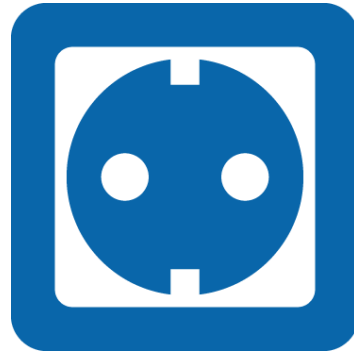




# Good practice examples and optimization potential for network connection and network access



## Overview of current figures on grid connection and grid access

# The Austrian electricity market

*Key figures, market participants*

**Electricity Consumption:** approx. 55 TWh

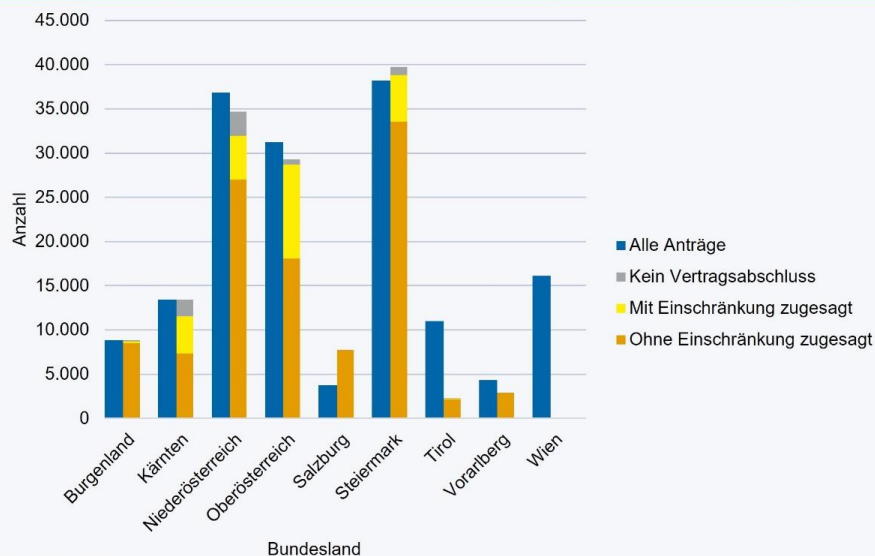
## **Market participants:**

- Generators (317 power plants > 10 MW, approx. 261,102 power plants < 10 MW)
- approx. 125 balance groups
- approx. 120 DSOs
- 2 TSOs
- 7 control reserve providers (<https://markt.apg.at/netz/netzregelung/> )
- approx. 290 suppliers and electricity traders
- approx. 4.8 million end consumers
- Approx. 6.3 million metering points

# Applications for grid connection of PV systems

Number of complete applications with 60 DSOs in 2023

ANZAHL ANTRÄGE AUF NETZANSCHLUSS VON PV-ANLAGEN BEI 60 VNB NACH BUNDESLAND (2023)



Quelle: E-Control

Abb.: Anträge auf Netzanschluss für PV-Anlagen 2023 pro Bundesland bei 60 VNB, Quelle: Jahresbericht Erhebung Netzanschluss 2024, E-Control

## Applications for PV systems with 60 DSOs in 2023:

- 163.690 applications for grid connection of PV systems in 2023 (cf. 169.738 applications in 2022).
- The majority could be approved without power restrictions.
- Applications for small systems  $\leq 20$  kW were approved within 11 days on average.

# Development of grid connections

Installed capacity at 60 DSOs

## BESTAND ENGPASSLEISTUNG VON PV- UND WINDKRAFTANLAGEN BEI 60 VNB (STAND 2023)

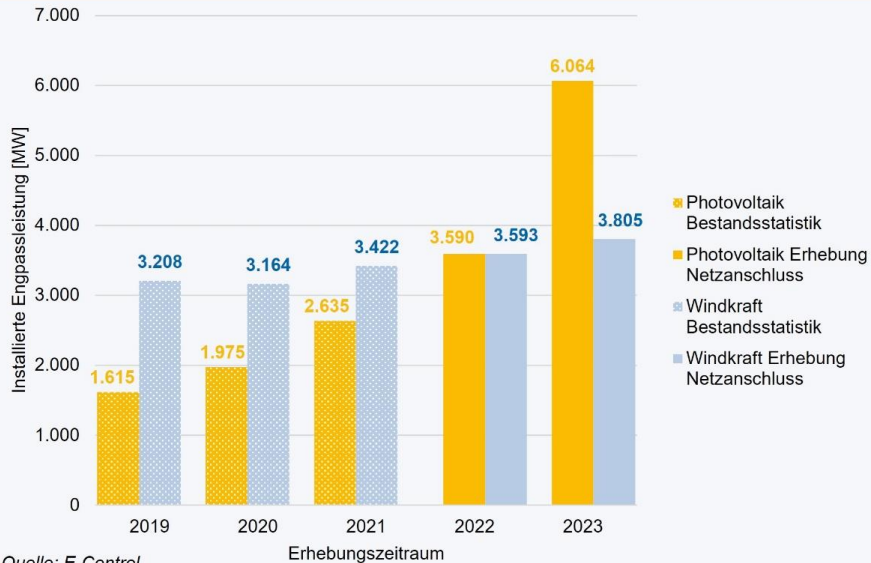
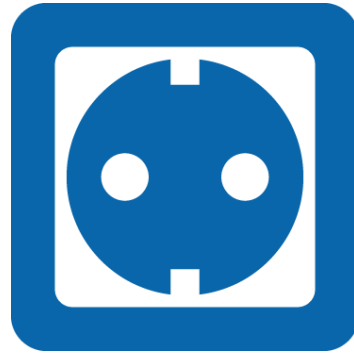


Abb.: Bestand Engpassleistung von PV- und Windkraftanlagen bei 60 VNB  
(Stand 2023), Quelle: Jahresbericht Erhebung Netzanschluss 2024, E-Control

## Development of the PV systems at 60 grid operators:

- Largest increase in installed PV systems to date in 2023.
- In 2023, approximately 2.5 GW or 138.000 PV systems were added.
- + 69 % installed capacity compared to 2022..



## Optimisations for grid connection and grid access

# Looking back: Challenges

*for grid connection and grid access for renewable electricity generation plants*

Limitation of feed-in  
capacities

Long waiting times for grid access  
requests and notification of feed-in  
metering points

Waiting times for  
commissioning appointments

Sharp increase in the number of applications  
for renewable power generating plants



Limited capacity of distribution  
networks

Skilled labor shortage and supply chain  
disruptions hinder necessary measures  
in the networks

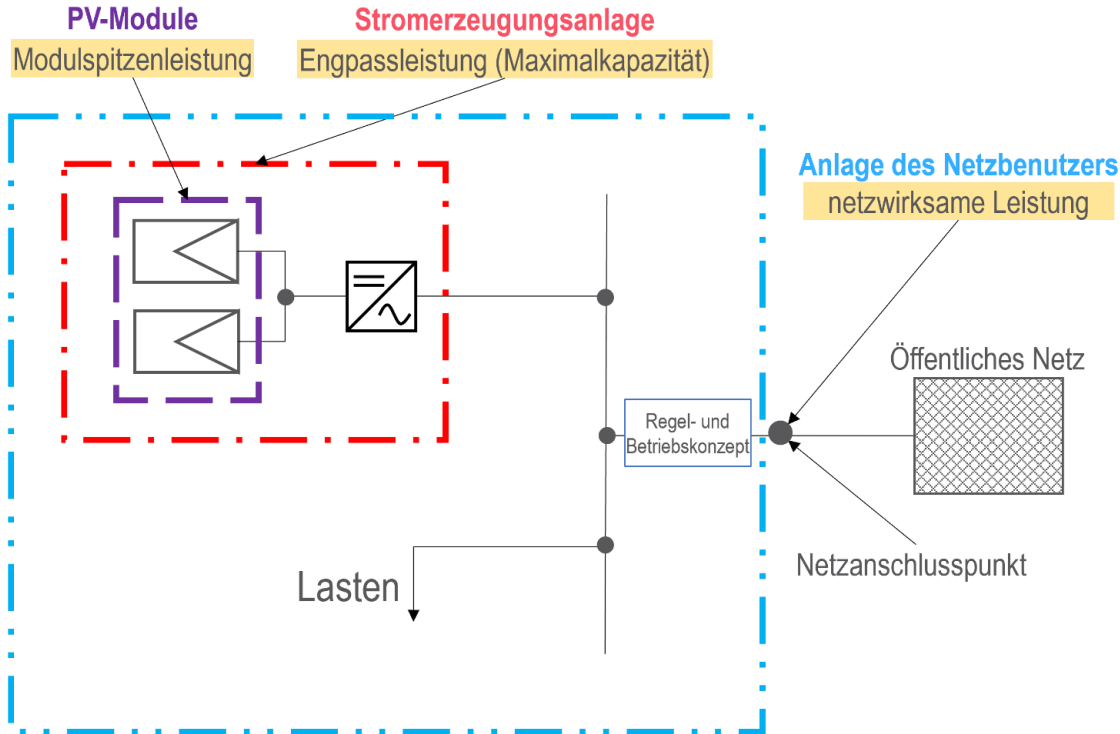
Derivation of optimisation potential to accelerate the integration of renewable energies!

## Measures to increase grid connection capacity

- Incentives for **load, generation and store management** – **Concept of network-effective power**
- „**Aktionsplan Netzanschluss – Action Plan for Grid Connection**“ describes challenges, offers concrete solutions, and highlights what is still needed to connect PV systems to the grid more quickly
- **Network connection survey and monitoring** – Support for DSOs in optimizing process flows
- **Efficient network connection processes** through automated network connection assesment, op-to-date web portals, compliance with legal deadlines
- Publication of **network connection capacities** at grid level 4
- Transparency in network expansion and connection: **network development plans** for DSOs (V-NEP)
- **Revision of technical and organizational rules (TOR):** TOR are developed in collaboration with TSOs and DSOs and provided by E-Control..
- **Ongoing exchange** with industry



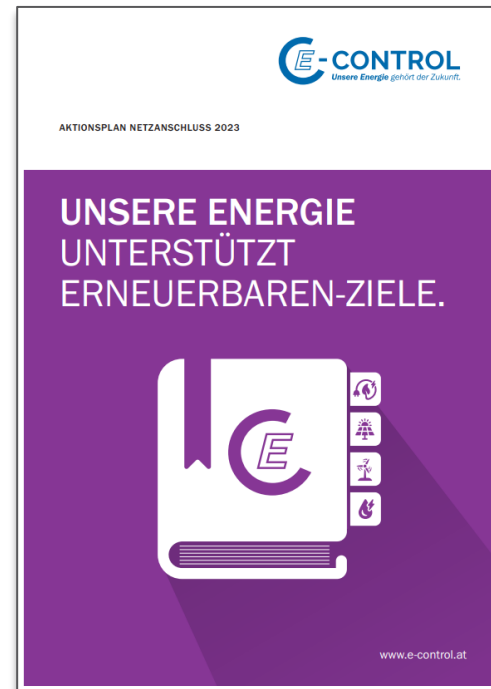
# Concept of network-effective power



Quelle: Aktionsplan Netzanschluss 2023

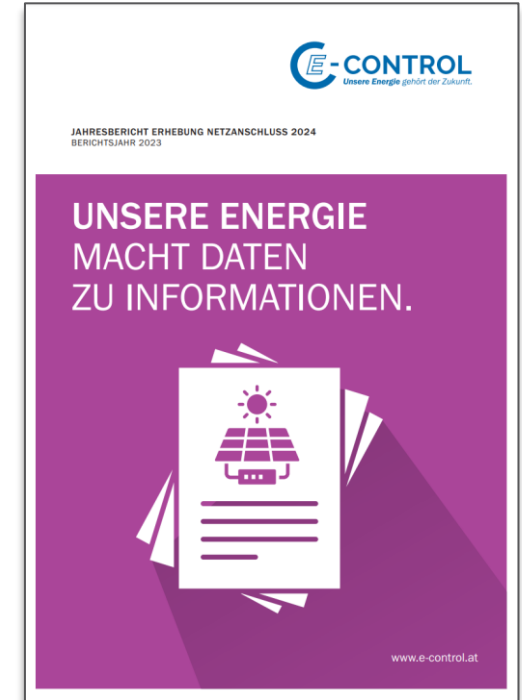
- Aims to facilitate the integration of decentralized renewable power generation systems into existing power grids through load, generation, and storage management (behind the meter).
- Local combination of loads, generators, and storage as an alternative to grid expansion.
- Energy management system for more efficient use of existing grid capacities and avoidance of peak loads (tariff incentives).

- Identification of challenges and barriers that occur during the grid connection and grid access of PV systems up to 20 kW.
- Clear presentation of the necessary processes.
- In the action plan, **14 concrete actions** have been developed – focusing on **standardization and monitoring**.
- **Responsibility for implementation** lies both with E-Control itself and with the distribution network operators and **in cooperation of all involved parties**.



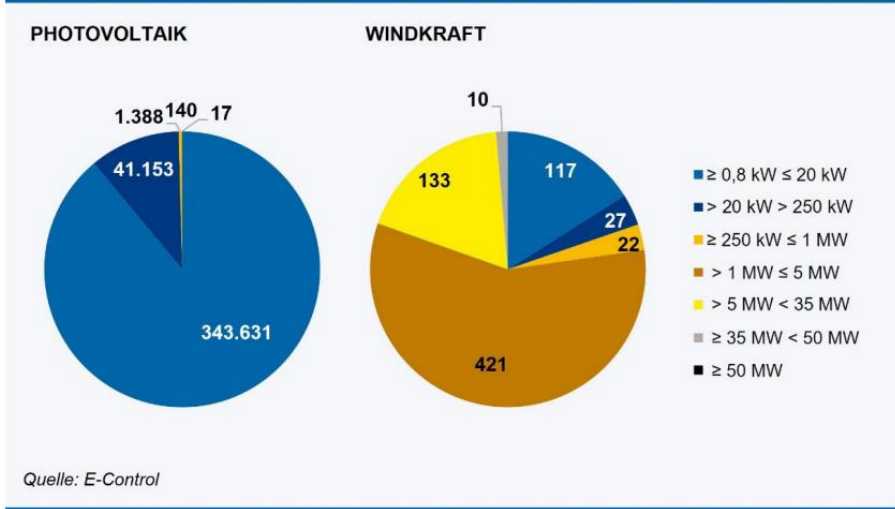
As part of the 'Grid Connection Action Plan', E-Control is carrying out increased monitoring of renewable electricity generation plants:

- **Quarterly surveys** of 16 large distribution system operators (DSOs) - cover over 85% of metering points.
- **Annual survey** of a further 44 DSOs - together with the 16 large DSOs, represent 98% of the metering points.
- Results are published.
- Reports (2023: Q3, Q4, annual report and 2024: Q1) include
  - Status quo grid connections
  - Applications for grid connection of PV systems
  - Average time until grid connection
  - Ratio of feed-in metering points to reference metering points
  - Notifiable operating resources



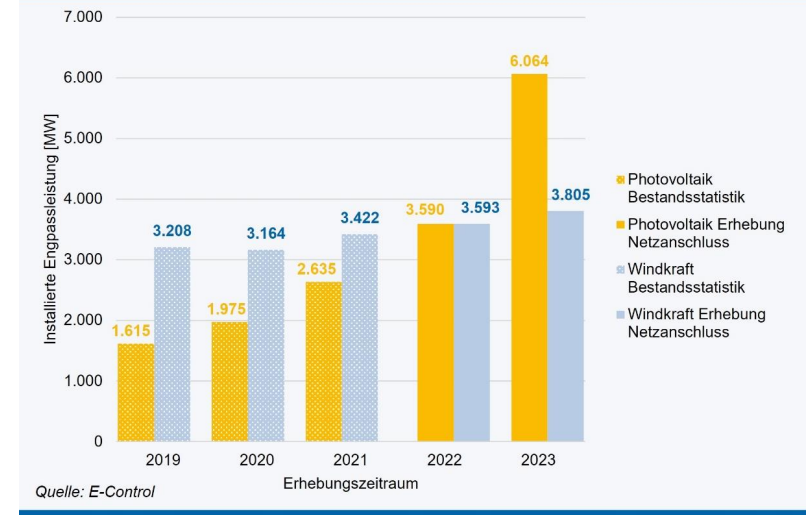
# Status-quo grid connections of renewable power generation plants

BESTAND DER ZÄHLPUNKTE VON PV- UND WINDKRAFTANLAGEN BEI 60 VNB NACH GRÖSSENKLASSEN (2023)



Number of metering points for PV and wind energy systems at 60 DSOs by size class.

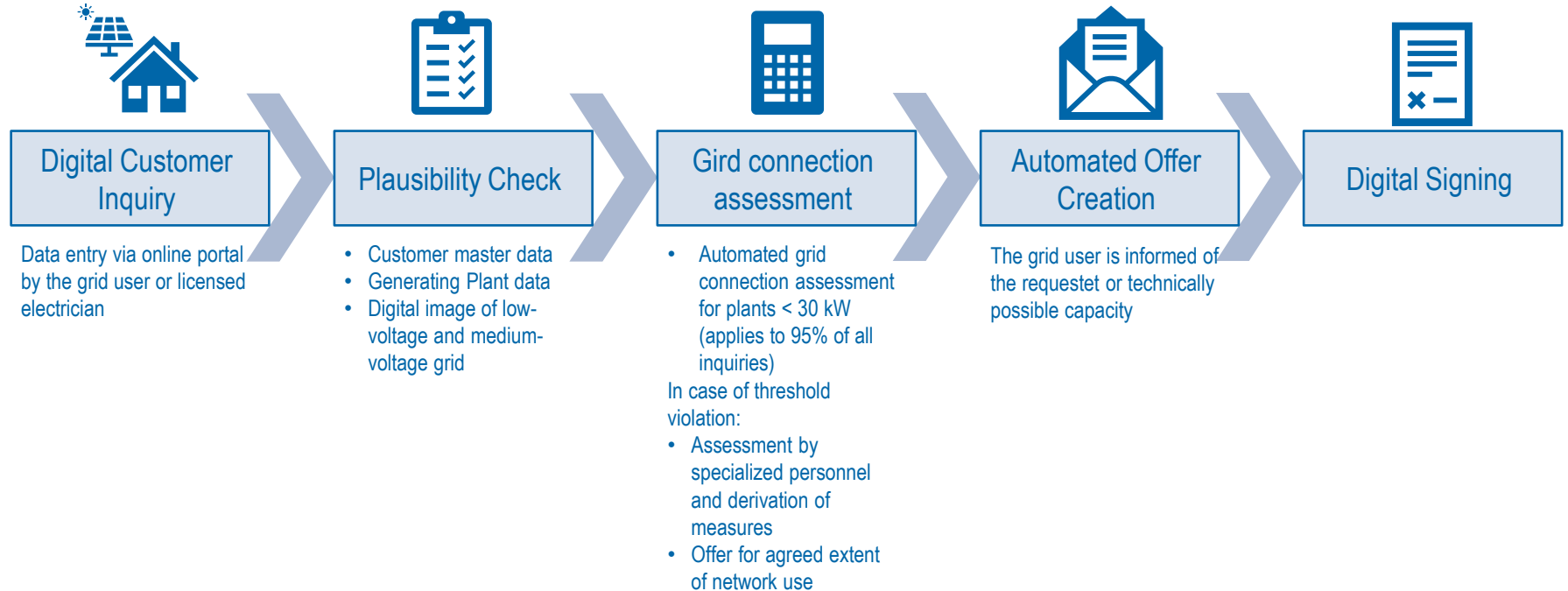
BESTAND ENGPASSLEISTUNG VON PV- UND WINDKRAFTANLAGEN BEI 60 VNB (STAND 2023)



Development of the PV and Wind systems at 60 grid operators

# PV Grid Connection Process

Good-practice-example



## Section 20 EIWOG 2010: Transparency in the event of insufficient capacities

- Transparency obligation for grid operators, available and booked capacities at grid level 4 (transformation from high to medium voltage)
- Reservation of capacities
- Method for determining capacities

## Objectives

- Standardization of the determination of available capacities and thus ensuring a consistent calculation of available capacities
- Creation of transparency for market participants
- Basis for grid development plan for distribution grids

E-Control provides an overview of the publications of the DSOs

# Roll-out rate and number of smart meters

118 DSOs – 6,64 million metering points at grid level 6 and 7

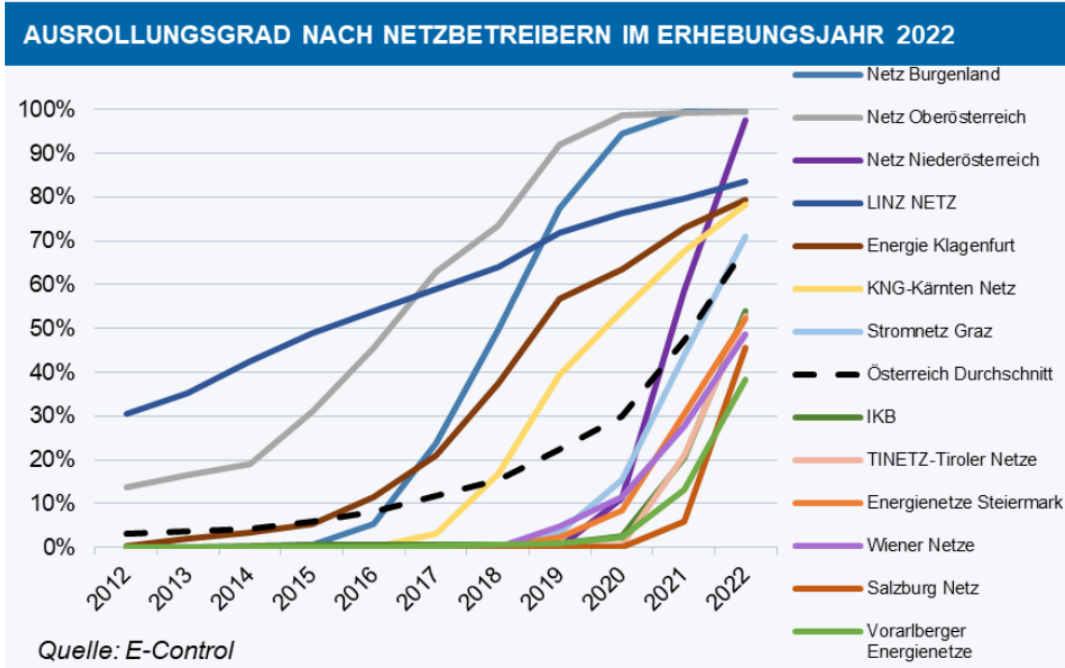
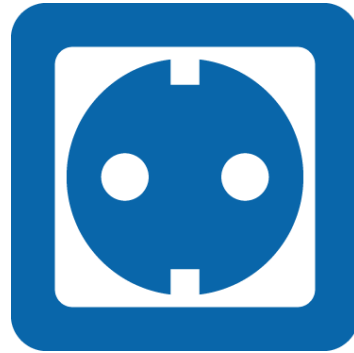


Abbildung 2: Tatsächlicher Smart Meter-Ausrollungsgrad bei ausgewählten Netzbetreibern, Stand Ende 2022

Preliminary figures:

- End of 2023: Roll-out rate 85 % (communicative: 82%)
- Target 2024: 95%
- 9 DSOs do not plan to reach the 95% threshold until 2025 or 2026



Outlook: new possible legal framework conditions



New and growing requirements bring increased need for information

## **Increasing demands on the distribution grids**

- Need for grid expansion
- Optimum utilisation of existing connection capacities - alternatives to grid expansion

## **Growing dissatisfaction among grid users**

- Appeal to grid connection obligation or right to grid connection (§ 46 EIWOG 2010)
- Lack of understanding of technical restrictions and duration of grid expansion

## **Long-term and forward-looking planning** of energy infrastructures is essential

- Consistency across all planning levels (EU, national, regional - TYNDP, ÖNIP, Ü-NEP, V-NEP)
- Transparency for grid users and project developers

Requirements from the **EU legal framework** (in particular Art. 32 Directive (EU) 2019/944):

- Para. 1: Utilisation of flexibility services in distribution grid operation and planning
- Para. 3: Transparency through the publication of grid development plans

Developments in recent years have presented the energy industry with new realities:

- **Generation side:** Massively accelerated expansion of renewable electricity generation
- **Load side:** Increasing relevance and challenges due to e-mobility and sector coupling
- **Grid expansion:** often cannot be realised at the required pace (supply and personnel bottlenecks, approval procedures, etc.)

Regulations on grid access must ensure that...

- ...**existing grid connection capacities** can be optimally utilized
- and **transitional solutions** for the fastest possible integration of new electricity generation plants are possible.

E-Control proposes a 2-step approach...

- „**Flexible grid access**“ as a temporary solution in the event of insufficient connection capacity
- Possibility of **permanent “peak capping”**  
(limitation of grid active capacity for PV & wind by DSO)
  - **Relief of the grids** and **increase in connection capacities** by avoiding rare feed-in peaks.
  - Losses can be avoided by optimising **self-consumption**.

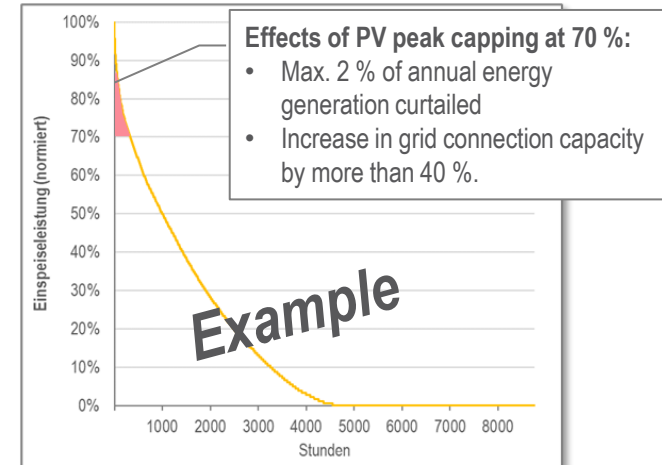
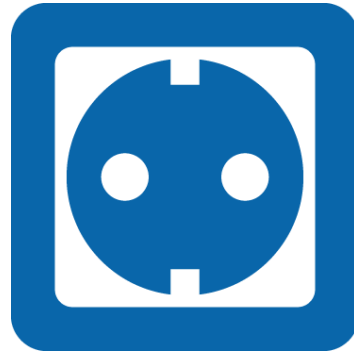


Abb.: Jahresdauerlinie von PV in der APG-Regelzone (Daten: APG, 2023; Analyse und Darstellung: E-Control, 2024)



## Summary and conclusion

## Optimization options for efficient use of resources

- Further identify and analyze optimization potential
- Grid expansion and efficient utilization of existing infrastructure
- System integration of renewable electricity generation and flexibilization of consumption
- Further development and flexibilization of the grid fee structure
- Better planning through distribution grid development plans
- Push digitalization in grid operation
- Usage of the research budget of grid operators to increase optimization potential
- Incorporating new market reactivity and business models

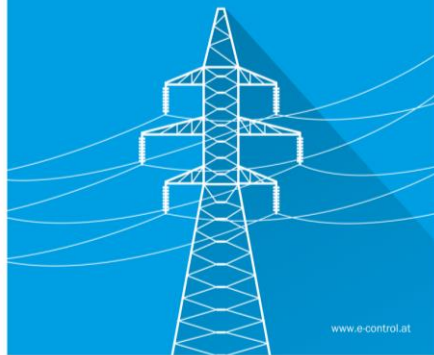


# E-Control publications

Information on grid connection and grid access

LEITFADEN NETZANSCHLUSS  
ALLES WISSENSWERTE ZU NETZANSCHLUSS & NETZZUGANG.

**STROMANSCHLUSS  
LEICHT GEMACHT.**



www.e-control.at

<https://www.e-control.at/documents/1785851/1811582/Leitfaden-Netzanlass-v1-1.pdf/9d1841bb-e09d-963c-d59f-05e7b771df85?t=1659097466014>

AKTIONSPLAN NETZANSCHLUSS 2023

**UNSERE ENERGIE  
UNTERSTÜTZT  
ERNEUERBAREN-ZIELE.**



www.e-control.at

[https://www.e-control.at/documents/1785851/1811582/E-Control-Aktionsplan-Netzanlass-2023\\_Web.pdf](https://www.e-control.at/documents/1785851/1811582/E-Control-Aktionsplan-Netzanlass-2023_Web.pdf)

JAHRESBERICHT ERHEBUNG NETZANSCHLUSS 2024  
BERICHTSJAHR 2023

**UNSERE ENERGIE  
MACHT DATEN  
ZU INFORMATIONEN.**



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<https://www.e-control.at/publikationen/publikationen-strom/berichte>

**Leitfaden für die  
Erstellung von  
Netzentwicklungsplänen  
für Verteilernetze**

Leitfaden für die erstmalige Erstellung 2024

Version 1.1  
Stand: 30. April 2024

<https://www.e-control.at/marktteilnehmer/strom/leitfaden-fuer-verteilernetzentwicklungsplaene>

***Unsere Energie gehört der Zukunft.***

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