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# A digital twin for resilient infrastructure coupling e-mobility and grid

for Aspern Smart City Research

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**IDC Smart Cities and Communities**  
2020 Awards, Europe and Central Asia

WINNER: Resilient Infrastructure

# A digital twin for resilient infrastructure coupling e-mobility and grid



## ASCR - Aspern Smart City Research

Explores solutions for the energy future within an urban development zone



## CLIENT CHALLENGES

Model the energy demand of electrical vehicles & their impact on the electricity grid



## OUR SOLUTION

Merging data sources and streams by creating a graph-based data model (City Graph), enabling planning of network capacities and related expansion



## CLIENT BENEFITS

Improved system efficiency & operation by coordinated interaction with the electricity grid

up to

**15%**

cost savings  
on contracted  
network  
capacity

up to

**25%**

efficiency  
increase in  
network  
utilization

up to

**20%**

increase  
in energy  
delivery

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One of Europe's largest & most innovative Energy Research Projects



Aspern, Vienna



Energy & Smart Infrastructure



Second program phase launched in 2019 by Wien Energie, Wiener Netze, and Siemens



85 million € total R&D expenditure



Over 100 researchers from various disciplines

# THE CHALLENGE

Prediction improvement of charging demand & understanding of the impact on the infrastructure

1

Utilize the electricity network to maximize the supplied energy

2

Communication & information of extra network capacity reserves for electric car users

3

Improve system efficiency & operation by connecting charging points to buildings & their parking lots

Exploring  
charging-  
management to  
tap into unused  
network capacity

# OUR APPROACH

Implementing applications for network capacity prediction & providing the information for the end user

1

## Data Sources:

Ontology  
Electrical  
network data  
based on the IEC  
standard CIM  
(Common  
Information  
Model)

2

## Electrical load information:

Publicly  
accessible &  
open data  
platforms  
provide  
charging station  
information

3

**Digital Twin:** Correlation  
of transportation &  
electricity network  
data, charging stations  
& electric vehicle  
consumption by  
creating a graph-  
based data model  
(CityGraph)

**Connectivity  
and visualization  
of e-cars within  
district**  
to model exact energy demand

# OUR APPROACH

Implementing applications for network capacity prediction & providing the information for the end user

## 4

**Visualization of correlated data:**  
Transportation information & traffic flows for end users in an interactive map

## 5

**Status of charging:**  
Prediction of charging point usage (occupancy & energy demand)

**Implementation of local IoT field devices**  
to reflect the real-world status of network load



# THE IMPACT

Improved system efficiency & operation by coordinated interaction with the electricity grid

1

Enabling e-mobility through better planning of network capacities and related expansion

2

Providing services through open standards & interfaces, with the goal of affordability, monetization enablement & longevity

3

Digital Twin can be extended with any ontology (e.g. heat networks, transportation, buildings) and related for many other business use cases

4

Increasing customer satisfaction & attractiveness of e-mobility through fast availability & transparency of charging capacities, leading to a reduction of emissions from combustion vehicles

5

The system implemented for providing & monitoring network capacity can help to secure the reliability of power supply in large cities



# SOCIAL



- Possibility of faster charging, higher capacity & cost reduction
- Optimization of infrastructure & customer needs



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# IOT AS A KEY DRIVER FOR SUSTAINABILITY



# ECONOMICAL

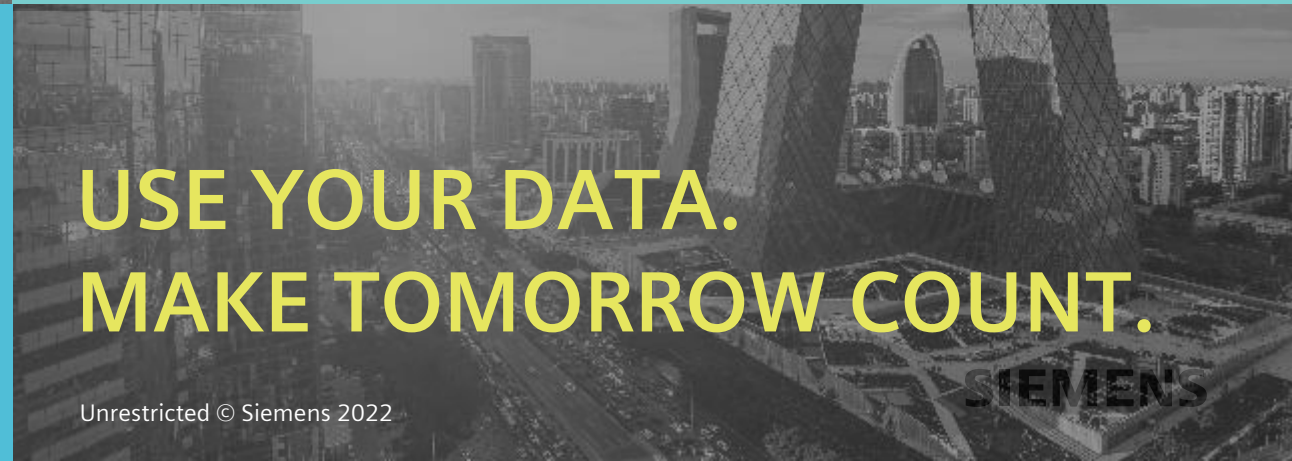


- Rollout of charging infrastructure
- Measurement of impact and evaluation of availability of additional network reserves
- Planning of network capacities and related expansion

# ENVIRONMENTAL



- Flexibility of batteries & controlled charging
- Replacing combustion vehicles in the long term
- Reduction of emission and noise, consequently increase of air quality and quality of life



**USE YOUR DATA.  
MAKE TOMORROW COUNT.**

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“With the City Graph, our partners Siemens Advanta Solution and Microsoft supported us to integrate multiple data sources in an efficient way and we were able to jointly build digital twins of our city district in a very short time frame.”

Roman Tobler, Manager at ASCR and Wiener Netze



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# Why is Siemens Advanta the best partner for this sort of project?

## Benefit from our deep **Domain Knowledge**

Siemens Advanta's City Graph data modelling supports developers in many ways to create custom domain models of any connected environment using Digital Twins.

## Leverage us as a **One-Stop-Shop**

Siemens Advanta offers solutions to multi-faceted challenges all out of one hand. This reduces your project related risks and overall complexity.

## Profit from our powerful **Ecosystem**

Siemens Advanta agnostically integrates across various platforms, drawing on an extensive, global partner network to deliver tangible business outcomes for your projects.

