

The Future of Decarbonisation is today: Successes and Hurdles of grid-serving Electromobility

**IEA Networking Event Switzerland 2022: Decarbonisation –
the indispensable pathway of the future**

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Outline

- A glance on **Task 43**
- Two Swiss **V2X implementation** projects
- The **Hurdles** of grid-serving e-mobility
- The **Successes** of grid-serving e-mobility



A Glance on Task 43

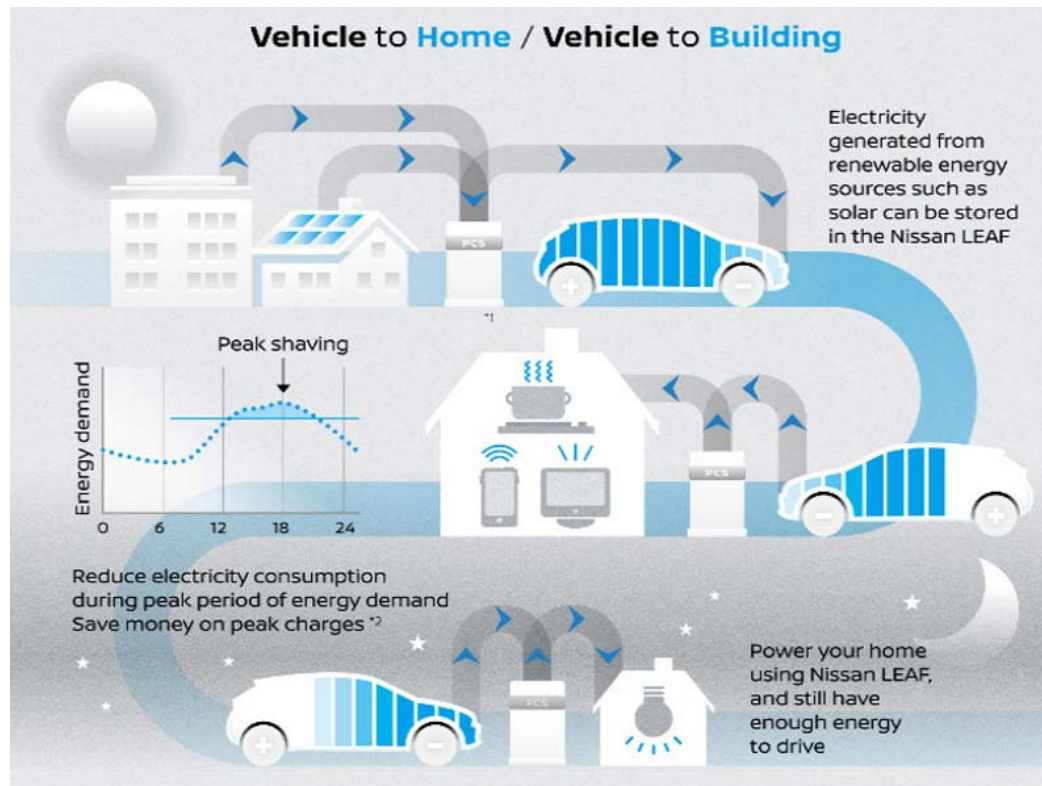
● Vehicle Grid Integration

- Co-operating agents Cristina Corchero & Josh Eichmann, IREC Barcelona
- 13 countries, Kick-off 2019 in Lyon, 3 online workshops in 2020
- Stand by in 2021, 2 workshops in 2022 plus final meeting

● Objectives

1. To **explore, identify and give answers** to the gaps preventing the electric vehicles to be fully integrated in the electrical grid.
2. To **improve the joint work between electric sector and mobility sector**, which is a key point for the real energy transition.

Project 1: Two bidirectional EVs integrated in Site



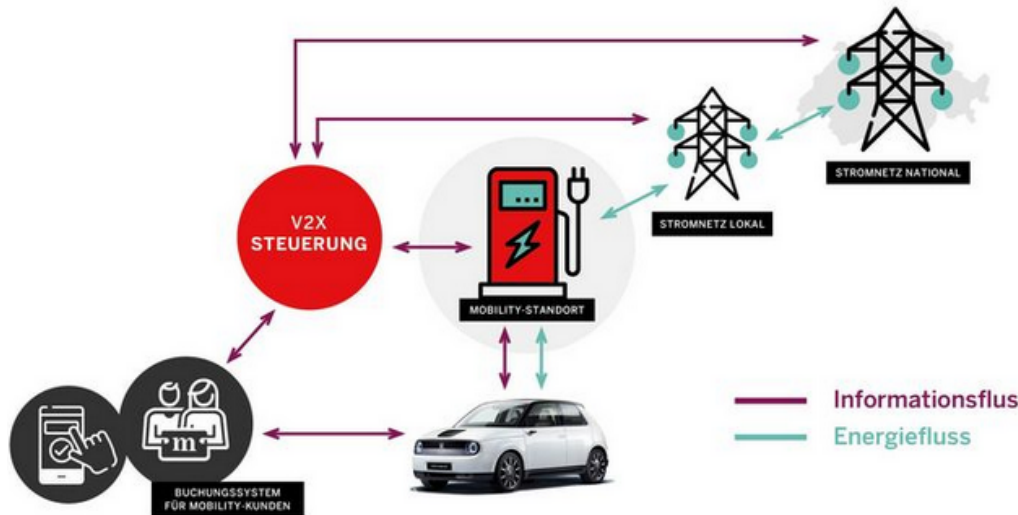
Source: The Driven ([online](#))

More information: Final Report www.novatlantis.ch/projekte

Proof of Concept in Basel 1/19-3/22:

- biggest self-consumption community in CH
- E-car sharing concept operated by ADEV
- 2 bidir. EVs integrated with 13 buildings & micro power grid
- EVs are used 2x/day
- Peak shaving with new energy manager: successful breaking of peak loads
- Modeling of larger fleets (private & work)
- Consumer behavior intervention

Project 2: V2X Suisse with 50 bidirectional EVs



Demonstration Project in Switzerland 9/21-12/23

- Mobility: Business Model for bidir. fleet of 3'000 EVs?
- 50 bidir. Honda-e, 40 locations in CH
- Certified series products
- Charging stations and vehicles on European CCS basis (not CHAdeMO)
- Flexibility aggregation and competition between potential flexibility buyers
- 7 partners



mobility

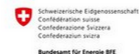


EVTEC

tiko



More information: Project Website www.novatlantis.ch/projekte



Hurdles of grid-serving e-mobility

Hurdles of Task 43

- Technology Collaboration Program: ~~Hybrid~~ and Electric Vehicle
- Excessive targets and unclear assessment of target achievement
- Very different country situations regarding energy, mobility, legal framework etc.
- Focus on basic research, hardly any applied research or implementation

Technical & organisational Hurdles

- Bidir. EVs, charging stations & control systems: few products, high prices
- No customer-friendly packages on the market; low level of awareness
- Specific solutions needed for residential (owners, tenants) and workplace

Successes of grid-serving e-mobility

Group Success of Task 43

- Network including Horizon 2020 proposals
- Mutual understanding of national challenges

Energy Success of bidir. EVs

- Peak shaving is feasible ... and grid-serving
- Future business models: peak shaving and supply of flexibility
- Use of excess PV power in sites with bidir. EVs is grid-serving

Mobility Success of bidir. EVs

- Carsharing & e-mobility enables «double effect» of decarbonisation
- Decarbonised e-mobility requires use of renewable electricity

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sustainability | knowledge transfer

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The V2X Suisse Project Team,
Kick-off Meeting 9/2021



Facts & Figures Project 1: Erlenmatt Ost, Basel



Sector coupling and E-Car Sharing: Core Items

- Duration 2017-2019, funded by City of Basel
- Transdisciplinary project team
 - applied sustainability & energy research
 - development of ICT & new business models
- Multi-stakeholder management
 - site developer: Foundation Habitat
 - 650 residents & workers on the site
 - energy service provider became mobility provider
- Bidirectional EVs and charging technology
 - 2 EVs: Nissan Leaf und Nissan Evalia (40 kWh)
 - 2 bidirectional charging stations: EVTEC
- E-car sharing concept
 - own website and app for car sharing Erlenmatt Ost
 - Booking and billing of shared e-vehicles
 - Pricing by time & distance (8 CHF/h & 0.40 CHF/km)



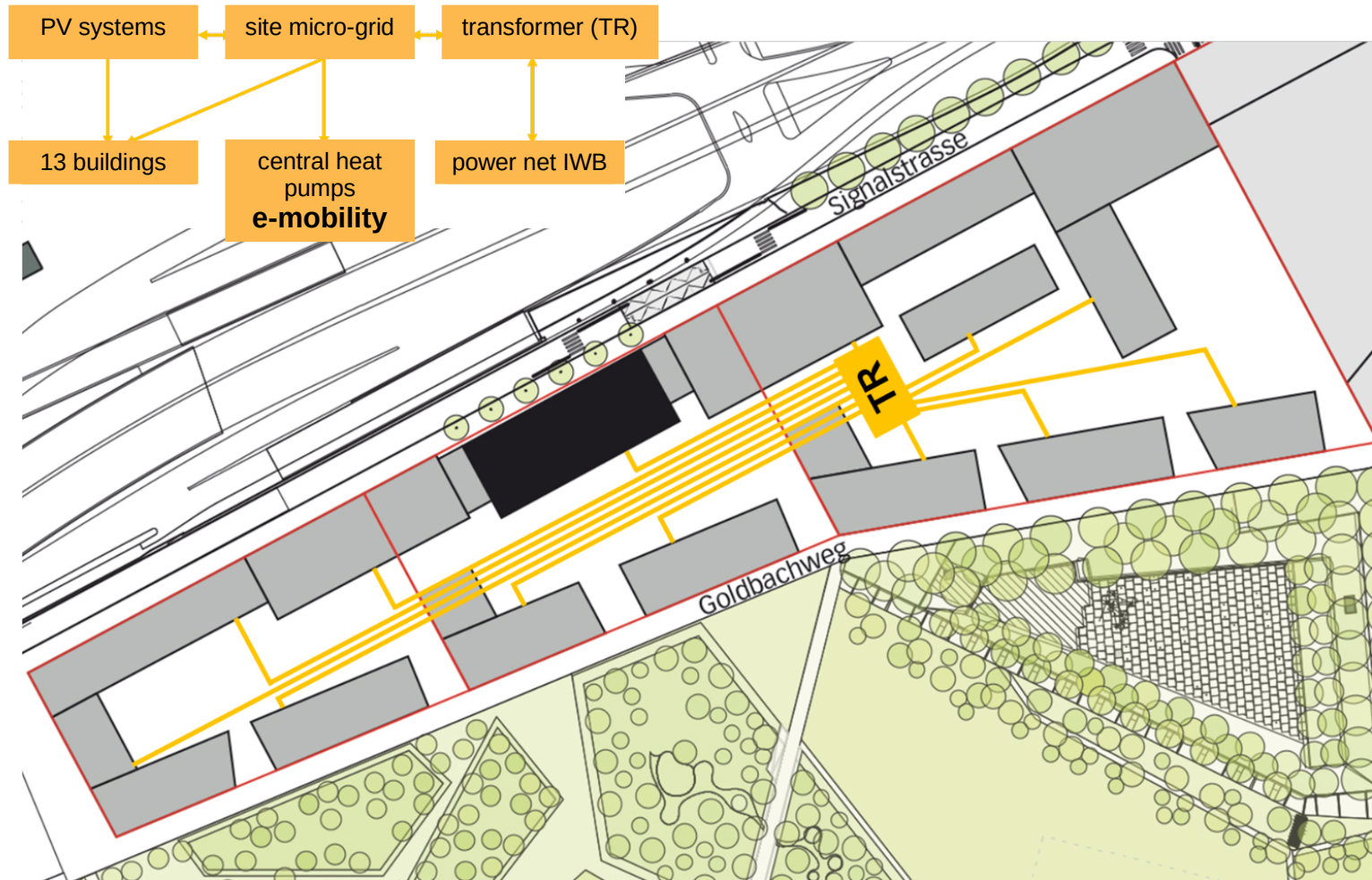
ERLENMATT OST
E-MIETAUTO

Key figures «Self-Consumption Community»

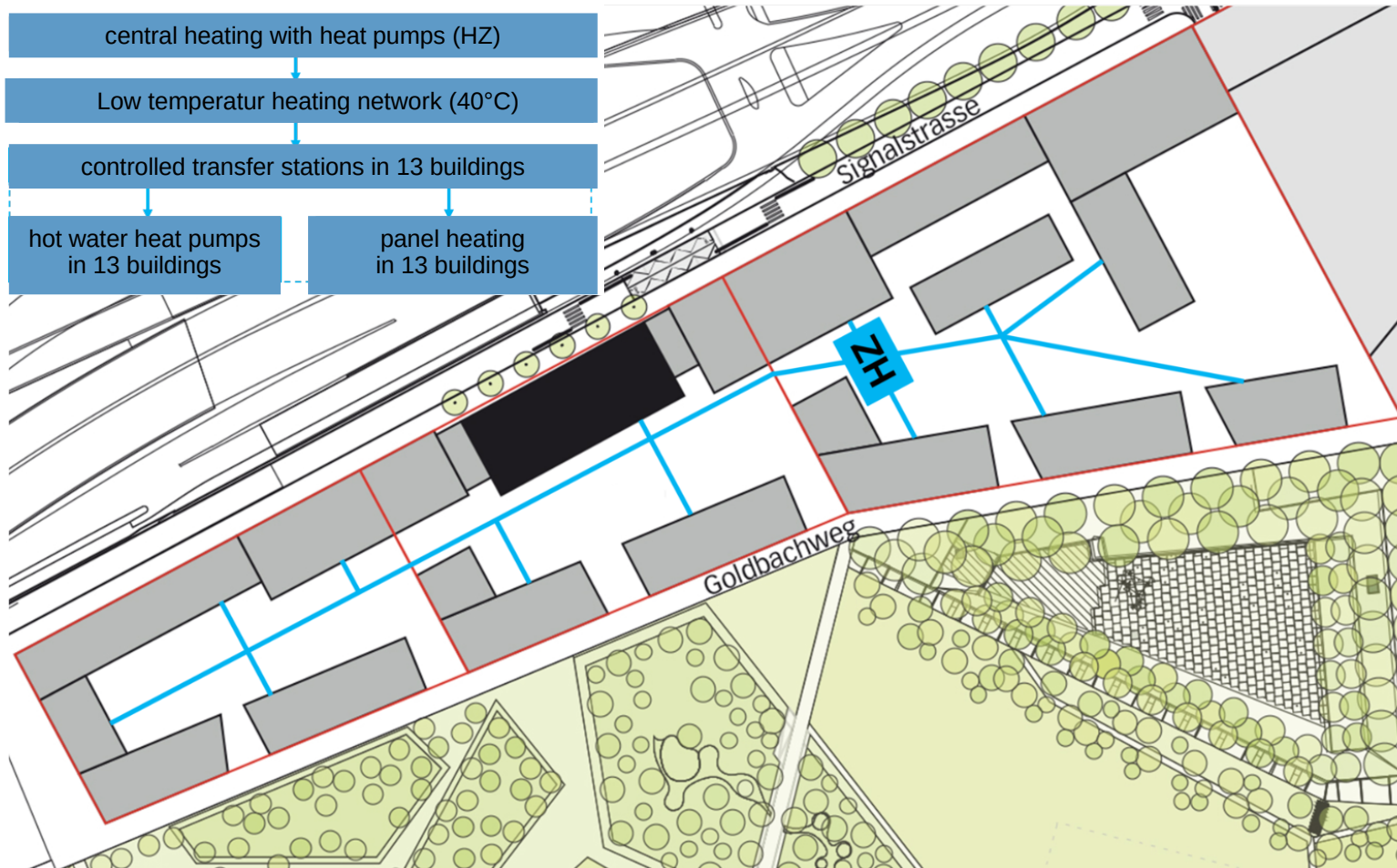
- Erlenmatt Ost is Switzerland's biggest PV-SCC (since 11/2017) and award winner Watt d'Or (1/2019)
- Buildings:
 - > 650 people in 13 buildings in 200 apartments plus commercial
- 650 kW power PV
- 3 central heat pumps with 900 kW power
- 70'000 liter heat storage (also buffer for solar power)
- 13 decentral hot water heat pumps in the 13 buildings
- forced control of heat pumps with excess PV power
- 1 parking spot for 10 apartments



Electricity Network Erlenmatt Ost



Heating Network Erlenmatt Ost



Smart Mobility: new solutions

- Project duration 1/2019–3/2022
- Funding by Swiss Fed. Office of Energy and City of Basel
- Predictive optimization of self-consumption with smart integration of different ICT platforms:
 - online booking system
 - local information from intelligent charging stations
 - weather forecast with own radiation prognosis (new)
 - adaptive algorithm for recognizing user behavior (new)
- Behavior intervention with smart tariff system
 - tariffs depending on pricing and information
- Development of new business models

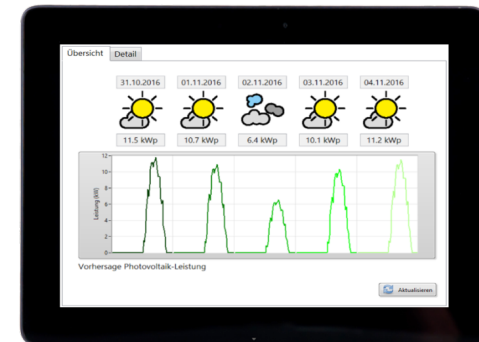
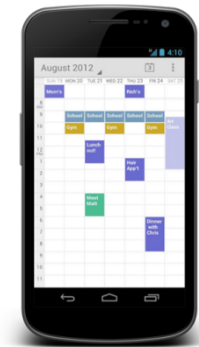




Fig.: SEC

Technical Specifications EVTEC Charging Station

Model «coffee & charge bidirectional».

Development and production in Switzerland.

Technical Specifications (single-user model)		
Input AC	Grid connection	AC 3-Ph
	Input voltage range	400 V _{AC} +/- 10%
	Nominal input current	3 x 32 A _{AC}
	Input frequency	45 - 65 Hz
DC Output	DC Plug	Plug CHAdeMO
		 JEVS G105, 4m cable
	Maximum DC output power	10 - 20 kW
	DC Output voltage range	170-500 V _{DC} (under load: 50-500 V _{DC})
	Maximum DC output current	50 A _{DC}
	Power factor (≥ 50% load)	> 0.99
	Efficiency	93% at full load
	Safety	<ul style="list-style-type: none"> - Short circuit protected - Overcurr. circuit breaker - Overvoltage protection - Low-voltage protection - Isolation monitoring - Earth monitoring
	Operating temperature	-20°C to +45°C
	Storage temperature	-40°C to +85°C
General	Relative humidity	5% to 95% (without condensation)
	Protection	IP54 (indoor / outdoor use)
	Collision protection	Steel frame painted
	Dimensions (D x W x H)	490 x 770 x 1120 mm
	Mass	Body: 85 kg (depending on options)
	Electrical safety (xFC1)	IEC 61851-1, IEC 62479
	EMC	EN 61000-6-1, -2, -3, 4, EN 61000-3-2
Standards	CHAdeMO	Rev. 0.9.1 (certified)
		

Conclusion

- Successful first V2H and V2G implementation in Switzerland
 - Technically and organizationally highly complex project
 - Innovative research and implementation partners required
 - Development of specific on-site solutions necessary
 - Nevertheless high scalability for other sites
 - Forward-looking combination of e-car sharing and sector coupling
- ➡ More information in Final Report www.novatlantis.ch/projekte