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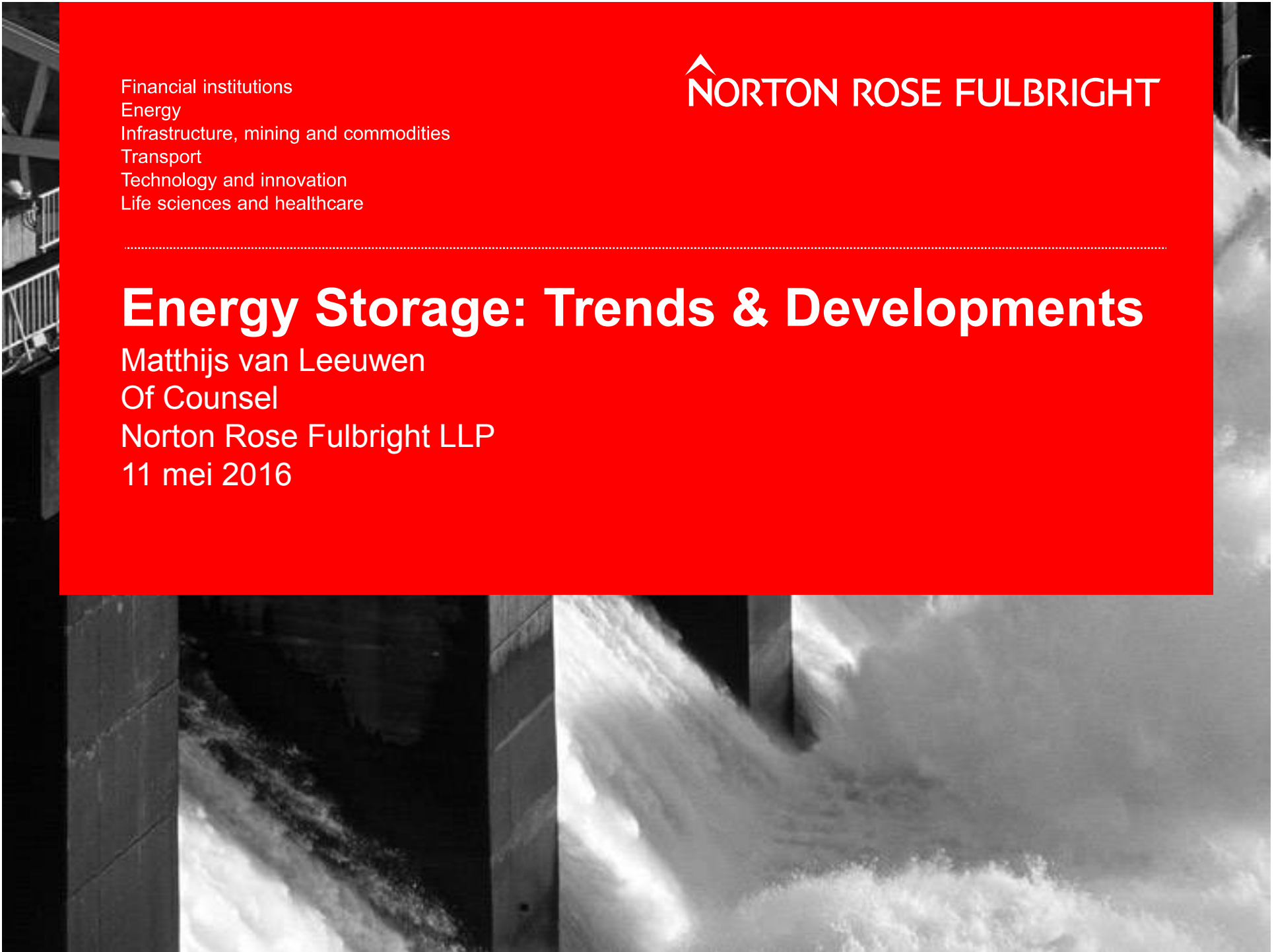
# **Energy Storage: Trends & Developments**

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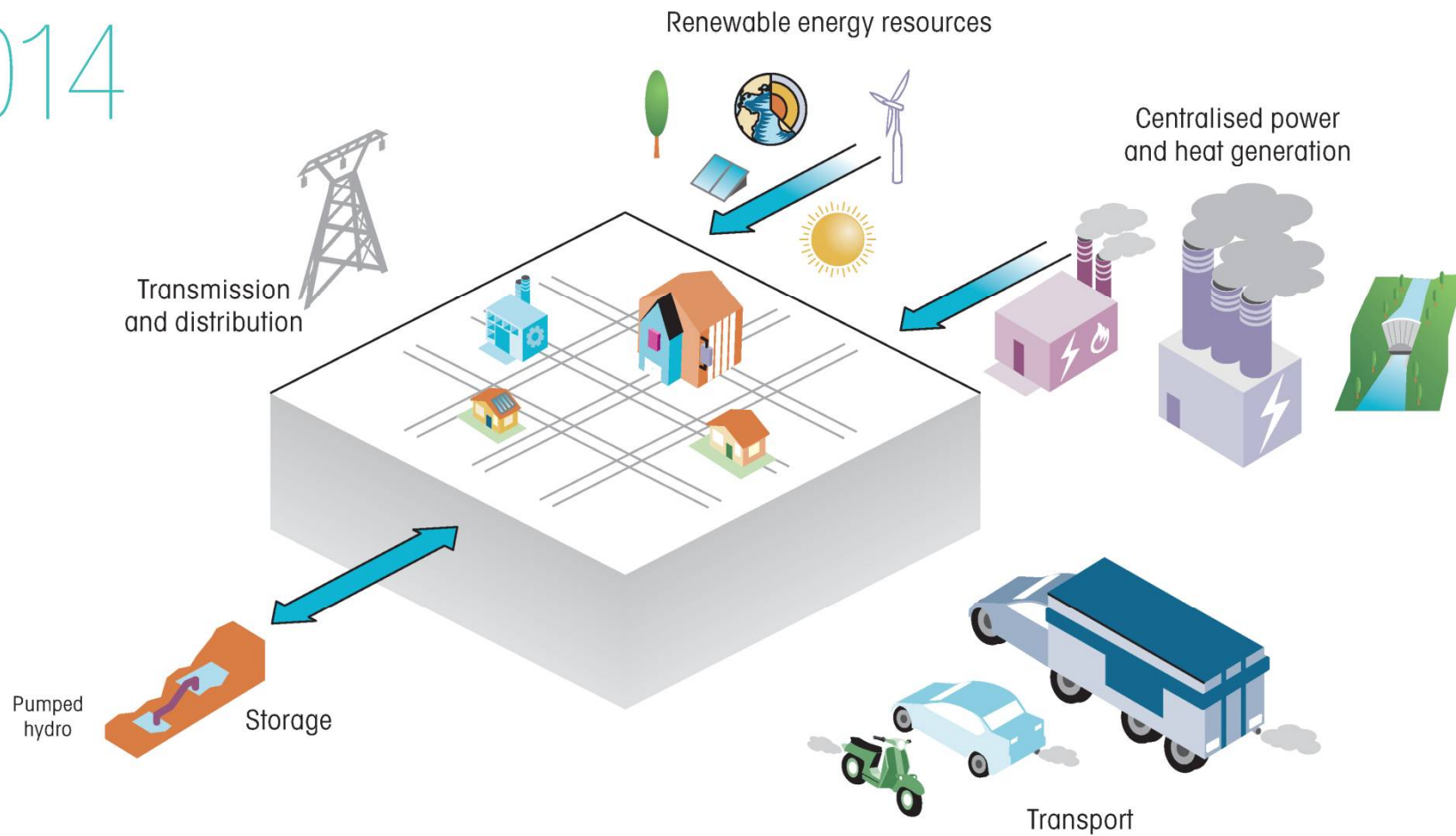


# Overview

1. Introduction
2. E-Storage: international trends in applications
3. Market and regulatory conditions
4. Financing: project risks
5. Policy and Legislation

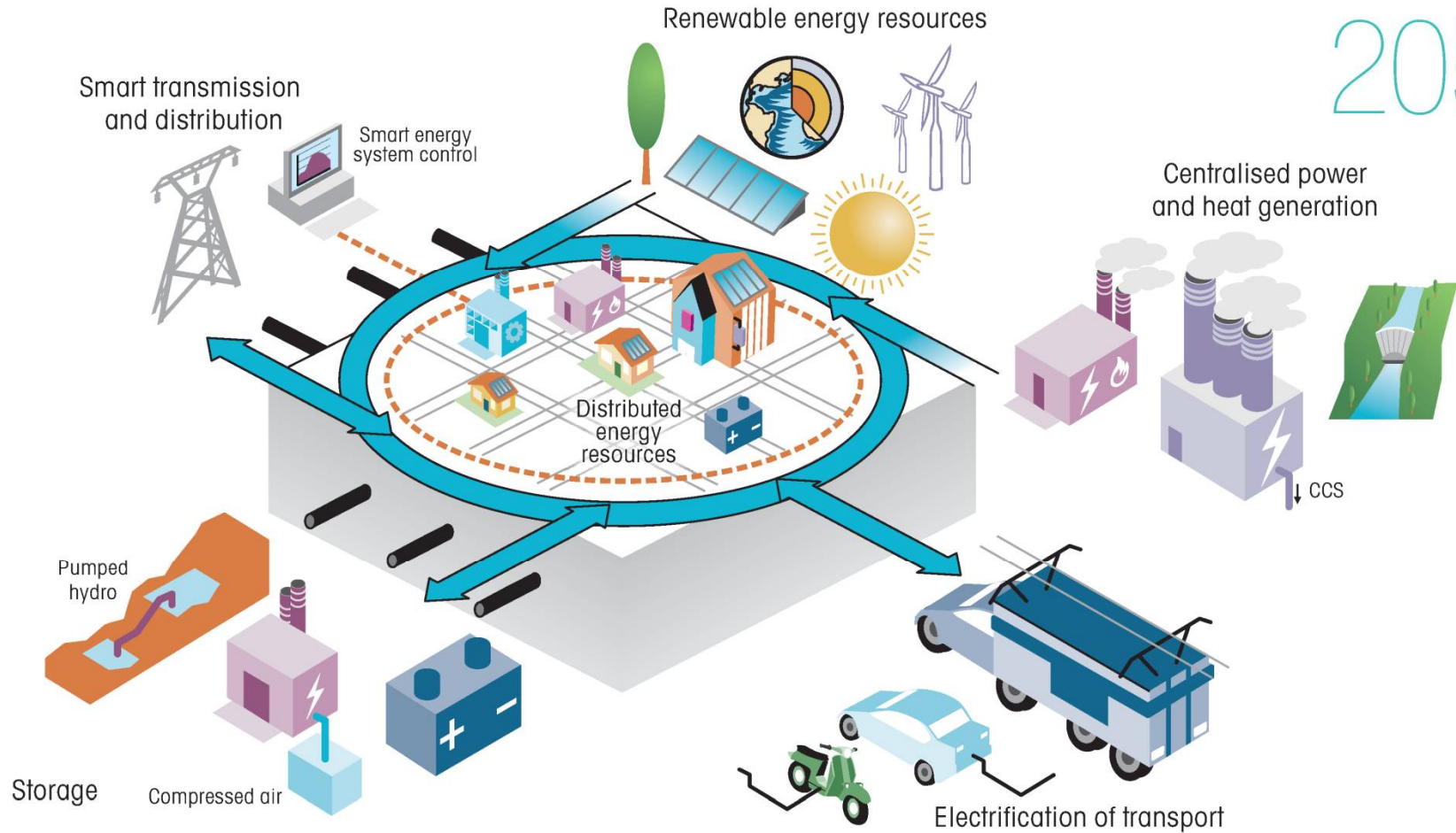
# Current energy system

2014



Bron: International Energy Agency

# Future energy system



Bron: International Energy Agency

## E-Storage: overview

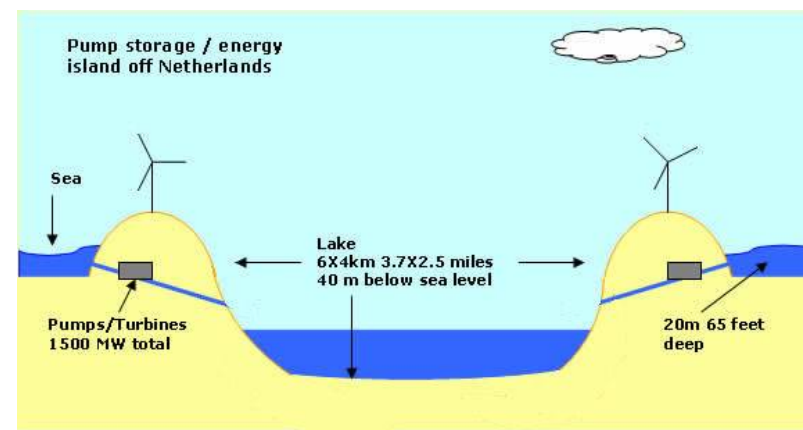
*“If renewable energy becomes competitive then it will be a wonderful opportunity. There will be disruption but more opportunity than disruption.” (Warren E. Buffett)*

- Market development: 24GW (2020), tot 113 GW (2050/EU)
- Reallocation of subsidies?
- Complex conditions for stimulating investments:
  - Low electricity prices
  - Absence of viable CO<sub>2</sub>(e)-pricing
  - Fossil fuel pricing



## E-Storage: applications

- Current:
  - Behind the meter
  - Renewable + storage: 'internal hedge'
  - Deferral or avoidance of grid investments
  - Off-grid
  - Balancing and grid services
  - Energy management
  - Power-to-products
- Future
  - Energy islands
  - Offshore power-to-gas



## E-Storage: market and regulatory conditions

- Successful implementation of e-storage project benefits from:
  - Smart metering
  - (financial) incentives for technology development
  - Proper valuation of flexibility
  - Benefit stacking
  - Renewable energy share: ~>30%
  - Adequacy of grid infrastructure
  - Access to imbalance markets
  - Arbitrage potential
  - System approach
  - Comprehensive policy: long-term stability, predictability and foreseeability
  - Technology neutral
  - Clear definition of participants roles
  - Available capital
  - Proper legislation

## Financing: project risks

- Depending on:
  - Technology utilised for specific application
  - Behind the meter or *grid-scale*
- Business model
- Contracting structure
- Construction
- Planning / Health, Safety and Environment
- Operational and technical specifications
- Technology: warranty structure
- Control over asset?
- Privacy and data protection



## Policy and Legislation: international

- IEA: *'regulatory and market conditions often ill-equipped to compensate storage for the suite of services it can provide'*
- EU 2030 Energy & Climate Framework
- Recent developments:
  - Flexible pricing of electricity network tariffs
  - Net-metering
  - Incentivising storage for consumers
  - Tenders for long-term supply of grid services
  - Review of business models network operators

## Policy and Legislation: Netherlands

- Frontier Economics: necessity from 2035, now R&D
- SDE+: negative pricing of electricity?
- *Besluit Experimenten Decentrale Duurzame elektriciteitsopwekking*
- *Wetsvoorstel Voortgang Energietransitie*
  - Focus on experiments
  - Network operators versus market participants
  - Grid investments versus e-storage?
  - Availability of system information
  - Investment plans grid managers

## Further information and contact



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**Energy Storage Updater 1<sup>st</sup> edition:**

**<http://www.nortonrosefulbright.com/knowledge/publications/136741/energy-storage-updater>**

**Article published in Project Finance International: Energy storage projects – A global overview:**

**<http://www.pfie.com/energy-storage-projects-a-global-overview/21242630.article>**

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