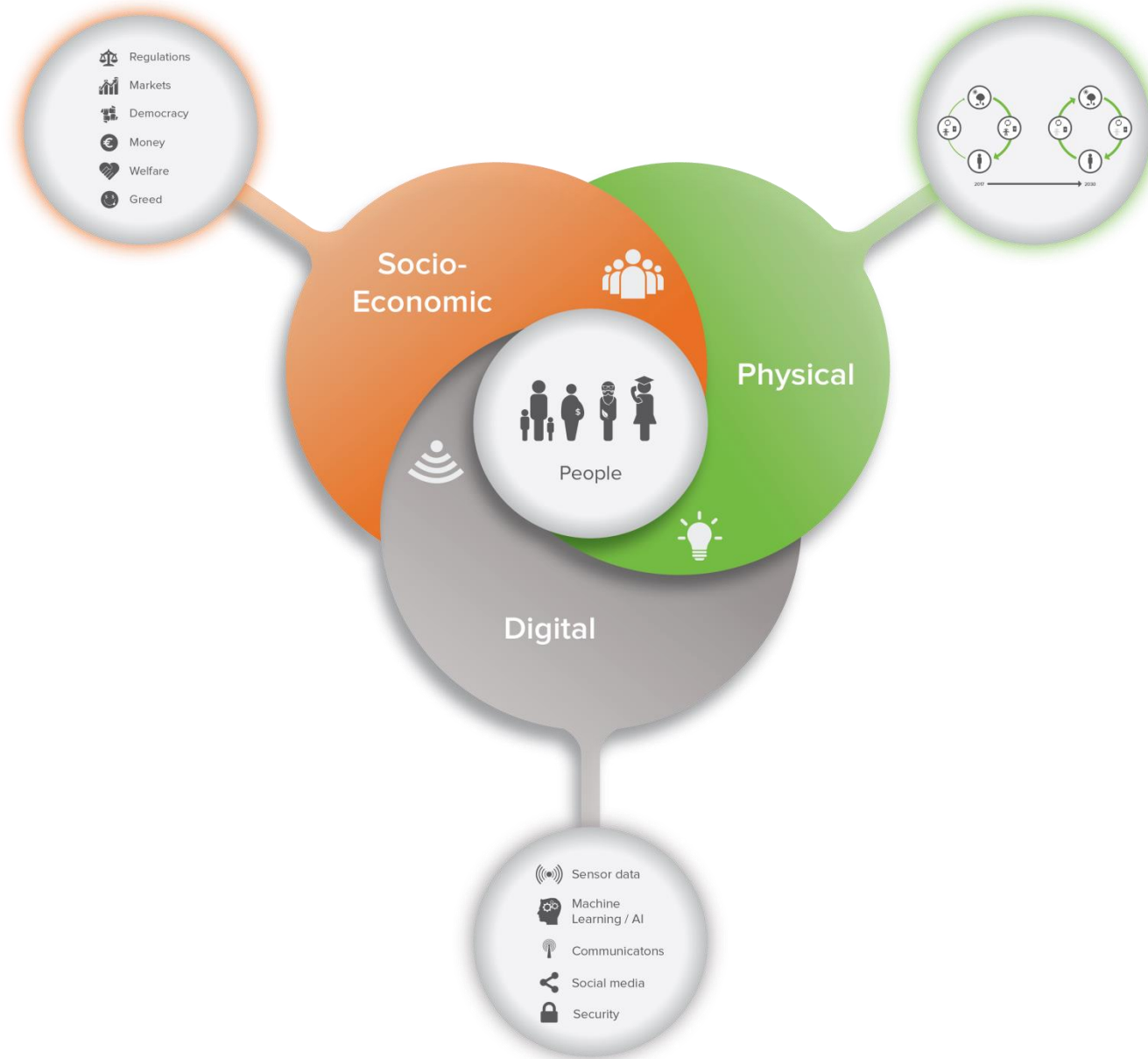


# Next level Flexibility

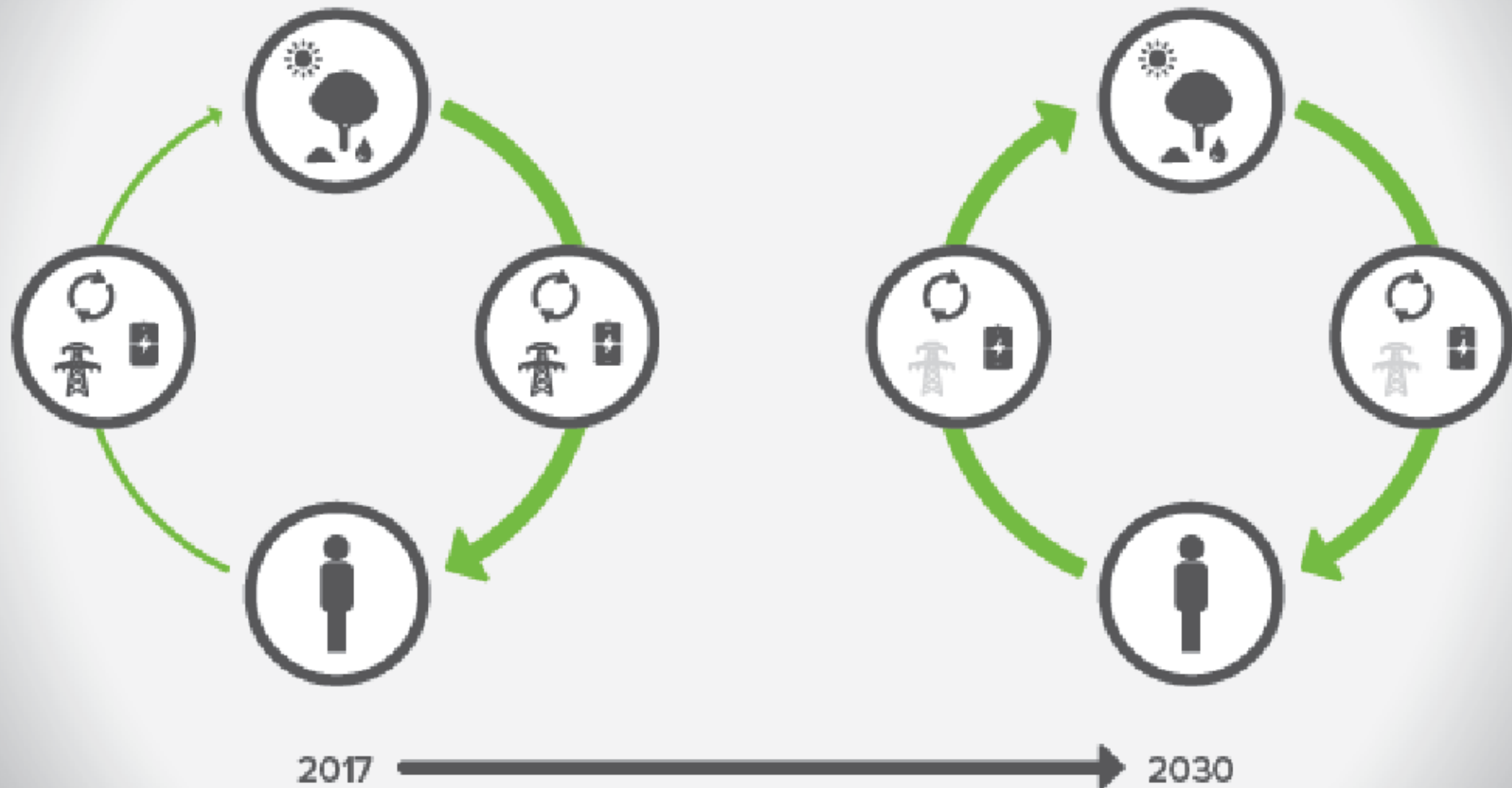


MFC  
Microbial Fuel Cell

# Future Energy System



# Future Energy System: Physical



# Future Energy System: Social / Economic



Regulations



Markets



Democracy



Money



Welfare



Greed



# Future Energy System: Digital



Sensor data



Machine Learning / AI



Communicatons



Social media



Security



Transacties, Trust, Blockchain



Digitale Identiteit



Big / open data



Cryptografie



Gamification



Privacy

# Values electricity storage



Motorisation hybride Toyota Prius



TOYOTA

Optimizing production



Legenda

— 50 kV  
— 110 kV



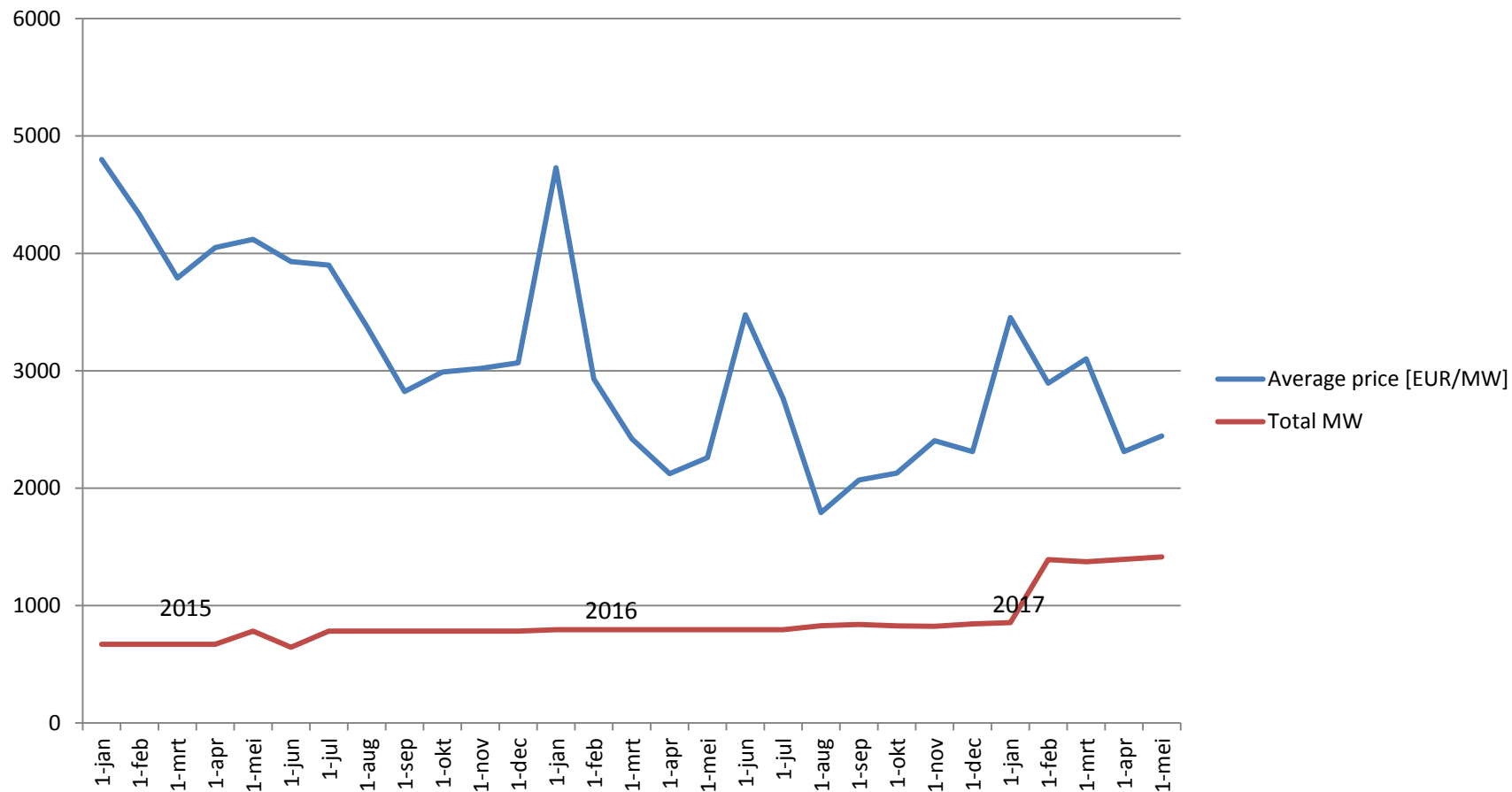


# Customer Values



- Own PV Energy
- Autonomy → Grid defection
- No Breaks: Medical, safety, ICT
- Reset clock
- €: Lower feed in tariffs
- €: Trading
- €: Smaller connection
- Local community green
- Support local DC net

# Markets: Frequency



# Grid Values

## More Grid Capacity



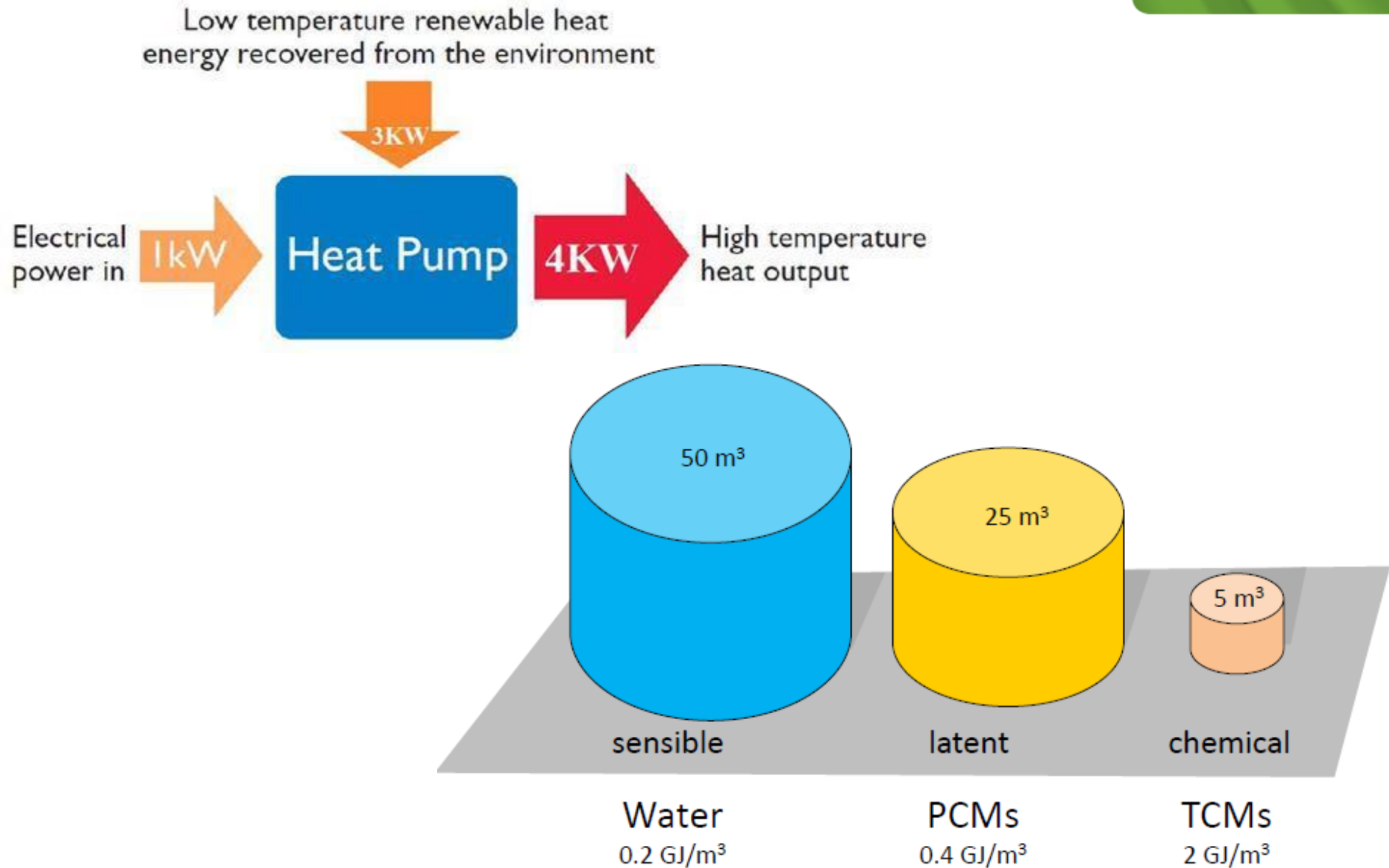
## Temporary Grid Capacity



## Power Quality



# Heat Pumps & Heat Storage



# Neighborhood Battery

## Owning → Sharing

A home battery has energy losses up to 400 kWh / Year / Household  
Converter create most losses

A neighborhood Battery combines values Houses / Markets / Grids

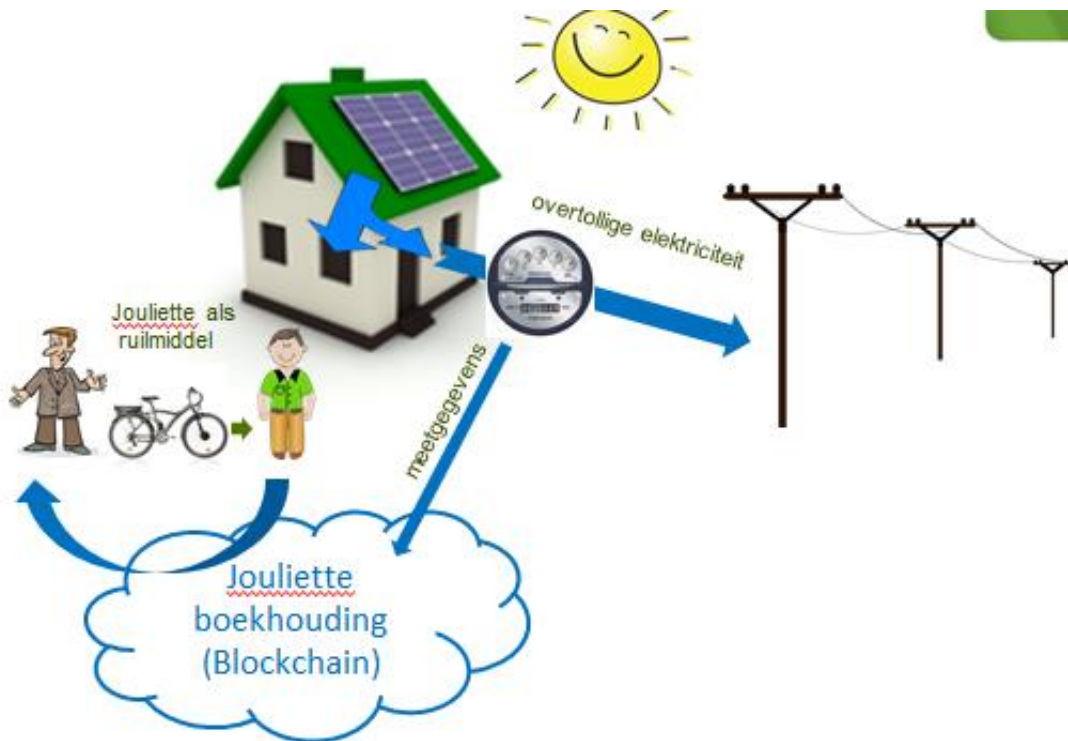


# Sharing Energy → Jouliette

The ま is the female variant off Joule

The ま is based on shared sustainable energy

P2P transactions possible, based on blockchain

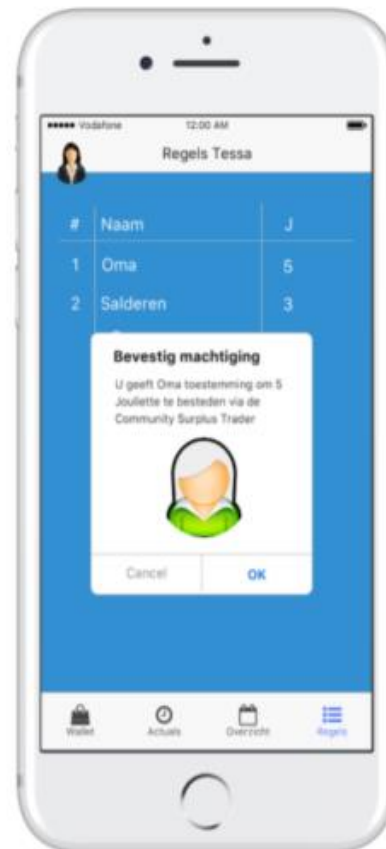
















# The KiloWattsApp








alliander

Where participants can choose to be Tessa, who has surplus supply of solar energy, which she wants to share with her grandma





#	Name	Market Cap	Price	Available Supply	Volume (24h)	% Change (24h)	Price Graph (7d)
1	 Bitcoin	\$9,618,140,541	\$606.74	15,852,240 BTC	\$75,018,000	0.20%	
2	 Ethereum	\$963,693,480	\$11.51	83,702,629 ETH	\$6,741,150	-1.56%	
3	 Ripple	\$209,035,978	\$0.005919	35,316,813,001 XRP *	\$568,997	-0.19%	
4	 Litecoin	\$188,038,374	\$3.96	47,435,804 LTC	\$1,648,780	-0.75%	
5	 Monero	\$168,860,405	\$13.16	12,830,948 XMR	\$25,483,000	1.94%	
6	 Ethereum Cla...	\$120,179,503	\$1.44	83,668,321 ETC	\$3,210,950	-5.14%	

1	 Bitcoin	\$28,283,927,974	\$1732.91	16,321,637 BTC	\$950,027,000
2	 Ethereum	\$8,269,473,004	\$90.40	91,477,281 ETH	\$202,017,000
3	 Ripple	\$6,909,395,687	\$0.182039	37,955,579,225 XRP *	\$172,504,000
4	 Litecoin	\$1,797,526,272	\$35.22	51,032,307 LTC	\$295,128,000
5	 NEM	\$1,016,982,000	\$0.112998	8,999,999,999 XEM *	\$16,735,900
6	 Dash	\$681,661,073	\$93.54	7,287,328 DASH	\$20,610,400
7	 Ethereum Classic	\$587,944,110	\$6.43	91,482,612 ETC	\$29,511,800