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39th IAEE International Conference
Energy: Expectations
and
Uncertainty

19 - 22 JUNE 2016 Bergen, Norway

8. Intermittent Renewable Electricity Generation (Aud. Jan Mossin)

Thomas Leautaud, *Presiding*
TSE Researcher, Toulouse School of Economics

Comparative Scenarios in Islanded Systems: Energy Supply-storage Sizing Problem Applied to Electricity and Mobility
Rodica Loisel
Lionel Lemiale
Université de Nantes, IEMN-IAE

Solar, Wind and Market Power in a Hydro Based Grid
Stephen Poletti
Mina Gholami
University of Auckland

Impact of Variable Renewable Energy Production on Electricity Prices Through a Modeling Approach
Cyril Martin de Lagarde
Anna Creti
Université Paris-Dauphine
Christophe Bonneray
ERDF
Frédéric Lantz
IFP EN, IFP School

Electricity Storage and Flexibility Requirements on the Road to Decarbonization in European Electricity
Clemens Gerbaulet
Cassimir Lorenz
TU Berlin

Estimating Emissions Offsets of Intermittent Renewable Energy
Miguel A. Castro
Michigan State University

7. Financial Risk and Electricity Markets (Aud. Agnar Sandmo)

Patrick Narbel, *Presiding*
Partner, ADAPT Consulting AS

Financial Arbitrage and Efficient Dispatch in Wholesale Electricity Markets
John E. Parsons
MIT Sloan School of Management
Cathleen Colbert
California ISO
Erin Mastrangelo
Jeremy Larrieu
Taylor Martin
FERC

Zero-Variable Cost Power Systems: Implications for Electricity Market Design and Capacity Investments
Jesse D. Jenkins
Néstor Sepúlveda
Massachusetts Institute of Technology
Fernando J. de Sisternes
Argonne National Laboratory

Risk Exposure in Electricity Markets: The Need for Intra-day Hedging
Rachael Homayoun Boroumand
Associate Professor of Economics, PSB Paris School of Business

Market and Policy Risks for VRE Investment and their Impacts on Effectiveness and Efficiency of RES-E Policy Targets - An Agent-Based Modelling Approach
Matthias Reeg
German Aerospace Center (DLR) - Systems Analysis and Technology Assessment

The Corporate Social Responsibility of Hydropower Companies in Alpine Regions - A Welfare-economic Approach
Werner Hediger
HTW Chur

8. Innovations and Technologies (Aud. Terje Hansen)

Roger Fouquet, *Presiding*
Professor, Grantham Research Inst LSE

Life Cycle Analyses of End-User Electricity Generation in Ten Major European Countries
Gorkem F. Uctug
Gizem Alevli
Bahcesehir University

The Welfare Effects of Energy Services and Technologies (1700-2010)
Roger Fouquet
London School of Economics and Political Science (LSE)

Technology Implications for an Integrated European Bioeconomy
Fabian Schipfer
Reinhard Haas
Lukas Kranz
Energy Economics Group

Structuring Public Support for Radical Low-Carbon Innovation in the Materials Sector: Bridging the Valley of Death
Vera Zipperer
Karsten Neuhoff
DIW Berlin
Gregory Nemet
University of Wisconsin-Madison

Multinational Innovation, Product Life Cycles and Intellectual Property Rights Protection: Which is the Best Place to Invent Something?
Giulia Valacchi
IHEID

9. IAAE Best Student Paper Award Session (Aud. 24)

Knut Einar Rosendahl, *Presiding*
Professor, Norwegian Univ. of Life Science

Carbon Taxes, Oil Monopoly and Petrodollar Recycling
Waldemar Marz
Johannes Pfeiffer
IFO Institute for Economic Research at the University of Munich

Estimating the Potential for Electricity Savings in Households
Nina Boogen
ETH Zurich, Center of Economic Research (CER-ETH)

Reliability, Congestion and Investment in Electricity Transmission
Marten Ovaere
KU Leuven, Department of Economics

How to Sell Renewable Electricity - Interactions of the Intraday and Day-Ahead Market Under Uncertainty
Frank Obermüller
Andreas Knaut
Institute of Energy Economics, University of Cologne

10. Heat and Electricity (Aud. 23)

Benjamin Schlesinger, *Presiding*
President, Benjamin Schlesinger & Assoc LLC

CHP Plant Operation and Electricity Market Prices - Analytical Insights and Large-Scale Model Application
Björn Felten
Research Associate, University of Duisburg-Essen

Residential Energy Efficiency and European Carbon Policies: A CGE-analysis with Bottom-up Information on Energy Efficiency Technologies
Orvika Rosnes
Brita Bye
Taran Fæhn
Statistics Norway

Endogenous Power and Heat Generation Modelling in various CHP Plant Types
Andreas Bloess
DIW Berlin

Status-quo Bias and Consumers' Willingness to Pay for Green Electricity: A Discrete Choice Experiment With Real Economic Incentives
Fabian Grabicki
Roland Menges
Clausthal University of Technology

Technical-Economic Potential of PV Systems on Colombian Residential Sector
Rosa Esperanza González Mahecha
André Lucena
Alexandre Szklo
Raul Miranda
PPE/COPPE
Ferreira Paula
Universidade do Minho

11. Prospects for Nuclear Power (Aud. 22)

Christian von Hirschhausen, *Presiding*
Professor, TU Berlin

Phasing Out Nuclear Power in Europe
Rolf Golombek
Hilde H. Le Tissier
Frisch Centre
Finn R. Aune
Statistics Norway

Ambiguity Aversion and the Expected Cost of Rare Energy Disasters: An Application to Nuclear Power Accidents
Romain Bizet
François Lévêque
Mines ParisTech - CERNA Centre for Industrial Economics

Logistics of Dismantling Nuclear Power Plants - A Model-Based Analysis of Low- and Intermediate-Level Waste Management in Germany
Tim Scherwath
German Institute for Economic Research (DIW Berlin)
Roman Mendeleevitch
Technische Universität Berlin (TU Berlin)

RENEWABLE ENERGY DEPLOYMENT IN EU MEMBER STATES AND ENERGY COMMUNITY CONTRACTING PARTIES – A COMPERATIVE REVIEW OF PAST PROGRESS AND POTENTIAL TARGET ACHIVEMENT BY 2020

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Overview

The existing EU climate and energy package sets binding targets for all Member States (MS) for the share of renewable energy in gross final energy demand in 2020. The details for applicable promotion schemes for renewable energies and market access for investments in appropriate technologies are regulated by Directive 2009/28/EC. The Directive was also adapted on the 18 October 2012 by the Energy Community (EnC) and as such sets binding targets in 2020 and a similar framework for its eight Contracting Parties (CPs) (2012/04/MC-EnC).

Examined research questions:

- How does the historic deployment of renewable energy sources (RES) in the electricity-, heat- and transport sector fit to the self-constituted interim-targets formulated in the National Renewable Action Plans (NREAP) of the 28 EU MS and eight EnC CPs?
- What results do the model-based assessments of the energy policy framework provide for the sector of renewable energies of the respective countries with regard to the 2020 target achievement?
- How do the dynamics of RES deployment in EnC CPs compare to the EU MS, and what does this reveal about the state of the energy policy framework for the sector of renewable energies in the EnC CPs?

Methods

In a first step, the actual deployment of RES technologies is compared to the MS and CPs NREAPs to assess their current progress.

In a second step, scenarios for the assessment of the energy policy framework for RES in all MS and CPs are developed with the application of the Green-X model. The Green-X model incorporates an extensive database on the costs and potentials for the expansion of renewable energies in Europe and the Mediterranean countries. These scenarios show the chances of a possible target achievement for all individual countries and for the EU wide 20% target share of renewable energies in 2020. There exists no overall target for the EnC for 2020. The Directive 2009/28/EC and 2012/04/MC-EnC respectively include a reporting obligation for the first time on the 31st of December, 2011 for the EU MS and on the 31st of December, 2013 for the CPs and thereafter every two years. The so-called progress reports have to be compiled in a uniform format including a list of policy measures concerning the conditions for investments in renewable energy. This information about currently implemented and planned policies to stimulate investment renewable energies is collected for all MS and CPs. A distinction is made between the following measures:

- Political initiatives to improve the financial support framework for renewable energy.
- Measures to reduce non-economic barriers that reduce investment readiness in renewable energy.

This information obliges for an in-depth assessment of the current framework conditions for investments in RES technologies.

In a last step, the past progress and target achievement perspectives are compared between selected MS and CPs. This comparison should show the improvements or deficiencies concerning policy framework conditions on the subject of the deployment of RES technologies in selected countries.

The data gathering and scenario development work for this analysis for the EU were conducted within two projects with the title „Renewable energy progress and biofuels sustainability“ published in 2012 and 2014 (Hamelinck et al., 2012 and 2014). Additionally the results of comparable work for the “Keep-on-track” project are included, to comprise the most actual data availbale for the EU perspective (Resch et al., 2015). The past RES deployment progress and modelling-based assessment for a target achivement in the EnC CPs was published in Veum et al., 2015.

Results and Conclusions

Based on the data of 2013 of 28 MS, 21 were on track regarding the RES trajectories defined in the NREAP and 7 underachieved. Regarding the interim targets defined in the RES Directive, 25 Member States have already met the 2013/2014 milestone (Resch et al., 2015). This is not surprising, given the relatively low ambition level of the interim targets in the early years. Trajectories will become steeper just before 2020. The picture looks worse regarding the CPs of the EnC. A reason may be that the minimum trajectory for the overall RES share in the gross final energy consumption in 2011/2012 defined by the RES Directive (2012/04/MC-EnC) sets a relatively strict interim target. Only one CP of the EnC, namely Montenegro, achieved its RED target for 2011/2012. To the contrary all CPs except Moldova achieved their interim targets set in the NREAP (Veum et al., 2015).

A comparison of the model results reflecting the current policy initiatives for the EU shows an underachievement by 1.6 percentage points of the renewable energy target of a 20% RES share in 2020 (Resch et al., 2015). Out of the 28 Member States analysed in 2015, only ten are expected to meet their 2020 targets (Austria, Bulgaria, Croatia, Cyprus, Estonia, Ireland, Italy, Lithuania, Romania, and Sweden).

A target achievement in 2020 is even more challenging for the CPs of the EnC. Montenegro is expected to reach the given 2020 target with currently implemented and planned policy measures. Another CP, Moldova may be added to that list where expected 2020 RES deployment is slightly below the given target. All other CPs appear to fail in complying with their binding 2020 RES target whereby a comparatively small gap is expected for Serbia (Veum et al., 2015).

If the market situation for RES technologies is compared between the EU and the EnC, it can be seen that the framework conditions in the EnC are less desirable than in the EU. A more detailed picture including a specific view on the historic and expected deployment rates and absolute deployment of RES technologies in the electricity, heating and cooling and transport sectors will be included in the final version of this analysis.

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