

Climate Change Integration in the Multilevel Governance of Italy and Austria

Studies in Territorial and Cultural Diversity Governance

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Climate Change Integration in the Multilevel Governance of Italy and Austria

*Shaping Subnational Policies in the Transport,
Energy, and Spatial Planning Sectors*

Edited by

Federica Cittadino, Louisa Parks,
Peter Bußjäger and Francesca Rosignoli



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Contents

Acronyms, Abbreviations and Symbols VII

List of Tables XI

Introduction

Climate Change Integration in the Multilevel Governance of Italy and Austria 1

Louisa Parks and Niccolò Bertuzzi

PART 1

Setting the Scene of Climate Change Integration

- 1 The Challenges of Multilevel Climate Governance
Facing Hurdles in the EU's Climate Policy Ambitions 25
Mariachiara Alberton
- 2 Climate Change at Domestic Level
National Powers and Regulations in Italy and Austria 44
Maria Bertel and Federica Cittadino
- 3 Climate Change at Subnational Level
The Case Study of the Autonomous Provinces of Trento and Bolzano (Italy) and the Länder Tyrol and Vorarlberg (Austria) 68
Mariachiara Alberton, Peter Bußjäger, Alice Meier and Sara Parolari

PART 2

Integrating Climate Change in the Policy Sectors Where it Matters Comparing Subnational Governments

- 4 Transport 95
Alessio Claroni and Ekkehard Allinger-Csollich
- 5 Energy and Water 119
Giada Giacomini and Arnold Autengruber

- 6 Spatial Planning 145
Friederike Bundschuh-Rieseneder, Maria Tischler and Esther Happacher

PART 3

Facilitating Climate Change Integration in Subnational Governments Analysis of the Institutional Factors

- 7 Coordination and Leadership 165
Niccolò Bertuzzi, Peter Bußjäger and Alice Meier
- 8 Funding Climate Change
A Subnational Government Perspective 193
Mathias Eller and Alice Valdesalici
- 9 Information and Participation in Climate Change Integration 219
Martina Trettel, Melanie Plangger and Franz Koppensteiner

PART 4

Conclusion

- 10 Which Factors Influence Climate Policy Integration? Insights from
 Italian and Austrian Cases 251
Federica Cittadino, Louisa Parks, Peter Bußjäger and Francesca Rosignoli
- Appendix 281
 Interview Guide 281
 References 283
 Index 300

Energy and Water

Giada Giacomini and Arnold Autengruber

1 Introduction

Energy and water are closely linked to one another within the specifics of the regions to be examined in the context of climate change. Especially hydro-power plays a major role in achieving climate policy objectives in the energy sector.¹ Energy and water are therefore two interrelated policy sectors when it comes to effectively combatting climate change by avoiding the release of polluting emissions into the environment.² In this regard, such interrelation embodies a case of climate change policy integration (CPI) in itself. Based on the relevance in the field of climate change mitigation, the emphasis of this chapter will be put on energy policies in the Italian Autonomous Provinces of Trento and Bolzano, and in the Austrian *Länder* of Tyrol and Vorarlberg, whereas the field of water will mainly be dealt with in the context of hydro-power. This chapter will also highlight problems and flaws relating to the same sectors, drawing upon the results of the interviews conducted within the Eurac project “Climate change integration in the multilevel governance of Italy and Austria”.³

1 For Vorarlberg “Strategie Energieautonomie + 2030”, at <https://www.energieautonomie-vorarlberg.at/zoolu-website/media/document/3817/Strategie+Energieautonomie%2B+2030>, at 39. See for Tyrol *Ressourcen- und Technologieeinsatz- Szenarien Tirol 2050 – Bericht*, at https://www.tirol.gv.at/fileadmin/themen/umwelt/wasser_wasserrecht/Downloads/19-0308_Szenarien-Tirol-2050_Endbericht-Stand-18-10-15.pdf, at 20. All internet sources in this chapter were accessed on 9 May 2022.

2 See E. Schulev-Steindl, “Die Verantwortung des Staates bei der Energiewende”, *RdU-UT*, 6 (2014) 90–102, at 99. The importance of hydroelectric power for a secure energy supply, in particular also for reducing GHG emissions, is undisputed in the scientific community. See amongst others R. Koubek, “Systembetrachtung CO₂-Reduktion”, *Elektrotechnik und Informationstechnik*, 129 (2012) 367–373, at 370.

3 Research project “Climate Change Integration in the Multilevel Governance of Italy and Austria: Policy-Making and Implementation in Selected Subnational Policies” funded by the Autonomous Province of Bolzano program Research Südtirol/Alto Adige 2019.

2 Italy's Autonomous Provinces

2.1 *Preliminary Remarks*

Energy policies are deemed crucial as far as the establishment of effective strategies for the reduction of greenhouse gas (hereinafter GHG) emissions in the atmosphere is concerned, and thus in the mitigation of climate change impacts. In relation to this, the energy sphere is characterized by a great quantity of laws and policies in the Autonomous Provinces of Trento and Bolzano/Bozen, data that has clearly emerged since the first phase of the research project. This section will outline the main legal and political initiatives in the two Italian Autonomous Provinces, highlighting how these are playing a crucial role in the fight against climate change. It will do so by engaging with the key sectoral documents, but also by drawing upon the outcomes of interviews conducted with sectoral experts.

D.P.R. 235/1977 as modified by D.lgs. 463/1999 defines the “Rules for the implementation of the Autonomous Statute of the Trentino Alto Adige Region in the field of water, water works and concessions of large hydroelectric derivations, production and distribution of electricity”. It provides for the transfer to the Autonomous Provinces of Trento and Bolzano, for their respective territories, of the legislative and administrative functions in the field of energy exercised either directly by the central and peripheral organs of the state or through public bodies and institutions of a national or supra-provincial character. Competences are also defined in article 9(1) No. 9 of the Autonomy Statute, which includes small water derivations under the competences of the Autonomous Provinces.⁴

2.2 *Energy – Bolzano and Trento*

The Autonomous Province of Bolzano/Bozen, located in the Italian Region Trentino-South Tyrol, holds a particular status within the national legal system, entrenched in its 1972 Autonomy Statute. The Province has adopted its own climate policies and can directly integrate the EU legal framework into its territory for those matters that fall within its legislative powers and overlap with climate change. Directive 2009/28/EC, launched to stimulate the growth of renewable energy sources (RES), imposes binding targets on member states. The EU requires that each country, by 2020, reaches the share of energy from RES in the gross final consumption of energy assigned as a target (for Italy,

4 See also M. Alberton and F. Cittadino, “La tutela dell’ambiente”, in W. Obwexer *et al.* (eds), *L’impatto dell’Unione europea sull’autonomia legislativa ed amministrativa dell’Alto Adige/Südtirol* (ESI 2015) 471–514.

17%). With regard to energy efficiency criteria, the goal is to achieve a 20% improvement in energy efficiency by 2020. The law that regulates energy savings, renewables and climate protection in Bolzano was L.P. 9/2010, now substituted by L.P. 10/2018.⁵

To contribute to those targets, the Province of Bolzano adopted its first Climate Plan “South Tyrol Energy 2050” (now *Piano clima Alto Adige 2040* or *Klimaplan Südtirol 2040*) back in 2011 in light of the objectives adopted at national and international level. The Plan is currently under review with a view to adopting a new, more ambitious version in 2022. Bolzano also adopted in 2019 a Sustainability Strategy (hereinafter Strategy) that operates in conjunction with the Climate Plan. The Strategy prescribes an important objective in relation to climate change – in fact, climate change is one of the Sustainable Development Goals (hereinafter SDGs). Thus, the Climate Plan functions as a perfect example of CPI and as an operationalization of the Sustainability Strategy. It also contains important trackers that help in pursuing the SDGs’ objectives.⁶

Regulation of the energy sector is one of the most important features of both the Climate Plan and the Strategy. The Climate Plan illustrates how the Province of Bolzano can build a low-emission economy while consolidating its position in terms of international competitiveness. In the Plan, the energy sector is deeply intertwined with other sectors, which include water and its implication with the production of renewable energy.

The Climate Plan has the primary objective of reducing the annual CO₂ emissions deriving from energy consumption per inhabitant to below 1.5 tonnes (one third lower than the per capita emissions in 2008) and the consumption measured as continuous output per capita to below 2200 W.⁷ It aims to reach these targets by pursuing different strategic priorities simultaneously: energy savings and increased energy efficiency in all strategic sectors; reducing dependency on fossil fuels and substituting these with RES; reducing CO₂ emissions, and building a culture of sustainability.⁸ The tools used by the Province of Bolzano in order to reach the emission reduction ambitions are economic

5 See http://lexbrowser.provinz.bz.it/doc/it/lp-2010-9/legge_provinciale_7_luglio_2010_n_9.aspx.

6 Also see the Sustainability Strategy website at <https://sostenibilita.provincia.bz.it/it/home>, and the SDGs trackers for the Province of Bolzano, at <https://astat.provinz.bz.it/barometro/upload/sdg/html/it/index.html>.

7 *Piano Clima Energia-Alto Adige-2050*, now partially replaced by *Piano clima Alto Adige 2040*.

8 *Ibid.*, at 23.

instruments such as incentives (monetary and non-monetary), taxation (such as water charges, as we shall see later in the chapter), as well as non-economic strategies such as education, awareness and information strategies, and target-oriented research funding.⁹

The Climate Plan outlines several “axes of intervention” that will be decisive in achieving the objectives of the strategic priority areas. The energy-related axes are defined as management of energy supply and the smart use of energy. One of the most important aims of the Province of Bolzano is to meet the energy demand with renewable sources produced locally. However, the Climate Plan clarifies that “if the demand for electricity cannot be met by means of local sources in a sustainable way, energy is to be imported from other regions”.¹⁰ Among the initiatives, the Green Corridor Project (Brenner LEC) is being implemented along the Brenner highway. The project aims to make the area along this corridor an international model for energy efficiency and to supply it entirely with energy from RES in the coming decades.¹¹ Additionally, with regard to the energy efficiency requirement, South Tyrol is especially suitable for the construction of pumped-storage plants and water reservoirs, as we shall see in the next section in relation to water policies, sustainable energy and climate change.

Another important sector related to the smart use of energy in the Province of Bolzano is the construction of solar facilities for hot water production and the thermal insulation of buildings. As outlined in the Climate Plan, the average energy consumption of households was to have been cut by 20% by 2020, with a view to increasing this to 35% by 2050 compared to 1990 levels.

The interviews conducted within the project have helped to shed light on how the emission reduction objectives are being achieved in the Province of Bolzano. The interviewees affirmed that fundamentally two priorities are being followed: first, to reduce energy consumption in all areas (construction, transport, production processes in the private sector, etc.); second, to decarbonize the remaining abovementioned energy requirements set out in the Climate Plan.

9 See Chapters in 8 and 9 in this volume.

10 *Piano clima Alto Adige 2040, supra*, at 32.

11 The green corridor is an idea that combines the development of road and rail infrastructure with the proposal for a model of low energy consumption, low pollution and low surface consumption, in which maximum attention would be paid to the quality of life of the resident populations. See also Brenner LEC website: <https://brennerlec.life/>, and Chapter 4 in this volume.

According to an interviewee, the construction sector is crucial for the energy efficiency objectives or the overall reduction of the environmental footprint in the construction sector.¹² The respondent asserted that it is well known that the large-scale building industry is the world's highest energy and raw material consumer, and also the largest producer of waste and emissions (it accounts for about 40% of our total energy consumption) and is responsible for over a third of CO₂ emissions.¹³ This is why the inhouse agency *CasaClima*, with its system of energy certifications for buildings, is regarded as one of the most important allies in energy savings and therefore indirectly in climate change mitigation.¹⁴ It has been demonstrated that a *CasaClima*-certified house consumes 10% less energy compared to the existing average building, and also covers a large part of its needs from RES. This is crucial insofar as building in a sustainable way and upgrading existing buildings are the most effective and cheapest measures to reduce our environmental impact.¹⁵ Another important initiative according to the latter stakeholder is constituted by the national sustainability report, because it is a crucial tracker for emissions reductions, presenting information also on a provincial basis.¹⁶

Among the other initiatives related to the energy sector, the interviews highlighted the importance of the introduction (in 2012, now extended until 2026) of the “*Bonus cubatura*”. In the case of new buildings, where more than 50% of the total volume is intended for residential purposes, the above-ground eligible area can be increased by 10% if (1) the whole building meets *CasaClima* standards and, (2) the rules on building materials and the coverage of electricity needs from RES are met.

In conclusion, some final remarks on the actual reduction of GHG emissions are due in order to understand to what extent the Province of Bolzano is going to meet its targets. According to the monitoring reports of the Provincial Agency for the Protection of the Environment and the Climate (*Agenzia Provinciale per l'Ambiente e la Tutela del Clima*) the actual coverage of the needs with energy produced from RES amounted to almost 70% in 2014 and then

12 IntBZ_08.

13 IntBZ_08.

14 Throughout the interviews, the initiative *CasaClima* has been widely mentioned and their initiatives illustrated by many stakeholders (IntBZ_02; IntBZ_03; IntBZ_08; IntBZ_09). More information is available at <https://www.agenziacasaclima.it/it/home-1.html>.

15 IntBZ_08.

16 The 2022 Sustainability Report is available at <https://research.cerved.com/>.

decreased slightly in subsequent years.¹⁷ As the Agency has reported, this fluctuation also depends on the availability of RES (sun and water) during the year, and fluctuations in the annual water balance, due to the strong dependence on hydropower. The monitoring mechanism also outlines that South Tyrol ranked second in Italy and at the European summits for the coverage of energy needs from RES.¹⁸

The other two indicators used to track progress of the Climate Plan implementation are “energy efficiency” and the “per capita energy intake”. These indicators are calculated by dividing the provincial energy consumption by the number of inhabitants and the number of hours during which energy is used per year. According to the Agency website, the value of the energy efficiency indicator increased sharply until 2010 and then decreased until 2014. It then rose to values close to those of 2010 in 2018. The website reports that: “there is no doubt that further efforts are needed to reach the target of 2,500 W per capita by 2020. The key to the future is energy efficiency in all sectors”.¹⁹ In relation to the per capita CO₂ emissions, the website reports that these have lower values compared to other settings in Italy thanks to the widespread use of renewable energy sources and efficient use of energy, and the absence of particularly energy-intensive production lines. Emissions dropped below 4.25 tons per capita in 2014 and then rose slightly again in the following years.²⁰ However, no further data is available at the moment with regard to the last few years.

Turning now to the Autonomous Province of Trento, there is a long history of environmental and energy planning in this area, which dates back to the 1980s and 1990s. In the beginning, the main focus when discussing energy was on ensuring energy security and the provision of energy in the mountains and valleys. It is only more recently (since 2010) that there has been a focus on the reduction of GHG emissions in order to avoid the worst climate change impacts. Like for the Province of Bolzano, also in Trento climate change policies are closely intertwined with plans for the reductions of GHG emissions. In 2010, the Trentino Provincial Climate Law provided for the reduction of greenhouse gas emissions by 50% compared to 1990 levels by the year 2030 and 90%

17 Monitoring tools are available at <https://ambiente.provincia.bz.it/energia/piano-clima-energia-alto-adige-2050.asp>.

18 Also see the Agency website at <https://ambiente.provincia.bz.it/energia/piano-clima-energia-alto-adige-2050.asp>.

19 *Ibid.*

20 *Ibid.*

by the year 2050, in line with the European pathway of almost complete decarbonization by 2050.²¹

The most important document for energy regulation and policy is the Energy and Environmental Provincial Plan (hereinafter PEAP). The PEAP 2021–2030 takes into account as a general objective to 2030 the goal set in article 23 of L.P. 19/2013, which concerns the objective of reaching a climate-neutral Province by 2050 in line with the objectives of both the Paris Agreement and L.P. 20/2012.²² The PEAP initially had the objective of reducing CO₂ emissions by 300,000 tonnes in 2012 through the promotion of energy efficiency and RES mainly for civil purposes.²³ The adoption of the Paris Agreement has marked a new era for the definition of climate change strategies in the Province of Trento, which adopted a new PEAP for the period 2021–2023. In this document, adopted in June 2021, it is reported that “the implementation of the strategy of this Plan and therefore of its twelve strategic lines is one of the most significant steps for Trentino in achieving the overall goal of reducing climate-altering emissions to 2030 by 55% compared to 1990”.²⁴ The PEAP instrument operatively interconnects the Provincial Strategy for Sustainable Development and the Provincial Strategy for Mitigation and Adaptation to Climate Change.²⁵

21 L.P. 5/2010, available at <https://www.consiglio.provincia.tn.it/leggi-e-archivi/codice-provinciale/Pages/legge.aspx?uid=21336>.

22 This provincial law concerns the implementation of art. 13 of Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources, amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Art. 1 reads: “The Autonomous Province of Trento, [...] promotes and coordinates, with the involvement of public and private entities, initiatives aimed at a rational use of fossil energy sources, the enhancement of renewable energy sources, energy efficiency and energy savings, as well as an overall improvement in the quality of life, in the context of a sustainable development model, while reducing, emerging negative externalities that could cause damage to the social life of the territory and its economy”.

23 The full version of the PEAP is available at http://www.energia.provincia.tn.it/binary/pat_agenzia_energia/piani_programmi/piano_1_1227689145.pdf. L.P. 20/2012 is the law on Energy Act and implementation of article 13 of Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources.

24 Provincia Autonoma di Trento, *Piano Energetico-Ambientale Provinciale 2021–2030* (Trento 2021), at 271.

25 See also website of the Strategy for sustainable development at <https://agenda2030.provincia.tn.it/Trentino-2030/Strategia-provinciale-SproSS>, and <http://www.climatrentino.it/>. Also see the Resolution No. 1306 of 7 August 2021 of the Provincial government of Trento.

The document was drawn up also through consultation with civil society and private companies.²⁶

The PEAP aims to reduce GHG emissions by targeting specific areas that can be identified as the regulatory-normative sector, economic and financial resources, education, and research and innovation among others. The top priority concerns the upgrading of buildings. The objective in the building sector is to increase the use of energy storage systems through the institution of a methodology for building certification. This objective and relative method of actuation can be considered similar to the Bolzano's *CasaClima* certification system, because energy efficiency is achieved through building certification. Moreover, the Province of Trento wishes to reach the emission reductions objective of the certification system through "careful consideration of the contribution of woody biomass in buildings energy certification", therefore energy from RES.²⁷ Another interesting measure in the PEAP is represented by the "energy mortgage", which promotes banking products that promote the restoration of buildings to make them energy-efficient and finances the purchase of high energy-saving class housing.

As far as industrial production is concerned, the PEAP devotes a special part to "highly-efficient industry" which includes consulting services to private stakeholders and the subsequent steps for the implementation, financing, monitoring and certification of product sustainability. This strategy also concerns the "dissemination of company energy diagnostics", meaning that the Province will promote the drafting of energy audits in favor of those companies not obliged by D.lgs. 102/2014, in order to be able to identify potential energy efficiency interventions, with achievable costs and savings.²⁸ In addition, the PEAP promotes the identification of economic and financial instruments and mechanisms that favor the installation of photovoltaic systems on roofs and

26 The reports of PEAP consultation are available on the APPA website: <http://www.energia.provincia.tn.it/peap/-categoria8/pagina33.html>.

27 *Piano Energetico-Ambientale Provinciale 2021–2030*, *supra*, at 273.

28 The D.lgs. 102/2014 concerns the implementation of Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC. The legislative decree establishes that the national energy saving target consists in the reduction, by the year 2020, of 20 million tons of oil equivalent of primary energy consumption, 15,5 million tons of final energy oil equivalent, calculated from 2010, in line with the National Energy Strategy. In article 10 of the decree are enumerated the entities which had to share their energy data in order to draft an assessment of the national application potential of high-efficiency cogeneration and efficient district heating and cooling.

industrial facades, potentially combined with self-consumption solutions.²⁹ Finally, another point worth of consideration is the objective of the promotion of energy management systems such as ISO 50001 standard³⁰ through information and awareness initiative for small and medium-sized enterprises.³¹

In terms of the actual implementation of energy policies in the Province of Trento, the PEAP 2021–2030 highlights the main trends in energy consumption and GHG emissions. Comparing data from 2008–2009–2010 and 2014–2015–2016, there has been a 15% decrease in consumption in Trentino. Reductions are most noticeable in the use of fossil fuel from the transport sector. Furthermore, the year 2016 registered a reduction of -20% compared to 1990 levels.³²

While this data is a herald of hopes for the future of climate change mitigation, the interviews conducted reveal a partially different picture for the Province of Trento. The initial draft of the 2021 PEAP, for example, had anticipated goals that were introduced in EU legislation only later (e.g. reducing GHG emissions by 55% by 2030). As was outlined in one interview, “in Italy, the adoption of European directives related to energy has not taken place in suitable timeframeshowever, fortunately there is the possibility to legislate on a provincial level, skipping the state level and considering the European level directly”.³³ However, as maintained by other interviewees, significant limits and obstacles remain in effectively contrasting climate change within the current politics conducted by the Province of Trento: in particular, it was outlined that there is such a “scarce amount of renewable energy, that they only took into consideration solar panels and hydroelectric energy” This means that in the definition of the instruments for the PEAP’s energy efficiency targets, significant limits and obstacles remain in effectively combatting climate change in the current politics conducted by the Province of Trento: in particular more investment on RES has been identified as the best solution.³⁴

29 Provincia Autonoma di Trento, *Piano Energetico-Ambientale Provinciale 2021–2030*, *supra*, at 277.

30 See <https://www.iso.org/iso-50001-energy-management.html>. ISO stands for International Organization for Standardization.

31 This measure implements art. 8 of the Ex. D.lgs. 102/2014 as amended by Ex. D.lgs. 73/2020. The latter concerns the implementation of EU Directive 2018/2002 amending Directive 2012/27/EU on energy efficiency.

32 L. Boschini *et al.*, *Rapporto Ambientale – Piano Energetico Provinciale 2020* (Provincia Autonoma di Trento 2020), at 37; *Piano Energetico-Ambientale Provinciale 2021–2030*, *supra*, at 34.

33 IntTN_05.

34 IntTN_11.

Furthermore, according to the accounts of both interviewed experts and administrative staff, the main driver in the various plans has always been mitigation measures, while adaptation measures lag behind. Only in the 2021 PEAP was there an increase in the number of adaptation measures.

Another critical feature of the PEAP is that, although it contains a specialist technical scenario report authored by scientific experts (*Fondazione Bruno Kessler*, University of Trento, *Fondazione Mach*), there was a lack of effective involvement from civil society associations in the elaboration of the plan. According to an interview, the PEAP lacked the participation of environmental associations.³⁵ This was due perhaps to the large number of pages and information contained in the PEAP (more than three-hundred pages) which make the document very difficult to understand overall. Both the administrative sources and interviewees from civil society organizations attributed this lack of participation to negative previous experiences which had led to a certain degree of mistrust on the part of civil society and the impression that the parties were involved solely for the sake of personal visibility and not to be meaningfully involved in the drafting process. Nevertheless, one interviewee insisted that many of the observations made by civil society associations during consultation were taken into account.³⁶

2.3 *Water and Hydroelectric Power – Bolzano and Trento*

All the energy produced in the Province of Bolzano comes from RES, such as hydroelectric power and wood biomass. According to the ASTAT (*Istituto provinciale di statistica* – Provincial Institute for Statistics) report, the production of energy from hydroelectric power has grown consistently: already in 2012, it represented 92% of the electricity produced in the Province of Bolzano.³⁷ According to the SDG tracker for Goal 7 on clean energy, in South Tyrol the share of energy from RES in gross final energy consumption was 64,2 in 2018.³⁸

35 IntTN_05.

36 IntTN_05. For an account on the participatory mechanism of the PEAP, see Chapter 9 in this volume. Also consult the website of the Agenzia Provinciale per la Protezione dell'Ambiente (APPA Trento) at: <http://www.energia.provincia.tn.it/peap/-categoria8/pagina33.html>.

37 Istituto Provinciale di Statistica, *ASTAT Info n.48 07/2014* (Provincia Autonoma di Bolzano 2014).

38 The reference indicator for monitoring progress towards the Europe 2020 renewable energy targets set by EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources. The calculation is based on data collected under Regulation (EC) No 1099/2008 on energy statistics, some of which obtained by applying calculation criteria specifically introduced by the Directive (for example, standardization of electricity production from water and wind). See also SDGs trackers at https://astat.provincz.bz.it/barometro/upload/sdg/html/it/detail_7.html#measurement-7.2.1.10.

In the Climate Plan, it is reported that “In South Tyrol there are currently 30 power plants with an installed power of over 3 MW. Alongside these large power plants, there are another 784 small power plants with an installed power of < 220 kW and 116 plants with an installed power > 220 kW and < 3 MW. These small power plants produce a total of 775 GWh of electricity (about 25% of South Tyrol’s power demand, situation in 2009)”.³⁹ Therefore, water is an ally of utmost importance in the reduction of GHG emissions and, consequently, in the integration of climate change objectives in the Province of Bolzano.⁴⁰

The main offices that deal with provincial water planning are the Water Protection Office and Water Resources Management Office within the Provincial Agency for the Protection of the Environment and the Climate. Such planning and management initiatives were mainly implemented in the publication of the General Plan for the Use of Public Water (PGUAP – *Piano Generale di Utilizzazione delle Acque Pubbliche*), the first draft of which was approved in 2012. The plan was made operational by D.P.R. 22 June 2017.⁴¹ The most important measure from the point of view of climate change mitigation was the introduction in 2019 of new water charges, pursuant to L.P. 10/2019 and to its implementing resolutions 857 and 848 of November 2020. These two resolutions are important because they define water fees for different water uses and, concerning irrigation use, they provide a set of fee reductions for those users who apply sustainable practices, such as saving water through the use of reservoirs.

However, because of climate change impacts and their severe consequences, the availability of water and the water runoff in winter and summer will undergo serious alterations in the Province of Bolzano and Trento as well. The effects of climate change predicted for the rainfall patterns will change the availability of water resources, in particular by altering the seasonality of outflows in surface watercourses, among others negative climate impacts that will occur. One interviewee affirmed that climate change certainly has an impact on the availability of water, so limited availability of water should be taken into account when granting concessions to new hydroelectric power stations.⁴²

39 Piano Clima Energia-Alto Adige-2050, *supra*, at 61. MG stands for megawatt, kW for kilowatt and GWh Gigawatt hours.

40 A comprehensive list of hydroelectric power stations is available on the Provincial Agency website: https://ambiente.provincia.bz.it/pubblicazioni.asp?publ_action=4&publ_article_id=231509.

41 The full version of the General Plan can be accessed here: <https://ambiente.provincia.bz.it/acqua/piano-generale-utilizzazione-acque-pubbliche.asp>.

42 IntBZ_03.

This is foreseen in the PGUAP, which, in its Part 3 (article 40, paragraph 2), gives mandate to the provincial council to identify by resolution those “areas characterized by drought or recurrent situations of water supply crisis”. For such droughty areas, a specific plan will be established aimed at ensuring sustainable water use and achieving good quality status.

Turning now to the Province of Trento, the Plan for the General Management and the Use of Public Water (*Piano di Gestione Generale dell'Utilizzazione delle Acque Pubbliche*) was launched in 2006 through the Executive Decree of the President of the Republic of 24 May 2006.⁴³ The Plan, which is organized along the district lines of the rivers Po and Adige, is about to be adopted, and it will integrate climate change concerns.⁴⁴ In fact, the new plan 2022–2027 contains adaptation measures in “Allegato M”.⁴⁵ The Plan condenses the principles of the two main European directives dealing with water; the Water Framework Directive 2000/60/EC and the Floods Directive 2007/60/EC. The main measure of the Plan concerning hydroelectric derivations is the Environmental Flow,⁴⁶ which after having been applied in 2009 only to large hydroelectric derivations, entered into full force in 2017 with the application of the measure to all existing derivations with very few exceptions.⁴⁷

In the PEAP water policies appear linked to the hydroelectric sector, as in the Climate Plan. Hydroelectric power is an important source of renewable energy in the Province of Trento, which constitutes a very significant portion of Italian hydroelectric production: 82.7% of the electricity produced in Trentino comes from RES, that is, almost exclusively, from hydropower.⁴⁸ The remaining 17.3% comes from cogeneration plants (that is, simultaneous production of electricity and heat) that use fossil fuels. In Italy 3,432 plants are in operation, resulting in gross installed capacity of 18,481 MW, and a gross

43 S. Cappelletti *et al.*, *Piano Generale di Utilizzazione delle Acque Pubbliche – Relazione Illustrativa* (Provincia Autonoma di Trento 2006).

44 The draft New Water Management Plan 2022–2027 is available at http://www.appa.provincia.tn.it/pianificazione/Piano_di_tutela/-Piano_Tutela_Acque/pagina37.html.

45 See http://www.appa.provincia.tn.it/pianificazione/Piano_di_tutela/pagina36.html.

46 The environmental flow is commonly defined as “the river-flow characteristics necessary to maintain the integrity of riverine ecosystems. The concept of environmental flows has evolved over the past half-century, beginning with the development of minimum instream flows necessary to protect a single fish species to current frameworks for holistically including all aspects of river health that depend on natural flow regimes”, see generally R. Morrison and E. Bray, *Environmental Flows* (Oxford University Press 2019).

47 C. Ferrari *et al.*, *Trentino Sostenibile. Verso la Strategia Provinciale di Sviluppo Sostenibile* (Provincia Autonoma di Trento 2019), at 86.

48 *Ibid.*

production of 58,545 GWh. Concerning the hydroelectric sector, the PEAP and New Draft Water Management Plan predict in the relative scenario that until the year 2030 there will be no significant reductions on the annual quantity of outflows. However, uses for hydroelectric derivations could lead in 2030 to an overall reduction in water availability for hydroelectric purposes estimated at up to 2%.⁴⁹ The power produced by the plants located in the Province of Trento in 2014 was equal to about 10.4% of total Italian power.⁵⁰ However, the last report shows a downward trend in the production of hydroelectric energy in the period 2014–2017, due to the change in water availability, while hydroelectric remains the most important source.⁵¹

Moreover, it is reported that the Province of Trento will undergo a process of reallocation of hydroelectric permits for large hydroelectric branches – but it is still unknown when.⁵² According to the report, through this action it will be possible to rationalize the use of water, considering that hydroelectric power stations use about 84% of the availability of superficial water. Additionally, the Provincial Agency for Environmental Protection for Trento and the University of Trento have signed an agreement for the development and application of the MesoHABSIM Methodology within the province of Trento. This consists of an innovative system for monitoring of watercourses that allows for evaluations of the ecological outflow in compliance with Executive Decree 30/2017.⁵³

49 *Piano Energetico-Ambientale Provinciale 2021–2030*, *supra*, at 75.

50 M. Niro, *Rapporto sullo Stato dell'Ambiente – Energia* (Provincia Autonoma di Trento 2016), at 7.

51 M. Niro, *Rapporto sullo Stato dell'Ambiente 2020* (Provincia Autonoma di Trento 2020), at 102.

52 *Ibid.*

53 C. Ferrari *et al.*, *Trentino Sostenibile*, *supra*, at 87. Decrees 30/2017 and 29/2017 are two regulations that the Ministry of the Environment has issued in accordance with the Action Plan 2016 agreed with the European Commission, in relation to some criticalities that the Commission itself had found regarding the district management plans of the waters (Directive 2000/60/CE). Among these criticalities, one in particular (Case Pilot 6011/2014) concerned the need to properly assess the environmental risk generated by the proliferation of small hydroelectric power derivations. See also Italian Ministry of the Environment Website at https://www.mite.gov.it/sites/default/files/archivio/allegati/trasparenza_valutazione_merito/informazioni%20ambientali/15_-_decreti_sulle_valutazioni_ambientali_delle_derivazioni_e_sui_deflussi_ecologici.pdf.

3 Austria – Regulations and Policies

3.1 Preliminary Remarks

The topics of energy and water have many points of contact with climate change, as recognized in the government programs of some *Länder*.⁵⁴ At first glance, however, the *Länder* seem to have only limited scope for action in these areas. Based on the Austrian distribution of competences, the *Bund* is largely responsible for legislation and enforcement in these areas.⁵⁵

On closer inspection, however, it turns out that the *Länder* do have considerable opportunities to exert influence in these areas and have already anchored at least programmatic provisions in connection with climate protection efforts at constitutional level of the *Länder*.⁵⁶ This is not only due to the implementation of various specific regulations in the respective relevant sectors (e.g. facilitations for the approval of photovoltaic systems under building law), but also, and above all, at the level of the creation of economic incentives in the form of subsidies as well as company ownership. Subsidies are mostly granted within the framework of the so-called private sector administration, i.e. by means of a contract. Since this non-sovereign administration forms a

54 Consequently, this is also identified in the current government programs as one of the greatest challenges of the coming years. For Tyrol, the “government program for Tyrol 2018–2023”, https://www.tirol.gv.at/fileadmin/buergerservice/Bilder_Div/Landesregierung_NEU_20182023/Regierungsprogramm_2018-2023.pdf and for Vorarlberg, the “Arbeitsprogramm 2019–2024”, <https://vorarlberg.at/documents/302033/472082/Arbeitsprogramm+2019+-+2024.pdf/42363506-5c70-d126-c847-d72c13a6e0c3?t=1616150574042>.

55 On the qualification of (environmental) energy law as a so-called “cross-sectional matter” with significant competences in favor of the *Bund*, see G. Schnedl, *Umweltrecht* (facultas 2020), margin No. 441 ff. With regard to the far-reaching competences of the *Bund* in the area of water law, see for example J. Müllner, “Art 10 Abs 1 Z 10 B-VG”, in A. Kahl and L. Khakzadeh and S. Schmid (eds.), *Kommentar Bundesverfassungsrecht* (Jan Sramek 2021) 212–228, margin No. 46ff. See also IntT_01, IntT_02, IntT_06. Also see Chapter 2 in this volume.

56 The commitment to sustainable and effective climate protection as a prerequisite for preserving our living space for future generations, as laid down in the respective state constitutions see art. 7(3) *Tiroler Landesordnung 1989* (StF: LGBl 1988/61) as well as art. 7(6) (provides for measures and funding with regard to the policy area of water) and para. 7 (which, in addition to a general implementation on climate protection, primarily states the promotion of measures to increase energy efficiency as well as the sustainable use of renewable energies) *Verfassungsgesetz über die Verfassung des Landes Vorarlberg* (StF: LGBl 1999/9). Further to the regulation in the *Tiroler Landesordnung 1989*: A. Gamper, “Art 7 Tiroler Landesordnung 1989”, in P. Bußjäger and A. Gamper and C. Ranacher (eds), *Tiroler Landesverfassungsrecht* (Verlag Österreich 2020), margin No. 11 ff.

competence-neutral area according to article 17 of the Federal Constitution (*Bundes-Verfassungsgesetz – B-VG*), the *Bund* and *Länder* can also grant subsidies in those administrative areas in which they do not have any legislative and enforcement competence *per se* according to article 10 to 15 B-VG.⁵⁷ Finally, both the *Länder*⁵⁸ and the *Gemeinden* (municipalities)⁵⁹ may establish companies. Tyrol and Vorarlberg have made extensive use of this possibility. Thus, the major energy supply companies of the *Länder* (in Tyrol, the *TIWAG-Tiroler Wasserkraft AG*⁶⁰ and in Vorarlberg the *illwerke vkw AG*⁶¹) are exclusively⁶² or indirectly⁶³ wholly owned by the respective *Länder*. Smaller municipal energy utilities and companies active in the field of water supply and wastewater disposal are also regularly owned solely or predominantly by the public sector.⁶⁴

Although the political or economic influence of the *Länder* from a constitutional perspective may seem small on paper, in reality it is considerably greater. Thus, the programs described in the following are of considerable importance when it comes to questions of CPI by Tyrol and Vorarlberg.

3.2 Energy (Vorarlberg and Tyrol)

Based on general political objectives, the energy-related policies that integrate climate change are multi-layered, especially in two ways. While concrete legislative steps are taken only sporadically considering the distribution of competencies described above, the private sector administration (in the form of subsidies and corporate policy guidelines for major state-owned companies) is the most effective and most frequently used instrument for taking climate change-related measures at the *Land* level.

57 T. Öhlinger and H. Eberhard, *Verfassungsrecht*¹³ (Facultas 2022), margin No. 238. Also see Chapters 2 and 3 in this volume.

58 Based on art. 17 B-VG. See only C. Grabenwarter and M. Holoubek, *Zur Auslegung des Art 17 B-VG* (ZfV 2016), at 16. See also A. Kahl, “Art 17 B-VG”, in B. Kneihl and G. Lienbacher (eds.), *Rill-Schäffer-Kommentar Bundesverfassungsrecht* (Verlag Österreich 2013).

59 Based on art. 116 (2) B-VG. See K. Giese, “Art 116 B-VG”, in A. Kahl and L. Khakzadeh and S. Schmid (eds.), *Kommentar Bundesverfassungsrecht, supra*, 1139–1151, margin No. 17.

60 See the Austrian company register (*Firmenbuch*): FN 44133b.

61 See the Austrian company register (*Firmenbuch*): FN 59202m.

62 For Tyrol.

63 The *illwerke vkw AG* shows *WEG Wertpapiererwerbengesellschaft mbH* as a shareholder with 4.5%, whereby *WEG Wertpapiererwerbengesellschaft mbH* is wholly owned by *Landesvermögen-Verwaltungsgesellschaft m.b.H.*, which in turn shows Vorarlberg as the exclusive owner.

64 For example: *Innsbrucker Kommunalbetriebe Aktiengesellschaft* (Austrian company register: FN 90981x), *Stadtwerke Kufstein GmbH* (Austrian company register: FN 41696v) or *Stadtwerke Bregenz GmbH* (Austrian company register: FN 67988h).

In the interests of close coordination between the *Bund* and *Länder*, a *Bund-Länder* agreement based on article 15a of the Federal Constitution (B-VG) has also been concluded, which aims to increase the efficiency of the energy system by exploiting all possible energy-saving potential. To this end, in accordance with the principle of a cooperative federal state, the agreement is intended to coordinate the instruments at *Bund* and *Länder* level as far as possible, with certain minimum requirements being laid down in particular for the construction of buildings and heating systems.⁶⁵ In addition, there is another *Bund-Länder* agreement within the meaning of article 15a B-VG to favor measures to reduce greenhouse gas emissions in the area of residential and non-residential buildings. The *Länder* thus create subsidy models for residential buildings, which include incentive systems for the purpose of improving thermal insulation as well as the use of ecologically compatible building materials and low-carbon or carbon dioxide emission-free building services systems.⁶⁶ In the following, the measures taken specifically for the *Länder* are to be examined in more detail.

In a government resolution in 2014, the Tyrolean government set the goal of energy autonomy by 2050.⁶⁷ In terms of framework requirements, Tyrol's energy consumption is to be reduced by as much of 50% as possible by 2050 and the share of renewable energies is to be increased by 30%.⁶⁸ Consequently, Tyrol has started a process to initiate this transformation in energy supply. Future generations should cover their own energy needs from domestic sources in order to be no longer dependent on external suppliers. Accordingly, the targeted energy mix for Tyrol⁶⁹ provides for the following composition:

- i. 46% hydropower
- ii. 19% photovoltaics
- iii. 18% biomass
- iv. 12% geothermal and environmental heat
- v. 5% other energy sources

65 See Announcement of the Governor of the Tyrol of 20 June 1995 concerning the Agreement between the Federal Government and the Provinces pursuant to art. 15a B-VG on the Saving of Energy, StF: LGBl (Tyrol) 1995/94. In Vorarlberg, the agreement was announced in LGBl 1995/15.

66 In Tyrol, the agreement was announced in LGBl 2009/62. In Vorarlberg in LGBl 2009/46.

67 Regarding this, see <https://www.tirol.gv.at/landesentwicklung/nachhaltigkeits-und-klimakoordination/klimaschutz-und-klimawandelanpassung/grundlagen-und-ziele-der-klimapolitik/tirol-2050/>.

68 See also IntT_06.

69 See <https://www.tirol2050.at/unser-ziel/szenarien/>.

According to the “*Tiroler Nachhaltigkeits- und Klimastrategie*”⁷⁰ (Tyrolean Sustainability and Climate Strategy), hydropower is Tyrol’s most important energy resource and is to be expanded by a further 2.8 TWh (Terawatt-hour) on balance by 2036 compared with generation in 2011. For this purpose, both new hydropower plants are to be built and existing plants are to be revitalized. This results in an energy potential of around 34,000 TJ/a (Terajoule per annum) by 2036.

Solar energy is to be used in the best possible way by means of photovoltaic systems and solar thermal energy on roofs. If 95% of all reasonably usable roof surfaces of Tyrolean buildings are used, the solar potential will amount to about 15,700 TJ/a of electricity and about 2,200 TJ/a of heat. In addition to focusing on the development of building-integrated solar potential, the expansion of photovoltaic systems on open spaces is also planned.

Biomass energy is to be generated primarily from wood. The annual growth of wood in Tyrol’s productive forest (“*Ertragswald*”) amounts to 1.8 million solid cubic meters of harvestable product, which corresponds to a theoretical energy content of about 16,000 TJ/a. The wood used for energy in Tyrol includes energy wood harvested in Tyrolean forests on the one hand, but also sawmill by-products. In addition, biogas (potentially around 1,500 TJ in 2050), waste (around 2,300 TJ in 2050), wind power (around 900 TJ/a in 2050), environmental heat and deep geothermal energy will represent further pillars of the future energy supply in Tyrol.

The objectives declared in this way are to be achieved on the one hand (especially in the area of hydropower) via the Land-owned TIWAG *Tiroler Wasserkraft AG*. In other areas, Tyrol acts primarily through steering measures by means of corresponding subsidies.

In January 2020, Tyrol published a hydrogen strategy (following the signs of technological development) including a plan that focuses primarily on both the creation of appropriate framework conditions and the initialization and implementation of hydrogen projects.⁷¹ Concrete steps have already been taken to implement these general goals, and comprehensive measures have been enacted in the area of provincial legislation, particularly with

70 On this and the following, see *Tiroler Nachhaltigkeits- und Klimastrategie*, https://www.tirol.gv.at/fileadmin/themen/landesentwicklung/raumordnung/Nachhaltigkeit/Nachhaltigkeits-_und_Klimakoordination/Publikationen/Nachhaltigkeits-und-Klimastrategie_2021.pdf, at 22.

71 See <https://www.standort-tirol.at/unternehmen/hydrogen-austria/wasserstoff-in-oest-erreich>.

regard to energy-efficient construction.⁷² These follow from amendments to the *Tiroler Bauordnung 2018*⁷³ (Tyrolean Building Code), the *Technische Bauvorschriften 2016*⁷⁴ (Technical Building Regulations), but also the *Tiroler Gas-, Heizungs- und Klimaanlagegesetz 2013*⁷⁵ (Tyrolean Gas, Heating Systems and Air Conditioning Act) and the *Tiroler Bauproduktegesetz 2016*⁷⁶ (Tyrolean Construction Products Act).⁷⁷ This combination of legislative measures results in particular in corresponding requirements to increase the energy efficiency of buildings as well as the avoidance of the use of fossil fuels in the field of supplying energy for buildings.

Apart from initial legal steps, a comprehensive subsidy program to stimulate private investments in climate-friendly forms of energy (photovoltaics, battery storage options, heat pumps, central heating system with biomass as well as implementation of an ecological construction method and use of sustainable materials) has also been adopted and implemented by the *Land* within the framework of subsidy administration.⁷⁸ Further, there is a regular exchange with the *Bund* on subsidies.⁷⁹

In addition, there are think tanks and competence centers initiated by the *Land*, such as the platform “*Plattform Klima, Energie und Kreislaufwirtschaft*”, in which *Land* Tyrol, *Energie Tirol*,⁸⁰ *Klimabündnis Tirol*⁸¹ and *Standortagentur Tirol*⁸² pool their knowledge and expertise in order to set new standards and achieve a high degree of dissemination.⁸³

72 The *Tiroler Elektrizitätsgesetz 2012* (StF: LGBL 2011/134) must not be deceptive about the scope of design concerning energy legislation at the *Land*-level, since it is less a completely independent law and more an implementing act for the *Elektrizitätswirtschafts- und -organisationsgesetz 2010* of the *Bund* (StF: BGBL I 2010/110). In other words, the purpose of the *Tiroler Elektrizitätsgesetz 2012* is to implement laws of the *Bund*.

73 StF: LGBL 2018/28.

74 StF: LGBL 2016/33.

75 StF: LGBL 2013/111.

76 StF: LGBL 2016/41.

77 For further details on the whole K. Weber and I. Rath-Kathrein, *Kommentar Tiroler Bauordnung 2018* (Verlag Österreich 2019).

78 See <https://www.energie-tirol.at/foerderungen/neubau-foerderungen-in-tirol/>.

79 IntT_02.

80 *Energie Tirol* is an independent consulting agency of the *Land* Tyrol and a contact for all energy issues.

81 *Klimabündnis Tirol* is a registered association (“*Verein*”) and part of the largest municipal climate protection network in Europe. The global partnership connects more than 1,700 municipalities from 27 countries in Europe.

82 *Standortagentur Tirol* is a service company of the *Land* Tyrol and assists companies, research institutions, municipalities or regions in their growth, digitization and start-up projects and supports them in networking regionally, nationally and internationally.

83 See <https://www.standort-tirol.at/unternehmen/klima-energie-und-kreislaufwirtschaft>.

Finally, the *Land*-owned energy company *TIWAG-Tiroler Wasserkraft AG* (which not coincidentally seeks to attract customers under the slogan “*saubere Energie für Tirol*” – clean energy for Tyrol) also plays a leading role in the energy policy integration of climate change mitigation measures. Private and corporate customers as well as public institutions at the *Länder* and municipal level are offered products in the areas of electricity (in addition to the offer of 100% electricity generated from sustainable energy sources in Tyrol).⁸⁴ This also includes the implementation of photovoltaic projects⁸⁵ as well as the corresponding subsidy processing⁸⁶ and gas, heat⁸⁷ and energy consulting,⁸⁸ in order to provide every consumer with easy access to such offers. In line with the energy policy strategy of Tyrol as the sole owner of *TIWAG-Tiroler Wasserkraft AG*, five large-scale expansion projects for hydropower plants are currently being promoted.⁸⁹ All this is in line with the political mandate given to the *Land*-owned company, which is formulated as follows:⁹⁰ with its subsidiaries, the company makes a significant contribution to regional value creation, is a driving force for the ecological transformation of the energy industry in Tyrol and thus supports the European and national energy targets. *TIWAG* generates environmentally friendly electricity from domestic, renewable energy sources in its existing and new power plants – in addition to hydropower, these also include photovoltaics and biomass. *TIWAG* also makes a significant contribution to climate protection with its many measures for the economic and efficient use of valuable energy. Similar approaches can also be found at the political level below the *Land*-level in the area of municipal utilities or energy supply companies owned by municipalities. Examples include *Innsbrucker Kommunalbetriebe AG*,⁹¹ *Stadtwerke Schwaz GmbH*⁹² and *Stadtwerke Kufstein GmbH*.⁹³

Not only Tyrol, but also Vorarlberg has committed itself to achieving energy autonomy by 2050.⁹⁴ The following milestones characterize the targeted development:⁹⁵

84 <https://www.tiwag.at/privat/strom/stromprodukte/>.

85 <https://www.tiwag.at/photovoltaik/produkte/>.

86 <https://www.tiwag.at/privat/zusatzleistungen/foerderungen/>.

87 <https://www.tigas.at/produkte/>.

88 <https://www.tiwag.at/privat/zusatzleistungen/energieberatung/>.

89 <https://www.tiwag.at/unternehmen/unsere-kraftwerke/unsere-ausbauvorhaben/>.

90 See <https://www.tiwag.at/unternehmen/>.

91 See <https://www.ikb.at/> menu item “*Energie*”.

92 See <https://stadtwerkeschwaz.at/> menu items “*Strom*” and “*Photovoltaik*”.

93 See <https://www.stwk.at/>.

94 See <https://www.energieautonomievorarlberg.at/zooluwebsite/media/document/3817/Strategie+Energieautonomie%2B+2030>.

95 See *Arbeitsprogramm 2019 – 2024*, <https://vorarlberg.at/documents/302033/472082/Arbeitsprogramm+2019++2024.pdf/42363506-5c70-d126-c847-d72c13a6e0c3?t=1616150574042> from page 24.

- i. Climate protection through 40% lower GHGs by 2030 compared to 2005.
- ii. The amount of RES for electricity, space heating and water heating is to be consistently expanded. By 2030, this should amount to at least 50% of the total final energy demand.
- iii. The achievement of a level of 100% RES in the power supply from 2030. In the “*Energieautonomie + 2030*” strategy, twenty-six fields of action with corresponding action areas were defined, whereby, unlike for Tyrol, no concrete energy mix is specified. Key Performance Indicators (KPI) were defined for these fields of action in order to measure the progress of goal achievement. The approach in Vorarlberg is broader since the strategy also addresses issues outside the pure energy sector (such as transport, waste management or agriculture and forestry), thus offering a compelling example of CPI.⁹⁶

Like Tyrol, Vorarlberg has already taken concrete steps to implement the strategy and has enacted comprehensive measures in its *Land* legislation, especially in the area of energy-efficient construction.⁹⁷ Alongside energy efficiency measures in the building sector, this results in approaches to avoid the use of fossil fuels in the area of energy supply for buildings.

In addition to the initial steps taken at the legislative level, the *Land* also adopted and implemented comprehensive subsidy programs to stimulate private investment in climate-friendly forms of energy (solar systems, heat pumps and biomass).⁹⁸ Moreover, the *Land* Vorarlberg has established the “*Vorarlberger Energieinstitut*” (Energy Institute), a non-profit association that unites essential stakeholders in the field of energy management in Vorarlberg. Its task is to advise, educate and carry out research in the fields of sensible energy use and RES.

As in Tyrol, the *Land*-owned energy company *illwerke vkw AG* also plays an important role in the energy policy integration of climate change mitigation

96 See <https://www.vn.at/2021/05/StrategieEA2030.pdf>.

97 See only the Ordinance of the *Landesregierung* on the technical requirements of structures (StF LGBL 2012/84) and the measures taken therein. On the other hand, the *Vorarlberger Elektrizitätswirtschaftsgesetz* (StF: LGBL 2003/59) should not be misleading with regard to the scope for shaping the energy sector under.

Land-law, as it is less a completely independent law and more an implementing act for the *Elektrizitätswirtschafts- und -organisationsgesetz 2010* of the *Bund* (StF: BGBL I 2010/110).

98 https://vorarlberg.at/-/energiefoederungsrichtlinie-2018-20-1?article_id=154851 as well as <https://vorarlberg.at/-/foederungsrichtlinien-der-abteilung-wohnbaufoederung>. See also https://vorarlberg.at/documents/302033/472360/2021_Informationenblatt_Biomasse_und_Abw%C3%A4rmenutzung_-_Grobstudien.pdf/f96ae891-2bfb-b532-b80c-8d4b5637a5a8?t=1619068538052.

measures in Vorarlberg. Private and corporate customers as well as public institutions at the *Land* and municipal level are offered products in the areas of electricity,⁹⁹ gas¹⁰⁰ and energy consulting,¹⁰¹ in order to provide every consumer with easy access to such offers.

Overall, the boundaries between the *Bund* and *Land* governments in the field of energy are very clear, despite many overlaps. The scope of action of the *Länder* is thus clearly circumscribed and the relevant actors move within their range of possibilities.¹⁰² Most of the measures shown, which deal with climate change in Tyrol and Vorarlberg in the areas discussed here, were therefore not of a legal, but rather of a sub-normative nature (this is a level under statutory law, i.e. non-binding acts), although the legislator (though not strictly in terms of energy [economic] law, but mostly in the field of building regulations) has taken selective initiatives, which can stimulate measures to combat climate change. However, the core of efforts in this regard at the provincial level is the subsidy regime¹⁰³ as well as entrepreneurial activity in the energy sector within the framework of private-sector administration.

3.3 *Water (Vorarlberg and Tyrol)*

Austrian water management is primarily characterized by a legislative (but also an executive)¹⁰⁴ competence of the *Bund*. A primary objective of water management is, in particular, the secure and sustainable supply of the population with high-quality, natural groundwater and drinking water. In order to be able to guarantee the qualitative and quantitative drinking and process water resources also for future generations, the necessary legal framework conditions have been created in Austria at the *Bund* level by means of the *Wasserrechtsgesetz* (WRG) 1959 (Law relating to water)¹⁰⁵ and the *Trinkwasserverordnung* (Drinking Water Ordinance),¹⁰⁶ which additionally

99 In addition to the offer of 100% electricity generated from sustainable energy sources in Vorarlberg, above all the implementation of photovoltaic projects including the corresponding subsidy processing.

100 <https://www.vkw.at/erdgas-privat.htm>.

101 <https://www.vkw.at/energiespartipps-privat.htm>.

102 See also IntT_02.

103 See also IntV_01; IntV_02 and IntV_06.

104 Note that in Austria the execution of laws is a task of the *Bund*, even if it takes place within the indirect federal administration ("*mittelbare Bundesverwaltung*"); see A. Kahl and K. Weber, *Allgemeines Verwaltungsrecht* (facultas 2019), margin No. 298, which means execution by the *Landeshauptmann* and his subordinated authorities, who are bound by the decrees and instructions of the supreme federal authorities.

105 StF: BGBl 1959/215 (wv).

106 StF: BGBl II 2001/304.

implement the EU Water Framework Directive 2000/60/EC as well as the EU Groundwater Directive as of the year 2000.

Accordingly, three fields of action determine water management:

- i. Protection of water bodies: The protection of all water bodies is one of the key objectives of water management. This applies to surface waters such as streams, rivers and lakes as well as to groundwater. The protection goal is defined very specifically in the WRG.¹⁰⁷
- ii. Sustainable use of water bodies: Water management defines the limits for the use of water to ensure long-term sustainable use. Withdrawals of water for water supply, private or business purposes, discharges of wastewater, withdrawals for the use of hydropower or the use of the thermal capacity of the water need defined limits in order to protect the water bodies and to ensure long-term usage. Uses of water bodies or installations in the stream bed must not be detrimental to the chemical and ecological status. Uses may only influence each other to the extent that their respective purpose is achieved.
- iii. Protection against water hazards: Floods are one of the greatest natural hazards in Alpine regions. Structural measures are to be taken to improve protection against floods. In the catchment area of torrents,¹⁰⁸ mudflow processes are also taken into account. Particularly in the case of extreme runoff events caused by climate change with intensive bed-load transport processes or mudflows, solid material management is necessary to protect settlement and traffic areas as well as hydropower plants.

Climate change is reflected in the context of the topic of water at the national level in two main ways. On the one hand, there is a close connection in the area of the energy turnaround already described, for which hydropower-based

¹⁰⁷ For surface waters, good ecological status and good chemical status are defined as targets; for groundwater good quantitative status and good chemical status. For heavily impaired waters, the target is good ecological potential. At the same time, a general “prohibition of deterioration” also applies, i.e., the current status may not be deteriorated. Exceptions to this require a comprehensive weighing of interests by the responsible authority.

¹⁰⁸ When it comes to water it is also necessary to mention the “*Wildbachverbauung*” (Torrent Control) which is sole competence of the *Bund* in legislation and execution. The Torrent (and Avalanche) Control authority is a subordinate agency of the “*Bundesministerium für Landwirtschaft, Regionen und Tourismus*” (Federal Ministry on Agriculture, Regions and Tourism). As a state organization, the Torrent Control aims at sustainable protection against natural hazards in the area of torrents, avalanches and erosion. Seven sections of the Torrent Control as well as 21 area construction managements are responsible for regional coordination and supervision of all services in the *Länder*.

energy generation plays a key role, but on the other hand, there are also questions about the consequences of climate change (such as increasing flood events and the like). In addition to this, there are measures to ensure the condition of water bodies as a result of changing conditions with regard to rising temperatures.

Specific legislation explicitly addressing the consequences of climate change on water (and or their prevention) is not discernible. Admittedly, there are comprehensive *Land* regulations in the context of nature conservation law¹⁰⁹ (which falls within the regulatory competence of the *Land* legislature) and wastewater disposal,¹¹⁰ which are of no further significance in the context to be discussed here. For the sake of completeness, the Vorarlberg law on public water supply by the municipalities in Vorarlberg (*Gesetz über die öffentliche Wasserversorgung durch die Gemeinden in Vorarlberg*)¹¹¹ should also be mentioned, which also pursues the goal of sustainably securing drinking water reserves.

However, the focus of this study is primarily on legal regulations resulting from the consequences of climate change, such as spatial planning¹¹² and building law¹¹³ with regard to flood areas or in the area of properties exposed to avalanches and torrents, especially since climate change increasingly causes such extreme events.

Parallel to this, the creation of a scientific basis (groundwork) is also important at the *Land* level. In order to collect the relevant data, comprehensive studies have been initiated in the field of hydrology to survey and secure strategic water resources that may be affected by climate change.¹¹⁴ In Vorarlberg, further developments are also defined in the *Wasserwirtschaftsstrategie 2025* (Water Management Strategy).¹¹⁵

At the interface between energy and water policies, Tyrol (in view of the already identified great importance of private parties and private-sector

109 See *Tiroler Naturschutzgesetz* (StF: LGBL 2005/26) or the *Gesetz über Naturschutz und Landschaftsentwicklung in Vorarlberg* (StF: LGBL 1997/22).

110 See the *Tiroler Kanalisationsgesetz 2000* (StF: LGBL 2001/1) as well as the *Vorarlberger Kanalisationsgesetz* (StF: LGBL 1989/5).

111 StF: LGBL 1999/3.

112 See Chapter 6 in this volume.

113 See only section 3 para. 2 *Tiroler Bauordnung 2018* and section 4 para. 4 *Vorarlberger Baugesetz* (StF: LGBL 2001/52).

114 See <https://www.ressourcenmanagement.tirol/projekte/wasser/strategische-wasserresourcen/>.

115 See <https://vorarlberg.at/documents/302033/472735/Wasserwirtschaftsstrategie+2025.pdf/44666b8c-f900-554d-cf2e-c7aa1e249863>.

administration in the field of climate change mitigation in the policy areas to be studied here) has also created a catalogue of criteria for the implementation of hydropower, which has been identified as essential for climate change mitigation.¹¹⁶ On a regional or strategic level, this serves as support for the site assessment to identify the most suitable areas or stretches of water (i.e., to answer the question: Where should integrative hydropower plants be built?). On a local or site-specific level, it serves as orientation for the assessment of concrete projects in the project planning and project appraisal phase (i.e., to answer the question: How must projects be designed in order to have the highest possible chance of approval in a transparent weighing of interests and taking ecological requirements into account?).

Finally, there are also comprehensive measures in the field of water management within the framework of subsidy or private sector management. In addition to the creation of appropriate hazard-avoiding structures, the aim is above all to secure the water supply in urban areas and for agriculture in a sustainable and lasting manner (also in the event of the occurrence of climate change-induced extreme weather events such as dry spells).

Thus, in Tyrol, the renaturation of (flowing) waters and the creation or expansion of retention areas as well as the reduction of water consumption in the municipal area are comprehensively promoted in the area of climate change adaptation.¹¹⁷ In addition, there are climate change adaptation measures for rainwater storage and the associated potential for savings in the area of drinking water, especially since extreme weather phenomena, such as dry spells in particular, will be accompanied by an increasing demand for drinking and service water.¹¹⁸ In Vorarlberg, too, there are comprehensive funding opportunities in the field of residential water management¹¹⁹ as well as protective hydraulic engineering and for renaturation.¹²⁰

Finally, also the role of the Bund in the field of executing the laws set by the Bund has to be mentioned, as it has far-reaching powers even concerning the enforcement of laws by the *Land* authorities. Within the indirect federal

116 See https://www.tirol.gv.at/fileadmin/themen/umwelt/wasser/Kriterienkatalog_Wasserkraft/downloads/Kriterienkatalog_Version-07-04-2011_3.o.pdf.

117 See the relevant subsidies matrix: https://www.tirol.gv.at/fileadmin/themen/landesentwicklung/raumordnung/Nachhaltigkeit/Nachhaltigkeits_und_Klimakoordination/Nachhaltige_Entwicklung/Foerdermatrix.pdf.

118 See <https://www.tirol.gv.at/meldungen/meldung/klimawandelanpassung-regenwasser-nutzen-trinkwasser-sparen-kanale-entlasten/>.

119 See only <https://vorarlberg.at/-/viid-siedlungswasserwirtschaft-landesfoerderung>.

120 See further <https://vorarlberg.at/-/viid-schutzwasserbau-und-renaturierungen-landesfoerderung>.

administration (“*mittelbare Bundesverwaltung*”), the *Landeshauptmann* and his subordinated authorities are bound by the decrees and instructions of the supreme federal authorities. Therefore, the federal ministry can provide the *Landeshauptmann* and the office of the *Land* government (as the competent institutions to act in the indirect federal administration) with instructions.

Overall, the demarcation lines between *Bund* and *Land* in the field of water management prove to be clear, with the *Länder* having only limited legal room for maneuver. Therefore, the most important measures that deal with climate change in Tyrol and Vorarlberg in the areas discussed here were not of a legal but mainly of a sub-normative nature, although the legislature has taken selective initiatives (mostly in the field of building codes) that can stimulate measures to combat climate change. The core of efforts in this regard at the *Land* level, however, is the subsidy regime within the framework of private-sector administration.

4 Conclusions

Energy and water are two very tightly interrelated sectors in both Italian and Austrian Autonomous Provinces analyzed in this chapter. Bolzano, Trento, Vorarlberg and Tyrol have integrated climate change concerns and objectives into their respective provincial policies and regulations with regard to the reduction of GHG emissions through the rational use and development of energy. In the policies of the four cases analyzed, we found that ambitious energy objectives are set for 2030 and 2050, with hydropower being a relevant source of renewable energy. However, in both cases there is a law and policy gap in the sector of water, whereas climate change concerns do not appear sufficiently integrated.

In Bolzano and Trento, the research has evidenced that water is a resource of utmost importance, whose availability is going to be impacted both by climate change and by competing uses, including the production of “green” electricity. This chapter has demonstrated that there are trade-offs among uses and perhaps the administration is not taking these conflicts over water use into sufficient account. While this topic should deserve specific attention and could be better addressed in future research, it gives us an idea on how water, climate change and renewable energy are closely interrelated and interdependent, paving the way for future consideration on how fair water and energy management should consider such aspects as part of a same holistic policy and significant example of CPI.

As far as Austria is concerned, the research has outlined that the points of contact under competence law for the implementation and enforcement of measures to combat climate change in Tyrol and Vorarlberg are limited. However, there are far-reaching opportunities for the *Länder* to act (apart from selective regulatory powers, e.g., in building law), especially in the field of private sector administration by means of *Land*-owned companies or subsidy administration. Moreover, Austrian *Länder* seem more advanced in terms of climate change adaptation compared to the Italian Autonomous Provinces. Ultimately, *Länder* have powerful options at their disposal for effectively countering climate change in their areas of political responsibility. In the light of limited legislative (and executive) powers, the political programs enacted and presented thus have a significance that goes beyond the content of purely programmatic announcements.

In conclusion, this chapter has demonstrated that both the Autonomous Provinces in Italy and the *Länder* in Austria under consideration have significant maneuvering space in terms of climate adaptation and mitigation policies, especially in the field of energy. This aspect is important, as it demonstrates how climate change instruments are applied at the local level starting from European directives, which sets a general framework of action. Even though some obstacles still persist in both countries, the chapter has evidenced how local initiatives are paramount in applying international and national climate policies.