Air Quality Monitoring System and Benchmarking

Air quality monitoring has become an integral part of smart city solutions. This paper presents an air quality monitoring system based on Internet of Things (IoT) technologies, and establishes a cloud-based platform to address the challenges related to IoT data management and processing capabilities, including data collection, storage, analysis, and visualization. In addition, this paper also benchmarks four state-of-the-art database systems to investigate the appropriate technologies for managing large-scale IoT datasets.
A Novel Smart Meter Controlling System with Dynamic IP Addresses

Smart meters are the electronic devices for measuring energy consumption in real time. Usually, static public IP addresses are allocated to realize the point-to-point (P2P) communication and remote controlling for smart metering systems. This, however, restricts the wide deployment of smart meters, due to the deficiency of public IP resources. This paper proposes a novel subscription-based communication architecture for the support of dynamic IP addresses and group controlling of smart meters. The paper evaluates the proposed architecture by comparing the traditional P2P architecture, and validate its effectiveness to interact with smart meters.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, Sam Ratulangi University, De La Salle University-Manila
Authors: Manembu, P. (Ekstern), Welang, B. (Ekstern), Kalua Lapu, A. (Ekstern), Kewo, A. (Intern), Nielsen, P. S. (Intern), Liu, X. (Intern)
Pages: 1465-1470
Publication date: 2017

Host publication information
Title of host publication: Proceeding of The 26th IEEE International Symposium on Industrial Electronics
Main Research Area: Technical/natural sciences
Conference: 26th IEEE International Symposium on Industrial Electronics (ISIE), Edingburg, United Kingdom, 19/06/2017 - 19/06/2017
Source: PublicationPreSubmission
Source-ID: 133670308
Publication: Research - peer-review » Article in proceedings – Annual report year: 2017

CITIESData: a smart city data management framework

Smart city data come from heterogeneous sources including various types of the Internet of Things such as traffic, weather, pollution, noise, and portable devices. They are characterized with diverse quality issues and with different types of sensitive information. This makes data processing and publishing challenging. In this paper, we propose a framework to streamline smart city data management, including data collection, cleansing, anonymization, and publishing. The paper classifies smart city data in sensitive, quasi-sensitive, and open/public levels and then suggests different strategies to process and publish the data within these categories. The paper evaluates the framework using a real-world smart city data set, and the results verify its effectiveness and efficiency. The framework can be a generic solution to manage smart city data.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, Department of Civil Engineering, Section for Building Energy, Centre for IT-Intelligent Energy Systems in Cities
Authors: Liu, X. (Intern), Heller, A. (Intern), Nielsen, P. S. (Intern)
Pages: 699-722
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Knowledge and Information Systems
Volume: 53
Issue number: 3
ISSN (Print): 0219-1377
Ratings:
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.36 SJR 0.726 SNIP 1.679
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.858 SNIP 1.496 CiteScore 1.89
Regression-based Online Anomaly Detection for Smart Grid Data

With the widely used smart meters in the energy sector, anomaly detection becomes a crucial mean to study the unusual consumption behaviors of customers, and to discover unexpected events of using energy promptly. Detecting consumption anomalies is, essentially, a real-time big data analytics problem, which does data mining on a large amount of parallel data streams from smart meters. In this paper, we propose a supervised learning and statistical-based anomaly detection method, and implement a Lambda system using the in-memory distributed computing framework, Spark and its extension Spark Streaming. The system supports not only iterative detection model refreshment from scalable data sets, but also real-time detection on scalable live data streams. This paper empirically evaluates the system and the detection algorithm, and the results show the effectiveness and the scalability of the proposed lambda detection system.

General information
State: Submitted
Organisations: Department of Management Engineering, Systems Analysis, DTU Climate Centre
Authors: Liu, X. (Intern), Nielsen, P. S. (Intern)
Number of pages: 11
Publication date: 2017
Main Research Area: Technical/natural sciences

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Journal: Energy
ISSN (Print): 0360-5442
Ratings:
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.17 SJR 1.999 SNIP 1.798
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.276 SNIP 2.046 CiteScore 5.03
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.647 SNIP 2.63 CiteScore 5.7
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.54 SNIP 2.593 CiteScore 5.02
ISI indexed (2013): ISI indexed yes
SciCloud: A Scientific Cloud and Management Platform for Smart City Data

The pervasive use of Internet of Things and smart meter technologies in smart cities increases the complexity of managing the data, due to their sizes, diversity, and privacy issues. This requires an innovate solution to process and manage the data effectively. This paper presents an elastic private scientific cloud, SciCloud, to tackle these grand challenges. SciCloud provides on-demand computing resource provisions, a scalable data management platform and an in-place data analytics environment to support the scientific research using smart city data.

General information

State: Published
Organisations: Department of Management Engineering, Systems Analysis, Department of Civil Engineering, Section for Building Energy, Section for Indoor Climate and Building Physics
Authors: Liu, X. (Intern), Nielsen, P. S. (Intern), Heller, A. (Intern), Gianniou, P. (Intern)
Pages: 27-31
Publication date: 2017

Host publication information

Title of host publication: 2017 28th International Workshop on Database and Expert Systems Applications (DEXA)
Publisher: IEEE
ISBN (Electronic): 978-1-5386-1051-0
Main Research Area: Technical/natural sciences
Conference: 28th International Conference on Database and Expert Systems Applications, Lyon, France, 28/08/2017 - 28/08/2017
Electronic versions:
output.pdf
Structured Literature Review of Electricity Consumption Classification Using Smart Meter Data

Smart meters for measuring electricity consumption are fast becoming prevalent in households. The meters measure consumption on a very fine scale, usually on a 15 min basis, and the data give unprecedented granularity of consumption patterns at household level. A multitude of papers have emerged utilizing smart meter data for deepening our knowledge of consumption patterns. This paper applies a modification of Okoli's method for conducting structured literature reviews to generate an overview of research in electricity customer classification using smart meter data. The process assessed 2099 papers before identifying 34 significant papers, and highlights three key points: prominent methods, datasets and application. Three important findings are outlined. First, only a few papers contemplate future applications of the classification, rendering papers relevant only in a classification setting. Second; the encountered classification methods do not consider correlation or time series analysis when classifying. The identified papers fail to thoroughly analyze the statistical properties of the data, investigations that could potentially improve classification performance. Third, the description of the data utilized is of varying quality, with only 50% acknowledging missing values impact on the final sample size. A data description score for assessing the quality in data description has been developed and applied to all papers reviewed.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis
Authors: Tureczek, A. M. (Intern), Nielsen, P. S. (Intern)
Number of pages: 19
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Energies
Volume: 10
Issue number: 5
Article number: 584
ISSN (Print): 1996-1073
Ratings:
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.5 SJR 0.691 SNIP 1.053
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.804 SNIP 1.416 CiteScore 2.87
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.87 SNIP 1.601 CiteScore 2.66
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.632 SNIP 1.345 CiteScore 2.29
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.874 SNIP 1.54 CiteScore 2.46
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.659 SNIP 1.439 CiteScore 2.24
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
A hybrid ICT-solution for smart meter data analytics

Smart meters are increasingly used worldwide. Smart meters are the advanced meters capable of measuring energy consumption at a fine-grained time interval, e.g., every 15 min. Smart meter data are typically bundled with social economic data in analytics, such as meter geographic locations, weather conditions and user information, which makes the data sets very sizable and the analytics complex. Data mining and emerging cloud computing technologies make collecting, processing, and analyzing the so-called big data possible. This paper proposes an innovative ICT-solution to streamline smart meter data analytics. The proposed solution offers an information integration pipeline for ingesting data from smart meters, a scalable platform for processing and mining big data sets, and a web portal for visualizing analytics results. The implemented system has a hybrid architecture of using Spark or Hive for big data processing, and using the machine learning toolkit, MADlib, for doing in-database data analytics in PostgreSQL database. This paper evaluates the key technologies of the proposed ICT-solution, and the results show the effectiveness and efficiency of using the system for both batch and online analytics.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, DTU Climate Centre, Centre for IT-Intelligent Energy Systems in Cities
Authors: Liu, X. (Intern), Nielsen, P. S. (Intern)
Number of pages: 13
Pages: 1710–1722
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication Information
Journal: Energy
Volume: 115
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BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.17 SJR 1.999 SNIP 1.798
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.276 SNIP 2.046 CiteScore 5.03
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.647 SNIP 2.63 CiteScore 5.7
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.54 SNIP 2.593 CiteScore 5.02
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.998 SNIP 2.25 CiteScore 4.25
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
CITIESData: Towards Cloud Based Big Data Management for Smart Cities

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, DTU Climate Centre, Department of Civil Engineering, Section for Building Energy, Centre for IT-Intelligent Energy Systems in Cities
Authors: Liu, X. (Intern), Heller, A. (Intern), Nielsen, P. S. (Intern)
Number of pages: 1
Publication date: 2016
Event: Poster session presented at 3rd General Consortium Meeting of Smart Cities project, CITIES, Kgs. Lyngby, Denmark.
Main Research Area: Technical/natural sciences

Identification of parameters affecting the variability of energy use in residential buildings

General information
State: Published
Organisations: Department of Civil Engineering, Section for Indoor Climate and Building Physics, Section for Building Energy, Department of Management Engineering, Systems Analysis, DTU Climate Centre, Centre for IT-Intelligent Energy Systems in Cities
Identification of Parameters Affecting the Variability of Energy Use in Residential Buildings

Energy use of buildings varies significantly. When aggregating the demand profiles of a group of buildings, the variations of energy demand are critical to determine the aggregated load profile. Especially when dimensioning district energy systems, it is important to know the variability of energy demand that can guarantee the efficient operation of the system. For this reason, it is useful to distinguish the parameters that affect building energy performance the most and to estimate the magnitude of these variations on each parameter. The aim of the present study is to identify the parameters that lead to the largest variations in energy performance of residential buildings in Denmark. A set of sensitivity analysis has been carried out using an extensive search algorithm. These sensitivity analyses were then applied for modelling a reference building representing Danish single-family houses of the 1940’s. The study was able to determine the key variables that affect energy use in old Danish single-family houses using sensitivity analysis and proposes a methodology for parameter optimization. This analysis pointed out that the insulation in external walls and roof lead to the largest variations in space heating demand. Also, the infiltration rate and occupancy behavior play important role on space heating consumption. It was concluded that these findings highly depend on the specific case study and the characteristics of the buildings that are examined. If outdoor climate and location differ from the current case, a different set of parameters should be investigated upon its effect on building energy use.

Online Anomaly Energy Consumption Detection Using Lambda Architecture

With the widely use of smart meters in the energy sector, anomaly detection becomes a crucial mean to study the unusual consumption behaviors of customers, and to discover unexpected events of using energy promptly. Detecting consumption anomalies is, essentially, a real-time big data analytics problem, which does data mining on a large amount of parallel data streams from smart meters. In this paper, we propose a supervised learning and statistical-based anomaly detection method, and implement a Lambda system using the in-memory distributed computing framework, Spark and its extension Spark Streaming. The system supports not only iterative refreshing the detection models from scalable data sets, but also real-time anomaly detection on scalable live data streams. This paper empirically evaluates the system and the detection algorithm, and the results show the effectiveness and the scalability of the lambda detection system.
Optimizing ETL by a Two-level Data Staging Method

In data warehousing, the data from source systems are populated into a central data warehouse (DW) through extraction, transformation and loading (ETL). The standard ETL approach usually uses sequential jobs to process the data with dependencies, such as dimension and fact data. It is a non-trivial task to process the so-called early-/late-arriving data, which arrive out of order. This paper proposes a two-level data staging area method to optimize ETL. The proposed method is an all-in-one solution that supports processing different types of data from operational systems, including early-/late-arriving data, and fast-/slowly-changing data. The introduced additional staging area decouples loading process from data extraction and transformation, which improves ETL flexibility and minimizes intervention to the data warehouse. This paper evaluates the proposed method empirically, which shows that it is more efficient and less intrusive than the standard ETL method.
Streamlining Meter Data Analytics

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, DTU Climate Centre, Centre for IT-Intelligent Energy Systems in Cities
Authors: Liu, X. (Intern), Nielsen, P. S. (Intern)
Number of pages: 1
Publication date: 2016
Event: Poster session presented at 3rd General Consortium Meeting of Smart Cities project, CITIES, Kgs. Lyngby, Denmark.
Main Research Area: Technical/natural sciences
Electronic versions: smas_poster.pdf
Links:
Publication: Research › Poster – Annual report year: 2016

Utilisation of rice residues for decentralised electricity generation in Ghana: An economic analysis

Developing countries, especially in Sub-Saharan Africa, face large challenges to achieve universal electrification. Using the case of Ghana, this study explores the role that rice residues can play to help developing countries meet their electrification needs. In Ghana, Levelised Electricity Costs (LEC) of a grid-connected 5 MWe straw combustion plant ranged between 11.6 and 13.0 US cents/kWh, based on region of implementation. Rice straw combustion is a viable grid-connected option in all regions, as the bioenergy Feed-in-Tariff is 29.5 US cents/kWh in Ghana. Residue supply cost contributes significantly (49-54%) to LEC of rice straw combustion. LEC of husk gasification mini-grids ranged between 5 and 53 US cents/kWh for rural populations between 3000 and 250 people. Husk gasification mini-grids can be a suitable electrification solution for these un-electrified populations, as its LEC is lower than the average LEC of grid extension diesel mini-grids and off-grid solar systems for remote communities in Ghana. Electricity produced from husk gasification has the potential to cater to 7% of the needs of un-electrified communities in Ghana. The methodology and analysis of this study can support policymakers of similar countries decide the economic feasibility of decentralised bioenergy solutions while forming national electrification plans.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, DTU Climate Centre, Universidade de Lisboa
Authors: Ramamurthi, P. V. (Ekstern), Fernandes, M. C. (Ekstern), Nielsen, P. S. (Intern), Pedro Nunes, C. (Ekstern)
Pages: 620-629
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Energy
Volume: 111
Cloud-Based Software Platform for Smart Meter Data Management

Today smart meters are increasingly used in the worldwide. Smart meters are the advanced meters capable of measuring customer energy consumption at a fine-grained time interval, e.g., every 15 minutes. The data are very sizeable, and might be from different sources, along with the other social-economic metrics such as the geographic information of meters, the information about users and their property, geographic location and others, which make the data management very complex. On the other hand, data-mining and the emerging cloud computing technologies make the collection, management, and analysis of the so-called big data possible. This can improve energy management, e.g., help utility companies to forecast energy loads and improve services, and help households to manage energy usage and save money. As this regard, the proposed paper focuses on building an innovative software platform for smart meter data analytics using cloud technologies, aiming to maximize the information assets in demand-side energy management and relieving peak load. The proposed platform will offer information integration pipeline to ingest smart meter time-series data; a secure repository for researchers sharing their knowledge; scalable data analytics platform for data mining over big data sets for energy demand forecasting and consumption discovering; data as the service for other applications using smart meter data; and a portal for visualizing data analytics results. The design will incorporate hybrid clouds, including Infrastructure as a Service (IaaS) and Platform as a Service (PaaS), which are suitable for on-demand provisioning, massive scaling, and manageability. Besides, the design will impose extensibility, efficiency, and high availability on the system. The paper will evaluate the system comprehensively, and compare with other similar works. This paper will provide a proof of concept for building the data management system expanding from the data management of energy sector to the entire sectors of smart cities.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, DTU Climate Centre, Energy Systems Analysis, Centre for IT-Intelligent Energy Systems in Cities
Authors: Liu, X. (Intern), Nielsen, P. S. (Intern)
Publication date: 2015
Main Research Area: Technical/natural sciences
Cloud-based, Platform, Smart meter, Data management

Streamlining Smart Meter Data Analytics
Today smart meters are increasingly used in worldwide. Smart meters are the advanced meters capable of measuring customer energy consumption at a fine-grained time interval, e.g., every 15 minutes. The data are very sizeable, and might be from different sources, along with the other social-economic metrics such as the geographic information of meters, the information about users and their property, geographic location and others, which make the data management very
complex. On the other hand, data-mining and the emerging cloud computing technologies make the collection, management, and analysis of the so-called big data possible. This can improve energy management, e.g., help utilities improve the management of energy and services, and help customers save money. As this regard, the paper focuses on building an innovative software solution to streamline smart meter data analytic, aiming at dealing with the complexity of data processing and data analytics. The system offers an information integration pipeline to ingest smart meter data; scalable data processing and analytic platform for pre-processing and mining big smart meter data sets; and a web-based portal for visualizing data analytics results. The system incorporates hybrid technologies, including big data technologies Spark and Hive, the high performance RDBMS PostgreSQL with the in-database machine learning toolkit, MADlib, which are able to satisfy a variety of requirements in smart meter data analytics.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, DTU Climate Centre, Energy Systems Analysis, Centre for IT-Intelligent Energy Systems in Cities
Authors: Liu, X. (Intern), Nielsen, P. S. (Intern)
Number of pages: 14
Publication date: 2015

Host publication information
Title of host publication: Proceedings of the 10th Conference on Sustainable Development of Energy, Water and Environment Systems
Publisher: International Centre for Sustainable Development of Energy, Water and Environment Systems
Main Research Area: Technical/natural sciences
Electronic versions:
Streamlining_Smart_Meter_Data_Analytics.pdf

Relations
Activities:
10th Conference on Sustainable Development of Energy, Water and Environment Systems
Source: PublicationPreSubmission
Source-ID: 110735753
Publication: Research - peer-review › Article in proceedings – Annual report year: 2015

A comparative study of contextual urban design approaches in the UK and DK
During the last century urban planning has changed dramatically due in part to vehicular development, a modernist design culture, rapid urbanisation and new computer technologies. This planning strategy has influenced that new-implemented areas looks incredible from a helicopter, but the human scale has, as a consequence, been completely shattered. The context of buildings has predominantly not been preserved, or adequately considered; the shape of buildings has been the most significant focus in the planning process. Two approaches, comprehensive development and cellular renewal, will be introduced as different ways of accommodating, more contextual urban renewal.
In this paper, four different case studies in two different cities, Winchester in UK and Copenhagen in DK, are examined in regards to their urban planning and their use of the two above-mentioned approaches. A number of different key performance indicators have been selected, analysed and evaluated in a spiderweb, to clarify where in the process the planning could have been better or improved with regard to future similar planning processes.
The two cities, Winchester and Copenhagen, and the four case studies, selected in the beginning of this paper, turned out to be more dissimilar than anticipated. This was due to cultural traditions and different construction methods in the two countries. In spite of this, clear pros and cons, of using comprehensive development and cellular renewal have been identified.
Both case studies approached by cellular renewal turned out to be the most contextual urban design, where the focus on social- and physical contextualism was introduced early in the process. With that said comprehensive can still be considered and approached by contextualism.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, DTU Climate Centre, Energy Systems Analysis, Technical University of Denmark, University of Southampton
Authors: Højriis, J. (Ekstern), Herrmann, I. T. (Intern), Nielsen, P. S. (Intern), Bulkeley, P. (Ekstern)
Number of pages: 10
Pages: 37-46
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 3rd International Workshop on Design in Civil and Environmental Engineering
Logistics cost analysis of rice residues for second generation bioenergy production in Ghana

This study explores the techno-economic potential of rice residues as a bioenergy resource to meet Ghana’s energy demands. Major rice growing regions of Ghana have 70–90% of residues available for bioenergy production. To ensure cost-effective biomass logistics, a thorough cost analysis was made for two bioenergy routes. Logistics costs for a 5MWe straw combustion plant were 39.01, 47.52 and 47.89USD/t for Northern, Ashanti and Volta regions respectively. Logistics cost for a 0.25MWe husk gasification plant (with roundtrip distance 10km) was 2.64USD/t in all regions. Capital cost (66–72%) contributes significantly to total logistics costs of straw, however for husk logistics, staff (40%) and operation and maintenance costs (46%) dominate. Baling is the major processing logistic cost for straw, contributing to 46–48% of total costs. Scale of straw unit does not have a large impact on logistic costs. Transport distance of husks has considerable impact on logistic costs.
The Potential of the Technical University of Denmark in the Light of Sustainable Livable Cities

The Technical University of Denmark (DTU) has a long tradition for research and education in urban planning and sustainable urban development. An increasing societal focus on sustainability and urbanization in society supports this continuous focus on sustainable urban planning in technical educations. The focus on sustainable urban development includes understanding the role of civil engineering, water engineering, sustainable mobility and energy, and communities in developing future desirable solutions. However, beyond the challenges faced in each of the specific technical fields, there is a growing demand for integrated solutions. A proposal has been developed in the last couple of years to further develop DTU’s education in urban development and livable cities with an emphasis on integration and interdependencies in urban engineering. This paper describes core professional design niches which by themselves have an impact on urban development, including water in cities, climate adaptation, mobility planning, building, energy, and community designs. A number of challenges in developing an integrated approach in the technical education are discussed in the paper. The increasing focus on sustainability but also on global urbanization, compact cities, and smart cities supports new thinking in urban planning and design in technical education. The paper suggests a new initiative to further develop the sustainable urban planning research and education at DTU.

General information

State: Published
Organisations: Department of Civil Engineering, Section for Building Design, Department of Management Engineering, Systems Analysis, DTU Climate Centre, Energy Systems Analysis, Production and Service Management, Centre for Facilities Management, Department of Transport, Transport policy and behaviour, Department of Environmental Engineering, Urban Water Engineering
Authors: Jensen, L. B. (Intern), Nielsen, P. S. (Intern), Nielsen, S. B. (Intern), Nielsen, T. A. S. (Intern), Mikkelsen, P. S. (Intern)
Number of pages: 6
Pages: 90-96
Publication date: 2014
Definition of Smart Energy City and State of the art of 6 Transform cities using Key Performance Indicators: Deliverable 1.2

This report summarises the work undertaken under the EU-FP7 TRANSFORM project for Work Package 1 (part 1): Becoming a Smart Energy City, state of the Art and Ambition. Part 1 starts with a clear outline of each of the participating cities. The work describes the context in terms of climate, energy assets, ambitions, targets and main possibilities in terms of energy efficiency, flows and energy production. After this first step, the work focuses on the description of what a smart energy city is (this report), what the main Key Performance Indicators (KPIs) are that should be met and how this relates to where the current cities and the living labs are. It describes at the same time the current status of city planning, energy planning tools, and existing energy data. The outline should also include information on energy production, energy flows and energy efficiency, where possible. The work will draw largely on existing Strategic Energy Action Plans, Climate Action Plans and planning documents.

This report establishes a definition of smart cities develops Key Elements, Key Performance Indicators and reports on the state of the art regarding the KPIs for the 6 Transform cities. As specified in the Transform proposal, the objective of the evaluation is to identify previous and existing initiatives as a sort of stocktaking on the way to establishing a smart city transformation pathway for each of the participating cities in the Transform project. The definition of a smart energy city and the key performance indicators will be used throughout Transform the guide the work.

Use of biomass energy in Denmark and its dependence on internalisation of externalities from energy systems

General information
State: Published
Organisations: Department of Buildings and Energy
Authors: Meyer, N. I. (Intern), Nielsen, P. S. (Intern), Nielsen, V. (Ekstern)
Publication date: 2012
Main Research Area: Technical/natural sciences

Bibliographical note
Presentation and paper
Publication: Research › peer-review › Paper – Annual report year: 2012
Life Cycle Assessment of wood pellets and bioethanol from wood residues and willow

The uptake of biomass as an energy source can reduce the use of and dependence on fossil fuels in heating and transportation in New Zealand. The environmental impacts and efficiency of three biomass options; wood pellets produced from sawmill residues, and bioethanol produced from forest residues and from purpose grown-willow, are analysed using Life Cycle Assessment.

Wood pellets are a renewable energy fuel used mainly for residential heating. The production of heat from wood pellets is viable from an energy point of view, with varying efficiencies depending on the type of fuel used to dry timber at the sawmill. Heat from wood pellets has a significantly lower global warming potential than the production of heat from a heat pump.

Bioethanol from wood is a renewable fuel that can be used as a partial substitute to petrol in transportation. The production of bioethanol is viable from an energy point of view, as approximately 4.8 MJ and 3.7 MJ of bioethanol are produced from willow and forest residues respectively, for every 1 MJ of input energy. The use of bioethanol as a partial substitute of petrol reduces the global warming potential and non-renewable energy use of the fuel. The uptake of wood pellets for heating and bioethanol as a fuel for transportation would help reduce fossil fuel use in New Zealand.

General information
State: Published
Organisations: Scion, Nielsen Marketing Ltd.
Authors: Sandilands, J. (Ekstern), Kellenberger, D. (Ekstern), Nicholas, I. (Ekstern), Nielsen, P. S. (Intern)
Pages: 25-33
Publication date: 2009
Main Research Area: Technical/natural sciences

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Volume: 53
ISSN (Print): 1174-7986
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Scopus rating (2016): SJR 0.116 SNIP 0.162
Scopus rating (2015): SJR 0.12 SNIP 0.409 CiteScore 0.11
Scopus rating (2014): SJR 0.133 SNIP 0.099 CiteScore 0.09
Scopus rating (2013): SJR 0.274 SNIP 0.401 CiteScore 0.16
ISI indexed (2013): ISI indexed no
Scopus rating (2012): SJR 0.273 SNIP 0.631 CiteScore 0.09
ISI indexed (2012): ISI indexed no
Scopus rating (2011): SJR 0.263 SNIP 0.556 CiteScore 0.12
ISI indexed (2011): ISI indexed no
Scopus rating (2010): SJR 0.293 SNIP 0.478
Scopus rating (2009): SJR 0.195 SNIP 0.253
Scopus rating (2008): SJR 0.239 SNIP 0.521
Scopus rating (2007): SJR 0.216 SNIP 0.418
Scopus rating (2006): SJR 0.227 SNIP 0.452
Scopus rating (2005): SJR 0.183 SNIP 0.158
Scopus rating (2004): SJR 0.145 SNIP 0.323
Scopus rating (2003): SJR 0.142 SNIP 0.228
Scopus rating (2002): SJR 0.113 SNIP 0.359
Scopus rating (2001): SJR 0.111 SNIP 0
Scopus rating (2000): SJR 0.107
Scopus rating (1999): SJR 0.105
Original language: English
Publication: Research - peer-review › Journal article – Annual report year: 2009

Analysing transport costs of Danish forest wood chip resources by means of continuous cost surfaces

While international markets for woody biomass emerge, growing consumption of wood chips for energy in Denmark is leading to increasing import. With improved competitiveness and unquestionable environmental benefits, domestic wood chip supply is preferable, but measures must be taken to make the supply chain more cost efficient. One of the major contributors to the delivered costs of wood chips is transportation, which is highly determined by the geographical location of forests and energy plants. This paper presents a method based on continuous cost surface mapping using raster-based geographical information systems (GISs). The national wood chip resources have been mapped and for selected bioenergy plants the costs of transporting the annual fuel demand have been modelled using cost distance functions,
supply curves and sensitivity analysis. Hence a geographically determined relation of cumulative wood chip resources and their average costs was established. The results may be used for socio-economically sound resource allocation, optimal plant fuel mix, and planning of future energy plants.

**General information**

State: Published
Organisations: Aalborg University, New Zealand Forest Research Institute
Authors: Møller, B. (Ekstern), Nielsen, P. S. (Intern)
Pages: 291-298
Publication date: 2007
Main Research Area: Technical/natural sciences

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Mapping of PM10 from Domestic heating with firewood in rotorua, New Zealand

**General information**
State: Published
Organisations: Unknown
Authors: Jonsson, A. (Ekstern), Nielsen, P. S. (Intern)
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Publisher: Swedish University of Agricultural Sciences
Main Research Area: Technical/natural sciences
Publication: Research › Journal article – Annual report year: 2007

**Fuel pellets**

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State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern)
Publication date: 2005
Main Research Area: Technical/natural sciences
Publication: Research › Paper – Annual report year: 2005

**Opportunities for installing cogeneration plants for wood processing operations in Australasia**

**General information**
State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern), Pedersen, J. J. (Ekstern), Estcourt, G. (Ekstern)
Publication date: 2005
Main Research Area: Technical/natural sciences
Publication: Research › Paper – Annual report year: 2005

**Quantifying the availability and volume of the forest residues resource**

**General information**
State: Published
Organisations: Unknown
Authors: Hock, B. (Ekstern), Nielsen, P. S. (Intern), Grigolato, S. (Ekstern), Firth, J. (Ekstern), Möller, B. (Ekstern), Evanson, T. (Ekstern)
Publication date: 2005
Supply of logging residues for energy production

General information
State: Published
Organisations: Unknown
Authors: Grigolato, S. (Ekstern), Firth, J. (Ekstern), Nielsen, P. S. (Intern), Cavalli, R. (Ekstern), Möller, B. (Ekstern)
Publication date: 2005

Host publication information
Title of host publication: Proceedings of the 14th European Biomass Conference
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Article in proceedings – Annual report year: 2005

Bioenergy cogeneration opportunities in Australia

General information
State: Published
Organisations: New Zealand Forest Research Institute
Authors: Nielsen, P. S. (Intern), Pindstrup, M. (Ekstern), Möller, B. (Ekstern)
Publication date: 2004

Host publication information
Title of host publication: Proceedings of the Bioenergy Australia 2004 Conference - Building the Australian Bioenergy Industry
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Article in proceedings – Annual report year: 2004

Case study: Rotorua pellets study

General information
State: Published
Organisations: New Zealand Forest Research Institute
Authors: Nielsen, P. S. (Intern), Estcourt, G. (Ekstern), Hodgson, C. (Ekstern)
Publication date: 2004

Host publication information
Title of host publication: Proceedings of the BANZ bioenergy workshop: What more can be done to increase the use of bioenergy in New Zealand from woody biomass
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Article in proceedings – Annual report year: 2004

Energy demand analysis for small and medium scale heat users in Rotorua aiming at converting existing heating systems to bioenergy

General information
State: Published
Organisations: New Zealand Forest Research Institute
Authors: Nielsen, P. S. (Intern), Estcourt, G. (Ekstern), Shepherd, M. (Ekstern)
Publication date: 2004

Host publication information
Title of host publication: Proceedings for the International Conference on Sustainability Engineering and Science
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Article in proceedings – Annual report year: 2004
Geographical analyses of wood chip potentials, costs and supply for sustainable energy production in Denmark

General information
State: Published
Organisations: Aalborg University, New Zealand Forest Research Institute
Authors: Møller, B. (Ekstern), Nielsen, P. S. (Intern)
Publication date: 2004

Host publication information
Title of host publication: Proceedings for the International Conference on Sustainability Engineering and Science
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Article in proceedings – Annual report year: 2004

Residential heating in New Zealand - are wood pellet appliances a benefit to the energy sector in New Zealand?

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State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern)
Publication date: 2004

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Title of host publication: Proceedings of the Sustainable Energy Forum Conference 2004: sustainable energy futures - think big or think smart?
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Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Article in proceedings – Annual report year: 2004

Scoping technology scenarios for a 100% renewable energy Rotorua

General information
State: Published
Organisations: New Zealand Forest Research Institute
Authors: Collins, M. (Ekstern), Nielsen, P. S. (Intern)
Publication date: 2004

Host publication information
Title of host publication: Proceedings for the International Conference on Sustainability Engineering and Science
Main Research Area: Technical/natural sciences
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Life after Waste Assessment as a contrast to Life Cycle Assessment

General information
State: Published
Organisations: Forest Research
Authors: Nielsen, P. S. (Intern)
Publication date: 2003

Host publication information
Title of host publication: Proceedings of 15th Annual Conference of the Waste Minimisation Institute of New Zealand
Main Research Area: Technical/natural sciences

Bibliographical note
Presentation and paper
Pellets - processing into a pellet fuel

General information
State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern), Estcourt, G. (Ekstern)
Publication date: 2003

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Title of host publication: Proceedings of IEA Bioenergy task 30: Making short rotation crops mainstream
Main Research Area: Technical/natural sciences
Conference: IEA Bioenergy task 30: Making short rotation crops mainstream, Tauranga, New Zealand, 01/12/2003 - 01/12/2003

Bibliographical note
Presentation and paper
Publication: Research › Article in proceedings – Annual report year: 2003

Potential resources for wood pellet production

General information
State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern), Anderson, C. (Ekstern), Gifford, J. (Ekstern)
Publication date: 2003

Host publication information
Title of host publication: Proceedings of International Nordic Bioenergy Conference Bioenergy2003
Main Research Area: Technical/natural sciences

Bibliographical note
Presentation and paper
Publication: Research › Article in proceedings – Annual report year: 2003

Application of fuel pellets for institutional/industrial energy users, district heating and CHP - European experiences

General information
State: Published
Organisations: New Zealand Forest Research Institute
Authors: Nielsen, P. S. (Intern)
Publication date: 2002
Main Research Area: Technical/natural sciences

Bibliographical note
Presentation and paper
Publication: Research › Paper – Annual report year: 2002

Resources for fuel pellets production in New Zealand

General information
State: Published
Organisations: Unknown
Authors: Lavery, J. (Ekstern), Mallinson, R. (Ekstern), Gifford, J. (Ekstern), Nielsen, P. S. (Intern)
Publication date: 2002
Main Research Area: Technical/natural sciences
Publication: Research › Paper – Annual report year: 2002
Sustainable energy - Danish case studies

General information
State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern)
Publication date: 2002
Main Research Area: Technical/natural sciences

Bibliographical note
Presentation and paper
Publication: Research › Paper – Annual report year: 2002

The wood waste resource: Assessing the technical, economic and market potential for energy production in New Zealand

General information
State: Published
Organisations: Unknown
Authors: Gifford, J. (Ekstern), Nielsen, P. S. (Intern), Hall, P. (Ekstern), Nicholas, I. (Ekstern), Robertson, K. (Ekstern), Duignan, A. (Ekstern), Li, J. (Ekstern), Ford-Robertson, J. (Ekstern)
Publication date: 2002

Host publication information
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Article in proceedings – Annual report year: 2002

Utilisation of wood waste - challenges for the sector

General information
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Organisations: Unknown
Authors: Nielsen, P. S. (Intern), Fredricsen, P. (Ekstern), Ware, P. (Ekstern), Tritt, S. (Ekstern), Lee, C. (Ekstern), Duignan, A. (Ekstern)
Publication date: 2002

Host publication information
Title of host publication: Proceedings of the 14th Lifeafterwaste WasteMINZ conference
Main Research Area: Technical/natural sciences

Bibliographical note
Presentation and paper
Publication: Research › Article in proceedings – Annual report year: 2002

Linking fuel supply to new bioenergy markets

General information
State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern)
Publication date: 2001
Event: Paper presented at Workshop: Recent advances in bioenergy, Rotorua, New Zealand.
Main Research Area: Technical/natural sciences

Bibliographical note
Presentation
Publication: Research › Paper – Annual report year: 2001
Scoping Combustion Guidelines

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Authors: Nielsen, P. S. (Intern)
Publication date: 2001
Event: Paper presented at Workshop: Recent advances in bioenergy, Rotorua, New Zealand.
Main Research Area: Technical/natural sciences

Bibliographical note
Presentation
Publication: Research › Paper – Annual report year: 2001

Transforming the forest waste streams into biofuels for energy: A case study for Rotorua

General information
State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern), Gifford, J. (Ekstern)
Publication date: 2001

Host publication information
Title of host publication: Proceedings of the 13th WasteMINZ conference
Main Research Area: Technical/natural sciences
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Transforming the forest waste streams into biofuels for energy. A case study for Rotorua

General information
State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern)
Publication date: 2001
Event: Paper presented at Workshop: Recent advances in bioenergy, Rotorua, New Zealand.
Main Research Area: Technical/natural sciences
Publication: Research › Paper – Annual report year: 2001

Electrokinetic Remediation of bio-ashes

General information
State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern), Houmøller, S. (Ekstern), Fock, M. (Ekstern), Hansen, H. (Ekstern), Ottosen, L. (Ekstern)
Publication date: 2000
Main Research Area: Technical/natural sciences
Publication: Research › Paper – Annual report year: 2000

Assessment and dissemination of a Pyrolysis Gasifier Stove in Ghana - A Project Description

General information
State: Published
Organisations: Department of Buildings and Energy
Authors: Nielsen, P. S. (Intern), Kuuyuor, T. (Ekstern)
Pages: 1501-1506
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Title of host publication: Biomass - A Growth Opportunity in Green Energy and Value-added Products
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Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

Biomass Policies and Biogas Utilisation in Denmark

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State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern), Salomonsen, K. (Ekstern), Holm-Nielsen, J. (Ekstern)
Pages: 1579-1586
Publication date: 1999

Host publication information
Title of host publication: Biomass - A Growth Opportunity in Green Energy and Value-added Products
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Publisher: Pergamon Press
Editors: Overend, R., Chornet, E.
ISBN (Print): 9780080430195
Main Research Area: Technical/natural sciences

Bibliographical note
Presentation and paper
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

Elektrokinetisk rensning af aske: Fase 1. Resultater af rensningsforsøg med halmaske og træaske og vurdering af metodens egneted

General information
State: Published
Organisations: Department of Geology and Geotechnical Engineering, dk-TEKNIK A/S
Authors: Nielsen, P. S. (Intern), Houmøller, S. (Ekstern), Fock, M. W. (Ekstern), Hansen, H. (Intern), Ottosen, L. M. (Intern)
Number of pages: 27
Publication date: 1999

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Main Research Area: Technical/natural sciences
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Environmental Costs of energy from Two Biogas Plants in Denmark

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State: Published
Organisations: Unknown
Authors: Nielsen, P. S. (Intern)
Pages: 421-426
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Editors: Overend, R., Chornet, E.
Energy and Greenhouse gas balances of the utilisation of biogas for energy: - with a special focus on transportation

The utilisation of biogas for energy is an important part of the Danish energy plan for reducing Danish emissions of greenhouse gases. Implementation programmes for new biogas plants have been in operation since 1990, promoted by the Ministry of Environment and Energy. The focus of the implementation programmes has been on development of technologies for joint biogas plants, where more than one farm supplies the animal slurry. The joint biogas plants are dependent on industrial organic wastes to obtain high biogas yields for making the biogas plant economical. The industrial organic waste will, however, be the scarce factor in a further development of the joint biogas plants in Denmark. The purpose of the present study is related to the discussion on the role of transportation in the biogas fuel chain.

Transportation plays a central role in the assessment of environmental advantages of utilising biogas for energy. Two different Danish joint biogas plants are evaluated with the aim of determining the role of transportation and co-fermentation on the energy and the balance of greenhouse gases from the biogas fuel cycle.

Environmental external effects from wind power based on the EU ExternE methodology

The European Commission has launched a major study project, ExternE, to develop a methodology to quantify externalities. A “National Implementation Phase”, was started under the Joule II programme with the purpose of implementing the ExternE methodology in all member states. The main objective of the Danish part of the project is to implement the framework for externality evaluation, for three different power plants located in Denmark. The paper will focus on the assessment of the impacts of the whole fuel cycles for wind, natural gas and biogas. Priority areas for environmental impact assessment are identified, based on results of earlier studies and some identified of specific relevance for Denmark. Importance is attached to the quantification of impacts for each of the three fuel cycles and to monetisation of the externalities.
Environmental externalities related to power production on biogas and natural gas based on the EU ExternE methodology

This paper assesses the environmental impacts and external costs from selected electricity generation systems in Denmark. The assessment is carried out as part of the ExternE National Implementation, which is the second phase of the ExternE project and involves case studies from all Western European countries. The project use a “bottom-up” methodology to evaluate the external costs associated with a wide range of different fuel cycles. The project has identified priority impacts, where most are impacts from air emissions. Externalities due to atmospheric emissions are calculated through the use of a software package, EcoSence, having an environmental database at both a local and regional level including population, crops, building materials and forest. The system also incorporates two air transport models, allowing local and regional scale modelling. The results of the Danish case study show that estimated damages due to the greenhouse effect are predominant, however, the uncertainty is high. The predominant damage at the local and regional level is related to emission of NOx, which results in effects on public health.

External effects related to biogas and wind power

Energy produced by wind power and biogas is today more expensive than energy produced by fossil fuels. However, by including external costs related to the technologies, the renewable technologies are expected to result in social benefits compared to the conventional power technologies. The paper will focus on estimates of externalities related to wind and biogas energy supplies using the ExternE methodology developed in a major study launched by the European Comission. External costs are the costs imposed on society that are not included in the market price (e.g. effects of air pollution on health, buildings, crops, forests and global warming, emissions of noise etc.).

Test of pyrolysis gasifier stoves in two institutional kitchens in Uganda

The main purpose of the paper is to evaluate tests of institutional kitchens carried out at schools in Uganda 1997. The results of the tests for the institutional kitchen with pyrolysis gasifier stoves are compared with the fuel use in traditional kitchens with three-stone stoves. The project was financed by the Norwegian Forestry Society and involved two institutional kitchens in the northern part of Uganda. The pyrolysis gasifier stove, which is used as heating source, is a simple batch fed top-down inverted gasifier. The two institutional kitchens prepared food for 107 students and 700 pupils, respectively. The cooking place was built with a rotating plate on which tree gasifier units were placed.
way it was possible to change on of the gasifier units when necessary. The pot was then mounted on a tripod app. 10 cm above the gasifier units. The results of the tests show that the improved institutional cooking places can be used to prepare the local food and that it saves at least 2/3 of the wood compared with the use of traditional three stone stoves. Furthermore, the use of the gasifier units, which burn without smoke, reduces the exposure to smoke considerably; however, this is only evaluated qualitatively.

**General information**
State: Published
Organisations: Department of Buildings and Energy, Low Technology Development
Authors: Wendelbo, P. (Ekstern), Nielsen, P. S. (Intern)
Pages: 1753-1756
Publication date: 1998

**Host publication information**
Title of host publication: Biomass for Energy and Industry
Place of publication: Wurzburg
Publisher: CARMEN
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 170900
Publication: Research - peer-review › Article in proceedings – Annual report year: 1998

**The role of transportation and co-fermentation in the CO2 balance for utilisation of biogas for energy**
Biogas is an essential biomass source for achieving a reduction of CO2 emission by 50% in year 2030 in Denmark. The physical potential for biogas production in Denmark is more than 10 times the present biogas production in Denmark. In Denmark the largest part of the biogas production is produced at 19 decentralised joint biogas plants involving a varying number of farms (5-100). All of these plants use to some extent co-fermentation with industrial organic waste to increase biogas yield. A fuel chain approach for utilisation of biogas for energy purposes is carried out for determining the role of increased transportation distances at large biogas plants on the total CO2 balance of the biogas plant. The advantage of constructing large biogas plants is the cost-effective possibility of using industrial organic waste to increase biogas production. In some cases co-fermentation increases biogas production up 100%. The present study evaluate optimal transportation strategies for biogas plants taking CO2 balances into account.

**General information**
State: Published
Organisations: Department of Buildings and Energy, SUC, Institute of Biomass
Authors: Nielsen, P. S. (Intern), Karlsson, K. B. (Intern), Holm-Nielsen, J. B. (Ekstern)
Publication date: 1998

**Host publication information**
Title of host publication: Proceeding of Sustainable Agriculture for Food, Energy and Industry
Main Research Area: Technical/natural sciences
Conference: International Conference on Sustainable Agriculture for Food, Energy and Industry, Braunschweig, Germany, 05/11/1997
Source: orbit
Source-ID: 169332
Publication: Research - peer-review › Article in proceedings – Annual report year: 1998

**Total Costs and Benefits of Biomass in Selected regions of the European Union**
Project outline: In the Biocost project, representative biomass-to-electricity and biomass-to-transport-service fuel cycles located at different sites within the European Union have been evaluated concerning their environmental and economic performance. Each case study was compared to a fossil-fuel fired reference case. The case studies examined comprise:- utilisation of forestry residues in the Naessjoe circulation fluidised bed combustion plant, Sweden, versus the use of Polish coal in the same plant; - utilisation of forestry residues and short-rotation coppice for industrial combined heat and power production in Mangualde, Portugal, versus the use of fuel oil in an engine generating heat and power; - production of biogas from animal slurry for municipal combined heat power generation at Hasnoej, Denmark, versus the use for Danish natural gas in the same engine; - gasification of woody biomass for combined heat and power generation in Vaemamo, Sweden, and Eggborough, UK, versus the use of coal in the Naessjoe plant mentioned above and a UK power plant; - production of cold-pressed rape-seed oil and its use in a cogeneration plant at Weiessenburg, Germany, versus the use of diesel fuel in a similar engine; - production of rape-seed oil methyl ester (RME) and its use for goods transport in Germany, versus the use of diesel fuel in the same fleet of trucks; - production of ethyl tertiary butyl ether (ETBE) from sugar beets and sweet sorghum for transport applications in France, versus the use of methyl tertiary butyl ether (MTBE) from fossil sources for the same purpose.
CO2 balance in production of energy based on biogas

Biogas is an essential biomass source for achieving a reduction of CO2 emission by 50% in year 2030 in Denmark. The physical potential for biogas production in Denmark is more than 10 times the present biogas production in Denmark. In Denmark the largest part of the biogas production is produced at 19 decentralised joint biogas plants involving a varying number of farms (5-100). All of these plants use to some extent co-fermentation with industrial organic waste to increase biogas yield. A fuel chain approach for utilisation of biogas for energy purposes is carried out for determining the role of increased transportation distances at large biogas plants on the total CO2 balance of the biogas plant. The advantage of constructing large biogas plants is the cost-effective possibility of using industrial organic waste to increase biogas production. In some cases co-fermentation increases biogas production up 100%. The present study evaluate optimal transportation strategies for biogas plants taking CO2 balances into account.
Environmental Externalities Related to Power Production Technologies in Denmark

The European Commission has launched a major study project, ExternE, to develop a methodology to quantify externalities. A 'National Implementation Phase', was started under the Joule II programme with the purpose of implementing the ExternE methodology in all member states. The main objective of the Danish part of the project is to implement the framework for externality evaluation, for three different power plants located in Denmark. The paper will focus on the assessment of the impacts of the whole fuel cycles for wind, natural gas and biogas. Priority areas for environmental impact assessment are identified, based on results of earlier studies and some identified of specific relevance for Denmark. Importance is attached to the quantification of impacts for each of the three fuel cycles and to monetisation of the externalities.

General information
State: Published
Organisations: Risø National Laboratory for Sustainable Energy, Department of Buildings and Energy
Authors: Ibsen, L. S. (Intern), Nielsen, P. S. (Intern)
Pages: 264-271
Publication date: 1997

Host publication information
Title of host publication: 1st international conference on energy and the environment. Efficient utilisation of energy and water resources. Vol. 1
Place of publication: Uxbridge (GB)
Publisher: Brunel University
Editor: Tassou, S.
Main Research Area: Technical/natural sciences
Conference: 1st international conference on energy and the environment, efficient utilisation of energy and water resources, Uxbridge, 01/01/1997
Source: orbit
Source-ID: 169199
Publication: Research - peer-review › Article in proceedings – Annual report year: 1997

External Costs Related to Power Production Technologies: ExternE National Implementation for Denmark

The European Commission has launched a major study project, ExternE, to develop a methodology to quantify externalities. A 'National Implementation Phase', was started under the Joule II programme with the purpose of implementing the ExternE methodology in all member states. The main objective of the Danish part of the project is to implement the framework for externality evaluation, for three different power plants located in Denmark. The paper will focus on the assessment of the impacts of the whole fuel cycles for wind, natural gas and biogas. Priority areas for environmental impact assessment are identified, based on results of earlier studies and some identified of specific relevance for Denmark. Importance is attached to the quantification of impacts for each of the three fuel cycles and to monetisation of the externalities.

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Authors: Ibsen, L. S. (Intern), Nielsen, P. S. (Intern)
Number of pages: 126
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Main Research Area: Technical/natural sciences

Bibliographical note
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Source-ID: 169250
Publication: Research - peer-review › Report – Annual report year: 1997

External costs related to power production technologies. ExternE national implementation for Denmark

General information
External costs related to power production technologies. ExternE national implementation for Denmark. Appendix

Assessment of Environmental External Effects in Power Generation
Balanced Ecological Use of Biomass Resources in DK

As Denmark has no hydro power, biomass resources play an important role for a future sustainable energy system. Especially surplus straw and animal manure (for biogas) from agriculture. This paper describes the potential of biomass in the Danish energy supply system three to four decades ahead. The use of biomass for energy purposes may however conflict with the need to maintain soil quality of arable fields. The official Danish policies are supporting both an expansion of ecological farming and an expansion of the use of biomass in the energy supply system. This may give rise to conflicts around the use of biomass between different interest groups.

General information
State: Published
Organisations: Department of Civil Engineering, Section for Building Physics and Services, Department of Buildings and Energy, Research Center Foulum, Royal Veterinary and Agricultural University
Authors: Meyer, N. I. (Intern), Nielsen, P. S. (Intern), Christensen, B. (Ekstern), Kølster, P. (Ekstern), Søgaard, C. (Ekstern)
Publication date: 1996

Efficiency Tests on the New Peko Pe Stove in Uganda

General information
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Organisations: Department of Buildings and Energy
Authors: Nielsen, P. S. (Intern)
Publication date: 1996
Main Research Area: Technical/natural sciences

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Issue number: 14
Original language: English
Links:
Publication: Communication › Journal article – Annual report year: 1996

Efficiency tests on the pyrolysis gasifier stove Peko Pe

This paper presents results from water boiling tests on the pyrolysis gasifier stove Peko Pe, which has been developed by the Norwegian Paal Wendelbo. The stove efficiency determined vary between 21 and 29% when burning dry Danish woodchips (10% moisture) with an estimated caloric value of 16 MJ/kg. CO-emissions have been determined with varying distance between the stove and the pot to estimate the combustion efficiency. Efficiency tests performed in Adjumani refugee camp with grass as fuel show a stove efficiency of 25-29% with a caloric value of 14 MJ/kg. It has not been possible to determine the water content in the grass. In Adjumani refugee camp it was furthermore found that the stove was able to provide sufficient energy from solid combustion, after the pyrolysis was stopped, to boil water for additional 25-30 minutes with lid. This effect was not seen in the tests on woodchips in Denmark. Advantages and disadvantages of the stove compared to three-stone stoves are discussed and perspectives are outlined for further improvements of the stove.

General information
State: Published
Organisations: Department of Buildings and Energy
Authors: Nielsen, P. S. (Intern)
Number of pages: 11
Publication date: 1996
Energy conservation options for cooking with biomass in Ghana
Cooking is the main energy consuming activity in Ghana. This is mainly due to a generally low material standard of living, but also because the cooking process itself is energy inefficient. The fuel for cooking in Ghana is mainly biomass either in the form of wood, agricultural residues or charcoal. An energy chain for the cooking process is established and the possible conservation options are surveyed in kitchen performance tests in Abodom in the tropical zone of Ghana. The energy consumption for the food preparation has been measured and energy saving options have been determined for some parts of the energy chain. The results show that the possible options for energy conservation through the entire energy chain of the present technology are at least of the same magnitude as that involved in just switching to a more efficient biomass stove. The heat loss is largest while simmering when the boiling point has been reached. Most cooks tend to continue using a high heat supply even though it is not necessary. This process is often carried out without lid on the pot even though the use of lid will reduce the energy loss considerably. It is also concluded that the average fuelwood consumption in Abodom per household (tropical zone) only is 20% higher than the per family fuelwood consumption in the northern part of Ghana (Guinea Savanna). A larger difference in fuelwood consumption per household is normally assumed between households in tropical zones and in savanna zones.

Life Cycle Assessment of Selected Biomass and Fossil Fuel Energy Systems in Denmark and Ghana - with a focus on greenhouse gases
The aim of the present project has been to establish an LCA methodology for assessing different biomass energy systems in Denmark and Ghana in relation to their emission of greenhouse gases. The biomass systems which have been studied are willow chips, surplus straw and biogas from manure for Denmark and energy forest and use of saved wood in the food preparation process for electricity production in Ghana. Denmark
The life cycle analysis has been relatively well defined for the case of willow chips and straw as their system boundaries are relatively well-defined, whereas the definition of system boundaries are more difficult for the biogas case. For the willow chip production the uncertainty is the possible enhanced emission of N2O when the energy forest is fertilised. For the biogas study, the uncertainties are related to the definition of alternative uses and handling of the manure, and for the definition of reference technology. For all Danish case studies the reference technology has been energy produced by natural gas. The total emission for willow chips in Denmark is 99 g CO2-eq per kWh of electricity produced for willow chips, 68 g CO2-eq per kWh for surplus straw and 58 g CO2-eq per kWh for biogas. The CO2 reduction potential is determined as 310 g CO2 per kWh for willow chips, 340 g CO2-eq per kWh for surplus straw and 350 g CO2 per kWh for biogas, when they replace energy produced in a natural gas system. With a potential of 32 PJ energy forest (200,000 ha), 33 PJ of surplus straw and 20 PJ of biogas, the total CO2 reduction will be 3.8 million tonnes or 6% of present CO2 emission if biomass substitute natural gas. This relates to the use of present available technologies. In the decades to come new and more efficient technologies will be developed for biomass plants. This will increase the reduction potential for CO2. Ghana Two different case studies have been carried out for Ghana. The first is a life cycle analysis of an energy forest plantation in Ghana which has been cultivated with modern equipment. The second LCA is extended with an energy end use chain to determine the energy conservation options in the food preparation process. The idea has been to use the saved wood in the food preparation process for electricity production. The results for the energy forest in Ghana are not very different from the willow forest in Denmark. Similar assumptions about energy consumption for use of machines have been made in the two cases. The main difference is that the energy forest in Ghana uses Nitrogen fixing species to avoid the use of fertilisers. The second Ghanaian case study was established so that one-third of the electricity produced at the power plant should be supplied by savings in the food preparation process to cover the domestic electricity consumption. The remaining two-thirds of the electricity has been produced in an energy forest to cover industrial demand. The saving options have been determined to be 65% by use of an improved woodstove and efficient cooking performances compared to the traditional cooking performance and
the use of three-stone stove. The results indicate that the energy saving options are higher by changing habits than by changing cooking stove. This implies that it is better to use an efficient cooking performance on a three-stone stove than inefficient cooking performance on an improved stove. The efficiency options for the improved stove have also been compared with the use of LPG and electric stoves. The use of a life cycle analysis for the saved wood case indicate that the energy saving options have to be taken into account when assessing the different cooking options. This is an important issue as long as cooking is the main energy service in Ghana. Life cycle analysis can be a useful tool for assessing the different saving options and for identifying environmental impacts from the cooking process. To supply sufficient woodfuel to cover one-third of the electricity production two-thirds of the households would have to change into efficient cooking performance and to use improved stoves. This model is only theoretical, but it indicates that the amount of biomass which is wasted in the food preparation process is large. The assumed electricity consumption per household is 1,200 kWh per year. The biomass potential in Ghana is large. If degraded land were changed into energy forests, biomass could be the major energy source for decades in Ghana. Utilising 5% of the area for energy production will almost double the electricity capacity in Ghana today. The estimated saving potential of 65% in the food preparation process will lead to a saving of a total of 3 million tonnes of wood throughout Ghana. If it was used for electricity production it could lead to an electricity production of 3.8 TWh per year or a capacity of 0.8 GW using the key figures of the power plant studied in this report. This is almost equal to the present power capacity in Ghana. Energy planning and LCA in Ghana Danish energy planning experiences have been developed in a educated population and in society with traditions for well-functioning institutions. Even though some energy programmes have been implemented, the institutional framework is relatively weak in Ghana compared to the severe and in some cases fundamental problems they are supposed to solve. Severe problems are present both in the traditional sector with increasing utilisation of biomass and in the modern energy sector which is challenged by the high population growth. The advanced energy planning used in Denmark today is only relevant for the modern energy sector, and it has to be adjusted in order to cope with the large rate of population growth in Ghana. The problems in Ghana are related to the general development of society, education of people, training of technicians, and creation of economic incentives for stimulating people to take the right decisions. A comparison of the two energy sectors illustrates the difficulties in using the advanced Danish energy planning experience in Ghana. The basic parameters are very different. Compared with Denmark, the modern energy sector in Ghana is challenged by a high population growth whereas the population has stabilised in Denmark. Furthermore, the Danish energy planning has been supported by an educated population and strong public institutions. This is not the case in Ghana.

General information
State: Published
Organisations: Department of Buildings and Energy
Authors: Nielsen, P. S. (Intern)
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 166190
Publication: Research › Ph.D. thesis – Annual report year: 1996

Assessment of environmental external effects in the production of energy

General information
State: Published
Organisations: Risø National Laboratory for Sustainable Energy, Systems Analysis Division, Energy Systems Analysis, Department of Buildings and Energy
Authors: Morthorst, P. E. (Intern), Meyer, H. J. (Intern), Schleisner, L. (Intern), Meyer, N. I. (Intern), Nielsen, P. S. (Intern), Nielsen, V. (Ekstern)
Pages: 68-76
Publication date: 1995
Main Research Area: Technical/natural sciences

Publication information
Journal: ENER Bulletin
Issue number: 17
Original language: English

Bibliographical note
European Network for Energy Economic Research
Source: orbit
Source-ID: 293672
Publication: Research › Journal article – Annual report year: 1995
Miljøeksternaliteter ved energiproduktion

General information
State: Published
Organisations: Risø National Laboratory for Sustainable Energy
Authors: Meyer, H. (Intern), Morthorst, P. (Intern), Schleisner, L. (Ekstern), Meyer, N. (Ekstern), Nielsen, P. (Intern), Nielsen, V. (Ekstern)
Pages: 99-119
Publication date: 1995

Host publication information
Title of host publication: Økonomisk vurdering af energiprojekter
Place of publication: København
Publisher: Energistyrelsen
Editor: Hjort-Andersen, C.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 293670
Publication: Research › peer-review › Book chapter – Annual report year: 1995

Energy Efficiency in the Food Preparation Process

General information
State: Published
Organisations: Department of Buildings and Energy, University of Ghana
Authors: Nielsen, P. S. (Intern), Adanu, K. (Ekstern)
Publication date: 1994
Main Research Area: Technical/natural sciences
Publication: Research › Paper – Annual report year: 1994

External effects in the utilisation of renewable energy

General information
State: Published
Organisations: Risø National Laboratory for Sustainable Energy, Department of Civil Engineering
Authors: Meyer, H. (Intern), Nielsen, P. (Intern), Meyer, N. I. (Intern), Morthorst, P. (Intern), Schleisner, L. (Ekstern)
Pages: 59-73
Publication date: 1994

Host publication information
Title of host publication: Seminar on External effects in the utilisation of renewable energy
Place of publication: Roskilde
Publisher: Risø National Laboratory. Systems Analysis Department
ISBN (Print): 87-550-1957-9
Main Research Area: Technical/natural sciences
Conference: Seminar on external effects in the utilisation of renewable energy, Lyngby (DK), 16 Sep, 01/01/1993
Electronic versions:
Seminar_on_External_Effects_1993_.pdf
Source: orbit
Source-ID: 291489
Publication: Research › Article in proceedings – Annual report year: 1994

Low Electricity Europe

General information
State: Published
Organisations: Department of Buildings and Energy, Technical University of Denmark
Authors: Nørgård, J. (Ekstern), Nielsen, P. S. (Intern), Vigand, J. (Ekstern)
Pages: 399-418
Publication date: 1994
Summary of conference papers and discussions

General information
State: Published
Organisations: Department of Buildings and Energy
Authors: Meyer, N. I. (Intern), Nielsen, P. S. (Intern)
Publication date: 1991

Host publication information
Title of host publication: Global collaboration on a sustainable energy development. Conference proceedings
Place of publication: Lyngby
Publisher: Physics Laboratory 3. Technical University of Denmark
Editors: Meyer, N., Nielsen, P.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Article in proceedings – Annual report year: 1991

Occupational Health and Safety in the Printing Industry, Malaysia

General information
State: Published
Organisations: Department of Buildings and Energy
Authors: Nielsen, P. S. (Intern)
Publication date: 1989

Publication information
Publisher: Department of Society and Technology, Technical University of Denmark
Main Research Area: Technical/natural sciences
Publication: Research › Working paper – Annual report year: 1989

Projects:

Smart Cities Accelerator
European Interreg Project with 6 municipality implementing the research findings of the CITIES project in cooperation with other universities in the area Copenhagen, Southern Sweden.

Centre for IT-Intelligent Energy Systems in Cities
Department of Civil Engineering
Department of Applied Mathematics and Computer Science
Department of Management Engineering
Period: 20/04/2018 → 20/07/2018
Number of participants: 3
Acronym: SCA
Project participant:
Heller, Alfred (Intern)
Nielsen, Per Sieverts (Intern)
Project Manager, academic:
Madsen, Henrik (Intern)

Science Cloud for Cities
A Deic/Deff project developing a science cloud for research (in cities).

Centre for IT-Intelligent Energy Systems in Cities
Department of Civil Engineering
Department of Management Engineering
Aarhus University
University of Southern Denmark
Aalborg University

Period: 01/09/2016 → 16/12/2017
Number of participants: 3
Project participant:
Nielsen, Per Sieverts (Intern)
Madsen, Henrik (Intern)

Project Manager, academic:
Heller, Alfred (Intern)

Benchmarking Residential Energy Consumption In Indonesia
Department of Management Engineering
Period: 01/05/2016 → 30/04/2019
Number of participants: 3
PhD Student:
Kewo, Angreine (Intern)

Supervisor:
Liu, Xiufeng (Intern)
Main Supervisor:
Nielsen, Per Sieverts (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Stipendie fra udlandet
Project: PhD

Modeling Energy Supply for Future Cities
Department of Energy Conversion and Storage
Period: 15/09/2015 → 14/09/2018
Number of participants: 4
PhD Student:
Dominkovic, Dominik Franjo (Intern)

Supervisor:
Nielsen, Per Sieverts (Intern)
Sørensen, Mads Peter (Intern)
Main Supervisor:
Pedersen, Allan Schrøder (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet

Relations
Activities:
The 40th International IAEE Conference
30th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems
12th International SDEWES Conference
Blockchain Summer School 2017
Climate-KIC PhD Summer School Urban Transition Amsterdam-Bologna 2017

Publications:
Integration of district cooling in smart energy systems: the case of Singapore
Potential for dynamic pricing in district heating systems in Denmark and Finland
Project: PhD
Analysis of high frequency ("smart meter") energy consumption data

Department of Management Engineering
Period: 01/08/2015 → 31/07/2018
Number of participants: 3
Phd Student:
Tureczek, Alexander Martin (Intern)
Supervisor:
Madsen, Henrik (Intern)
Main Supervisor:
Nielsen, Per Sieverts (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet
Project: PhD

Buildings for Smart Energy Cities
Centre for IT-Intelligent Energy Systems in Cities
Department of Civil Engineering
Section for Indoor Climate and Building Physics
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Energy Systems Analysis
Section for Building Energy
Period: 15/09/2014 → 15/09/2017
Number of participants: 4
Phd Student:
Gianniou, Panagiota (Intern)
Supervisor:
Nielsen, Per Sieverts (Intern)
Heller, Alfred (Intern)
Main Supervisor:
Rode, Carsten (Intern)
Project

Buildings for Smart Energy Cities
Department of Civil Engineering
Period: 15/09/2014 → 14/12/2017
Number of participants: 4
Phd Student:
Gianniou, Panagiota (Intern)
Supervisor:
Heller, Alfred (Intern)
Nielsen, Per Sieverts (Intern)
Main Supervisor:
Rode, Carsten (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet
Project: PhD
Center for IT-Intelligent Energy Systems for Cities
A wide range of research activities have arisen to support the Danish target of a 100% renewable energy system by 2050. Projects focused on individual aspects of the energy system, such as zero emissions buildings or intelligent power systems provide valuable insight, that facilitates flexibility throughout the energy system. CITIES will address this deficiency by establishing an integrated research centre covering all aspects of the energy system, including gas, power, district heating/cooling and biomass, and most importantly methods to forecast, control and optimize their interactions through the use of advanced ICT solutions.

The high densities of population, energy consumption, and energy and communications networks in cities offer the greatest potential for flexibility at the last cost, and the fact that cities account for 80% of global energy consumption and emissions [1] make the urban environment an ideal setting for energy systems integration research. CITIES will pioneer research into fully integrated city energy systems, building short-term operational models that feed longer term planning models, considering the spatiotemporal variations, interactions, dynamics and stochastics in the energy system. Low level models of system components will inform higher-level aggregate models employed in market and control framework design. The leading position of European academia and industry and the rapidly growing market for smart energy solutions indicates substantial scope for increased competitiveness and job creation within this field. CITIES will, in collaboration with its industrial and academic partners, conduct research with a view to developing tools for the implementation of integrated energy system solutions.

Center granted by Strategic Research Council.

To be a sustainable organisation.

Department of Applied Mathematics and Computer Science
Department of Civil Engineering
Department of Management Engineering
Department of Energy Conversion and Storage
Department of Informatics and Mathematical Modeling
Centre for IT-Intelligent Energy Systems in Cities

Aalborg University
Period: 01/01/2014 → 31/12/2019
Number of participants: 8

Strategic
Acronym: CITIES
Number of related Ph.D. students: 12
Project participant:
Madsen, Henrik (Intern)
Heller, Alfred (Intern)
Nielsen, Per Sieverts (Intern)
Pedersen, Allan Schrøder (Intern)
Rode, Carsten (Intern)
Pinson, Pierre (Intern)
Jørgensen, John Bagterp (Intern)
Project Manager, organisational:
Herrmann, Ivan Tengbjerg (Intern)

Financing sources
Source: Forskningsrådene - Andre
Name of research programme: Energy Programme
Amount: 44.00 Danish Kroner
Year of approval: 2013

Relations
Activities:
3rd International Workshop on Design in Civil and Environmental Engineering
The 40th International IAEE Conference
30th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems
12th International SDEWES Conference
Blockchain Summer School 2017
Energy Supply Modelling in Cities: Illustrated Using Data from the Danish Municipality of Sønderborg
Energy Supply Modelling in Cities: Illustrated Using Data from the Case of Sønderborg
Status and Results of Energy Supply Modelling in CITIES: Illustrated using Data from the Case of Sønderborg
Big Data as a tool for controlling the cities energy: Data aspects and data management
Climate-KIC PhD Summer School Urban Transition Amsterdam-Bologna 2017
CITIES Annual Conference
Executive Development Programme with Technical University of Denmark
Big Data som værktøj til at styre byens energi
Publications:
Model Identification for Control of Display Units in Supermarket Refrigeration Systems
Project

Hybrid Life-cycle-assessment-urban-metabolism model as a framework for quantifying the contributions of urban agriculture to the sustainability of urban food system

Department of Management Engineering
Period: 01/12/2013 → 23/03/2017
Number of participants: 7
Phd Student:
Goldstein, Benjamin Paul (Intern)
Supervisor:
Fernandez, John E. (Ekstern)
Hauschild, Michael Zwicky (Intern)
Main Supervisor:
Birkved, Morten (Intern)
Examiner:
Nielsen, Per Sieverts (Intern)
Dalgaard, Tommy (Intern)
Newell, Joshua P. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)

Relations
Publications:
Assessing the edible city: Environmental implications of urban agriculture in the Northeast United States
Project: PhD

Urban energy transitions and quality of life

Department of Management Engineering
Period: 01/12/2013 → 05/12/2018
Number of participants: 3
Phd Student:
Ben Amer-Allam, Sara (Intern)
Supervisor:
Gregg, Jay Sterling (Intern)
Main Supervisor:
Nielsen, Per Sieverts (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Performance indicators frameworks for national sustainable transport planing

Department of Transport
Period: 15/02/2013 → 29/09/2016
Number of participants: 6
Phd Student:
Cornet, Yannick (Intern)
Supervisor:
Leleur, Steen (Intern)
Main Supervisor:
Gudmundsson, Henrik (Intern)
Examiner:
Nielsen, Per Sieverts (Intern)
Macharis, Cathy (Ekstern)
Marsden, Greg (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

Energy Demand Modelling
Department of Management Engineering
Period: 01/04/2008 → 26/02/2013
Number of participants: 6
Phd Student:
Zvingilaite, Erika (Intern)
Supervisor:
Karlsson, Kenneth Bernard (Intern)
Main Supervisor:
Klinge Jacobsen, Henrik (Intern)
Examiner:
Nielsen, Per Sieverts (Intern)
Ahlgren, Erik (Intern)
Ejling Larsen, Anders (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

AVALANCHE - Applied Global Simulation of Renewable Energies on Internet: Removing barriers to RE by embedding powerful software into a social context
The objective of the project is to initiate an AVALANCHE for the presentation and use of relevant data for renewable energies (RE) on the Internet. The goal is to put away with the key constraints "lack of information" and "lack of know how" faced by RE today. Target groups are renewable energies data providers such as manufacturers of RE components - mainly small and medium enterprises (SME) - and international institutions with data pools on the "supply side", and users such as engineers, architects, building companies, schools and universities on the "demand side". RE addressed in this project include PV, wind energy, hydro power and biogas.

Department of Buildings and Energy
University of Kassel
European Commission - Joint Research Center
Ecole des Mines de Paris
European Photovoltaic Industries Association
IT Power Ltd.
Zentrum für Europäische Wirtschaftsforschung
ASEW
Period: 01/05/1998 → 30/04/2000
Number of participants: 2
Project participant:
Nielsen, Per Sieverts (Intern)
Project Manager, organisational:
Nielsen, Vilhjálmur (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 370,000.00 Danish Kroner
Project

Biocost
Evaluation of externalities from different types of energy systems based on biomass with participation of eight groups from different EU countries. The project is sponsored by the EU Commission, DG XII.

Department of Buildings and Energy
Period: 01/01/1997 → 31/12/1997
Number of participants: 6
Project participant:
Nielsen, Per Sieverts (Intern)
Hall, David (Ekstern)
Ericson, Sven-Olov (Ekstern)
de Almeida, Anibal T. (Ekstern)
Project Manager, organisational:
Meyer, Niels I (Intern)
Project Manager, academic:
Groscurth, Helmuth-Michael (Ekstern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 945,000.00 Danish Kroner
Project

Energi- og miljømæssige perspektiver ved udnyttelse af biomasse i energiforsyningen
Technical University of Denmark
Period: 01/02/1994 → 23/04/1997
Number of participants: 3
Phd Student:
Nielsen, Per Sieverts (Intern)
Main Supervisor:
Meyer, Niels I (Intern)
Examiner:
Hvelplund, Frede (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD

Activities:

Low Carbon Economy Territory (ESPON - LOCATE) workshop
Period: 29 Mar 2017
Angreine Kewo (Speaker)
Per Sieverts Nielsen (Speaker)
Department of Management Engineering
Systems Analysis
Degree of recognition: International
Related event

Low Carbon Economy Territory (ESPON - LOCATE) workshop
29/03/2017 → …
Vienna, Austria
Activity: Talks and presentations › Conference presentations

The Potential of Car Sharing to Disrupt the Transportation System in Denmark
Period: 1 Feb 2017 → 4 Jul 2017
Jay Sterling Gregg (Main supervisor)
Per Sieverts Nielsen (Supervisor)
Department of Management Engineering
Systems Analysis

Description
Master's Thesis
Elisa Johanna Lucia Teluij
S151266
Activity: Examinations and supervision › Supervisor activities

Smart Cities: Low Carbon Solutions
Period: 26 Sep 2016
Per Sieverts Nielsen (Lecturer)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities
Documents:
Smart Cities - Low carbon solutions -Singapore visit Sept2016 v2

Related event

Smart and sustainable cities: DTU-BCA Executive Development Programme 2016
26/09/2016 → 30/09/2016
Copenhagen, Denmark
Activity: Talks and presentations › Conference presentations

Den Digitale Masterplan
Period: 23 Sep 2016
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Description
Den Digitale Masterplan

Related event

Den Digitale Masterplan: Veje til en smart by
Egedal, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.
Smart Cities: Low Carbon Solutions
Period: 16 Aug 2016
Per Sieverts Nielsen (Lecturer)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities
Documents:
Smart Cities - Low carbon solutions DTU Byg August2016 v2

Related event
Urban Challenge Summer school: Hamburg-Copenhagen
08/08/2016 → 19/08/2016
Hamburg and Copenhagen, Denmark
Activity: Talks and presentations › Conference presentations

Generalforsamling i Dansk Byplanlaboratorium
Period: 22 Jun 2016
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Description
Generalforsamling Dansk Byplanlaboratorium

Related event
Generalforsamling i Dansk Byplanlaboratorium 2016
22/06/2016 → 22/06/2016
København, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Bits and Bytes - NATUR & MILJØ 2016
Period: 8 Jun 2016 → 9 Jun 2016
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities
Description
Bits and Bytes - NATUR & MILJØ 2016

Related event
Bits and Bytes - NATUR & MILJØ 2016
08/06/2016 → 09/06/2016
Nyborg, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Visit by UK delegation
Period: 17 May 2016
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre

**Description**
Visti by UK delegation (Smart City Activities)

**Related event**

**Visit by UK delegation**
17/05/2016 → 17/05/2016
Lyngby, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

**Version2 Conference and Exhibition**
Period: 3 May 2016 → 4 May 2016
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

**Description**
Vision2 Conference and Exhibition

**Related event**

**Version2 Conference and Exhibition**
03/05/2016 → 04/05/2016
København, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

**DiCyPS årsmøde 2016**
Period: 3 Mar 2016
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

**Description**
DiCyPS årsmøde 2016

**Related event**

**DiCyPS årsmøde 2016**
03/03/2016 → 03/03/2016
Ålborg, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

**Workshop om data og forretningsudvikling hos slutbrugerne**
Period: 3 Feb 2016
Per Sieverts Nielsen (Participant)
Department of Management Engineering
System Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Description
Data og forretningsudvikling hos slutbrugere

Related event
Workshop om data og forretningsudvikling hos slutbrugere
03/02/2016 → 03/02/2016
København, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Databeskyttelsesdagen
Period: 28 Jan 2016
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Description
Databeskyttelsesdagen

Related event
Databeskyttelsesdagen
28/01/2016 → 28/01/2016
København, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Match making meeting in Paris - UERA - ENSUF
Period: 18 Jan 2016 → 19 Jan 2016
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre

Description
Match making meeting in Paris - Urban Europe JP

Related event
Match making meeting in Paris - UERA - ENSUF
18/01/2016 → 19/01/2016
Paris, France
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Temadag: Grøn omstilling og vækst som tema i planstrategier og kommuneplaner
Period: 13 Jan 2016
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

**Description**
Temadag: Grøn omstilling og vækst som tema i planstrategier og kommuneplaner

**Related event**
Temadag: Grøn omstilling og vækst som tema i planstrategier og kommuneplaner  
13/01/2016 → 13/01/2016  
København, Denmark  
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

**Living Labs for Scalability**
Period: 17 Dec 2015  
Per Sieverts Nielsen (Speaker)  
Department of Management Engineering  
Systems Analysis  
DTU Climate Centre  
Centre for IT-Intelligent Energy Systems in Cities  
Documents:  
17-12-2015 Living Labs for Scalability - Per S. Nielsen og Alfred Heller - DTU Sustain

**Related event**
DTU Sustain Conference 2015  
17/12/2015 → 17/12/2015  
Lyngby, Denmark  
Activity: Talks and presentations › Conference presentations

**Smart City workshop between TU Berlin, NTNU and DTU**
Period: 7 Dec 2015 → 8 Dec 2015  
Per Sieverts Nielsen (Participant)  
Department of Management Engineering  
Systems Analysis  
DTU Climate Centre  
Centre for IT-Intelligent Energy Systems in Cities  

**Description**
TU Berlin, NTNU and DTU Smart Cities workshop in Berlin

**Related event**
Smart City workshop between TU Berlin, NTNU and DTU  
07/12/2015 → 08/12/2015  
Berlin, Germany  
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

**Match making møde på den Nederlandske Ambassade**
Period: 23 Nov 2015  
Per Sieverts Nielsen (Participant)  
Department of Management Engineering  
Systems Analysis  
DTU Climate Centre
Match making møde på den nederlandske ambassade

Match making møde på den Nederlandske Ambassade
København, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

UCD Energy Institute & Electricity Research Centre Research Symposium 2015
Period: 23 Nov 2015 → 24 Nov 2015
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Smart City Conference and Exhibition in Barcelona 2015
Period: 16 Nov 2015 → 19 Nov 2015
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Nordisk konference om Grøn omstilling af kommuner
Period: 11 Nov 2015 → 12 Nov 2015
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Smart City Expo in Barcelona 2015

Nordisk konference om Grøn omstilling af kommuner
Related event

Nordisk konference om Grøn omstilling af kommuner
København, Denmark
Activity: Attending an event › Participating in or organising a conference

NTNU rector visit and workshops
Period: 2 Nov 2015 → 3 Nov 2015
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Description
NTNU rector visit and workshops

Related event

NTNU rector visit and workshops
02/11/2015 → 03/11/2015
Lyngby, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

News from CMT and WP1 activities
Period: 26 Oct 2015
Per Sieverts Nielsen (Speaker)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities
Documents:
CMT and WP1 pres PSN Oct26_2015

Related event

PhD/Postdoc workshop on October 26th 2015
26/10/2015 → …
Lyngby, Denmark
Activity: Talks and presentations › Conference presentations

Urbanisering og sammenhængskraft
Period: 19 Oct 2015
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Description
Urbanisering og sammenhængskraft

Related event
CPH Climate plan
Period: 5 Oct 2015
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Related event
CPH Climate plan
05/10/2015 → 05/10/2015
København, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Transition towards Sustainable and Liveable Urban Futures
Period: 30 Sep 2015
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre

Description
Transition towards Sustainable and Liveable Urban Futures

Related event
Transition towards Sustainable and Liveable Urban Futures: JPI Urban Europe
30/09/2015 → 30/09/2015
Brussels, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Energi i planlægningen
Period: 9 Jun 2015
Per Sieverts Nielsen (Lecturer)
Department of Management Engineering
Systems Analysis
DTU Climate Centre

Documents:
By og trafikplanlægning DTU Transport kursus v1

Related external organisation
Unknown external organisation
Activity: Talks and presentations › Conference presentations

Smart City Conference and Exhibition in Amsterdam 2015
Period: 2 Jun 2015 → 5 Jun 2015
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Description
Smart City Conference and Exhibition in Amsterdam 2015

Related event
Smart City Conference and Exhibition in Amsterdam 2015
02/06/2015 → 05/06/2015
Amsterdam, Netherlands
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Integration of energy systems in the CITIES project
Period: 19 May 2015
Per Sieverts Nielsen (Speaker)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities
Documents:
DTU Water CITIES v2

Related external organisation
Unknown external organisation
Activity: Talks and presentations › Conference presentations

Use of KPI's in the Transform Project
Period: 4 Dec 2014
Per Sieverts Nielsen (Speaker)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Documents:
DTU Transform EERA VTT Dec2014

Related event
EERA Smart City JP Workshop in Helsinki
04/12/2014 → 05/12/2014
Helsinki, Finland
Activity: Talks and presentations › Conference presentations

Energiscenarier for Sønderborg
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Description
Energiscenarier for Sønderborg

Related event
Energiscenarier for Sønderborg
20/10/2014 → 21/10/2014
Sønderborg, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Energy Services and Demand
Period: 26 May 2014
Per Sieverts Nielsen (Lecturer)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities
Documents:
Energy Services CITIES - Nielsen 26-05-14

Related event
CITIES Annual Conference
26/05/2014 → 28/05/2014
Kgs. Lyngby, Denmark
Activity: Talks and presentations › Conference presentations

Generalforsamling i Dansk Byplanlaboratorium
Period: 21 May 2014
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre

Description
Generalforsamling Dansk Byplanlaboratorium

Related event
Generalforsamling i Dansk Byplanlaboratorium 2014
21/05/2014 → 21/05/2014
København, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

iPower Annual Conference 2014
Period: 13 May 2014
Per Sieverts Nielsen (Participant)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities

Description
iPower conference

Related event

iPower Annual Conference 2014: Smart Grid in Residential Buildings
13/05/2014 → 14/05/2014
Copenhagen, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

CITIES - WP1 – Energy services and demand: state of the art
Period: 29 Jan 2014
Per Sieverts Nielsen (Lecturer)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Centre for IT-Intelligent Energy Systems in Cities
Documents:
CITIES Kick off meeting WP1 29-01-14 Per Nielsen

 Related event

CITIES - Kick off meeting
29/01/2014 → 29/01/2014
Lyngby, Denmark
Activity: Talks and presentations › Conference presentations

Green Growth and Urban Development – European experiences.
Period: 25 Sep 2012
Per Sieverts Nielsen (Lecturer)
Department of Management Engineering
Systems Analysis
DTU Climate Centre
Documents:
Copenhagen green city Per Nielsen to Vietnam v2 part 1
Copenhagen green city Per Nielsen to Vietnam v2

 Related event

GGGI-VASS Capacity Building Workshop
25/09/2012 → 26/09/2012
Halong City, Viet Nam
Activity: Talks and presentations › Conference presentations