

Sustainable Management,
Wertschöpfung und Effizienz

RESEARCH

Gregor Weber

Sustainability and Energy Management

Innovative and Responsible Business
Practices for Sustainable Energy
Strategies of Enterprises in Relation
with CSR



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Dedication

To my loved family

To my dear wife Rita and my precious children Jasmin and Miriam who always were so supportive and patient with me while working on this research and “dreaming up crazy ideas”.

And to my parents, Mathilde and Alois, without whom this project ever would have been worked on.

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List of Abbreviations

AA 1000	Standard Account Ability, a standard for ethical performance constructed by the organization ISEA
ACT-ORANGE	sustainability initiative founded and operated by the author
AHK	German chamber of foreign trade (Außenhandelskammer)
AIPM	Australian institute of project management
AöR	Public law institution (Anstalt öffentlichen Rechts)
ASE	Academia de Studii Economice din Bucharesti (Bucharest University of Economic Studies)
B2B	business to business
B2C	business to customer
BAFA	German Federal office for economic affairs and export control (Bundesamt für Wirtschaft und Ausfuhrkontrolle)
BCOT	Benefits-Cost-Opportunities-Threats analysis
bdew	Federal Association of the German energy and water industry (Bundesverband der Energie- und Wasserwirtschaft)
BDI	Federation of the German Industry (Bundesverband der Deutschen Industrie e.V.)
Bet	Institute for energy economics and technical consulting (Büro für Energiewirtschaft und technische Planung)
BMF	German Federal Ministry of Finance (Bundesministerium der Finanzen)
BMU	German Federal Ministry of Environment (Bundesministerium für Umwelt)
BMW	Bayrische Motorenwerke (German car manufacturer)
BMWi	German Federal Ministry of Economy and Energy (Bundesministerium für Wirtschaft und Energie)
Bn	billion
CCI	Chamber of Commerce and Industry
CEO	Chief Executive Officer
CHP	Combined heat and power
CO ₂	Carbon dioxide
corp.	corporate
CR	Corporate Responsibility
CRI	Corporate Responsibility Index
CRR	Corporate Responsibility Rating
CS	Corporate Sustainability
CSI	Corporate Social Innovation

CSP	Corporate Social Performance
CSR	Corporate Social Responsibility
CSUD	Council of Doctoral Studies
dena	German energy agency (Deutsche Energieagentur)
DENEFF	Initiative of German enterprises for energy efficiency (Deutsche Unternehmensinitiative Energieeffizienz)
DIHK	Deutscher Industrie- und Handelskammertag (Association of German Chambers of Commerce and Industry)
DIN	German industry norm (Deutsche Industrie Norm)
DIW	Deutsches Institut für Wirtschaftsforschung (German Institute for Economic Studies)
DJSI	Dow Jones Sustainability Index
DLR	German Institute for aerospace (Deutsches Institut für Luft- und Raumfahrt)
DNK	German Sustainability Codex (Deutscher Nachhaltigkeits-Kodex)
DWD	Deutscher Wetterdienst (German Weather Service)
EBM	Energy consulting for SME program of the German government (Energieberatung Mittelstand)
EC	European Commission
ECO	Ecological
EDL-G	German Energy Service Law (Energie Dienstleistungs-Gesetz)
EEA	European Environment Agency
EED	European Energy Efficiency Directive
EEG	Renewable Energy Law, Germany (Erneuerbare Energien Gesetz)
eff.	efficient
EFQM	European Foundation of Quality Management
e.g.	exempli gratia (for example)
EMAS	European Environmental Management and Auditing Scheme
EnEff	Energy Efficiency
EnEV	German Energy Saving Ordinance (Energie Einspar Verordnung)
EnMS	Energy Management System
EnPI	Energy Performance Indicator
EMS	Environment Management System
EN	European industry norm
EPBD	Energy Performance of Buildings Directive
EVPG	Energy related product laws (Germany)
et al.	et alii (and others)

etc.	et cetera (and so forth)
ETS	Emission Trading Scheme
EU	European Union
Euro/a	Euro per year (Euros per annum)
ewi	Institute for energy economics (Energiewirtschaftliches Institut Uni Köln)
FHL	Frankfurter Lohenheimer Leitfaden (CSR rating guideline by the universities of Frankfurt and Hohenheim, Germany)
FSC	Forest Stewardship Council
FÖS	Green Budget Germany (Forum Ökologisch-soziale Marktwirtschaft)
GDP	Gross Domestic Product
GER	Germany
GHG	Greenhouse gas
GRI	Global Reporting Initiative
GWh	Gigawatt hours
GWh/a	Gigawatt hours per annum (per year)
gws	Institute for economic structure research (Gesellschaft für wirtschaftliche Strukturforchung)
HR	Human Resources
HVAC	Heating-Ventilation-Air Condition
ICB	Internet Citizen's Band (internet conferencing)
ICMLG	International Conference on Management, Leadership and Governance
ICT	Information and communication technology
Ifeu	Institute for energy and environmental research (Institut für Energie- und Umweltforschung)
IHK	Chamber of Industry and Commerce (Industrie- und Handelskammer)
ILO	International Labour Organization
IÖW	German institute for ecological economy research
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
ISEA	Institute for Social and Ethical Accountability
ISO	International Standardization Organization
ISR	Individual Social Responsibility
IT	Information Technology
iza	Institute for the study of labour
KfW	German Bank for Reconstruction (Kreditanstalt für Wiederaufbau)
KIBS	Knowledge Intensive Business Services

KMU	Kleine und Mittlere Unternehmen (= SME: Small and Medium Enterprises)
KPIs	Key Performance Indicators
kWh	kilowatt hours
kWh _{el}	kilowatt hours – electrical energy
KWK-G	German law for combined power and heat (Kraft-Wärme-Kopplungs-Gesetz)
LED	light emitting diode
LEEN	Learning Energy Efficiency Network
LOHAS	Lifestyle of Health and Sustainability
min.	minutes
Mgmt.	Management
MS	Management system
MSC	Marine Stewardship Council
MTOE	Mega Tons Oil Equivalent
NAPE	simultaneously used to NEEAP: German National Energy Efficiency Plan (Nationaler Aktionsplan für Energieeffizienz)
NEEAP	simultaneously used to NAPE: German National Energy Efficiency Plan (Nationaler Aktionsplan für Energieeffizienz)
NGO	Non-governmental Organization
OECD	Organization for Economic Cooperation and Development
OEM	Original Equipment Manufacturer
OPM3	Organizational Project Management Maturity Model
P2M	Project management for enterprise innovation
P&R	Peschla & Rochmes (company)
PA	Planned level of Activity
PDCA	Plan-Do-Check-Act cycle
PEC	Primary Energy Consumption
PEI	Primary Energy Intensity
PM	particular matter
PMBOK	Project management body of knowledge
PMCDF	project manager competency development framework
POS	Point of Sales
ppm	parts per million
PQ	per quantity
PR	Public Relations
Prince2	Projects in controlled environment (project management methodology)
PU	per unit

PV	Photovoltaics
QMS	Quality Management System
QUT	Queensland University of Technology (University in Brisbane, Australia)
r2b	r2b energy consulting
R&D (RND)	Research and Development
RASI	Responsibility-Approval-Support-Information
RE	Renewable Energy
ROI	Return on Investment
RO	Romania
RMIT	Royal Melbourne Institute of Technology (University in Melbourne, Australia)
SA 8000	Auditable social certification standard
SAAS	Social Accountability Accreditation Services
SCADA	Supervisory Control and Data Acquisition
SIM	Subscriber identify module
SMART	Specific-Measurable-Achievable-Relevant-Time bound
SME	Small- and Medium sized Enterprise
SMS	Security Management System
SOI	Sustainability Oriented Innovation
SSM	Security Management System
SR	Standard Romania
SRU	German Advisory Council on the Environment (Sachverständigenrat für Umweltfragen)
SWOT	Strength-Weaknesses-Opportunities-Threats analysis
tCO ₂	tons of Carbon dioxide
TEHG	German greenhouse gas and emissions law (Treibhaus- und Emissionsgas Gesetz)
TQM	Total Quality Management
UBA	Umwelt Bundesamt (German Federal environment Agency)
UN	United Nations (New York, USA)
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNGC	United Nations Global Compact
US	United states of America
USB	Universal serial bus
VAT	value added tax
VCI	Federation of the German Chemical Industry (Bundesverband der Deutschen Chemieindustrie)

VDMA	Association of the German engineering and plant construction industry (Verband Deutscher Maschinen- und Anlagenbau)
VW	Volkswagen (German car manufacturer)
WBS	Work breakdown structure
yr.	year
znes	Center for sustainable energy supply (Zentrum für nachhaltige Energieversorgung)

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Introduction

Climate change and other crisis are more and more dominating today's life. As a consequence, the CO₂ concentration in the atmosphere is rising along with extreme weather. The current refugee phenomenon is mainly caused by war and terror, however with increasing water shortages and draughts, many more people will prospectively be on the run for a place to survive and further increase the current scenarios. Besides other effects, as a consequence the energy economics are changing world wide impacting the way enterprises used to do their business. Elements such as energy efficiency, renewable energies, resource efficiency, sustainability and Corporate Social Responsibility (CSR) more and more get on the agendas of today's enterprises.

But how do enterprises deal with these changes, which measures do they execute, which are there major threats, are they aware of legal changes coming along with these changes, how do they judge the ongoing trends and how does their wish list look like for politics - questions which so far were not investigated and evaluated yet.

In this context, there are also many other elements impacting and influencing enterprises as well as the national economies. Some of which were selected to additionally be studied or to allow for a deeper dive into specific energy related topics. Cyber security for power plants, smart homes, e-mobility and energy storage systems is in this context as important as sustainability in transport, Corporate Social Responsibility (CSR) or the role of Knowledge Intensive Business Services (KIBS) and Key Performance Indicators (KPIs). In addition to the pure energy economics, also those were evaluated in the context of innovative and responsible business practices and sustainable energy strategies for enterprises, as well as the roles of innovation and change management as supporting factors.

As laid out in Figure 1, part I of this thesis is focusing on the theoretical aspects and the current state of knowledge in the respective areas. Part II represents the "practical" and "empirical" section of the thesis. The main research evaluates the correlations between changes in energy economics and counteracting strategies & behaviours of enterprises. In that context, more than 2,000 enterprises in Germany (2013-2015) and Romania (2013) were interviewed each year with specific questions related to the changing energy economics.

Research methodology	Research objective	Chapters and topics
I: Literature review	Development of the theoretical framework by intensive literature research	Chapters: 1, 2, 3, 4 <ul style="list-style-type: none"> • Innovative business practices, • Energy economics, • CSR, • Innovation, • KIBS, • Sustainability
	Deviation of hypotheses	
II: Own contribution	Empirical analysis through quantitative analysis ↓ ↓ Energy KIBS	Chapters: 5, 6 <ul style="list-style-type: none"> • Energy sector evolution, • Innovative initiatives, • The role of KIBS
	Development of proposals for improved business models ↓ ↓ ↓ Energy KIBS CSR	Chapter: 7 <ul style="list-style-type: none"> • Improved framework for innovative and responsible business processes, • Integrated model for sustainable energy and CSR
	Verification of the developed models through quantitative analysis ↓ ↓ ↓ Energy KIBS CSR	

Figure 1: Structure of research and document

(Source: by author)

The underlying research was conducted by the author with the support of the Association of the German Chambers of Commerce and Industry – DIHK¹ and with the support of the German-Romanian Chamber of Commerce and Industry (CCI), Bucharest. The objective was to collect data, comparable between the enterprises in Germany and Romania. This data was to be evaluated and compared in order to find out whether enterprises in Romania and Germany assess changes to the energy system / energy economics differently.

¹ DIHK: Deutscher Industrie- und Handelskammertag (***DIHK, 2014), represents a total of eighty Chambers of Commerce and Industry in Germany and covers hereby for more than three million entrepreneurs in companies of all sizes in Germany.

In parallel four smaller studies were conducted, focusing on the role of leadership for sustainability, the situation for energy KIBS in Germany, the chances for corporate efficiency networks and the role of the private people to CSR strategies of enterprises. Finally, two models/frameworks were developed to improve energy efficiency as well as the next generation CSR.

The following key scientific research areas are addressed in the thesis paper:

- correlations between changes in energy economics and counteracting strategies & behaviours of enterprises
- tendencies regarding energy economics, related effects and the relevance of sustainable energy and knowledge intensive business services in this context
- approaches and tendencies in sustainable energy economics in relation to CSR
- roles of KIBS in the context of changing energy economics
- approaches of innovation and innovative initiatives in the context of energy economics
- evolution of the energy economics in Germany
- opinions and judgement of enterprises regarding the evolution of the energy sector
- proposal for an improved framework for innovative and responsible business processes for sustainable energy
- proposal for an integrated model for sustainable energy and social responsibility

Before and during the time of the research, the author of this paper has had profound insights into various elements of energy economics, sustainability and related stakeholder demands. He is running a small consulting business in the energy and sustainability sector in Germany himself. He also supports innovative start-ups developing sustainable business plans and strategies. Being actively involved in the subject investigated in the research, he was able to experience in the field of investigation and to test the practicability of the proposed models first hand. Additionally he is a member of the supervisory board of the “energy concepts donnersberg AöR”, a state owned institution focusing on sustainable municipal energy strategies.

In his role as developer and lecturer of seminars and university courses as well as concept developer, moderator and leader of congresses in the field of energy efficiency and sustainability he was in a position to cross-check and to evaluate many information and ideas first hand with academics and experts from the industry.

Having been invited to deliver expert speeches at several events and conferences at international universities, chaired by the *German Federal Ministry of Econo-*

my and Energy, the author was able to widen the viewpoint of his studies by discussing the topics also with academics and industry experts internationally.

The initiative for sustainability “*ACT-ORANGE... save our planet*” founded by the author was affiliated by the UNESCO as UN-world decade project “education for sustainable development” and nominated for several awards.

During the course of the research, the author was involved in many projects accompanying the study including intensive discussions with top management and experts in the research field. Those helped the author to understand the actual needs and perceptions of the target groups; where possible the findings and learnings from these projects and discussions were integrated in the research.

His research topics were presented at several international conferences and published in several internationally recognized and ISI web of knowledge indexed scientific journals; one of his conference papers was awarded in the category “Best PhD paper Award” at the 3rd ICMLG 2015 conference at Massey University and Auckland University in New Zealand.

Turning his learnings and findings into practice, the author developed a concept for a consulting and research institute in the field of sustainability in order to

- further research the context and impacts of ISR to enterprises, society and individuals
- develop and offer training programs addressing these dimensions
- develop and consult companies on sustainable ISR concepts and strategies

In cooperation with universities and enterprises, this institute is currently in process of being set-up. Details can be found on www.ecoistics.institute.

This research builds on correlations with several people which were patient, inspiring and supporting, but also critical and challenging which helped to push for innovation, creativity and quality throughout the research process. Throughout this entire process, my scientific coordinator and supervisor Prof. PhD Marieta Olaru patiently answered all my many questions. In addition she was inspiring, supportive and challenging for which I’m really grateful.

With their support in the data collection process and contacts to the many interviewed enterprises, Mr. PhD Sebastian Bolay (DIHK, Germany), Mrs. PhD Roxana Clodnitchi and Mrs. PhD Ilinca Pandele (both German-Romanian Chamber of Industry and Commerce, Bucharest) have helped to make the field studies happen; without the data from these studies the research would not have been possible.

A special thank also to numerous discussion partners within my network, at conferences, congresses and seminars, as well to selected customers who took their

valuable time to critically discuss and comment all my questions and ideas developed during the last 3 years.

Finally, I'm much obliged to my family who always were (almost) endlessly patient with me "living in another world" and tried their best to keep my back free – they certainly not always had an easy time with me. To them I dedicate this work.

1. Current tendencies regarding sustainable energy strategies and knowledge intensive business services

1.1. Conceptual framework of today's innovative business practices

1. 1. 1. Defining elements of the concept of innovative business practices

Innovative business practices are defined more and more by Corporate Social Responsibility (CSR), efficiency and innovations. If in addition they need to be sustainable also, they take many stakeholder interests in account too. Those include economical, but also ecologic and social interest. In that context, Brocken et al. (2014) introduced archetypes for sustainable business models in order to describe their mechanisms and solutions (Figure 2). That they placed the maximisation of material and energy efficiency into the technological group is been seen critical by the author. Efficiency in these areas is not just technology related but also depending strongly on the individual's behaviour. A similar argument can be debated for the grouping of other archetypes also.

groupings								
technological			organisational			social		
related archetypes								
maximise material and energy efficiency	create value from waste	substitute with renewables and natural processes	repurpose for society/ environment	develop scale up solutions	deliver functionality rather than ownership	adopt a stewardship role	encourage sufficiency	

Figure 2: Sustainable business model archetypes

Source: Brocken et al. (2014)

The innovation of business practices is going along also with change. With the energy transition being a process coming along with massive change potential for concerned parties, enterprises need to change their processes, strategies and structures, need to develop new business models (Abrell, 2012). These changes are required in order to achieve improvements in such systems; on the other hand, change mostly requires a paradigm shift (Kolbusa, 2013), (Kreutzer, 2014).

Changes, such as the energy transition are understood by many organisations as opportunity, by others as crisis. As such risk management is a helpful tool in order to shift risk into opportunities (Kronenberg et al., 2010) or as Kres (2015) says: “organisations, able to build a bridge out of know-how and creativity towards innovation and new perspectives will always be able to be sustainably productive”. In the context of changes in the energy economics, sustainability is an important factor and motivator. In absence of one generally recommended innovation measurement tool (Eggingk, 2012), change management is in this context a suited tool to accompany the change process ensuring that the system modifications are sustainable and make sense for a long time. Schinnenburg and Schambeck (2015) and (Lozano, 2015) differentiate the kinds of change by their external visibility and the degree of the change. Change caused by shifting towards a corporate CSR strategy represents here a high level of change at a minimal external visibility potential (Figure 3).

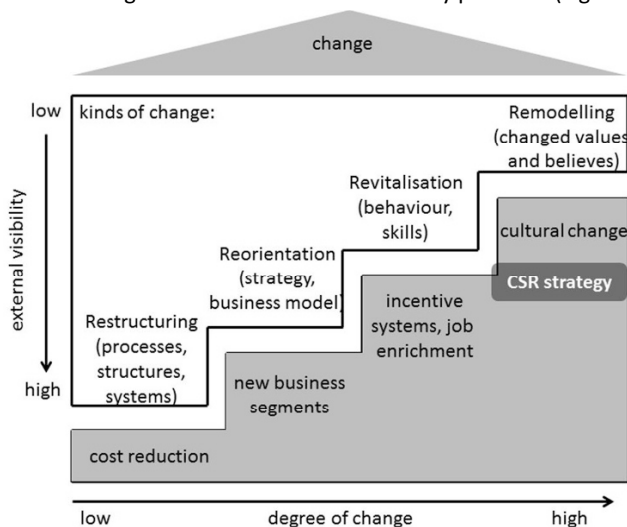


Figure 3: Kinds and motivators for change

Source: by author based on Schinnenburg and Schambeck (2015)

a) Change and innovation

The change management and innovation management processes are directly linked to each other (Figure 4). Whereas innovation management is focused on the elements know-how, the innovation itself (hence the product), the customer value as well the success in the market (change management) focuses on the organisation (its internal complexity) and its business strategy (influenced by external complexity) (see also Werther and Jacobs, 2014).