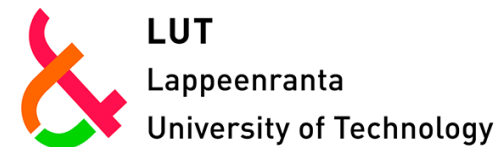




# CARBON MANAGEMENT INDEX

PREDICTING THE EMISSION DEVELOPMENT

Henri Mikkola

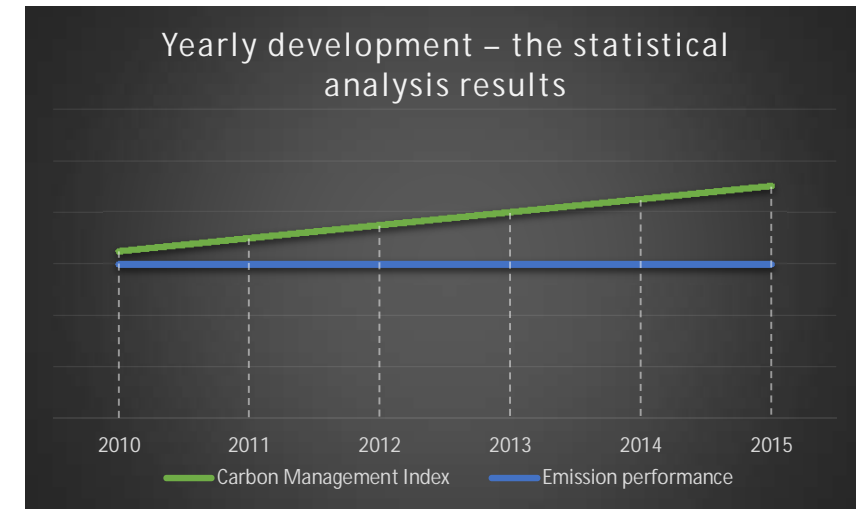


# PREVIOUS RESEARCH (THESIS)

- More actions done  $\neq$  emission performance
  - 2010 -> 2015, the highest emitters (252 companies)
  - 14% of global CO2 emissions yearly
  - Industrial emissions
- Conclusion: decoupling

# CARBON MANAGEMENT INDEX (ARTICLE)

- Improved Carbon Management Index (CDP data)
  - Data from 2010 to 2016, the highest emitters (261 companies, over 14% of global CO2 emissions yearly)
  - Longitudinal, more variables extracted under analysis, and detailed & improved coding
- Find common factors driving the variation in the Carbon Management Index data
  - Index construction and validation through factor analysis (in progress) – less variables in the final index (simplified)
  - How these are connected to emission performance
    - Predict and measure emission performance
- Analyzed variables from 3 main groups – groups validation through factor analysis and panel regressions
  - Direct influence to emission performance
  - Indirect influence to emission performance
  - Risk management (climate change)
- Also analyze and compare to CSR Hub Indexes



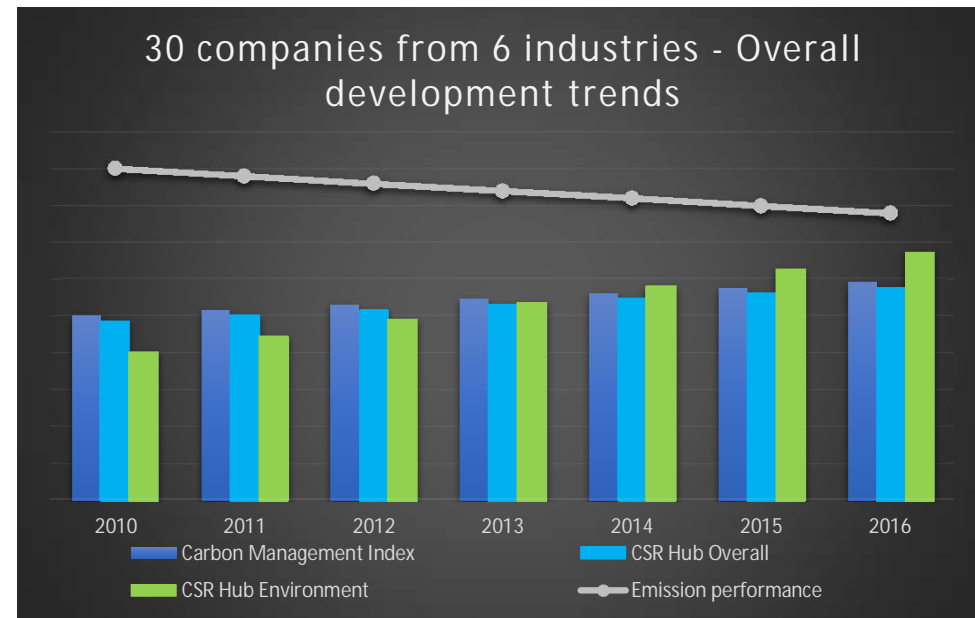
# FINANCIAL PRECONDITION FOR INVESTING IN RENEWABLE ENERGY – SELECTED 30 COMPANIES FROM 6 INDUSTRIES

- Closer look at the following companies carbon management actions together with comprehensive financial analysis

Production of electricity	E.ON	Electricite de France	ENEL	ENGIE	Fortum	RWE	Vattenfall
Oil or Gas production	BP	Gazprom	Neste	Royal Dutch Shell	Statoil		
Automotive production	BMW	Daimler	Fiat Chrysler	PSA	Renault	Volkswagen	
Cement production	CRH	Cementir	Heidelberg-Cement	Lafarge-Holcim			
Pulp and Paper production	SCA	Stora Enso	UPM-Kymmene	Arkhangelsk Pulp and ...			
Steel & Aluminum prod.	Arcelor-Mittal	Norsk Hydro	Outokumpu	SSAB			

# FINANCIAL PRECONDITION FOR INVESTING IN RENEWABLE ENERGY — SELECTED 30 COMPANIES FROM 6 INDUSTRIES

- Related to the upcoming article of the improved Carbon Management index
  - Possibility to go in detail to the carbon management actions
    - Comparison to Antero's comprehensive financial data extraction and discoveries from annual reports
  - Discoveries can be used and/or validated with the larger dataset (index development)
- CSR Hub indexes analyzed
  - 15 000+ companies, data from 2008 to present
  - Objective: provide consistent rating of CSR performance
    - Learn and compare company sustainability and CSR behavior
  - Data not for investment decisions
  - SRI Data: ESG analysis, NGOs, research, CSR publications
    - CDP one of the major data sources
  - CSR Hub Overall Index: Community, Employees Environment and Governance



# FINANCIAL PRECONDITION FOR INVESTING IN RENEWABLE ENERGY – SELECTED 30 COMPANIES FROM 6 INDUSTRIES

- Top 5 emission reduction initiative activity types
  - Energy efficiency: Processes; E.g. heat recovery, refrigeration, process optimization, fuel switch, compressed air, combined heat and power, waste water treatment, process water, machine replacement
  - Low carbon energy installation; The source could be biomass, fuel cells, geothermal, hydro, solar, solar hot water, biogas
  - Process emissions reductions; Initiatives to reduce process emissions from manufacturing, e.g. new equipment, changes in operations, process materials selection
  - Energy efficiency: Building services; E.g. building controls, HVAC, lighting, motors and drives, combined heat and power
  - Product design
- Top 5 methods to drive investment in emissions reduction activities (the ways in which capital is directed towards emissions reduction activities within the company, rather than the drivers for doing so)
  - Compliance with regulatory requirements/standards
  - Dedicated budget for low carbon product R&D
  - Dedicated budget for energy efficiency
  - Partnering with governments on technology development
  - Other

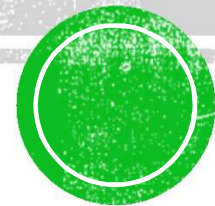
# FINANCIAL PRECONDITION FOR INVESTING IN RENEWABLE ENERGY – SELECTED 30 COMPANIES FROM 6 INDUSTRIES

Trends	Profitability (ROS %)	Emission performance	Carbon Management Index	CSR Hub Environment	CSR Hub Overall
Automotive production	↘	↗	↗	↗	↗
Cement production	↗	↘	↗	↗	↗
Oil or Gas production	↘	↗	↗	↗	↗
Production of electricity	↘	↘	↗	↗	↗
Pulp and Paper production	↗	↘	↘	↗	↗
Steel & Aluminum production	→	→	↘	↗	↗

- From 2010 to 2016 – preliminary results
- On average absolute total emissions (Scope 1 + Scope 2) decreasing
- Emission performance extracted from emission intensity
  - Total emissions / Net sales
    - Indirect Scope 3 emissions ignored (the largest)
  - Decreasing emission intensity → improving emission performance
- Highest emission intensities to the lowest:
  - Cement → Production of electricity → Pulp and Paper → Steel & Aluminum → Oil or Gas → Automotive



# THANK YOU!



Questions & comments?

