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Rheintal, Austria

Applied Research

Case Study Report

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Territories and low-carbon economy

Regional Case Study:
Rheintal, Austria

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1 General description of the region

1.1 Location of region and geographical characteristic

The Austrian part of the Rhine Valley ("Rheintal") is located in Vorarlberg, Austria's western province. Within Vorarlberg, this large area covers the western part and extends over three of the four districts (from Feldkirch via Dornbirn to Bregenz).

Figure 1.1: Location of the federal state of Vorarlberg (NUTS 2 Code AT34) in Austria

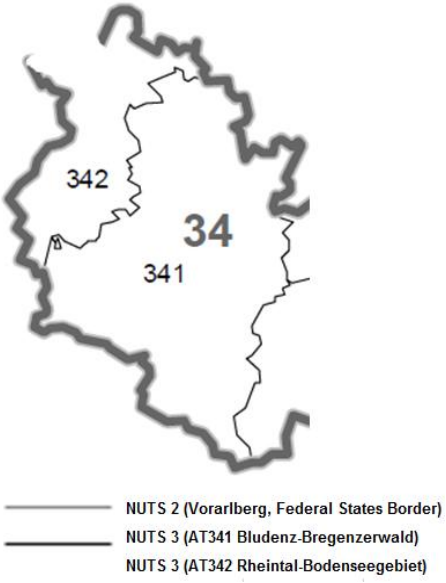
Source: Wirtschafts-Standort Vorarlberg GmbH (2015): Standortdokumentation p:4

The Rhine Valley ("Rheintal") and the related lake area ("Bodenseegebiet") are regions in the Austrian State of Vorarlberg (NUTS 2, see below: Figure 1.2 and Figure 1.3). Together, these two regions form the NUTS 3 region Rhine Valley – Lake Bodensee Area (AT 342 – "Rheintal-Bodenseegebiet") in Vorarlberg (see below: Figure 1.3).

Figure 1.2: The four capitol cities of the districts of the federal state of Vorarlberg (NUTS 2 Code AT34)

Source: own adaptation, based on Statistik Austria (2017a): NUTS 3 Österreichs

Figure 1.3: Spatial structure of the four federal districts with his capitol cities of the Federal State of Vorarlberg (NUTS 2 Code AT34)



Source: Wirtschafts-Standort Vorarlberg GmbH (2015): Standortdokumentation, p. 4

Figure 1.4: Location of the Rhine river and the Rhine Valley region between Austria, Switzerland and Liechtenstein

Source: own adaptation, based on Tschubby, Wikipedia – GNU-Licence for free documentation

The Vorarlberg Rheintal is divided into the upper Rhine valley (southern part) and lower Rhine valley (northern part), according to the direction of the river Rhine, which is named as the upper and lower land[1].The Rhine touches the border area at the corner of the three countries ("Dreiländereck") Switzerland, Liechtenstein and Austria[2]. The eastern end of the Rhine Valley is marked by ascending mountain range of the regions Bregenzerwald, Großes Walsertal and Walgau. In the north the Rhine Valley ends in the Lake Constance area. While the remaining areas in eastern Vorarlberg become more mountainous, the Rhine valley is comparatively flat and extensive. In short: the Rhine Valley is defined by a broad river valley and is structured by the mountains of the Alps[2].

The Vorarlberger Rheintal is the last of a total of six subregions along the 90 kilometre-long Rhine River, which originates in Switzerland, touches the Principality of Liechtenstein respectively the federal state of Vorarlberg and finally flows into the Bodensee near Bregenz.[2]

From a spatial planning perspective, the Rhine Valley is the largest agglomeration in Vorarlberg and is one of the most densely populated regions in Austria. Roughly two thirds of Vorarlberg's population live in this area that covers about one third of Vorarlberg's territory.

[1] IRKA/IRR (n.d.): Zukunft Alpenrhein

[2] Land Vorarlberg (2014a): Vorarlberg – Leitfaden Was Staatsbürgerschaftswerber über unser Land wissen sollten

The settlement characteristics of the area correspond to a growing and closed settlement band of villages and three cities. The formerly village structure of the individual, more clearly delineated settlement areas, became blurred in the course of the settlement development of the last decades and was increasingly transformed into a village-like city region within the natural valley borders. The Rheintal is an urban-rural type of linkage.[3]

The main agglomeration area in Vorarlberg and within the Rhine Valley is between Bregenz and Feldkirch. Most of the inhabitants live here, and most of the companies are located in this area. It is one of the most productive economic areas in Austria.[4]

Table 1.1: Biggest cities and towns in Rhine Valley (LAU 2 Level)

LAU 2: Communities in Vorarlberg above 10,000 Inhabitants	
Dornbirn (District capitol)	48,121
Feldkirch (District capitol)	32,534
Bregenz (District – and Federal capitol)	29,153
Lustenau	22,219
Hard	13,207
Rankweil	11,734
Götzis	11,280
Lauterach	10,034

Source: Land Vorarlberg, Landesstelle für Statistik (2016a): Bevölkerung Vorarlbergs nach Wohnsitz-qualität

Delineation

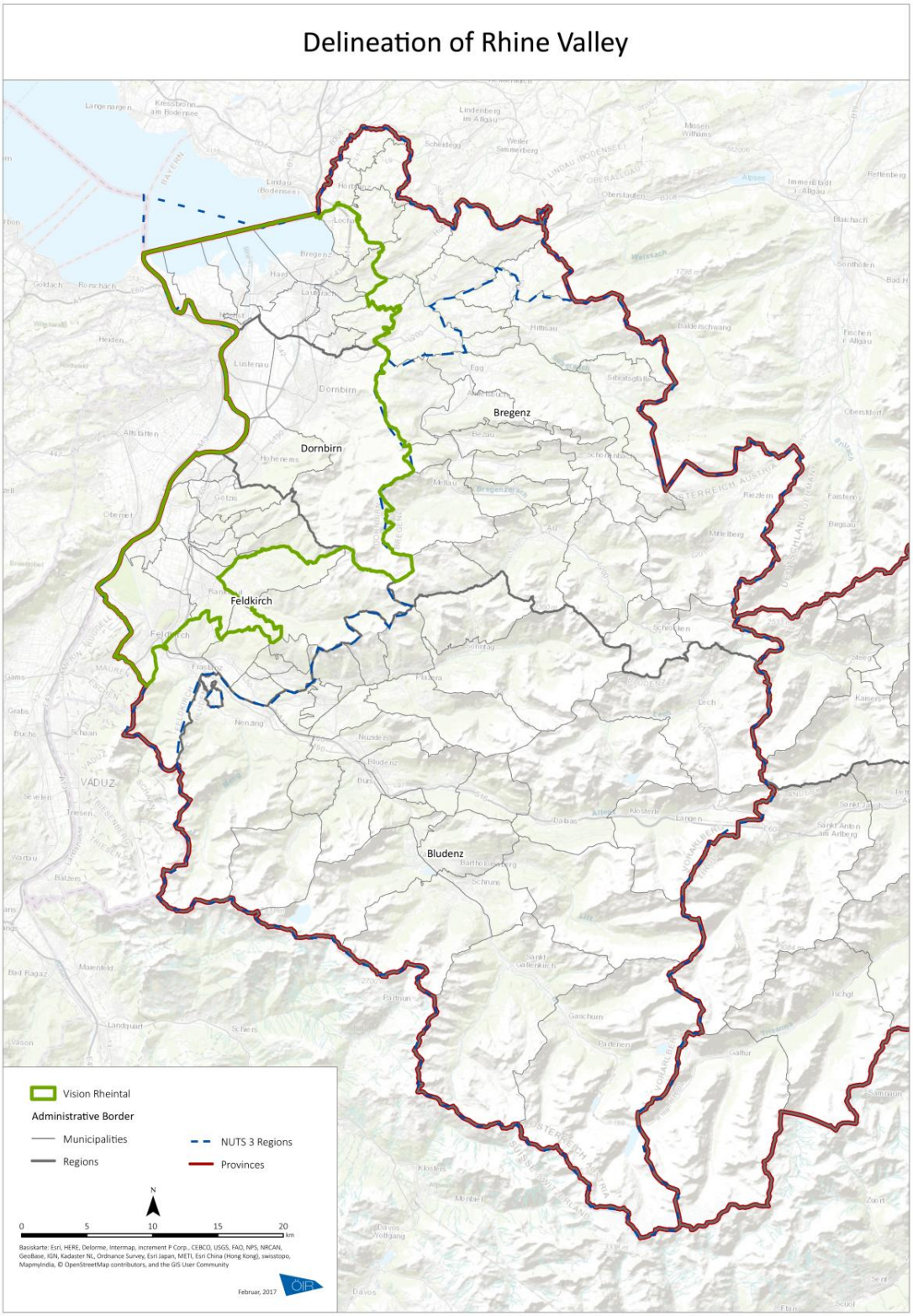
In 2005 all 29 Rhine Valley communities have joined together to form a cross-municipality planning area and -network, “Vision Rheintal”. These Vision Rheintal municipalities cover Vorarlberg’s Rhine Valley territory. This territory does neither correspond to the administrative borders within Vorarlberg (it incorporates one district as a whole and parts of two more) nor with the NUTS 3 classification of “Rheintal-Bodenseegebiet”. This NUTS 3 area is however quite close in demarcating the Rhine Valley, but includes a few more municipalities in the southeast (according to the districts border) and more municipalities in the hinterland of Lake Constance.

The map below illustrates the differences in delineation between Vision Rheintal, administrative structure (incorporating the districts Bregenz, Dornbirn, Feldkirch) and NUTS 3 Rheintal-Bodenseegebiet. A corresponding table can be found below, indicating the municipalities and inhabitants.

[3] Vision Rheintal (2013): 29 Gemeinden. 1 Lebensraum

[4] Land Vorarlberg(1971): Raumordnung Vorarlberg, Strukturanalyse des Landesgebietes

Figure 1.5: Territorial coverage and district borders of the Spatial Planning Community "Vision Rheintal", NUTS 3 district borders of the Federal State of Vorarlberg (NUTS 2 Code AT34)



Source: ÖIR 2017

Table 1.2: Municipalities and inhabitants 2016 (absolute value)

NUTS Region	District	Community	Inhabitants	Area [km²]	Population Density [Inhab./km²]	Community Network
NUTS Level 3: AT342_Rheintal-Bodenseegebiet [294,213]	Parts of the District of Bregenz [103,893]	Alberschwende	3,216	21	15	29 Communities form the Vision Rheintal [237,604]
		Bildstein	725	9	79	
		Bregenz	29,153	30	979	
		Buch	602	6	98	
		Doren	1,028	14	73	
		Eichenberg	405	12	35	
		Fußach	3,827	12	322	
		Gaißau	1,802	6	311	
		Hard	13,207	18	743	
		Höchst	7,851	21	374	
		Hohenweiler	6,317	9	723	
		Hörbranz	1,266	8	150	
		Kennelbach	1,900	3	590	
		Langen bei Bregenz	1,348	22	62	
		Lauterach	10,034	12	843	
		Lochau	5,716	10	557	
		Möggers	505	11	44	
		Riefensberg	1,038	15	70	
		Schwarzach	3,844	5	783	
		Sulzberg	1,774	23	77	
		Wolfurt	8,335	10	834	
	District of Dornbirn [70,563]	**Dornbirn**	48,121	121	398	
		Hohenems	15,932	29	546	
		Lustenau	6,510	5	1,215	
	District of Feldkirch [119,757]	Altach	413	3	120	
		Düns	22,219	22	999	
		Dünserberg	155	6	28	
		Feldkirch	32,534	34	948	
		Frastanz	6,376	32	198	
		Fraxern	688	9	78	
		Göfis	3,252	9	359	
		Götzis	11,280	15	772	
		Klaus	3,114	5	594	
		Koblach	4,455	10	435	
		Laterns	662	44	15	
		Mäder	3819	3	1,181	
		Meiningen	2,150	5	401	
		Rankweil	11,734	22	537	
		Röns	1,926	3	706	
		Röthis	331	1	229	
		Satteins	2,571	13	203	
		Schlins	2,363	6	392	
		Schnifis	787	5	162	
		Sulz	2,558	3	849	
		Übersaxen	639	6	111	
		Viktorsberg	410	12	33	
		Weiler	2,098	3	681	
		Zwischenwasser	3,223	23	143	

Source: own compilation, based on data from Land Vorarlberg, Landesstelle für Statistik(2016b)

Vorarlberg (NUTS 2) is split in two NUTS 3 Regions. Comparing the two NUTS 3 regions in Vorarlberg reveals a large difference in the distribution of populations. In the Rhine Valley region, 77% of Vorarlberg's inhabitants live on just 28% of the total area. Rheintal thus forms the urban agglomeration in Vorarlberg in contrast to the mountainous and rural eastern part of the province of Vorarlberg.

After Austrians capital city Vienna, the Rheintal-Bodensee region is the second most densely populated region in Austria.

Table 1.3: NUTS Classification related to inhabitants, size and density

NUTS Level	Inhabitants [absolute]	Area [km^2]	Inhabi-tants [%]	Area [%]	Population Density [Inhab./km^2]
Austria	8,700,471	83,879	--	--	104
Vorarlberg NUTS 2	384,147	2,601	100	100	148
Bludenz-Bregenzerwald NUTS 3	89,934	1,874	23	72	48
Rheintal-Bodenseegebiet NUTS 3	294,213	727	77	28	405

Source: Statistik Austria (2016b): Gliederung Österreichs in NUTS-Einheiten

Socio-demographic structure and development

In Austria, as in so many other industrialized nations, the general demographic trend is an aging society. This means that there are more people of retirement age than children and adolescents before the age of fifteen In Vorarlberg, this ratio is much more balanced (about 16% each) than Austria's average (14% of children and adolescents; 18% of people of retirement age). Vorarlberg has the youngest population of Austria: The proportion of children and young people under the age of 15 is the highest.

Table 1.4: Demographic structure – age structure in the Rheintal-Bodenseegebiet

Sex	2010	2011	2012	2013	2014	2015
Total	280,127	281,426	283,063	284,811	287,375	289,734
Women	142,577	143,218	144,131	144,930	146,175	147,272
Men	137,550	138,208	138,932	139,881	141,200	142,462
Age			**[absolute]**			
0 to 14 Years	48,173	47,616	47,089	46,937	46,714	47,485
15 to 64 Years	189,745	191,013	191,876	192,490	193,939	194,270
65 and more Years	42,209	42,797	44,098	45,384	46,722	47,979
Age			**[%]**			
0 to 14 Years	17.2	16.9	16.6	16.5	16.3	16.4
15 to 64 Years	67.7	67.9	67.8	67.6	67.5	67.1
65 and more Years	15.1	15.2	15.6	15.9	16.3	16.6

Source: Land Vorarlberg, Landesstelle für Statistik (2016a): Bevölkerung Vorarlbergs nach Wohnsitz-qualität

The geographic location, a strong economy and high quality living conditions are generally considered as favourable for growth. In the Rhine Valley these conditions apply: The Rhine Valley has a growth rate of over 10% and exceeds the already high rate of growth in Vorarlberg (one of the highest in Austria) by 1.5%.

Table 1.5: Population development at Vorarlberg NUTS 2 and 3 level (2001-2016)

NUTS Level	2001	2016	absolute	in %
Vorarlberg NUTS 2	350,129	384,147	34,018	8.9
Bludenz-Bregenzer Wald NUTS 3	86,510	89,934	3424	3.8
Rheintal-Bodenseegebiet NUTS 3	263,619	294,213	30,594	10.4

Source. Land Vorarlberg, Landesstelle für Statistik (2016b): Bevölkerung Vorarlbergs mit Hauptwohnsitz

The constantly increasing population figures are developing rapidly in the Rhine Valley. Within the last 15 years this NUTS 3 region has grown by over 30,000 people and the trend is unabated.

The share of population with compulsory education is above average in Vorarlberg. Furthermore, the country is characterized by a high proportion of pupils in secondary schools or New Middle Schools. The proportion of young people in secondary schools and the student population is below the Austrian average. In Vorarlberg a broad spectrum of general and vocational higher schools ("AHS" und "BHS") is offered. Nevertheless, the closing rates are below the Austrian average.

Of the Vorarlberg students, Innsbruck and Vienna are chosen as the place of study within Austria. Many students choose Universities in Switzerland or Germany.[5]

Table 1.6: Demographic structure – education levels in the NUTS 2 – Vorarlberg and Austria

25-64-year-old population after the highest level of education in %		
Year 2013	**NUTS 2 Vorarlberg**	**Austria**
General-educating Compulsory School	23.5	19.2
Apprenticeship Training	34.7	35.1
Vocational Middle School	17.2	15.3
School of general higher education	4	5.7
Vocational school with higher education/College	7.7	9
University/Other Univerity-related higher spezialised school	12.8	15.7
Total	100	100

Source: AMS (2015) Arbeitsmarktprofil Vorarlberg

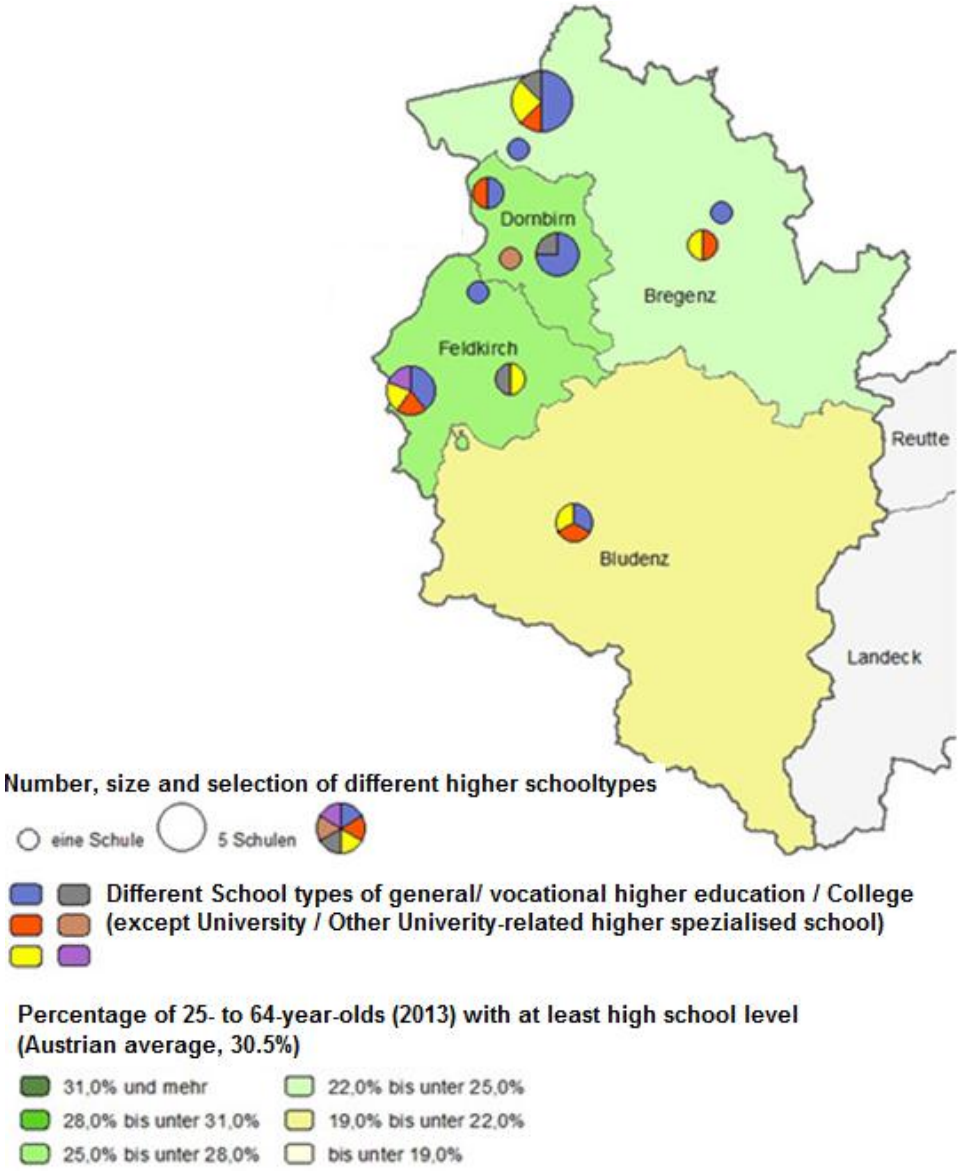
The highest number of AHS and BHS locations can be found in the districts of Bregenz and Feldkirch, with the highest education levels in the districts of Feldkirch and Dornbirn.

In Vorarlberg, there is one educational college (Feldkirch, here is also a location of the private educational college Innsbruck) as well as a higher spezialised school location ("Fachhochschulstandort") in Dornbirn, where 13 higher spezialised school courses are offered.[6]

[5] Statistik Austria (2017b) Österreich ZAHLEN.DATEN.FAKTEN

[6] AMS (2015) Arbeitsmarktprofil Vorarlberg

Figure 1.6: Educational site and level of the Federal State of Vorarlberg (NUTS 2 Code AT34)



Source: AMS (2015) Arbeitsmarktprofil Vorarlberg

1.2 Settlement type and building stock

75% of all buildings in Vorarlberg are located in the Rhine valley region (NUTS 3), where the population density is also enormous and the most urban settlements are given. 95% of these buildings in the NUTS 3 region are residential buildings.

Table 1.7: Residental and non-residential buildings 2016

NUTS Level	Total	Residental Buildings	Non-Residental Buildings	Buildings Total, share of NUTS 2
Vorarlberg NUTS 2	417,099 (100%)	388,110 (93%)	28,990 (7%)	100%
Bludenz-Bregenzerwald NUTS 3	103,464 (100%)	90,807 (88%)	12,657 (12%)	25%
Rheintal-Bodenseegebiet NUTS 3	313,636 (100%)	297,303 (95%)	16,333 (5%)	75%

Source. Land Vorarlberg, Landesstelle für Statistik (2016b): Bevölkerung Vorarlbergs mit Hauptwohnsitz

Of these residential buildings, 69% are buildings with 1 apartment. In comparison, buildings with 2, 3 or more apartments are available between 14% and 17%. Hence, the single family home is the most common building form in Vorarlberg, as it is in Austria in general.

Table 1.8: Apartments in residential buildings 2011

NUTS Level	Buildings (total)	From that: Residential Buildings	From that in %		
			Residential Buildings with 1 Apartment	Residential Buildings with 2 Apartments	Residential Buildings with 3 or more Apartment
Austria	2,191,280	1,973,979	73.1	14.4	12.5
Vorarlberg NUTS 2	98,469	88,432	69	16.7	14.3

Source: BMWFW (2014) Daten, Fakten zu Wohnungspolitik und Wohnungswirtschaft in Österreich

Apart from the residential buildings, the non-building categories “Hotel and similar buildings” as well as “Industrial and building buildings” are the most common building categories. Especially industry and tourism are two main pillars of Vorarlberg’s economy, which is mirrored in the building statistics.

Table 1.9: Buildings for communities and non-residential buildings as well as selected building categories

Buildings for communities and non-residential buildings		Selected building categories 2011				
2001	2011	Hotel and similar buildings	Office buildings	Wholesale and retail buildings	Industrial and warehouse buildings	Buildings for cultural and recreational purposes as well as for education and health care
12,331	10,037	2,061	1,462	1,519	3,189	1,297

Source: BMWFW (2014) Daten, Fakten zu Wohnungspolitik und Wohnungswirtschaft in Österreich

The average household size has declined from 2.93 to 2.39 persons/apartment in 1990, 2000, 2010 and 2012. At the same time, between 1990 and 2012, the number of households in Vorarlberg rose from 110,000 to 154,000 in Vorarlberg. These trends are increasing. This corresponds to a general trend towards reduced household size in Austria due to a more differentiated society with different family structures and living needs.

Table 1.10: Average household size in Austria and Vorarlberg NUTS 2 (2011)

	Austria (%)	Vorarlberg (%)
1990	2.61	2.93
2000	2.45	2.67
2010	2.29	2.41
2012	2.27	2.39

Source: BMWFW (2014) Daten, Fakten zu Wohnungspolitik und Wohnungswirtschaft in Österreich

The distribution of household sizes in the Rhine Valley corresponds to those in Vorarlberg and Austria. The largest group is made up by households with two people. They exist twice as often as three-person households or four-person households. The large household groups with 5 and 6 persons are half as often represented as the households with 4 persons. Smaller

housing estates in different forms are becoming more and more frequent compared to large family households.

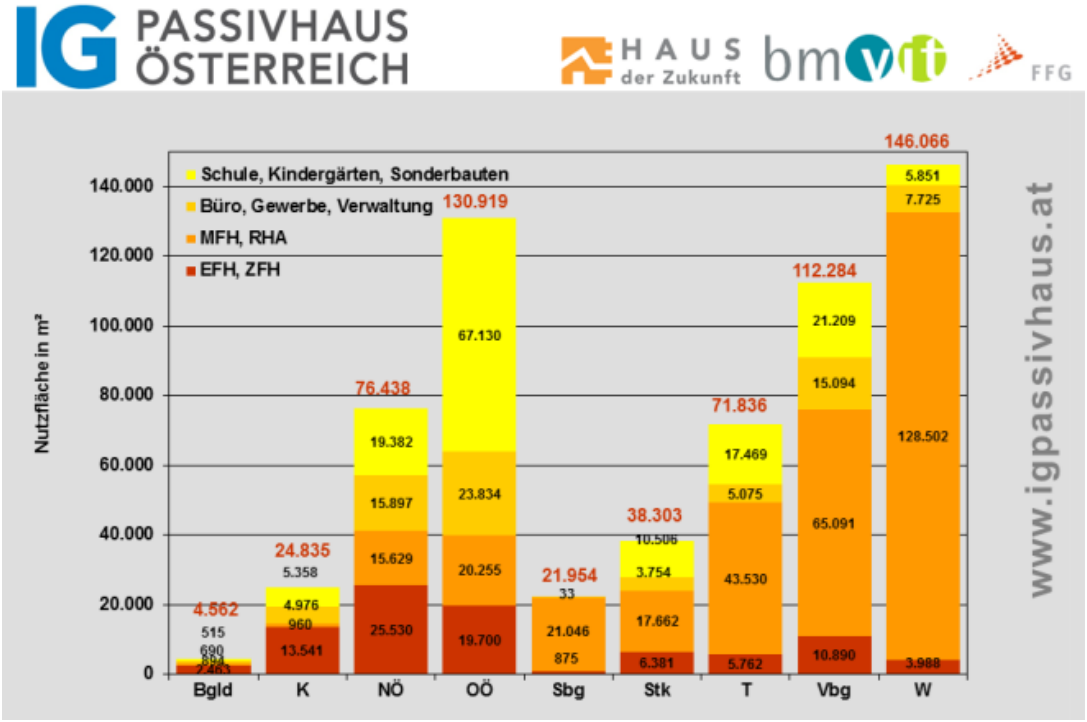
Table 1.11: Private households (annual average 2015) in Vorarlberg NUTS 2

Household size	Vorarlberg
Household total	160,400
with:	
1 person	53,100
2 persons	48,200
3 persons	24,600
4 persons	23,000
5 and more persons	11,500
Average household size	2.34

Source: Wirtschaftskammer Vorarlberg (2016) Vorarlberg in Zahlen

Vorarlberg is in line with the Austrian old building stock: In Vorarlberg 15 out of 100 buildings were built before 1919. This share is only slightly higher than in the Austrian average (14.9%) but lower than in Vienna (19.7%). A smaller proportion of the buildings (5.6%) comes from the inter-war period and from the years of the Second World War (1919-1944). Of the other buildings, a slightly larger proportion from the period before 1919 is preserved.

Figure 1.7: Total usable floor space (m^2) available in passive house standard (residential, service and educational buildings) 2010



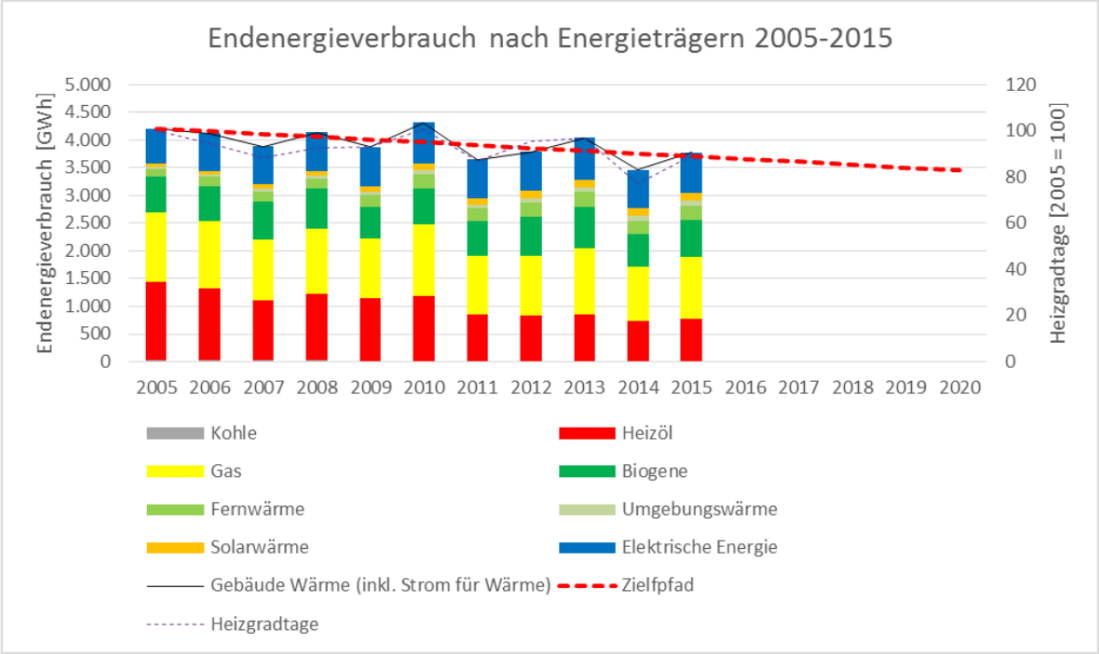
Source: Lang Consult/IG Passivhaus, 2010

In terms of building standards, Vorarlberg is the leading province in Austria referring to passive house buildings. In this area, population as well as public authorities and enterprises started to apply passive house standard relatively early. It was also the first Austrian province to define passive house standard as required standard for publicly funded social housing. In

addition, several municipalities defined passive house buildings as standard for all new communal buildings. Meanwhile, although it is the second smallest province in terms of population, it shows the highest density of passive houses in relation to the overall building stock.

Due to the high standards for new buildings, the decreasing quantitative target path for the energy demand in the building stock has been achieved between 2005 and 2015.

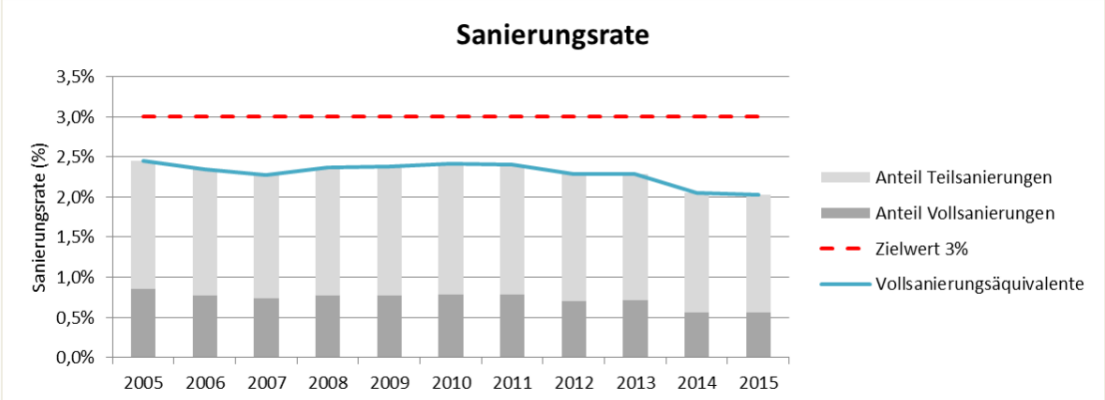
Figure 1.8: Energy consumption in the building sector (heat and hot water), 2005-2015



Source: Umweltbundesamt, 2017

Nevertheless in terms of renovation rates, the target of 3% has not been achieved so far. It even decreased again after 2011 and actually accounts for about 2% of the building stock per year.

Figure 1.9: Building renovation rates, 2005-2015



Source: Umweltbundesamt, 2017

1.3 Transport system and modal split

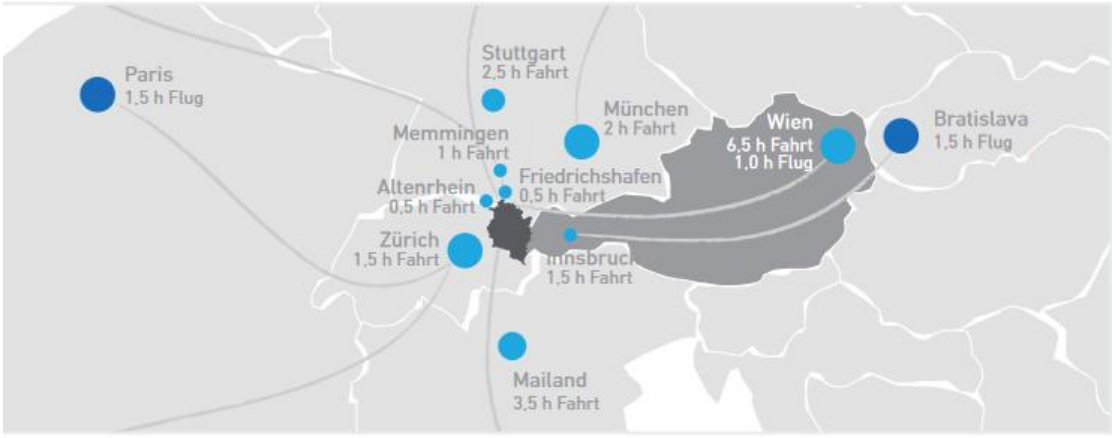
Quantitative data on transport infrastructure relate to 2013 levels: Vorarlberg has about 3900 km of roads. There are 65 km of motorway (A 14), 28 expressway kilometres (S 16), 804 km of national roads (marked B, but a total of 97 provincial roads (L) in Vorarlberg) and 3,000 km of municipal roads. Of 23 border crossings, 2 border crossings concern neighbouring Tyrol, the other border crossings exist to the neighbouring states of Germany, Switzerland and the Principality of Liechtenstein.

Figure 1.10: Important transport axes in the province (Federal State) of Vorarlberg (NUTS 2 Code AT34)

Source: Wirtschafts-Standort Vorarlberg GmbH (2015) Standortdokumentation

The closest international airport is in Zürich, Switzerland: the closest regional airports half an hour drive away in Altenrhein and Friedrichshafen.

Figure 1.11: Overview of the closest airports and flight distances between Vorarlberg and to European metropolises



Source: Wirtschafts-Standort Vorarlberg GmbH (2015) Standortdokumentation, p:15

The higher traffic connections for motorized individual traffic (with supraregional importance – transport connections with the motorway system to Lindau/Germany and to the federal states of Austria to the east) lead through Vorarlberg through the regions Rhine Valley, the Walgau and the Klostertal to the "Arlberg", the mountain and natural borderlands to Tyrol. Along this traffic axis is the Rheintal/Walgau motorway ("Autobahn A 14") and the Arlberg Expressway ("Schnellstraße S 16") (with the Arlberg-road tunnel towards the Tyrol/A12 Inntal motor way).

The important border crossings in the Rhine Valley are via the provincial roads 190, 191, 202 and 204. 190 leads from Hörbranz to Germany. The provincial road 191 reaches from Feldkirch to Liechtenstein. The provincial road 202 leads from Höchst to Switzerland and the provincial road 204 further along Lustenau to Switzerland.

In terms of car ownership, 194,000 cars existed in 2012 in Vorarlberg. Conversely, this means 520 cars per 1,000 inhabitants. In Germany there are 523 cars, in Switzerland 535 cars and 768 cars per 1,000 inhabitants in Liechtenstein.[7]

The Vorarlberg rail network has around 120 km. It consists almost entirely of the main traffic connection: a 92.4 km long route from the western borderline to the Arlberg tunnel to the German State borders. Further connections exist from Lauterach to the border of Switzerland (6.4 km) and from Feldkirch to the state border of the Principality of Liechtenstein (8.4 km). [8]

The main traffic route of the national and international train connections (high express train from Zurich to Vienna/Budapest in one-hour interval) is between the Arlberg and via Bludenz as well as the Rhine valley towns Feldkirch, Dornbirn and Bregenz. The EuroCity trains from Munich to Zurich stop in Bregenz. In Vorarlberg, there are two express lines ("S-Bahn") of the

[7] Land Vorarlberg (2013): Verkehrsbericht

[8] ibid

Austrian Federal Railways ("ÖBB"), which transport approximately 40,000 passengers per day. [9]

The route Bludenz – Lindau (Germany) runs through the entire Rhine valley. Along the route are all major important traffic nodes such as Bregenz, Dornbirn and Feldkirch. The second route, Bregenz – St. Margarethen, crosses the important local transport junction Lustenau and the St. Margrethen borderline railway station to Switzerland – there is a linkage to St. Gallen (Switzerland) and Zurich International Airport.

In addition, ÖBB operates a regional train line between Feldkirch and Buchs (Switzerland), linking Austria with Liechtenstein and Switzerland. An express connection is planned (project FL.A.CH).

Regional bus connections supplement public transport in Vorarlberg. Individual regions or several municipalities are approached by different bus systems. Together with the railway system it belongs to the Vorarlberg transport network (the individual fares are coordinated with one another). The bus organization is divided into landbus, city bus and local bus systems and operated by the ÖBB Postbus. Most of the lines run at half-hour intervals. The bus system, which covers the Rhine Valley, includes:

- City bus Bregenz, Dornbirn, Feldkirch, Bludenz
- Land bus lowlands
- Landbus Upper Rhine Valley
- Local bus at the Kumma[10]

The total length of the cycling network in Vorarlberg is about 760 km. 140 km bike routes are planned for the medium term future.[11]

In terms of modal split in Vorarlberg, in 2013 about 43% of trips are done by car and a share of about 9% is travelling a car passengers. Referring to sustainable transport modes, in total a share of 48% of trips are done by walking, cycling or public transport. In the urbanized areas (roughly equivalent to the area of Rheintal), the share of sustainable transport modes is slightly higher in larger municipalities (ca. 49%), mainly due to a higher share of cycling.

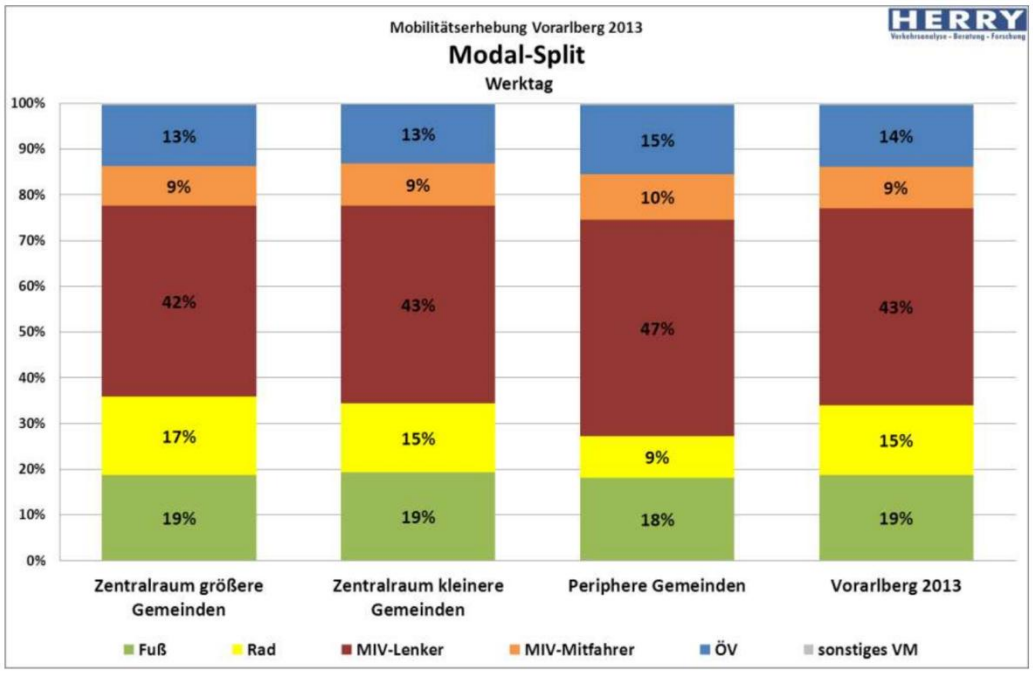
Between 2008 and 2013, the share of sustainable transport modes has increased for about +2%-points.

[9] Österreichische Bundesbahnen (2017): ÖBB S-Bahn Vorarlberg

[10] Verkehrsverbund Vorarlberg (2017): Zonenplan 2017

[11] Land Vorarlberg (2013): Verkehrsbericht

Figure 1.12: Modal Split in Vorarlberg and urbanized areas (Zentralraum), 2013



Source: https://www.vorarlberg.at/pdf/verkehrsbefragungkontiv20.pdf

1.4 Regional economic structure and development

Vorarlberg is a stable and productive economic country and one of the top economic areas in Europe. This has not changed since the millennium. The statistics show a very strong economic performance of Vorarlberg and its NUTS 3 area Rheintal-Bodensee. Compared to the EU average, Austria, Vorarlberg and the NUTS 3 region show much higher values. Vorarlberg also has higher GDP values on average than Austria or Rhine Valley.

Table 1.12: Gross domestic product (million €) 2000-2013

NUTS Level	EU (28)	Austria NUTS 0	Vorarlberg NUTS 1	Rheintal-Bodensee-gebiet NUTS 3
2000	9,561,961	213,196	9,515	7,258
2001	9,959,568	220,096	9,942	7,486
2002	10,327,875	226,303	10,329	7,803
2003	10,495,096	230,999	10,420	7,852
2004	11,024,409	241,505	10,954	8,135
2005	11,517,668	253,009	11,460	8,499
2006	12,182,659	266,478	12,036	8,872
2007	12,915,386	282,347	12,880	9,548
2008	12,995,762	291,930	13,372	9,844
2009	12,255,574	286,188	13,086	9,500
2010	12,794,720	294,628	13,486	9,839
2011	13,180,892	308,630	14,199	10,462
2012	13,433,175	317,056	14,547	10,737
2013	13,550,560	322,878	15,066	11,135

Source: Eurostat Datenbank (2016): GDP/capital

Table 1.13: Gross domestic product (€ per inhabitant) 2000-2013

NUTS Level	EU (28)	Austria NUTS 0	Vorarlberg NUTS 1	Rheintal-Bodensee-gebiet NUTS 3
2000	19,600	26,600	27,200	27,600
2001	20,400	27,400	28,300	28,300
2002	21,100	28,000	29,200	29,300
2003	21,400	28,500	29,300	29,300
2004	22,400	29,600	30,600	30,100
2005	23,300	30,800	31,700	31,200
2006	24,500	32,200	33,100	32,300
2007	25,900	34,000	35,300	34,500
2008	26,000	35,100	36,500	35,400
2009	24,400	34,300	35,600	34,000
2010	25,400	35,200	36,600	35,000
2011	26,100	36,800	38,400	37,100
2012	26,500	37,600	39,100	37,800
2013	26,700	38,100	40,300	38,900

Source: Eurostat Datenbank (2016): GDP/capital

Labour market situation and development in Vorarlberg

Vorarlberg has the youngest population compared to other federal states, but a clear tendency towards an aging of society is also evident. According to projections, the population of Vorarlberg will rise to around 420,000 by 2050, with an enormous shift in age structure.

Today, around 19,000 people with an age above 55 years are employed, and this figure is expected to rise to 32,000 by the year 2050. This means that one in six employees in Vorarlberg will be between the age of 55 and 65. Currently about 160,000 people are employed in Vorarlberg. Together with the unemployed persons registered at the employment exchange office (AMS), this results in a workforce potential of around 170,000 people. Around 40 per cent of the workforce (who are registered at the AMS Vorarlberg) have a migration background (the highest share is made up by Germans).

In view of the demographic change and the increasing operational requirements for future employees, it will be even more difficult to attract suitable employees for the company in future. In certain industries the lack of skilled workers is already so acute that economic growth potentials cannot be used optimally. In addition, more and more people are starting their studies and opting for a skilled workforce training or early entry into the professional world.[12]

The labour market situation in Vorarlberg is relatively homogenous and is very good in national comparison. Unemployment statistics are relatively low. The strong business location Vorarlberg, with its density of companies and enterprises, allows a stable labour market with positive prospects

[12] AMS (2016): AMS Vorarlberg – die Organisation

Table 1.14: Employment situation – important labour market figures (2016) of Vorarlberg NUTS 2 and in percent compared to the previous year

Labour market figures	Year average 2016 (absolute)	Change to 2015 (%)
Self-employed	159,247	1.80%
Noted unemployed	10,067	-1.70%
Access to unemployment	38,027	-0.90%
Departure from unemployment	41,311	-0.20%
Participants in training courses	2,356	0.40%
Unemployment rate	5,90%	
Reported Vacancies	2,062	16.90%
Job placement (number of unemployed)	4.9	--
Available apprentice seekers	262	5.90%
Immediately available open apprentice position	189	-3.70%

Source: AMS (2016): AMS Vorarlberg – die Organisation

The largest group of working people are employed people at place of residence (162,873). But there is also a large share of domestic commuters (135,317).

The short distance to Switzerland and Liechtenstein are reflected in commuter behaviour. More than half of Vorarlberg's commuters (13,917) leave Austria regularly to work abroad, while only a small share (2,362) commutes to other Austrian states.

Table 1.15: Employees in 2011 by place of residence, place of work and commuting frequency in Vorarlberg NUTS 2

Distance category/Working place	Total (absolute)
Employed people at place of residence	162,873
Non-commuters	11,277
Vorarlberg domestic commuters	135,317
Commuters (from Vorarlberg) total	20,460
to Austrian States	2,362
to foreign Countries	13,917
Commuters (to Vorarlberg) from other Austrian States	4,181

Source: AMS (2016): AMS Vorarlberg – die Organisation

Despite economic uncertainties and cautious forecasts, economic power has steadily increased in Vorarlberg in recent years. Innovative companies contribute to the multifaceted development of the economic region through high regional productivity. Moreover, industry-oriented and technology-oriented service providers are responsible for the particular dynamism of the domestic economy. About 95% of the companies in Vorarlberg are micro and small enterprises (up to 49 employees), but the Vorarlberg leading companies are one of the largest employers in the country. About 55 percent of all employees in Vorarlberg work in a company with more than 50 employees.[13]

[13] AMS (2016): AMS Vorarlberg – die Organisation

Table 1.16: Regional economic profile 2014 (employment) of the Federal State of Vorarlberg (NUTS 2 Code AT34)

ÖNACE 2008 Economic Sections		Austria		Vorarlberg	
2014		absolute	%	absolute	%
	Total	3,670,306	100.0	161,060	100
A	Agriculture and Forestry	414,440	11.3	14,186	8.8
B	Mining	6,464	0.2	203	0.1
C	Manufacture of goods	621,067	16.9	43,915	27.3
D	Energy power supply	27,592	0.8	1,820	1.1
E	Water supply and waste disposal	20,978	0.6	869	0.5
F	Construction	288,352	7.9	13,254	8.2
G	Trade	650,837	17.7	23,697	14.7
H	Traffic	193,649	5.3	8,966	5.6
I	Accommodation and gastronomy	292,892	8.0	14,673	9.1
J	Information and communication	108,790	3.0	2,030	1.3
K	Financial and insurance services	120,942	3.3	4,334	2.7
L	Property and housing	50,460	1.4	1,824	1.1
M	Freelance/technical Services	235,407	6.4	8,150	5.1
N	Otherwise. Business Services	219,682	6.0	8,840	5.5
R	Art, entertainment and recreation	119	0.0	--	--
S	Otherwise. Services	4,195	0.1	113	0.1

Source: Statistik Austria (2014): Leistungs- und Strukturstatistik

If the NACE sectors are compared, it is clear that in Vorarlberg, manufacture of goods (27.3%), trade (14.7%) and accommodation and gastronomy (9.1%) are the dominant economic areas in Vorarlberg, followed by the equitable sectors Agriculture and Forestry (8.8%) and construction (8.2%) The Rhine Valley and Vorarlberg, respectively, are primarily industrial production and trade areas, while the mountainous regions in the eastern part of Vorarlberg are more designed for tourism.

Two energy companies are among the 22 most important and largest companies in Vorarlberg.

Table 1.17: Energy-related companies in the Federal State of Vorarlberg (2015)

Vorarlberg Company Ranking	5	22
Companies	Illwerke/VKW-Group	OMICRON electronics GmbH
Categories	Energytrading and -utility company	Energy Technology
Employed in Vorarlberg	1,273	433
Employed at other locations	-	294
Apprentices	107	-
Sales total 2015 (in million €)	600	118
Change (in%)	-	9.0
Investments (in million €)	155.6	-
Export (in%)	44	98

Source: Land Vorarlberg (2016): Vorarlbergs größte Unternehmen TOP 10

2 Energy strategy, energy consumption and regional renewable energies

2.1 Regional highlights and challenges

Vorarlberg is Austria's most ambitious and forward-looking province in terms of renewable energy and energy efficiency. In the past it has acted as a pacemaker for related discussion as well as in terms of implementation. Beyond actual discussion lines and themes which have been brought up by the international discussion and EU strategies and directives, Vorarlberg started to talk about energy issues early, also including energy autonomy, the topic (and challenge) of sufficiency as well as energy scarcity and peak oil in a very early stage of the discussion. Many private and public persons are sensible about these topics, considering these issues also in everyday life.

Combination of ambitious top down and bottom up actors

This top down ambition has also highly influenced the densely built up, urban area of Rheintal with its municipalities and population. In addition to this framework at the larger regional level (province), many municipalities are motivated to contribute and ambitious in their implementation. This lead to a development which stimulated regional planning and strategy development within the area of Rhein-Valley without being compulsory.

The coordination of spatial planning, economic development and transport strategies was mainly driven the municipalities, but at the same time essentially supported by provincial authorities. This combination allowed for a prosperous, sustainable further development dealing with major challenges as traffic jams and scarcity of space (for housing and enterprises) within the relatively narrow valley of Rheintal.

In addition, Vorarlberg has a long tradition of renewable energy use, mainly based on hydropower and biomass for heating, which has been further developed and increased by other sources with meanwhile high shares of solar thermal and PV installations on top.

Cooperation of municipalities and civil society

Within this ambitious climate of resource efficiency and innovation, municipalities and civil society cooperate to further drive their common success story. Examples for this prosperous cooperation are citizens energy cooperatives (with contributions from municipalities), active energy teams in municipalities, the initiative to introduce a fixed contribution for the implementation of renewable energy within the country or the intensive ambitions for public participation and inclusion of citizens by introducing citizens' councils and citizens' cafés dealing with energy topics throughout the country.

Finally, on top of provincial funds for the implementation of energy efficiency and renewable energy measures in private households and enterprises, also some municipalities provide financial means and/or consulting in order to support their population developing towards low carbon economy.

2.2 Energy strategy of the region

As described above, an independently elaborated energy strategy especially for the Rhine Valley does not exist in this form. Apart from the spatial planning law of Vorarlberg, the Vorarlberg regional government initiated visions, objectives, implementation strategies as well as elaborated a catalogue of measures affecting the whole state. An overview of regional low carbon policies is to be found in chapter 3.3.

Energy-related measures are therefore implemented decentralized in Vorarlberg. The state of Vorarlberg provides the legal and/or strategic framework. Recommendations for action are directed at regions, municipalities, public institutions, businesses and industries as well as at associations and private persons. Thus, for example, local development concepts of municipalities with a strong regard of environment and energy issues are being developed. Regional planning societies take up some measures and committed citizens, private or business initiatives complement these activities.

If we consider the Rhine Valley as a single strategic area, we must consider the sum of the various individual measures and community activities in the Rhine Valley region.

The spatial planning legislation

The spatial planning legislation of Vorarlberg is the predominant instrument of legally binding spatial planning. It proposes comparable living conditions to be strived for in all regions.

In the last version of the spatial planning legislation (2011), the topic of energy was given greater consideration. Spatial development concepts of municipalities include, among other things, planning instruments for the integration of energy topics and should contain fundamental statements about the energy supply of the state of Vorarlberg as well as the use of renewable energies. Energy planning is considered an important component of spatial planning.

"Energy future Vorarlberg": Visions for 2050

"Energy Future Vorarlberg" is the central energy policy program of Vorarlberg, which was launched in 2007 in a unanimous Landtag decision. Its objectives are for Vorarlberg to be self-determined in energy questions, to achieve independence from price increases and supply bottlenecks for fossil fuels and to make an important contribution to climate protection. This should be achieved through more energy efficiency in living, working and production, as well as through a consequent expansion of renewable energy sources and the use of efficiency potential. Research and development is to play an important part in this process.

In an outcome-oriented visions process which consulted stakeholders and citizens, know-how from the fields of energy efficiency, renewable energies and communication was collected for the transfer of knowledge and a common understanding of manageable measures. Consequently the elaboration of an energy strategy and complementing action plan were the next

steps. The time horizon of the vision process is 2050, the first implementation phase was planned from 2010 to 2020.[14]

"Energy autonomy Vorarlberg" – strategic goal of the "energy future Vorarlberg" 2050

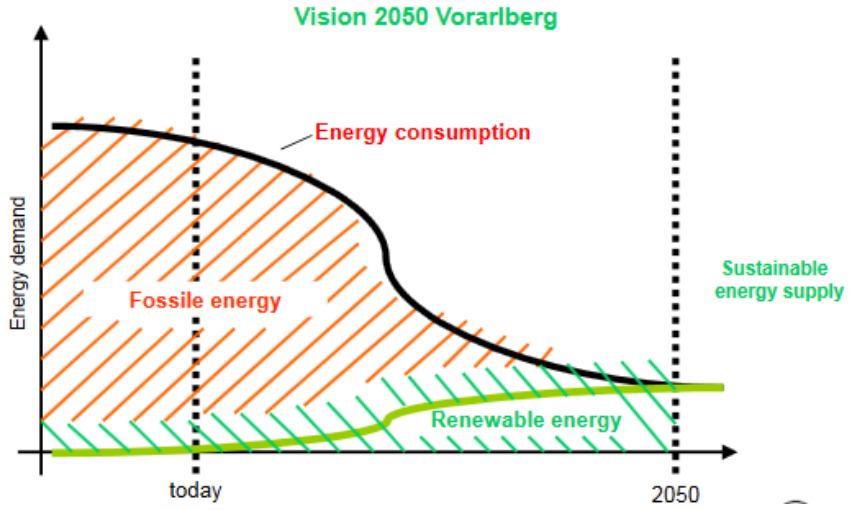
Hence, in 2009, the Vorarlberg State Parliament decided unanimously to set energy autonomy as a long-term strategic target for the energy sector: Vorarlberg is supposed to phase out its CO_2 emissions by 2050. This target is broadly in line with the target agreed upon at the World Climate Conference in Paris in 2015 to reduce greenhouse gas emissions by 80-95% as compared to 1990 until 2050.

Next to the overall goal, the energy strategy also defines short term goals to be reached by 2020. These are:

- 15% less energy consumption than 2005
- 18% less CO_2 emissions than 2005
- 19% increased share of renewable energies compared to 2005[15]

The figure below illustrates the general idea of these targets.

Figure 2.1: The path to energy autonomy in Vorarlberg



Source: Gmeiner/Energieinstitut Vorarlberg, 2015

In order to realise these ambitious targets, the strategy was accompanied by the elaboration of an action plan which describes concrete measures to be implemented until 2020. Two years, experts were working in four thematic groups along the topics renewable energy, buildings, industry & trade, mobility & spatial planning to finally distil 101 implementation measures

[14] Vorarlberger Landesregierung (2010): Energiezukunft Vorarlberg – Ergebnisse aus dem Visionsprozess

[15] Vorarlberger Landesregierung (2011) Schritt für Schritt zur Energieautonomie in Vorarlberg. 101 enkeltaugliche Maßnahmen

in what was called the “101 grandchild suitable measures” in 2011. The table below gives an overview over the most important aims and means of reaching this goal.

Table 2.1: Action Plan – aims and means

Renewable Energies	**Mobility**	**Buildings**	**Industry and Trade**
(most important) AIMS by 2020			
half of the energy demand is covered by renewable energies	20% less energy demand for mobility	18% less energy demand	4% less energy demand
+ 200/220 GHWh hydropower	+ 5% of passenger traffic on bikes	Rate of refurbishment: 3%/year	Increase of productivity 1%/year
+ 15,000m^2/year solar collectors	5% share of e-mobility	20% less energy consumption for heat	
+ 40,000m^2/year photovoltaic installation	Increase rail share in freight, destination and origin traffic from 22% to 30%		
MEANS of reaching this goals (examples of the 101 measures)			
Expansion of hydropower	Introduction of cheap annual ticket	Energy monitoring in public buildings	Better use of waste heat
Advancement of funding instruments (solar and photovoltaic)	Further development of bicycle lane network	Adaption of housing support scheme, Mandatory minimum use of RES for heating	Projects on energy and resource efficiency
Sensitization measures (solar energy, biogas, wood)	Municipal program for mobility planning	Network of energy and refurbishment consultations,	More consultancy activities to increase energy efficiency
Assessing potential (Geothermal energy and wind)	Master plan for freight traffic	Measures to reduce electricity consumption in households	Consultancy program for corporate mobility management

Source: compiled by OIR, Vorarlberger Landesregierung (2011) Schritt für Schritt zur Energieautonomie in Vorarlberg. 101 enkeltaugliche Maßnahmen

In order to promote the implementation, 40 measures were defined which were to be prioritized in realization. The degree of attainment is documented in the annual monitoring.

2.3 Regional and local energy infrastructure

Energy data is difficult to obtain for the delimintation of the region of Rheintal. Although many municipalities provide information and data, harmonized data for the total region of Rheintal is not available. Therefore, the following data mainly refers to the province of Vorarlberg in total. In terms of interpretation, one has to consider the large rural share of the area outside of Rheintal.

Energy utilities in Vorarlberg

In Vorarlberg, a number of energy utilities are operating to generate electrical energy from hydropower and supply electricity to customers. At the forefront is the largest energy supplier in the federal state – the merged Illwerke/VKW Group with its five areas of activity (see list below).

The seven owners of electricity grids in Vorarlberg are

- Illwerke/VKW-Group (including: Vorarlberger Illwerke AG, Vorarlberger Power Plants AG, Vorarlberger Energy Networks GmbH, Vorarlberger Transmission Network GmbH, VKW- Ecological Electricity GmbH)
- Stadtwerke Feldkirch
- Electricity Factories Frastanz GmbH
- Montafoner Railway AG
- Power Supply Kleinwalsertal GesmbH
- Alfenzwerke Elektrizitätserzeugung GmbH
- Getzner Mutter & Cie GesmbH & Co[16]

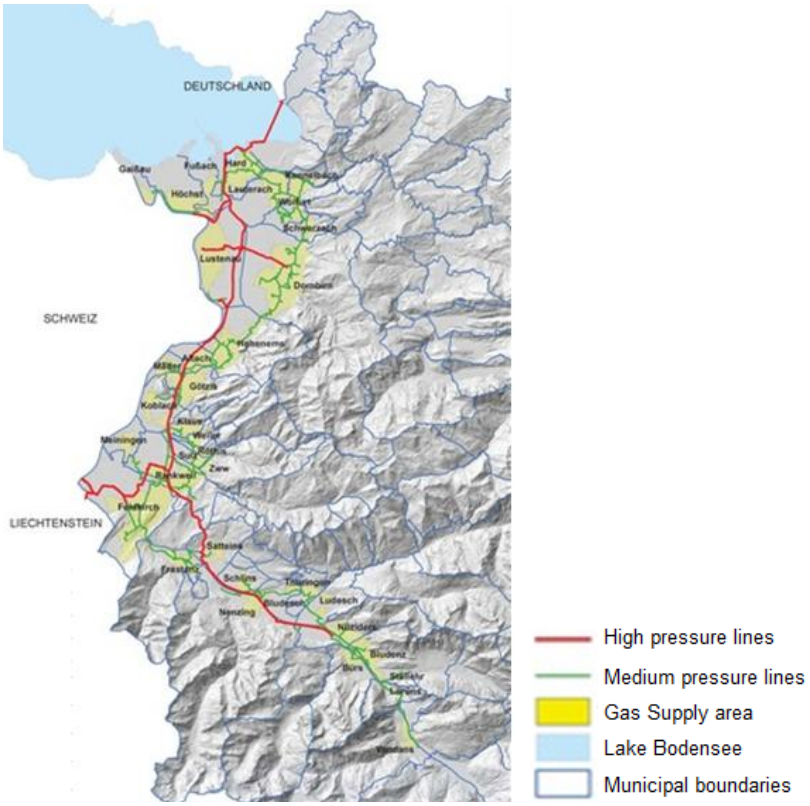
Gas grid and supply companies in Vorarlberg

Vorarlberg's gas customers can choose between three regional, 17 Austrian suppliers as well as one German gas supplier.

Owners of gas grids in Vorarlberg:

- Vorarlberger Power Supply (VKW)/Vorarlberger Energy Networks GmbH (certified network operator)
- Stadtwerke Bregenz
- Maxenergy Dornbirn

Figure 2.2: Overview of the gas supply infrastructure in Vorarlberg



Source: Illwerke/VKW Group – Vorarlberger Energy Networks GmbH (2016): Gasversorgungsgebiet Vorarlberg,

[16] Land Vorarlberg (2017): Energie Links

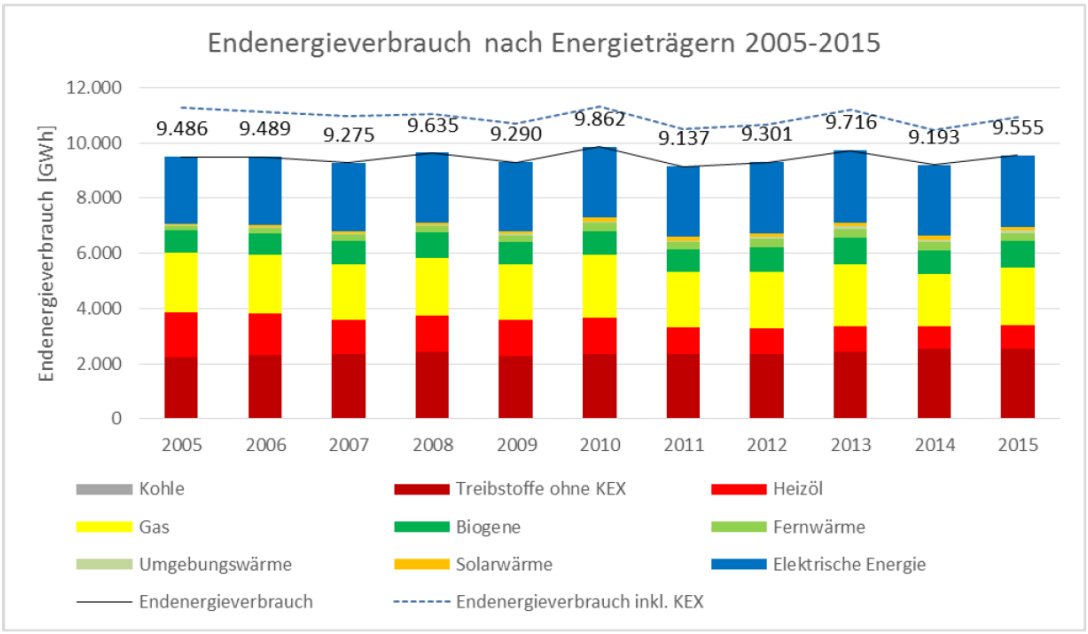
The gas network in Vorarlberg covers over 2,000 km of medium and low pressure pipelines. In addition there are about 420 km of house connection lines.

The Illwerke/VKW Group procures the natural gas required for the Vorarlberg market almost exclusively at the neighbouring Net Connect Germany (NCG). The Vorarlberg natural gas network is integrated into the European network.[16]

The natural gas is taken over from Lindau (Germany) to the transport network of Vorarlberg. The approximately 80 km high-pressure distribution network is part of the European natural gas network and therefore also assumes transport tasks to supply eastern Switzerland, Liechtenstein and Graubünden (Switzerland). The gas transit through Vorarlberg is about 0.7 billion kWh per year. 2014, 36 cities and municipalities are supplied via the transport and supply network in Vorarlberg.

2.4 Patterns of energy consumption

Figure 2.3: Final energy consumption in Vorarlberg NUTS 2 (2005-2015), by energy carrier



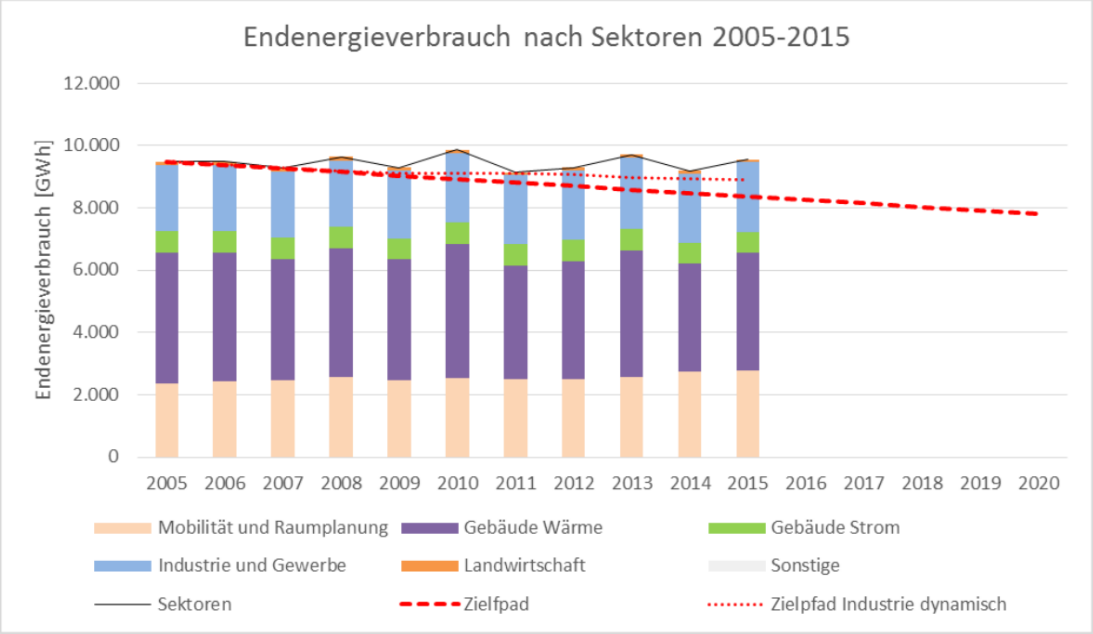
Source: Umweltbundesamt, 2017

In 2005, the total final energy consumption in Vorarlberg amounted to 9.486 GWh. Despite the growing population in this province, the consumption value has been relatively stable – with some ups and downs – until 2015.

The upper, dotted line shows the specific phenomenon of gas tank tourism in this area. As gasoline prices in Vorarlberg are lower than in neighbouring countries (Switzerland, Germany), there is quite a traffic to be stated mainly for tanking in Austria.

Nevertheless, the targets of decreasing energy consumption in all sectors has not been achieved so far.

Figure 2.4: Final energy consumption in Vorarlberg NUTS 2 (2005-2015), by sectors



Source: Umweltbundesamt, 2017

Between 2000 and 2015, growth in final energy consumption was observed in the two most important sectors of production and transport, while a decline has occurred in the 3 subsectors, public and private services, households and agriculture.

The percentage growth of 17.8% is the strongest in the production sector. The most marked shrinkage (-34%) is agriculture. Transport remains the largest sector in 2015 with a consumption rate of 35.8%. The smallest final consumption is in agriculture with 1.3%.

The share of private households in energy consumption has steadily declined between 2000 and 2015, with temporary increases in the years 2010, 2012 and 2013. Among others, reason for this steady decline are to be found in further developed in building's energy infrastructures (eg. passive energy house construction, etc.) as well as building refurbishments.

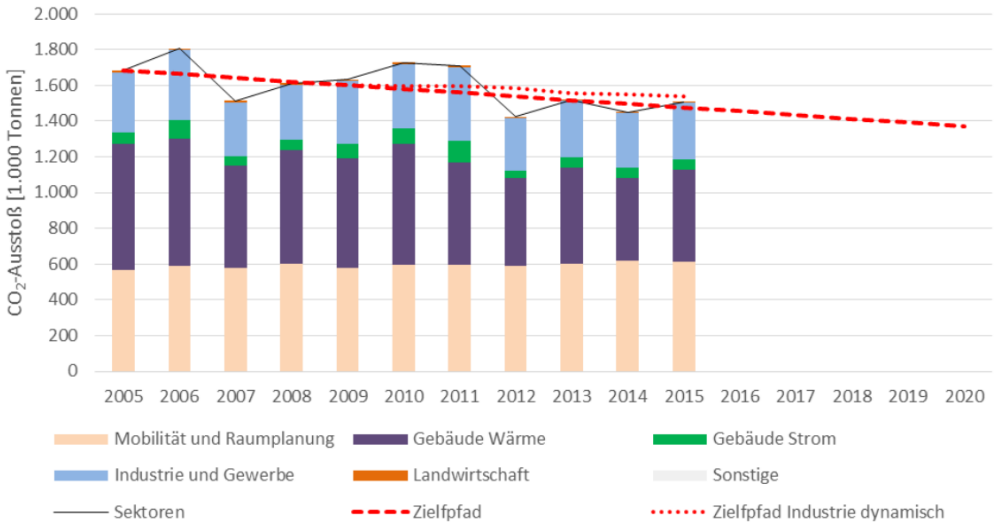
Table 2.2: Total energy consumption of households by end-use (final energy) 2000-2015

Year	TJ	%	Year	TJ	%
2000	11,307	33	2008	10,501	26
2001	11,493	32	2009	10,122	26
2002	10,904	30	2010	11,114	27
2003	10,613	28	2011	9,697	26
2004	10,477	27	2012	10,354	27
2005	10,599	26	2013	11,232	28
2006	10,295	26	2014	9,674	26
2007	10,118	26	2015	10,365	26

Source: Statistik Austria (2015) Bundesländer Energiebilanzen – Vorarlberg 1988-2015

Even though, Vorarlberg missed its targets referring to the decrease of energy demand, the province successfully decreased total CO_2-emissions between 2005 and 2015.

Figure 2.5: CO_2-emissions in Vorarlberg NUTS 2 (2005-2015)

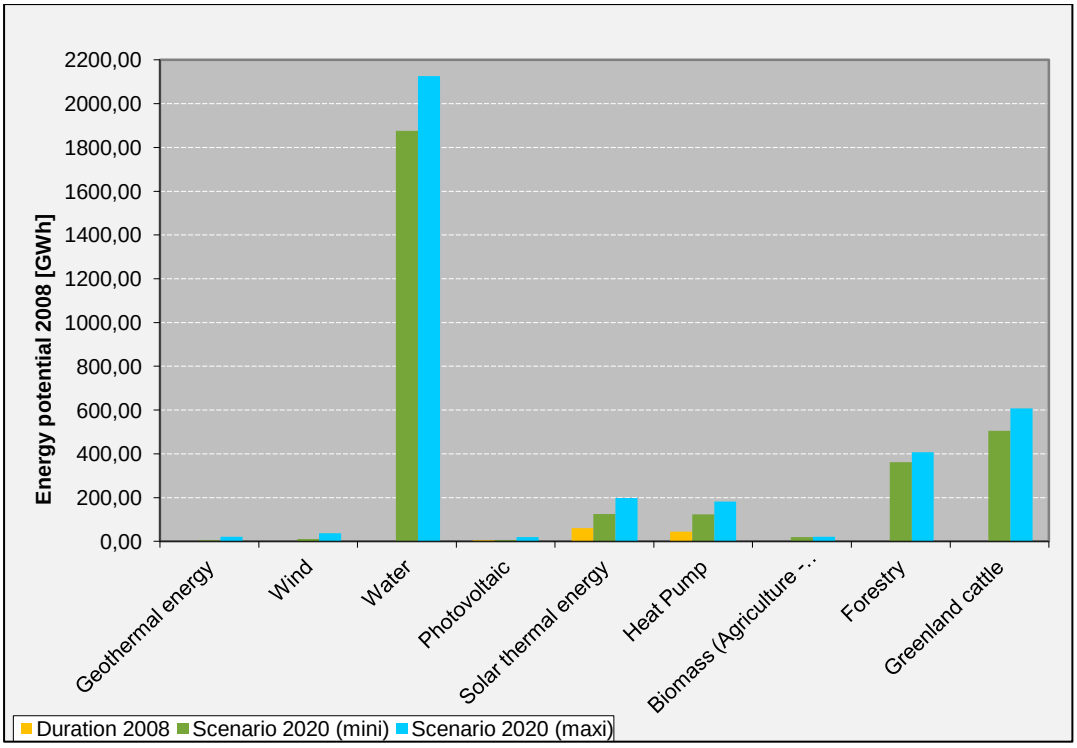


Source: Umweltbundesamt, 2017

2.5 Regional potential of renewable energy

Information on the regional potential of renewable energy is provided from a research project from 2010. In the project, the RES potential was analysed for different scenarios in comparision with the situation in 2008. The scenario overview of renewable energy potentials shows that there is greater potential for future use of the following renewable energy sources: water, solar thermal energy, heat pump, forestry and greenland cattle.

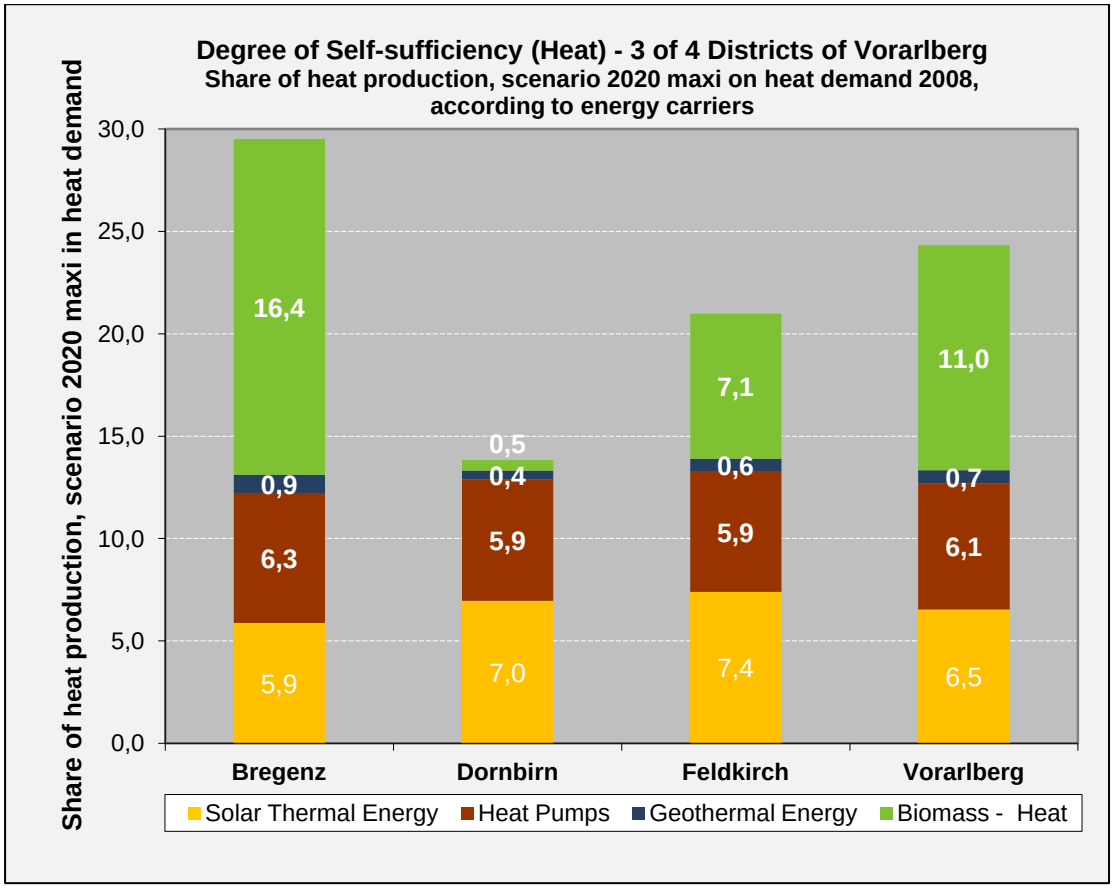
Figure 2.6: Potential of renewable energy sources (2008) and scenarios (2020), districts of Bregenz/ Dornbirn/Feldkirch



Source: ÖIR et al (2010): Regio-Energy

The scenarios for 2020 show that the largest share of heat production for self-sufficiency could be reached with biomass. Except in the district of Dornbirn – here the biomass share is very low. Geothermal energy shares hardly exist. The shares of the heat pumps and solar thermal energy would be approximately the same size for all state districts.

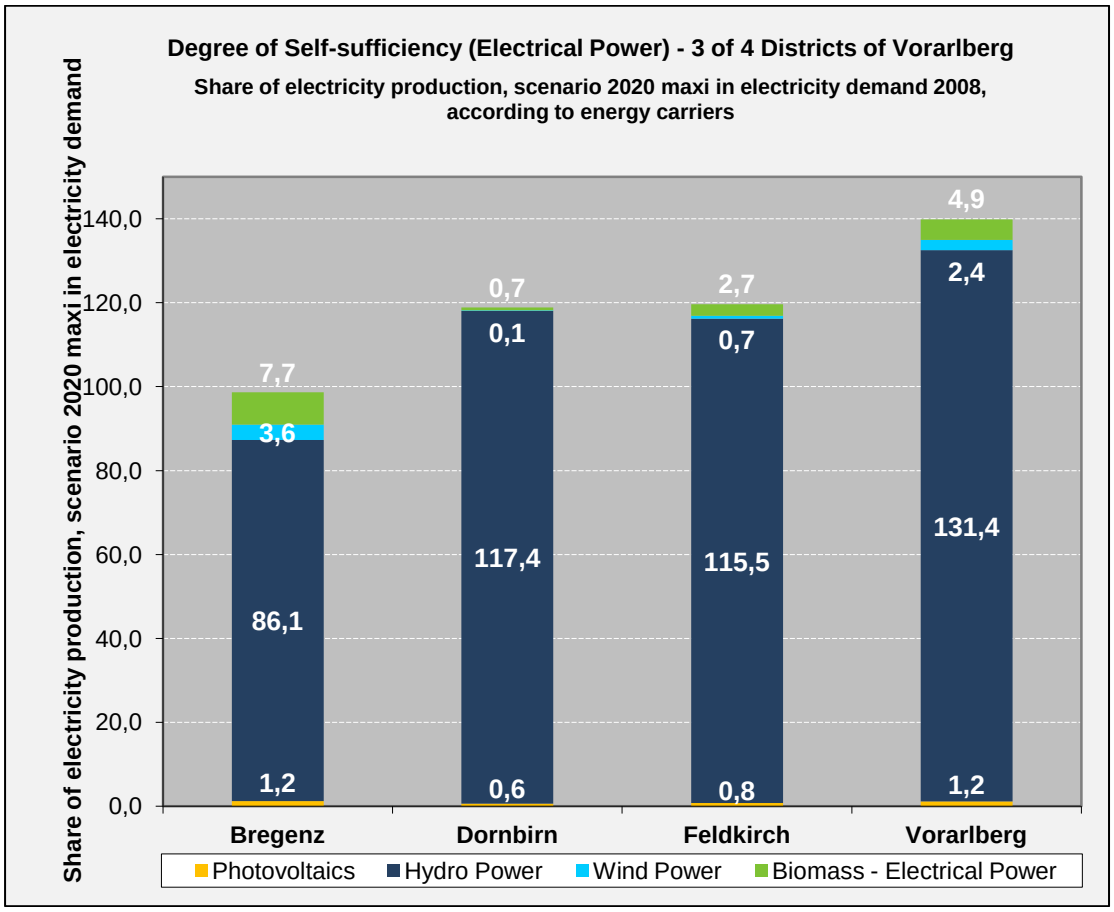
Figure 2.7: Degree of self-sufficiency (heat), share of heat production according to energy carriers



Source: ÖIR et al (2010): Regio-Energy

With the degree of self sufficiency, hydro power would be by far the largest share of the electrical power production. To a small extent, biomass would be a further potential, apart from the Bregenz region. There is even a small potential of wind power in Bregenz, also Photovoltaics will continue to play a minor role in the future (in terms of overall capacities).

Figure 2.8: Degree of self-sufficiency (Electrical Power), Share of electricity production according to energy carriers



Source: ÖIR et al (2010): Regio Energy

2.6 Use of renewable energy in the region

Renewable Energy in Vorarlberg

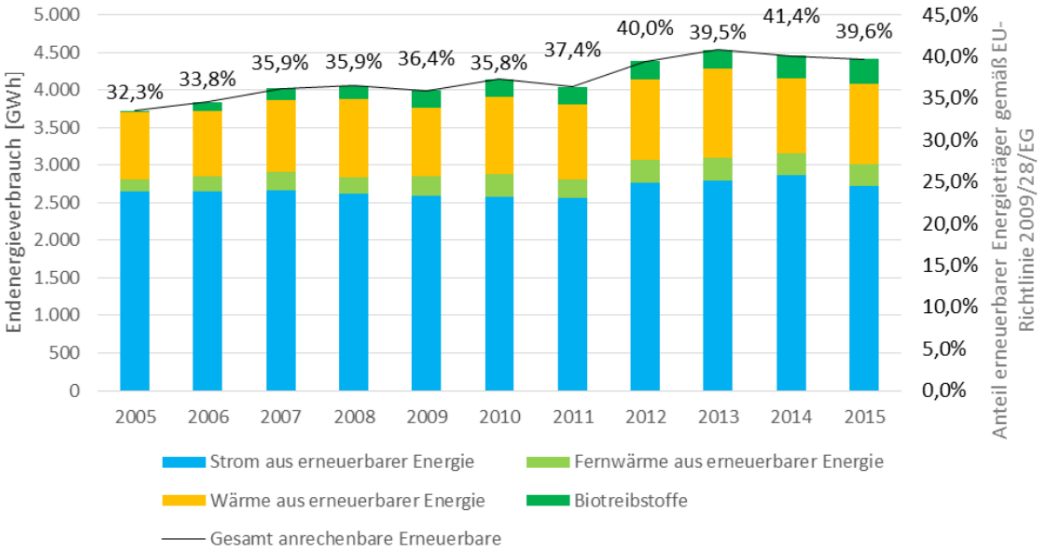
Vorarlberg supplies 2014 about 80 percent of renewable energy. Apart from photovoltaics and biomass, small-scale hydropower has the largest and most cost-saving potential and is also favoured by topographical conditions. Wind turbines have so far not been implemented in Vorarlberg – topographical conditions are named as the main barrier for their installation.

There was a rapid development in heat pumps and solar systems; While in 2003/04 only about 2,000 households had them installed, ten years later 30,000 households participated.

Heat pumps have increased eightfold over the period of energy consumption, and solar heating has led to a doubling. 2014 solar systems contribute 3% of space heat and heat pumps 6%.

Overall, the share of renewable energy carriers is increasing and meets the targeted path towards energy autonomy in Vorarlberg.

Figure 2.9: Renewable Energy Use in Vorarlberg (2005-2015)

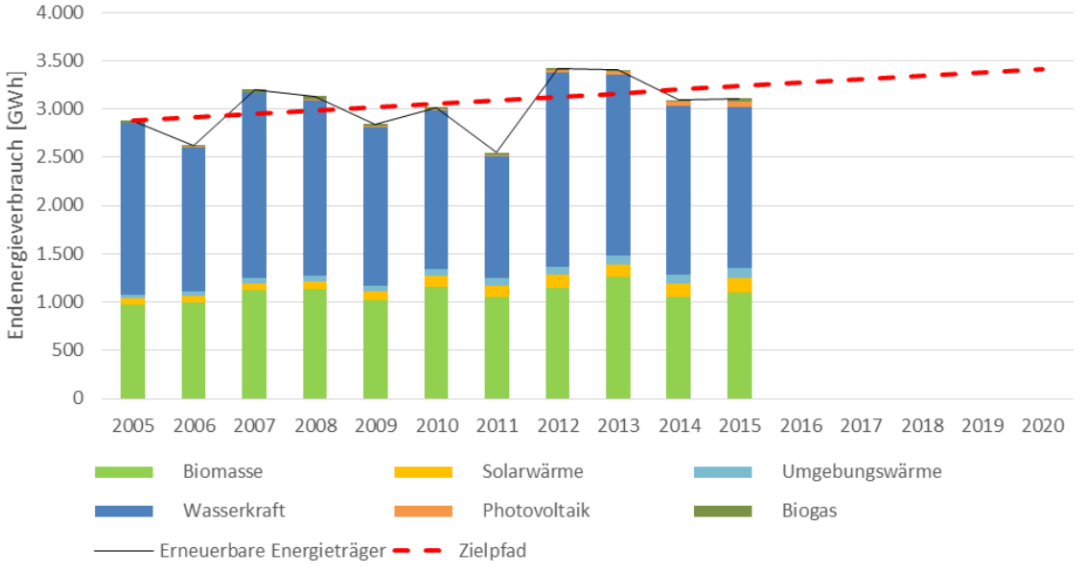


Source: Umweltbundesamt, 2017

The share of renewable energies in Vorarlberg in 2015 is 39.6%. On a retroactive basis, by 2000, the average share is 37.1%. Between 2005 and 2015, the proportion of renewable energies has risen by a total of 22.3%, with an almost stagnation (-0.2%) between 2007 and 2010. Percentage declines were observed between 2009 and 2010 (-1.6%), from 2012 to 2013 (-1.3%) and finally from 2015 to 2016 (-4.4%). Nevertheless, the long-term monitoring of the graph shows a continuously growing share of renewable energies.

Regarding renewable energy carriers, most important is hydro power, followed by biomass. Nevertheless, solar heat, PV and ambient heat show steadily increasing numbers.

Figure 2.10: Renewable Energy Carriers in Vorarlberg (2005-2015)



Source: Umweltbundesamt, 2017

Change of heating systems towards renewable energy

Table 2.3: Comparison of heating systems 2003/2004 with 2013/2014 according to federal states, used energy carrier and type of heating – results for Vorarlberg

Energy use of households – Vorarlberg	**2003/14**	**2013/14**	**2003/04-2013/14**
	Share in %	**Share in %**	**Change in %**
Wood, Wood shavings chips, Pellets, Wood briquets	21	16	-5
Coal, coke, briquettes	1	-	-1
Heating oil, Liquid gas	45	29	-16
Electrical current	8	8	0
Natural gas	16	15	-1
Solar, heat pumps	2	19	17
District heating	7	13	6
Total	100	100	0

Source: Statistik Austria (2015): Bundesländer Energiebilanzen – Vorarlberg 1988-2015

In 2003/2004, the largest proportion of heating oil and liquid gas was 45%, which is more than twice as high as the second-largest heating form of wood, wood chips, pellets, wood briquettes with 21%. By far the least represented heating forms are coal, coke, briquettes (1%) and solar, heat pumps (2%).

In the observation period until 2013/2014, the heating modes changed extremely: heating oil, liquid gas fell most significantly by -16% to a share of 29% of total heat. The second-largest representative of the energy carriers (wood, wood shavings chips, pellets, wood briquets) held a share of 16% in 2013/14, which resulted in a proportionate reduction of -5%.

The most positive change was made by solar, heat pumps. With only 2% energy input with sun or geothermal heat in the years 2003/04, ten years later, it is almost tenfold with 19%, combined with a doubling of district heating – from formerly 7% to 13% share (2013/2014).

Bioenergy and district heating production in Vorarlberg 2014

The smallest province of Austria has a land area of 2,601 km^2. 2.5% of the agricultural area is arable land. The forest share is 37.4% below the federal average. The wood resource plays a key role in Vorarlberg as a renewable raw material for construction, industry and industry. Vorarlberg's forestry achieves a surplus and has faced an increase lately. These factors also influence the energy industry. The use of wood-based energy sources from the regional stock and its energetic use in biomass heat plants and CHPs has increased its importance.

In Vorarlberg, bioenergy holds a share of 35% among renewable energies. The most important biomass products are wood chips, sawed products and bark with 38%, followed by firewood with 37%. Biofuels are used to 14%.

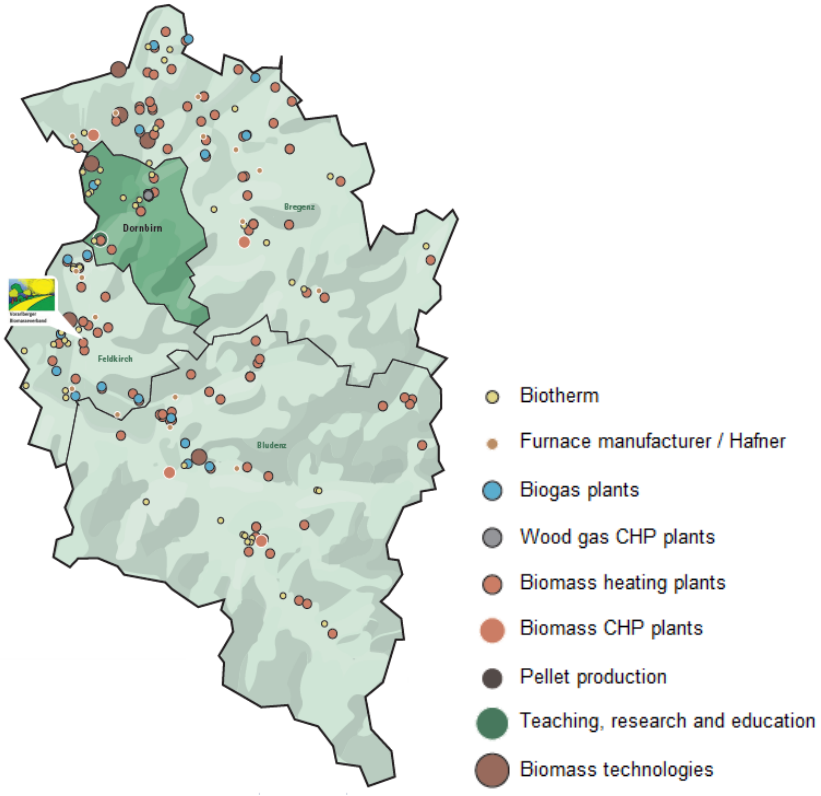
In the last ten years, households with connection to the district heating network doubled from around 10,000 to 20,000. Vorarlberg generates a share of biomass fired district heating of over 93% in district heating production. Due to the rural structure of the country, in absolute terms, the district heating consumption in Vorarlberg is comparatively very low. However, since 2005, district heating production in Vorarlberg has risen from 0.6 PJ to 1.1 PJ. In total

there are 110 heating plants which supply 246 GWh of heat. The four biomass cogeneration plants produce 45 GWh bioheat. [17]

Biogas production in Vorarlberg

VKW biogas is produced from 100% biogenic waste from the region. The contractually agreed share of biogas is fed into the Vorarlberg natural gas network. In total, there are 10 composting/biogas production sites in the NUTS 3 Region[18] Rheintal Valley-Lake Bodensee area.

Figure 2.11: Overview and localization of bioenergy related Locations in Vorarlberg



Source: Österreichischer Biomasse-Verband (2016): Bioenergieatlas

[17] Österreichischer Biomasse-Verband (2016): Bioenergieatlas

[18] Österreichischer Biomasse-Verband (2016): Bioenergieatlas

3 Governance and important regional policies

3.1 Regional governance system

To tell a long story short – the regional governance system for the low carbon development is complex and cannot be narrowed down to Rheintal region but involves stakeholders across the province of Vorarlberg.

The governance system has developed and changed enormously in the past century. While in the mid 20th century the focus lay on providing and safeguarding the energy supply (especially electricity) at an affordable price, the field of attention shifted in the 1980ies towards climate protection and thus saving energy. As an organizational unit, energy issues have always been represented by the economics department of the provincial administration of Vorarlberg, lately valorised by being represented as the *specialist division Energy and Climate Protection* in the same department.

It is this department that was in charge of the developing the programme *Energy future Vorarlberg* ("Energiezukunft Vorarlberg"), which subsequently lead to the energy strategy *Energy Autonomy – Vorarlberg* ("Energieautonomie Vorarlberg"), agreed upon by the state parliament in 2009.

Although the specialist division Energy and Climate Protection is in charge of coordinating the Energy Autonomy, there have been manifold institutions, associations, companies, experts, people etc. involved in the process.

One very important stakeholder is the Vorarlberg's *energy agency* ("Energieinstitut Vorarlberg"). Founded in 1985 as *Energy-Saving-Association* its main task today is the support of committed players from all areas on the road to energy autonomy. As a non-profit organization, supported by 13 institutional members (mainly the province of Vorarlberg, the main energy provider Illwerke/VKW, and a regional branch of a bank – Vorarlberg Raiffeisen), the energy agency can be labelled as an intermediate body in the governance structure. According to an interview, the energy agency was deliberately established outside the realm of the provincial administration to be able to act more flexible und independent in a rapidly changing technical, economic and political environment. However, the tiers to the government are strong: Until the early 2000 years, the managing director of the energy agency was also the energy coordinator of the province and employed 50% by the provincial administration. Today, the head of the specialist division Energy and Climate Protection fulfils that role. The energy agency's scope of duties includes research, planning and coordination of educational events as well as consulting for people and institutions. It is the latter that plays probably the most important role in the governance of low carbon development. The energy agency – among others – developed and coordinates the *E5 Programme for Energy Efficient Communi-*

ties[19]*.* In this role it offers long-term support to the network of e5 municipalities to identify their energy saving potential and increase their use of renewable energy. Based on a comprehensive and structured catalogue of all energy-related measures relevant for municipalities the participants develop action plans whose implementation in monitored internally and externally. Success in measured in "e" – one e equals the lowest and eeeee the best scoring.

It has been pointed out in various interviews, that this network is very powerful in Vorarlberg, and even more so in Rhine Valley where more than 50% of the municipalities, and all major cities take part in that programme. Its established standards, methodologically sound procedures, and the opportunities for communities to exchange on related topics is very appreciated in the region and the network regarded as key governing body. The "landscape" of awarded e's can also hint at the regions frontrunners and followers in the region: whereas those municipalities with eeee or eeeee can be considered proficient in following a low carbon development path (most notably Feldkirch, Dornbirn, Mäder, Wolfurt and Zwischenwasser), those without e certification or only one e or ee still need to rise to the challenge.

Another important governance process is *Vision Rheintal,* a regional development process which is shared among 29 municipalities of Rhine valley and the province of Vorarlberg and started in 2004. The Rheintal Vision's first task was to develop general principles for spatial development and regional cooperation in a two-year participatory process. The signing of the Rheintal contract by the state governor and all mayors of the Rhine Valley reaffirmed their commitment to cooperation and the elaborated principles and is regarded as a major milestone in the process. The aim of Vision Rheintal is to create an interconnected "polycentric region, promote cooperation within the region, promote cross-border cooperation and create an interconnected living space, foster and enhance regional awareness and regional identity."[20] This includes sustainable spatial development goals like inter-communal industrial/commercial areas, coordinated development of settlements, densification along high level public transport routes etc. – hence low carbon development is an implicit goal of that process.

With the end of 2016 the project Vision Rheintal was officially over. At the time of writing the project team and the regional stakeholders are at the point of redesigning the next steps, which will not carry on the name Vision Rheintal, as they want to focus less on developing visions, principles and concepts but want to put the implementation at the center of attention. More liability, more inter-communal and cross-border cooperation will most certainly shape the next phase of the cooperation in the Rhine Valley.

In spite of the criticism regarding the emphasis on theory, all interview partners regard Vision Rheintal as successful in terms of awareness-rising. The mind-set of the stakeholders has

[19] Read more on this program in chapter 3.4.

[20] Obkircher (2015) The Influence of Regional Identities on Spatial Development: A Challenge for Regional Governancen Processes in Cross-Border Regions 221-243; In: Governance in Transition, edited by Jan Bucek and Andrew Ryder, Springer Science+Business Media Dordrecht, p:230

accepted cooperation (inter-communal, regional, province-municipalities) as prerequisite for efficient spatial planning and regional development and has thus strengthened a (sub)-regional level of governance. Since the launch of Vision Rheintal, many *inter-communal co-operation platforms* on a smaller scale were formed[21]. Some focus on spatial planning issues (regional development concepts and joint solutions for business zones, traffic, public transport, green and recreational areas), others on administration (joint accounting, building authority, supply and disposal systems) or providing social services (child care, medical and health care). These co-operations have different names, different legal status, include different combination of municipalities and are usually formed as strategic partnerships to address specific challenges.

Another important player in the governance system of low carbon economy is the *energy provider.* In Vorarlberg the biggest energy provider Illwerke/VKW is owned by the province and in addition, some cities of the Rhine Valley have their own power authorities. This constellation facilitates the access of the provider by the local/regional authorities and they are an important partner for activities in that field (see next chapter). However, their engagement in low carbon governance is rather selective and only in particular cases a regional approach.

A specific characteristic of Vorarlberg's governance can be attributed to its rather small size. In unison the interview partners depicted a functioning network of relevant stakeholders. The scene is small enough to constantly run into each other at events, working groups and meetings. Some co-operate formally (in the frame of a specific project or sponsorships) others do so as needed. This cooperation is highly appreciated by the interview partners: It supports the exchange of experiences including set-up and effects, facilitates cost estimation, supports implementation and aligning of goals.

Further attention could be paid on the liabilities on regional level. A foundation has already been laid with Vision Rheintal and communal cooperation within e5 and others, but there is yet a lack of resources (personal) to gather data, do basic research and quite generally enforce the relevant low carbon strategies of the province on a regional level.

[21] E.g. Hofsteigparlament (http://hofsteig.com/), Rheindeltagemeinden (http://www.rheindelta-bodensee.com), amKumma (http://amkumma.at/) , Plan B (http://planb.vmobil.at/)

3.2 Involvement of private sector partners

3.2.1 Commerce and industry

The driver to engage commerce and industry in low carbon development is in most cases not the notion of climate protection but cost reduction. In this regard, cost reduction can be achieved most obviously through energy saving via thermal restoration and modernising support processes like heating, lightning, ventilation etc.

In Vorarlberg, the energy agency has played a vital role in promoting the idea of investing in energy saving measures. In the first years of the 21st century the energy agency and the City of Feldkirch offered companies what they called an *"energy check".* An expert on energy efficiency would analyse the processes within the company and check whether or not combined effects could be used with neighbouring land uses. Out of all the interested companies, only one project was realised in this pilot project: Vorarlberg's dairy factory's heat waste has since then been used to warm a nearby school. However, the energy agency pursued to promote the energy check for commerce and industry and has reached numerous companies over the years. Being considered a neutral consultant it has become the first address for companies that are interested in becoming active in energy saving measures.

For the last years, an average of 60 companies per year made use of the energy check and 80% of these become active afterwards. While in the earlier years the focus lay on investments in the *thermal insulation* (under consideration of the government subsidies) it is shifting towards *building technology and support processes.* Another recent trend is the rising number of *mobility* consultancies, mostly coming from industrial enterprises.

This is especially interesting for Rhine Valley region, as it is the most industrialised region in Vorarlberg. As space is rather scarce in the Rhine Valley, parking space is becoming a cost factor. More and more companies are thus experimenting with incentives to motivate their employees to use alternatives to a private car to commute to work. One of these projects is called "eco-points": employees can collect eco-points – the fewer parking spaces at the working facility their mode of transport uses up, the more eco-points they get daily. Once a certain number of points is collected, the company exchanges the points with a voucher for goods.

Other initiatives can be found in the field of e-mobility. Rhine Valley and its surrounding municipalities is the first e-mobility model region of Austria, called *VLOTTE*[22]*.* Its main aim was to provide affordable and sustainable electric mobility to users directly. The project was driven by Vorarlberg's energy provider Illwerke/VKW in cooperation with numerous (private) partners, like a e-mobility consultant, bank, the provincial public transport and tariff association, province of Vorarlberg, energy agency of Vorarlberg, provincial insurance company, Austrian

[22] https://www.vlotte.at/; Schuster (2010), Austrian Energy Agency (2015)

automobile club, car repair shops and the Vienna University of Technology. VLOTTE started in 2008 and was subsidised by Austrian's Climate and Energy Fund since 2009. Within three years the car pool included more than 350 e-cars and more than 150 public charging stations had been built. The energy required for fuelling of electric vehicles is generated by additionally installed renewable energy sources (PV and small hydropower). Its business model entails a mobility card, which – for monthly fee – includes the rental fee for an electric car, charging, all maintenance fees for the vehicle, membership at an Austrian automobile club and an annual ticket of the Vorarlberg public transport system. After 4 years the car can be bought by the client at a rate of 25% of the price for a new car.

The *energy provider* Illwerke/VKW is also an important driver when it comes to energy efficiency measures in companies. In the two so-called *"learning-energy-efficiency-networks"* (LEEN) that were set-up by Illwerke/VKW, 10-15 companies from the region come together to save energy by means of organizational and investment measures. Together they agree on target values regarding energy and CO_2 reduction. According to their self-presentation[23], one of the main benefits of LEEN is the exchange with other companies and experts in order to get a market overview and implement profitable energy efficiency activities with focus on cross-sectional technologies. The improvement of the public image is another reason mentioned.

In 2015 ten of these companies founded the *"alliance of carbon neutrality"* (Klimaneutralitätsbündnis) 2025. The aim of the initiative is to make all entrepreneurial activities climate-neutral by 2025 at the latest. The companies follow five steps: Measuring their CO_2 emissions; Decrease of CO_2 emissions by increasing efficiency, behavioural change and utilizing renewable energy; Compensation via dealing with CO_2 certificates; Certification and communication. By 2017 the almost 50 companies had joined the alliance. Again, the energy provider is the driving force.

What can be learned from these experiences? First, the company must benefit from the activities set. This can be directly – reduced (energy) costs, or indirectly by promoting the business' corporate social responsibility to acquire customers. Second, a potent partner can nudge companies into becoming active. In some cases it is the partners professional public relations and the promises they imply for the company; It may also be the additional competences the partner offers and the business itself lacks. Whatever the reason, having a powerful partner to one's side seems to be a motivational factor. And third, the region benefits from its regional affiliation and small size. In many interviews the point was made that the region is small enough for people to know each other or know "whom to call". Using this network for word-to-mouth recommendation by presenting successful projects to common challenges should not be underestimated.

[23] Forschungsgesellschaft für Energiewirtschaft (2016), Poster presentation

3.2.2 Involvement of regional population

The “Arbeitsgemeinschaft Erneuerbare Energie Vorarlberg” (AEEV, http://www.aeev.at/), an NGO dealing with renewable energy which is located in Vorarlberg is offering **crowd funding/financing projects** in order to allow for citizens’ contribution to the energy transition within the region. As it is clear, that the aim of energy autonomy will only be achieved if citizens are involved and able to contribute also financially. Within the region this involvement of population and municipalities leads to higher acceptance and willingness to contribute. AEEV is organized as an association, its members, sponsors and funders are regional citizens, enterprises, municipalities, other associations and organizations. The association is financed by membership fees, consulting services and additionally sponsored by Vorarlberg (NUTS2-region, Land).

The applied participation model allows citizens to finance sustainable business and get back the invested money in the form of repayment and interest either cash or as regional currencies/vouchers. Since the start of this option, more than EUR 4 million has been invested in municipalities and companies in citizen projects. It is successful, because it provides with advantages for all municipalities or enterprises may present a positive image are more independent from bank, citizens’ money works regionally and the population can identify themselves with sustainable actions. The program strengthens regional economic cycles and supports municipalities and enterprises in order to actively implement sustainable energy and environmental protection projects.

In the same region, also a second organization is active in this field of **citizens’ energy cooperatives**. Allmenda (http://www.allmenda.com/2016buergerkraftwerke), a cooperative also located in Vorarlberg, offers members the possibility for contributions to crowd financing for regional renewable energy projects.

The members of Allmenda are private households, companies, but also municipalities and regions who are willing to act as supporters of the energy transition in Vorarlberg. The cooperative provides with a platform for participating in the realization of renewable energy projects. Joint financing of citizens, allows to realize solar power installations even with little or no public funds. The cooperative is a platform for those who realize projects and people who want to invest funds into such investments. Professional and efficient processing and stable operation are ensured within the framework of the cooperative. By providing these services, the platform facilitates realization of private renewable installations by

- conducting an analysis of the relevant prerequisites (location, orientation, feasibility)
- providing an offer for financing the installation including conditions and considering available public funds (to be paid in monthly rates), taking over the liability for the investment and
- installing the renewable energy facility and putting it into operation.

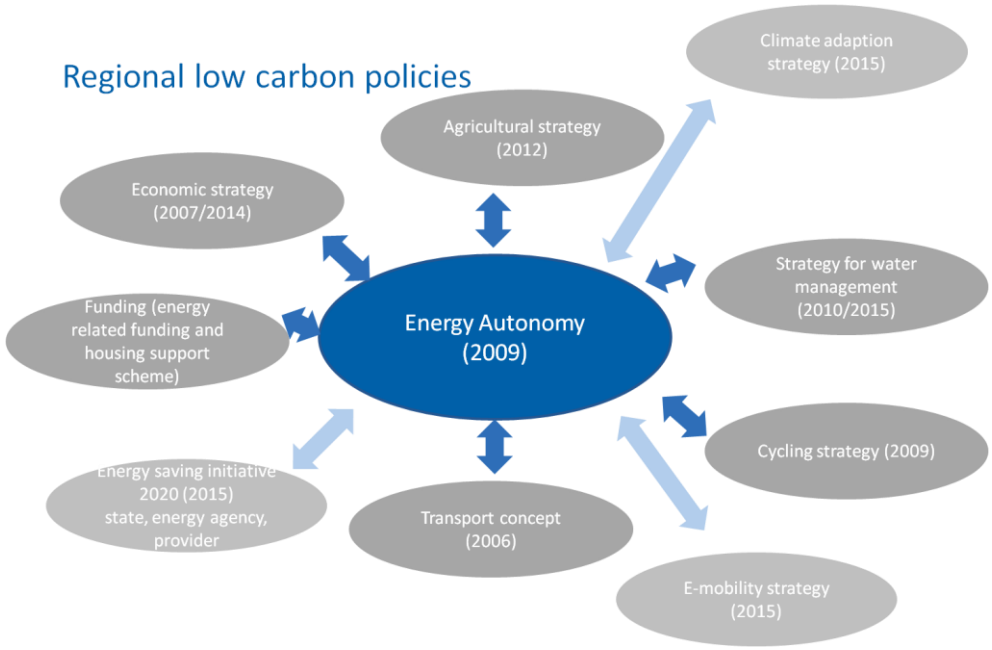
In order to maximise regional added value, the installation is assembled by components from the wider region (defined as Austria, Germany and Switzerland). The members of the coop-

erative who are financing a project may choose between a 1% rate of return (either cash or provided as regional currency) or to forgo the return in favour of low-cost investments.

3.3 Regional policies

As described above, Energy Future and its follow up, the strategy Energy Autonomy have become the driving force behind low carbon development in Vorarlberg in the last decade. Chapter 2.2 describes the strategy paper Energy Autonomy and its action programme in more detail. This chapter in turn, provides an overview about other policies in different sectors that contribute to the regional low carbon development.

Figure 3.1: Regional low carbon policies in Vorarlberg



Source: ÖIR

Vorarlberg's *economic strategy*[24] ("Leitbild 2010+ Wirtschaft Vorarlberg) from 2007 calls environmentally sustainable economic actions a key dimension of the state's economic policy. It refers specifically to the further development of sustainable, ecologically responsible products, technologies and services on the one side, and increased resource efficiency on the other. The strategy was evaluated and adapted in 2014[25] and by then refers clearly to Energy Autonomy – Vorarlberg. One field of action was dedicated to energy and resource efficiency, including activities like:

- Initiation of energy efficiency networks in the economy
- Use of industrial waste heat

[24] Land Vorarlberg (2007) Leitbild 2010+ Wirtschaft Vorarlberg. Amt der Vorarlberger Landesregierung

[25] Land Vorarlberg (2014b) Leitbild 2010+ Wirtschaft Vorarlberg. Update 2014. Amt der Vorarlberger Landesregierung

- Supporting enterprises in the introduction of energy management systems and the establishment of operational energy concepts
- Increase energy efficiency of buildings (new buildings and renovation)
- Expansion of renewable energy sources
- Introducing support for new processes to improve reusable material cycles (recovery of valuable metals, important components and raw materials (on the basis of physical, chemical and mechanical processes, etc.)
- Increase supporting measures for the sustainable and resource-saving production of goods.

Ökoland Vorarlberg – regional and fair[26] is the state's agricultural strategy and was published in 2012. In its four fields of actions (1. Education, social responsibility and partnership 2. Value added 3. Environment, food quality, animal welfare 4. Cultural landscape) and inherent 16 goals, there is one dedicated to the contribution of agriculture and forestry to reaching the goals of Vorarlberg's Energy Autonomy. This includes 100% renewable energy sources and the reduction of electricity consumption by 40% and heat consumption by 80% compared to 2010-2011 in 2050. Forestry plays a central role in that strategy, in particular through the exploitation of sustainably available wood reserves (e.g. cooperative use in small structured forest areas). Large contributions to Energy Autonomy are envisaged by promoting the installation of solar and photovoltaic plants.

The use of the hydropower to generate electricity has an important economic and political significance in Vorarlberg. In 2014 there were about 250 approved hydropower plants. The annual energy generated according to the energy reports of the country 2009-2013 is about 3,200 GWh. To achieve the objectives of Energy Autonomy, further expansion of hydropower is necessary. The *strategy for water management*[27] ("Wasserwirtschafts-Strategie des Landes Vorarlberg") of 2010 and 2015 make provisions for balancing energy-economic benefits and the impairment of the ecology of the body of water.[28]

In 2015 Illwerke/VKW, the energy agency and the state set up *Energy Saving Initiative 2020*[29] ("Energiesparoffensive 2020") to contribute to Energy Autonomy – Vorarlberg by saving about 30 gigawatt hours (GWh) annually in the next five years. Within the scope of the initiative, Illwerke/VKW and other energy suppliers support Vorarlberg's private customers, communities and companies in pursuing energy saving measures in the programme areas households, industry and trade as well as in the public sector. For 2016 Vorarlberg budgeted € 1 million. The programme included activities like the promotion of LED lights (in households, communal buildings, warehouses) and replacement of streetlights, funding for new circulation pumps,

[26] Land Vorarlberg (2012) Ökoland Vorarlberg – regional und fair

[27] Land Vorarlberg (2010) Wasserwirtschafts-Strategie des Landes Vorarlberg. Amt der Vorarlberger Landesregierung , Land Vorarlberg (2015e) Wasserwirtschaftsstrategie 2020 des Landes Vorarlberg. Amt der Vorarlberger Landesregierung

[28] Ibid, p. 18

[29] Land Vorarlberg (2015a) Energiesparoffensive 2020

funds for an energy saving programme in SMEs, forming of energy efficient networks in industries and accompanying consultation and information campaigns.

The *transport concept*[30] ("Verkehrskonzept Vorarlberg – Mobile in the Ländle") of 2006 with a forecast horizon up to the year 2015 concentrates on the scope for action of the state, but also targets transport policy on a higher level (cross-border, national). The transport concept follows the following principles:

- Traffic avoidance and relocation
- Handling transport environmentally friendly and safe
- Fair access to mobility
- Good accessibility for business and people
- Innovation
- Cooperation

These principles are detailed in priority areas and an action programme. The priority areas are defined by objectives and measurable criteria while the action programme includes deadlines and responsibilities. Awareness raising and behavioral change play is one of the key strategies in the transport concept: Mobility management is regarded as priority area and aims at influencing the choice of transport means by providing information, consultation and incentives for chosing environmental friendly modes of transport. Consequently a coordination platform *Vorarlberg MOBIL*[31] was established, to bundle activities in the field mobility management for the population, educational institutions, municipalities and companies.

One of the results of the transport concept was the elaboration of a *cycling strategy*[32] ("Frischer Wind – Die Radverkehrsstrategie für Vorarlberg") in 2009. According to the transport strategy, cycling trips should increase by 20% by the year 2015, especially for short and medium distances. This equals an increased modal split for cycling from 14% to 17%. The strategy defines principles and fields of action to promote the promotion of everyday cycling. The cycling strategy pursues a very broad communication approach ranging from high-quality infrastructure, information, services and awareness-raising to image-forming activities.

In 2015 Vorarlberg adopted the *e-mobility strategy*[33] ("Elektromobilitätsstrategie Vorarlberg 2015-2020 elektrisch mobil") and the *climate adaption strategy*[34] ("Strategie zur Anpassung an den Klimawandel in Vorarlberg"). As both were adopted at the very end of the period under

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[30] Land Vorarlberg (2006) Verkehrskonzept Vorarlberg 2006. Mobil im Ländle. Amt der Vorarlberger Landesregierung

[31] Vorarlberg MOBIL – anders unterwegs (n.d.) http://www.vmobil.at/

[32] Land Vorarlberg (2009) Frischer Wind – Die Radverkehrsstrategie für Vorarlberg. Amt der Vorarlberger Landesregierung

[33] Land Vorarlberg (2015b) Elektromobilitätsstrategie Vorarlberg 2015-2020 elektrisch mobil. Amt der Vorarlberger Landesregierung

[34] Land Vorarlberg (2015d) Strategie zur Anpassung an den Klimawandel in Vorarlberg – Ziele, Herausforderungen, Handlungsfelder. Amt der Vorarlberger Landesregierung

consideration of this case study, and hence cannot have had significant impact, they will not be described in more detail but are named to complete the overview of low carbon related policies.

Other important regional policy instruments for low carbon development of regional authorities include the different *funding schemes:*

Energy related funding

Vorarlberg, the federal government and many municipalities are promoting investments in various technical energy systems that lead to the reduction of energy dependency from fossil fuels and thus reduce CO_2 emissions.

These systems are e.g. wood heating systems, pellet heaters, heat pumps, thermal solar systems, photovoltaic systems and comfort ventilation systems with heat recovery. This funding is usually targeted at households. There are also lucrative subsidies for energy improvement measures for companies and municipalities. They include subsidized energy consulting (via Impuls3[35] and energy agency), investment grants for rehabilitation measures (thermal insulation, replacement of fossil fuelled heating systems, low energy building construction, etc) and funding for mobility management (klimaaktiv mobil). The later offers subsidies for the purchase of e-cars, pedelecs or bicycle storage facilities but also supports multi-year implementation programmes with up to 30% of the environmental-relevant costs.

Housing support scheme

The housing support scheme of Vorarlberg promotes ecological and sustainable construction and rehabilitation. Even before the Energy future Vorarlberg the amount of subsidies was linked to environmental criteria: The heating demand, the type of heat generation, materials used etc. had an impact on the support rates. This system of rewarding efforts in energy efficiency and ecological construction and has been strengthened in recent years.

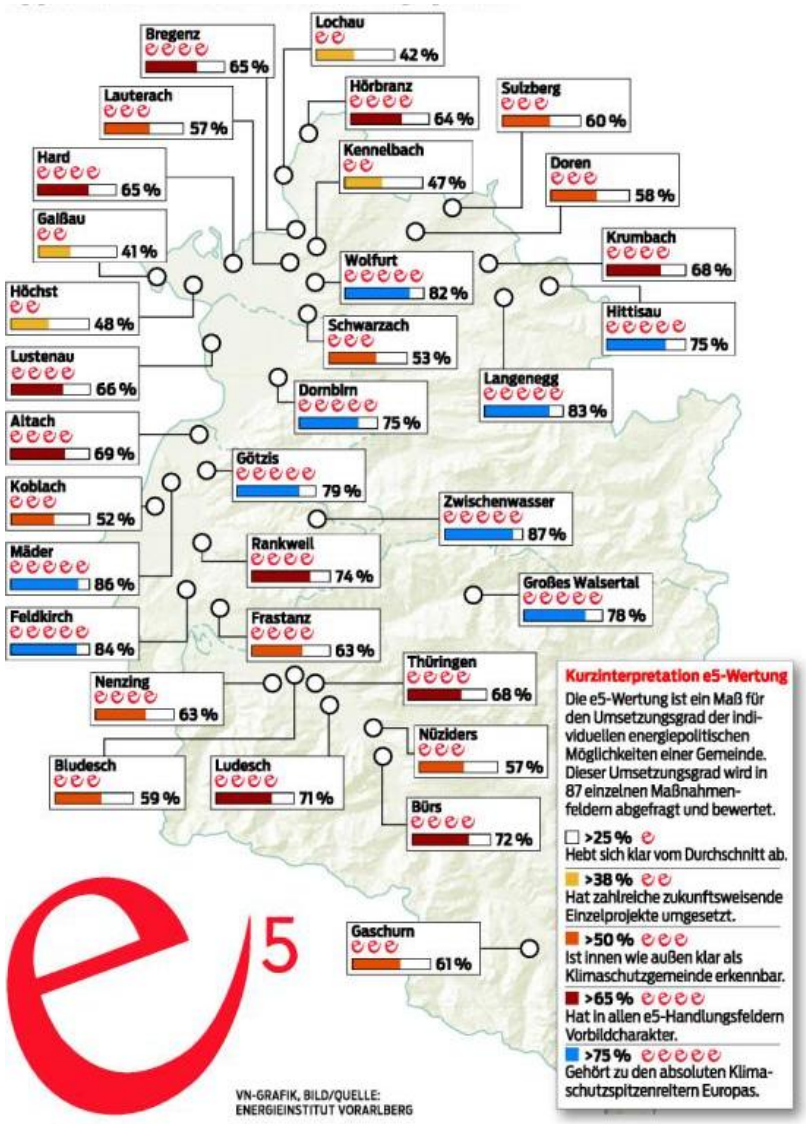
All the above mentioned policies and policy instruments are valid and significant for the Rhine Valley. Two more, should be mentioned here. First, *Vision Rheintal* that was already described in chapter 3.1 as regional governance layer. Its mission statement pronounces sustainable spatial planning as its core. This entails regional spatial planning policies that support low carbon development. Second, the *e5 programme for energy efficient communities.* With its broad coverage of participating municipalities in Rhine Valley and its institutional backing the e5 programme is more than a low carbon initiative but can be considered a regional energy efficiency policy. The programme will be described in the following chapter.

[35] Impuls3 is a subsidized consulting service for companies and public institutions to identify existing potentials and measures to improve energy and resource efficiency, the use of renewable energies and the prevention of waste. It also supports Vorarlberg's companies to implement environmental- and mobility management. This programme is a joint initiative of the State of Vorarlberg and the BMLFUW

3.4 Membership in low carbon programmes and initiatives

Vorarlberg communes and cities have joined numerous low carbon programmes and initiatives. A vast number of communes participate in either the e5 programme for energy efficient communities or climate alliance. In most cases the municipality is member of both initiatives. In Rheintal-Bodenseegebiet (NUTS 3 region) the percentage of the participating communities is higher than Vorarlberg's average: More than 50% participate in the e5 programme and 38% are members of the climate alliance.

Figure 3.2: Vorarlberg's e5 communities: spatial distribution and ranking



Source: Vorarlberger Nachrichten/Energieinstiut Vorarlberg (04/11/2016)

The *e5 programme for energy efficient communities* is the most popular and widely spread low carbon programme in Vorarlberg. It was established 1998 (developed mainly by the energy agency Vorarlberg) to support communities to identify their energy saving potential and increase the use of renewable energy. In 2004, klima:aktiv, the climate protection initiative of the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management took on the task of managing and developing the e5 programme in Austria at national level.

The annual monetary contribution for the e5 programme membership of a municipality depends on the size of its population.

The core element of the e5 programme is a comprehensive and structured catalogue of all energy-related measures relevant for municipalities. This catalogue serves as the basis for their communal action programme, which is prepared annually and also sets out an internal structure suitable for steering the process. Each year, the municipalities carry out an internal audit to determine their progress. At least every three years they are subject to an external assessment. The success of the communities is measured in "e". The best communities achieve up to "eeeee", corresponding to having implemented 75% of all possible energy measures according to the catalogue. The e5 programme correlates with the European system "European Energy Award".

Results of an evaluation[36] of the e5 programme in 2010 and interviews issue the programme a very good report. Its effects are

- increased networking, exchange of experiences and tools and subsequently more collaboration and positive competition between the municipalities
- increased the willingness of communities to take action in their energy policy
- establishment of quality orientated processes and structures for implementing energy-saving measures
- higher number of implementations of energy efficiency measures and policies

The *climate alliance* main objectives are the reduction of climate-damaging emissions by implementing local climate protection measures and preserving the rainforest in South America. The core of the climate protection measures is to provide information and raise awareness, as well as the implementation of projects and campaigns. Unlike the e5 programme, the climate alliance can be joined by federal states, municipalities, educational institutions and companies. In the case of Vorarlberg, due to the dominance of the e5 programme, climate alliance acts mainly in the field of development cooperation by supporting indigenous partners to protect the rainforest. Hence, this programme only plays a subordinate role in supporting the region in its low-carbon development. In total 15 municipalities of the Rhine-Valley joined climate alliance as members.

The *2000-Watt-Society* is regional initiative of nine cities in the boarder triangle region of Switzerland, Austria and Germany aiming at reducing the CO_2 emissions and energy use. The name refers to their goal to live in a city in which by 2050 each person consumes at most 2000 watt per year. The means of reaching this goal is mainly civic engagement and education: campaigning, brochures, articles, action days, puppet theatre etc. Another effect of this initiative is that the participants are required to monitor the city's low carbon development. Of

[36] Stadelmann (2010): Kommunale Energiepolitik in Vorarlberg. Untersuchung der Energiepolitik in den Gemeinden Vorarlbergs zur Evaluierung des E5-Landesprogramms für energieeffiziente Gemeinden. Masterarbeit. Universität für Bodenkultur.

the 12 participating cities two are in Vorarlberg: Feldkirch (one of the founding cities) and Bregenz (joined in 2016).

Smart City Rheintal is another initiative supporting research and implementation of low carbon projects. Financed by the Austrian Climate and Energy Fund (programme "Smart Energy Demo – FIT for SET"), four construction projects in three cities (Bregenz, Feldkirch, Hard) deal with the topics energy supply of the future, mobility of the future and living in the future.

The resulting projects are characterized by an energy-saving and resource-saving construction and CO_2-neutral energy supply adapted to the respective local conditions. For the supply of cold or heat in the newly emerging areas – the use of sea or ground water and locally available biomass is intended. With a view to the overall system, a "Mobility on Demand" system will be combined with a social media platform to support the user's behaviour towards alternative CO_2-neutral mobility forms such as public transport, cycling and e-mobility. The residential areas are partly equipped with innovative smart home solutions.

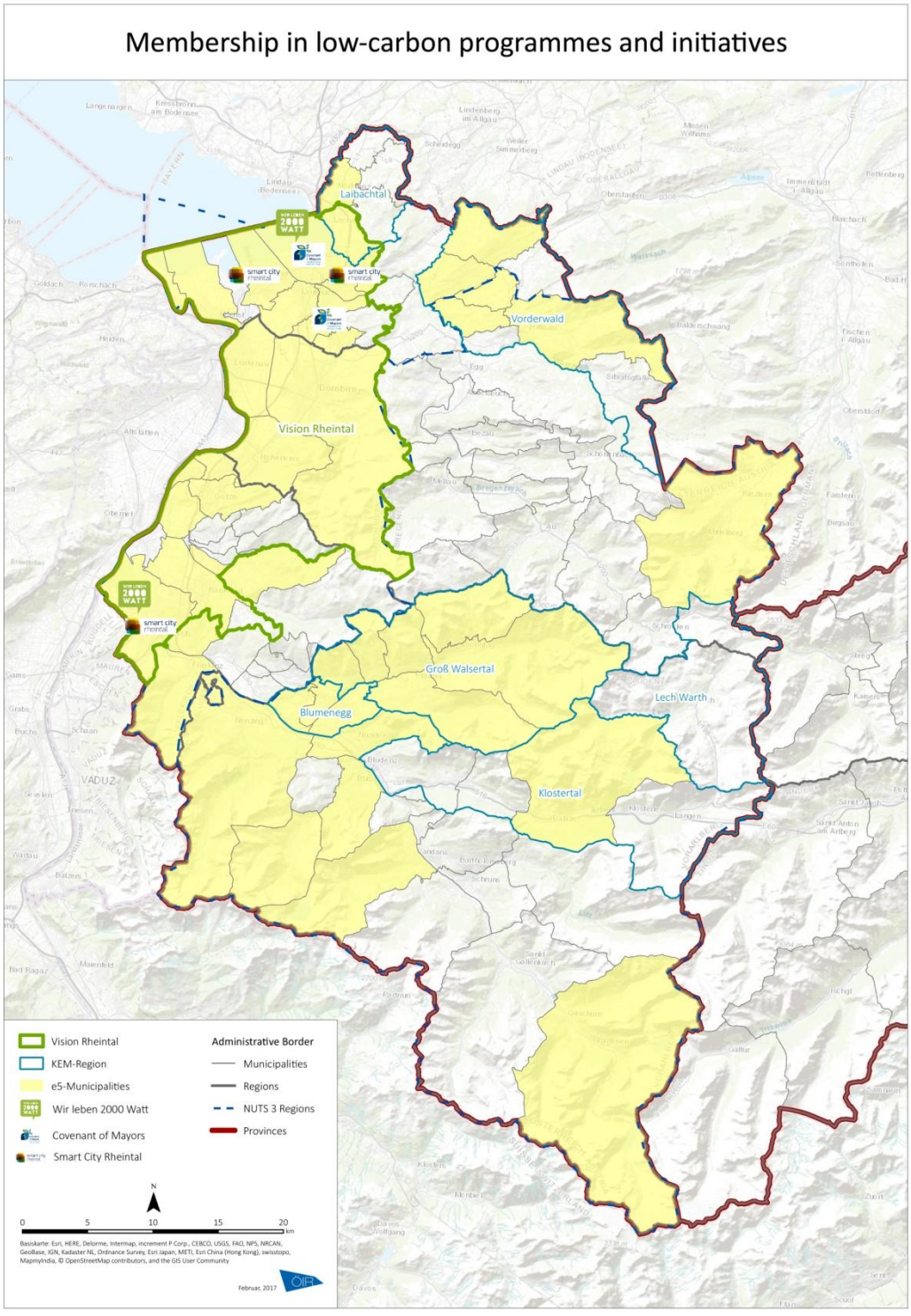
Another programme has been well accepted in Vorarlberg: the *model regions for climate and energy (KEM),* funded by the Austrian Climate and Energy Fund. A regions applies for funding with a regional implementation concept that describes the status quo, defines goals and benchmarks, identifies potentials and sets out concrete actions for the region in question (about max. 60,000 inhabitants).

After a successful application, a regional manager is appointed who acts as contact person for the stakeholders of the region and is driving the implementation of projects of the action plan. The funding supports the KEMs with exclusive investment grants for projects in the fields of PV, wood heating systems, solar thermal energy, electric vehicles (in combination with PV) and the refurbishment of buildings. While this instrument has been used widely in Vorarlberg (6 KEM, two of which are still active) Rheintal-Bodenseegebiet can only showcase the KEM Laibachtal on the very edge of Rhine Valley and KEM Vorderwald which functionally belongs already to another region,

The regional capital Bregenz (since 2011) and Wolfurt (since 2008), both situated in the Rheintal are members of the *Covenant of Mayors* (CoM), an initiative launched by the European Commission to support the local authorities in implementing the EU sustainable energy policies. The participants commit to prepare a Baseline Emission Inventory and a Sustainable Energy Action Plan, outlining the measures foreseen to increase energy efficiency and the use of renewable energy that has to be approved by the municipal council. Every two years an implementation report has to be submitted for evaluation and monitoring purposes. In a report on the implementation status of the Covenant of Mayors in Austria, the author states that due to the strong presence of many similar climate protection initiatives for municipalities and cities, the situation for promoting the Covenant of Mayors and motivating municipalities to

join the CoM is quite hard[37]. In interviews the statement reoccurred that these international programmes cause a lot of extra work but do not provide an additional benefit.

Figure 3.3: Membership in low-carbon programmes and initiatives



Source: ÖIR

[37] Hofer (2013): Feedback from the ground on the Covenant of Mayors implementation in Austria, p.3

ICLEI – Local Governments of Sustainability is yet another international programme promoting sustainable development (including low-carbon and resource-efficient development, smart infrastructure and biodiversity) via a global network of local and regional governments. According to their internet presence, they foster exchange and develop common methodologies and create tools to support communities in their climate action planning and use of sustainability management systems. Dornbirn in the Rhine Valley was the only city of Vorarlberg who participated in that network – it joined in 1992 and left in 2004. Interviews suggest that the issues at stake are already well covered by the e5 programme and that only cities of a certain size can benefit from international programmes.

4 National and European policy background, complementarity

4.1 Relevant national low carbon policies, interrelation with regional policy

The following paragraphs provide an overview on the national policies regarding low carbon development. The description is based on the report on GHG Projections and Assessment of Policies and Measures in Austria by the Environment Agency Austria[38], which details each policy according to its contribution to the reduction of greenhouse gas emissions in each sector.

A milestone in Austria's low carbon policy was the *Austrian Climate Strategy 2010*[39] that was elaborated in 2002 in order to reach the Kyoto target. A revised *Climate Startegy II*[40] was released in 2007. In response to the European 20-20-20 commitments on renewable energy and climate change Austria adopted the *Energy Strategy for Austria*[41] in 2010 after a broad stakeholder consultation process. In 2011, the *Austrian Climate Change Act*[42] was implemented to ensure clear sectoral targets, responsibilities and rules in order to promote effective measures for climate change mitigation. Among others, the Climate Change Act regulates the CO_2-reduction duties between the federal and the province level.

Several policies have been implemented in regard to *(energy) industries.* The Electricity Act 2012 and the Feed-In tariff ordinance 2012 provided a harmonisation of the system for promoting electricity production from renewable sources by granting fixed feed-in tariffs. Furthermore, the Green Electricity Act included new expansion targets for renewables for 2020 and was designed to increase funding for them. In 2014 the Energy Efficiency Act[43] was adopted, which includes different provisions for energy suppliers, companies and the federal government. This act is part of the implementation of the National Energy Efficiency Action Plan 2011 that set targets regarding the reduction of energy consumption.

In regard to reducing GHG emissions in the *transport sector* several federal laws and incentives are aiming to increase the share of clean energy sources and fuel efficiency in road transport as well as promoting a modal shift to environmental friendly transport. This include increased fuel taxes, the fuel ordinance, promoting the use of energy from renewable sources

[38] Umweltbundesamt (2015) GHG Projections and Assessment of Policies and Measures in Austria, reporting under Regulation (EU) 525/2013, Chapter 4

[39] BMLFUW (2002) Strategie Österreichs zur Erreichung des Kyoto-Ziels. Klimastrategie 2008/20012

[40] BMLFUW (2007) Klimastrategie 2007. Anpassung der Klimastrategie Österreichs zur Erreichung des Kyoto-Ziels 2008–2012

[41] BMWFJ & BMLFUW (2010) Eckpunkte der Energiestrategie Österreich

[42] 204/ME (XXIII.GP) Bundesklimaschutzgesetz

[43] Federal Law Gazette I No. 72/2014 Bundes-Energieeffizienzgesetz

but also the Implementation Plan for electric mobility 2010[44] and the klima:aktiv mobil initiative supporting mobility management and awareness raising.

National policies also target the *energy performance of buildings,* with funding schemes for increased share of renewable energy for space heating or building renovation initiative for buildings to improve their energy performance[45]. Guidelines and laws[46] on thermal insulation, energy certification of buildings or district heating and –cooling support the measures.

In the *agricultural sector,* national policies concentrate on the reduction of emission through-livestock and feeding management, sustainable nitrogen management and the implementation of EU agricultural policies. The programme for rural development 2007-2013 in the framework for EAFRD plays a very significant role in that regard. In includes several low carbon development measures, e.g.:

- Renunciation of yield-increasing inputs on arable lands and grasslands
- Mulching of arable land and direct seeding Low-loss application of liquid manure and biogas slurry
- Promotion of organic farming and grazing
- Reduced usage of mineral fertilisers

As one can see, policies were partly reflected in legislation which is also effective in the provinces on regional level. Bills on energy performance of buildings or the energy efficiency act, to only name a few, have also had an impact on regional level.

In Austria, legislation is shared between the federal government and the provinces which also formulated regional energy strategies and climate change programmes and other policies in related fields (e.g. agriculture, mobility,..). These regional strategies and funding schemes are discussed in chapter 3.3.

National funding schemes play a very important role on the regional level, with the Domestic Environmental Support Scheme, the Austrian Climate and Energy Fund (KLI.EN) as well as klima:aktiv/klima:active mobil leading the way.

The objective of the *Domestic Environmental Support Scheme (Umweltförderung im Inland – UFI)* is the protection of the environment by the prevention and reduction of pressures such as air pollution, greenhouse gases, noise and waste. Funding is provided by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management on the basis of the Environmental Aid Act[47]. The focus of its funding scheme lays on measures which pro-

[44] BMLFUW & WIKO (2010) 10 Punkte Aktionsprogramm zur Markteinführung von Elektromobilität mit erneuerbaren Energien in Österreich

[45] Federal Law Gazette I No. 40/2014 Sanierungscheck zur Verbesserung der Energieeffizienz von Prviatgebäuden und betrieblichen Gebäuden.

[46] Federal Law Gazette I No. 27/2012 Energieausweis-Vorlage-Gesetz, Federal Law Gazette I No. 58/2009 Wärme- und Kälteleitungsausbaugesetz, OIB Guideline 6 – Energieeinsparung und Wärmeschutz

[47] Federal Law Gazette I No. 185/1993 i.d.F. 34/2008 Umweltförderungsgesetz UFG

mote positive environmental effects (in particular CO_2 reductions and energy savings), such as the use of renewable, increasing energy efficiency, mobility measures, as well as projects for the prevention and reduction of air pollution, noise and hazardous waste. According to an evaluation[48], biomass heating, the distribution of heat and measures for energy savings in companies and thermal insulation were the most frequently request funding areas between 2011 and 2013.

The *Austrian Climate and Energy Fund* was established in 2007 by the Austrian Federal Ministries for "Transport, Innovation and Technology" and "Agriculture, Forestry, Environment and Water Management") to support the reduction of GHGs in Austria. Within the framework of annual programmes, KLI.EN promotes innovative projects that make a significant contribution to its goal. From 2007 to 2015 the fund supported more than 76,000 projects in 27 programmes with measures in the field of mobility, buildings, industrial production and energy supply with about € 934 million[49]. Programmes of this fund include inter alia

- Smart Energy Demo – FIT for SET that supported the Smart City Rheintal projects,
- E-mobility model regions that funded Rheintal's VLOTTE project
- Model regions for climate and energy (KEM), like Energy region Laibachtal.

Within its diverse programmes, KLI.EN supports a wide range of target groups form companies, to local authorities, private individuals and research facilities.

Klima:active, an initiative by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, was launched in 2004 to support and complement the national climate strategy by means of rapid and broad market introduction of climate-friendly technologies and services. Measures in the field of building and renovation, energy saving, renewable energy and mobility (klimaaktiv mobil, see below) are coordinated by the Austrian Energy Agency. They include consulting, information and qualification initiatives, the development of transparent standards and quality assurance measures as well as activation and networking of relevant actors. The coordination of the national e5 programme for energy efficient communities in also one of their tasks. In addition to the mobility programme (see below), funding is provided for energy efficient building construction.

Klimaaktiv mobil was launched in 2007. The initiative "offers extensive initiatives for promoting climate-friendly mobility management, alternative fuels, electric mobility and renewable energy in the transport sector as well as cycling and fuel-saving initiatives. It is intended to motivate the relevant stakeholders and decision makers and to support them in the development and implementation of projects for the promotion of climate-friendly, efficient and sustainable mobility. The cornerstones of klimaaktiv mobil are the funding programme for businesses,

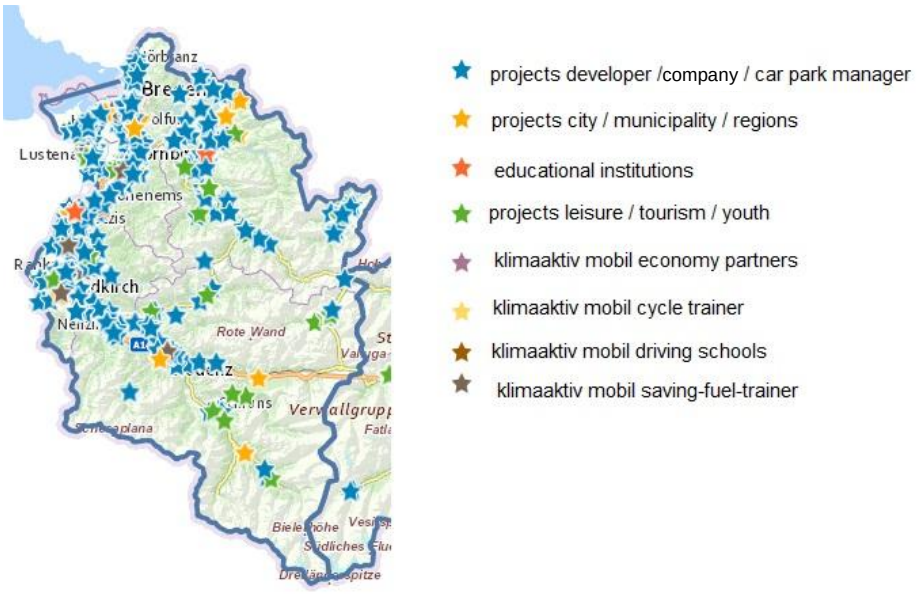
[48] BMLFUW (2014) p. 29

[49] Umweltbundesamt (2015) p. 95

communities and associations, target group-oriented counselling programmes, awareness-raising initiatives, partnerships, and training and certification initiatives."[50]

The map below illustrates the territorial distribution of projects in Vorarlberg including a rough classification of the project's content. It reveals the high concentration of projects in Rhine Valley region with a strong focus on the car park management.

Figure 4.1: Vorarlberg's klimaaktiv mobile projects since 2004



Source: Austrian Energy Agency (n.d.) kamaps.energyagency.at/index.php?id=28

The funds are provided by the BMLFUW as part of the klimaaktiv mobil funding programme or rather as part of the annual programme of the Climate and Energy Fund.

In general Rhine Valley benefits from the national funding programmes that are interweaved with regional policies and funding programmes. For example, Vorarlberg provides an add-on funding for improving cycle parking that receives funding form klimaaktiv mobil[51]. Small and medium sized enterprises – the main categories of companies in Rhine Valley – are eligible for non-repayable investment grants for projects that save energy or use renewable energy sources. This programme of the state of Vorarlberg is to a large extent complementary to the possibilities for funding within the UFI-scheme. Another example is impuls3 – a programme of the state of Vorarlberg to provide consulting services for companies and public institutions in the field of energy, material flow, environmental- and mobility management. Impuls3 is supported by UFI funding.

However, there were instances where the national funding opportunities were criticised for their crude implementation. In 2009 the application process of national funding for refurbish-

[50] Umweltbundesamt (2015), p. 106

[51] BMLFUW (2015) Klimaaktiv mobil Förderungsprogramm, p.9

ment of residential houses preferred the first movers and not those with coherent approaches[52]. That frustrated those who used regional support structure (mostly by the energy agency) to reach a well informed decisions and were then too late to get a share of the funds. An interview partner added another example: The implementing agency for many UFI funds, KPC, promoted funding opportunities for e-mobility. The fund was used up only ten days later. Again, the regional agencies had just started to inform potential beneficiaries about the funding details, who where then left behind empty handed. It is this "shooting from the hop" phenomenon on the national level that strikes the regional bodies as inadequate.

4.2 Complementarity of regional, national and EU low carbon policies

Although Austria had been active in the protection of the environment before its accession to the EU, the European Commission has been the driving force ever since. It is the EU level that sets the goals and impels Austria to act.

The EU energy- and climate objectives[53] base on the Kyoto Protocol. In addition, the EU committed itself in 2007 to their 20-20-20 targets as part of the climate and energy package and adopted in 2014 a framework for climate and energy policy by 2030 to meet the long-term goal of reducing greenhouse gas emissions by 80% to 95% by 2050 in the most cost-effective way possible. Targets were defined to put the EU on the way to achieve the transformation towards a low-carbon economy as detailed in the 2050 low-carbon roadmap. This roadmap emphasises the need to implement measures in all main sectors responsible for green house gas emissions in Europe. This includes power generation, industry, transport, buildings, construction and agriculture.

In chapter 4.1 Austrians national policies in these sectors have been described. In most cases these policies can be traced back directly or indirectly to EU policies – strategies, directives and regulations. This strengthens the prevailing opinion expressed in interviews, that EU policy is very important to national and hence regional low carbon development as they urge national policy makers into action. In most cases it is the EU (with or without lobbying of Austrians representatives) that defines objectives and sets targets aiming high. Austria – as all member states – is obliged to react accordingly. Interview partners agree that it needs this common approach, the peer pressure to implement these policies on national level. It takes the conviction that all the others are going in this direction too, especially for a small country like Austria, which might otherwise doubt that it is up for the challenge. Interviews further suggest that the obligatory reporting of all member states is an important source of information for the national/regional policy makers and civil society to know where they stand and to learn about other experiences and ways to tackle the challenges along the way.

[52] Energieinstitut Vorarlberg (12/2009), p. 9

[53] Read more on http://ec.europa.eu/clima/policies/strategies_en

All in all the EU policies in low carbon development are regarded as innovative by regional stakeholders. In general more innovative than national policies where the different interest groups often water down the policy's character when translated into national policy. In this regard the energy efficiency act was criticized by numerous interview partners due to its poor implementation (low impulse, massive administrative efforts, established measures were sold as new; etc.).

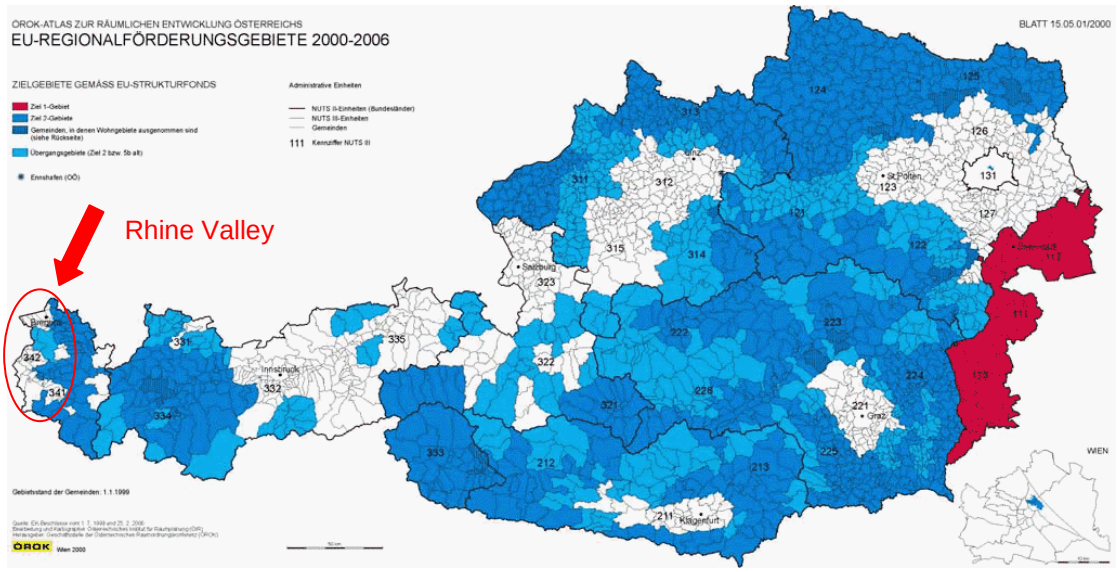
However, regional policy is in aligned with national policy which again is derived from EU policy. Regional and national funding schemes support those. No hints were found that indicate deviating or conflicting objectives. If any, Vorarlberg's policies tend to be more progressive than their national counterpart.

5 The role of cohesion policy for regional low carbon development

The structural funds (ERDF and ESF) as well as the cohesion funds are available as financing instruments for the implementation of cohesion policy, the ERDF being the far more important player in the field of low carbon development than ESF. The time frame of this case study ranges from 2000 to 2016, which corresponds to two entire EU programming periods: The first from 2000 to 2006 and the following from 2007 to 2013. Since 2014 the current programming period is under way but no substantial effects can be expected up to the time of writing this report. The following account will therefore focus on the ERDF and the more recent programming period 2007-2013.

In the programming period 2000-2006 Vorarlberg was partly eligible for funding under Objective 2 – "regions in structural decline" (including the phasing-out regions). In total, € 23 million of ERDF funding was available. The operational programme proposed two action points: (1) Development of sustainable enterprises and (2) Development of competitive (rural) regions. This however did not apply for many of the municipalities in Rhine Valley as they were not eligible under this objective.

Figure 5.1 Eligible areas for EU structural funds 2000-2006



Source: ÖROK, 2000, http://www.oerok.gv.at/eu-regionalpolitik/eu-strukturfonds-in-oesterreich-2000-2006/foerderfaehige-regionen.html

Notably, the mid-term evaluations (2003 and 2005) indicated, that the demand for environmentally improving measures in companies and R&D projects was particularly high[54].

The reform of the Structural Funds 2007-2013 resulted in a major reorientation of the European Structural Funds policy with the implication, that from that point onwards the entire fed-

[54] Land Vorarlberg (2015c) OP Vorarlberg 2007-2013/EFRE, Ziel Regionale Wettbewerbsfähigkeit & Beschäftigung 2007AT162PO003, p. 6

eral territory was eligible for funding and the policy was reoriented according to the restart of the Lissabon-Strategy and its objectives.

In Austria, the so called – STRAT.AT was the national strategic reference framework (NSRF) for EU cohesion policy 2007-2013. It served as a framework for the ERDF objectives "Regional Competitiveness and Employment" and "Convergence Phasing Out" (Burgenland) as well as the reference point for the ESF strategy. At the same time it took up the ERDF objective of "territorial cooperation" and includes the interfaces to priority 3 of the EAFRD rural development programme 2007-2013 (diversification of rural economy and quality of life in rural areas). STRAT.AT[55] defined three main policy priorities:

(1) Promoting an innovation-and knowledge-based economy;
(2) Developing attractive regions and competitive enterprise locations; and,
(3) Increasing the adaptability and qualification of the work force.

The priorities of the NSRF were translated into 9 regional programmes (one per Land) of which 8 under the Competitiveness Objective and one, as a Phasing-out region under the Convergence Objective (Burgenland). All in all the ERDF support in Austria amounted to less than 0.1% of GDP over the period, Burgenland receiving comparatively the lion share.[56] As the map below illustrates, Vorarlberg's Rhine Valley belonged to the region with the lowest amount of approved funding per capita. This very low financial contribution indicates the rather low importance of ERDF funds in Austria in general and in Vorarlberg's Rhine Valley in particular.

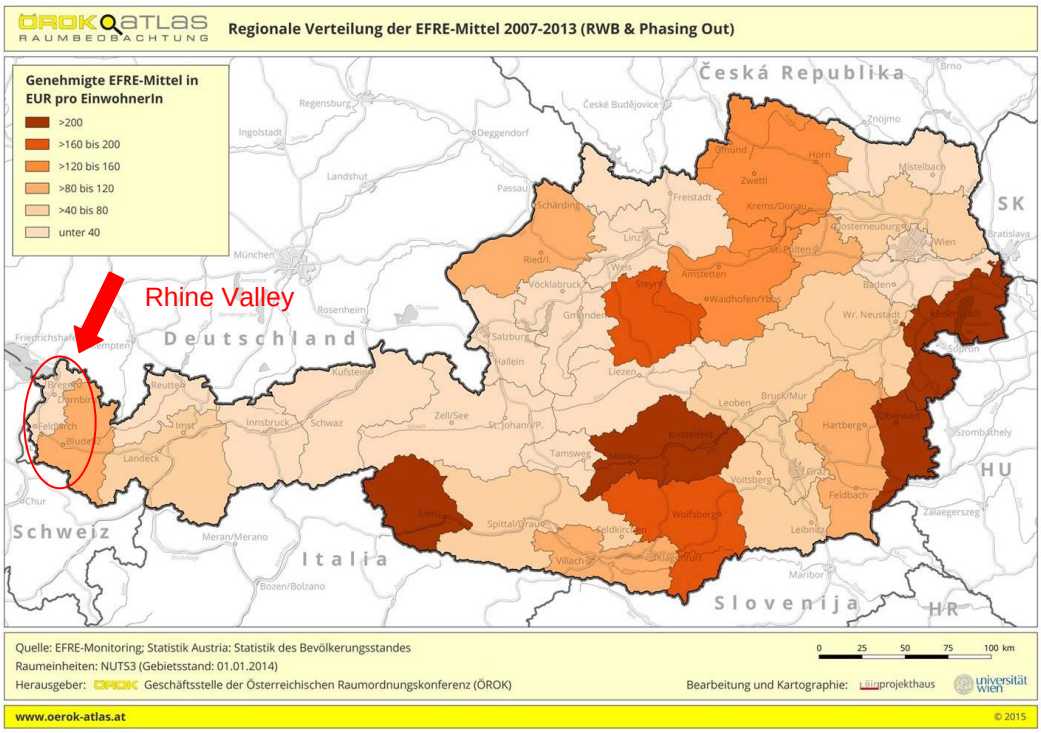
However, Vorarlberg was eligible under the competitive and employment objective and focussed in its operational programme on priority area 1 and 2 for which € 17.6 million of ERDF funds were available. This is approximately 1.22%[57] of the total EU money invested in Austria under Cohesion policy 2007-2013.

[55] ÖROK (2006) STRAT.AT 2007-2013. Nationaler Strategischer Rahmenplan Österreich. Download via www.oerok.gv.at

[56] Applica, Ismeri Europa, Cambridge Economic Associates (2016) WP1: Synthesis Report: Ex post evaluation of Cohesion Policy Programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF). Task 3 Country Report Austria. Commissioned by the EC – DG regio. p. 11

[57] Regional policy – InfoRegio: Operational Programme ‚Vorarlberg',http://ec.europa.eu/regional_policy/en/atlas/programmes/2007-2013/austria/operational-programme-vorarlberg

Figure 5.2: Regional distribution of ERDF funding (per capita) 2007-2013



Source: ÖROK Atlas, 2015, http://www.oerok-atlas.at

Target indicators suggest effects on low carbon development. Since there is no final evaluation available, these effects cannot be varified:

- Number of investments in eco-technologies and renewable energy technologies: 16
- Additional renewable energy capacity: 3 MW
- Decrease of greenhouse gas emissions: 12,500 kt CO_2

The following low carbon relevant activities eligible for funding were mentioned in the programme[58]:

- Support of research and technological development, particularly in small and medium sized enterprises (~ € 954,500)
- Support for small- and medium sized enterprises to promote environmentally-friendly products and production processes (introduction of efficient environmental management systems, introduction and application of pollution prevention technologies, inclusion of clean technologies in production processes) (~ € 250,000)
- Renewable energy (solar: ~ € 200,000, biomass: ~ € 2,649,848, energy efficiency, energy management, power-heat coupling ~ € 150,000)

The unanimous Landtag decision approving the Energy Autonomy – Vorarlberg, made energy to an important theme of the state of Vorarlberg. This lead to a reallocation of ERDF funding to the "biomass" area for increased investment in biomass power plants. It is this investment in biomass power plants that is the only issue that came to mind when asking interviewees about the effects of cohesion policy in Vorarlberg's low carbon development.

[58] Land Vorarlberg (2015c) OP Vorarlberg 2007-2013/EFRE, Ziel Regionale Wettbewerbsfähigkeit & Beschäftigung 2007AT162PO003, p. 40f

In the operational programme itself mentioned the Vision Rheintal as potential beneficiary[59] but consultations with stakeholders indicated that there were many hick-ups in the funding process, resulting in minimal input from ERDF funds to that programme. The Vision's set-up was not compatible with the funding logic concluded the consulted stakeholders.

In addition to the aforementioned operational programme, Vorarlberg is also covered by the INTERREG programme "Alpenrhein-Bodensee-Hochrhein"[60], the programme for cross-border cooperation within the framework of objective 3 "European territorial cooperation". It is also marginal touched by the German-Austrian programme for cross-border cooperation.

Figure 5.3: INTERREG A/Cross-border Cooperation 2006-2013

Source: BKA by ÖIR Informationsdienste GmbH (2006) on www.oerok.gv.at

Their focus is very similar to the programme under the competitive and employment objective but include a cross-border effect as a criterion for the funding of individual projects. The INTERREG programme "Alpenrhein-Bodensee-Hochrhein" notably funded the 2000-Watt society (refer to chapter 3.4) but will not do so in the 2014-2020 period, the funds for that project are exhausted. Since 2008 the programme also funds the International Lake Constance Conference, which in turn elaborated a cross-border strategy on energy and climate protection[61], engaged a working group on the climate change adaption strategy for regional agriculture, supported the development of a regional eco-mobility card and is currently implementing Lake Constance Region as model region for sustainable development.

[59] Land Vorarlberg (2015c) OP Vorarlberg 2007-2013/EFRE, Ziel Regionale Wettbewerbsfähigkeit & Beschäftigung 2007AT162PO003, p. 59

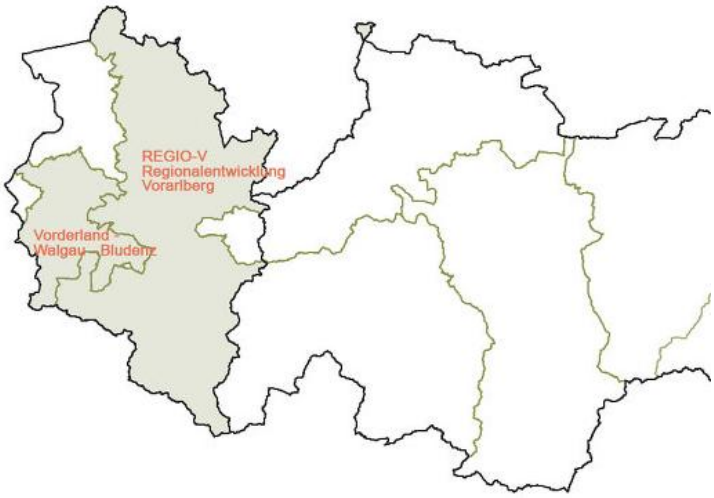
[60] EU (2007) Interreg IV-Programm „ Alpenrhein-Bodensee-Hochrhein" im Rahmen des Ziels Europäische territoriale Zusammenarbeit 2007-2013, C(2007)4345

[61] IBK (2014) Strategie zum Klimaschutz und Energy, http://www.bodenseekonferenz.org/41000/41362/Home/Strategie-Klimaschutz-und-Energie/Umwelt/Plattform-Klimaschutz-und-Energie/Strategie/index_v2.aspx

Interviews suggest that using financial means of cohesion policy for low carbon development is rather unattractive. Potential beneficiaries are increasingly reluctant to submit funding applications due to the administrative burdens, extra efforts and uncertainties regarding the actual distribution of funds. Although one can find noteworthy actions, all in all the cohesion policy seems to play an insignificant role in low carbon development of the region.

It is worth mentioning, that EAFRD/Leader also impacts low carbon development in Vorarlberg, although not in the Rhine Valley, which represent – to a large extent -, the urbanised region of Vorarlberg. In the former programming period the local action group "REGIO-V" was an important partner to promote and support low carbon development in their LEADER region. In the latest programming period, a second local action group was formed that incorporates Rhine Valley territory.

Figure 5.4: EAFRD/LEADER – local action groups in Vorarlberg 2014-2020



Source: Netzwerk Zukunftsraum Land LE 14-20

Their input to local carbon development remains to be seen. In addition EAFRD funds can be used co-finance UFI projects (in the fields of biomass local heating systems, construction, expansion and consolidation of heat distribution networks), projects financed by klimaaktiv mobil and the Climate and Energy Fund (for investments in KEM and photovoltaic systems in agriculture).

6 Good practices and successful approaches

6.1 Climate and Energy Model Regions (KEM) – national strategy with major impact on regional implementation)

The Climate and Energy Model Regions are a bottom-up approach in the field of climate change and energy funded by national climate and energy fund. The region has to apply for funding with a regional concept that describes the status quo, sets goals and benchmarks, identifies potentials and sets out concrete actions for defined regions (about max. 60,000 inhabitants). After a successful application, a regional manager is driving the implementation of projects of the action plan. This person also acts as contact person for the stakeholders of the region. The development process requires integration of the region by cooperation with stakeholders, local economy, local policy makers and citizens awareness for the project and its development can be increased and anchored within the region.

The programme is divided into three phases:

Phase 1 – Development of an implementation concept with predefined requirements with involvement of essential stakeholders.

Phase 2 – A model region manager receives funding and support for the acquisition of know-how for a period of 2 years (max. amount of funding for phases 1 and 2 is € 145,000, co-financing by the region is required). Prolongation is possible, but requires successful evaluation.

Phase 3 – The Climate and Energy Fund supports the Climate and Energy Model Regions with exclusive investment grants for projects in the fields of PV, wood heating systems, solar thermal energy, electric vehicles (in combination with PV) and the refurbishment of buildings.

KEM/Energyregion Leiblach Valley

The five Leiblach Valley communities (Hörbranz, Lochau, Möggers, Hohenweiler, Eichenberg) are committed to a sustainable and future-oriented regional development and energy autonomy in the joint association “Energieregion Leiblachtal”. The Leiblachtal was one of the KEM regions, as well as part of the Vorarlberg LEADER region “REGIO-V” (managed by the “LAG Regional Development Vorarlberg”). As of 2015, Laiblachtal is progressing its low carbon development with EAFRD funds only, and has not prolonged its participation in the KEM programme.

The main focus includes:

- regional value creation
- consistent energy efficiency
- broad independence from energy imports
- climate and environmental protection
- Reduction of energy demand and CO_2 emissions in the Leiblachtal through cross-community projects

- Increased independence from energy imports
- Involvement of citizens and enterprises (citizens' dialogue, Energy round table together with an energy consultant about the current energy projects of the valley)
- E-mobility for the whole Valley

Accomplished and planned projects are:

- Solar power station (34kWp) – Solarpower for the operation of ARA Leiblach Valley (Wastewater treatment plants)
- PV Cadastre to determine the suitability of PV installations for citizens
- Potential recovery for civil wind power plant (Möggers)
- Biomass heating (MZG Eichenberg)
- GIS based energy master plan
- LED street lighting concept
- Heating plant (Lochau)

6.2 Vision Rheintal – dissemination and consciousness building process "urban quarter of the future"

From 2010-2012, the regional planning cooperation of Vision Rheintal initiated a series of lectures, conferences, workshops, excursions etc. together with the provincial energy agency of Vorarlberg in order to generate ideas and give impetus for new urban quarters which provide with high living quality in future even though densities of settlements are increasing steadily. The target group of the initiative was mainly municipal actors, regional experts and the interested public. This initiative also had an impact on following research and implementation projects dealing with urban development quarters in the region aiming at exemplary low carbon development including energy efficient and sustainable buildings, intelligent home automation and a reasoned comprehensive mobility concept.

6.3 VLOTTE Rheintal – e-mobility model region

The VLOTTE region in the province of Voralberg, is one of Europe's largest e-mobility model areas. The project started in 2008 and was funded by the Austrian Climate and Energy Fund. Together with the project leader a company dealing with e-car planning and consulting a number of partners in the fields of energy and transport provision are cooperating: provincial energy provider (VKW), bank, provincial public transport and tariff association, province of Vorarlberg, energy agency of Vorarlberg, provincial insurance company, Austrian automobile club, car repair shops, Technical University.

VLOTTE-clients receive a mobility card for about € 500 per month, including car leasing and maintaining (of electrical parts), a public transport pass for the province and free of cost refuelling at public charging stations and membership at an Austrian automobile club. After 4 years the car can be bought by the client at a rate of 25% of the price for a new car.

In 2013 (end of the first project phase), more than 350 e-vehicles have been sold, 6.8 million kilometres travelled, 142 power stations including 3 fast charging stations (CHAdeMO) are in

operation. The energy required for fuelling of electric vehicles is generated by additionally installed renewable energy sources (PV and small hydropower).

Based on the experiences with the fist phases of the project VLOTTE, the following phase VLOTTE MEET & CHARGE aimed to accelerate the further spread of e-mobility in Vorarlberg. For this purpose, the public loading infrastructure is to be added to the public charging infrastructure in cost-effective, roaming-capable, standardized e-parking spaces for gastronomy. In September 2014 the first location was opened in KEM Laiblachtal. By September 2015, 13 sites had already been opened. Over the past project period, a constantly growing interest in charging infrastructure solutions for the gastronomy and hotels is to be perceived.

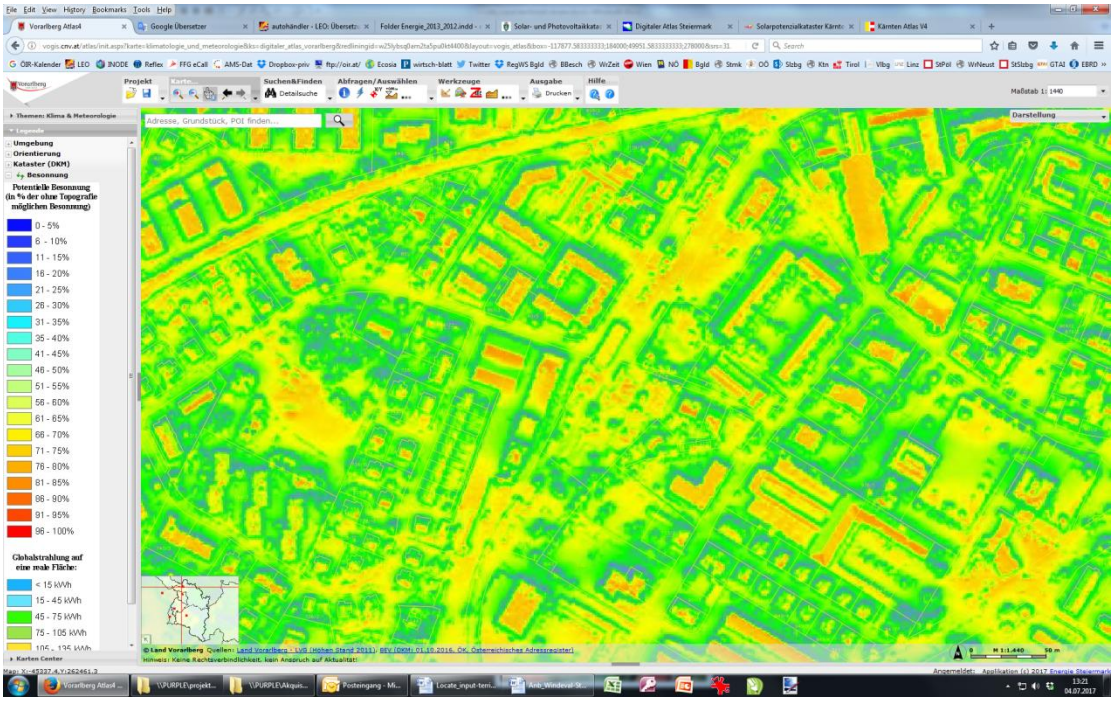
Currently, VLOTTE 2.00, promotes up to 125 electric vehicles for commuters in Vorarlberg. The total cost of the project is € 500,000, – per vehicle max. € 4.000, -. VKW the local energy provider is responsible for project organization, application and pre-financing for the subsidy to the commuters. Meanwhile, Vorarlberg shows a relatively high market share, 2.4% of all new registrations in Vorarlberg are e-cars, and the interest of the commuters has risen. It was possible to sponsor 113 of the 125 possible electric vehicles by mid-November 2016. A separate platform was programmed to better organize the project between car dealers and the VKW. All relevant data and documents are recorded via this platform. These form the basis for subsidy billing.

6.4 Solar atlas Vorarlberg

The solar atlas is a service of the region and offers landowners and building owners the opportunity to a ex-ante online check whether such an investment in solar energy makes sense. By means of laser scanning, data were determined and evaluated in terms of the orientation and inclination of the surfaces (including roof surfaces) as well as shading through vegetation and surrounding buildings. The local global radiation value was used to calculate the overall solar potential. This overview provides with a first impression of which locations are better or not so good for solar use – i.e. whether there is very good or good potential on the areas and roofs of the region.

The service cannot be seen as a substitute for expert advice, but serves as an initial information. It has the potential to convince in case of very good prerequisites and avoids further expenses of private persons and enterprises in the case of very poor suitability.

Figure 6.1: Solar atlas Vorarlberg (detail)



http://vogis.cnv.at/atlas/init.aspx?karte=klimatologie_und_meteorologie&ks=digitaler_atlas_vorarlberg&layout=vogis_atlas

References

AMS – Public Employment Service Austria (2015) AMS Arbeitsmarktprofile 2015 Vorarlberg, www.arbeitsmarktprofile.at/8/teil_02.html (last accessed 30/11/2016)

AMS – Public Employment Service Austria (2016) AMS Vorarlberg – die Organisation www.ams.at/_docs/800_ams_VBG_dieOrganisation.pdf

Applica, Ismeri Europa, Cambridge Economic Associates (2016) WP1: Synthesis Report: Ex post evaluatin of Cohesin Policy Programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF). Task 3 Country Report Austria. Commissioned by the EC – DG regio, http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/expost2013/wp1_at_report_en.pdf (last accessed 01/02/2017)

Austrian Energy Agency (2015) Model regions of electric mobility in Austria. Experiences form six years of pioneering work. Austrian Climate and Energy Fund, https://www.klimafonds.gv.at/assets/Uploads/Broschren/Modellregionen-der-Elektromobilitt/MODELREGIONSofelectricmobilityinAustria.pdf (last accessed 30/01/2017)

Austrian Energy Agency (n.d.) Map on all projects since 2004 funded under klimaaktiv mobil. kamaps.energyagency.at/index.php?id=28, (last accessed 01/02/2017)

BMLFUW – Federal Ministry of Agriculture and Forestry, Environment and Water Management (2002): Strategie Österreichs zur Erreichung des Kyoto-Ziels. Klimastrategie 2008/20012. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, 17/07/2002. Vienna

BMLFUW – Federal Ministry of Agriculture and Forestry, Environment and Water Management (2007): Klimastrategie 2007. Anpassung der Klimastrategie Österreichs zur Erreichung des Kyoto-Ziels 2008–2012. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, 21/03/2007. Vienna. http://www.klimastrategie.at, (last accessed 30/01/2017)

BMLFUW – Federal Ministry of Agriculture and Forestry, Environment and Water Management (2014): Evaluierung der Umweltförderungen des Bundes 2011-2013, BMLFUW, Wien, 2014 https://www.bmlfuw.gv.at/umwelt/klimaschutz/ufi/ufi.html (last accessed 30/01/2017)

BMLFUW – Federal Ministry of Agriculture and Forestry, Environment and Water Management (2015) Klimaaktiv mobil Förderungsprogramm. Leistungsbericht und Neue Offensiven. BMLFUW.

BMLFUW& WIKO (2010): 10 Punkte Aktionsprogramm zur Markteinführung von Elektromobilität mit erneuerbaren Energien, in Österreich. 20/01/2012. http://doku.cac.at/aktionsprogramm_elektro mobilitaet.pdf

BMWFJ &BMLFUW – Federal Ministry of Economy, Family and Yout & Federal Ministry of Agriculture and Forestry, Environment and Water Management (2010): Eckpunkte der Energiestrategie Österreich. Wien, 20/03/2010. http://www.energiestrategie.at/, (last accessed 30/01/2017)

BMWFW – Federal Mionistry of Science, Research and Economy (2014) Daten, Fakten zu Wohnungs-politik und Wohnungswirtschaft in Österreich, www.bmwfw.gv.at/Wirtschaftspolitik/Wohnungspolitik/Documents/Zahlen%20Daten%20und%20Fakten%20-%20Endbericht.pdf (last accessed 29/11/2016)

Energieinstitut Vorarlberg (12/2009): max50, Ausgabe Dezember 2009, Nr. 40

Energieinstitut Vorarlberg (07/2011): max50, Ausgabe Juli 2011, Nr. 45

EU (2007) Interreg IV-Programm " Alpenrhein-Bodensee-Hochrhein" im Rahmen des Ziels Europäische territoriale Zusammenarbeit 2007-2013, C(2007)4345

Eurostat Datenbank (2016): Bruttoinlandsprodukt (BIP) pro Einwohner zu laufenden Marktpreisen nach NUTS-3-Regionen, appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10r_3popgdp&lang=de (last accessed 29/11/2016)

Forschungsgesellschaft für Energiewirtschaft (2016) LEEN Vorarlberg- Das erste Lernende Energie-Effizienz-Netzwerk Österreichs, https://www.ffegmbh.de/download/bildarchiv/20130206%20LEEN-Poster%20Vorarlberg%20IEWT%202013_reduz.pdf (last accessed 30/01/2017)

Gmeiner, Energieinsitut Vorarlberg (2015) Präsentation: Energy Autonomy Vorarlberg – Ecologisation of the local building industry. Target, strategy, tools, samples. http://www.energieinstitut.at/wp-content/uploads/2015/05/Ecologisation-of-the-local-building-industry.pdf?x43267 (last accessed 30/01/2017)

Hofer (2013): Feedback from the ground on the Covenant of Mayors implementation in Austria

IBK – International Bodensee Conference (2014) Strategie zum Klimaschutz und Energy, http://www.bodenseekonferenz.org/41000/41362/Home/Strategie-Klimaschutz-und-Energie/Umwelt/Plattform-Klimaschutz-und-Energie/Strategie/index_v2.aspx

Illwerke/VKW Group – Vorarlberger Energy Networks GmbH (2016) Gasversorgungsgebiet Vorarlberg, www.vorarlbergnetz.at/downloads/at/Vorarlberg_Netz_Uebersicht_2016_01_25.pdf (last accessed, 07/02/2017)

IRKA/IRR – Internationale Regierungskommission Alpenrhein/Internationale Rheinregulierung (n.d.) Zukunft Alpenrhein: Der Alpehrhein – Entwicklungsgeschichte. www.alpenrhein.net/DerAlpenrhein/EntwicklungsGeschichte/tabid/79/Default.aspx (last accessed, 07/02/2017)

Land Vorarlberg (1971) Raumordnung Vorarlberg, Strukturanalyse des Landesgebietes, Band 1

Land Vorarlberg (2006) Verkehrskonzept Vorarlberg 2006. Mobil im Ländle. Amt der Vorarlberger Landesregierung

Land Vorarlberg (2007) Leitbild 2010+ Wirtschaft Vorarlberg. Update 2014. Amt der Vorarlberger Landesregierung

Land Vorarlberg (2009) Frischer Wind – Die Radverkehrsstrategie für Vorarlberg. Amt der Vorarlberger Landesregierung

Land Vorarlberg (2012) Ökoland Vorarlberg. Regional und Fair. Strategie Landwirtschaft Vorarlberg 2020. Amt der Vorarlberger Landesregierung.

Land Vorarlberg (2013) Verkehrsbericht. Abteilung Allgemeine Wirtschaftsangelegenheiten

Land Vorarlberg (2014a) Leitfaden Was Staatsbürgerschaftswerber über unser Land wissen sollten, https://www.vorarlberg.at/pdf/leitfaden-vorarlberg.pdf, (last accessed 06/02/2017)

Land Vorarlberg (2014b) Leitbild 2010+ Wirtschaft Vorarlberg. Update 2014. Amt der Vorarlberger Landesregierung

Land Vorarlberg (2015a) Energiesparoffensive 2020 https://www.vorarlberg.at/vorarlberg/wasser_energie/energie/energie/neuigkeiten_mitbild_/energiesparoffensive2020.htm (last accessed 07/02/2017)

Land Vorarlberg (2015b) Elektromobilitätsstrategie Vorarlberg 2015-2020 elektrisch mobil. Amt der Vorarlberger Landesregierung

Land Vorarlberg (2015c) OP Vorarlberg 2007-2013/EFRE, Ziel Regionale Wettbewerbsfähigkeit & Beschäftigung, 2007AT162PO003

Land Vorarlberg (2015d) Strategie zur Anpassung an den Klimawandel in Vorarlberg – Ziele, Herausforderungen, Handlungsfelder. Amt der Vorarlberger Landesregierung

Land Vorarlberg (2015e) Wasserwirtschaftsstrategie 2020 des Landes Vorarlberg. Amt der Vorarlberger Landesregierung

Land Vorarlberg (2016) Vorarlbergs größte Unternehmen TOP 10, Abteilung Allgemeine Wirtschaftsangelegenheiten, http://cdn4.vol.at/2016/03/2016_03_31_TOP_100_AnsichtsPDF.pdf (last accessed 18/02/2017)

Land Vorarlberg (2017): Energie Links, www.vorarlberg.at/vorarlberg/wasser_energie/energie/energie/weitereinformationen/energie-links/energie-links.htm (last accessed 18/02/2017)

Land Vorarlberg (n.d.) Impuls3, http://www.vorarlberg.at/vorarlberg/wirtschaft_verkehr/wirtschaft/wirtschaft/weitereinformationen/impuls3/wasistimpuls3.htm (last accessed 06/02/2017)

Land Vorarlberg, Landesstelle für Statistik (2016a): Bevölkerung Vorarlbergs nach Wohnsitzqualität, NUTS 3 Regionen und Bezirken im Jahresdurchschnitt, apps.vorarlberg.at/bevoelkerungsstatistik/Default.aspx (last accessed 06/02/2017)

Land Vorarlberg, Landesstelle für Statistik (2016b) Bevölkerung Vorarlbergs mit Hauptwohnsitz, NUTS 3 Regionen, Bezirken, Regionen und Gemeinden im Jahresdurchschnitt 2016, Region: Rheintal, apps.vorarlberg.at/bevoelkerungsstatistik/Default.aspx, (last accessed 06/02/2017)

Netzwerk Zukunftsraum Land (n.d.) Leader & Regionen – Vorarlberg, http://www.zukunftsraumland.at/index.php?inc=page&id=40 (last accessed 18/01/2017)

Obkircher (2015) The Influence of Regional Identities on Spatial Development: A Challenge for Regional Governancen Processes in Cross-Border Regions 221-243; In: Governance in Transition, edited by Jan Bucek and Andrew Ryder, Springer Science+Business Media Dordrecht, p:230

Österreichischer Biomasse-Verband (2016) Bioenergieatlas, www.biomasseverband.at/presse/presseaussendungen/pressematerialien-2017/bioenergie-atlas/ (last accessed 18/01/2017)

OIB – Österreichiches Institut für Bautechnik (2015) OIB Richtlinie 6 – Energieeinsparung und Wärmeschutz OIB-330.6-009/19, https://www.oib.or.at/sites/default/files/richtlinie_6_26.03.15.pdf, (last accessed 18/01/2017)

ÖIR et al (2010) Regio Energy – Regionale Szenarien erneuerbarer Energie potenziale in den Jahren 2012/2020. Endbericht. www.regioenergy.oir.at/sites/regioenergy.oir.at/files/uploads/pdf/REGIO-Energy_Endbericht_201013_korr_Strom_Waerme.pdf (last accessed 12/02/2017)

Österreichische Bundesbahnen (2017) ÖBB S-Bahn Vorarlberg, www.oebb.at/de/entdecken/s-bahn-vorarlberg, (last accessed 31/01/2017)

ÖROK – Austrian Conference on Spatial Planning (2006) STRAT.AT 2007-2013. Nationaler Strategischer Rahmenplan Österreich. Prepared by ÖIR, Download via www.oerok.gv.at

ÖROK – Austrian Conference on Spatial Planning (2012) STRAT.AT Bericht 2012 – Strategic Report, prepared by convelop, http://ec.europa.eu/regional_policy/sources/how/policy/doc/strategic_report/2012/at_strat_report_2012.pdf, (last accessed 31/01/2017)

Schuster (2010), Electric mobility model region VLOTTE in Austria: Scientific accompanying research. The 25th Word Battery, Hybrid and Fuel Cell Electric Vehicle Symposium & Exhibition EVS-25 Shenzhen, China, Nov. 5-9, 2010

Stadelmann (2010): Kommunale Energiepolitik in Vorarlberg. Untersuchung der Energiepolitik in den Gemeinden Vorarlbergs zur Evaluierung des E5-Landesprogramms für energieeffiziente Gemeinden. Masterarbeit. Universität für Bodenkultur.

Statistik Austria (2014) Leistungs- und Strukturstatistik

Statistik Austria (2015) Bundesländer Energiebilanzen – Vorarlberg 1988-2015

Statistik Austria (2016a) Bundesländer Energiebilanzen – Vorarlberg 2016

Statistik Austria (2016b) Gliederung Österreichs in NUTS-Einheiten; Gebietsstand, www.statistik.at/web_de/klassifikationen/regionale_gliederungen/nuts_einheiten/index.html (last accessed 04/11/2017)

Statistik Austria (2017a) NUTS 3 Österreichs, Gebietsstand 1.1.2017, http://www.statistik.at/web_de/klassifikationen/regionale_gliederungen/nuts_einheiten/index.html (last accessed 30/02/2017)

Statistik Austria (2017b) Österreich ZAHLEN.DATEN.FAKTEN, www.statistik.at/web_de/services/oesterreich_zahlen_daten_fakten/index.html (last accessed 17/02/2017)

Umweltbundesamt (2015) GHG Projections and Assessment of Policies and Measures in Austria, reporting under Regulation (EU) 525/2013, Chapter 4

Umweltbundesamt (2017) Energie- und Monitoringbericht Vorarlberg

Verkehrsverbund Vorarlberg (2017) Zonenplan 2017, www.vmobil.at/index.php?menuid=93 (last accessed 24/02/2017)

Vorarlberger Landesregierung (2010) Energiezukunft Vorarlberg – Ergebnisse aus dem Visionsprozess. Schritt für Schritt zur Energieautonomie, Quantifizierungen und Zukunftsentwürfe; Bregenz (last accessed 18/01/2017)

Vorarlberger Landesregierung (2011) Schritt für Schritt zur Energieautonomie in Vorarlberg. 101 enkeltaugliche Maßnahmen. Maßnahmenplan bis 2020 Schlussbericht. Bregenz, www.vorarlberg.at/pdf/schlussberichtenkeltaugli.pdf, (last accessed 18/01/2017)

Vorarlberger Nachrichten/Energieinstitut Vorarlberg (04/11/2016) Liste der e5 Gemeinden wächst um vier Orte. http://www.vn.at/lokal/vorarlberg/2016/11/03/liste-der-e5-gemeinden-waechst-um-vier-orte.vn (last accessed, 18/01/2017)

Vorarlberger Elektroautomobil Planungs- und Beratungs GmbH (2016): Statusbericht der E-Mobilitätsmodellregion VLOTTE, November 2016

Vision Rheintal (2013): 29 Gemeinden. 1 Lebensraum, www.vision-rheintal.at/fileadmin/VRuploads/PDF/Downloads_A-Z/Projektinformationen/Kurzinfo_deutsch_2013_web.pdf (last accessed, 18/01/2017)

Wirtschaftskammer Vorarlberg (2016) Vorarlberg in Zahlen, www.wko.at/service/vbg/VIZ2016_Web.pdf (last accessed, 18/01/2017)

Wirtschafts-Standort Vorarlberg GmbH (2015) Chancenland Vorarlberg – Standortdokumentation. Dornbirn. http://www.vorarlberg.at/pdf/standortdokumentation_201.pdf (last accessed, 17/02/2017)

Legislation

204/ME (XXIII.GP) Bundesklimaschutzgesetz (Climate Change Act): Bundesverfassungsgesetz, mit dem das Bundesverfassungsgesetz vom 27. November 1984 über den umfassenden Umweltschutz geändert wird, Bundesverfassungsgesetz, mit dem das Bundes- Verfassungsgesetz geändert wird, und Bundesgesetz, mit dem Bund und den Ländern Klimaschutzverpflichtungen zugeordnet werden.

Federal Law Gazette No. 185/1993 i.d.F. 34/2008 Umweltförderungsgesetz UFG: Bundesgesetz über die Förderung von Maßnahmen in den Bereichen der Wasserwirtschaft, der Umwelt, der Altlastensanierung, zum Schutz der Umwelt im Ausland und über das österreichische JI/CDM-Programm für den Klimaschutz.

Federal Law Gazette I No. 149/2002 i.d.F. BGBl. I Nr 105/2006 Ökostromgesetz: Bundesgesetz, mit dem Neuregelungen auf dem Gebiet der Elektrizitätserzeugung aus erneuerbaren Energieträgern und auf dem Gebiet der Kraft-Wärme-Kopplung erlassen werden (Ökostromgesetz) sowie das Elektrizitätswirtschafts- und -organisationsgesetz (ElWOG) und das Energieförderungsgesetz 1979 (EnFG) geändert werden. Zuletzt geändert durch BGBl. I Nr. 114/2008.

Federal Law Gazette I No. 27/2012 Energieausweis-Vorlage-Gesetz, Federal

Federal Law Gazette I No. 40/2007 Klima- und Energiefondsgesetz KLI:EN-FondsG: Bundesgesetz über die Errichtung des Klima- und Energiefonds.Federal Law Gazette I No. 44/2008 Ökostromgesetz – ÖSG: Bundesgesetz, mit dem Neuregelungen auf dem Gebiet der Elektrizitätserzeugung aus erneuerbaren Energieträgern und auf dem Gebiet der Kraft-Wärme-Kopplung erlassen werden.

Federal Law Gazette I No. 40/2014 Sanierungscheck zur Verbesserung der Energieeffizienz von Privatgebäuden und betrieblichen Gebäuden.

Federal Law Gazette I No. 58/2009 Wärme- und Kälteleitungsausbaugesetz,

Federal Law Gazette I No. 630/1994 Mineralölsteuergesetz 1995, zuletzt geändert durch das BGBl. I Nr. 105/2014.

Federal Law Gazette I No. 72/2014 Bundesgesetz über die Steigerung der Energieeffizienz bei Unternehmen und dem Bund (Bundes-Energieeffizienzgesetz – EEffG)

Federal Law Gazette I No. 72/2014 Energieeffizienzpaket des Bundes: Bundesgesetz, mit dem das Bundes-Energieeffizienzgesetz, das Bundesgesetz, mit dem der Betrieb von bestehenden hocheffizienten KWK-Anlagen über KWK-Punkte gesichert wird, und das Bundesgesetz, mit dem zusätzliche Mittel für Energieeffizienz bereitgestellt werden, erlassen sowie das Wärme-und Kälteleitungsausbaugesetz und das KWK-Gesetz geändert werden (Energieeffizienzpaket des Bundes)

Homepages

www.covenantofmayors.eu/

www.energieautonomie-vorarlberg.at

www.iclei.org/

www.vision-rheintal.at/

www.vorarlberg.at/

www.vlotte.at/

www.oerok-atlas.at

Vorarlberg MOBIL – anders unterwegs (n.d.) http://www.vmobil.at/

European Commission – Climate action: ec.europa.eu/clima/policies/strategies_en

d-maps.com: d-maps.com/m/europa/austria/vorarlberg/vorarlberg21.gif

http://www.langconsulting.at/index.php/de/forschung/transferprojekte?catid=33&id=79:1000-passivhaeuser-in-oesterreich-3-dokumentationsperiode

List of interviewed persons

Martin Assmann, Head of department of city- and transport planning of the City of Dornbirn, before that: project leader of Vision Rheintal, date of interview: 24/1/2017

Sabine Danczul, Project leader of Vision Rheintal, date of interview: 18/01/2017

Hartmut Dumke, University of Technology, project leader of ENUR, date of interview: 26/1/2017

Manfred Kopf, Head of regional planning office at Vorarlberg provincial administration, date of interview: 19/01/2017

Martin Reis, Energieinstitut Vorarlberg, Department leader: mobility, date of interview: 13/1/2017

Gabor Mödlagl, Building authority, City of Feldkirch, date of interview: 17/1/2017

Bertram Schedler, Ex – Manager of the KEM Laibachtal, project leader of developing Energiezukunft Vorarlberg, date of interview: 17/1/2017

Christian Vögel, Head of energy and climate protection office at Vorarlberg provincial administration, date of interview: 30/01/2017

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