



## **CV - Dr. Martin Densing**

Energy Economics Group  
Paul Scherrer Institute (PSI)

### **Research Topics:**

Stochastic Programming:

- Risk-Averse Decision Making
- Storage Dispatch Optimization

Game-Theoretic Modeling of Energy Markets

# Curriculum vitae

## Martin Densing

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Laboratory for Energy Systems Analysis  
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## Personal information

Date of birth	July 27, 1970
Place of birth	Scherzingen, Switzerland
Nationality	Swiss
Marital status	relationship, one child

## Employment

Jul 2009 –	Research Scientist at Energy Economics Group, tenured position, Paul Scherrer Institute, Switzerland
May 2008 – Jun 2009	Freelance consultant in financial risk management. Customers: Swisscom IT Services Finance, retail banks in Switzerland and Liechtenstein
Jul 2006 – Apr 2008	Consultant at FIS Corp. (financial risk management)
Sep 1999 – Sep 2005	Research Assistant at the Institute for Operations Research and Mathematical Methods in Economics (IOR), University of Zurich
1997 – Sep 1999	Consultant at Wolters-Kluwer Corp. (financial risk management)
1995 – 1996	Software Engineer (Martignoni Electronics Corp., Zürich)

## Education, academic degrees

<b>Dr. sc.</b>	June 2007	Institute for Operations Research (IFOR), Department of Mathematics, ETH Zurich
<b>MSc</b>	Nov 1996	Theoretical Physics, ETH Zurich

## Languages

German (native), English, French

## Software Languages

GAMS (General Algebraic Modeling System), Mathematica, R, C, Matlab, SQL, VBA

## Current research interests

Stochastic programming problems for commodity (energy) storage  
Risk-averse electricity market equilibria  
Multi-stage stochastic programming models for energy storage optimization  
Multiperiod extensions of coherent risk measurement  
Approximation methods of stochastic programming

## Teaching

- 2017– *Mean-Risk Optimization*. University of Zurich  
Full master's course, 2 hours weekly (3 ECTS points), incl. exercises and final exam. Faculty of Business, Economics and Informatics, University of Zurich, <https://studentservices.uzh.ch/uzh/anonym/vvz/index.html#/details/2016/004/SM/50821177>
- 2018–20 *Optimization in Energy Systems*. Power Systems Lab, ETH Zurich.  
<http://www.vvz.ethz.ch/Vorlesungsverzeichnis/lerneinheit.view?lerneinheitId=129102&semkez=2019S&ansicht=KATALOGDATEN&lang=de>
- 2012 Training course for company Saudi Aramco on energy systems modeling
- 2000–2005 Exercises for courses Linear Programming & Nonlinear Programming;  
Seminar on OR application (on a continuous basis during employment as research assistant at University of Zurich)

## Funded Projects (academic/industrial/governmental)

- 2020–2024 *SNF Project: The role of storage in risk-averse energy market equilibria* (<http://p3.snf.ch/project-185149>)
- Own successful proposal
- 2020–2021 *ReMaP – Real-time Management of a decentralized energy system*
- Project within ETH Domain. Profitability analysis and price impact of decentralized agents using a game-theoretic market equilibrium model
  - Co-PI (leader of Energy Economics Group's part)
- 2017–2021 *SCCER-SoE (Swiss Competence Centers of Energy - Supply of Electricity) – Phase II*
- Work packages: (i) Stochastic hydropower dispatch optimization and (ii) Electricity market modeling
  - Co-PI (leader of Energy Economics Group's part)
- 2015–2018 *PowerDesign - Swiss policy options for future electricity markets*
- Stochastic hydropower optimization for Switzerland under different scenarios of Swiss and European market regimes
  - PI. Scientific research partner: Karlsruhe Institute of Technology (KIT)
- 2015–2017 *SwissHydropower*
- Market modeling and Risk-averse hydropower profit optimization using Multistage stochastic programming.
  - PI. Scientific advisor: Elektrizitätswerke Zürich (EWZ)

- 2014–2017 *BEM: Bi-level electricity market modeling*
- Game-theoretic market model of Switzerland and of its surrounding countries; impact on price levels under different levels of market power
  - PI. Scientific research partner: Chair of Quantitative Business Administration, University of Zurich.
  - Scientific advisors: Swiss Federal Office of Energy, Swiss power market operator (EPEX)
- 2012–2017 *INSIGHT\_E – EU energy consulting reports*
- Reports and briefs for the European Commission (INSIGHT\_E, the so called think-tank for the DG Energy in Brussels)
  - PI (PSI's part). Scientific research partners: European Universities: UCL, UCC, KIT, KTH, Stuttgart
- 2013–2016 *SCCER-SoE (Swiss Competence Centers of Energy - Supply of Electricity) – Phase I*
- Lead author on PSI-report and on journal article on Swiss electricity scenario comparison.
  - Analytical solutions of stochastic energy storage optimization problems
- 2014 *Comparison of Swiss Electricity Scenario Studies*. PI.
- 2013–2014 *National energy scenarios for New Zealand*
- Detailing the World Energy Council's global scenarios for New Zealand. PI
- 2012–2013 *Global energy scenarios for the World Energy Council (WEC)*.
- Numerical implementation of the WEC energy economy scenarios.
  - Data manipulation software for large-scale energy system modeling
  - Co-acquisition and contract-framing
- 2011 *Global mobility scenarios for the World Energy Council (WEC)*.
- Numerical implementation of WEC's mobility scenarios. Co-PI.
- 2010–2011 *Global mobility scenarios for Volkswagen AG*

## Other research collaboration

*University of Vienna, Dep. of Statistics and Operations Research & TU Wien, Operations Research and Control Systems: Book chapter, Invitation to colloquiums and conferences, Organizing conference sessions, Session chair*

*Karlsruhe Institute of Technology: Joint funded projects*

*University of Zurich, Chair of Quantitative Business Administration: Joint publication and conference presentation, Joint funded project (see above)*

*University of Basel, Energy Economics: Combined workshop on electricity market-model development, Data exchange on electricity supply and demand models*

*University of Bergamo: Book Chapter, Invitation to conferences*

*Norwegian University of Science and Technology: Invitation to conferences and workshops, Invitation to PSI, Talk at PSI*

*University of St. Gallen. Institute for Operations Research and Computational Finance: Invitation to conferences and workshops*

*Energy Science Center, ETH: Scientific advisor for AFEM Project*

## Supervision (as principal advisor)

- 2020-2024 EXP *SNF PhD thesis (ETH):* The role of storage in risk-averse energy market equilibria
- 2019–2023 EXP *PhD thesis (ETH):* Decentralized energy storage market players  
2019 *MSc thesis (ETH):* Impact of Nonlinear Inverse Price Demand Curves in Electricity Market Modeling. Best thesis award of SAAE.
- 2014–2017 *PhD thesis (ETH):* Decentralized and renewable heat and electricity for communities in Switzerland (CCEM, IDEAS4Cities)
- 2013–2017 *PhD thesis (ETH):* Multi-objective optimization with life-cycle objectives in energy systems modeling
- 2016 *MSc thesis (University of Zurich):* Empirical Analysis of Demand and Supply Curves of Electricity Prices in Europe

## Other activities

Financial auditor of the Swiss Operations Research Society (SVOR)  
Referee's reports for: OR Spectrum, European Journal of Operational Research, Energy Journal, Journal of Commodity Markets

## Memberships in professional societies

Swiss Operations Research Society (SVOR)  
Mathematical Optimization Society (MOS)  
International Association for Energy Economics (IAEE)

## Publications

### *Peer-reviewed papers*

- 16 Kober, T., Schiffer, H.-W., Densing, M., Panos, E. (2020).** Global energy perspectives to 2060 – WEC's world energy scenarios 2019. *Energy Strategy Reviews*, 31, 100523. [doi: 10.1016/j.esr.2020.100523](https://doi.org/10.1016/j.esr.2020.100523)
- 15 Keles, D., Dehler-Holland, J., Densing, M., Panos, E., Hack, F. (2020).** Cross-border effects in interconnected electricity markets – an analysis of the Swiss electricity prices. *Energy Economics*, 90, 104802. [doi: 10.1016/j.eneco.2020.104802](https://doi.org/10.1016/j.eneco.2020.104802)
- 14 Densing, M. (2020).** The value of flexible selling: Power production with storage for spinning reserve provision. *European Journal of Operational Research*, 281(1), pp. 141–151. [doi: 10.1016/j.ejor.2019.08.012](https://doi.org/10.1016/j.ejor.2019.08.012)

- 13 Panos, E., Densing, M. (2019). The future developments of the electricity prices in view of the implementation of the Paris Agreements: Will the current trends prevail, or a reversal is ahead? *Energy Economics*, 84, 104476. [doi: 10.1016/j.eneco.2019.104476](https://doi.org/10.1016/j.eneco.2019.104476)
- 12 Yazdanie, M., Densing, M., Wokaun, A. (2018). The nationwide characterization and modeling of local energy systems: quantifying the role of decentralized generation and energy resources in future communities, *Energy Policy*, 118, pp. 516–533. [doi: 10.1016/j.enpol.2018.02.045](https://doi.org/10.1016/j.enpol.2018.02.045)
- 11 Shivakumar, A., Pye, S., Anjo, J., Miller, M., Rouelle, P. B., Densing, M., Kober, T. (2018). Smart energy solutions in the EU: State of play and measuring progress. *Energy Strategy Reviews*, 20, pp. 133–149. [doi: 10.1016/j.esr.2018.02.005](https://doi.org/10.1016/j.esr.2018.02.005)
- 10 Yazdanie, M., Densing, M., Wokaun, A. (2017). Cost optimal urban energy systems planning in the context of national energy policies: A case study for the city of Basel, *Energy Policy*, 110, pp. 176–190. [doi: 10.1016/j.enpol.2017.08.009](https://doi.org/10.1016/j.enpol.2017.08.009)
- 9 Densing, M., Panos, E., Hirschberg, S. (2016). Meta-Analysis of Energy Scenario Studies: Example of Electricity Scenarios for Switzerland, *Energy*, 109, pp. 998–1015. [doi: 10.1016/j.energy.2016.05.020](https://doi.org/10.1016/j.energy.2016.05.020)
- 8 Yazdanie, M., Densing, M., Wokaun, A. (2016). The Role of Decentralized Generation and Storage Technologies in Future Energy Systems Planning for a Rural Agglomeration in Switzerland, *Energy Policy*, 96, pp. 432–445. [doi: 10.1016/j.enpol.2016.06.010](https://doi.org/10.1016/j.enpol.2016.06.010)
- 7 Panos, E., Densing, M., Volkart, K. (2016). Access to electricity in the World Energy Council's global energy scenarios: An outlook for developing regions until 2030, *Energy Strategy Reviews*, 9, pp. 28–49. [doi: 10.1016/j.esr.2015.11.003](https://doi.org/10.1016/j.esr.2015.11.003)
- 6 Panos, E., Turton, H., Densing, M., Volkart, K. (2015). Powering the growth of Sub-Saharan Africa: The Jazz and Symphony scenarios of World Energy Council, *Energy for Sustainable Development*, 26, pp. 14–33. [doi: 10.1016/j.esd.2015.01.004](https://doi.org/10.1016/j.esd.2015.01.004)
- 5 Densing, M. (2014). Stochastic programming of time-consistent extensions of AVaR, *SIAM Journal on Optimization*, 24(3), pp. 993–1010. [doi: 10.1137/130905046](https://doi.org/10.1137/130905046)
- 4 Densing, M. (2013). Dispatch Planning using Newsvendor Dual Problems and Occupation Times: Application to Hydropower, *European Journal of Operational Research*, 228, pp. 321–330. [doi: 10.1016/j.ejor.2013.01.033](https://doi.org/10.1016/j.ejor.2013.01.033)
- 3 Densing, M., Mayer, J. (2012). Multiperiod Stochastic Optimization Problems with Time-Consistent Risk Constraints, *Operations Research Proceedings 2011*, Klatte D., Lüthi H.-J., Schmedders K. (ed.), Springer, 2012, pp. 521–526. [doi: 10.1007/978-3-642-29210-1\\_83](https://doi.org/10.1007/978-3-642-29210-1_83)
- 2 Densing, M., Turton, H., Bäuml, G. (2012). Conditions for the successful deployment of electric vehicles - a global energy system perspective, *Energy*, 47, pp. 137–149, [doi: 10.1016/j.energy.2012.09.011](https://doi.org/10.1016/j.energy.2012.09.011)

- 1 **Densing, M. (2012).** Occupation times of the Ornstein–Uhlenbeck process: Functional PCA and evidence from electricity prices, *Physica A*, 391 (23), pp. 5818–5826, [doi: 10.1016/j.physa.2012.07.040](https://doi.org/10.1016/j.physa.2012.07.040)

### **Invited contributions in books**

**Kathrin, V., Densing, M., Pye, S., Rocco, M., Badouard, T. et al. (2017).** The Role of Fuel Cells and Hydrogen in Stationary Applications, in Welsch, M. et al (ed.) *Europe's Energy Transition - Insights for policy making (Ch. 23)*, pp. 189–205. Elsevier Science & Technology Books, ISBN 978-0-12-809806-6. <https://www.elsevier.com/books/europe-s-energy-transition/manuel-welsch/978-0-12-809806-6>

**Densing, M. (2013).** Price-Driven Hydropower Dispatch Under Uncertainty, in Kovacevic, R., Pflug, G. & Vespucci, M. T. (ed.), *Chapter 4, Handbook of Risk Management in Energy Production and Trading*, pp. 73–104, International Series in Operations Research & Management Science, Springer. [doi: 10.1007/978-1-4614-9035-7\\_4](https://doi.org/10.1007/978-1-4614-9035-7_4)

### **Other publications (Reports)**

**Zimmermann, F., Densing, M., Keles, D., Dehler, J., Hack, F., Fichtner, W. (2019).** Impact of different market designs in the CWE market area on electricity prices and on the competitiveness of Swiss hydropower (PowerDesign). *Report of SFOE-EWG Research Programme, Swiss Federal Office of Energy (SFOE)*, Bern. <https://www.aramis.admin.ch/Texte/?ProjectID=36989>

**Wilkinson, A., Belostotskaya, A., Flowers, B.-S., Kober, T., Panos, E., Densing, M., et al. (2019).** World Energy Scenarios 2019 - Exploring Disruptive Innovations in Global Energy Pathways to 2040. *World Energy Council*, London, UK. [https://www.worldenergy.org/assets/downloads/2019\\_Scenarios\\_Full\\_Report.pdf](https://www.worldenergy.org/assets/downloads/2019_Scenarios_Full_Report.pdf)

**Densing, M., Kannan, R., Panos, E., & Kober, T. (2018).** Long term role of Swiss hydropower from an energy systems and market perspective. *Report of the VSE/AES (Association of Electricity Producers of Switzerland) Research Fund*. Villigen, Switzerland. <https://www.dora.lib4ri.ch/psi/islandora/object/psi:25854>

**Panos, E., Densing, M., Schmedders, K. (2017).** Oligopolistic capacity expansion with subsequent market-bidding under transmission constraints (OCESM), *Report of SFOE-EWG Research Programme, Swiss Federal Office of Energy (SFOE)*, Bern. [doi: 10.5167/uzh-151127](https://doi.org/10.5167/uzh-151127) (<https://www.aramis.admin.ch/Default.aspx?DocumentID=46075>)

**Shivakumar, A., Anjo J., Miller, M., Pye, S., Rouelle, P.B., Densing, M., Kober, T. (2017).** Smart energy solutions in the EU: State of play and measuring progress, *INSIGHT\_E Policy Report*, 7<sup>th</sup> Framework Programme of the European Commission, Brussels. [http://www.insightenergy.org/static\\_pages/publications#?publication=47](http://www.insightenergy.org/static_pages/publications#?publication=47)

**Volkart, K., De Miglio, R., Densing, M., Priem, T., Pye, S. (2016).** Assessments of the Merit of Different Hydrogen and Fuel Cell Pathways for Energy Applications. *INSIGHT\_E*

*Policy Report*, 7<sup>th</sup> Framework Programme of the European Commission, Brussels.  
[http://www.insightenergy.org/static\\_pages/publications/?publication=37](http://www.insightenergy.org/static_pages/publications/?publication=37)

**Campbell, D., Densing M., Panos E., et al. (2015).** New Zealand Energy Scenarios – Navigating energy futures to 2050, *World Energy Council, BusinessNZ Energy Council*, New Zealand, [http://www.bec.org.nz/\\_data/assets/pdf\\_file/0014/110309/BEC-Report.pdf](http://www.bec.org.nz/_data/assets/pdf_file/0014/110309/BEC-Report.pdf)

**Densing, M., Hirschberg, S., Turton, H. (2014).** Review of Swiss Electricity Scenarios 2050, *PSI-Report, 14-05*, ISSN 1019-0643, Paul Scherrer Institute, Villigen  
[https://www.psi.ch/eem/PublicationsTabelle/PSI-Bericht\\_14-05.pdf](https://www.psi.ch/eem/PublicationsTabelle/PSI-Bericht_14-05.pdf)

**Bauer, C., Densing, M., Turton, H. et al. (2013).** A glimpse into the future, *Energie-Spiegel (Energy Mirror) No. 22*, ISSN 1661-5107, Paul Scherrer Institute, Villigen  
[http://www.psi.ch/eem/PublicationsTabelle/2013\\_energiespiegel\\_e.pdf](http://www.psi.ch/eem/PublicationsTabelle/2013_energiespiegel_e.pdf)

**Frei, C., Turton, H., Densing, M., Panos, E., Volkart, K. et al. (2013).** World Energy Scenarios – Composing energy futures to 2050, Project Partner Paul Scherrer Institute (PSI), Switzerland. *World Energy Council*, London, ISBN 978-0-946121-33-5,  
<https://www.worldenergy.org/publications/2013/world-energy-scenarios-composing-energy-futures-to-2050/>

**Turton, H., Panos, E., Densing, M., Volkart, K. (2013).** Global Multi-regional MARKAL (GMM) model update: Disaggregation to 15 regions and 2010 recalibration, *PSI-Report, 13-03*, Paul Scherrer Institute, ISSN 1019-0643, [https://www.psi.ch/eem/PublicationsTabelle/PSI-Bericht\\_13-03.pdf](https://www.psi.ch/eem/PublicationsTabelle/PSI-Bericht_13-03.pdf)

**Frei, C., Turton, H., Densing, M., et al. (2011).** Global Transport Scenarios 2050, *World Energy Council*, London, ISBN 978-0-946121-14-4/978-0-946121-13-7  
[https://www.worldenergy.org/wp-content/uploads/2012/09/wec\\_transport\\_scenarios\\_2050.pdf](https://www.worldenergy.org/wp-content/uploads/2012/09/wec_transport_scenarios_2050.pdf)

## **External Presentations (given by myself)**

**Densing, M. (2018).** Explicit solutions of stochastic energy storage problems, *29<sup>th</sup> European Conference on Operational Research (EURO 2018)*, **invited talk**, Valencia, Spain

**Densing, M., Panos, E. (2018).** Electricity Market Prices under Long-Term Policy Scenarios, *41<sup>st</sup> International IAEE (International Association of Energy Economics) conference*, Groningen, Netherlands

**Densing, M., Panos, E., Schmedders, K. (2017).** Stochastic bi-level electricity market modeling, *2<sup>nd</sup> Workshop of SET-Nav WP10 Modelling Forum - Modelling of Risk & Uncertainty in Energy System (with panel session)*, **invited talk**, ETH, Zürich, Switzerland

**Densing, M. (2016).** Stopped AVaR: A multiperiod extension of the risk measure AVaR, with application in power optimization, *14<sup>th</sup> Triannual International Conference on Stochastic Programming (ICSP 2016)*, **invited talk**, Búzios, Brazil

**Densing, M., Panos, E., Schmedders, K. (2016).** Oligopolistic Capacity Expansion with subsequent Market Bidding under Transmission constraints: Case of Switzerland and



surrounding countries, *SFOE-EWG Research Project Workshop (Swiss Federal Office of Energy – Energy-Economy-Society)*, ETH, Zürich, Switzerland

**Densing, M., Panos, E. (2016).** BEM – Bi-level electricity market modeling. *Joint workshop with chair of energy economics of UniBasel and SFOE*, University of Basel, Switzerland

**Densing, M., Panos, E., Schmedders, K. (2015).** Decision making in electricity markets: Bi-level games and stochastic programming, *Energy Science Center Workshop*, **invited talk**, ETH, Zürich Switzerland,  
[https://www.psi.ch/eem/ConferencesTabelle/BilevelAndSP\\_MartinDensing\\_TALK.pdf](https://www.psi.ch/eem/ConferencesTabelle/BilevelAndSP_MartinDensing_TALK.pdf)

**Densing, M., Panos, E., Schmedders, K. (2015).** Bi-level oligopolistic electricity market models: The case of Switzerland and surrounding countries, *Triannual International Conference of the Operations Research Societies of Germany, Switzerland and Austria (OR 2015)*, **invited talk, session organizer**, Vienna, Austria

**Densing M. (2015).** Stochastic programming formulations of coherent multi-period risk measurement, *13th Swiss Operations Research Days*, IBM Research, Rüschlikon, Switzerland

**Densing, M., Hirschberg, S., Panos, E. (2015).** Future Energy Scenarios, *4<sup>th</sup> International Congress on Sustainability and Engineering (ICOSSE 2015)*, **invited keynote talk**, Balatonfüred, Hungary

**Densing, M., Hirschberg, S. (2014).** Swiss Electricity Scenarios 2050, *Colloquium at Institute of Science, Technology and Policy (ISTP, Prof. S. Hellweg)*, **invited talk**, ETH, Zürich, Switzerland

**Densing, M. (2014).** Price-Duration Curves: Decomposition and integration into hydropower optimization models, *3rd Asset Optimization Day (AOD 2014, organized by BKW Energy)*, **invited talk**, Bern, Switzerland

**Densing, M. (2014).** Hydropower optimization against the market: Generalizations of the newsvendor problem, *4<sup>th</sup> Energy Finance Christmas Workshop (EFC 14)*, **invited talk**, University of St. Gallen, Switzerland

**Densing, M. (2014).** Pumped-storage hydropower optimization: Effects of several reservoirs and of ancillary services, *20<sup>th</sup> Triannual Conference of the International Federation of Operational Research Societies (IFORS 2014)*, **invited talk**, Barcelona, Spain,  
[https://www.psi.ch/eem/ConferencesTabelle/2014\\_IFORS\\_reduced\\_Densing.pdf](https://www.psi.ch/eem/ConferencesTabelle/2014_IFORS_reduced_Densing.pdf)

**Densing, M. (2013).** Price-driven hydropower dispatch under uncertainty, *Workshop on Risk Management in Energy Production and Trading*, **invited talk**, University of Vienna, Austria,  
<http://energybook.univie.ac.at/>

**Densing, M., Turton, H., Panos, E., Volkart, K. (2013).** Global Energy Scenarios 2050, *32<sup>th</sup> International Energy Workshop (IEW)*, Paris, France,  
[https://www.psi.ch/eem/ConferencesTabelle/2013\\_densing\\_iew.pdf](https://www.psi.ch/eem/ConferencesTabelle/2013_densing_iew.pdf)

**Densing, M., Turton, H., Panos, E., Volkart, K. (2013).** Energieszenarien bis 2050: Jazz und Symphony, *Rotary Club*, **invited talk**, Brugg, Switzerland

**Densing, M., Turton, H., Panos, E., Volkart, K. (2013).** Welt-Energieszenarien 2050, *Workshop on: Berichterstattung über den 22. Weltenergiekongress in Daegu 2013 durch den Schweizer Energierat. Energy Science Center, invited talk*, ETH, Zürich, Switzerland

**Densing, M., H. Turton, Bäuml, G. (2012).** Conditions for the deployment of alternative drivetrains: An energy system perspective, *12<sup>th</sup> European Energy Conference of the International Association for Energy Economics (IAEE)*, Venice, Italy, [https://www.psi.ch/eem/ConferencesTabelle/2012\\_densing\\_iaee.pdf](https://www.psi.ch/eem/ConferencesTabelle/2012_densing_iaee.pdf)

**Densing, M., Turton H., Bäuml, G. (2012).** Conditions for the successful deployment of electric vehicles, *12<sup>th</sup> Swiss Transport Research Conference*, Ascona, Switzerland, [https://www.psi.ch/eem/ConferencesTabelle/2012\\_densing\\_ascona.pdf](https://www.psi.ch/eem/ConferencesTabelle/2012_densing_ascona.pdf)

**Densing, M., Mayer, J. (2012).** Multistage stochastic optimization of power dispatch and multiperiod duality of CVaR, *21<sup>st</sup> International Symposium on Mathematical Programming (ISMP 2012)*, *invited talk*, Berlin, Germany, [https://www.psi.ch/eem/ConferencesTabelle/2012\\_densing\\_ismmp.pdf](https://www.psi.ch/eem/ConferencesTabelle/2012_densing_ismmp.pdf)

**Densing, M. (2012).** Stochastic programming formulations of coherent multiperiod risk measurement, *25<sup>th</sup> European Conference on Operational Research (EURO 2012)*, *invited talk*, Vilnius, Lithuania, [https://www.psi.ch/eem/ConferencesTabelle/2012\\_densing\\_euro.pdf](https://www.psi.ch/eem/ConferencesTabelle/2012_densing_euro.pdf)

**Densing, M. (2012).** Multiperiod stochastic optimization problems with time-consistent risk constraints and an application to power generation scheduling, *Institute of Statistics and Operations Research of the University of Vienna (ISOR Colloquium)*, *invited talk*, Vienna, Austria

**Densing, M., Mayer, J. (2011).** Multiperiod Stochastic Optimization Problems with Time-Consistent Risk Constraints, *International Conference on Operations Research (OR 2011)*, *invited talk*, Zürich, Switzerland

**Densing, M. (2007).** Multiperiod risk measurement and optimal scheduling of electricity generation, *11<sup>th</sup> International Conference on Stochastic Programming (SPXI)*, Vienna, Austria

**Densing, M. (2004).** Approaches to multiperiod coherent risk measurement. *International Conference on Computational Management Science (CMS04)*, Neuchâtel, Switzerland

## **Other Conference Contributions**

**Densing, M. (2019).** Modelling of dispatch of stored hydropower. *Swiss Competence Centre of Energy Research - Supply of Electricity Annual conference 2019*. EPFL, Lausanne, Switzerland

**Wan, Y., Densing, M. (2019).** Nonlinear Inverse Demand Curves in Electricity Market Modeling. *Swiss Competence Centre of Energy Research - Supply of Electricity, Annual conference*. EPFL, Lausanne, Switzerland

**Wan, Y., Densing, M. (2019).** Non-Linear Demand Curves in Electricity Markets: Impact on Market Power Estimation. *16<sup>th</sup> European IAEE (International Association of Energy Economics) Conference*, Ljubljana, Slovenia

**Panos, E., Densing, M., Kober, T. (2018).** Langfristige Preisentwicklungen im Strommarkt, *SWISSCLEANTECH Tutorial*, Zürich, Switzerland

**Densing, M. (2018).** Explicit solutions of stochastic energy storage problems, *29th European Conference on Operational Research (EURO 2018)*, Valencia, Spain

**Panos, E., Densing, M. (2018).** The future development of the electricity prices in view of the implementation of the Paris Agreements in 2030: will the current trends prevail or reverse is ahead? *37<sup>th</sup> International Energy Workshop*, Gothenburg, Sweden

**Kober, T., Panos, E., Densing, M., Kannan, R. (2018).** Zukünftige Rolle der Schweizer Wasserkraft im Gesamtenergiesystem, *VSE Fachtagung "Zukunft der Wasserkraft"*, Olten, Switzerland

**Densing, M. (2017).** Modeling of electricity markets and hydropower dispatch, *Swiss Competence Centre of Energy Research - Supply of Electricity Annual Conference 2017*, WSL, Birmensdorf, Switzerland.

**Kober, T., Yazdanie, M., Densing, M. (2017).** Energiedrehscheibe Basel: Langfristuntersuchungen der zukünftigen Basler Energielandschaft basierend auf einem ökonomischen Optimierungsmodell, *novatlantis Bauforum*, Basel, Switzerland

**Yazdanie, M., Densing, M. (2017).** The Role of Decentralized Generation and Storage Technologies in the Future Energy Systems of Swiss Communities, *INSMART - Integrative Smart City Planning (final conference)*, Brussels, Belgium

**Densing, M., Kober, T. (2016).** Exact dispatch solutions of stochastic hydropower problems (poster), *Swiss Competence Centre of Energy Research - Supply of Electricity Annual Conference 2016*, Sion, Switzerland

**Volkart, K., Densing, M., Panos, E., Mutel, C., Sabio, N., Strachan, N. (2016).** Implementation of multi-objective optimization in the MARKAL framework for simultaneously analysing the economic, societal and environmental performance of the global energy system, *wholeSEM Annual Conference 2016*, Cambridge, UK

**Yazdanie, M., Densing, M. (2016).** Decision-making for energy system planning using TIMES: the uptake of decentralized generation and storage technologies on a community-scale, *27th European Conference on Operational Research (EURO 2016)*, Poznan, Poland

**Volkart, K., Panos, E., Densing, M. (2015).** Review of Global Energy Scenarios (poster), *Swiss Competence Centre of Energy Research - Supply of Electricity Annual Conference 2015*, Neuchâtel, Switzerland

**Densing, M., Panos, E., Turton, H., Hirschberg, S. (2015).** Review and Meta-Analysis of Swiss Electricity Scenarios 2050 (poster), *Swiss Competence Centre of Energy Research - Supply of Electricity Annual Conference 2015*, Neuchâtel, Switzerland

**Panos, E., Densing, M., Volkart, K. (2015).** Achieving universal electricity access by 2030 in a sustainable way, *34<sup>th</sup> International Energy Workshop (IEW 2015)*, Abu Dhabi, UAE

**Panos, E., Densing, M., Turton, H., Volkart, K. (2014).** Orchestrating or improvising the global energy transition: Scenario modelling with the World Energy Council, *33<sup>rd</sup> International Energy Workshop (IEW 2014)*, Beijing, China

**Panos, E., Densing, M., Turton, H., Volkart, K. (2014).** Choosing a tempo to power Sub-Saharan Africa in 2050: Jazz and Symphony scenarios of the World Energy Council, *33<sup>rd</sup> International Energy Workshop (IEW 2014)*, Beijing, China

**Turton, H., Densing, M., Panos, E., Volkart, K. (2013).** World Energy Scenarios Composing energy futures to 2050 – PSI Methodology, *Swiss Energy Council's reporting from the 22<sup>nd</sup> World Energy Congress in Daegu 2013*, Energy Center, EPFL, Lausanne, Switzerland

### **PhD Thesis**

**Densing, M. (2007).** *Hydro-Electric Power Plant Dispatch-Planning - Multi-Stage Stochastic Programming with Time-Consistent Constraints on Risk*, ETH Zurich, 2007, No.17244, [doi: 10.3929/ethz-a-005464814](https://doi.org/10.3929/ethz-a-005464814). Referees: Peter Kall, Hans-Jakob Lühi.

### **Master Thesis (grade: 6.0)**

**Densing, M. (1996).** *Numerical Stability Analysis of Globally Regular Solutions of the Einstein-Yang-Mills-Dilaton-Proca-System*, University of Zurich (available on request). Examiner: Norbert Straumann.