



Economies of Scale in Biogas Production

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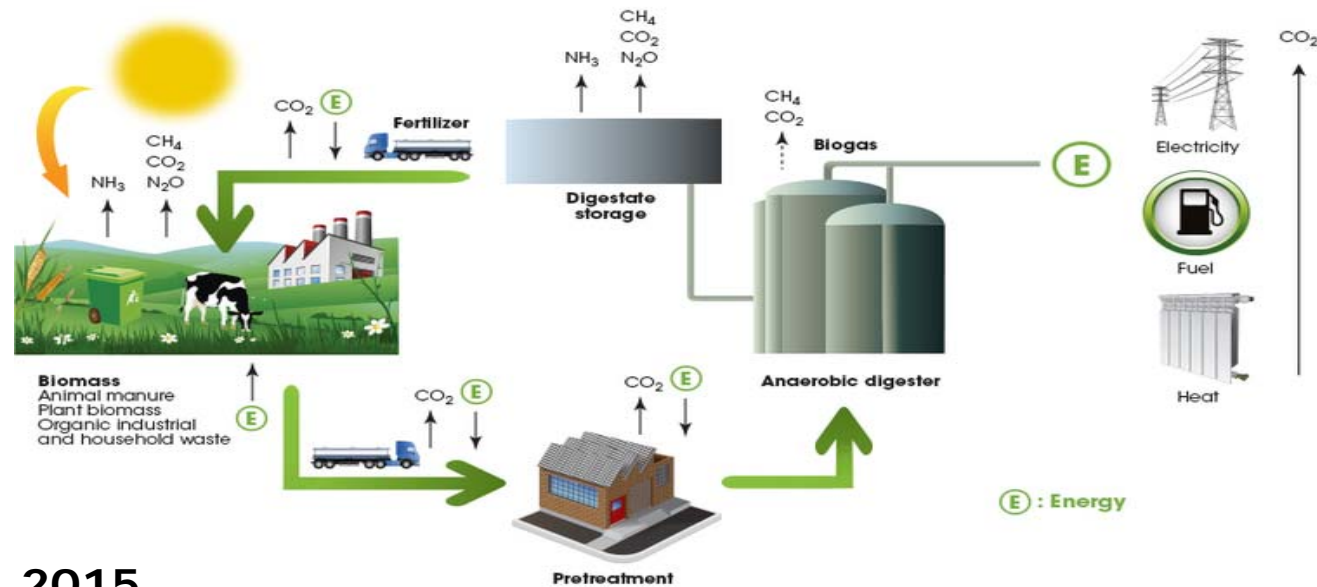
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Economies of Scale in Biogas Production and How to Organize Regulation



May 26, 2015

IAEE International Conference 2015 Antalya, Turkey

Session 25: Prospects of Biofuels

Lise Skovsgaard and Henrik Klinge Jacobsen

DTU Management Engineering

Department of Management Engineering

Economies of Scale in Biogas Production and How to Organize Regulation

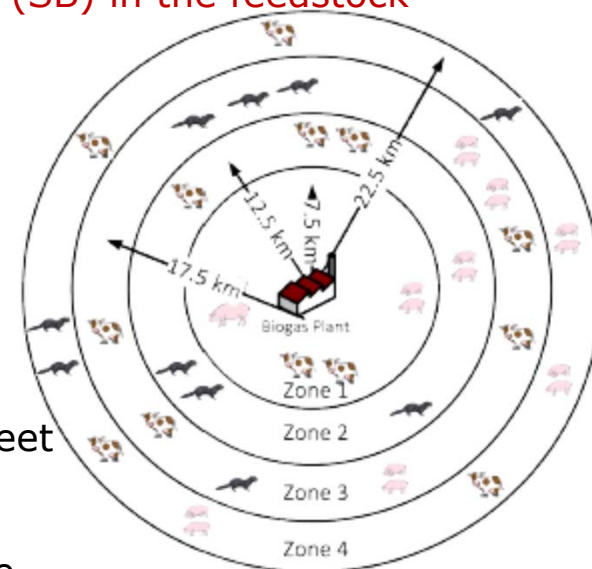
Agenda

1. The model
2. Focus on using only pig slurry, PSSB-0
 - Economy of scale
 - Sensitivity on net-income
 - Findings before sugar beet is added
3. When Sugar beet is added, PSSB-12.5 and PSSB-25
 - Economy of scale?
 - Cost factors
 - Findings on costs
4. Sensitivity on PSSB-12.5
5. Concluding remarks
6. Regulative implications

Economies of Scale in Biogas Production

The model: Feedstock, Scale and transport

- Three different plant sizes:
 - Small(110): 110.000 Mg of biomass p.a.
 - Medium(320): 320.000 Mg of biomass p.a.
 - Large(500) : 500.000 Mg of biomass p.a.
- Three mass-based ratios of Pig sludge (PS) and Sugar Beet (SB) in the feedstock are analysed:
 - PSSB-0: 100% PS, 0% SB
 - PSSB-12.5: 87.5% PS, 12.5% SB
 - PSSB-25: 75% PS, 25% SB
- Transport: Collection costs and density of resources
 - A specific location used, with actual distances
 - $$\Delta d_j(M_j) = \frac{m_{1j}}{M_j} r_1 + \sum_{i=2}^{o(M_j)-1} \frac{m_{ij}-m_{i-1,j}}{M_j} r_i + \frac{M_j-m_{nj}}{M_j} r_n$$
 - Trade off between short distance to manure or sugar beet
- Biogas sales – decision between upgrade or CHP
 - Small scale (biogas yield < 3.5 mill m3) => no upgrade
 - Large scale (biogas yield > 3.5 mill m3) => upgrade

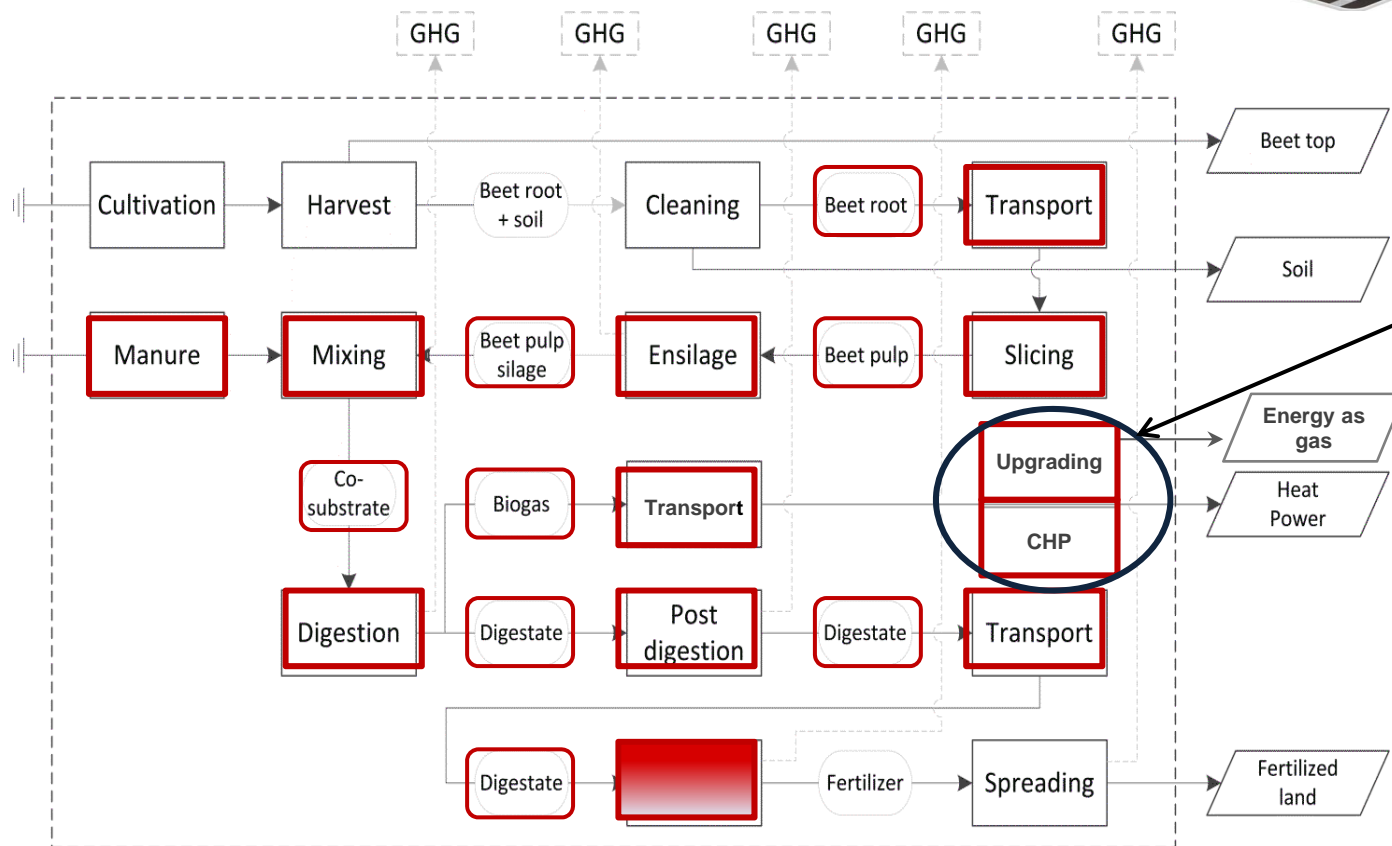
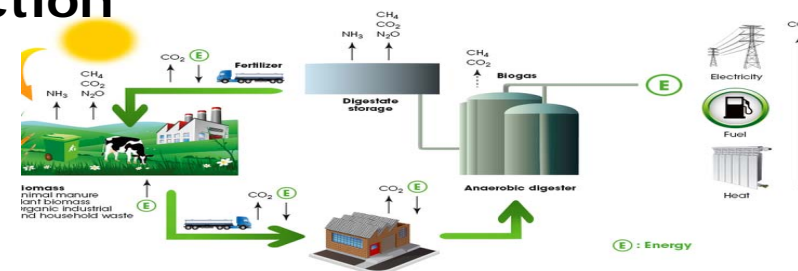


Economies of Scale in Biogas Production

The model

- The entire biochain

=> **The economic model – the plant view**

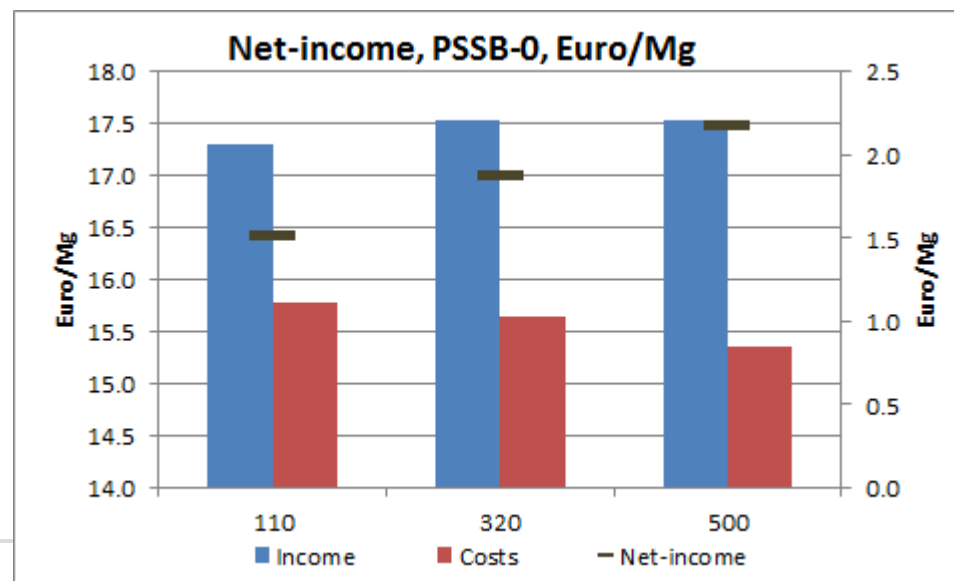


Upgrade when biogas yield > 3.5 mill m3,
CHP when yield < 3.5 mill m3

Scale effects – economies of scale?

Expectations and overall results – PSSB-0

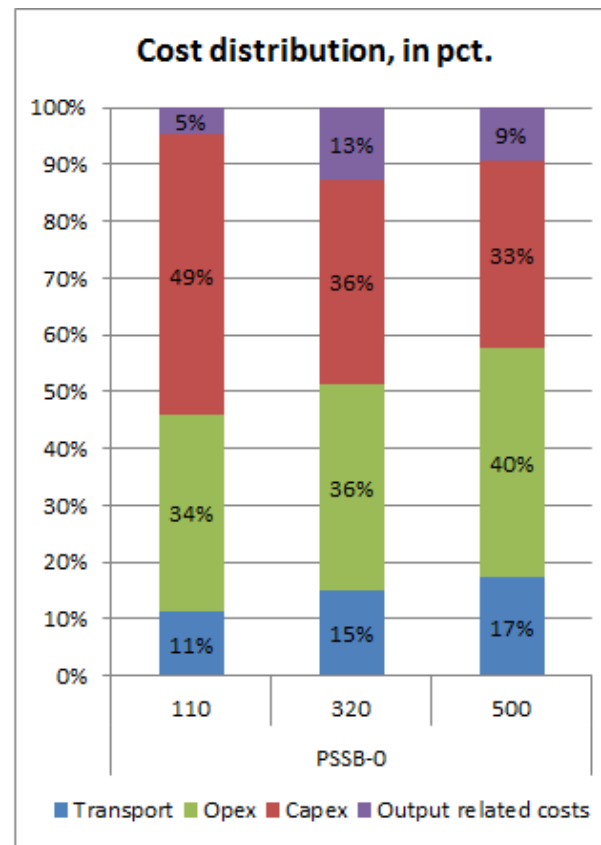
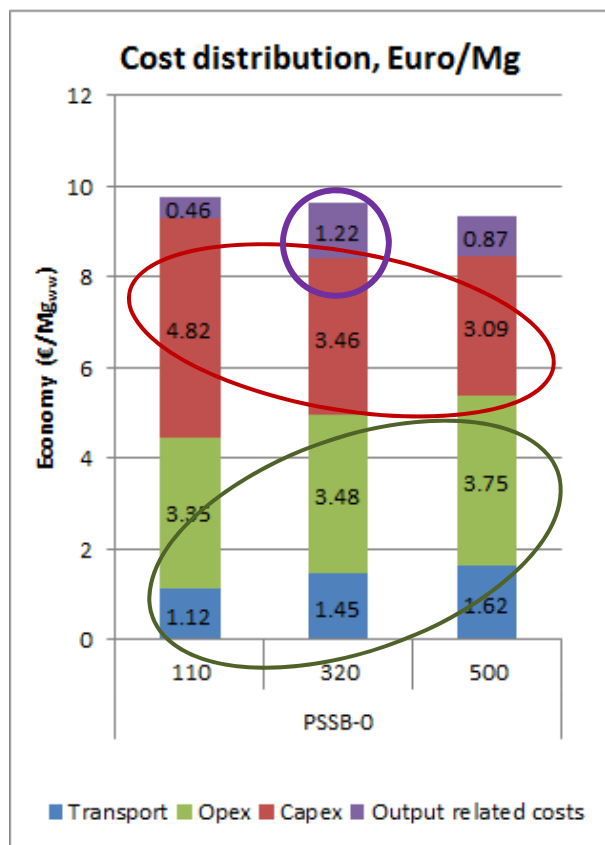
- Clear signs of economy of scale within PSSB-0 case
- Expectations
 - positive effect from capex
 - negative effect from transport



Net-income PSSB-0, Euro/Mg			
Ratio\Scale	110	320	500
Income	17.30	17.30	17.53
Costs	15.78	15.65	15.35
Net-income	1.52	1.65	2.18

Economy of scale – PSSB-0

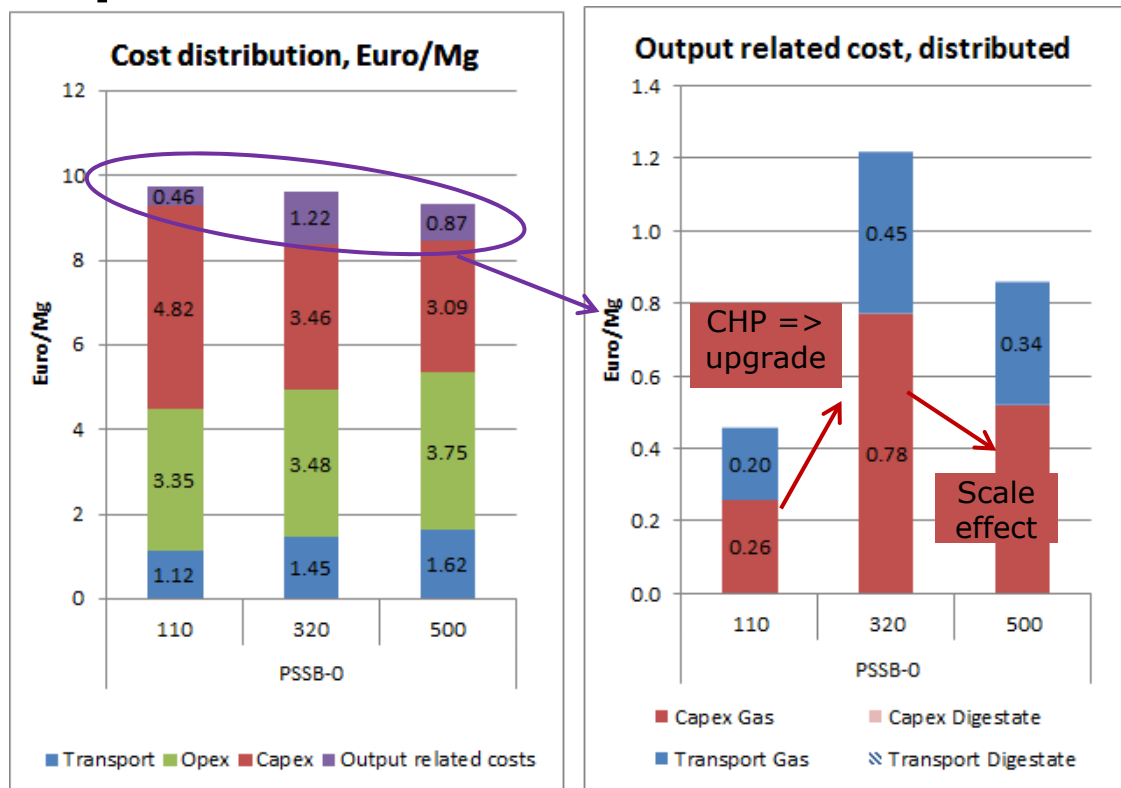
Cost distribution



- Clear sign of economy of scale
 - Trade off between capex and rising opex + transport costs –
 - Output related costs....?

Economy of scale – PSSB-0

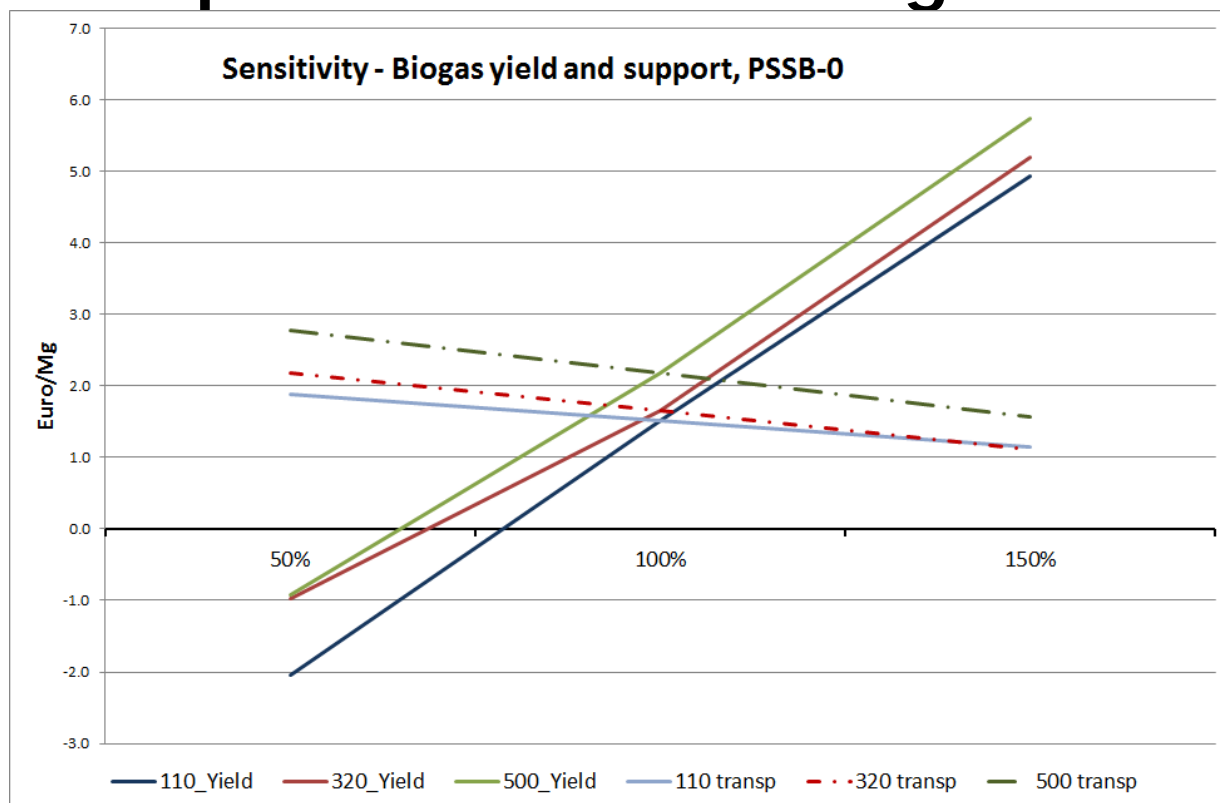
Output related costs



- Cost rise in capex and gas transport from small to medium size => change from CHP to Upgrade
- Economy of scale in Upgrade with cost reduction – from medium to large scale

Sensitivity on net income – PSSB-0

Effect on net income, with changes in Transport distance or Biogas Yield



- Net income robust compared to transport in the PSSB-0 case
- Regulative implications:
 - Biogas yield is important

Findings

– before sugar beet is added

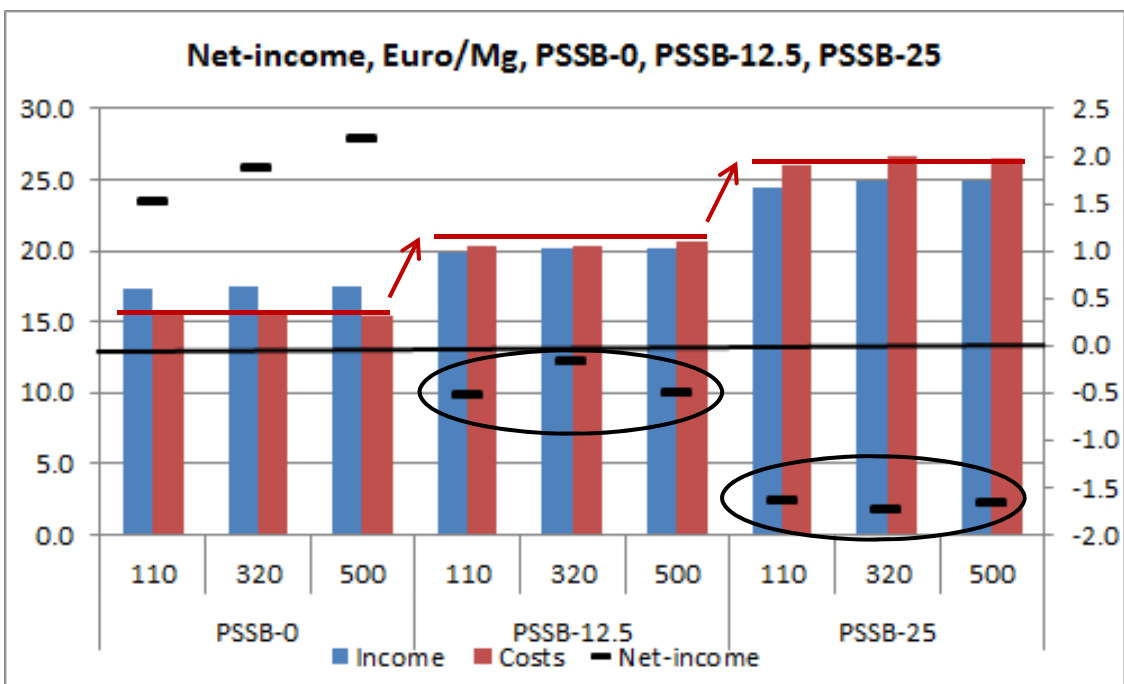
We find:

- Economy of scale when sugar beet is not added (case PSSB-0)
- Positive Net-income
 - Transport are costs not significant
 - Biogas yield important for results

=>=> Let's add a co-substrate e.g. Sugar beet

Adding sugar beet (SB) as input

Results PSSB-0 vs. PSSB-12.5 and PSSB-25



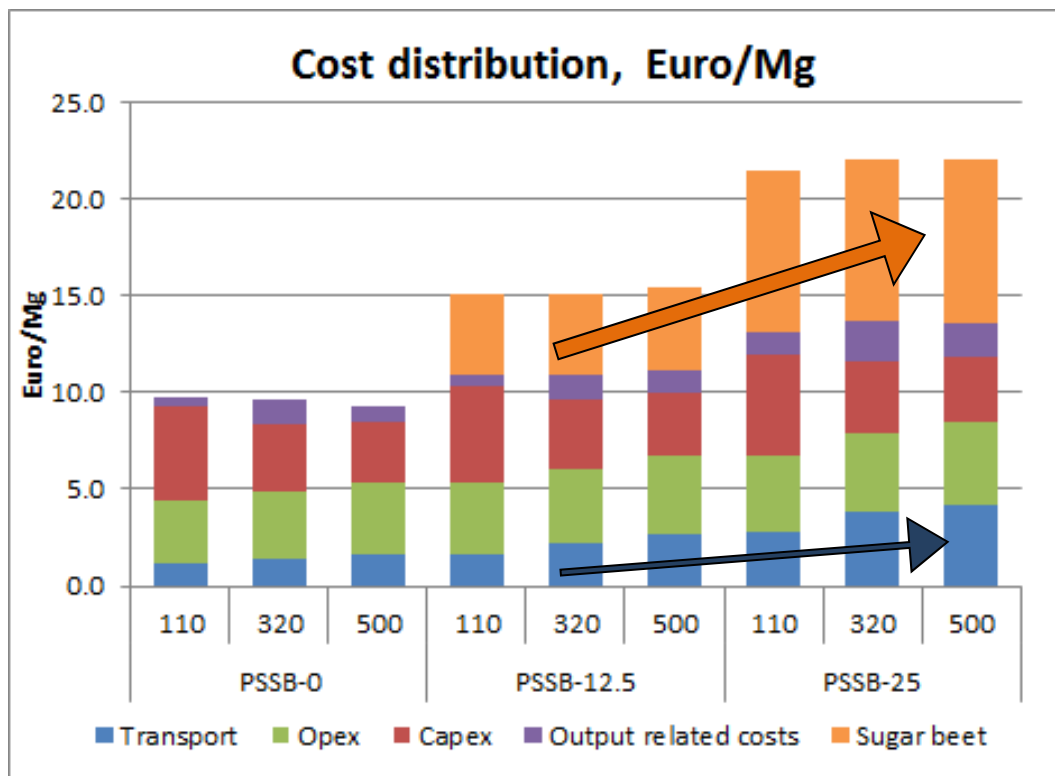
Increasing the share of beet

– initial observations

- Negative net-income in PSSB-12.5 and PSSB-25
- Unit Cost increase > Income increase
- Level of unit costs increases along with added sugar beet (SB)

Adding sugar beet (SB) as input

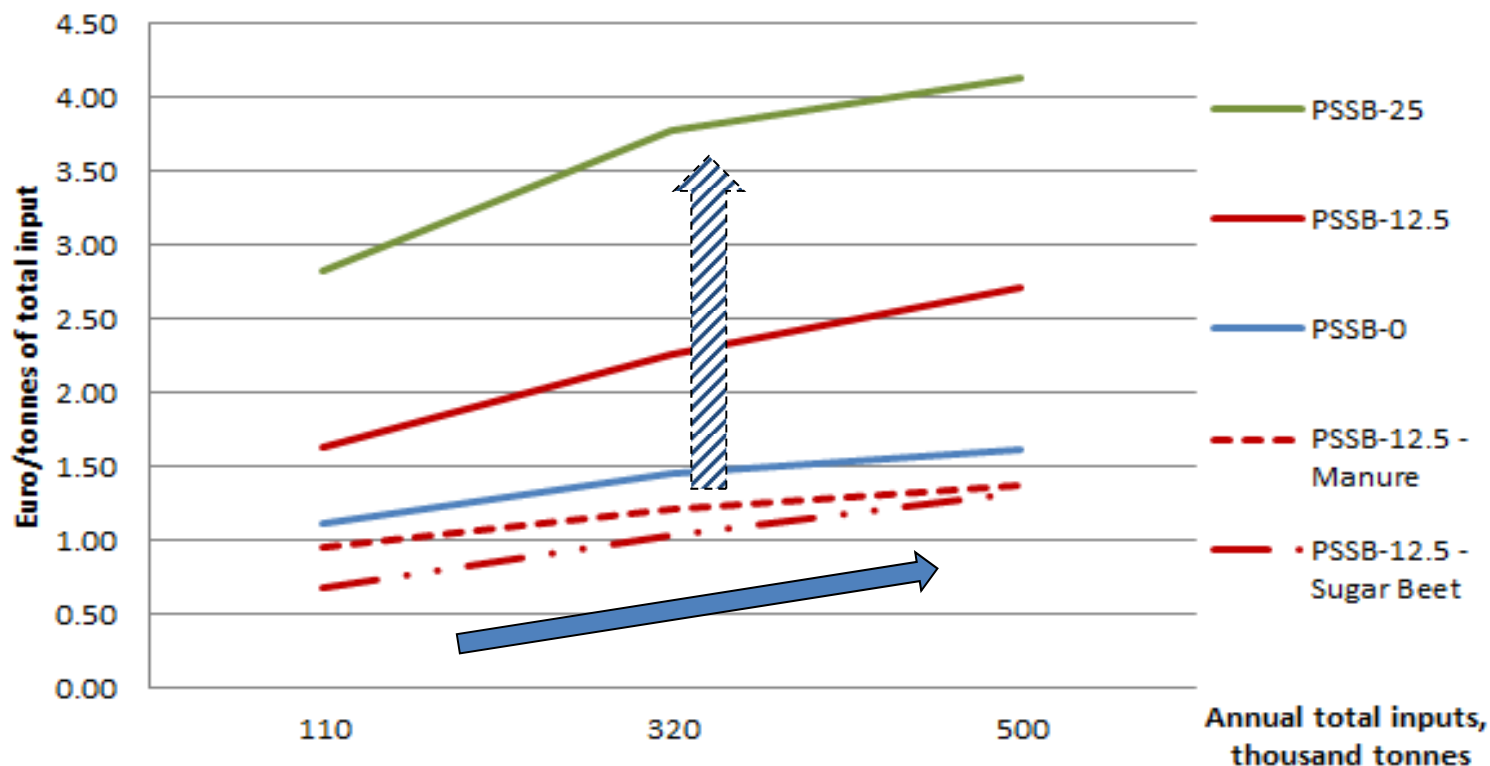
Results PSSB-0 vs. PSSB-12.5 and PSSB-25



1. Sugar beet price >> manure price
2. Increased transport cost
 1. longer distance
 2. one-way transport
3. Output related costs

Adding sugar beet (SB) as input Effect on transport costs

Rising transport cost per unit of total input



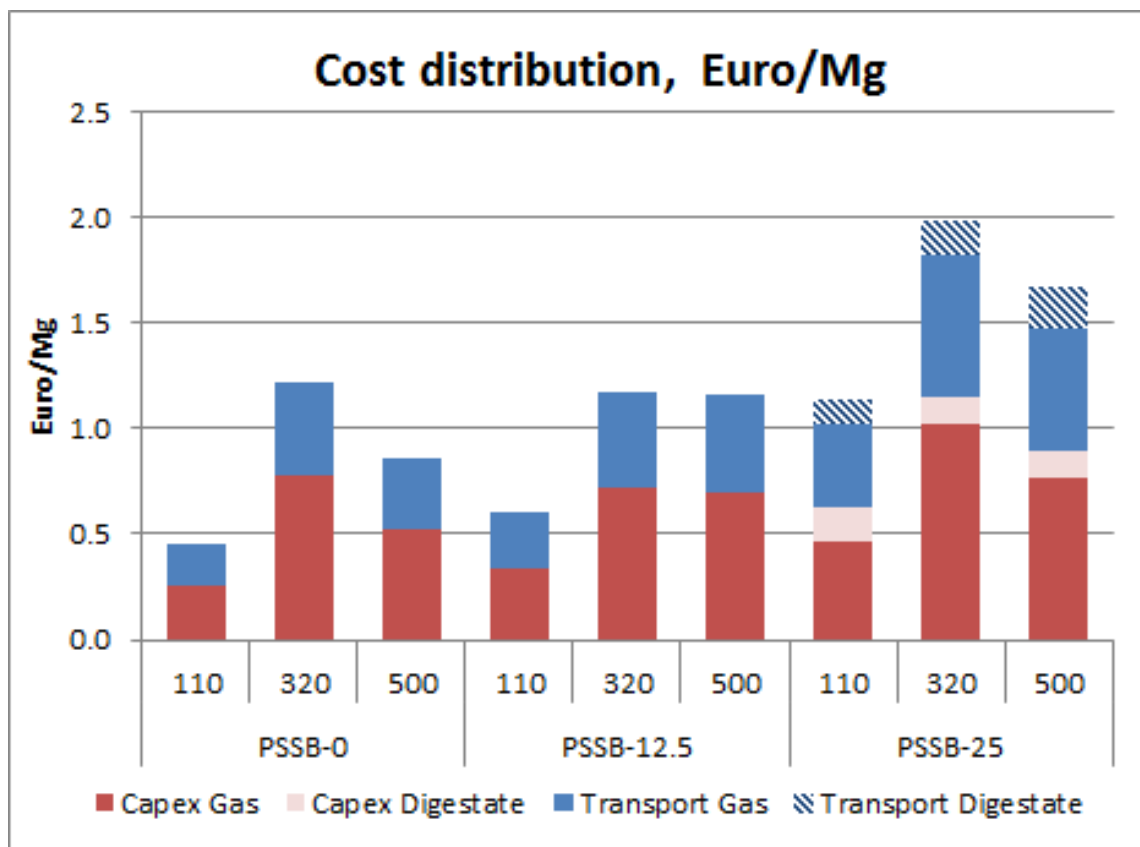
Increase in transport cost due to:

- higher beet share
- size of plant

Adding sugar beet (SB) as input

Output related costs

- Scale effects on output costs
 - CHP=> upgrade
 - Upgrade technology
- In PSSB-25 case additional costs with digestate
 - Storage and
 - Transport



Findings on costs

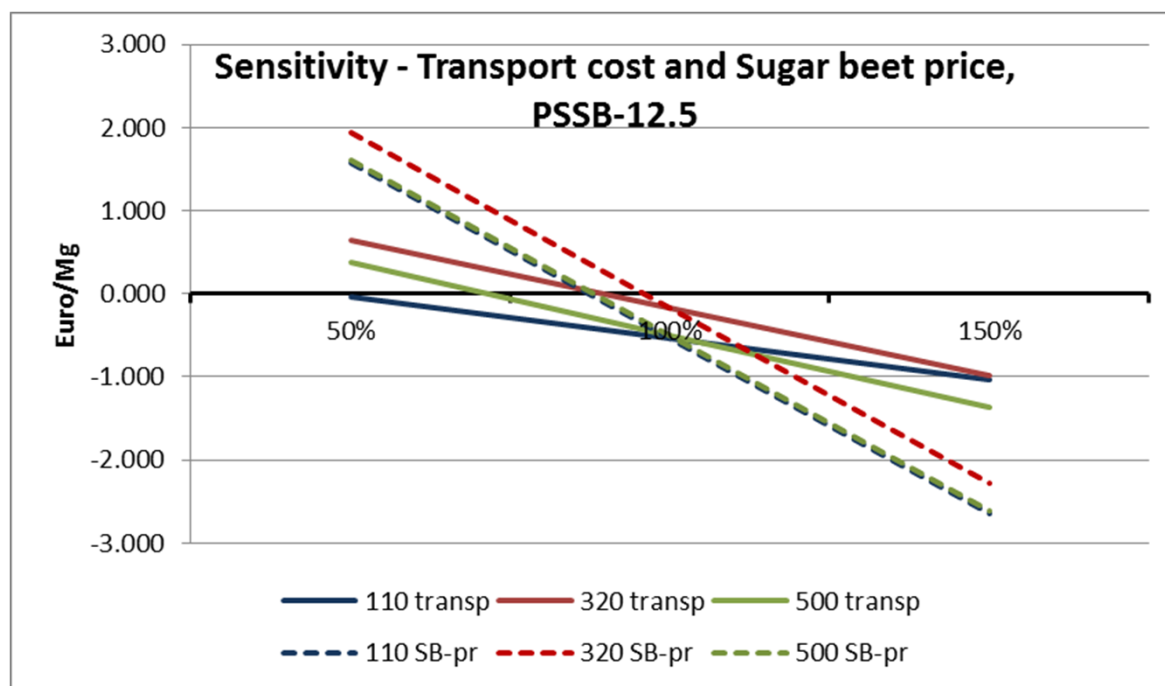
– When sugar beet is added

We find:

- Tendency to Economy of scale in:
 - Capex: all cases (case PSSB-0, PSSB-12.5 and PSSB-25)
- Overall the positive scale effect in Capex is outweighed by transport, Opex and in output related costs
- General costs remarks, when sugar beet is added
 - Generally higher costs allround – particularly in
 - Sugar beet costs
 - Transport costs
 - Opex

Sensitivity on Net income – adding sugar beet as input PSSB-12.5

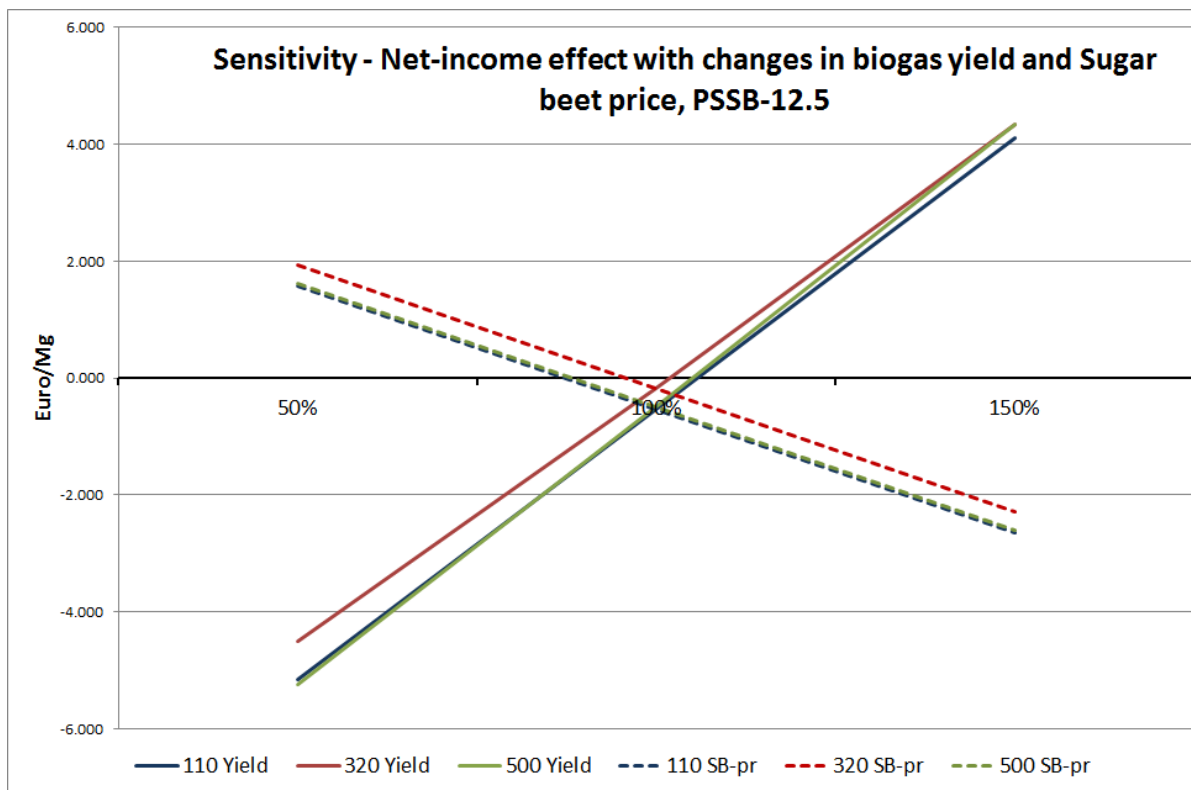
Effect on net-income, when **sugar beet** or **transport costs** are changed



- A reduction in transport costs can hardly turn the negative net-income, while a significant reduction in sugar beet price can

Sensitivity on Net income – adding sugar beet as input - PSSB-12.5

Effect on net-income, when **Biogas yield** or **sugar beet costs** are changed



- Yield still seems to have the higher influence on net-income

Overall concluding remarks

Economy of scale

- Economy of scale in capex ↑
 - Potential in large scale production and upgrading
- Transport costs ↓
 - Transport plays a significant role, particularly when sugar beet is added =>
 - Try to "buy local" (feed-stock and manure) =>

Net-income effects – critical parameters

- Input price
 - Sugar beet price is high and dominates costs in PSSB-12.5 and PSSB-25 => relevant with flexible input demand
- Yield
 - Yield seems to be the highest factor on net income results => focus on yield

Overall concluding remarks

- regulative implications

Concluding remarks

- Economy of scale
- Transport costs important
- Input price important
- Yield important

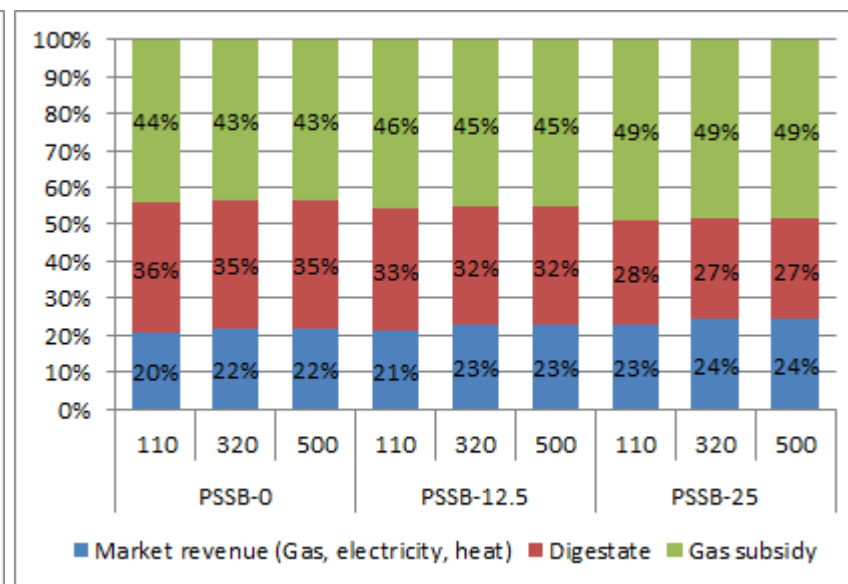
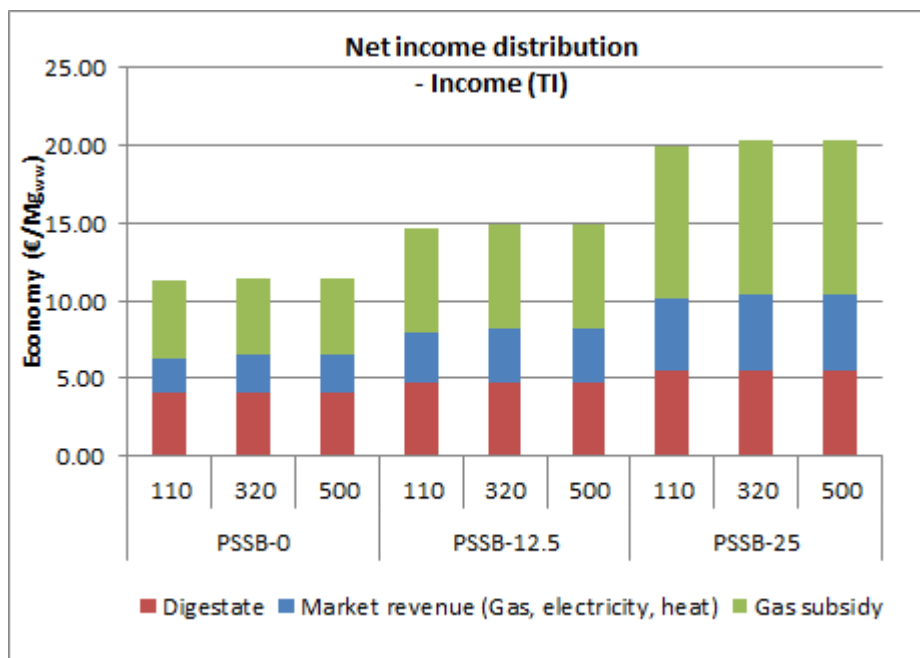
Regulative implications

- Economy of scale
 - Support/allow large scale facilities and upgrading
- Transport costs
 - Facilitate (do not hinder) use of local feedstock =>
- Input price
 - Facilitate flexible input =>
- Yield
 - Facilitate high yield =>

⇒ Reconsider restrictions on potential input
 ⇒ the effects on biogas income,
 compared to other considerations



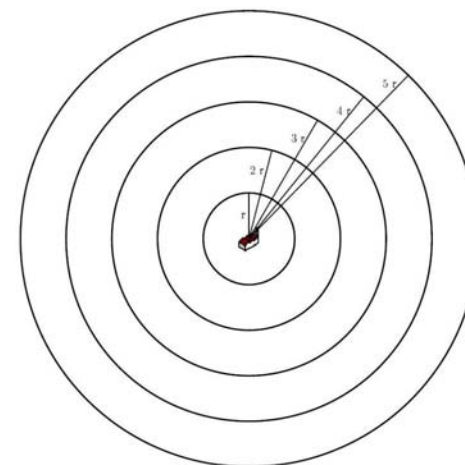
Additional – Income distribution



Additional – Transport formula_1

- The available pig slurry and sugar beet are divided into the amount available within the different radii and, by doing this, the average transportation distance (Δd) can be calculated as follows:
- $$\Delta d_j(M_j) = \frac{m_{1j}}{M_j} r_1 + \sum_{i=2}^{o(M_j)-1} \frac{m_{ij}-m_{i-1,j}}{M_j} r_i + \frac{M_j-m_{nj}}{M_j} r_n$$
- where m_{ij} is the mass of biomass j available in circle i ; M_j is the total mass of biomass j needed for the specific setting of plant size and ratio; r_j is the radius of circle i ; and $o(M_j)$ is the last circle needed for satisfying the requested demand. The average transportation distance (Δd , in km) for the different input mix is estimated in the table

Input	Unit	Input	Plant capacity (1'000 Mg)		
			110	320	500
PSSB-0	km	Sugar beet	0	0	0
	km	Pig slurry	6.1	8.9	10.3
PSSB-12.5	km	Sugar beet	23.2	44.0	60.9
	km	Pig slurry	5.9	8.4	9.9
PSSB-25	km	Sugar beet	42.9	65.1	70.4
	km	Pig slurry	5.5	7.6	9.5

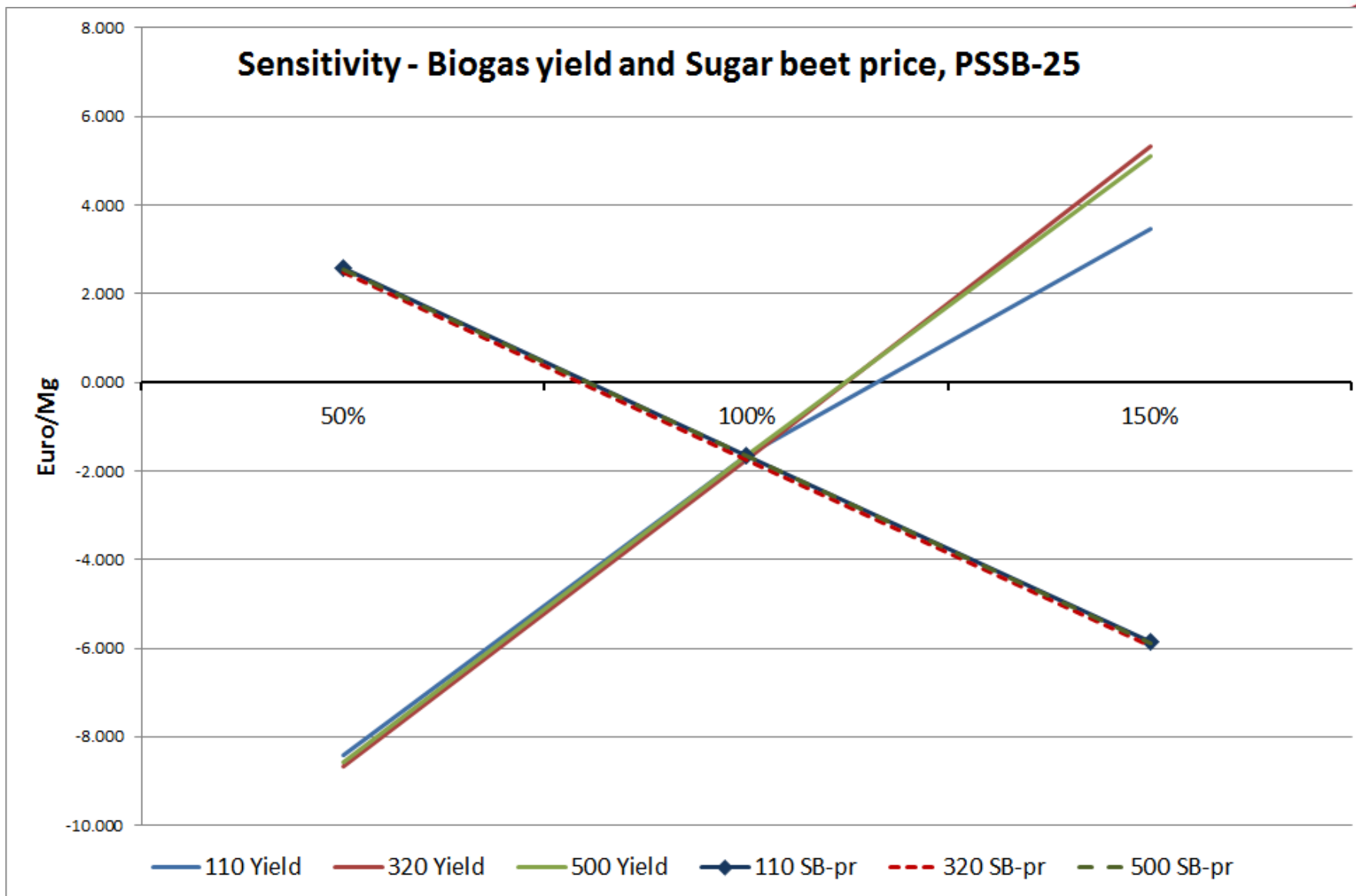


Additional – Transport formula_2

- After applying the formula for all plant sizes and ratios, the cost of collecting the pig slurry and sugar beet ($C_{trans,in}$) can be calculated as follows:

- $$C_{trans,in}(M_j) = \sum_{j \in J} \left(2 \cdot \frac{M_j \cdot \Delta d_j(M_j) \cdot p_j^{trans}}{cap_j \cdot \rho_j \cdot v_j} + \frac{M_j \cdot (t_j^{load} \cdot p_j^{load} + t_j^{unload} \cdot p_j^{unload})}{cap_j \cdot \rho_j} \right)$$

- The first fraction represents the cost of transporting the biomass, and the parameters represent: p_j^{trans} , the price for transporting biomass type j ; v_j is the speed of the truck used for transporting the biomass j (i.e. 50 km/hour); cap_j is the capacity of the truck used for biomass type j (i.e. 31.2 and 35 Mg/load for sugar beet and pig slurry respectively); and ρ_j is the density of biomass type j (i.e. 1 and 0.65 Mg/m³ for sugar beet and pig slurry respectively). The fraction is multiplied by 2, as the truck has to return to the plant after delivering the biomass. In case the trip is about pig slurry transport, the trip out to the farmer will include the delivery of digestate. An estimation of the transportation costs (€) on an annual basis is provided in Table S14. The second fraction represents the costs of loading and unloading the truck, and the parameters represent: $t_j^{load} / t_j^{unload}$ is the time for loading/unloading biomass type j ; $p_j^{load} / p_j^{unload}$ is the hourly price of loading/unloading (i.e. 87 and 104 €/hour for sugar beet and pig slurry respectively)





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Conference Program

Quick Links: [Sunday, 24 May](#) | [Monday, 25 May](#) | [Tuesday, 26 May](#) | [Wednesday, 27 May](#)

SUNDAY, 24 MAY 2015

IAEE COUNCIL MEETING (BY INVITATION)

9:00am - 5:00pm • Gloria Serenity Faces 3

IAEE COUNCIL LUNCH (BY INVITATION)

12:30pm - 1:30pm • Gloria Serenity Main Restaurant

WORKSHOP: "OPTIMIZING YOUR PRESENTATION SKILLS"

10:00am - 12:30pm • Gloria Serenity Faces 1

[Click for more information](#)

WORKSHOP: "SHALE GAS IN NORTH AMERICA"

2:00pm - 5:00pm • Gloria Serenity Faces 1

[Click for more information](#)

PHD DAY SESSION

1:15pm - 6:00pm • Gloria Serenity Faces 2

STUDENT HAPPY HOUR

6:00pm - 7:00pm • Gloria Serenity Lobby Bar Terrace

REGISTRATION

12:00n - 6:30pm • Gloria Golf Convention Center

OPENING RECEPTION

7:00pm - 8:30pm • Acisu Green Area

MONDAY, 25 MAY 2015

REGISTRATION

7:00am - 7:00pm • Saka

STUDENT BREAKFAST MEETING

8:30am - 9:30am • Manyas 3

TUESDAY, 26 MAY 2015

REGISTRATION

7:00am - 6:30pm • Saka

EUROPEAN AFFILIATE LEADERSHIP MEETING

7:30am - 8:30am • Turna 2-3

WEDNESDAY, 27 MAY 2015

REGISTRATION

7:00am - 6:00pm • Saka

2016 IAEE INTERNATIONAL CONFERENCE PLANNING MEETING

7:30am - 8:30am • Anka 1-2

IAEE AFFILIATE LEADERS MEETING

8:30am - 9:30am • Turna 2-3

WELCOME, PRESIDENTIAL ADDRESS & KEYNOTE SESSION: CLIMATE CHANGE

10:00am - 12:00n • Entertainment Center

Prof. Gürkan Kumbaroğlu (Presiding)
President Elect, IAEE; Boğaziçi University, Turkey

Mr. Masakazu Toyoda
Chairman and CEO, The Institute of Energy Economics, Japan

Dr. Jim Plummer
President, Climate Economics Foundation, USA

Dr. Michael Canes
Distinguished Fellow, Logistics Management Institute, USA

Prof. Richard Tol
University of Sussex, UK

PHOTOGRAPHY EXHIBITION OPENING

12:15 • Gloria Convention Center

LUNCH

12:20pm - 1:30pm • Anatolia Restaurant, Gloria Golf Resort

DUAL PLENARY SESSION: GEOPOLITICS OF GAS[\(Click for session description\)](#)

1:30pm - 3:00pm • Manyas 1

Dr. Tatiana Mitrova (Presiding)
Head of Oil and Gas Department, Energy Research Institute of the Russian Academy of Sciences (ERIRAS), Russia

Mr. Leonid Grigoryev
Chief Adviser to the Head of Analytical Center of the Government of the Russian Federation, Russia

Prof. Peter Hartley
President, IAEE; University of Western Australia, Australia

Dr. Xunpeng Shi
Senior Fellow, Energy Studies Institute, National University of Singapore, Singapore

DUAL PLENARY SESSION: ELECTRICITY FINANCE AND ELECTRICITY MARKET DESIGN[\(Click for session description\)](#)

1:30pm - 3:00pm • Manyas 2

Prof. Georg Erdmann (Presiding)
Berlin University of Technology, Germany

Prof. Lars Bergman
Stockholm School of Economics, Sweden

Mr. Christophe Bonnery
Director, Economics and Prospective, ERDF, France

EJ BOARD OF EDITORS MEETING

7:30am - 8:30am • Kumru

EERP BOARD OF EDITORS MEETING

7:30am - 8:30am • Anka 1-2

DUAL PLENARY SESSION: OIL AND GAS TRANSPORT ISSUES

8:30am - 10:00am • Manyas 1

Prof. Ilhan Or (Presiding)
Graduate Institute Director, Bogazici University, Turkey

Prof. Ivan Gudkov
Moscow State University of International Affairs, Russia

Mr. Nedim Özyol
Deputy General Manager, Botaş, Turkey

Dr. S. M. Hossein Adeli
Sec. General, Gas Exporting Countries Forum, GECF, Qatar

Dr. Jennifer Coolidge
Executive Director, CMX Caspian and Gulf Consultants, Iraq

DUAL PLENARY SESSION: LONG TERM LOW CARBON DEVELOPMENT PATHWAYS[\(Click for session description\)](#)

8:30am - 10:00am • Manyas 2

Prof. Ying Fan (Presiding)
Member, Academy of Science, China

Prof. Wenyang Chen
Institute of Energy, Tsinghua University, China

Prof. Andreas Löschel
Center for Applied Econ. Research, University of Münster, Germany

Dr. Olav Peter Hypher
Country Manager, Statkraft, Turkey

COFFEE BREAK

10:00am - 10:30am • Foyer area

CONCURRENT SESSIONS10:30am - 12:00n • [Click here for details](#)**LUNCH**

12:15pm - 1:30pm • Anatolia Restaurant, Gloria Golf Resort

DUAL PLENARY SESSION: GEOPOLITICS OF OIL WITH FOCUS ON MIDDLE EAST AND AFRICA

1:30pm - 3:00pm • Manyas 1

Dr. Carlo Andrea Bollino (Presiding)
President, AIEE, Italy

ASIAN AFFILIATE LEADERSHIP & PERTH 2016 CONFERENCE PLANNING MEETING

7:30am - 8:30am • Turna 2-3

DUAL PLENARY SESSION: NEW ENERGY TECHNOLOGIES AND THEIR STATUS

8:30am - 10:00am • Manyas 1

Prof. Reinhard Madlener (Presiding)
RWTH Aachen University, Germany

Dr. Akira Yoshino
General Manager, Yoshino Lab., Asahi Kasei Corp, Japan

Dr. Sean McCoy
CCS Unit, IEA, France

Dr. David Mooney
Director, Strat. Ener. Anal., National Renewable Energy Lab, USA

DUAL PLENARY SESSION: ENERGY ACCESS[\(Click for session description\)](#)

8:30am - 10:00am • Manyas 2

Prof. Wumi Iledare (Presiding)
Director, Emerald Energy Inst., University of Port Harcourt, Nigeria

Prof. Adeola Adenikinju
Director, Center for Energy Econ., University of Ibadan, Nigeria

Dr. Shonali Pachauri
Energy Prog.Intl. Inst. for Applied Syst. Anal. (IIASA), Austria

Dr. Ricardo Raineri
Former Energy Minister, Chile

COFFEE BREAK

10:00am - 10:30am • Foyer area

CONCURRENT SESSIONS10:30pm - 12:00n • [Click here for details](#)**LUNCH**

12:15pm - 1:50pm • Anatolia Restaurant, Gloria Golf Resort

CONCURRENT SESSIONS1:30pm - 3:00pm • [Click here for details](#)**COFFEE BREAK**

3:00pm - 3:30pm • Foyer area

DUAL CLOSING PLENARY SESSION: INTERNATIONAL IMPLICATIONS OF US ENERGY RENAISSANCE[\(Click for session description\)](#)

Ms. Silvia Kreibiehl
Head, UNEP Collaborating Center for Climate and Sustainable Energy, Frankfurt School of Finance, Germany

COFFEE BREAK & STUDENT POSTER SESSION

3:00pm - 3:30pm • Foyer Area
[Click for poster session details](#)

Sponsored By: Turcas

CONCURRENT SESSIONS

3:30pm - 5:00pm • [Click here for details](#)

CONCURRENT SESSIONS

5:15pm - 6:45pm • [Click here for details](#)

DINNER

7:00pm - 8:30pm • Anatolia Restaurant, Gloria Golf Resort

CONFERENCE NETWORKING RECEPTION

9:00pm - 11:00pm • Gloria Golf Course

Mr. Timothy Okon
Director, Nigerian National Petroleum Corporation, Nigeria

Dr. James Smith
Cary Maguire Chair in Oil and Gas Management, Southern Methodist Univ., USA

Mr. Sinan Ülgen
Chairman, Center for Econ. & Foreign Policy Studies, Turkey

DUAL PLENARY SESSION: ENERGY EFFICIENCY

[\(Click for session description\)](#)

1:30pm - 3:00pm • Manyas 2

Prof. Einar Hope (Presiding)
Norwegian School of Economics, Norway

Prof. James Sweeney
Director, Precourt Energy Eff. Center, Stanford University, USA

Mr. Samuel Thomas
Energy Efficiency Unit, IEA, France

Mr. Torkil Tyvold
Business Development, Norsk Hydro, Norway

COFFEE BREAK

3:00pm - 3:30pm • Foyer Area

CONCURRENT SESSIONS

3:30pm - 5:00pm • [Click here for details](#)

IAEE AWARDS CEREMONY

5:00pm - 6:30pm • Manyas 2

IAEE GENERAL MEMBERSHIP MEETING

6:30pm - 7:00pm • Turna 1

DINNER

7:00pm - 9:00pm • Anatolia Restaurant, Gloria Golf Resort

GLORIA WIDE ENTERTAINMENT

9:45pm - 10:30pm • Entertainment Center

GLORIA WIDE ISTANBUL PARTY

10:00pm - Midnight • []

3:30pm - 5:15pm • Manyas 2

Dr. Mine Yücel (Presiding)
Vice President, Federal Reserve Bank Dallas, USA

Prof. Hillard Huntington
Exec. Director, Energy Modeling Forum, Stanford Univ., USA

Dr. Zhen Wang
Dep. Dir. Gen., Policy Res., China Nat. Petroleum Corp., China

Mr. Laszlo Varro
Head, Gas, Coal & Electricity Markets, IEA, France

Prof. Scott Tinker
Director, BEG, University of Texas, Austin, USA

DUAL CLOSING PLENARY SESSION: AN INTEGRATED EURO-MEDITERRANEAN ENERGY MARKET

[\(Click for session description\)](#)

3:30pm - 5:15pm • Manyas 1

Ms. Silvia Pariente-David (Presiding)
Senior Energy Specialist

Mr. Abdelaziz Rassaa
Former Minister of Industry and Technology of Tunisia, Tunisia

Dr. Samuel Furfari
Advisor to Director General of Energy, European Commission

Mr. Hasan Hüseyin Erdogan
Deputy Head of Strategy Development, Ministry of Energy and Natural Resources, Turkey

Ms. Dayae Oudghiri
Member of the Board, MASEN, Morocco

CLOSING REMARKS

5:00pm - 5:15pm • Manyas 2





Concurrent Sessions

[1-9](#) | [10-19](#) | [20-30](#) | [31-41](#) | [42-52](#) | [53-63](#)

<p>CONCURRENT SESSIONS 1-9 Monday, May 25, 3:30pm - 5:00pm</p>
<p>1. Geopolitics of Gas 1 (Manyas 2)</p>
<p>Michael E. Canes, Presiding Distinguished Fellow Logistics Management Institute</p>
<p>New Alignments and the Security of Supply in the EU Countries: Investigating the Role of Russia and Iran With a Game Theoretic Approach Hamed Sahebbonar Ferdowdi University View Extended Abstract View Paper</p>
<p>Future of Natural Gas in EU: Will Geopolitics Take over Economics? Yuri Yegorov Jalal Dehnavi Franz Wirl University of Vienna View Abstract View Paper</p>
<p>Changes in EU Future Natural Gas Supply and the Role of Turkish Hub Jalal Dehnavi University of Vienna Aveed Raha Phd Student Yuri Yegorov Senior Researcher View Abstract</p>
<p>The European Union's Energy Security: the Case of Natural Gas Supply Boyko Nitzov Damjan Zagožen Agency for the Cooperation of Energy Regulators View Extended Abstract View Paper</p>
<p>Natural Gas Supply Diversification in Eastern Europe and Long-Term Opportunities from Domestic Shale Gas Resources: A Modelling Approach Using the Global Gas Model Fabian Stähr DIW Berlin, RWTH Aachen University Philipp M Richter Franziska Holzer DIW Berlin Reinhard Madlener Christoph Hilgers RWTH Aachen University View Abstract</p>
<p>^ Back to top</p>
<p>2. Risk Issues in Electricity Markets (Manyas 1)</p>
<p>Baris Sanli, Presiding Head of LPG Department Energy Market Regulatory Authority</p>
<p>Flexibility-Enabling Contracts in Electricity Markets Rahmat Poudineh Oxford Institute for Energy Studies Luis Boscán Department of Economics, Copenhagen Business School View Abstract</p>
<p>The Impact of Market Liberalisation on Investment in Electricity Sector in ASEAN Tue Anh Nguyen University of Greenwich View AbstractN View Paper</p>

The Value of ICT Platform Investments within Distributed Energy Systems

Ernesto M Garnier
 Reinhard Madlener
 RWTH Aachen University
[View Abstract](#)

Day-ahead Power Prices Influenced by Intermittency: Effect on the Forward Risk Premium

Mehtap Kilic
 Erasmus School of Economics
[View Extended Abstract](#) | [View Paper](#)

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3. Climate Change 1 (Anka 1-2)

Jean-Michel Glachant, Presiding
 Director, Florence School of Regulation
 European University Institute

Evaluating Multiple Emission Pathways for Fixed Cumulative CO₂ Emissions from Socioeconomic Perspectives

Ken'ichi Matsumoto
 The University of Shiga Prefecture
 Michio Kawamiya
 Kaoru Tachiiri
 Japan Agency for Marine-Earth Science and Technology
[View Extended Abstract](#) | [View Paper](#)

R&D, Endogenous Substitution and Climate Change

Youngho Chang
 Di Yin
 Yang Tang
 Nanyang Technological University
[View Abstract](#)

Convergence of Carbon Dioxide Performance Across Swedish Industrial Sectors: An Environmental Index Approach

Runar Brännlund
 Professor, Centre for Environmental and Resource Economics, Umeå University
[View Abstract](#)

Climate Change Beliefs, Ideological Orientation, and Environmental Values: An Empirical Cross-country Analysis

Andreas Ziegler
 University of Kassel
[View Extended Abstract](#)

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4. IAEE Student Best Paper Award Competition (Kirlangic 3)

Einar Hope, Presiding
 Professor of Energy Economics
 Norwegian School of Economics & Bus. Admin.

Welfare Implications of Capacity Markets in the Electricity Sector

Raul Bajo-Buenestado
 Rice University
[View Extended Abstract](#) | [View Paper](#)

Market Failure Caused by Wind-Power Integrations in a Competitive Electricity Market with Transmission Congestions

Yang Yu
 Stanford University
[View Extended Abstract](#) | [View Paper](#)

The Impact of Environmental Policy on Welfare and Growth

Giacomo A Schwarz
 ETH Zurich & MIT
[View Extended Abstract](#) | [View Paper](#)

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5. Electricity Modelling (Turna 1)

Reinhard Madlener, Presiding
 Full Professor of Energy Econ Mgt
 RWTH Aachen University

Demand Response – Temporal Availability and Actual Use for the Electricity System

Theresa Müller
 Chair of Energy Economics, TU Dresden
[View Extended Abstract](#)

Long-term Strategies to Ensure a Robust Performance of the European Electricity System

Paul Nahmmacher

Michael Pahle

Eva Schmid

Potsdam Institute for Climate Impact Research (PIK)

Brigitte Knopf

Mercator Research Institute on Global Commons and Climate Change (MCC)

[View Extended Abstract](#)**Load Aggregation Pricing in Germany – Zonal Producer Prices with Uniform Customer Price**

Dominik Schober

ZEW (Center for European Economic Research)

[View Abstract](#)**Forecasting Electricity Consumption with Markov Switching Autoregressive Model**

Gülsüm Akarsu

Ondokuz Mayıs University

[View Extended Abstract](#) | [View Paper](#)**Toward a New Pricing Scheme in the Electricity Retail Market**

Kwami Senam A Sedzro

Alberto J Lamadrid

Mooi Choo Chuah

Lehigh University

[View Abstract](#)[^ Back to top](#)**6. Energy Forecasting 1** (Turna 2-3)

Lars Bergman, Presiding

Former President and Professor

Stockholm School of Economics

Market Fundamentals and the Dynamics of Natural Gas Futures Volatility: An Augmented GARCH Approach

Islam Rizvanoghlu

Zirve University

Ibrahim Ergen

Federal Reserve Bank of Richmond

[View Extended Abstract](#)**Will the EU Reach its 2020 Targets for Renewable Energy? A Critical Evaluation of the Model-based Progress Assessment**

Lukas Liebmann

Gustav Resch

Vienna University of Technology, Energy Economics Group (EEG)

[View Abstract](#)**Dynamic Forecast Combination under Consideration of a Error Forecast Model for Prediction of Wind Energy**

Mathias Kaeso

Felix Muesgens

University of Technology Cottbus-Senftenberg

Oliver Grothe

University of Cologne

[View Abstract](#)[^ Back to top](#)**7. Smart Grids** (Kirlangic 2)

Youngho Chang, Presiding

Nanyang Technological University

Cost-Benefit Analysis for Smart Grid Projects

Nihan Karali

Chris Marnay

Gang He

Han Zhu

Lawrence Berkeley National Laboratory

Josh Mauzey

Southern California Edison

[View Abstract](#)**An Analysis on the Smart Community Connecting Commercial and Residential Sectors**

Yoshiki Ogawa

Professor, Toyo University

[View Extended Abstract](#) | [View Paper](#)

How Smart are Electricity Users with 'Smart Metering'? A Behavioural Economics Experiment

Simon L Bager

Luis Mundaca

International Institute for Industrial Environmental Economics, Lund University

[View Extended Abstract](#) | [View Paper](#)[^ Back to top](#)**8. Petroleum Modelling Issues** (Manyas 3)

Andreas Goldthau, Presiding

Professor

Harvard University & Central European University

CO₂ Cost Integration in Oil Production Investment Decision: Challenges & Opportunities for Oil Companies

Arash Farnoosh

Sidney Lambert-Lalitte

IFP School

[View Extended Abstract](#)**Oil and Unemployment in a New-Keynesian Model**

Veronica Acurio Vasconez

Université Paris 1, Paris School of Economics

[View Extended Abstract](#)**Disentangle the Interactions Between Global and Regional Seasonality of Crude Oil Consumption: Some Empirical Findings**

Jun Li

Curtin University

Jason Park

Julian Inchauspe

Curtin University

[View Extended Abstract](#)**Short-run Crude Oil Price Dynamics and Market Expectation**

Xin Jin

University of Aberdeen

[View Abstract](#)[^ Back to top](#)**9. Energy Efficiency in Industry and Manufacturing** (Kirlangic 1)

Nevenka Hrovatin, Presiding

Professor, Faculty of Economics

University of Ljubljana

Measuring the Efficiency of Energy-intensive Industries Across 23 EU Countries

Georgia Makridou

Kostas Andriopoulos

ESCP Europe Business School

Michael Doumpos

Technical University of Crete

Constantin Zopounidis

Technical University of Crete & Audencia Group

[View Extended Abstract](#)**A Structural and Dynamic Approach to Measuring Rebound Effect in China's Industrial Subsectors**

Baiding Hu

Lincoln University

[View Extended Abstract](#) | [View Paper](#)**Effects of Energy Audits on the Adoption of Energy Efficiency Measures**

Joachim Schleich

Grenoble Ecole de Management

Simon Hirzel

Tobias Fleiter

Fraunhofer Insitute for Systems & Innovation Research

[View Extended Abstract](#)**What Drives Energy Efficiency and Environmental Investments in Slovenian Manufacturing Industries?**

Nevenka Hrovatin

Jelena Zoric

Faculty of Economics, University of Ljubljana

[View Extended Abstract](#)[^ Back to top](#)**CONCURRENT SESSIONS 10-19**

Monday, May 25, 5:15pm - 6:45pm
10. Geopolitics of Gas 2 (Manyas 2)
<p>Franz Hubert, Presiding Professor Humboldt-Universitat zu Berlin</p>
<p>China's Natural Gas Market Liberalization and its Regional Impact Xunpeng Shi Hari M.P Energy Studies Institute, NUS View Extended Abstract</p>
<p>Comparing Natural Gas Supply Disruption Scenarios Hari Malamakkavu Padinjare Variam Kamal Soundararajan Energy Studies Institute, NUS View Extended Abstract</p>
<p>Strategic Pipelines in the Eurasian Gas Network Franz Hubert Humboldt University Berlin View Extended Abstract</p>
<p>Gas Market Integration in North West Europe: Is Moving from Market Coupling to Market Merging Necessary? Chris Cuijpers Andreas Tirez Commission for Electricity and Gas Regulation (CREG) View Extended Abstract View Paper</p>
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11. Electricity Markets (Manyas 1)
<p>Einar Hope, Presiding Professor of Energy Economics Norwegian Sch. of Econ. & Bus. Admin.</p>
<p>A Framework for Designing and Categorising Capacity Markets - Insights from an Application to Europe Jenny J Riesz UNSW Australia Greg Thorpe Oakely Greenwood Regina Betz Johanna Cludius Zurich University of Applied Sciences View Extended Abstract</p>
<p>Real-time versus Day-ahead Market Power in a Hydro-based Electricity Market Thomas P. Tangerås Research Institute of Industrial Economics Johannes Mauritzen Norwegian School of Economics View Abstract</p>
<p>Old vs New Thinking in Designing Future Electricity Markets Hans Auer Reinhard Haas EEG, TU Wien Georg Erdmann TU Berlin View Abstract</p>
<p>Short-Term Price and Volume Interactions in an Integrated Gas- and Electricity Market Framework Ozge Ozdemir Marit Van Hout ECN View Extended Abstract</p>
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12. Climate Change 2 (Anka 1-2)
<p>Reinhard Haas, Presiding Professor Vienna University of Technology</p>

Adapting Long-lived Infrastructure to Uncertain and Transient Change

Marius Paschen

Klaus Eisenack

Carl von Ossietzky University of Oldenburg Germany

[View Extended Abstract](#)**Assessing the Effects of Climate Policy on Firms' Greenhouse Gas Emissions**

Ana Maria Montoya Gomez

Markus Zimmer

ifo Institute

[View Extended Abstract](#)**Evaluating the Emissions Implications of Policies to Promote Clean Technologies**

Joel R Landry

The Pennsylvania State University

Richard Klotz

Cornell University

Antonio M Bento

Cornell University and the National Bureau of Economic Research

[View Abstract](#)[^ Back to top](#)**13. Regional Approaches to Renewable Energy** (Kirlangic 3)

Mustafa Ozgur Berke, Presiding

Climate & Energy Programme Supervisor

WWF-Turkey

Determinants of Renewable Energy Development in China

Oluwasola E Omoju

School of Economics, Xiamen University, China

[View Extended Abstract](#) | [View Paper](#)**The Impact of Technology Availability on the Costs of 100% Renewable Electricity Generation Scenarios for Australia**

Jenny J Riesz

Ben Elliston

UNSW Australia

[View Extended Abstract](#)**Renewable Energy Consumption, CO₂ Emissions and Economic Growth in Malaysia**

A.A. Azlina

Mahirah Kamaludin

Universiti Malaysia Terengganu

[View Extended Abstract](#)**Prospects for Renewable Energies in Europe up to 2030**

Gustav Resch

Sebastian Busch

Lukas Liebmann

TU Vienna, Energy Economics Group

[View Abstract](#)[^ Back to top](#)**14. Transmission Networks** (Turna 1)

Olvar Bergland, Presiding

Professor

Norwegian Univ of Life Sciences

Transmission Congestion and Switching Supply Functions

Olvar Bergland

Norwegian University of Life Sciences

Mirza M Faisal

University of Gujrat

[View Abstract](#)**Spatial Arbitrage Value of Transmission Upgrade Investments. An Economic and Environmental Assessment**

Amanda Spisto

European Commuision Joint Research Centre - Institute for Energy and Transport

Johannes Schmidt

University of Natural Resources and Life Sciences, Vienna, Institute for Sustainable Economic Development

[View Abstract](#) | [View Paper](#)**How Much Transmission Capacity will Europe Need in 2050?**

Richard Green

Iain Staffell

Imperial College Business School

[View Abstract](#)**Simulation of the Turkish Transmission Grid and Power System Operation with Increased Renewable Shares 2030, and Analysis of the Pumped Hydro Potential in Turkey**

Gerhard Totschnig

André Ortner

Gustav Resch

Ricki Hirner

Vienna University of Technology

[View Abstract](#)[^ Back to top](#)**15. Prospects of Coal** (Turna 2-3)

Dmitry Sokolov, Presiding

Researcher

Asia Pacific Energy Research Centre (APERC)

Is Sunshine the Best Disinfectant? Determining the Effectiveness of the Extractive Industries Transparency Initiative (EITI)

Goetz Walter

Int. School of Mgmt. ISM

Benjamin Sovacool

Aarhus University

[View Abstract](#)**The Comeback of Coal in the First Decade of the 21st Century**

Jorge Blazquez

Tarek N. Atallah

KAPSARC

[View Extended Abstract](#)**The Increasing Role of Coal in Energy Balance of APEC Economies for the Period till 2040**

Dmitry Sokolov

Naomi Wynn

Asia Pacific Energy Research Centre (APERC)

[View Extended Abstract](#) | [View Paper](#)**Analysis of the Potential Coal Production Peak in China and India: Impact on International Gas and Coal Markets**

Nikolay Arkhipov

Irina Mironova

Energy Research Institute of the Russian Academy of Sciences

[View Extended Abstract](#) | [View Paper](#) | [View Conference Presentation](#)[^ Back to top](#)**16. Impacts of Renewable Generation 1** (Kirlangic 2)

Aaron Praktijnjo, Presiding

TU Berlin

Residual Load and Flexibility in Electricity Systems with Intensively Integrated Fluctuating Feed-ins

Aaron Praktijnjo

Fabian Huneke

TU Berlin

[View Abstract](#)**The Effect of RES in the Italian Electricity Market**

Lucia Visconti Parisio

University of Milan-Bicocca

Angelica Gianfreda

Energy Markets Group, London Business School

[View Extended Abstract](#)**The Impact of Electricity from Renewable Energy Sources on Distribution Grid Congestion**

Hans Schermeyer

Philipp Ringler

Valentin Bertsch

Wolf Fichtner

Karlsruhe Institute of Technology/Chair of Energy Economics

[View Abstract](#)**Electricity Market Equilibria with High Shares of Wind Power**

Thomas Möbius

Felix Müsgens

University of Technology Cottbus-Senftenberg

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17. Fossil Fuel and Renewable Electricity Subsidies (Manyas 3)

Sevil Acar, Presiding
Assistant Professor
Kemerburgaz University
[View session description](#)

Switching from Fossil Fuel Subsidy to Renewable Electricity Development: Case of Tunisia

Rafik Missaoui
Manager Director, ALCOR, Tunisia
[View Abstract](#)

Subsidies and Renewable Incentives in Turkish Energy Market and Their Effects

Baris Sanli
Energy Market Regulatory Authority, Turkey
[View Abstract](#)

Sustainable Development, Financial Incentives and Wind Energy in Turkey

Yildiz Arikan
Assoc. Professor, Istanbul Kemerburgaz University, Department of Industrial Engineering
[View Abstract](#)

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18. Consumer Preferences and Environmental Consciousness (Anka 3)

Carlo Andrea Bollino, Presiding
Professor
Dipartimento di Economia, Università di Perugia

The Willingness to Pay of Swiss Households for a Reliable and Green Electricity Supply: A Discrete Choice Experiment

Alessandra Motz
Rico Maggi
Stefano Scagnolari
Università della Svizzera italiana
[View Extended Abstract](#) | [View Paper](#)

Smart grids and consumers attitude towards sustainable development

Simona Bigerna
Carlo Andrea Bollino
University of Perugia
[View Abstract](#)

The Social License to Operate: Examining the Social Acceptance of Firm Operations in Multi-Stakeholder Complex Environment

Piyali Rudra
Doctoral Researcher, Aalto School of Business
[View Extended Abstract](#)

Customers' Valuation of Grid Resilience to Extreme Events: Willingness to Pay and Preference Heterogeneity

Laura-Lucia Richter
Cambridge University
[View Extended Abstract](#) | [View Paper](#)

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19. Energy Efficiency in Households (Kirlangic 1)

Christophe Bonnery, Presiding
Director Economics & Energy Policy
ERDF

Capitalization of Residential Energy Efficiency

Erdal Aydin
Dirk Brounen
Tilburg University
Nils Kok
Maastricht University
[View Extended Abstract](#)

Money, Comfort or Environment? - Priorities and Determinants of Energy Efficiency Investments in Irish Households

Claudia Aravena
Eleanor Denny
Trinity College Dublin
Andres Riquelme
North Carolina State University
[View Extended Abstract](#)

Estimates of Energy Efficiency at the Household Level: A Mincerian Approach

David C Broadstock

Jiajia Li

Southwestern University of Finance and Economics

[View Extended Abstract](#)**Space Heating Demand in the Dutch Residential Sector from 1960 to 2005: A Decomposition Analysis**

Lars Dittmar

Technische Universität Berlin

[View Extended Abstract](#)[^ Back to top](#)**CONCURRENT SESSIONS 20-30**

Tuesday, May 26, 10:30am - 12:00pm

20. Gas Prices & Trading (Manyas 2)

Tatiana Mitrova, Presiding

ERIRAS

The Value of LNG Exports When Transportation is Costly

Atle Oglend

Tore Kleppe

Petter Osmundsen

University of Stavanger

[View Abstract](#) | [View Paper](#)**Gas Pricing System in the Asian Pacific Market : Influence of Europe and USA**

Jinseok Sung

Gubkin Russian State University of Oil and Gas

[View Extended Abstract](#) | [View Paper](#)**Imposing Netback Prices on Natural Gas in Russia**

Knut Einar Rosendahl

Norwegian University of Life Sciences

[View Abstract](#)**The Price Dynamics in Japanese and European LNG Markets**

Ziya Cologlu

PhD Candidate, University of Texas at Dallas

[View Extended Abstract](#)[^ Back to top](#)**21. Electricity Storage** (Manyas 1)

Regina Betz, Presiding

Joint Head EPAG

SML-ZHAW

Effect of Introducing Batteries into the Grid on Generation Costs and CO₂ Emissions Considering Wind Power Uncertainty

Shinichi Takayama

The University of Tokyo

[View Extended Abstract](#) | [View Paper](#)**The Role and Implications of Energy Storage: An Economic Perspective**

Tunç Durmaz

Norwegian School of Economics

[View Extended Abstract](#) | [View Paper](#)**Short-Term Energy Storage for Stabilizing the High Voltage Transmission Grid: A Real Options Analysis**

Reinhard Madlener

Katrin Illian

RWTH Aachen University

[View Abstract](#)**The Long-run Impact of Energy Storage on Electricity Prices and Generating Capacity**

Richard Green

Iain Staffell

Imperial College Business School

[View Abstract](#)[^ Back to top](#)**22. Climate Change 3** (Anka 1-2)

Fengjun Duan, Presiding

Canon Inst. of Global Studies

Toward a New Climate Regime Establishment (6) Economic Assessment of Emission Pathway

Fengjun Duan

Canon Institute for Global Studies

Kazushi Hatase

Graduate School of Economics, Kobe University

Shunsuke Managi

Graduate School of Environmental Studies, Tohoku University

[View Extended Abstract](#) | [View Paper](#)**Cost-benefit Analysis of Climate Action in Adaptive Economic Systems: A Technology Production and Supply Chain Perspective**

Pablo Salas

Rutger-Jan Lange

Jean-Francois Mercure

University of Cambridge

Michael Grubb

University College London

[View Extended Abstract](#) | [View Paper](#)[^ Back to top](#)**23. Support for Renewables** (Kirlangic 3)

Azlina Abd Aziz, Presiding

University Malaysia Terengganu

Turkey's Renewable Future: Alternative Power Supply Scenarios for Turkey until 2030

Mustafa O Berke

Climate & Energy Program Supervisor, WWF-Turkey

[View Extended Abstract](#)**The Hidden Winners of Renewable Energy Promotion. Insights into Sector-specific Wage Differentials**

Markus Janser

Florian Lehmer

Manfred Antoni

Institute for Employment Research (IAB)

[View Extended Abstract](#)**Policy Assessment for Low Carbon Electricity Markets**

Isaac Dyer

Universidad Jorge Tadeo Lozano

Sebastian Zapta

Carlos Franco

Laura Cardenas

Universidad Nacional de Colombia

[View Extended Abstract](#)**Diversification of Support Measures for Renewable Energy Sources in District Heating Sector**

Lina Murauskaite

Lithuanian Energy Institute

[View Extended Abstract](#)[^ Back to top](#)**24. Electricity Demand and Enduser Behavior 1** (Turna 1)

Yukari Yamashita, Presiding

Board Member Director

Institute of Energy Economics

The Interactions Between Residential Electricity Consumption and the Power Sector Within an Economic Equilibrium Framework: A Look at Energy Efficiency in Saudi Arabia

Walid Matar

Research Associate, King Abdullah Petroleum Studies and Research Center

[View Extended Abstract](#) | [View Paper](#)**Distributional Effects of a Revenue-Neutral Steering Tax on Energy: Empirical Evidence from Swiss Household Data**

Daniel Mueller

Sebastian Deininger

University of Basel

[View Extended Abstract](#)**Multi-Criteria Decision Making-Based Comparison of Energy Resources in Turkey**

Fehmi Gorkem Uctug

Bahcesehir University

Betul Akyurek

Renko Enerji

[View Abstract](#)

Estimating Commercial and Industrial Customer Response to Electricity Critical Peak Prices

Dongsik Jang

Korea Electric Power Corporation (KEPCO) Research Institute

Jaewoong Lee

Jiyong Eom

College of Business, Korea Advanced Institute of Science and Technology (KAIST)

[View Extended Abstract](#)[^ Back to top](#)**25. Prospects of Biofuels** (Turna 2-3)

Filiz Karaosmanoglu, Presiding

Professor

Istanbul Technical Univ.

Assessing the Stakeholder Support for Different Biofuel Options in France by 2030: A Range Based Multi-Actor Multi-Criteria Model

Gino Baudry

University of Nantes

[View Extended Abstract](#)**Economies of Scale in Biogas Production and How to Organize Regulation**

Lise Skovsgaard

Henrik Klinge Jacobsen

Technical University of Denmark, DTU Management Engineering

[View Extended Abstract](#)**The Contribution of Biomass to Emissions Mitigation under a Global Climate Policy**

Niven Winchester

John M Reilly

Massachusetts Institute of Technology

[View Extended Abstract](#)**Pellets Penetration in Southern Europe: Evidences for the Households Characterization**

J.A. Aranda

Eva Llera-Sastresa

Sabina Scarpellini

University of Zaragoza

Aranda Juan

CIRCE - University of Zaragoza

[View Abstract](#)[^ Back to top](#)**26. Impacts of Renewable Generation 2** (Kirlangic 2)

Gonenc Yucel, Presiding

Assistant Professor

Bogaziçi University

Comparing the Whole-system Costs of Baseload Power from CSP and Nuclear Power Plants Under High Renewables Scenarios for the Case of South Africa

Stefan Pfenninger

James Keirstead

Imperial College London

Paul Gauche

Stellenbosch University

[View Extended Abstract](#)**Market Power and System Cost: The Long Run Impact of Large Amounts of Wind Electricity Generation.**

Stephen Poletti

University of Auckland

David Young

Electric Power Research Institute

Oliver Browne

University of Chicago

[View Extended Abstract](#)**Contribution of Local Pricing Policies to the Integration of Renewable Energy Sources in Distribution Grids**

Björn Felten

Christoph Weber

Jessica Raasch

University of Duisburg-Essen

[View Abstract](#)**The Impact of Renewables Obligation on Residential Electricity Demand in the UK**

Ian Hamilton

Weibo Li

UCL Energy Institute

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27. Oil Markets (Manyas 3)

John Felmy, Presiding
Chief Economist
American Petroleum Institute

An Empirical Analysis of Dayrates in the Global Offshore Rig Market

Roar Adland
Justina Banyte
Harrison Alger
Norwegian School of Economics
[View Extended Abstract](#)

Financialisation of Oil Futures Markets and Oil Futures Market Efficiency - a Multifractal Perspective

Marc Gronwald
University of Aberdeen Business School
Cristina Sattarhoff
University of Hamburg
[View Abstract](#)

The World Oil Market: A Dynamic Model of Strategic Supply

Nathan Balke
Southern Methodist University
Mine Yücel
Federal Reserve Bank of Dallas
Xin Jin
University of Aberdeen
[View Abstract](#)

Recent Developments on Oil Prices and Reflection to Pump Prices in Turkey

Erol Seyfi Metin
SEM Sustainability, Energy & Logistics
[View Extended Abstract](#)

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28. Energy Transition & Demand Side Management. in Industry (Anka 3)

Joachim Schleich, Presiding
Professor
Fraunhofer Inst Sys Innov Research

Review of Barriers to Uptake of Demand Side Response in Medium Sized Businesses

Mitchell Curtis
University of Reading
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Recent And Future Development Of Demand Side Flexibility In Industry

Marian Klobasa
Fraunhofer Institute for Systems and Innovation Research ISI
[View Extended Abstract](#)

Heat Demand in the German Industrial Sector - The Combined Heat and Power (Co-Generation) Potential until 2030 and Contribution to Flexibility

Felipe Toro
IREES GmbH, Germany
[View Extended Abstract](#)

Energy Efficiency Recent Developments in German Industry

Dirk Köwener
LEEN GmbH
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29. Regional Studies of Energy Efficiency (Kirlangic 1)

Mark Stickells, Presiding
Director
Energy and Minerals Institute, The University of Western Australia

Market Prospects for Fuel Cell/Absorption Chillers to Displace Electric Chilling in Hospitals in California

Lori Smith Schell
Empowered Energy
Ashley DiMola
University of California-Irvine
[View Abstract](#) | [View Paper](#)

Reevaluation of Provincial Energy Efficiency in China Incorporating Human Capital Stock

Lingdi Zhao

Lei Zhang

Luxia Ma

Ocean University of China

[View Extended Abstract](#) | [View Paper](#)**How Public Interventions in Buildings' Energy Efficiency Affect the Economic Feasibility of a District Heating Network - A Case Study for Vienna**

Sara Fritz

Vienna University of Technology, Energy Economics Group

[View Abstract](#) | [View Paper](#)**Assessing the Technical and Economic Potential of High Efficient CHP and Efficient District Heating and Cooling: The Methodology Used for the "Comprehensive Assessment" in Austria**

Richard Buechele

Lukas Kranzl

Marcus Hummel

Andreas Mueller

Michael Harner

Vienna University of Technology

Marian Bons

Kornelis Blok

Yvonne Deng

Ecofys

[View Abstract](#) | [View Paper](#)**Waste Heat Recovery: Potential, Policy Challenges and Technology Choices**

Sanne Lemmens

University of Antwerp

[View Extended Abstract](#) | [View Paper](#)[^ Back to top](#)**30. Outlook of the Turkish Energy Sector** (Anka 4)

Oguz Can, Presiding

Recydia A S

Eastern Hub of the Western World - Turkey's Role on EU's Security of Supply

Mehmet Fatih Baltaci

Chairman, Akfel Holding

[View Abstract](#)**Solar Future In Turkey**

Kemal G Bayraktar

President, GÜNDER / Turkish Solar Energy Association

[View Abstract](#)**Cross Border Trade in Electricity: Bulgaria, Greece, Georgia, Turkey**

Mario Diel

CEO, Alpiq

[View Extended Abstract](#)**The View on the Future of the Turkish Energy Sector from a Foreign Investor**

Martin Pacovský

Deputy CEO, Akenerji / Country Manager, CEZ Turkey

[View Abstract](#)[^ Back to top](#)**CONCURRENT SESSIONS 31-41**

Tuesday, May 26, 3:30pm - 5:00pm

31. Changing Gas Pricing Mechanisms in Europe (Manyas 2)

Volkan Özdemir, Presiding

Chairman

Inst for Energy Markets and Policies

Gas Supply Vulnerability in Central and Eastern Europe: Politics, Policies and Pricing Practices

Andreas Goldthau

Central European University, and Associate, Geopolitics of Energy Project, Belfer Center for Science and International Affairs, Harvard University

Tim Boersma

Energy Security Initiative, The Brookings Institution

[View Abstract](#)**Changing European Gas Pricing**

Maximilian Kuhn

Philipp Offenberg

EUCERS King's College London

[View Extended Abstract](#)

Changing Gas Price Mechanisms In Europe And Russia`s Gas Pricing Policy

Tatiana Mitrova

Head of Oil and Gas Department , Energy Research Institute of the Russian Academy of Sciences (ERIRAS)

[View Extended Abstract](#)

Gas Import Pricing of Turkey: In or Out Of European Market?

Volkan Özdemir

EPPEN (Institute for Energy Markets and Policies)

[View Abstract](#)

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32. Interconnection of Electricity Markets (Manyas 1)

Jurgis Vilemas, Presiding

Leading Scientist

Vytautas Magnus University

Estimating the Value of an Energy Exchange for Turkey

Abdurrahman Kurucak

Energy Market Regulatory Authority of Turkey

Anastasia V Shcherbakova

University of Texas at Dallas

[View Extended Abstract](#)

Capacity Adequacy in Interconnected Electricity Markets

Camila Ochoa

Ann van Ackere

University of Lausanne

[View Abstract](#)

Expert Survey on Cross-border Effects of Capacity Markets in the U.S.: Lessons for the EU

Pradyumna C Bhagwat

Laurens J De Vries

Delft University of Technology

Benjamin F Hobbs

The Johns Hopkins University

[View Extended Abstract](#) | [View Paper](#)

A Zero Subsidy Western European Electricity System?

Arjun Mahalingam

David Reiner

David Newbery

EPRG, University of Cambridge

[View Extended Abstract](#)

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33. Energy and Environmental Policy (Anka 1-2)

Mark Stickells, Presiding

Director

Energy and Minerals Institute, The University of Western Australia

Directed Technical Change: The Tragedy of the Locals

Giulia Valacchi

Chiara Ravetti

IHEID

Tania Theoduloz

University of Cape Town

[View Extended Abstract](#) | [View Paper](#)

Macroeconomic and Environmental Impact of Energy Subsidies in Kazakhstan

Zauresh Atakhanova

Nazarbayev University

[View Extended Abstract](#) | [View Paper](#)

Technology-specific or Technology-neutral? On the Long-run Optimality of Renewable Energy Policy

Paul Lehmann

Helmholtz-Centre for Environmental Research - UFZ

Patrik Söderholm

Luleå University of Technology

Katherina Witte

University of Leipzig

[View Extended Abstract](#)

Environmental Externalities and Political Abuse: Interactions in the Chinese Context

Xiaoli Zhao

China University of Petroleum

Xiaoguang Yang

<p>Chinese Academy of Sciences Ying Wang Shunhao Wang NCEPU View Extended Abstract View Paper</p>
<p>^ Back to top</p>
<p>34. Transition to a Low Carbon Economy (Kirlangic 3)</p>
<p>Kemal Sarica, Presiding Assistant Professor ISIK University</p>
<p>Power Trade, Welfare, and Air Quality Talat Genc University of Guelph Abdurrahman Aydemir Sabanci University View Abstract</p>
<p>The German Energiewende - Additional Risk or Opportunity for Energy Security? Ulrike G. Lehr Anne Nieters Institute for Economic Structures Research View Extended Abstract</p>
<p>Assessing the Effectiveness of 'Green Economic Stimulus' in South Korea: Evidence from the Energy Sector Luis Mundaca IIIIEE at Lund University Beau Damen International Centre for Environmental Management View Extended Abstract View Paper</p>
<p>Redefining Utility Business Models: A Large-scale Assessment of the Customers' Perspective Markus Graebig Technische Universität Berlin, Department of Energy Systems Malcolm Yadack University of Hohenheim, Department of Innovation Economics View Extended Abstract</p>
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<p>35. Electricity Demand and Enduser Behavior 2 (Turna 1)</p>
<p>Andrew Pickford, Presiding Adjunct Research Fellow University of Western Australia</p>
<p>Is Our Everyday Comfort For Sale? - Preferences For Demand Management on the Electricity Market Lars Persson Thomas Broberg Umeå University, CERE View Extended Abstract View Paper</p>
<p>Incentives for Self-consumption and Future Penetration of Residential PV Battery Storage Systems: The German Case Andreas Dietrich University of Duisburg-Essen View Extended Abstract</p>
<p>An Empirical Grounding for Behavioural Parameters in an Energy System Optimisation Model Hannah E Daly UCL Energy Institute View Extended Abstract</p>
<p>Why Do Customers Switch Suppliers: Literature Review and Evidence from a New Electricity Supplier in Slovenia Nevenka Hrovatin Faculty of Economics, University of Ljubljana Gorazd Skubin Lea Petrac Petrol d.d. View Extended Abstract View Paper</p>
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<p>36. Energy Economy Interactions 1 (Turna 2-3)</p>
<p>Peter Howie, Presiding Nazarbayev University</p>

How Dependent is Growth from Primary Energy?

Zeynep N Kahraman

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Gaël Giraud

CNRS (Centre National de la Recherche Scientifique/National Center for Scientific Research), and Centre d'Economie de la Sorbonne

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Vidas Lekavicius

Arvydas Galinis

Lithuanian Energy Institute

[View Extended Abstract](#)**The Impact of Oil Expenses and Credit on the U.S. GDP.**

Florent John Mc Isaac

University of Paris 1

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Andreas Löschel, Presiding

Professor

University of Münster

Overlapping International Green R&D Agreements

Emilson C. D. Silva

Professor, University of Alberta

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Tian Sheng A Loi

Yujia J Tao

Energy Studies Institute, NUS

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Marijke Welisch

André Ortner

Gustav Resch

TU Wien

Cristina De la Rúa

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Andreas Türk

Joanneum Research

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Jules Wurlod

Joelle Noailly

Centre for International Environmental Studies

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Erol Metin, Presiding

Energy & Logistics

SEM Sustainability

Project Valuation - Separate Cash Flow Valuation and the Implied Required Rate of Return

Magne Emhjellen

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Johnsen

Norwegian School of Economics

Osmundsen

University of Stavanger

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Roy Endre Dahl

Petter Osmundsen

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<p>Systems Analysis of Alternative Fuels Production from Heavy Hydrocarbons in Saudi Arabia Yousef M. Alshammari King Abdullah University of Science and Technology (KAUST) View Extended Abstract View Paper</p>
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<p>Mine Yucel, Presiding SVP and Research Director Federal Reserve Bank of Dallas</p>
<p>On the Social Value of Public Information and Environmental Regulation Jihad C. Elnaboulsi Université de Franche-Comté, France Wassim Daher Gulf University for Science and Technology, Kuwait Yigit Saglam Victoria University of Wellington, New Zealand View Extended Abstract</p>
<p>Output-Based Incentive Regulation and Benchmarking of Network Utilities Wenche Tobiasson Tooraj Jamasb Durham University Business School Rahmat Poudineh Oxford Institute for Energy Studies, View Extended Abstract</p>
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<p>Nevenka Hrovatin, Presiding Professor, Faculty of Economics University of Ljubljana</p>
<p>White Certificates - Energy Efficiency Programs Under Private Information of Consumers Franz Wirl University of Vienna View Abstract View Paper</p>
<p>Economics of Energy Efficiency and Renewable Energy Michael E Canes Distinguished Fellow, Logistics Management Institute View Abstract View Conference Presentation</p>
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<p>Challenges and Potentials to Achieve Energy Efficiency Targets in the Building Sector in Selected CEE Countries: Policy Based Energy Demand Scenarios Until 2030 Agne Toleikyte Andreas Müller</p>

<p>Lukas Kranzl Vienna University of Technology, Energy Economics Group View Extended Abstract</p>
<p>The Interlinkages Between Improvements in Energy Efficiency and Macroeconomic Impacts Lisa Ryan University College Dublin Nina Campbell Databuild Karen Turner Patrizio Lecca University of Strathclyde View Extended Abstract View Paper</p>
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<p>Peter Hartley, Presiding Professor & Baker Institute Fellow Rice University</p>
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<p>Trackers, Pipe Replacements, and Leaks: An Analysis of the Effectiveness of Accelerated Pipe Replacement Program Cost Recovery Mechanisms David E Dismukes Gregory B. Upton Louisiana State University Center for Energy Studies View Extended Abstract</p>
<p>Energy Resources & Development: A Case Study of the Gulf of Guinea Joseph C Echendu World Bank African Centre of Excellence, CEFOR, University of Port Harcourt Wumi O Iledare Emerald Energy Institute, UNIPORT, Nigeria View Extended Abstract View Paper</p>
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<p>CONCURRENT SESSIONS 42-52 Wednesday, May 27, 10:30am - 12:00pm</p>
<p>42. The Legal and Economic Context for New Gas Transmission from Asia to Europe (Manyas 2)</p>
<p>John Jimison, Presiding Managing Director Energy Future Coalition</p>
<p>The Russian Perspective on New Gas Pipeline Exports to European Markets Ivan Gudkov Attorney at Law, Gazprom View Abstract</p>
<p>Legal Issues in Creating the Euro-Asian Gas Hub of the 21st Century Selma Karaduman Founder (Attorney at Law), Karaduman Law Firm View Abstract</p>
<p>EU Policy and Economic Perspectives on Proposed New Gas Imports via Turkey Erik Steen Sorensen Independent Consultant, Expert in European Natural Gas Contracting, Regulation, Strategies and Market Analysis View Extended Abstract</p>
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<p>43. Capacity Planning and Security of Supply (Manyas 1)</p>
<p>Reinhardt Haas, Presiding Professor Vienna University of Technology</p>
<p>Major Hydropower States, Sustainable Development, and National Security</p>

CONCURRENT SESSIONS 53-63 Wednesday, May 27, 1:30pm - 3:00pm
53. Global Prospects of Shale Gas (Manyas 2)
Robert E Brooks, Presiding President RBAC, Inc.
Shale Gas and Energy Markets in Transition: Lessons from North America Hillard G Huntington Executive Director, EMF, Stanford University View Extended Abstract
Pathways to Shale Gas Development in Asia Pacific Juan Roberto Lozano-Maya Researcher, Asia Pacific Energy Research Centre (APERC) View Abstract View Paper
Investment Decisions in the Eagle Ford Shale: Reduced Form Evidence from a Dynamic Game Mark J Agerton Graduate Fellow, Rice University View Extended Abstract
The US Natural Gas Market Turned Upside Down - Marcellus Changes Everything Robert E Brooks President, RBAC, Inc. View Extended Abstract View Paper
Prospects for Shale Gas Exploration in Europe: Ongoing Experience Igor Riepin Felix Muesgens Brandenburg Technical University View Extended Abstract
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54. Regional Issues in Electricity (Manyas 1)
Andrew Pickford, Presiding Adjunct Research Fellow University of Western Australia
Planning in Restructured Electricity Industries - Lessons from Australia's National Electricity Market Neil Raffan Iain MacGill Anna Bruce University of New South Wales View Extended Abstract
What Role for Renewable Energy from North Africa, Western Balkans and Turkey? Andre Ortner Vienna University of Technology View Abstract
How Can Turkey Benefit From Natural Gas Fired Electricity Generation? Berker Adigüzel Mustafa Kerem Topuz Deloitte Danismanlik A.S. (Deloitte Consultancy) View Extended Abstract View Paper
Monitoring Germany's Aggregate Electricity Expenditures Lars Dittmar Georg Erdmann Technische Universität Berlin View Extended Abstract
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55. Carbon Emissions 2 (Anka 1-2)
Anupama Sen, Presiding Senior Research Fellow Oxford Institute for Energy Studies
Revisiting Carbon Kuznets Curves with Endogenous Breaks Modeling: Evidence of Decoupling and Saturation (but few inverted-U's) for Individual OECD Countries Brantley Liddle Asia Pacific Energy Research Centre George Messinis Victoria Institute of Strategic Economic Studies View Extended Abstract View Paper

Assessing the Effectiveness of Renewable Portfolio Standards: An Analysis of Electricity Prices, Renewable Energy Generation and Emissions Reductions

Gregory B Upton

Brian Snyder

Louisiana State University Center for Energy Studies

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How Significant is the 'True' Energy Efficiency to Mitigate CO₂ Emissions? Evidence from OECD and OPEC Countries

Ibrahim A Tajudeen

University of Manchester, UK

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Estimating Abatement Cost Curve for Power from Shore

Björn A Kvinge

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Norwegian Petroleum Directorate

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56. Wind Energy Issues (Kirlangic 3)

David Mooney, Presiding

Strategic Energy Analysis Director

National Renewable Energy Lab

Invention, Innovation and Diffusion in the European Wind Power Sector

Jonas A Grafström

Åsa Lindman

Luleå University of Technology

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Growth of Wind Energy in Germany: the Role of Regional Policies and Policy Co-ordination

Tilmann Rave

Ifo Institute

Frank Götzke

University of Louisville

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Spatiotemporal Disaggregation of GB Scenarios Depicting Increased Wind Capacity and Electrified Heat Demand in Dwellings

Ed Sharp

UCL Energy Institute

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Epidemic, Rank, Stock and Order Effects in Renewable Energy Diffusion: A Model and Empirical Evidence from the China's Wind Power Sector

Yang Liu

Harbin Institute of Technology, China / Ecole Polytechnique, France

Taoyuan Wei

Center for International Climate and Environmental Research - Oslo (CICERO)

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57. Electricity Pricing (Turna 1)

Fehmi Gorkem Uctug, Presiding

Assistant Professor

Bahsehir University

Cap Prices or Cap Revenues? The Implications of Alternative Electricity Pricing Schemes in Jamaica

Alrick K Campbell

Australian National University

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Market Price and Revenue Outcomes in an Electricity Market with High Renewables - An Australian Case Study

Peerapat Vithayasrichareon

Iain MacGill

Jenny Riesz

Centre for Energy and Environmental Markets, UNSW Australia

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Efficient Pricing and Investment in Competitive Energy-Only Markets

Hamid Aghaie

AIT Austrian Institute of Technology

Reinhard Haas

Vienna University of Technology

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Demand and Supply Management - An Econometric Analysis of Electricity Prices

Ioana Neamtu

Aarhus University

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David Stern, Presiding

Professor

Australian National University

Poverty Reduction and Energy Accessibility/Reliability

Michael A Toman

Lead Economist, World Bank Development Research

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Shinichiro Okushima

University of Tsukuba

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Sabina Scarpellini

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University of Zaragoza

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Tülin Keskin, Presiding

Managing Consultant

Energy & Environment Consultancy

Financing Energy Sector in Turkey

Hülya Kurt

Türkiye Sınai Kalkınma Bankası A.S

[View Abstract](#)**Comparative Evaluation of the Turkish and European Legislation on Natural Gas Markets and Implications for Investors**

Selma Karaduman

Founder (Attorney at Law), Karaduman Law Firm

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Kari Nyman

World Bank

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Omowumi Iledare, Presiding

Professor & Director

Emerald Energy Institute, UNIPORT

Hybrid Model Between Top-down and Bottom-up Model to Reflect System Changes, Case of Japan

Hiroshi Hamasaki

Fujitsu Research Institute

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Luke Reedman

CSIRO

Iain F. MacGill

University of New South Wales

Liam D. Wagner

John Foster

University of Queensland

David J. Hill

Zhao Y. Dong

Anthony M. Vassallo

University of Sydney

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The Impact of Trade Structure in Environmental CGE Modelling: An Application on Singapore

Yingzhu Li

Bin Su

Energy Studies Institute, National University of Singapore

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Esin Tetik

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Isik University

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Thomas Tangerang, Presiding

Research Fellow

Research Inst of Industrial Econ

Would Progress in Nuclear Power Technology Brings the Nuclear Renaissance to ASEAN?

Victor Nian

Fellow, Energy Studies Institute, National University of Singapore

[View Extended Abstract](#)**Research on CO₂ Emission Abatement Effect of Nuclear and Natural Gas Power Based on LEAP**

Liya Cai

State Nuclear Power Research Institute

Jianfeng Guo

Institute of Policy and Management, Chinese Academy of Sciences

[View Extended Abstract](#) | [View Paper](#)**Consumer Responses to Food Products Produced Near the Fukushima Nuclear Plant**

Kentaka Aruga

Ishikawa Prefectural University

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Gurcan Gulen, Presiding

Senior Energy Economist - CEE

Bureau of Economic Geology, Univ of Texas

Who Among Korean User Groups Wants to Buy Electric Vehicles

Jikhan Jeong

Korea Electric Power Corporation

Kyung Wan Rho

Seong Woo Park

Korea Energy Management Corporation

[View Extended Abstract](#) | [View Paper](#)**Optimized Operation of an Electric Vehicle DC Fast Charging Station in Combination with Storage and Photovoltaics**

Johannes Schäuble

Karlsruhe Institute of Technology

Wolf Fichtner

Patrick Jochem

Johannes Kühner

Chair of Energy Economics, Karlsruhe Institute of Technology

[View Extended Abstract](#) | [View Paper](#)**On the Future Role of Hydrogen: Storage for Electricity and Fuel for Mobility**

Amela Ajanovic

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Maren Kier

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Ronald Ripple, Presiding

Professor of Energy Bus & Fin

The University of Tulsa

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Mengfei Jiang

Xi Liang

University of Edinburgh

David Reiner

University of Cambridge

Lin Boqiang

Xiamen University

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Assessing the Implementation of the Market Stability Reserve

Maria Eugenia Sanin

Ecole Polytechnique, Paris and EPEE, Univ. Evra Val d'Essonne

Corinne Chaton

Laboratoire de Finance des Marchés de l'Energies (FIME), Paris

Anna Creti

Univ. Dauphine, Paris and Ecole Polytechnique

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The Role of the Financial Sector in EU Emissions Trading

Regina Betz

Johanna Cludius

Zurich University of Applied Sciences

anne Schopp

German Institute for Economic Research

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