STORY

Added value of storage in distribution systems

Storages for future WS, Mia Ala-Juusela, SP18 Aix-Les-Bains

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About STORY

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646426

General project information

- 18 institutions from 8 countries
- Coordinator: VTT
- Technical coordinator: Th!nk-E
- Horizon 2020 (LCE-08-2014)
- Start: May 1st, 2015 (Duration: 60 months)
- Budget: 15,8 million Euro

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Project partners – 18 from 8 countries

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Objectives

Show the added value of storage in the distribution grid

- To **demonstrate** and evaluate **innovative approaches** for energy storage systems
- To find **solutions**, which are **affordable, secure** and ensure an **increased percentage of self-supply of electricity**
- To accelerate **innovation and business models** for deployment of storage at local level.

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Methodology

- Project demonstrations
  - Technology Readiness Level (TRL) 5 to 7
  - Interoperability
  - ICT
- Validate large scale models
- Understand impact (economic, environmental)
  - At demonstration level (measurements and simulations)
  - At level of grid (through simulations)
- Create framework for viable business cases

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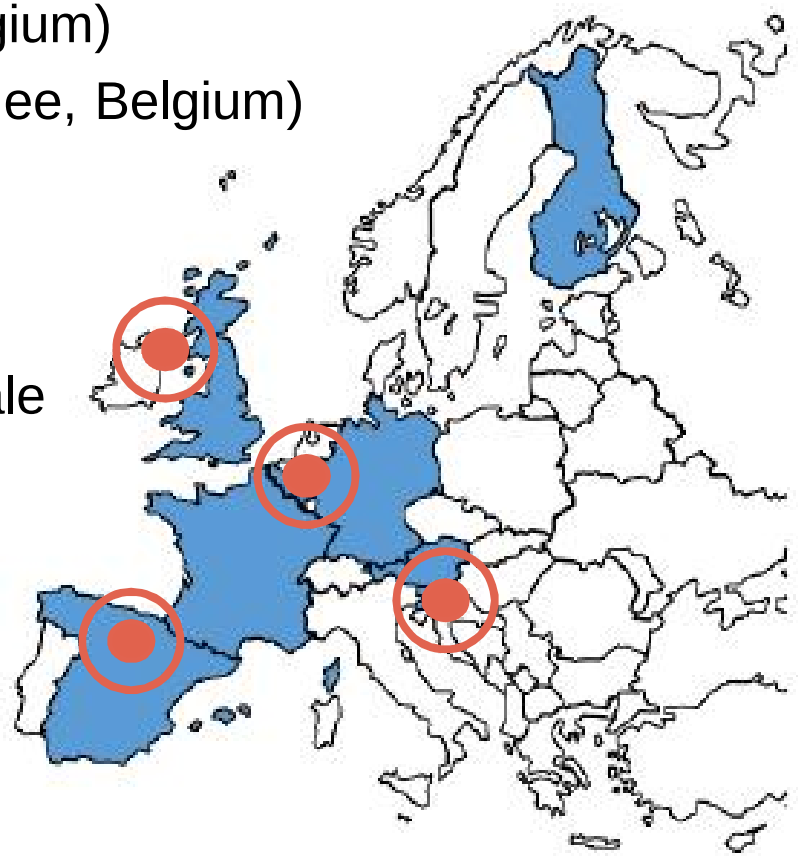
Project demonstrations

Overview

1. Residential building (Oud-Heverlee, Belgium)
2. Roll out of a neighbourhood (Oud-Heverlee, Belgium)
3. Storage in factory (Navarra, Spain)
4. Storage in residential district (Lecale, Northern Ireland)
5. Flexibility and robustness of medium scale storage unit in:
    1. Industrial area (Kranj, Slovenia)
    2. Residential area (Suha, Slovenia)
6. Roll out of private multi-energy grid in industrial area (Olen, Belgium)



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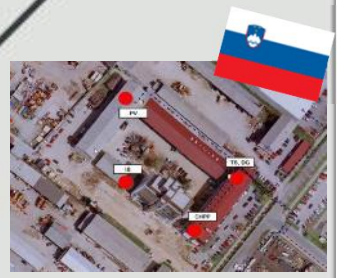
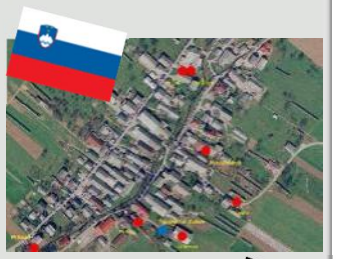
Project demonstrations

The demonstration cases of STORY

		BE: Residential buildings	BE: Neighborhood multi-energy grid	ES: Storage in a factory	UK: Storage in a residental district	SI: Large scale storage unit	BE: Private multi-energy grid
Type of storage	Thermal storage	■	■			■	■
	Battery	■	■	■	■	■	■
	Compressed air storage				■		
Technology	Combined heat and power					■	■
	Vacuum solar collectors	■	■				
	Heat pump	■	■				
	PV	■	■	■	■	■	■
	Wind power				■		
	Tidal power				■		
	Biogas				■		
	Fuel cell	■	■		■		
User sector	Residential	■	■		■	■	
	Industrial			■		■	■
Demo aims	Peak shifting and shaving	■		■			
	Load and generation control	■	■	■	■	■	■
	Grid support					■	
	Scheduling of flexbility	■	■			■	





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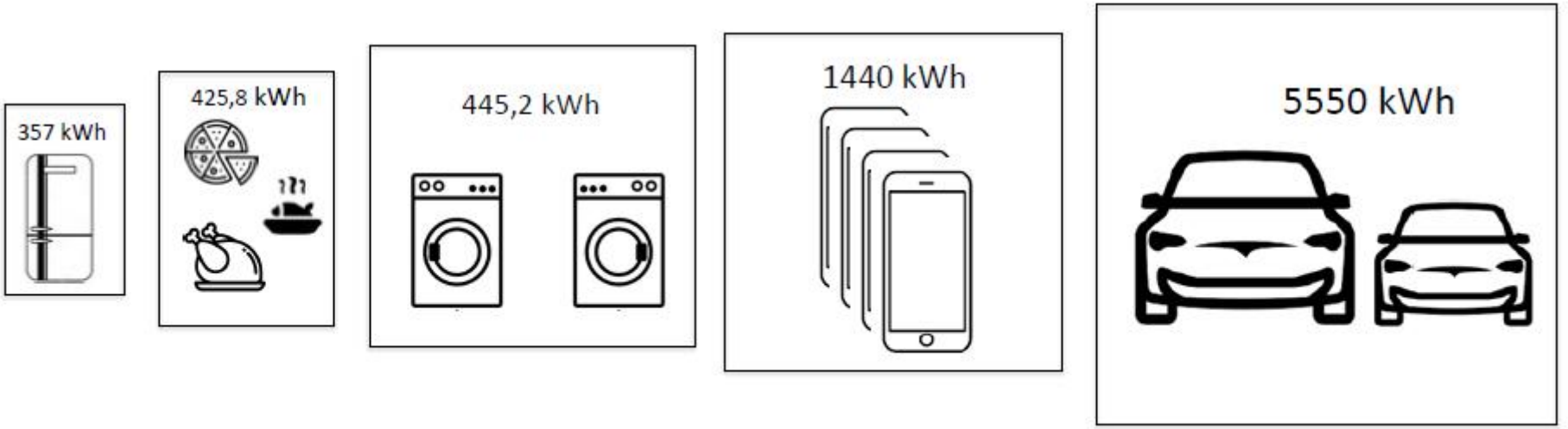
Biggest consumer in an energy efficient residential house?



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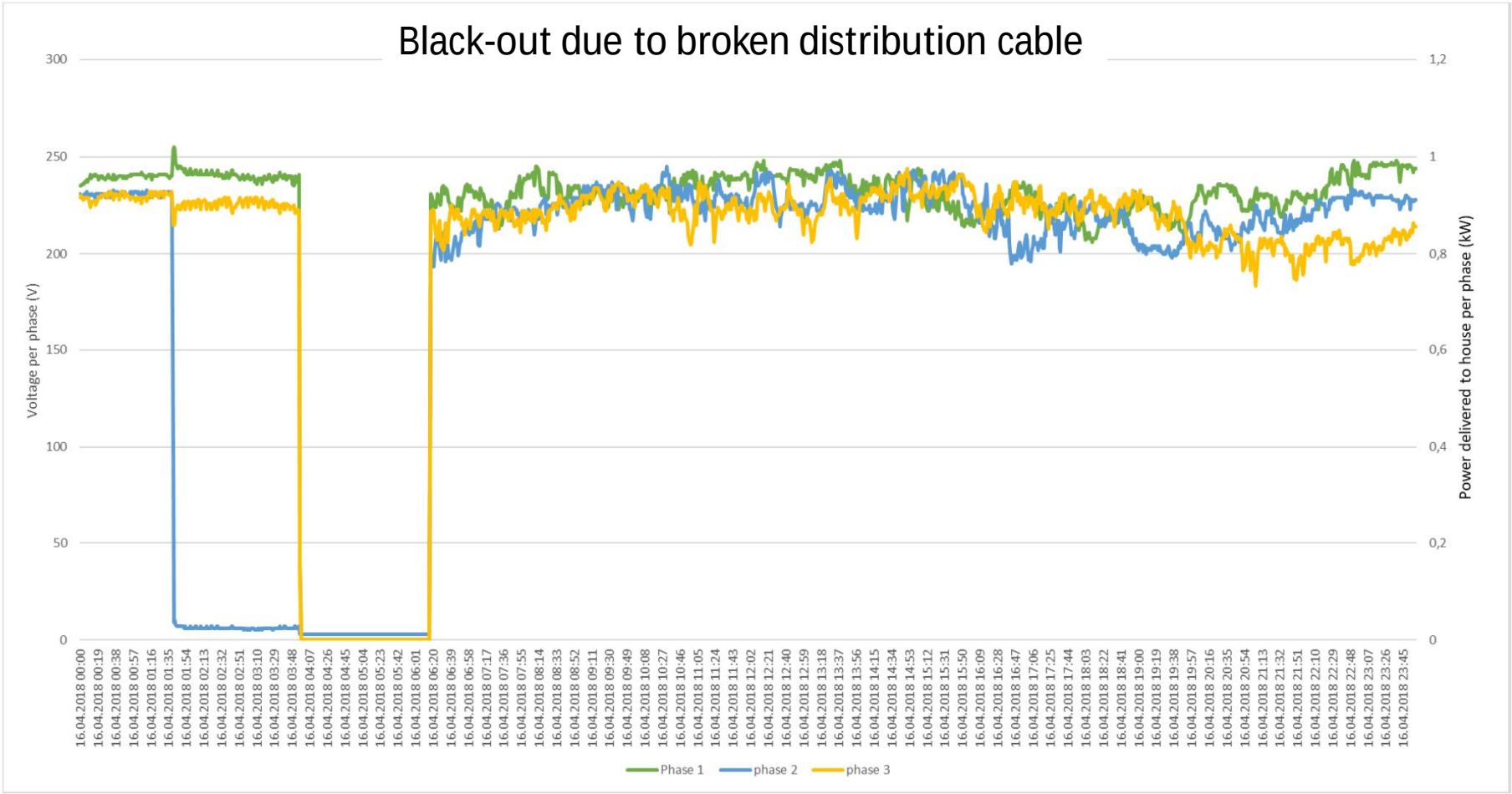
Project STORY - H2020-LCE-2014-3

What are we solving with storage?



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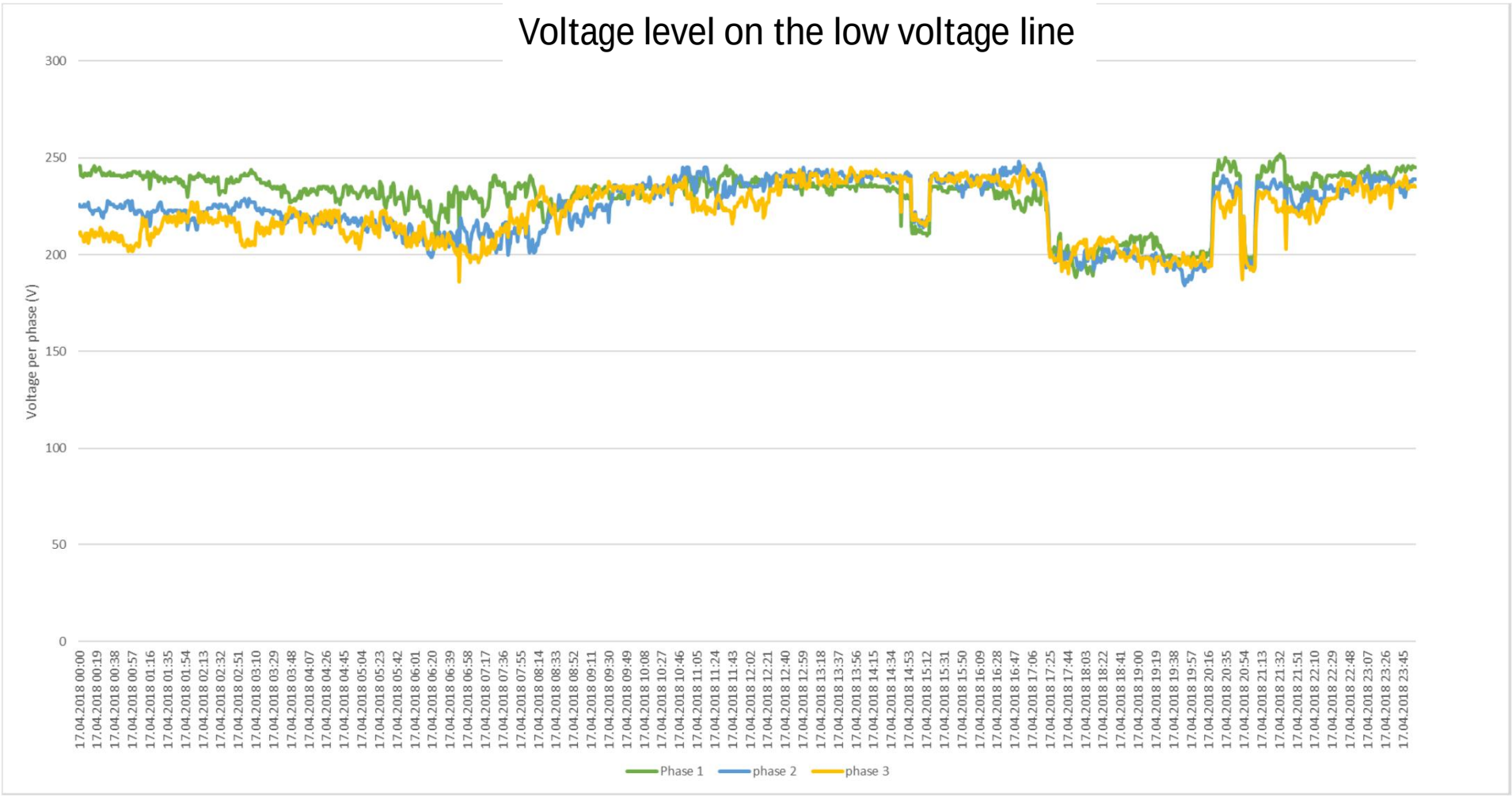
Project STORY - H2020-LCE-2014-3

What are we solving with storage?



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Project STORY - H2020-LCE-2014-3

Main grid challenges to be addressed by storage solutions

The Key Grid Challenges (KGC) recognized as most urgent by STORY project are:

- **Line congestion:** Impact from overproduction of distributed RES generation on a feeder or branch.
- **Voltage profile control:** Maintaining voltage profile in normal boundaries in cases of high state of production (overvoltages) or consumption (undervoltages).
- **Security of supply:** Provision of short term (load following, balancing market) and long term (generation adequacy and reserve market) security of supply.
- **Reserve provision:** Possibility of distribution network (DN) resources (RES and storage) for frequency response reserve and replacement reserve.

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Scenarios for RES, grid, storage

- STORY team will study through simulations how the storages and different control strategies would help in tackling the KGC presented above.
- We have recognized potential future developments that would increase the challenges:
  - Increased share of RES.
  - Increased consumption per user and increased number of users, with inclusion of energy efficiency level.
  - Changes regarding the thermal grid.
  - Temporal variability of demand and supply (seasonality).

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Portfolio of potential scenarios

- Portfolio of simulation cases:
  - Selection of representative grid cases
  - Selection of future grid development scenarios
  - Selection of storage integration scenarios
  - Rural/urban cases, LV/MV level
- Grid and RES Development scenarios:
  - Slow growth (regarding RES & EV & Heat Pumps)
  - Stable growth (regarding RES & EV & Heat Pumps)
  - Transition towards full electrification
  - Transition towards district heating
  - Additional scenarios:
    - Highly increased RES production, HV grid
    - Self-sufficient district (microgrid)

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Impact creation

- Proposing **policy and regulatory recommendations** that allow implementation of innovative technical solutions and business models for deployment of storage at local level
- Impact created by **involving full value chain of technology providers**: end users, investors, ICT and storage technology providers, as well as the Distribution System Operators (DSO)

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More information about STORY

Visit us: **horizon2020-story.eu**

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More information about STORY

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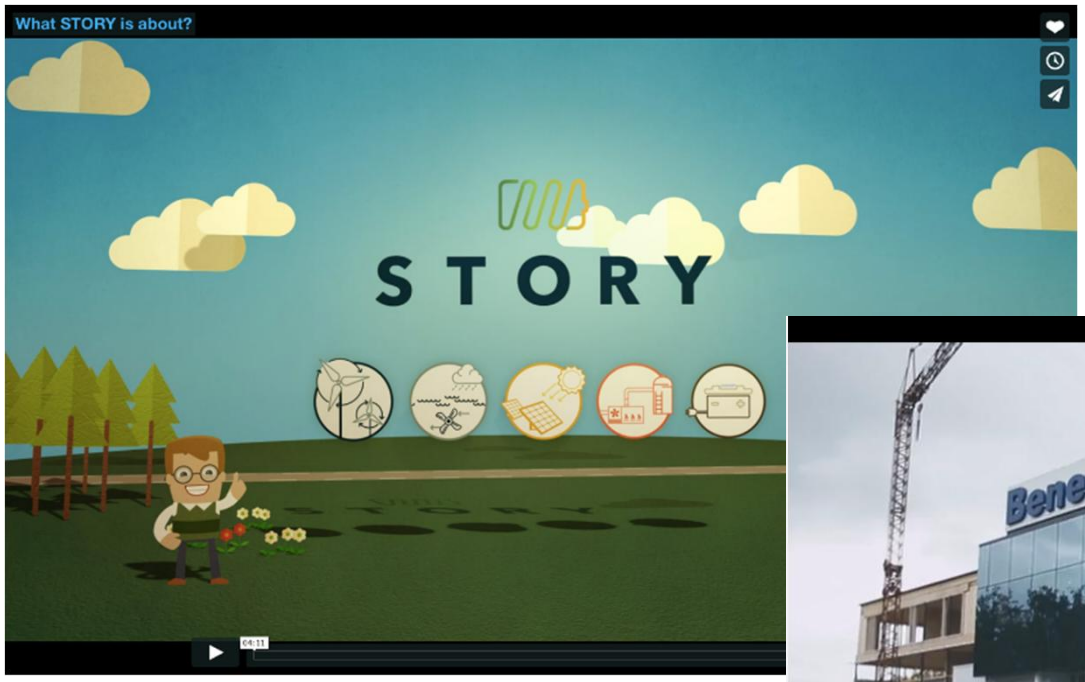

1) What STORY is about

2) Case study Beneens

….and more to come.

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