Alpine Space Working Group (ARGE ALP)
Principality of Liechtenstein

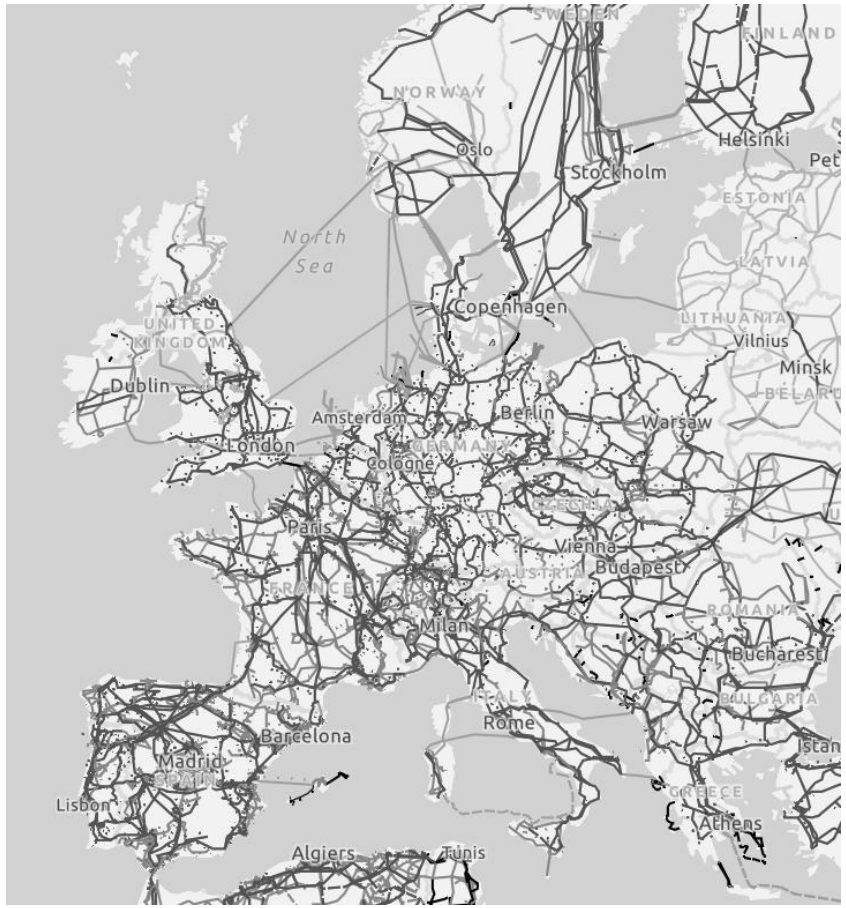
Energy supply in the Alpine region

Advantages and possibilities of cross-border co-operation

Dr Nicolas Schmid

Presentation at EUSALP energy group meeting
Online, 22 May 2025

Why is cross-border cooperation relevant for energy supply?



In the news

Twelve EU countries urge Brussels to back energy links, lower energy prices.

Energy Union goal: EU offers €600 million funding for cross-border projects

Spanish power cut highlights fundamental weakness in EU power grid

Relevant for

- Expansion of renewable energies
- Energy system resilience
- Energy costs and competitiveness

—— Transmission lines

Source: ENTSO-E

Why is cross-border cooperation relevant for energy supply in the Alpine region?

ARGE ALP
Die Alpen leben • Le Alpi vivono

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Arbeitsgemeinschaft Alpenraum (ARGE ALP)
Fürstentum Liechtenstein

Energieversorgung im Alpenraum
Vorteile und Möglichkeiten grenzüberschreitender Zusammenarbeit

Schlussbericht
Zürich, September 2024

Nicolas Schmid, Gabrielle Siegrist, Luca Apreda, Stefan Kessler, Thomas von Stokar

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Relevant for

- Expansion of renewable energies
- Energy system resilience
- Energy costs and competitiveness

Key questions and analytical steps of the study

Key questions

What role does cross-border cooperation play in security of supply and the energy transition?

What can the regional level contribute to cooperation in energy supply?

What measures and demands can regions formulate to intensify cooperation?

Analytical steps

- Literature review (>30 studies, >20 policy documents)
- Creation of 11 regional fact sheets
- Survey of 11 regional energy offices
- 22 interviews (energy offices, stakeholders)
- Interim presentation, feedback from regions
- Synthesis and report

The results at a glance

1. The energy systems of the regions will change massively in the course of the energy transition
2. Cross-border cooperation brings many advantages in the course of the energy transition
3. Cooperation is primarily managed at European and national level
4. However, the regions still have a wide range of options for shaping the energy transition
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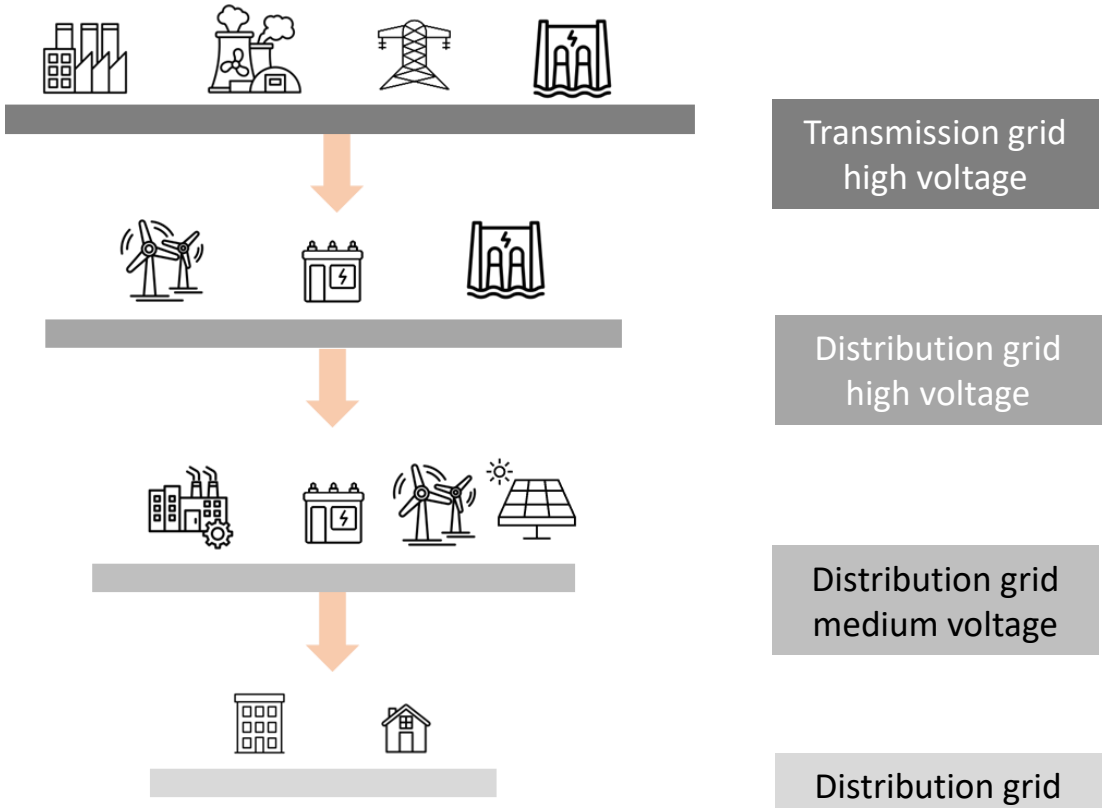
1 The energy transition is leading to massive changes on the supply and demand side as well as in the distribution of energy



Old world
Fossil, centralized energy system, unilateral energy flows

Source: ENTSO-E

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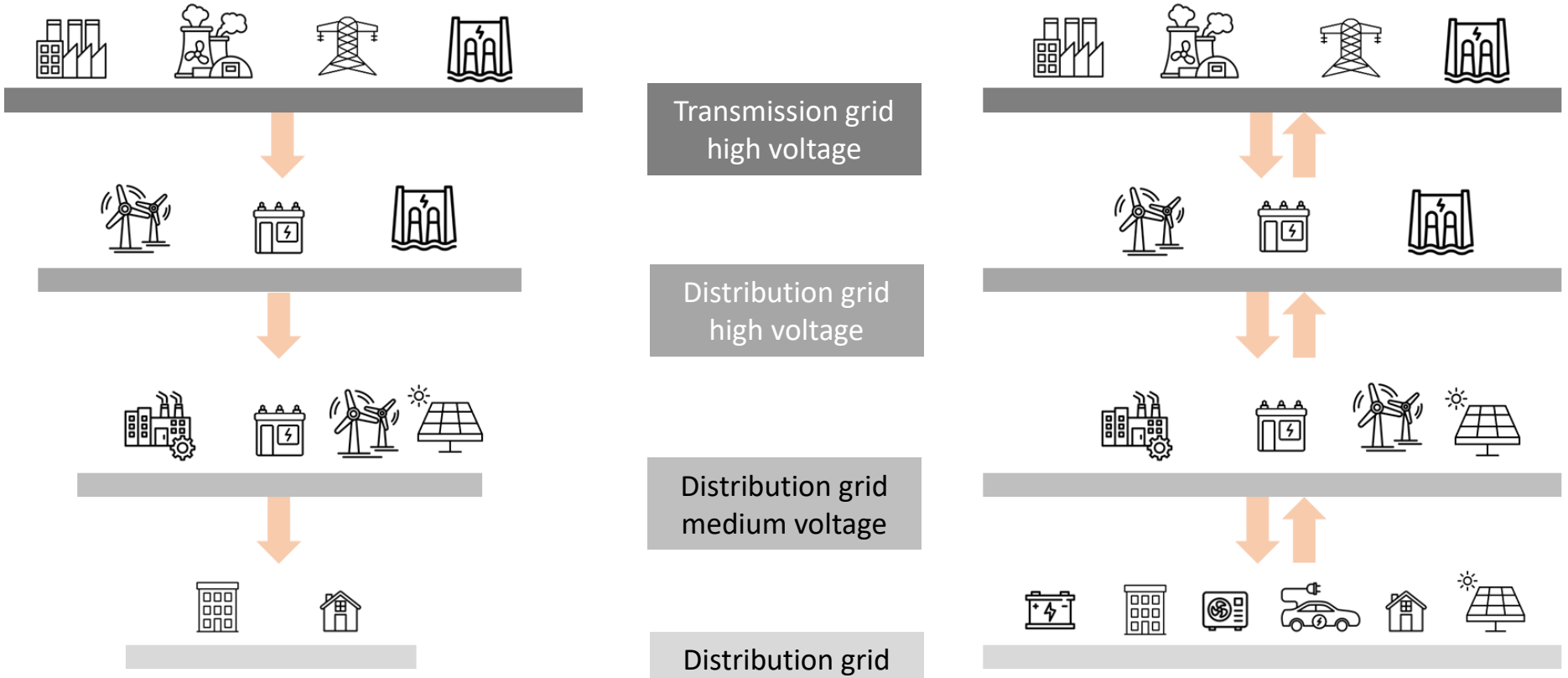
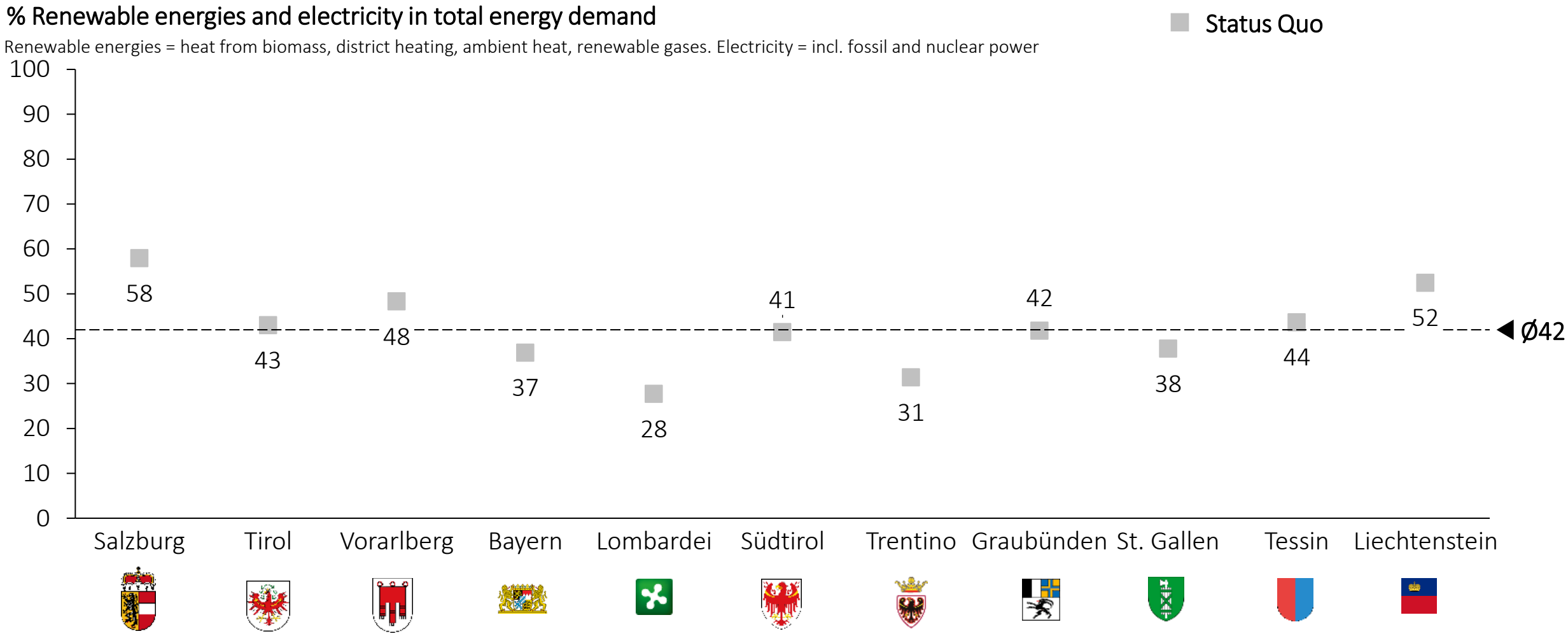


Old world
Fossil, centralized energy system, unilateral energy flows

New world
Decentralized renewables, bilateral energy flows, demand growth on lower grid levels

: ENTSO-E

1 These changes can also be found in the regions of ARGE ALP and are reflected in the regions' energy strategies



Source: Energy strategies of the regions

Please note: Different survey methods and balance sheet perimeters and reference years in some cases

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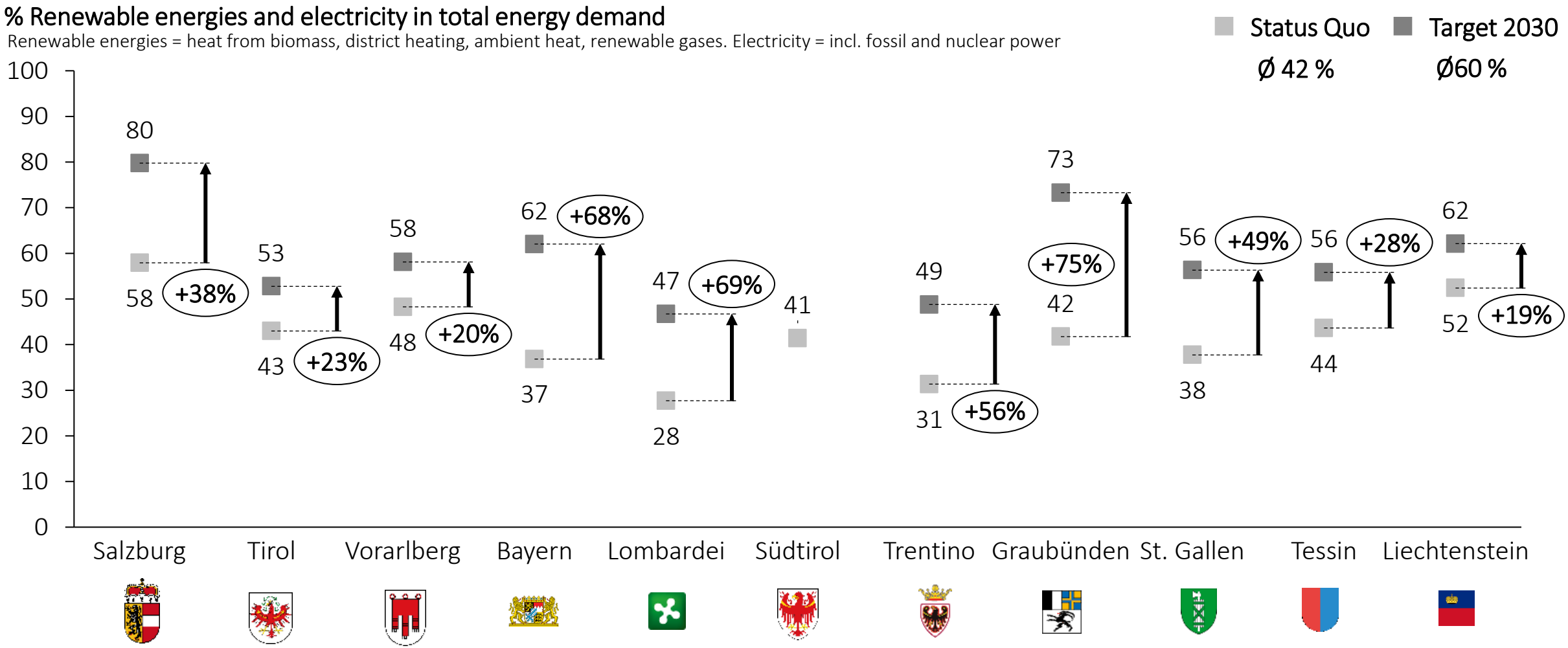

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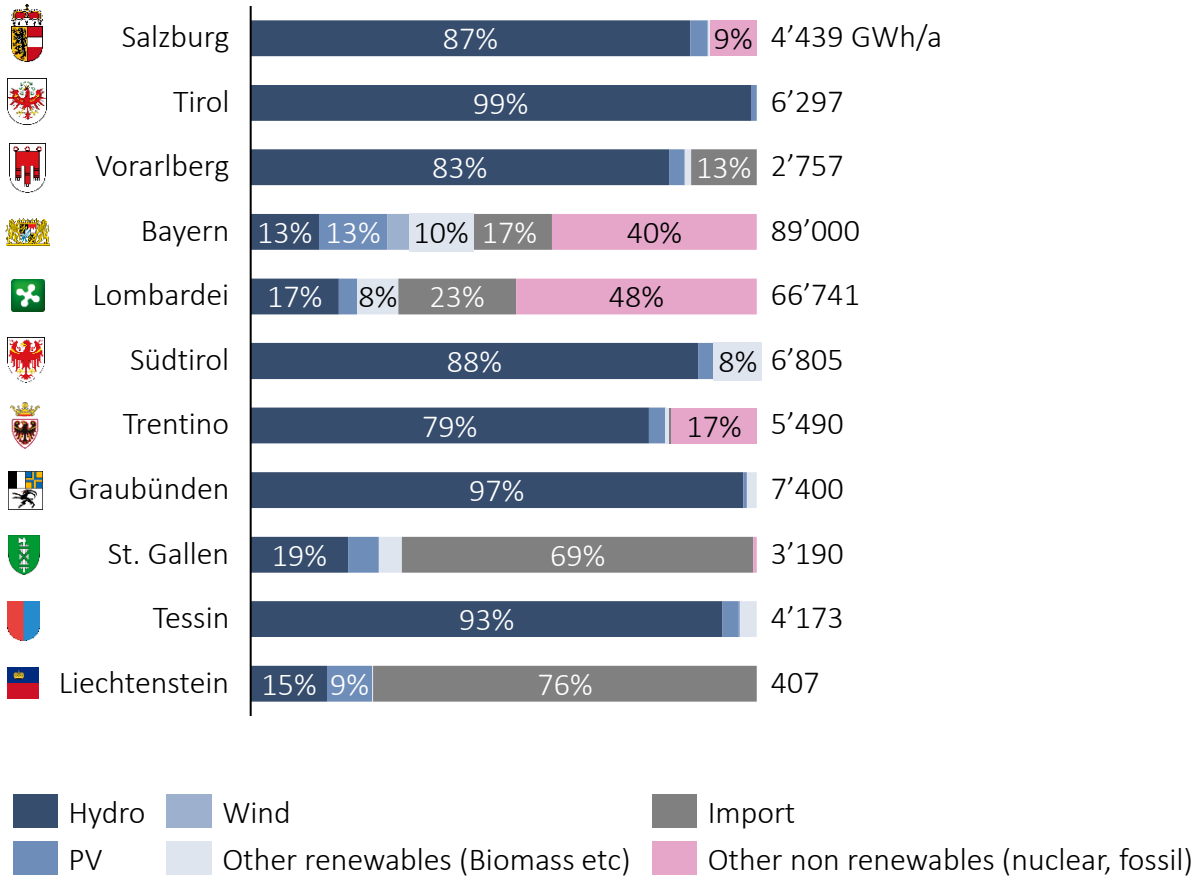
1 (Most) Alpine regions have similar electricity mixes and therefore also comparable challenges

A) Status quo electricity generation in the regions (in %)



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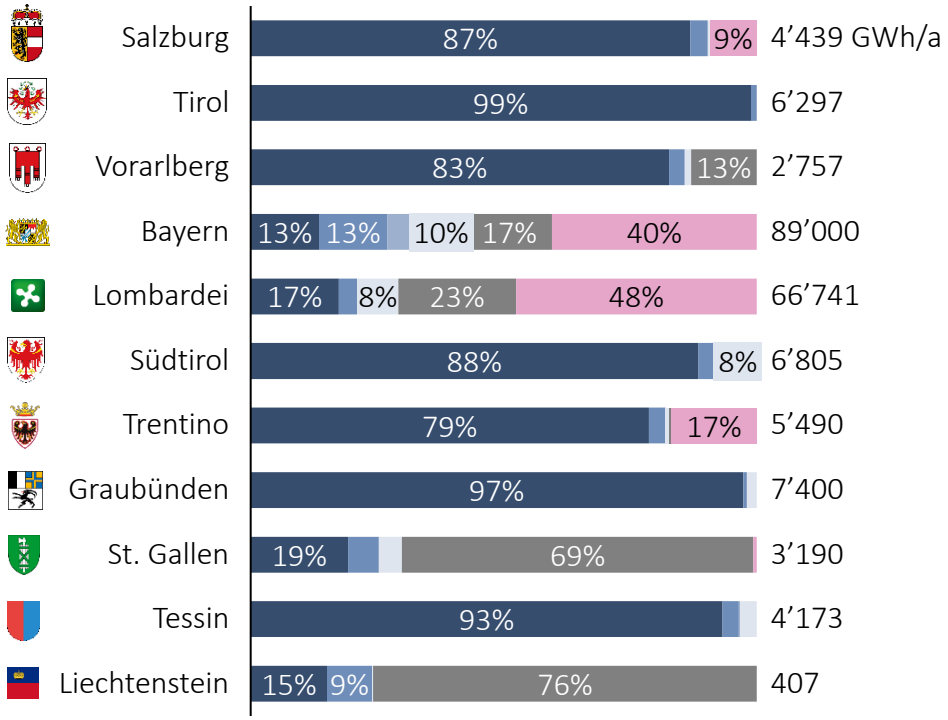
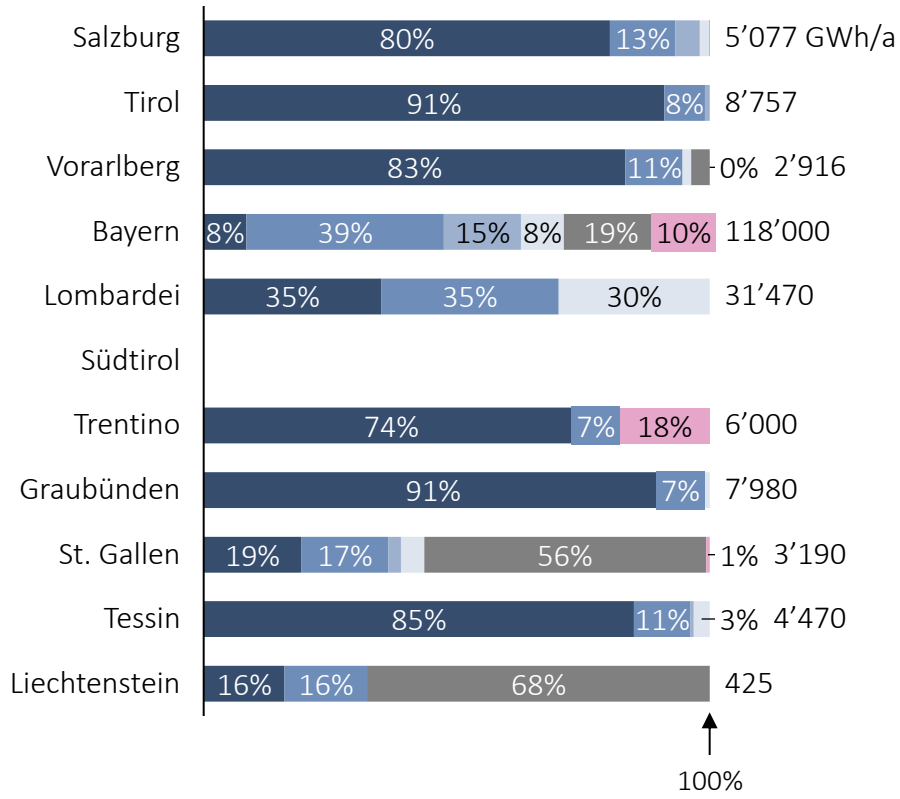


B) Target 2030 electricity generation in the regions (in %)



Hydro | Wind | Import
PV | Other renewables (Biomass etc) | Other non renewables (nuclear, fossil)

Source: Energy strategies of the regions

Please note: Different survey methods and balance sheet perimeters and reference years in some cases

The results at a glance

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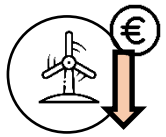
2 In the course of the energy transition, cross-border cooperation brings benefits for economic efficiency, security of supply and the environment

Economic efficiency



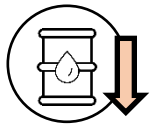
More renewables with less investment (resource utilisation, lower capital costs)

Lower price volatility

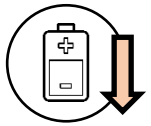
Savings for consumers due to more competition

Security of supply

More security with fewer backup power plants

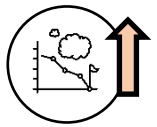


Less oil and gas consumption, fewer imports

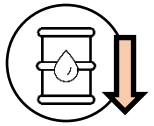


More flexibility with less investment in storage

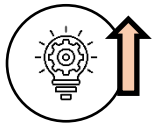
Environment



Higher share of renewables in the overall mix



Less oil and gas consumption, fewer emissions



More innovation in green technologies

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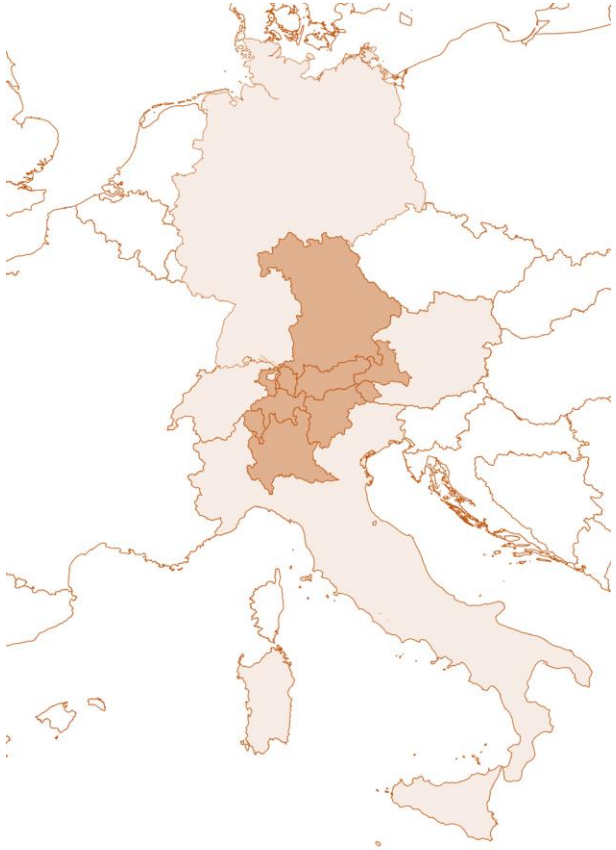

Europe and the European Union

- Energy Union: Regulation and the internal energy market
- Clean Energy4All, REPowerEU, Green Deal: targets, regulation, financing of RE, grids (RED III, TEN-E)
- Other supranational cooperation in energy policy via organisations such as ACER, ENTSO-E

National states (AT, CH, DE, IT)

- Regulation of energy production and grids (transmission and distribution grids), see NECPs
- Financing and targets for RE expansion, grid expansion
- Bi- and multilateral cooperation via platforms such as the Pentalateral Energy Forum

Regions of ARGE ALP

- Grid expansion (especially transmission grids) less in regional competence (distribution grids possibly via local energy supply companies)
- Energy flows and trade not a regional competence
- Expertise in RE expansion (land use planning, permits, etc.)

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4 The regions have competences and use a variety of political objectives and measures to promote the energy transition locally. For example:

Tyrol

- Expansion of RE to 65% energy demand by 2030
- Expansion of hydropower, solar PV and CHP
- Spatial energy planning, acceleration areas

Salzburg

- Expansion of RE to 65% energy demand by 2030
- Expansion of hydropower, solar PV and CHP
- Unbundling gas and district heating infrastructure

Vorarl-berg

- Expertise in buildings, construction law
- domestic RE to min 50% final energy demand
- 100% RE in power supply by 2030

Bavaria

- Annual expansion targets (Energy Plan 2040)
- Focus on supra-regional energy infrastructure
- Expertise in spatial energy planning, among other things

Grey Grisons

- Regulation and promotion in the building sector
- Expansion targets for renewable energies included in the energy sector plan
- Hydropower strategy 2022-2050

St. Gallen

- Regulation and promotion in the building sector
- Expansion of new RE from 2100 to 3100 GWh
- Keep power consumption constant

Ticino

- Expansion of RE and greater energy autonomy
- New pumped storage power plants
- Support for the expansion of the district heating network

Lom-Bardy

- Expansion of RE to 36% energy demand by 2030
- Expansion of electricity grid
- Increasing the resilience of the energy system

South Tyrol

- Expansion of RE to 75% energy demand by 2030
- Master plan for modernising electricity infrastructure
- Reduce oil, gas for heating purposes by 60%

Trentino

- Energy autonomy by 2050
- Promotion of energy communities
- Simplification of administrative processes for EE

Liechten-stein

- Expansion of RE to 30% energy demand by 2030
- 33% domestic electricity production by 2030
- Replacing oil heating systems with heat pumps

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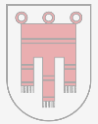

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So far only selective cooperation between the Alpine regions in the energy supply

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5 Various barriers make it difficult to realise the benefits of deeper cross-border cooperation in energy supply

Regulatory

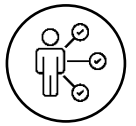
Complexity and duration of administrative procedures

Integration of renewables & grids in spatial planning

Lack of cooperation in the regulation of renewables

Technical

Problems due to integration (power flows etc.)



Shortage of skilled labour and local know-how/skills

Data and knowledge exchange between stakeholders

Economical

Distribution of costs/benefits between countries for projects

Subsidies and other support for fossil technologies

Investment security for renewables and grids

Political

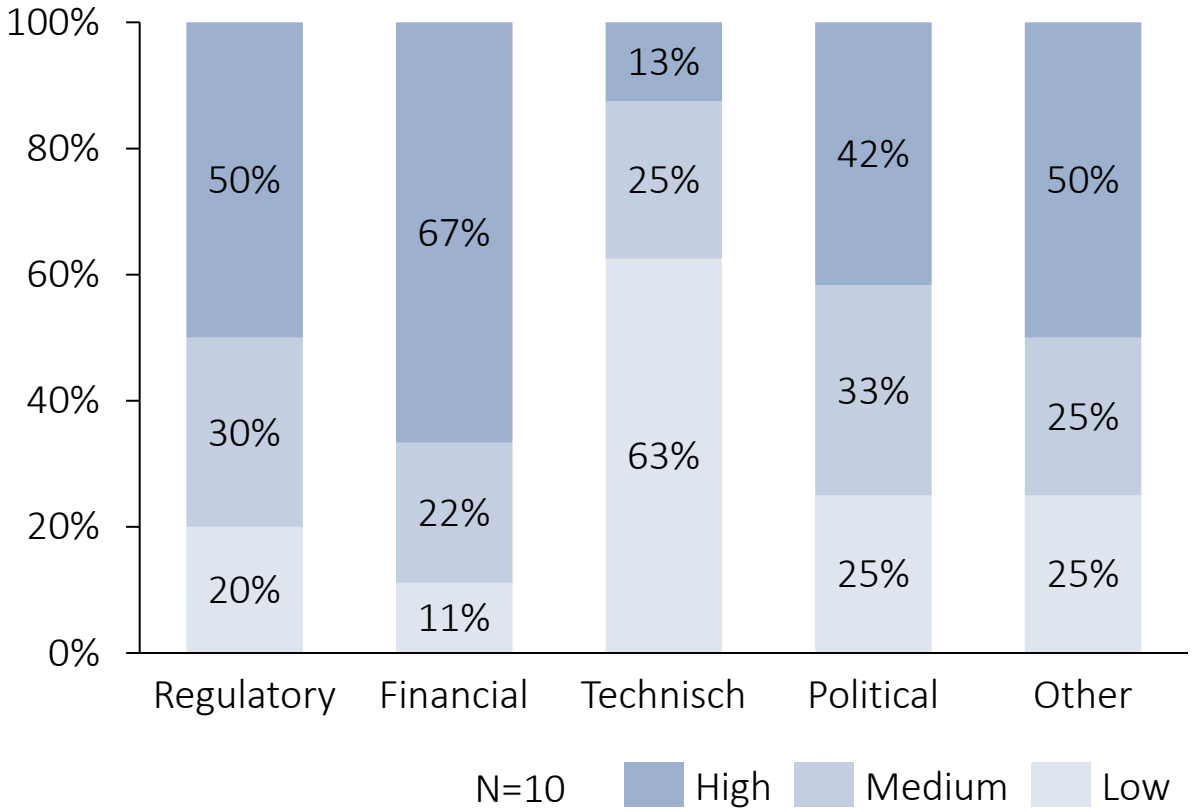
Lack of political will for more cooperation

Focus on self-sufficiency and national/ Regional self-interests

Geopolitical considerations (influence of non-European players)

5 These barriers also limit the opportunities for cross-border cooperation at regional level.

How do the energy offices in the regions assess the relevance of the barriers?



Examples of barriers mentioned by specialised offices

- Regulatory: complexity and duration of cross-border procedures
- Financial: balancing the costs and benefits of cross-border projects
- Political: Lack of political cooperation between Switzerland and the EU

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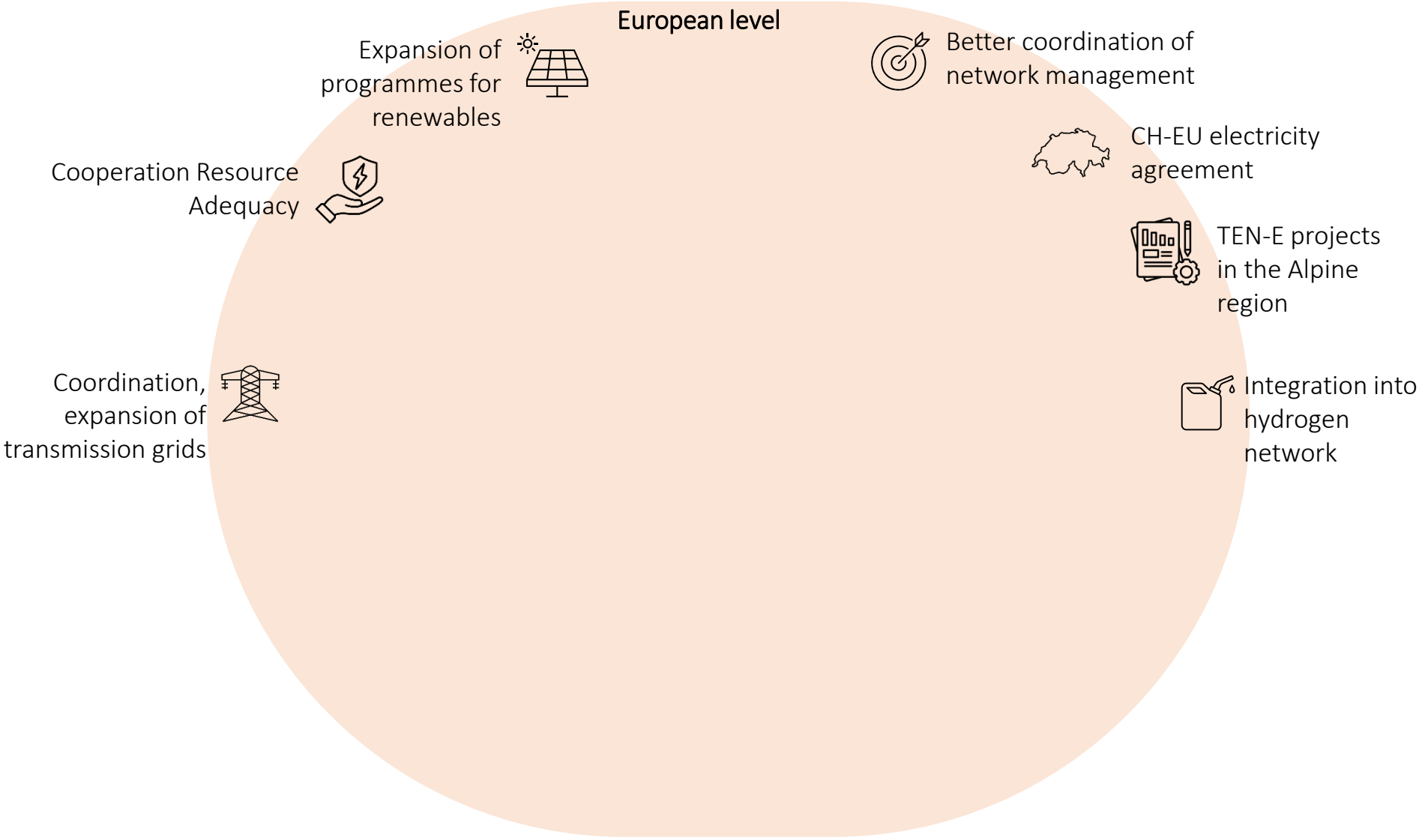
6 Only in-depth political co-operation can break down these barriers. ARGE ALP can take its own measures and make demands



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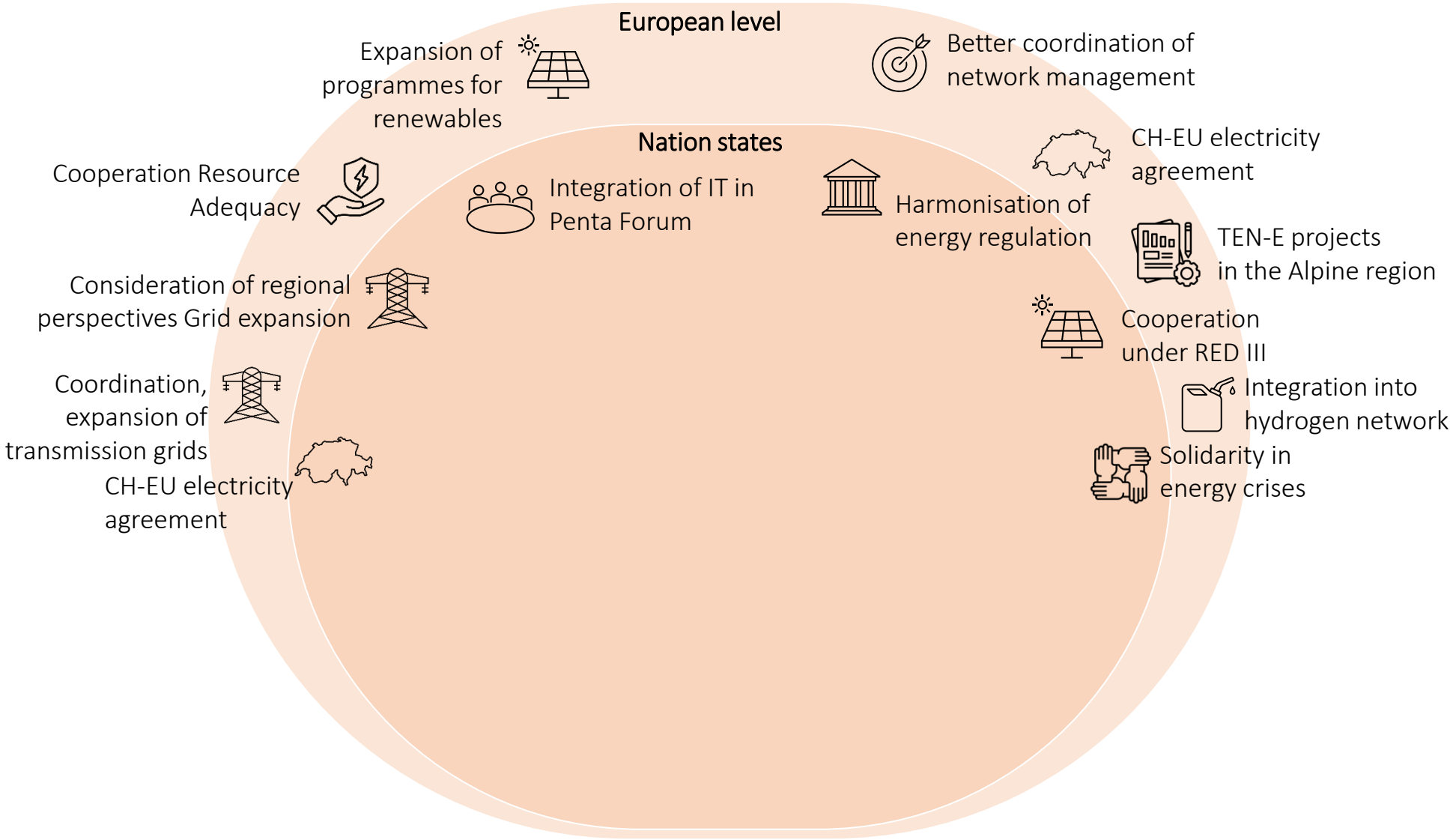

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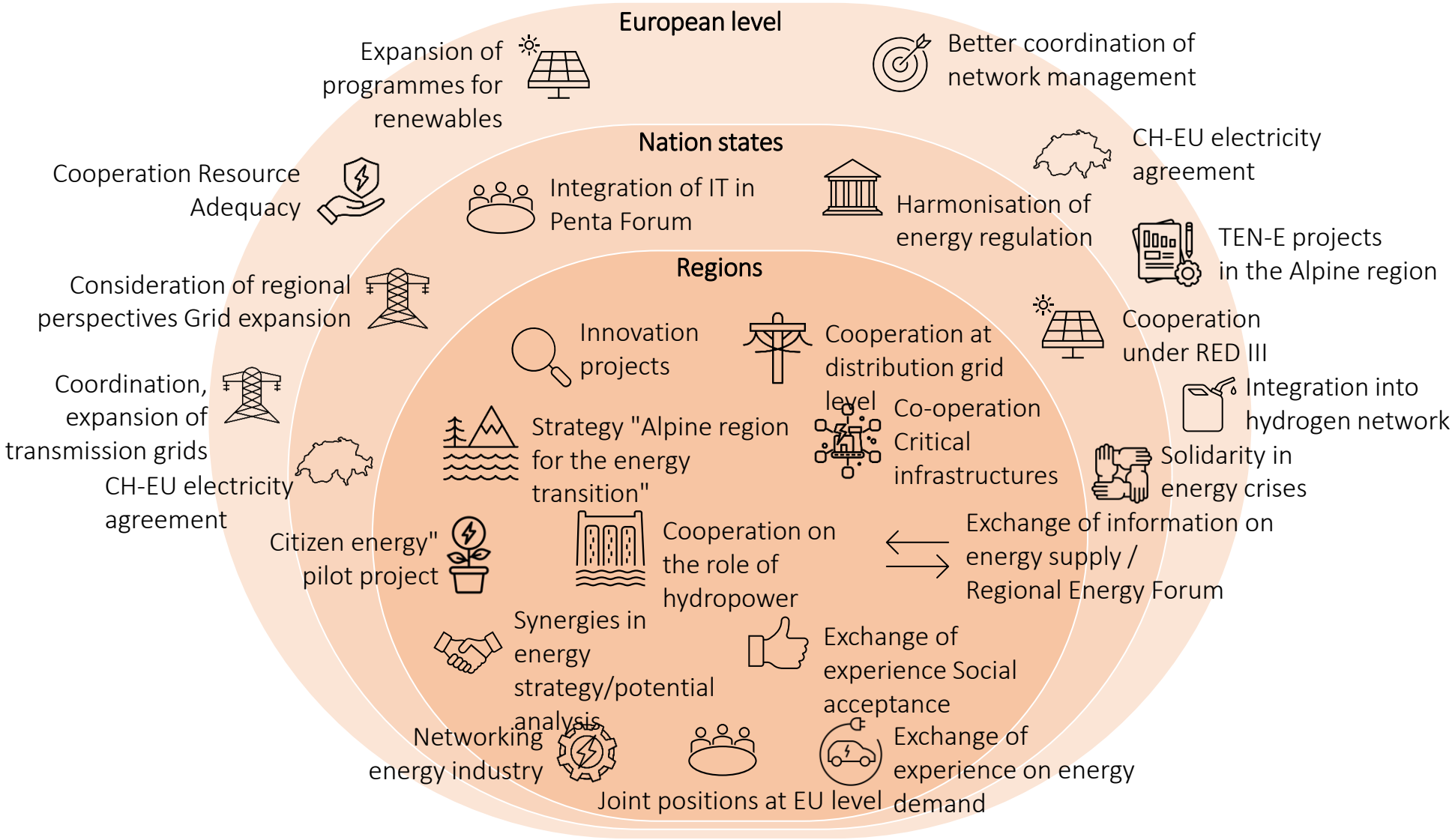

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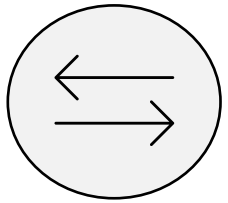
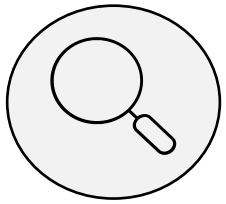
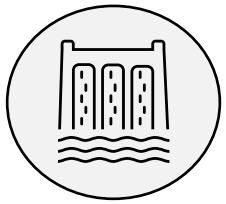


Exchange of experience and information between the regions on various topics
For example, on topics such as the role of the regions in the area of social acceptance in the expansion of renewable energies and/or better exchange of data on energy supply.



Joint innovation projects
ARGE ALP could initiate research and innovation projects on topics relating to the regional energy transition via funding programmes such as INTERREG Alpine Space.

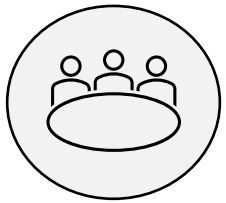


Cooperation on the role of hydropower in the energy transition
ARGE ALP could strive for a coordinated presence for hydropower in the Alpine region and tackle current issues such as new licences, renovation, expansion and maintenance of hydropower.

6 Only in-depth political cooperation can break down these barriers. ARGE ALP can make demands, for example:

Support EU-CH electricity agreement
ARGE ALP could lobby the national states (CH, but also AT, DE, IT) ¬ and the EU ¬ for an agreement on the EU-CH electricity agreement.

European investment projects in the Alpine region:
ARGE ALP could demand that more projects in the Trans-European Networks for Energy (TEN-E) programme be implemented in the Alpine region and that the electricity grids be included in the 10-year grid expansion plan.



More multilateral cooperation, e.g. by integrating Italy into the Pentalateral Energy Forum
ARGE ALP could call for an intensified exchange between AT, CH, DE and IT in the energy sector, for example via forums such as the Pentalateral Energy Forum. However, Italy is not yet represented there.

Examples of successful cross-border cooperation in energy supply in the Alpine region

A) Seit 2022: Laufwasserkraftwerk Inn (CH/AT)
- 400 GWh Strom
- 620 Mio. Euro
- Engadiner Kraftwerke AG & Tiroler Wasserkraft AG

B) 2021: Wiederverbindung Stromnetz Brenner (AT/IT)
- 123 kV Leitung (Verteilnetz)
- Verbindet Netzbereiche Nord- und Südtirol
- 1961 durch terroristische Anschläge zerstört

C) In Planung: Wärmeverbund Rupertiwinkel (AT/DE)
- Grobschätzungen: 2 TWh Wärme pro Jahr
- 200.000 Euro für Potentialstudie (bis August 2024)
- Salzburg AG, Regionalwerk Chiemgau-Rupertiwinkel

D) Seit 1920er: Kraftswerksgruppe Obere Ill Lünersee
- Als Spitzenkraftwerk für Ruhrgebiet gebaut
- Erzeugter Strom gehört zum dt. Regelblock
- EnBW & Vorarlberger Illwerke

Source: Thomas Einberger/imago

Thank you for your attention!

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Division Manager
Graduate engineer

Thomas von Stokar

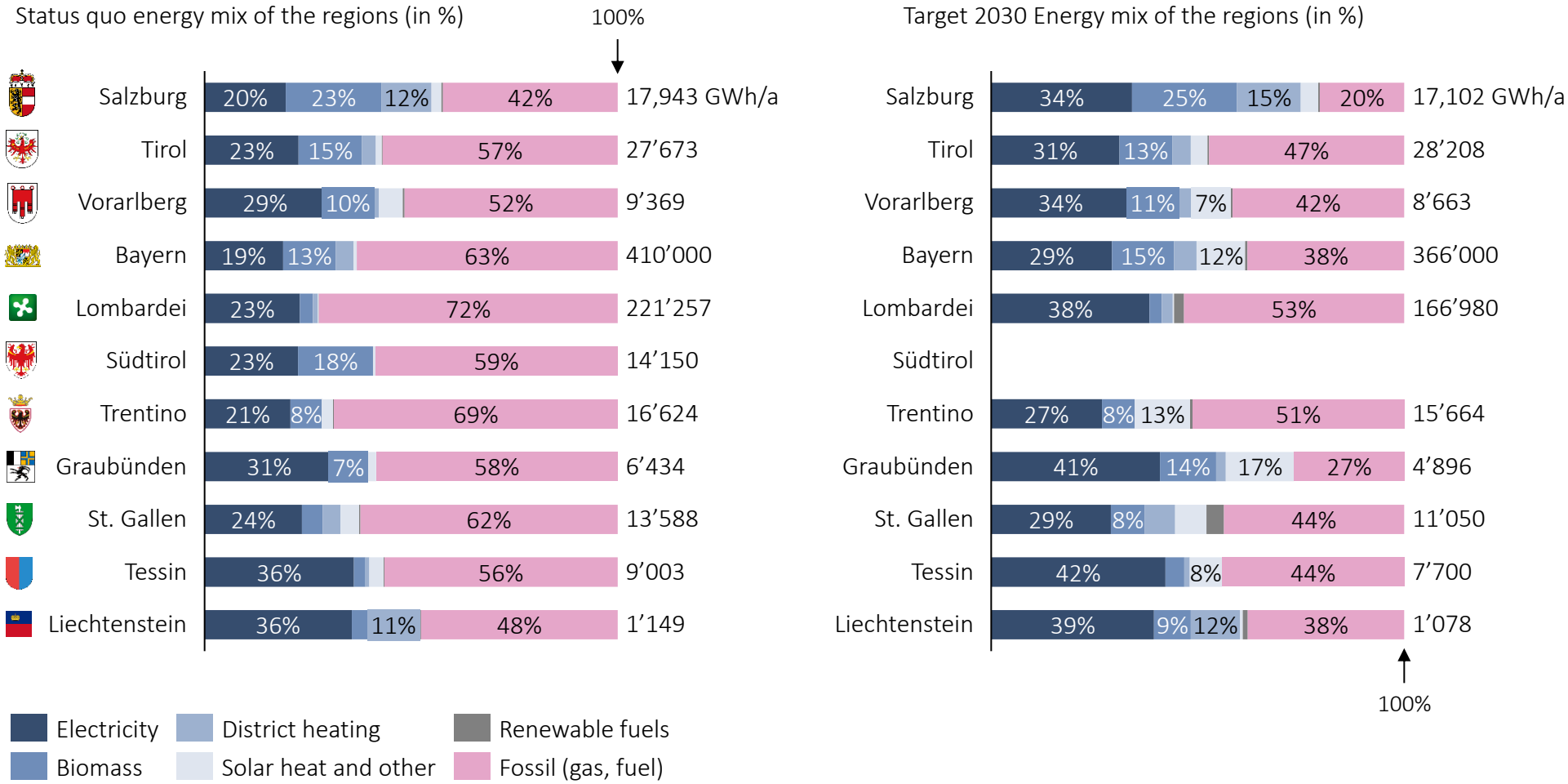
Managing Director, Board of Directors
Graduate geographer

Appendix

About us
INFRAS - Thinking about tomorrow

- Research and consulting since 1976
- Independent company with around 70 employees
- Headquarters in Zurich and Berne
- A wide range of commissions in the areas of energy, environment/climate, transport, economy, society and development

1 The Alpine regions still have a high proportion of fossil fuels in their total energy requirements - and therefore also face comparable challenges

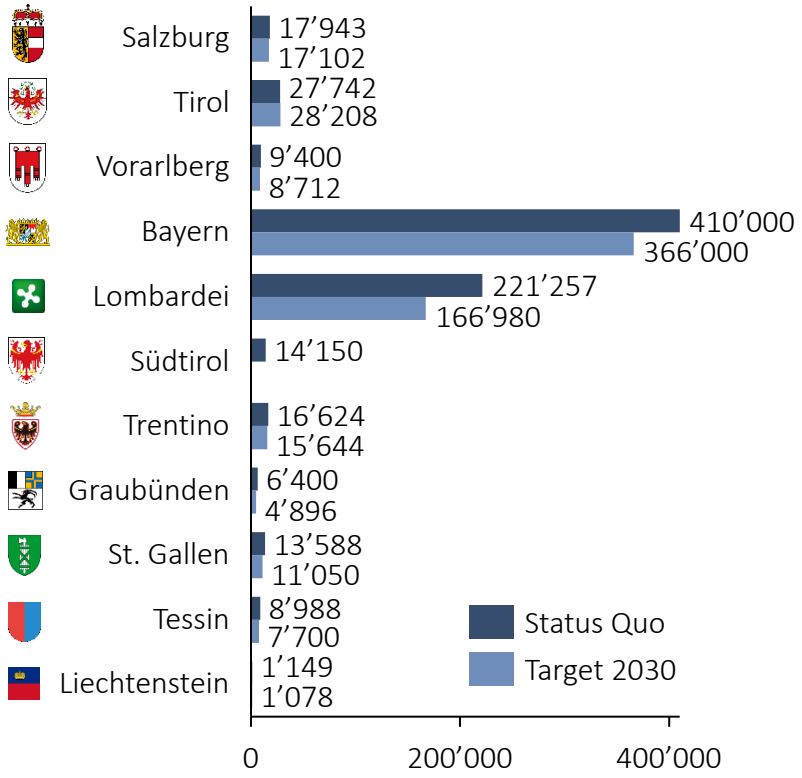


Source: Energy strategies of the regions

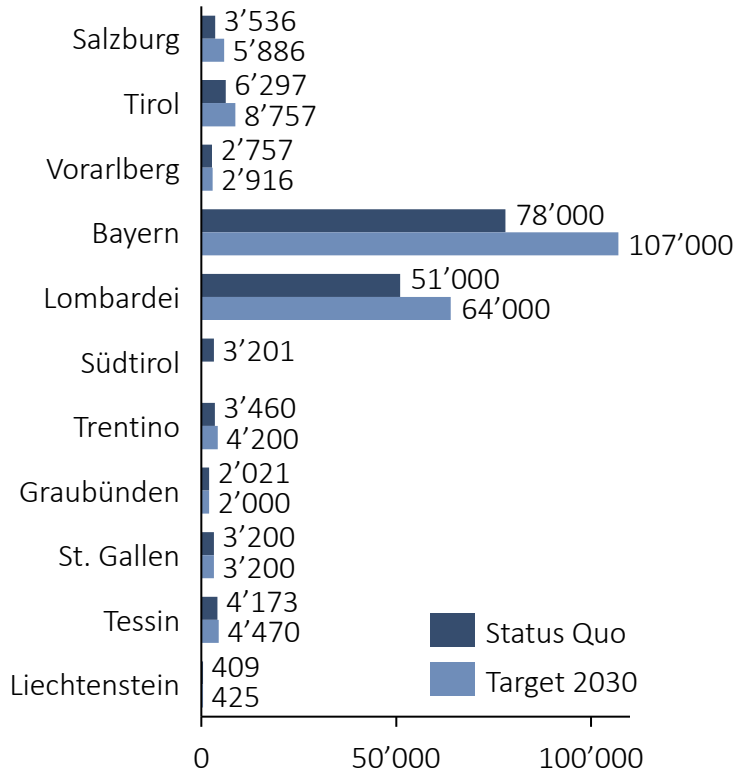
Please note: Different survey methods and balance sheet perimeters and reference years in some cases

1 However, the total energy and total electricity demand varies greatly

Total energy demand of the regions (in GWh)



Total electricity demand of the regions (in GWh)



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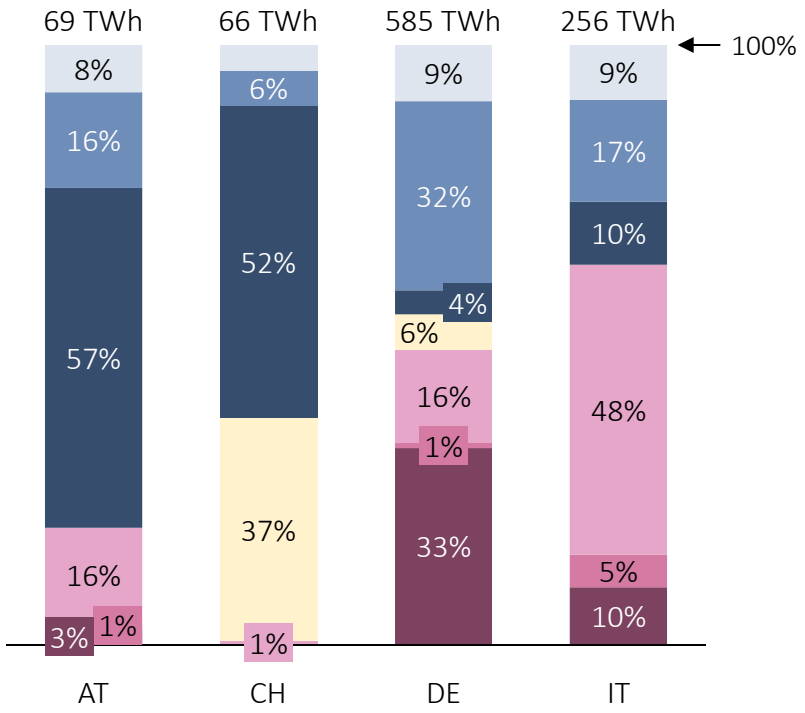
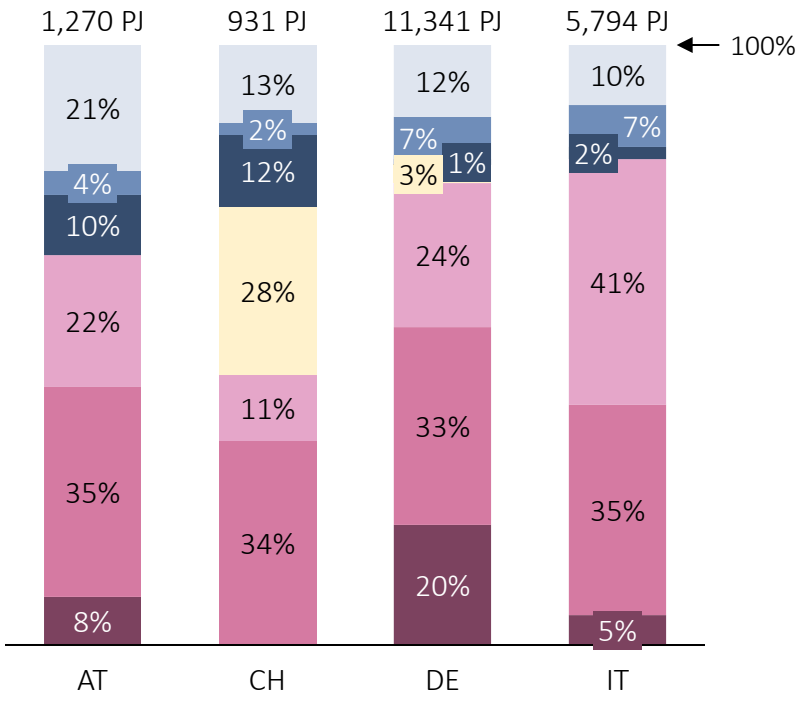
Energy and electricity mixes of AT, CH, DE and IT

Electricity mix by energy source, 2022



Total energy consumption by energy source, 2022

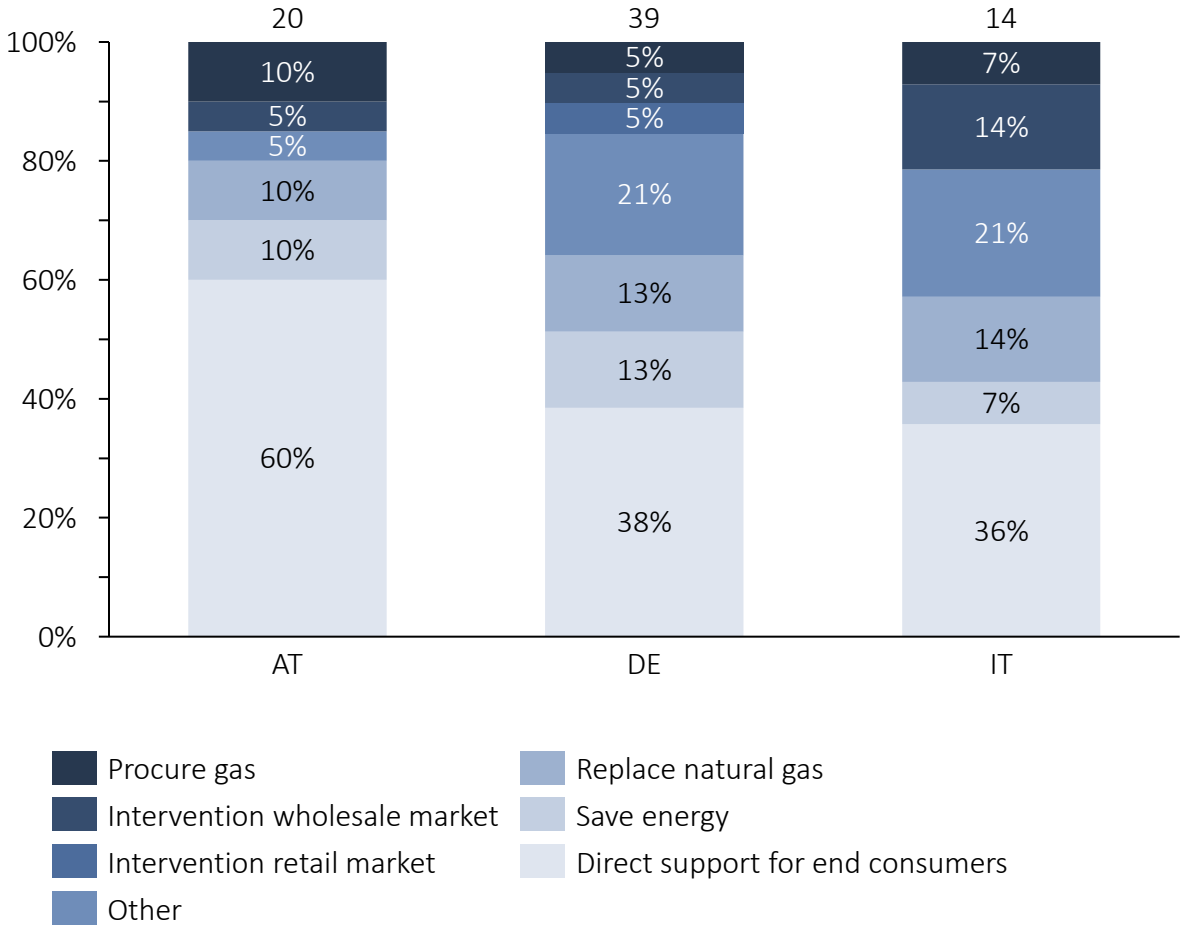


Coal · Natural gas · Hydro · Biomass and other
Oil · Nuclear · Wind, Solar

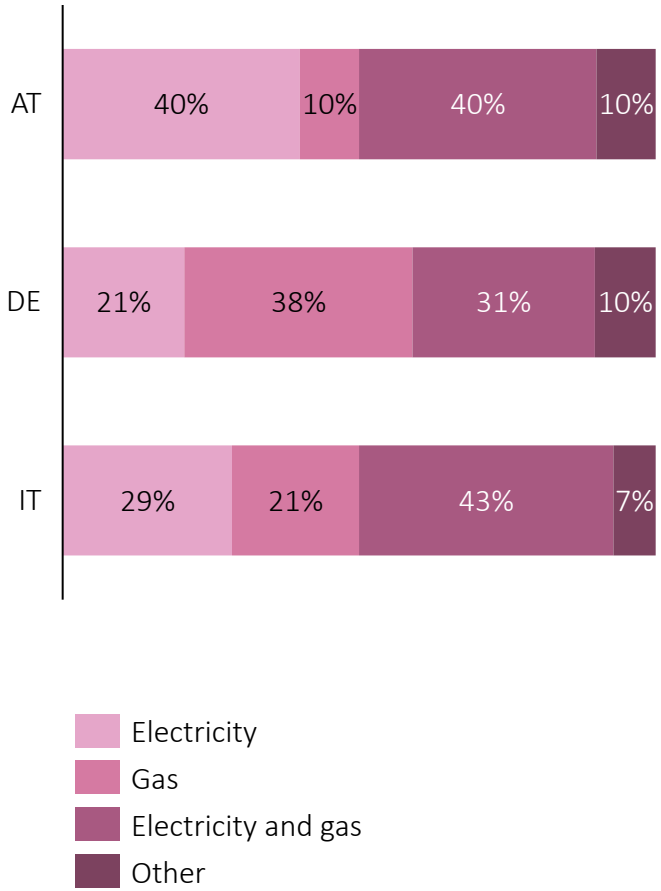
Source: IEA

Measures taken by nation states in the energy crisis 2022/2023

Emergency measures by member states of the European Union in 2022 in response to the energy crisis

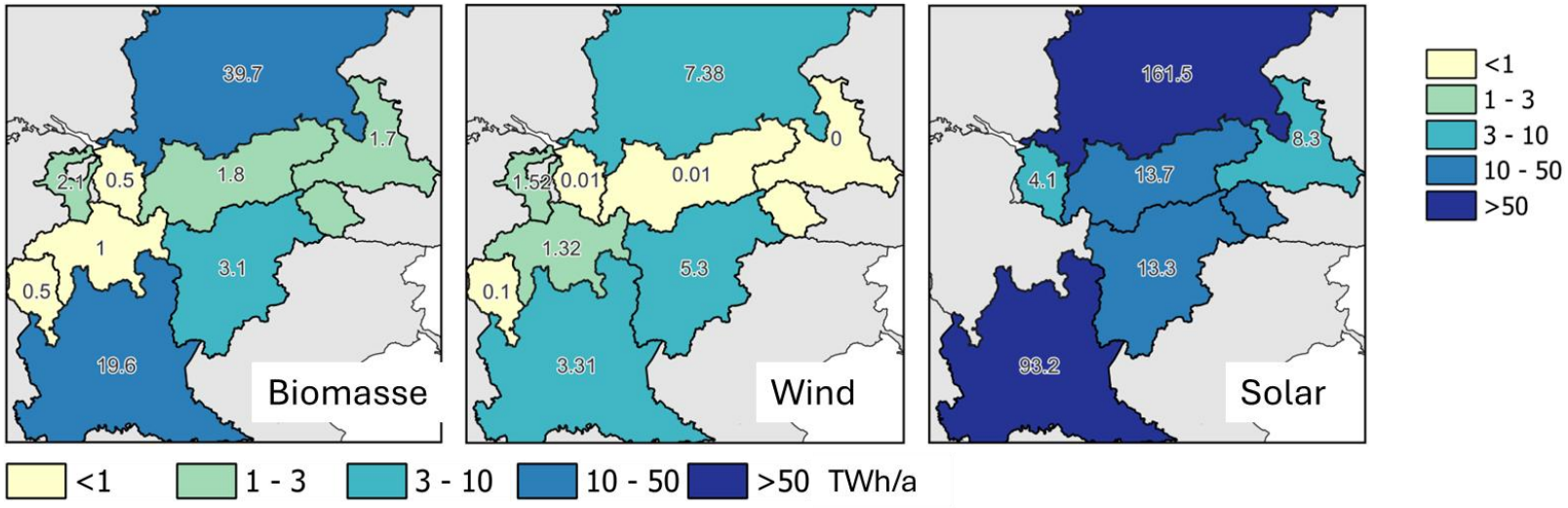


Sectors targeted by the emergency measures



Source: ACER

Energy potential of the regions



Source: Ruiz et al. (2019)

Possible measures and demands from the regions

Massnahmen auf regionaler Ebene

Ausbau erneuerbarer Energien

Gemeinsame Stellungnahmen: Die ARGE ALP könnte über Institutionen wie den Ausschuss der Regionen als Akteur und Multiplikator für eine verstärkte grenzüberschreitende Zusammenarbeit in der Energieversorgung auftreten.

Synergien in Energiestrategien und Potentialanalyse: Bisher werden Energiestrategien nicht oder nur wenig grenzüberschreitend abgestimmt. Auch gibt es nur in Ausnahmefällen eine gemeinsame Potentialanalyse für erneuerbare Energien. Die ARGE ALP könnte eine Zielvision formulieren sowie erste Massnahmen initiieren.

Erfahrungs- und Informationsaustausch zwischen den Regionen zu verschiedenen Themen, z.B.:

- Rolle der Regionen im Bereich **soziale Akzeptanz beim Ausbau von erneuerbaren Energien**: Erfahrungsaustausch, Best Practices zu Nutzungskonflikten, z.B. um Windkraft, Solar PV im Alpenraum
- Besserer **Austausch von Daten zur Energieversorgung**: Berichterstattung und Transparenz ist auf regionaler Ebene weniger stark ausgeprägt wie auf nationaler Ebene, hier besteht Potential.

Vernetzung regionaler Energieindustrie: Die ARGE ALP könnte zu einer stärkeren Vernetzung von Unternehmen im Bereich erneuerbare Energietechnologien beitragen im Sinne lokaler Wirtschaftsförderung und Innovationscluster. Ein weiteres Thema könnte der Fachkräftemangel sein.

Gemeinsame Innovationsprojekte: Die ARGE ALP könnten Forschungs- und Innovationsprojekte zu Themen der regionalen Energiewende anstossen, über Förderprogramme wie INTERREG Alpine Space.

Pilotprojekt grenzüberschreitende «Bürgerenergie»: Die ARGE ALP könnte ein Pilotprojekt für grenzüberschreitende Bürgerenergie im Rahmen der EU-RED III initiieren. Grenzregionen müssten dafür einen grenzüberschreitenden «Experimentierraum» aufmachen und Energiebranche, Zivilgesellschaft einbeziehen.

Kooperation zur Rolle der Wasserkraft in der Energiewende: Die ARGE ALP könnte einen koordinierten Auftritt für Wasserkraft im Alpenraum anstreben und aktuelle Themen angehen wie Neu-Konzessionierung, Sanierung, Ausbau und Erhalt von Wasserkraft angehen.

Strategie «Alpenraum für die Energiewende»: Die ARGE ALP könnte sich als «Ermöglicher und Katalysator» einer beschleunigten Energiewende positionieren und Ziele für Erneuerbare setzen. Als Inspiration könnte die «Esbjerg Deklaration» für gemeinsamen Windkraftausbau in der Nordsee dienen.

Netzausbau und Nachfrageseite

Erfahrungsaustausch zur Energienachfrage: Die ARGE ALP könnte einen Erfahrungsaustausch anstossen zum Umgang mit in den Regionen ähnlichen Veränderungen auf Nachfrageseite (flexiblere Nachfrage durch Digitalisierung, E-Mobilität, auch von Tourismus, Wärmepumpen für Haushalte und Industrie).

Kooperation Verteilnetzebene: Die ARGE ALP könnte u.a. einen Austausch zum Thema regionalem Netzausbau initiieren, oder spezifische Innovationsprojekte (siehe oben) dazu in Gang bringen. Die Rolle von Verteilnetzen wird im Rahmen des Ausbaus dezentraler Energieträger sowie höherem Strombedarf massiv zunehmen.

Versorgungssicherheit

Kooperation kritische Infrastrukturen/Bevölkerungsschutz: Zwar spielen die nationalen/europäischen Ebenen eine wichtigere Rolle beim Thema Versorgungssicherheit, aber auf regionaler Ebene besteht Potential für Zusammenarbeit bei der Resilienz kritischer Infrastrukturen im Energiebereich und im Bevölkerungsschutz.

Forderungen an die nationale Ebene

Ausbau erneuerbarer Energien

Integration von Italien ins Pentalaterale Energieforum: Die ARGE ALP könnte einen verstärkten Austausch zwischen AT, CH, DE, und IT im Energiebereich fordern, beispielsweise über bestehende Foren wie das Pentalaterale Energieforum. Dort ist Italien bislang aber nicht vertreten.

Mehr Kooperation unter RED III: Die ARGE ALP könnte AT, DE, IT (und CH) auffordern, grenzüberschreitende Energieprojekte unter RED III im Alpenraum voranzutreiben und so Vorteile grenzüberschreitender Zusammenarbeit (bessere Ausnutzung Ressourcenpotential etc.) zu realisieren.

Harmonisierung von Energiemarktregulierung: Die ARGE ALP könnte AT, CH, DE, IT auffordern, die Regulierung von Erneuerbaren, wo relevant, zu harmonisieren, um die Marktintegration zu vertiefen.

Netzausbau und Nachfrageseite

Harmonisierung Netzregulierung und Koordination Übertragungsnetzausbau: Die ARGE ALP könnte die Nationalstaaten auffordern Regulierung von Stromnetzen zu harmonisieren und Netzausbauplanung von Übertragungsnetzen voranzutreiben, um das europäische Verbundnetz zu stärken.

Bessere Integration der regionalen Perspektiven in Übertragungsnetzplanung: Die ARGE ALP könnte Übertragungsnetzbetreiber auffordern, die regionale Perspektive verstärkt bei Netzausbauplänen zu berücksichtigen, und dabei auch die grenzüberschreitenden Aspekte mehr zu beachten.

Versorgungssicherheit

Stromabkommen EU-Schweiz: Die ARGE ALP könnte sich bei den Nationalstaaten (CH, aber auch AT, DE, IT) und bei der EU für eine Vereinbarung zum EU-CH-Stromabkommen einbringen. Ein Entwurf des Stromabkommens könnte voraussichtlich bis Ende des Jahres 2024 von der EU-Seite vorliegen.

Mehr grenzüberschreitende Solidarität in Energiekrisen: Die ARGE ALP könnte die Nationalstaaten auffordern, die nationalen Ansätze zum Umgang mit Energiekrisen besser zu koordinieren, weniger stark auf nationale Massnahmen zu setzen, und sich zu Best Practices auszutauschen.

Forderungen an die europäische Ebene

Ausbau erneuerbarer Energien

Ausbau europäischer Instrumente: Die ARGE ALP könnte die EU auffordern, Instrumente wie RED III oder den Finanzierungsmechanismus für erneuerbare Energien zu stärken, und die Nutzung durch Mitgliedsstaaten (bisher in nur geringem Umfang) weiter zu fördern und fordern.

Netzausbau und Nachfrageseite

Mehr Koordination beim Stromnetzausbau und TEN-E-Projekte: Die ARGE ALP könnte fordern, dass mehr Projekte im Programm Trans-European Networks for Energy (TEN-E) umgesetzt werden, und im 10-Jahres-Netzausbauplan die alpinen Netze unter Einbindung der Regionen in den Fokus rücken.

Bessere Zusammenarbeit beim Netzmanagement: Die ARGE ALP könnte sich als zentrale Region im europäischen Stromnetz dafür einsetzen, dass das Netzmanagement und konkret das Re-Dispatch besser koordiniert wird – auf europäischer Ebene und zwischen betroffenen Institutionen.

Integration in Wasserstoff-Backbone und Umgang mit Gasnetzen: Die ARGE ALP könnte eine gute Integration der Alpenregion in die EU-Wasserstoff-Backbone fordern. Weiter könnte die ARGE ALP das Thema Abbau von Gasnetzen bearbeiten, z.B. im Rahmen von Erfahrungsaustausch und Best Practices.

Versorgungssicherheit

Harmonisierung «Resource Adequacy»: Die ARGE ALP könnte eine bessere Abstimmung der Methoden in nationalen Resource-Adequacy-Plänen fordern. Ausserdem könnte die ARGE ALP die Formulierung und Umsetzung ausgewogener Pakete von EU-Notfallmassnahmen im Energiebereich fordern.

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