

International Green Entrepreneurship Forum

Session II: Start-Ups in Sustainable Transportation



Prof. Dr. Dirk Ludewig

Dr. Werner Jackstädt-Zentrum
für Unternehmertum und Mittelstand Flensburg /
Flensburg University of Applied Sciences

International Green Entrepreneurship Forum

Session Overview



- **International Green Entrepreneurship Forum:**
 - 1st 2014 - Conference / 2nd 2015 - Session / 3rd 2016 - Track
 - Goal: Platform for learning, discussion and networking
- **Session overview - Start-Ups in Sustainable Transportation:**
 - Dirk Ludewig, Professor HS Flensburg
 - Thomas Neumann, Scientific Researcher GEC
 - Mogens Løkke, Sales Manager Tripl, Former CEO ECOmove
 - Søren Munk, Chief Investment Manager Insero
 - Plenary discussion

International Green Entrepreneurship Forum

Sustainable Transportation - Green Economy & Entrepreneurship



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Sustainable Transportation

Two Approaches of the Green Economy

- Process approach (“greening of the economy”): Green economy as an economy “that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.” - Characteristics: Low carbon, resource efficient and socially inclusive (UNEP 2015)
- Output approach (“green business”): Part of the economy/business that offers products, technologies and services in predefined “lead markets” of the green economy (OECD 2011)
- Cross-sectional character of the green economy: Overlap and basis of the green economy in industrial sectors such as engineering, automotive and chemical industry

Sustainable Transportation

Major Lead Markets of the Green Economy

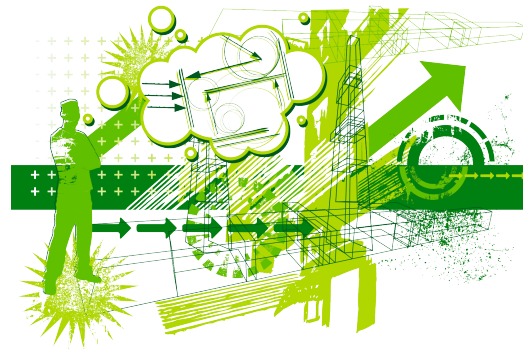
Lead markets	Market segments
 Environmentally friendly power generation, storage and distribution	<ul style="list-style-type: none"> • Renewable energy • Ecofriendly use of fossil fuels • Storage technologies <ul style="list-style-type: none"> • Efficient grids
 Energy efficiency	<ul style="list-style-type: none"> • Energy-efficient production processes • Energy-efficient buildings • Energy-efficient appliances <ul style="list-style-type: none"> • Cross-sector components
 Material efficiency	<ul style="list-style-type: none"> • Material-efficient processes • Cross-application technologies • Renewable resources <ul style="list-style-type: none"> • Protection of environmental goods • Climate-adapted infrastructure
 Sustainable mobility	<ul style="list-style-type: none"> • Alternative drive technologies • Renewable fuels • Technologies to increase efficiency <ul style="list-style-type: none"> • Transportation infrastructure and traffic management
 Waste management and recycling	<ul style="list-style-type: none"> • Waste collection, transportation and separation • Material recovery • Energy recovery <ul style="list-style-type: none"> • Landfill technologies
 Sustainable water management	<ul style="list-style-type: none"> • Water production and treatment • Water system • Wastewater cleaning <ul style="list-style-type: none"> • Increasing the efficiency of water usage

Source: BMUB 2014

Sustainable Transportation

Further Green Products and Services

- Further Green Products:
 - Green Food und Organic farming
 - Green Fashion
 - Green Living
- Further Green Services:
 - Green Financing/Money
 - Green Controlling
 - Green Consulting
 - Green Design
 - Green IT
 - Green Marketing
 - Green Trade
 - Green Health and Wellness
 - Green Sports and Leisure
 - Green Tourism
 - Green Events
 - Green Education



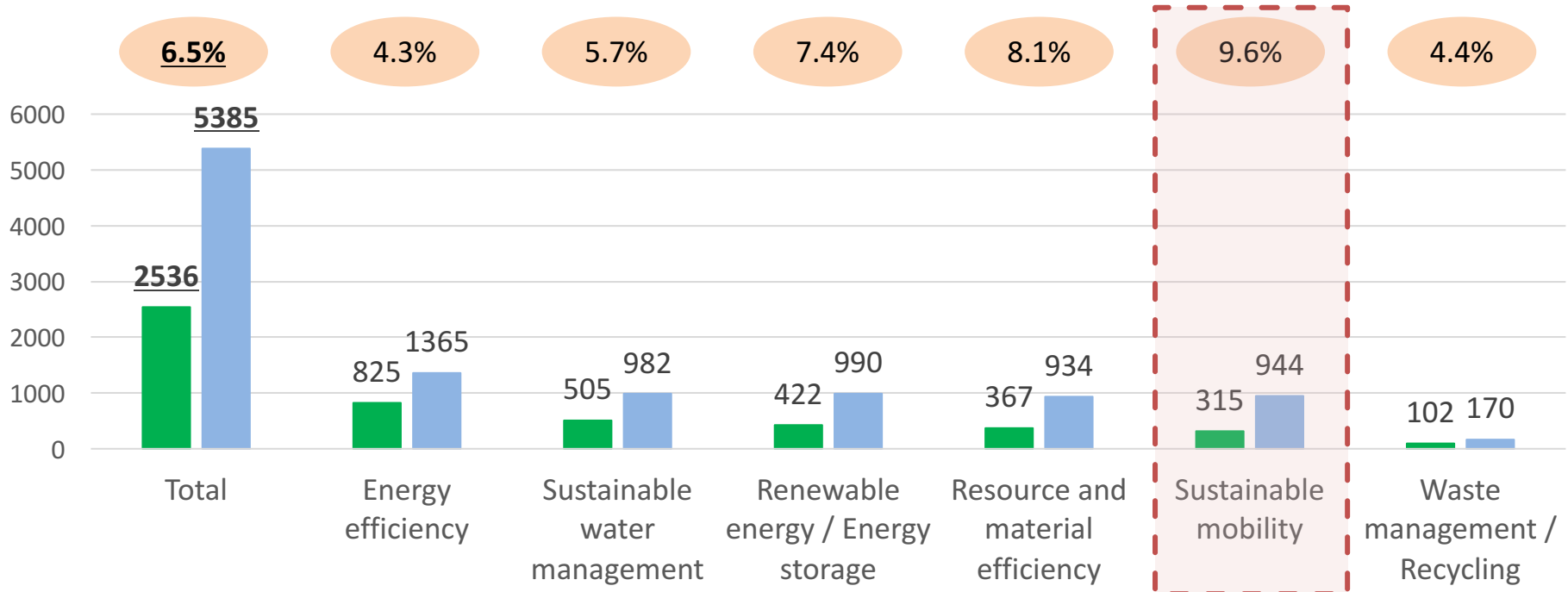
Source: Summarized in Ludewig 2015

Sustainable Transportation

Global Size and Growth Figures of the Green Economy

Global lead markets

(Size in billion € in 2013 / Size in billion € in 2025 / CAGR 2013-2025)



- Green Economy with 3% global GDP share in 2013 and above global GDP growth (3%)
- Sustainable mobility both with highest growth in absolute terms and CAGR

Source: BMUB 2014

Sustainable Transportation

Focus - Lead Market Sustainable Mobility



Sustainable mobility

Market segments

Alternative drive technologies

Key technology lines

- Hybrid drive systems
- Electric drive systems
- Fuel cell drive systems

Renewable fuels

- Bioethanol
- Biodiesel
- Biomethane
- Hydrogen from renewable resources
- Biokerosene

Technologies to increase efficiency

- Efficiency gains in combustion engines
- Lightweight engineering technologies
- Energy-saving tires

Transportation infrastructure and traffic management

- Rail vehicles and infrastructure
- Traffic control systems
- Filling station infrastructure for alternative drive systems
- Public transport
- Car sharing
- Cycle paths

Source: BMUB 2014



CLIMATE NEUTRALITY
Solutions for crossing borders



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für Unternehmertum und Mittelstand Flensburg

We foster the economy



Regional Economic Programme. Funded by
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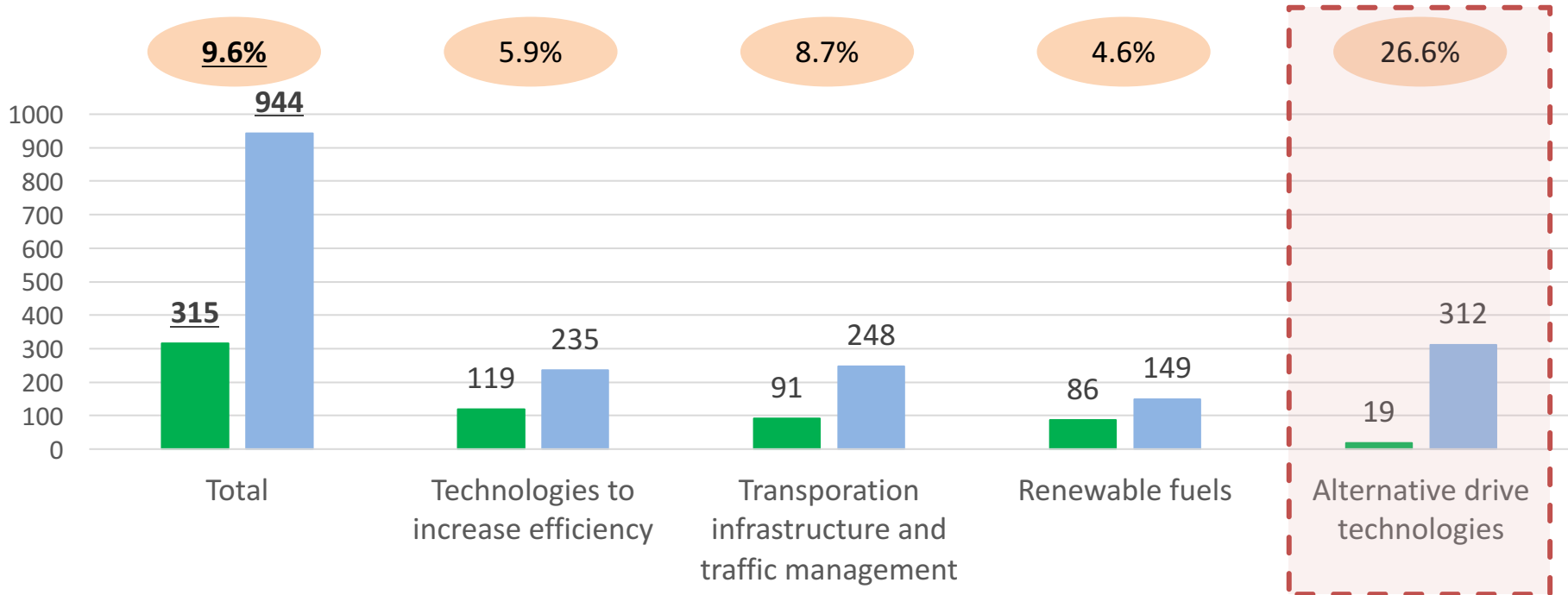


Sustainable Transportation

Global Size and Growth Figures in Sustainable Mobility

Global lead markets

(Size in billion € in 2013 / Size in billion € in 2025 / CAGR 2013-2025)



- Alternative drive technologies with CAGR 26.6% most dynamic market segment
- Electric drive systems most dynamic technology line in this segment with CAGR 37.8%

Source: BMUB 2014

Sustainable Transportation

Approaches of Green Entrepreneurship

- Process approach: Entrepreneurs or start-ups that “make their industry greener” (e.g. by using efficient technology in any industry) (OECD 2011)
- Output approach: Entrepreneurs or start-ups that are active in specific sectors (of the green economy) and produce specific types of output (“entering a green business”) (OECD 2011)
- Combination: Entrepreneurs and start-ups that contribute with their products, technologies and services by business mission to the goals of the green economy (Weiß/Fichter 2013)
- Green Intrapreneurship/Eco-Innovation: Green entrepreneurial activity and innovation in existing companies (OECD 2013)

Sustainable Transportation

Green Entrepreneurship - Necessity and Opportunity

- Sustainability necessity:
 - “...our only chance to cope with this [resource and environmental] challenge is to use the power of capitalism.” (Hall 2012)
 - High importance of green start-ups for transformation to green economy due to dynamic, flexibility and innovation power (BMBF 2014; BMUB 2014)
- Business opportunity:
 - “At the same time it is the world’s largest business opportunity.” (Hall 2012)
 - 17.3% of all German start-ups in 2014 are green (Fichter/Weiß 2016)

Sustainable Transportation

Green Entrepreneurship - Challenges for Green Start-Ups

- Only limited information about the field of green entrepreneurship/economy
- Incompatibility of “green” and “entrepreneurship” (inner conflict / mission driven)
- Technology specific hurdles (high importance and costs of R&D / long R&D time)
- Instability of political framework, legislation and norms
- “Lock-in” effects of old “non-green” solutions
- Instability of public opinion and thus concrete demand
- Lack of specific support programs
- Lack of financing/investment (e.g. by misfit of investors and entrepreneurs)

Source: Summarized in Ludewig 2015

Sustainable Transportation

Literature

- BMBF - Bundesministerium für Bildung und Forschung (2014): Forschungsagenda Green Economy
- BMUB - Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (2014): GreenTech made in Germany 4.0 - Umwelttechnologieatlas für Deutschland
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- Fichter, K. / Weiß, R. (2016): Green Economy Gründungsmonitor 2015, Borderstep, Universität Oldenburg
- Hall, C. (2012): Miljökapitalisterna - Hur svenska entreprenörer tjänar miljarder på att rädda vår planet
- Ludewig, D. (2015): Green Entrepreneurship - Einordnung in die Green Economy und Bestandsaufnahme des Themenfeldes, Flensburger Hefte zu Unternehmertum und Mittelstand - Heft Nr. 6
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- UNEP - United Nations Environment Programme (2015): Homepage - Green Economy

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International Green Entrepreneurship Forum

A Research Perspective on Start-Ups in Sustainable Transportation



Thomas Neumann

Green Entrepreneurship Center

Dock1 | VentureWerft

Flensburg University of Applied Sciences

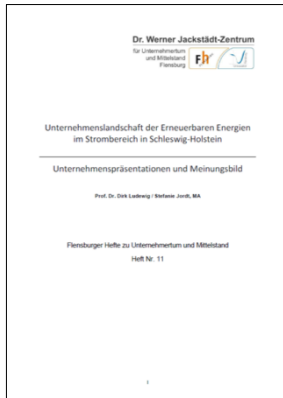


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A Research Perspective...

Green Entrepreneurship Center



- **Research:**
 - Publications
 - PhD-Theses
 - Research Studies
- **Networking:**
 - International Green Entrepreneurship Forum
 - Green Round Tables
 - Green Entrepreneurship Working Group
- **Motivation**
 - Newsletters
 - Idea contests
- **Support**
 - Office & Coworking Space
 - Coaching
- **Qualification**
 - Module: Green Entrepreneurship
 - Green Labs



A Research Perspective...

Strategies to decarbonize Transportation*

- Improving and changing mobility
 - engine and fuel technology improvements and innovations
- Reducing the need to travel
 - teleworking, ICT, internet shopping
- Encouraging modal shift
 - intermodality and sharing
- Reducing trip length
 - more integrated urban and transport planning



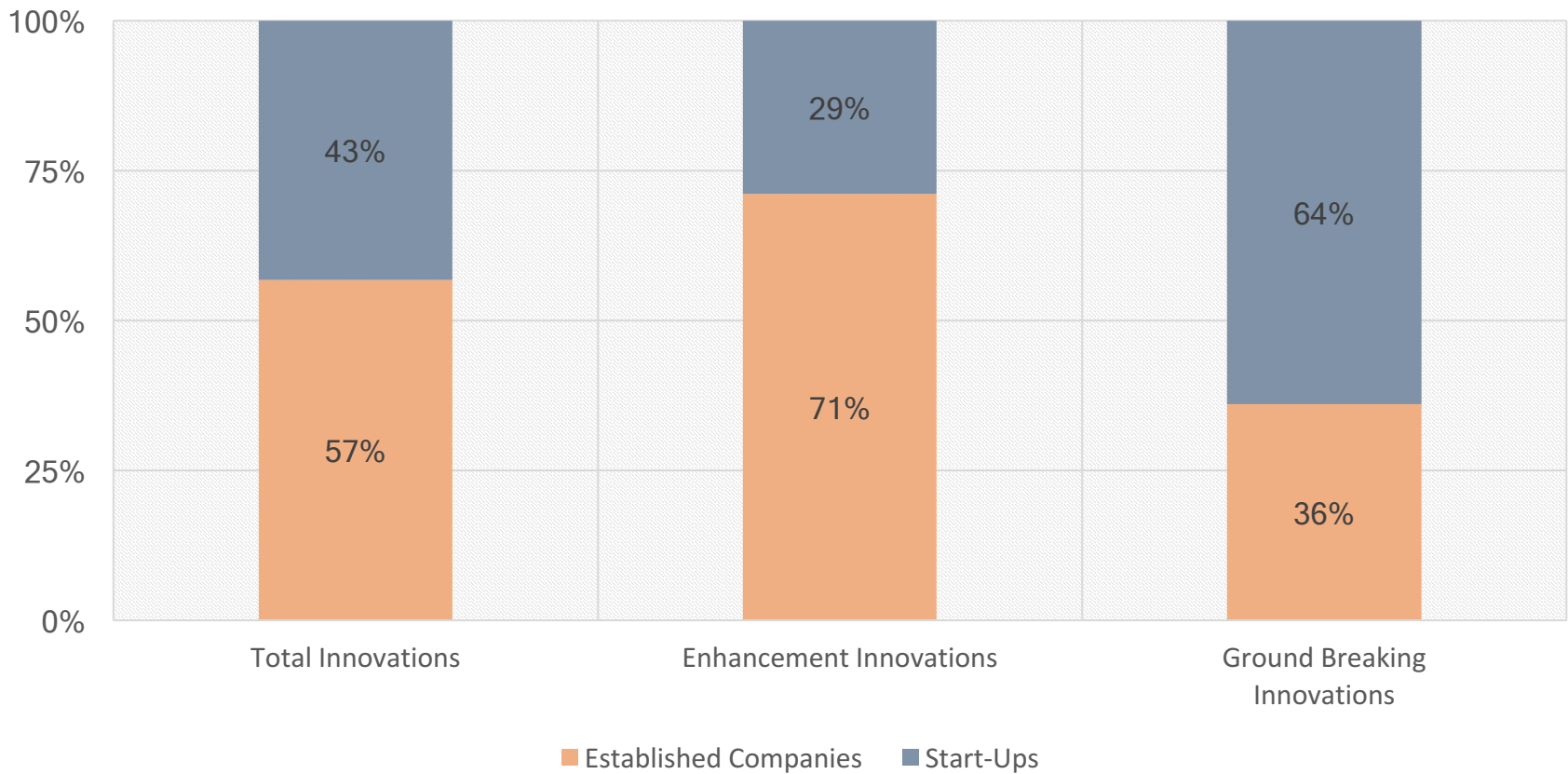
www.cema-agr.org

*Source: Köhler et. all 2017

A Research Perspective

Impact of Sustainable Start-Ups

Sustainable Innovations

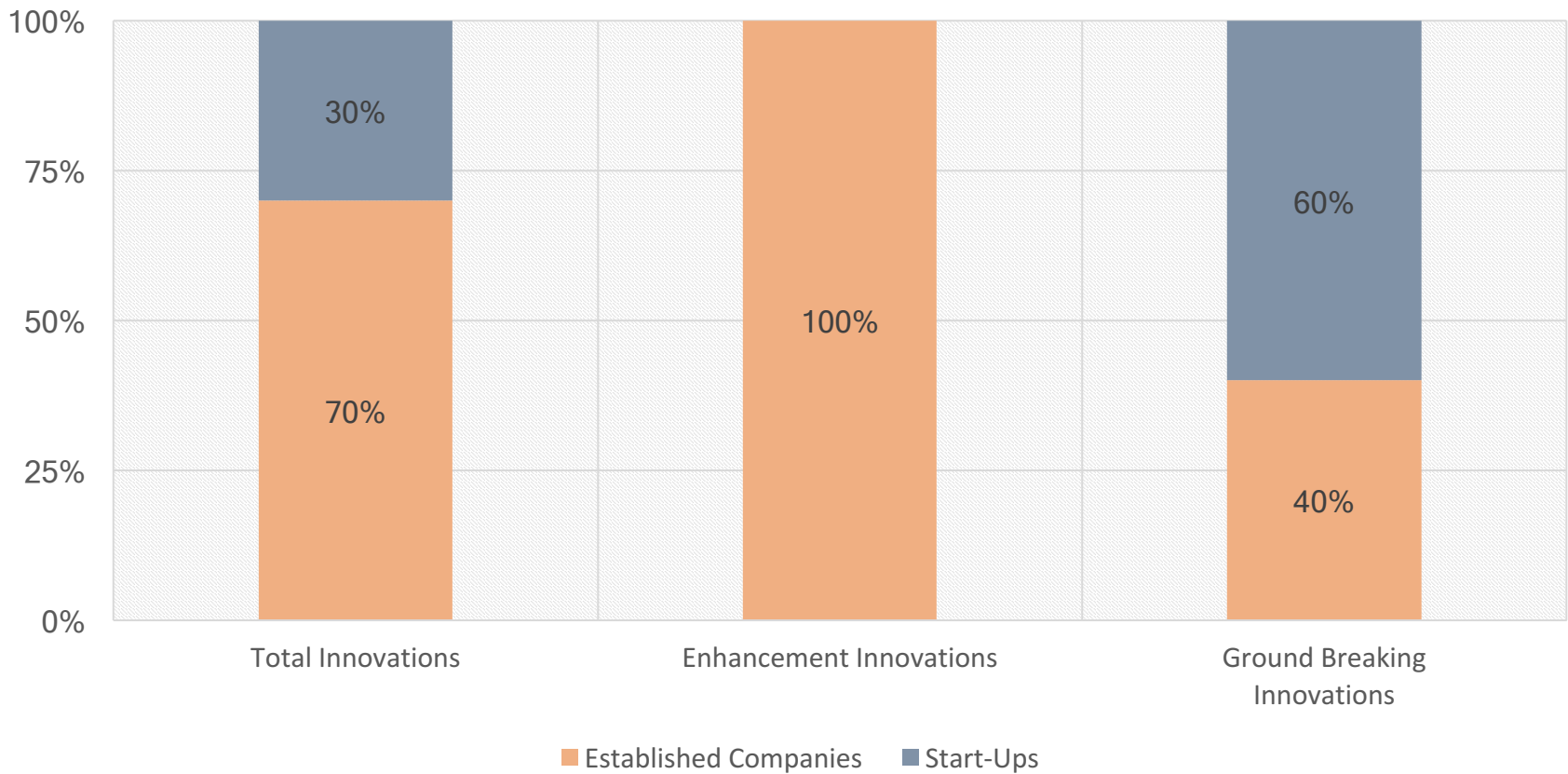


Source: Weiss, Fichter, Clausen 2012

A Research Perspective

Impact of Sustainable Mobility Start-Ups

Sustainable Mobility Innovations



Source: Weiss, Fichter, Clausen 2012

A Research Perspective...

The Future of the Car Market

2012

- Car market divided between market leaders
- Supplier provided new components & innovations to big players
- Start-Ups in transportation were rare

Source: Weiss, Fichter, Clausen 2012

IAA: 2017

- Ground Breaking Innovations mainly presented by Start-Ups and Supplier
- Supplier provide modular solutions to start-ups and big players

Source: Frahm 2017



www.IAA.de

The Green Economy in Germany

Literature

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- Weiss, R. / Fichter, C. / Clausen, J. (2012); Einfluss von Gründer-Pionieren bei der Markteinführung von Nachhaltigkeitsinnovationen, Potsdam
- Frahm, C. (27.09.2017): Zulieferer auf der IAA – E-volution von unten;
<http://www.spiegel.de/auto/aktuell/iaa-2017-elektroauto-aus-dem-zulieferer-baukasten-a-1168742.html>; Access Date: 29.09.2017

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Thomas Neumann

Green Entrepreneurship Center
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Flensburg University of Applied Sciences




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ECOMove vehicle technologies – lightweight and performance





The image features the word "TRIPAL" in a stylized, metallic, three-dimensional font. The letters are rendered in a light gray color with a reflective surface, giving them a chrome-like appearance. They are set against a dark gray background that has a subtle gradient and a soft shadow beneath the letters, suggesting they are floating or attached to a surface. The overall aesthetic is modern and industrial.

Mogens Løkke
Director Sales & Product Management



SMARTER WAY TO NEXT STOP

- Agile solution
- Low operating cost
- Zero CO₂ emissions

An aerial photograph of a busy city street, likely in London, showing a large crowd of people and cars. The street is filled with vehicles, including taxis and vans, and is surrounded by tall buildings. In the center of the street, there is a large, ornate monument or statue. The text "Entrepreneurs in Transportation" is overlaid on the image in a large, white, serif font.

Entrepreneurs in Transportation

THANK YOU



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Søren Munk

Chief Investment Director
INSERO Denmark