

### Electricity Markets

Electricity market simulation

Price forecasting

### Energy networks

Network simulation  
(electricity & heat)

### Generation & demand

Generation and demand forecasting

Long- and short-term portfolio  
optimization

Simulation of energy systems & sector coupling

# ENERGY SYSTEM ANALYSIS, PORTFOLIO OPTIMIZATION

AIT services, tools & reference projects



# AIT CLIENTS & SERVICES

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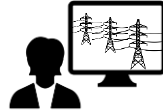
## Electricity suppliers

Model-based investment decision support

Business model development

High-resolution demand, generation and price forecasting

Portfolio optimization for distributed energy resources & consumption



## TSO

Strategies for system service procurement (balancing, congestion management)

Grid and market simulation to assess options for efficient grid operation



## DSO

Asset simulation & optimization

Tariff design

Cost-benefit analyses



## Municipalities

Assessment of decarbonization scenarios

Design of local energy community frameworks

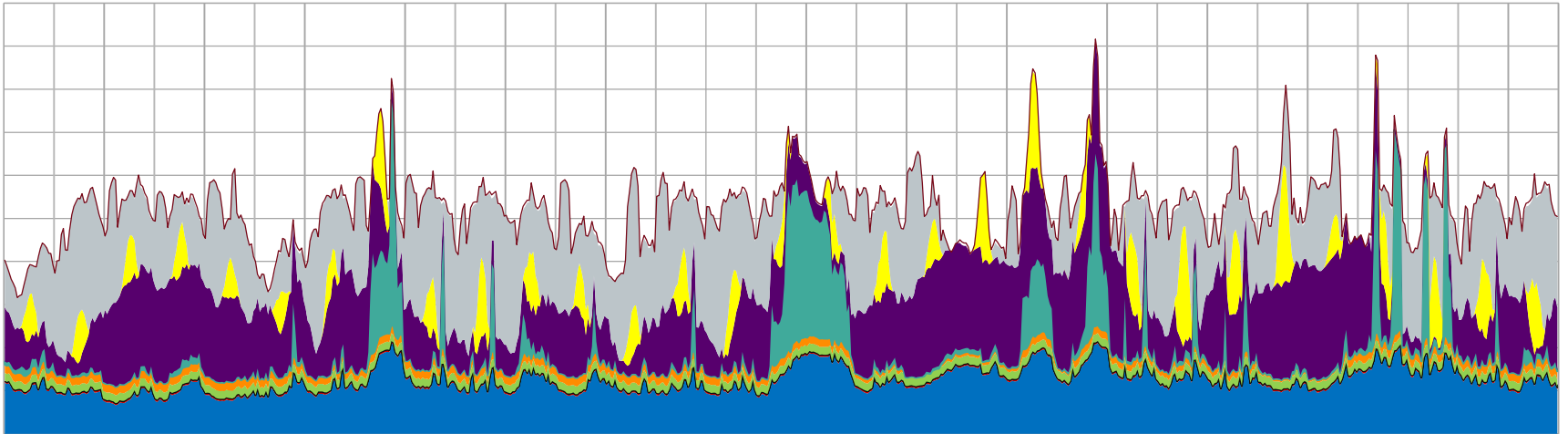


## Regulators & policymakers

Quantitative and qualitative analysis of regulatory or policy change

Model-based decision support

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# ENERGY SYSTEM MODELLING

AIT services, tools & reference projects



# ENERGY SYSTEM MODELLING SERVICES

Analysis of energy systems, grids and markets from technical, economic and regulatory perspectives, using appropriate optimization and simulation models

- Combined assessments of energy markets and infrastructure investments:
  - Electricity and heat supply, grids and storage needs
  - Coupling of electricity, heat, power-to-gas and vehicle charging
  - Cross-border market coupling and load-flow analysis
- Assessment of future electricity prices, future technology investment needs and decarbonization pathways
- Impact analysis of changes of market design, regulatory and policy framework

# TOOLING

Tool	Description	Key functionalities
<b>AIT MarketFlow</b>	<p>In-house fundamental model for the Austrian energy system and surrounding countries</p> <p>Flexible framework to perform market and power flow analysis of one or several countries</p>	<ul style="list-style-type: none"> <li>• Scenario analysis of the future Austrian energy systems, assessing:               <ul style="list-style-type: none"> <li>• future electricity and district heat prices,</li> <li>• future technology investment needs</li> <li>• decarbonization pathways</li> </ul> </li> <li>• Combined assessment of electricity markets and power system</li> <li>• Coupling of electricity, heat and charging infrastructure</li> <li>• Assess and develop strategies for congestion management and balancing</li> </ul>
<b>TIMES &amp; Balmorel</b>	<p>Internationally used and verified open-source models of the energy system</p>	<ul style="list-style-type: none"> <li>• Inclusion of all sectors (e.g. industry, transport)</li> <li>• Customized for specific countries (e.g. Austria)</li> <li>• Well-suited to the development of long-term scenarios and forecasts</li> </ul>

# SELECTED REFERENCES

Topic	Estimation of flexibility need to achieve 100% RES supply in Austria by 2030	Flow-based market coupling simulation	Energy and decarbonization transition for cities in the mid-to-long term (2030-2050)
Customer/ Project	<i>Association of Austrian Electricity Companies (Österreichs Energie)</i>	<i>Association</i>	<i>SURECITY project / JPI urban Europe</i>
Key deliverables	<p>Scenario analysis for the future flexibility need for different time scales (from daily to yearly)</p> <p>Assessment of the role of different flexibility options (storages, flexible power plants, P2X and demand side management)</p>	<p>Investigation of the added value of a novel approach to reduce redispatch needs, taking expected redispatch actions into account during day-ahead market clearing</p> <p>System modelling and implementation of optimization schemes</p> <p>Social welfare (cost-benefit) analysis and benchmarking against state of the art of redispatch management</p>	<p>TIMES model implemented to represent city's energy system, covering supply technologies, infrastructure and demand used in buildings, transportation and industry.</p> <p>Implementation of a software platform to perform holistic assessments in the medium-to-long term for smart cities/regions</p> <p><a href="http://surecityproject.eu/">http://surecityproject.eu/</a></p> <p><a href="https://ivl-surecity.azurewebsites.net/InstallTool">https://ivl-surecity.azurewebsites.net/InstallTool</a></p>



# PORTFOLIO OPTIMIZATION

AIT services & reference projects



# PORTFOLIO OPTIMIZATION SERVICES

Design and evaluation of control schemes for optimal use of customers' portfolios

- Portfolio optimization resulting in a technical and economic assessment and real-time operation
- Cost-benefit-analysis for deploying new flexibility options for market participation
- Optimal strategies for market participation of flexible distributed energy resources and demand response
- Development and evaluation of control schemes for energy communities and multi-family houses
- Forecasting of generation, demand and prices



# TOOLING

Tool	Description	Key functionalities
<b>AIT Flex&amp;Cast</b>	Comprehensive simulation framework which enables evaluation of control schemes for portfolio optimization	<ul style="list-style-type: none"> <li>• Techno-economic assessment of portfolio optimization schemes</li> <li>• Assessment of strategies for market participation of flexible energy resources and demand response</li> <li>• Development and evaluation of control schemes for energy communities</li> </ul>
<b>AIT proDG&amp;P</b>	Forecasting tool providing demand, generation and price forecasts	Providing forecasts of <ul style="list-style-type: none"> <li>• PV generation</li> <li>• Consumption</li> <li>• Prices: energy prices, balancing prices, intraday prices</li> </ul>

# SELECTED REFERENCES

<b>Topic</b>	<b>Use of distributed flexibility of heat pumps to support system operation</b>	<b>Optimal control strategies for a battery pool</b>	<b>Evaluation of local energy community design</b>
<b>Project/ Customer</b>	<i>Flex+</i>	<i>FeldBatt</i>	<i>Supplier</i>
<b>Key deliverables</b>	<p>Heat pump pooling</p> <p>Design of control architecture</p> <p>Design and field implementation of control schemes to maximize added value of heat pump pooling</p>	<p>Battery pooling</p> <p>Design and of control strategies for frequency containment reserve provision and short term trading</p> <p>Field implementation</p>	<p>Variant analysis of LEC setups</p> <p>Cost-benefit analysis for different stakeholders (operator, customer, network operator)</p> <p>Regulatory and legal assessment</p>

# AIT EXPERIENCE

For nearly 10 years, AIT has been working in the field of energy economics, currently with a team of over 10 experts.

As Austria's largest independent research institute, we provide sound scientific results, on which our customers build their business.

More than 30 projects on energy economics, totaling over 6 M€

> 70 customers and partners

## Selected customers and partners

