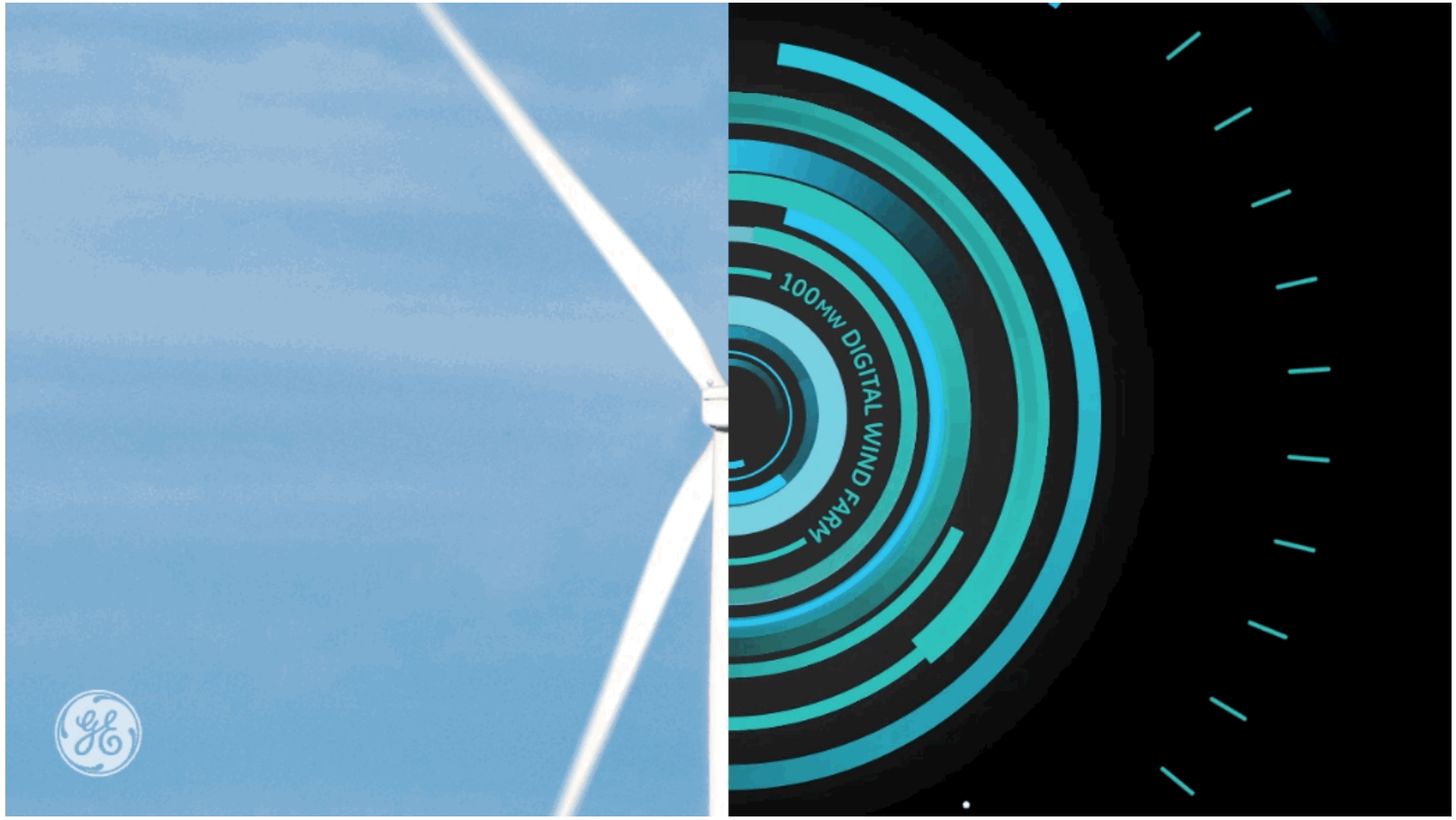
Rathenau Instituut

Governancesystem of the Internet of Energy



Romy Dekker

Rinie van Est

About Rathenau Institute

- Established in 1986 to *“Stimulate research and debate about impact of science, technology and innovation on society”*

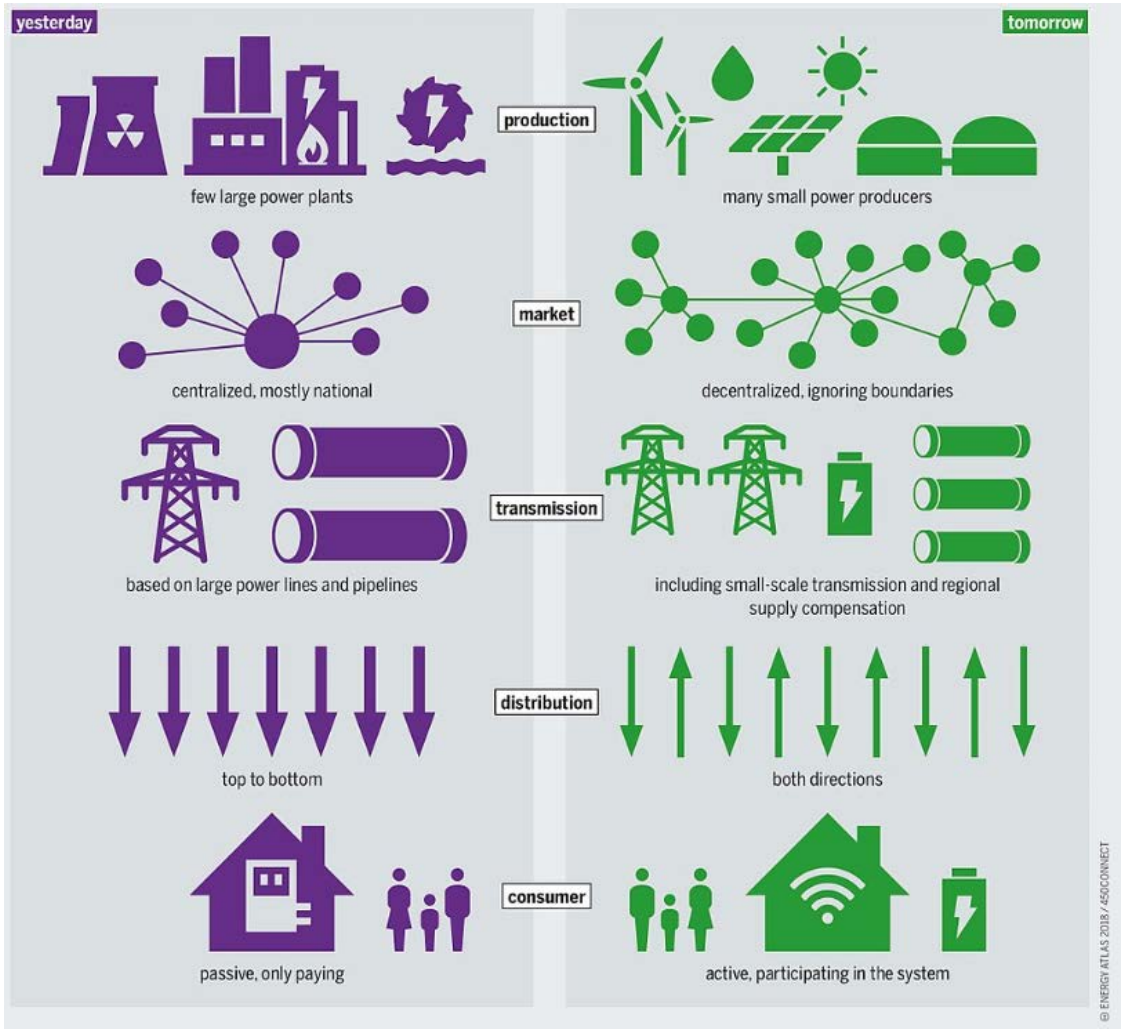
- Work program: Digital Society

Dutch energy policy goals

1998 – 2015
Affordable, reliable and (a little bit) clean

Since 2015
Affordable, reliable, safe and (very) clean

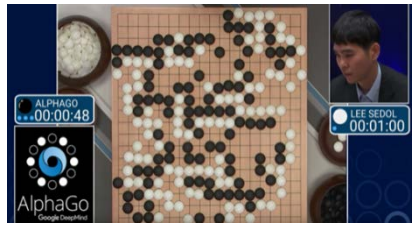
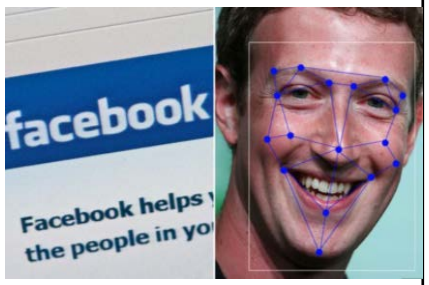
Energy transition as a network transition: Datagovernance as a new critical function



Urgent Upgrade

Protect public values in our digitized society

New digital wave: 8 technological trends

Material world	Biological world	Socio-cultural world	Digital world
Robotics	Persuasive technology	Platforms	Artificial intelligence
			
Internet of Things	Biometrics	VR/AR and social media	Big data and algorithms
			

Kool, L., J. Timmer, L. Royakkers en R. van Est, Urgent Upgrade - Protect public values in our digitized society. The Hague, Rathenau Instituut 2017

Digitisation of human life by means of the big data value chain

THINK

DATA ANALYSIS

PROFILING HUMANS

SENSE

DATA COLLECTION

MEASURING HUMANS

ACT

DATA APPLICATION

INTERVENING IN HUMANS

Public values at stake

Central topic	Issues
Privacy	Data protection, privacy, mental privacy, spatial privacy, surveillance, function creep
Autonomy	Freedom of choice, freedom of expression, manipulation, paternalism
Safety and security	Information security, identity fraud, physical safety
Control over technology	Control and transparency of algorithms, responsibility, accountability, unpredictability
Human dignity	Dehumanization, instrumentalization, deskilling, desocialization, unemployment
Equity and equality	Discrimination, exclusion, equal treatment, unfair bias, stigmatization
Balances of power	Unfair competition, exploitation, shifting relations consumers and businesses, government and businesses

Two big challenges converge: Energytransition & Digital transition

May & Jochim (2013): Policy regime perspectives: Policies, politics and governing

The contours of a given regime can be depicted with respect to the constellation of the three forces that comprise a regime:

- **Ideas: Shared commitments concerning policy purpose (provides the glue of a regime)**
- **Institutional arrangements: Structures of authority, attention, information, and organisational relationships (fosters structure-induced cohesion for a regime)**
- **Interests: Constituencies that provide interest support and opposition (establishes the governing capacity of a regime)**

Fase I (1998-2015): Governancesysteem van het Nederlandse elektriciteitssysteem

	Ideas	Institutional Arrangements	Interests
Policy goals	**Reliable** **Affordable** **Clean**	**Energynota's (1995)** **Energy reports (1999, 2002, 2008, 2011)**	**Kabinet** **European Union** **Ministry Economic Affairs** **Ministry Finance**
Implementation principles	Liberalization ('98)	Elektricitylaw 1989, 1998	Kabinet European Union Ministry Economic Affairs Ministry Finance
	Privatization ('06)	Law Independent Networkoperation 2006	
	Energy-efficiency ('07)	Action plan for Energy Efficiency - realizing the potential (COM/2006/545)	
Implementation	Electricity grid - Connection (Freedom to purchase) - Transaction (Freedom of contract) - Dispatch (Freedom to exchange energy when and with who you wand)	Copperplate Regulator	Transmission system operator Distributed system operator Consumers (large and small) Energy producers Energy suppliers ACM
	Energy market regulation - Free from private monopolies - Non-discriminatory access to data - Transparency	Energy markets - Imbalance market - Intraday market - Day ahead market - Long term market	System operators ACM Energy producers Energy suppliers Consumers
	Sustainability - Promotion of sustainable energy - Smart meter	- Program responsibility (Balans Responsibility Parties, BRP) - ESDN / NEDU	
	Consumer protection - Public participation - Freedom of choice - Tarif regulation	Regulator: Authority Consumer and Markets	ACM Consumers Energysuppliers Distributed System Operators

Fase I (1998-2015): Governancesystem of the Dutch electricitysystem

	Ideas	Institutional arrangements	Interests
Policy goals	**Reliable** **Affordable** **Clean**	**Energynota's (1995)** **Energy reports (1999, 2002, 2008, 2011)**	**Kabinet** **European Union** **Ministry Economic Affairs** **Ministry Finance**
Uitvoerings-principes	**Liberalization ('98)** **Privatization ('06)** **Energy-efficiency ('07)**	**Elektricitylaw 1989, 1998** **Law Independent Networkoperation 2006** **Action plan for Energy Efficiency - realizing the potential (COM/2006/545)**	**Kabinet** **European Union** **Ministry Economic Affairs** **Ministry Finance**
Uitvoering	Electricity grid - Connection (Freedom to purchase) - Transaction (Freedom of contract) - Dispatch (Freedom to exchange energy when and with who you wand)	Copperplate Regulator	Transmission system operator Distributed system operator Consumers (large and small) Energy producers Energy suppliers ACM
	Energy market regulation - Free from private monopolies - Non-discriminatory access to data - Transparency	Energy markets - Imbalance market - Intraday market - Day ahead market - Long term market	System operators ACM Energy producers Energy suppliers Consumers
	Sustainability - Promotion of sustainable energy - Smart meter	- Program responsibility (Balans Responsibility Parties, BRP) - ESDN / NEDU	
	Consumer protection - Public participation - Freedom of choice - Tarif regulation	Regulator: Authority Consumer and Markets	ACM Consumers Energysuppliers Distributed System Operators

Fase I (1998-2015): Governancesysteem van het Nederlandse elektriciteitssysteem

	Ideas	Institutional arrangements	Interests
Policy goals	Reliable Affordable Clean	Energynota's (1995) Energy reports (1999, 2002, 2008, 2011)	Kabinet European Union Ministry Economic Affairs Ministry Finance
Implementation Principles	Liberalization ('98) Privatization ('06) Energy-efficiency ('07)	Elektricitylaw 1989, 1998 Law Independent Networkoperation 2006 Action plan for Energy Efficiency - realizing the potential (COM/2006/545)	Kabinet European Union Ministry Economic Affairs Ministry Finance
Implementation	Electricity grid - Connection (Freedom to purchase) - Transaction (Freedom of contract) - Dispatch (Freedom to exchange energy when and with who you wand)	Koperenplaat-principe Toezichthouder	Transmission system operator Distributed system operator Consumers (large and small) Energy producers Energy suppliers ACM
	Energy market regulation - Free from private monopolies - Non-discriminatory access to data - Transparency Sustainability - Promotion of sustainable energy - Smart meter	Energy markets - Imbalance market - Intraday market - Day ahead market - Long term market - Program responsibility (Balans Responsibility Parties, BRP) - ESDN / NEDU	System operators ACM Energy producers Energy suppliers Consumers
	Consumer protection - Public participation - Freedom of choice - Tarif regulation	Regulator: Authority Consumer and Markets	ACM Consumers Energysuppliers Distributed System Operators

Emphasis on ‘clean’, ‘decarbonization’

Problems ahead: electricity grid runs into its limits

‘Duurzame stroom? Het elektriciteitsnet is vol’

Interview | Han Slootweg Voor wind- en zonne-energie is de animo nu zo groot, dat het elektriciteitsnet tekort dreigt te schieten. Geplande zonne- en windparken belanden op de wachtlijst, omdat ze hun stroom niet kwijtkunnen. „We zien het voor onze ogen ontsporen.”

Hester van Santen & Erik van der Walle
18 januari 2019

RENEWABLES, SOLAR, STRATEGIC DEVELOPMENT

Distributed solar to lead five-year renewables boom says IEA

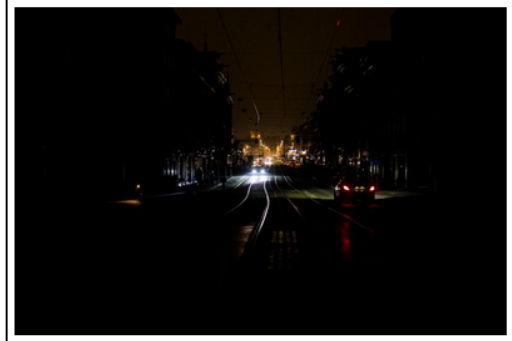
10.21.19

The world’s total renewables-based power capacity will grow by 50 per cent in the next five years – and solar PV will account for 60 per cent of this increase.

Netwerkbedrijf Alliander: ‘Stad is hard op weg naar een stroominfarct’

Het landelijke stroomnetwerk kan de enorme toename van het aantal datacenters, zonnepanelen, elektrische auto’s en airco’s nog maar amper bolwerken. Ook de stad is hard op weg naar een stroominfarct, waarschuwt netwerkbedrijf Alliander.

Herman Stil 3 augustus 2019, 8:03



BEELD MAARTEN BRANTE

Sense of urgency: digitalization as an enabler

WORLD ECONOMIC FORUM Agenda Initiatives Reports Events About English TopLink

Industry Agenda | Future of Energy

Here are 5 reasons why we need an 'Internet of Energy'

Society's accelerating shift towards renewables requires a completely new approach. Image: Karsten Würth/Unsplash

13 Feb 2018

Cedrik Neike
Member of the Managing Board, Siemens AG

Two technological revolutions are shaping the dawn of the 21st century: the development of the internet and the shift towards a carbon-free global energy system. The latter received a boost in 2015, when the G7 pledged to phase out fossil fuels by 2100. With the advent of the Internet of Things, these two revolutions are rapidly converging and will ultimately result in an "Internet of Energy".

1. **Soaring global demand for clean energy**
2. **Centralized grids are no longer adequate**
3. **Smarter grids ensure a more reliable supply**
4. **Dealing with mountains of data**
5. **Artificial Intelligence and quantum computing are transforming the energy sector**

Fase I (1998-2015): Governancesysteem van het Nederlandse elektriciteitssysteem

	Ideas	Institutional arrangements	Interests
Policy goals	Reliable Affordable Clean	Energynota's (1995) Energy reports (1999, 2002, 2008, 2011)	Kabinet European Union Ministry Economic Affairs Ministry Finance
Implementation Principles	Liberalization ('98) Privatization ('06) Energy-efficiency ('07)	Elektricitylaw 1989, 1998 Law Independent Networkoperation 2006 Action plan for Energy Efficiency - realizing the potential (COM/2006/545)	Kabinet European Union Ministry Economic Affairs Ministry Finance
Implementation	Electricity grid - Connection (Freedom to purchase) - Transaction (Freedom of contract) - Dispatch (Freedom to exchange energy when and with who you wand)	Copperplate-principle Regulator ACM	Transmission system operator Distributed system operator Consumers (large and small) Energy producers Energy suppliers ACM
	Energy market regulation - Free from private monopolies - Non-discriminatory access to data - Transparency	Energy markets - Imbalance market - Intraday market - Day ahead market - Long term market	System operators ACM Energy producers Energy suppliers Consumers
	Sustainability - Promotion of sustainable energy - Smart meter	- Program responsibility (Balans Responsibility Parties, BRP) - ESDN / NEDU	
	Consumer protection - Public participation - Freedom of choice - Tarif regulation	Regulator: Authority Consumer and Markets	ACM Consumers Energysuppliers Distributed System Operators

Fase II: 2015 - heden	Ideas		Institutional arrangements	Interests
Policy goals	Reliable Affordable Clean Safe	Digitale Infra: Reliable Affordable Safe	Energynota's (1995) Energy reports (1999, 2002, 2008, 2011) Energie report 2016 Integral digitization strategy (2018), Data agenda (2018), Vision data sharing (2019) Dutch climate deal	Kabinet European Union Ministry Economic Affairs and climate policy Ministry Finance
Implementation principles	Liberalization ('98) Privatization ('06) New market directive ('21) Energy efficiency ('07) Renewable energy Digitalization ('16)		Electricity Act 1989, 1998 Independent Network Management Act 2006 Action plan for Energy Efficiency - Realizing the potential (COM / 2006/545) Network and Information Systems Security Act (2018), Legislative agenda: Progress Energy Transition Act (2018), Act on the exchange of information above and below ground infrastructure and networks (2019), Implementation Clean Energy for all Europeans (2021), Energy Act 1.0 (2020?), Regional Energy Strategies	Kabinet European Union Ministry Economic Affairs and climate policy Ministry Finance
Implementation	Electricity grid - Connection (Freedom to purchase) - Transaction (Freedom of contract) - Dispatch (Freedom to exchange energy when and with who you wand)		Copper plate-principle "Expand unless" Regulator ACM	Transmission system operator Distributed system operator Consumers (large and small) Energy producers Energy suppliers ACM
	Energy market regulation - Free from private monopolies - Non-discriminatory access to data - Transparency - Energy communities access to markets		Energy markets - Imbalance market - Intraday market - Day ahead market - Long term market	System operators ACM Energy producers Energy suppliers Consumers Renewable energy communities Prosumers Techcompanies
	Sustainability - Incentives for renewable energy - Smart meter - Storage as a commercial activity		- Program responsibility (Balans Responsibility Parties, BRP) - ESDN / NEDU - SDE + (Stimulation Sustainable Energy)	
	Consumer protection - Public participation - Freedom of choice - Tariff regulation Energypoverty		Regulator: ACM, Agentschap Telecom, AP "Visie op datagovernance" "Energy Poverty Observatory"	ACM Consumers Energysuppliers Distributed System Operators

Societal challenges

Digital security

Privacy

Autonomy

Just transition

Datagovernance

Cyberattacks Put Russian Fingers on the Switch at Power Plants, U.S. Says

U.S. officials said the strikes accelerated in late 2015, at the same time the Russian interference in the American election was underway. Spencer Platt/Getty Images

Societal challenges

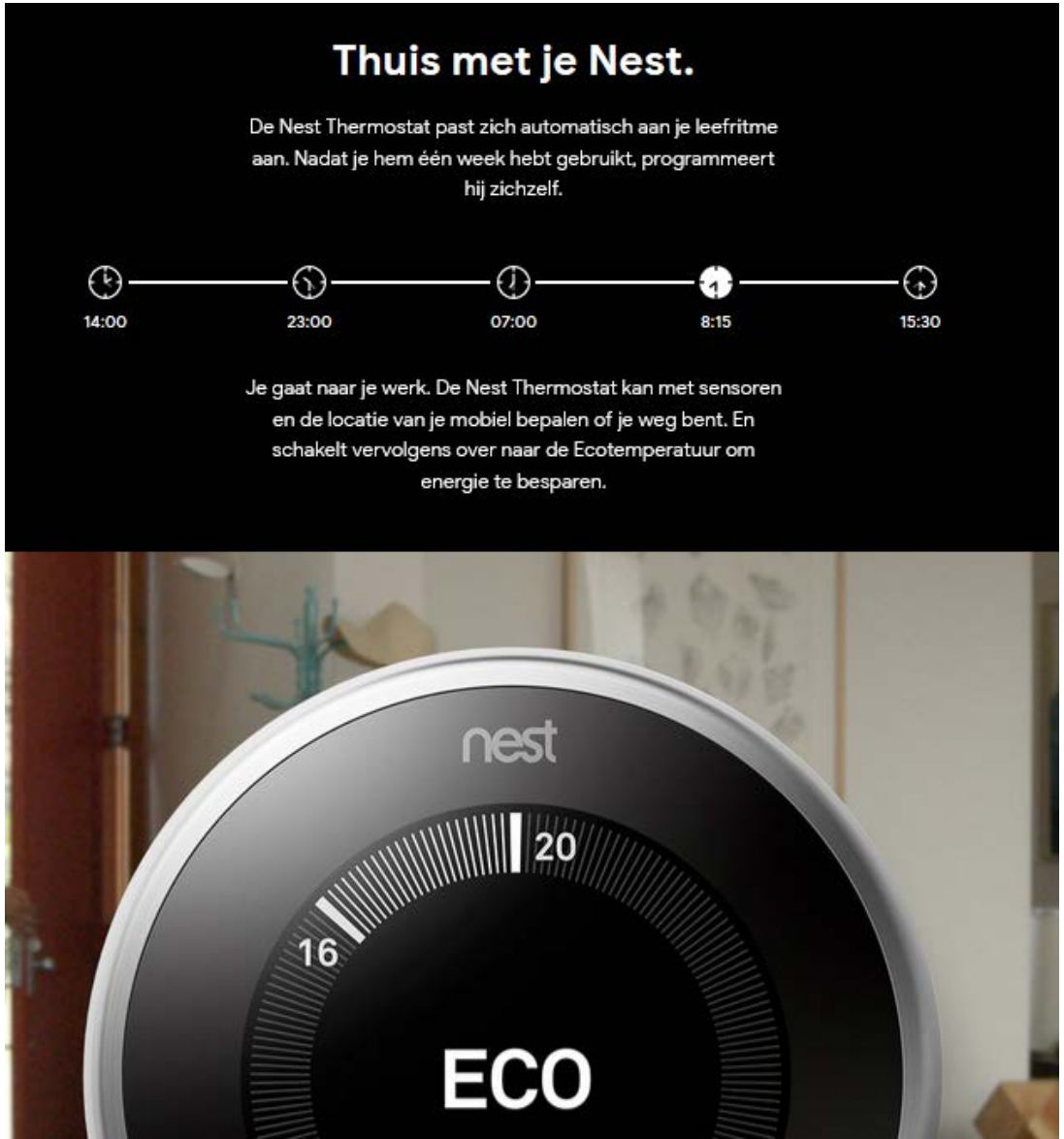
Digital security

Privacy

Autonomy

Just energytransition

Datagovernance



Societal challenges

Digital security

Privacy

Autonomy

Just energytransition

Datagovernance

From enhanced digitalization, to smart grids and smart appliances, passing through the Internet of Things, new batteries and storage systems: ***all these new technologies are creating ample opportunities for European citizens*** *to participate and benefit from the energy markets. (Clean Energy for All Europeans p.13)*

Societal challenges

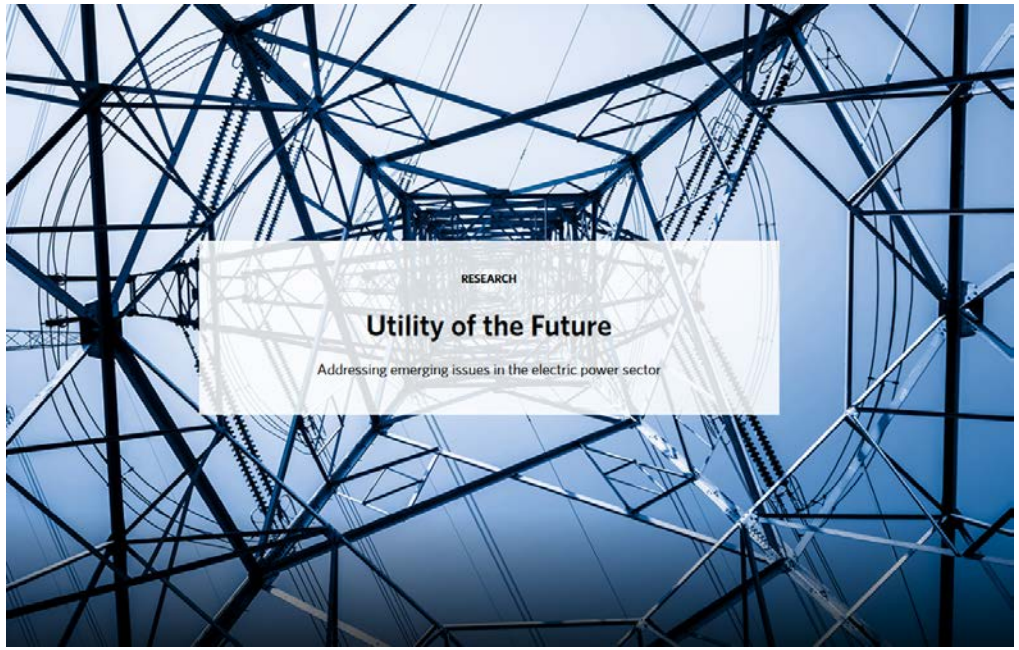
Digitale veiligheid

Privacy

Autonomie

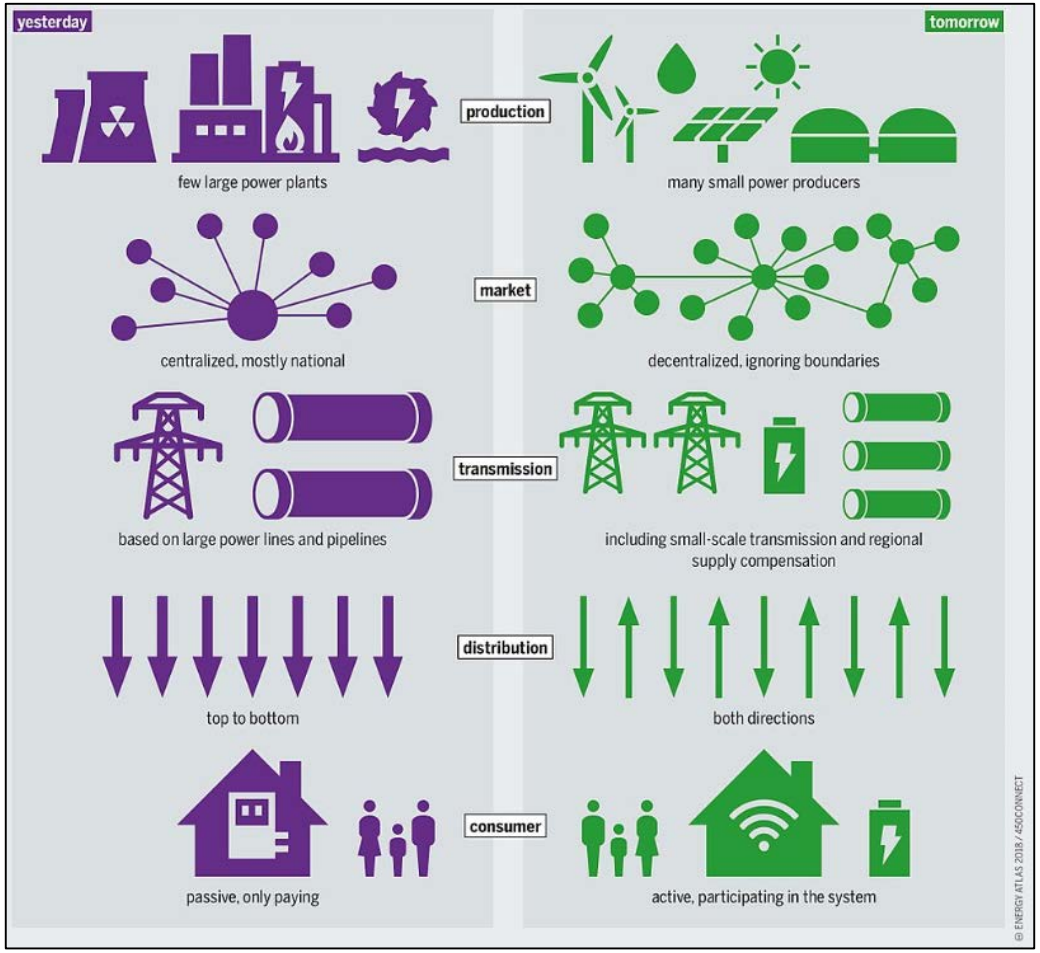
Eerlijke energietransitie

Datagovernance



Bron: MIT Energy Initiative, 2016

Datagovernance: from data-poor to datadriven



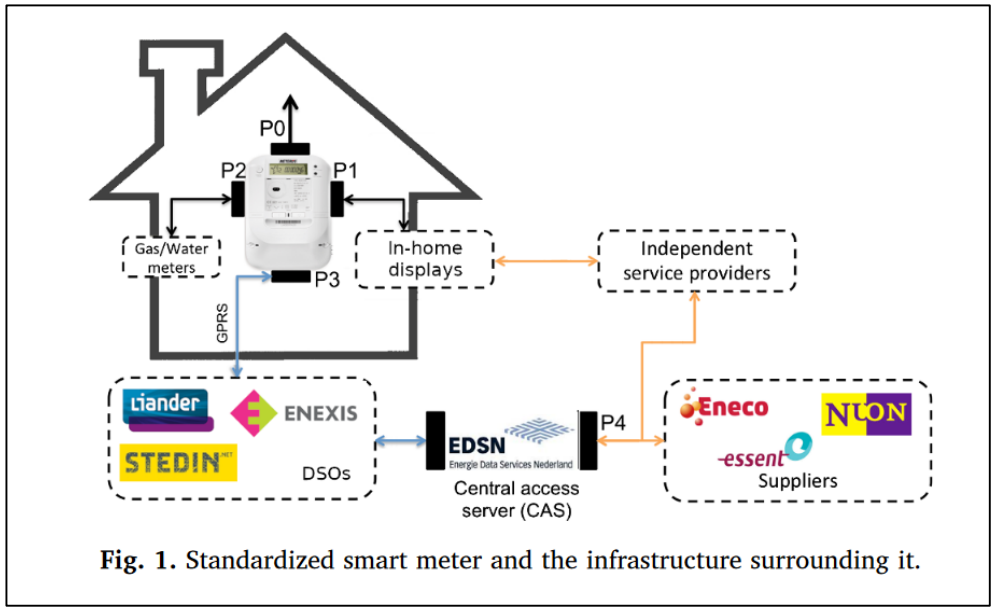
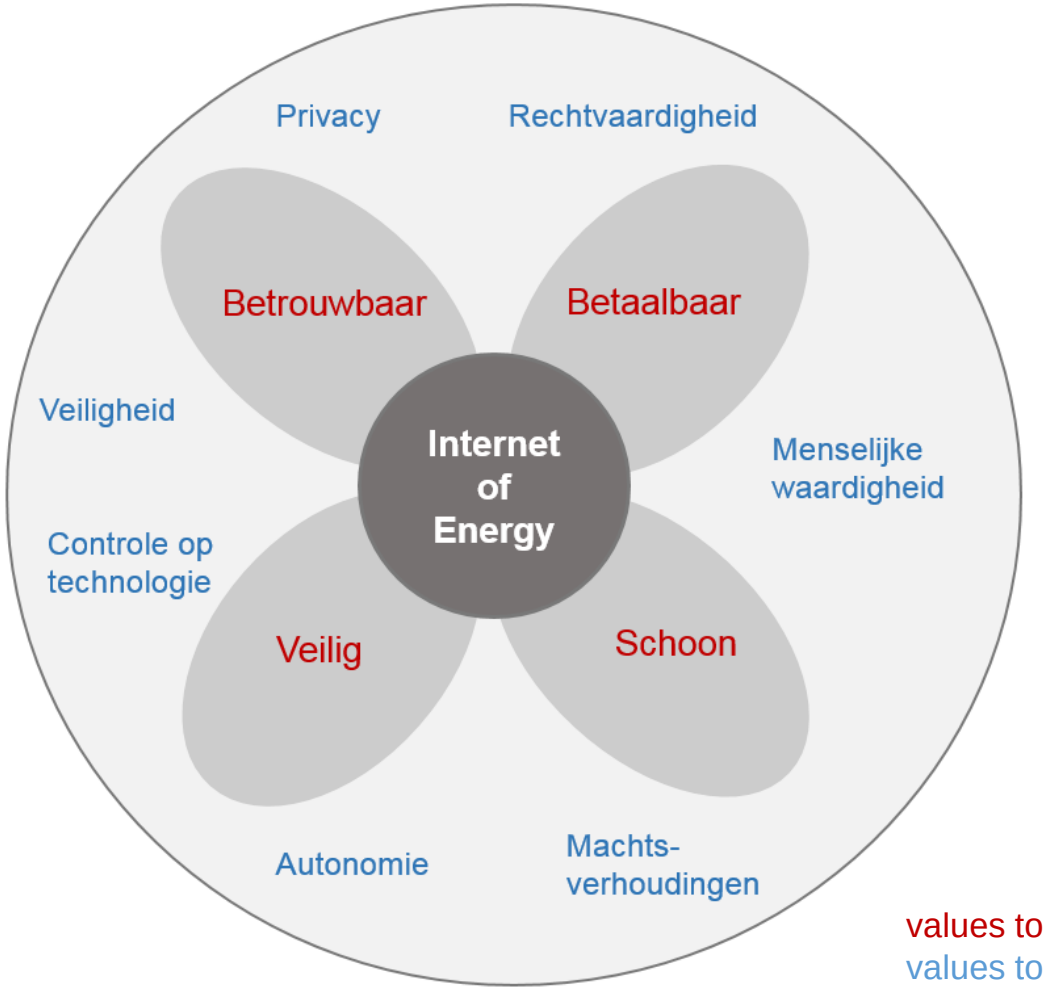


Fig. 1. Standardized smart meter and the infrastructure surrounding it.

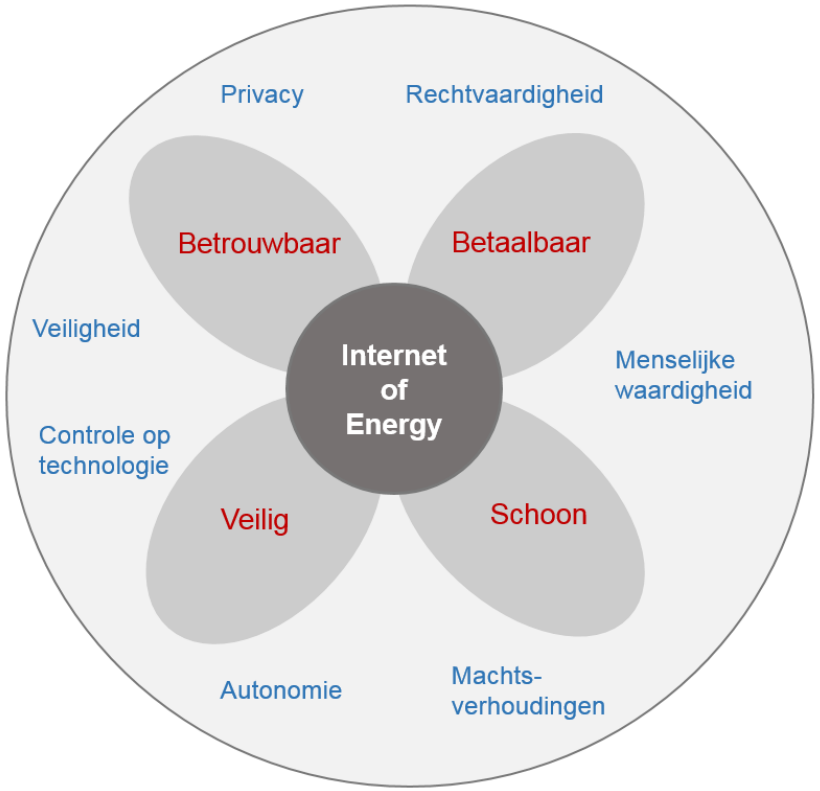
Valuable datagovernance



values to be pursued
values to be guaranteed

A smart choice: value driven digitalisation

- **The Netherlands wants a reliable, affordable, safe and sustainable energy system.**
- **Digitalisation can contribute to that**
- **The energy transition makes digitalisation urgent**
- **Data management should be designated as a critical core function for the energy sector.**
- **This requires an adequate model for data governance**
- **Numerous public values that play a role in digitization must be safeguarded**



Na te streven waarden
Te borgen publieke waarden

Rathenau Instituut

Thanks for you attention

Contactinformatie

Romy Dekker, r.dekker@rathenau.nl
Rinie van Est, r.vanest@rathenau.nl