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Energy Track

Optimization Strategies for the Energy Transition

Empowering a better Future

Frank Häger
Director Energy

Lennart Lahrs
Technical Account Manager

GUROBI LiVE!

Optimization Strategies for the Energy Transition

Empowering a better Future

Gurobi Live Barcelona

decide

JÜLICH
FORSCHUNGSZENTRUM

JuPower
DESIGN • COMPETE • EVALUATE

Customized Energy Solutions

kerith

OET Open Energy Transition
from the creators of PyPSA meets Earth

KISTERS
Empowering decisions of tomorrow

Optimization Strategies for
the Energy Transition
Empowering a better Future
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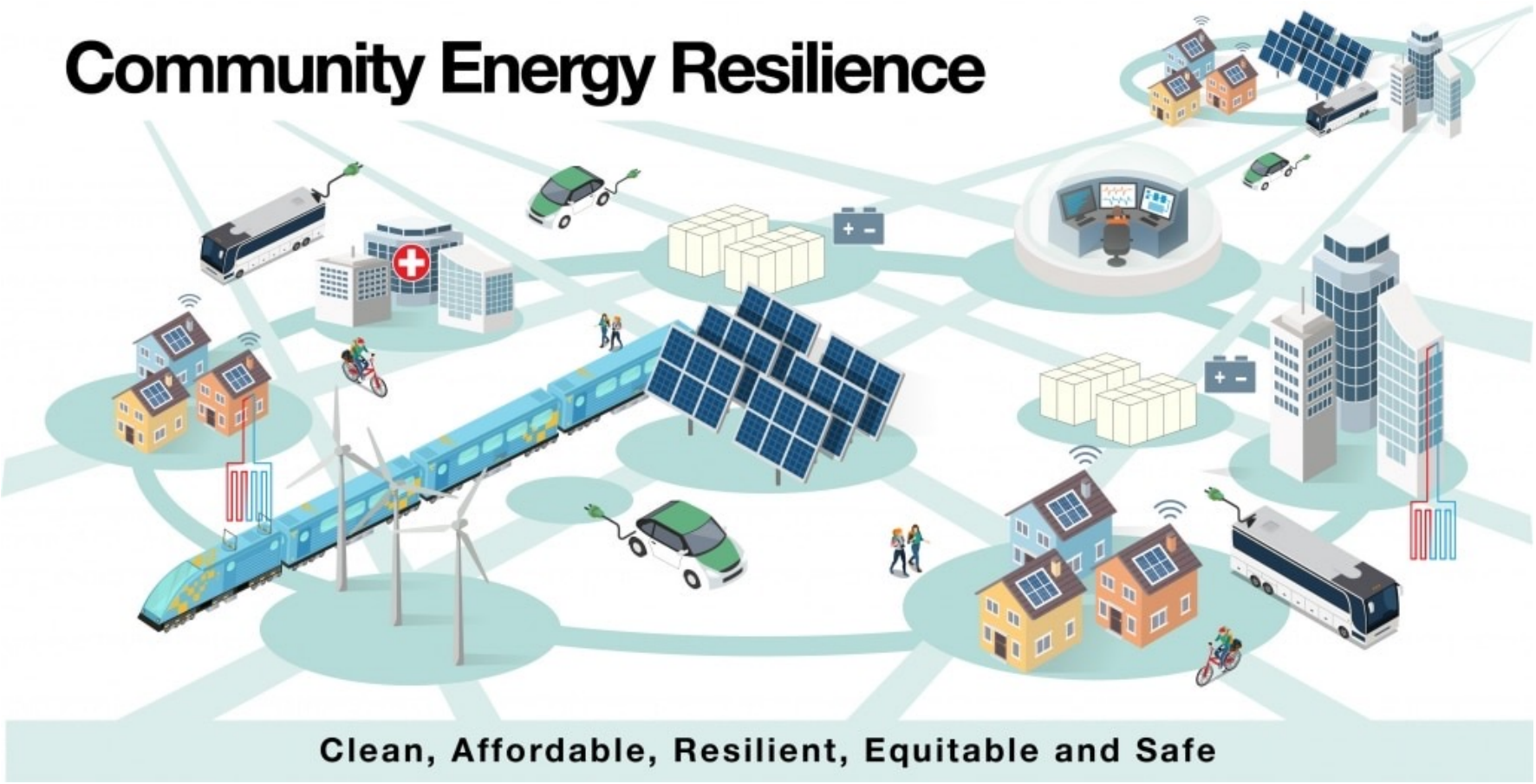

© Climate Center initiative

Optimization is helping companies and communities by simplifying the complex, maximizing the renewables, and creating a more resilient grid!

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OPTIMIZATION

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Meet the Team

Dr. Sonja Mars
Director of Optimization Support

Dr. Kostja Siefen
Director of Technical Account Management

Dr. Alison Cozad

Dr. Cara Touretzky

Dr. Chung-Kyun Han

Dan Jeffrey

Dr. Dan Steffy

Dr. David Torres Sanchez

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Dr. Eli Towle

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Dr. Mario Ruthmair

Dr. Riley Clement

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Dr. Simranjit Kaur

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Zed Dean

Lennart Lahrs

Dr. Marika Karbstein

Dr. Matthias Miltenberger

Dr. Rodrigo Fuentes

Dr. Silke Horn

Dr. Steven Edwards

Dr. Yuriy Zinchenko

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"Working with the Gurobi engineers has helped us move even more quickly."
Anne Tye, Senior Energy Analyst, Alpiq

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Gurobi as Performance Advisor

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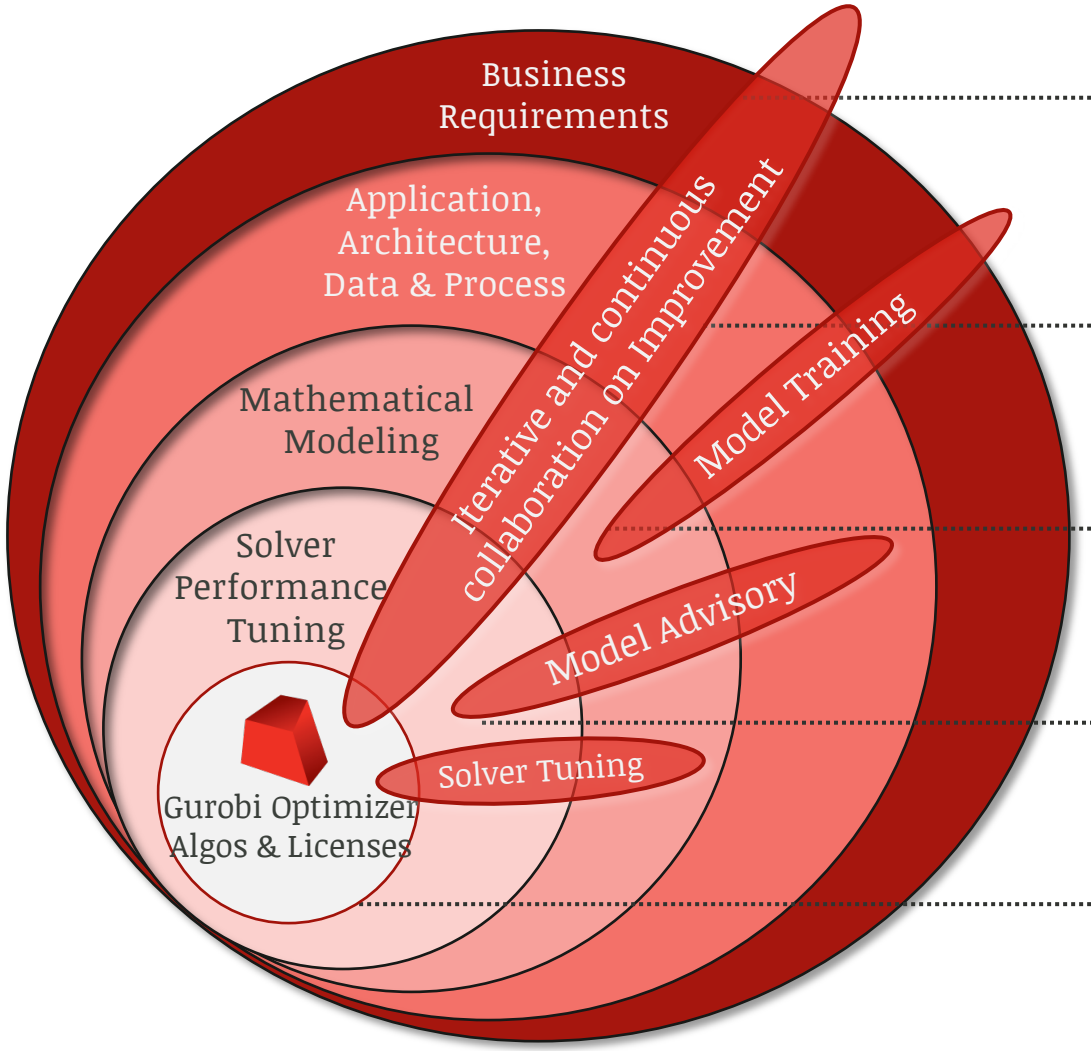
Get things right from the start



Optimization usage patterns (frequency, parallellism), ideal/acceptable runtime, optimality tolerance etc.

Architecture requirements, **performance** considerations, **security/failover** scenarios

Jointly: Analysis of the **mathematical model** and **implementation strategy.**

Gurobi Support: Fine-tuning of the **solver configuration** to optimize the algorithmic behaviour of the Gurobi solver.

Gurobi R&D: continuously improves the **solver engine**, also based on YOUR model. Difficult models an opportunity to improve Gurobi.

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Gurobi R&D

Ed Klotz

Ed Rothberg

Fernando Orozco

Jaromil Najman

Michael Winkler

Michel Jaczynski

Olivier Noiret

Pierre Bonami

Rinor Sadiku

Robert Luce

Roland Wunderling

Simon Bowly

Stefan Heinz

Thomas Braam

Tobias Achterberg

Wale Sipe

Xavier Nodet

Zonghao Gu

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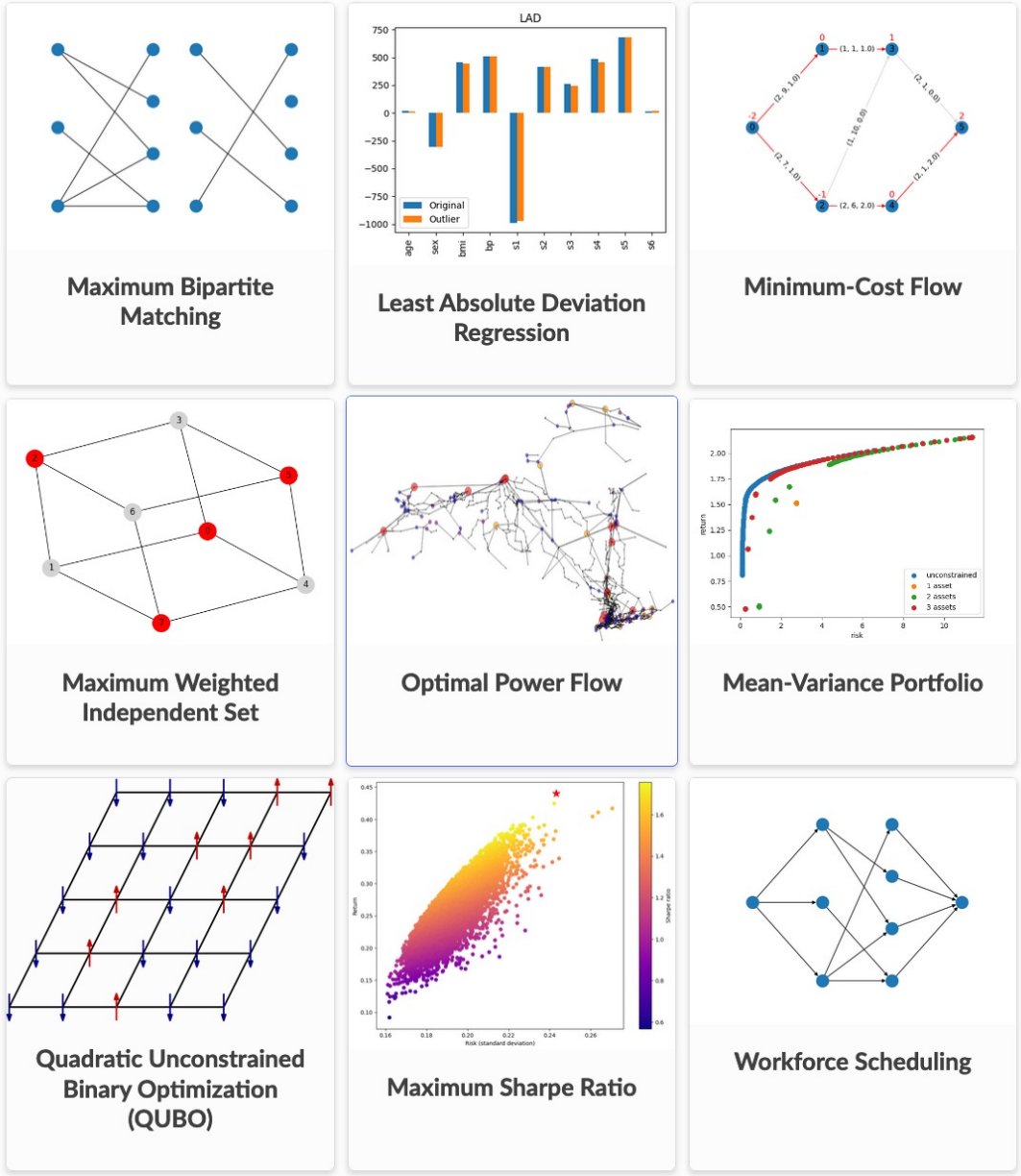
Gurobi OptiMods

- Data-driven APIs for common optimization tasks
- Easy to integrate with the greater Python ecosystem
- Solve problems without the need to dive into mathematical modeling
- Best practice modelling using gurobipy

The OptiMods Gallery



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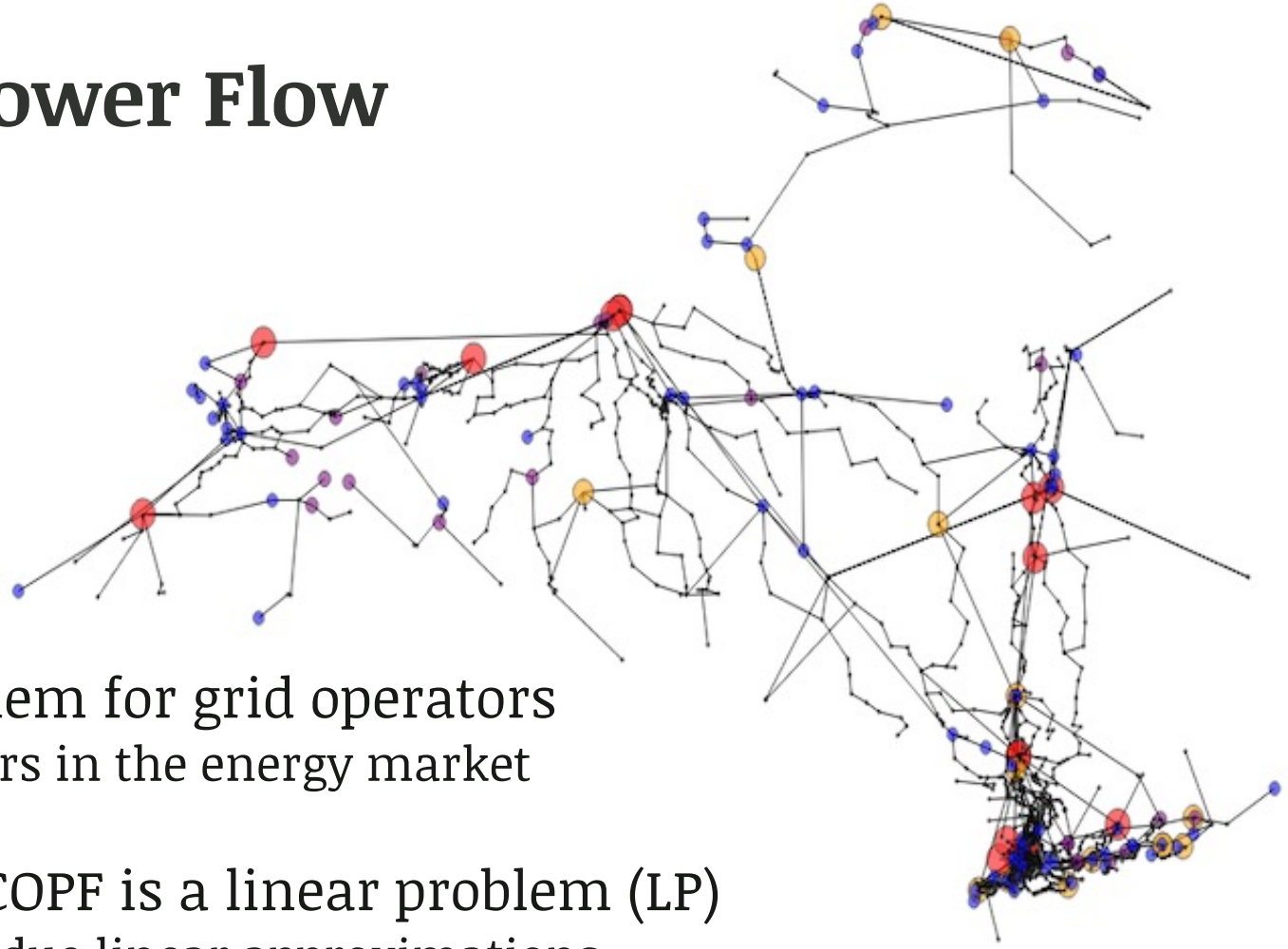
AC Optimal Power Flow



- Fundamental problem for grid operators
  - … and other players in the energy market
- Relaxed version, DCOPF is a linear problem (LP)
  - Comes with error due linear approximations
- ACOPF is a non-convex non-linear problem (NLP)
  - Highest accuracy when using polar coordinates

Gurobi 11: Global MINLP

Daniel Bienstock

Jaromil Najman

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Joint Research

Supported by:

Federal Ministry
for Economic Affairs
and Climate Action

on the basis of a decision
by the German Bundestag

InnOpTEM

Innovative approaches for optimizing
topological remedial actions in
grid congestion management

FGH

GUROBI
OPTIMIZATION

IAEW Elektrische Anlagen & Netze, Digitalisierung & Energiewirtschaft

RWTH AACHEN UNIVERSITY

Gurobi in the energy sector

is more than a solver

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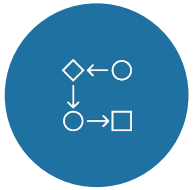
Track record
Numerous application integrations in the energy sector

R&D on complex model classes
Global Mixed Integer Non-Linear Programming (v11)

Contributing application code
Optimal Power Flow - OptiMod



Convenient modelling framework
General constraints, pandas support, machine learning integration

Expert Support
Fast response times from mathematical experts

Collaboration and learning platform
Live events (Energy Innovation Summits) and webinars

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Let's learn together …

- Exchange ideas
- Discuss challenges
- Get different perspectives

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… to reach a shared goal

- Your work on
  - Building and district system control
  - educational content
  - standardizing data and frameworks
  - optimizing storage operation
  - making mathematical optimization accessible
- … generates knowledge and creates working systems that help provide reliable, sustainable and affordable energy supply.

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