

AlpLinkBioEco

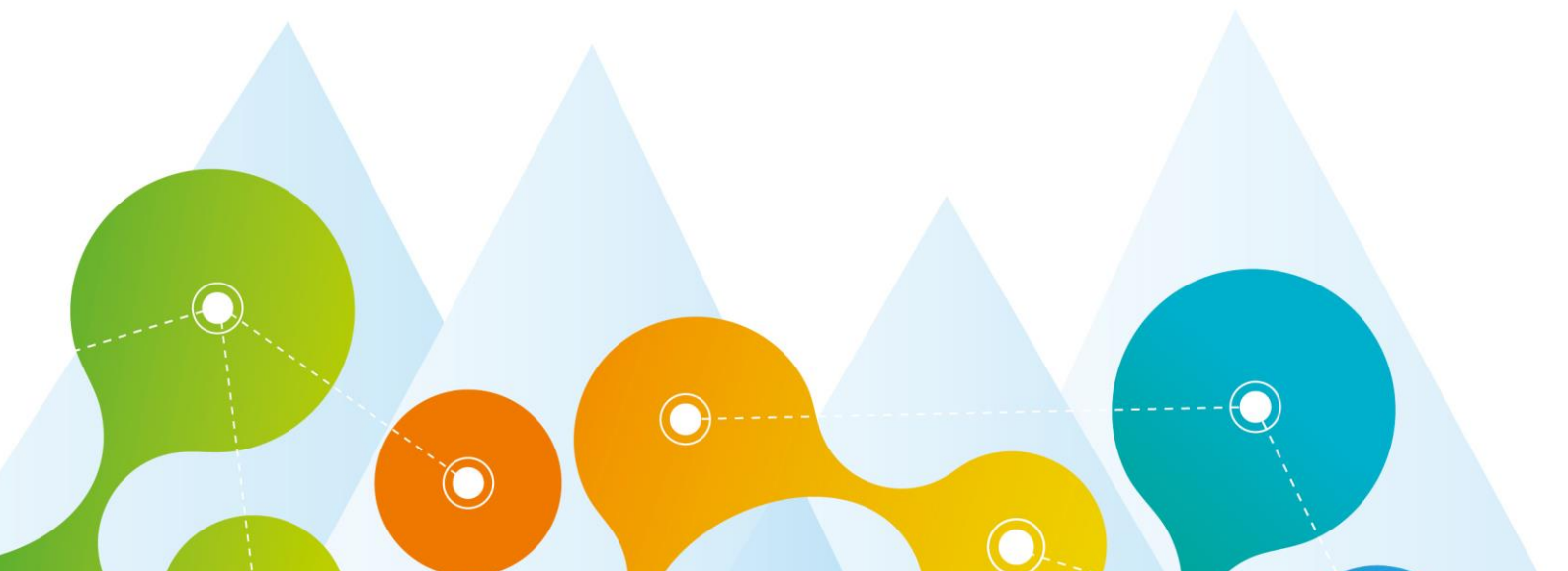
D.T1.1.1 –Inventory of policy instruments

Autonomous Province of Bozen-Bolzano

Pasqualina Sacco, Riccardo Brozzi, Laurent Giguère, PP15

Fraunhofer Italia Research Scarl

January 2020



This report has been produced within the frame of the AlpLinkBioEco project, funded by the Alpine Space INTERREG Programme of the European Commission.

Disclaimer

The information and perspectives set out in this report are those of the authors and do not necessarily reflect the official opinion of the European Commission or the project partners' regions. Neither the European Commission institutions and bodies nor any person acting on their behalf may be held responsible for the use that may be made of the information contained therein. Reproduction is authorised, provided the source is acknowledged, unless otherwise stated. For use/reproduction of third party material specified as such, permission must be obtained from the copyright. For further information about the AlpLinkBioEco project, you will find a short description at the end of the document. To learn more and to download additional resources please refer to the project website

<http://www.alpine-space.eu/projects/alplinbioeco/en/home>

The information is provided without assuming any legal responsibility for correctness or completeness.

© AlpLinkBioEco, 2019

Table of Contents

1. South Tyrol's economy: An overview
2. Biomass and its use in South Tyrol: analysis by sector
 - 2.1 Agricultural biomass
 - 2.1.1 Overview (Figure 1)
 - 2.1.2 Livestock production
 - a) Overview (Figure 2)
 - b) Current and potential applications:
 - Energy production
 - Renewable fertilizers
 - 2.1.3 Fruit production
 - a) Overview (Figure 3)
 - b) Current and potential applications:
 - Bio-based materials
 - Bio-based chemicals
 - 2.1.4 Other sectors
 - 2.2 Forest biomass
 - 2.2.1 Overview (Figure 4)
 - 2.2.2 Current and potential applications:
 - a) Energy production (Figure 5; Figure 6)
 - b) Other uses
 - 2.3 Urban waste:
 - 2.3.1 Overview
 - 2.3.2 Current and potential applications:
 - a) Composting
 - b) Anaerobic digestion
3. Programmes, policies and infrastructure supporting bioeconomy in South Tyrol
 - 3.1 Overview
 - 3.2 The bio-economy and the Regional S3 Strategy
 - 3.3 Provincial programmes and policies
 - 3.4 National and European programmes and policies
 - 3.5 Research and enterprise support infrastructure
4. Outlook 2020

1. South Tyrol's economy: An overview

South Tyrol, officially the Autonomous Province of Bolzano/Bozen, is an autonomous province located in northern Italy within the Autonomous Region of Trentino-Alto Adige/Südtirol. As of 2018, South Tyrol had a population of 531 178 inhabitants¹, distributed over an area of 7397 km². Since 1972, the province's autonomy status grants it extensive administrative power in most areas of government, including economic policy. The region boasts a very dynamic economy, as exemplified by its per capita GDP (€ 42,900 PPS in 2017), the highest of all Italian regions and one of the highest among all European regions (around 148% of the EU average in 2017)². This dynamism is also reflected in the growth of its real GDP, which was around 2% over the 2008-2017 period, something unique in Italy². The province's most important economic sectors are tourism, commercial services, industry and agriculture. Compared to other regions, agriculture and forestry play a considerable role in the regional economy. In fact, in 2016, both sectors made up together around 4.6% of the GDP, as compared to only 2.1% for Italy as a whole. When also considering the food processing activities, 7.7% of the province's GDP can be traced back to the agro-food industry, as opposed to only 3.9% for the whole country¹.

Although South Tyrol has yet to develop its own bioeconomy strategy, the region has the potential to significantly contribute to the development of the bioeconomy, particularly through the generation and the processing of biomass derived from agriculture and forestry, given the utmost importance of these two sectors for the province's economy. Considerable effort was already made in exploiting the potential of this biomass to produce energy, in part given the objectives set by the province's Climate Plan (Piano Clima "Energia-Alto Adige 2050"), whereby 90% of South Tyrol's energy demand should be satisfied by renewable energies by 2050³. In fact, as of 2013, 32 biogas facilities used to cogenerate heat and power from the processing of animal waste or urban organic waste were located on South Tyrol's territory⁴. Moreover, in 2015, the province had 77 district heating plants running on wood biomass and providing heat to localities scattered across its territory⁵. However, much more effort needs to be put into valorising biomass for scopes other than energy production. For instance, too much of the organic waste deriving from the apple industry still goes unused to produce renewable materials or substances, despite the existing potential. The same goes for wood biomass that is used neither for industrial purposes nor for energy purposes.

¹ ISTAT, banca dati sull'agricoltura, 2019

² <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/bolzano>

³ <http://www.provincia.bz.it/agricoltura-foreste/agricoltura/relazione-agraria-forestale.asp> (Relazione agraria e forestale 2018)

⁴ <http://www.provincia.bz.it/agricoltura-foreste/agricoltura/maso/biogas.asp>

⁵ https://ambiente.provincia.bz.it/downloads/Impianti_telerisc._a_biomassa_in_AA__2015_dettagliato.pdf

2. Biomass and its use in South Tyrol: analysis by sector

2.1 Agricultural biomass

2.1.1 Overview

Given the high importance of agriculture in South Tyrol, agricultural biomass represents a high potential raw material for the building of sustainable value chains within the region. South Tyrolean agriculture is dominated by two sectors: dairy farming and fruit production. While the dairy farming sector produces mostly animal waste as biomass, the fruit sector generates organic waste in the form of apple pulp, peel and seeds as well as weeds coming from the orchards and vineyards.

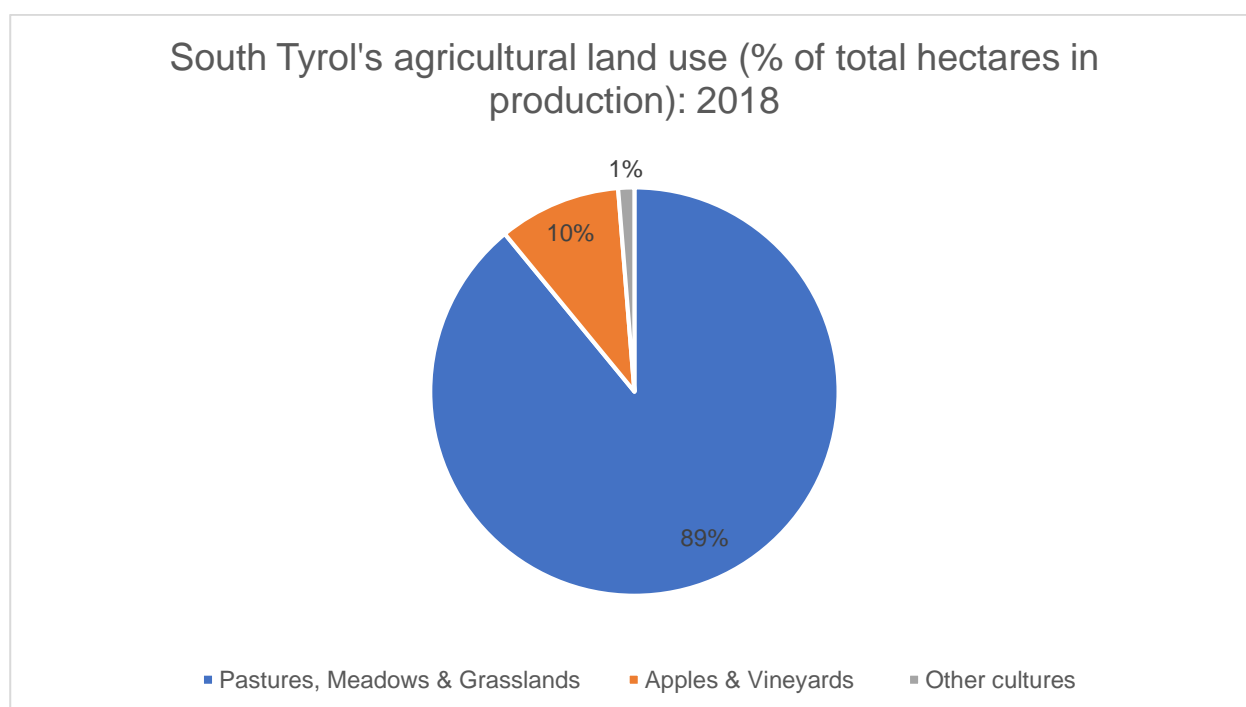


Figure 1 Agricultural land use in South Tyrol (% of total hectares in production): 2018. (Source: ISTAT, banca dati sull'agricoltura, 2019).

2.1.2 Livestock production

A) Overview

When it comes to its impact on the landscape, livestock production is by far the most important agricultural sector in South Tyrol. In fact, in 2018, around 89% of the province's used agricultural land was occupied by pastures, meadows or other permanent grasslands⁶, most of which were used for the raising of around 128 000 cows⁷. A very significant share of these cows are milk cows, as around 5000 of the

⁶ ISTAT, banca dati sull'agricoltura, 2019

⁷ <http://www.provincia.bz.it/agricoltura-foreste/agricoltura/relazione-agraria-forestale.asp> (Relazione agraria e forestale 2018)

8000 livestock raising farms in South Tyrol operate in the dairy sector⁷. From an economic perspective, dairy farming is second only to fruit production, with close to 37% of the province's total agricultural revenues which were derived from milk production in 2010⁸. Finally, of all cattle raised in 2010, 77% was raised inside stables, meaning that the animal waste it generates can be easily recuperated for circular purposes⁸.

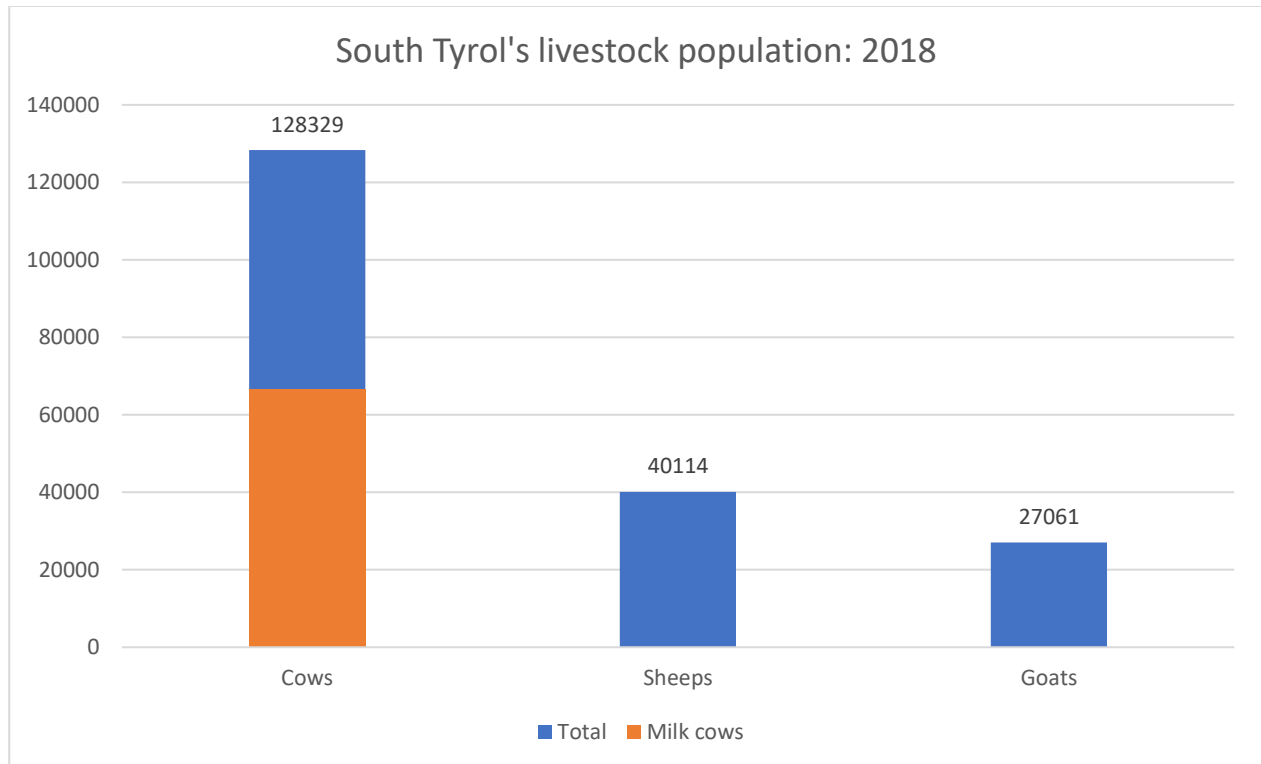


Figure 2: Livestock population 2018 in South Tyrol. (Source: Provincia autonoma di Bolzano, Relazione agraria & forestale 2018).

B) Current and potential applications

Energy production

Since animal waste has a very high content of organic matter, its degradation by anaerobic microorganisms leads to the release of a gas rich in methane that can be used for the production of heat or electrical power when combusted. The use of biogas for energy purposes is very analogical to the use of natural gas, the main difference being that biogas is fully renewable as well as carbon neutral, given that all the carbon released in the atmosphere during its combustion can then be reabsorbed by the phototropic organisms that allowed its production in the first place. This is one of the reasons why biogas is increasingly seen as an interesting alternative to conventional natural gas. Another reason is that it can favour energy self-sufficiency, at least in the case of South Tyrol, where the huge amounts of animal waste produced each year have the potential to replace a non-negligible share of imported fossil fuels. Finally, the production of biogas reveals itself as a far better way to manage animal waste than the spreading of manure on agricultural fields. As a matter of fact, greenhouse gas emissions are much lower when animal waste gets processed into biogas: around 60%

⁸ ISTAT (Censimento dell'agricoltura 2010)

lower in the case of CO₂⁹. As of 2013, 32 biogas producing plants could be found on the territory of the Province of Bolzano⁹. Of these 32 facilities, 25 belonged to private farms whereas the remaining ones belonged to local consortiums. Moreover, 24 of them had the capacity to produce combined heat and power, meaning they can produce both types of energy by exploiting the residual heat coming out of gas turbines⁹. Together, these plants produced 6.8 million kWh of heat and 24.5 million kWh of electrical power annually, something equivalent to 0.8% of the province's total electricity consumption⁹. This was achieved through the annual processing of 130 000 tons of animal waste and 10 000 tons of urban organic waste into 16 million m³ of biogas⁹. According to some estimates, this quantity of biogas represents only one third of South Tyrol's potential production. More specifically, if all the available animal waste were processed, up to 35 million additional m³ of biogas could be produced annually in the province, enough to satisfy the annual energy demand of 20 000 households⁹.

Renewable fertilizers

Long before it was used for energy production, animal waste was used as a fertilizer in South Tyrol. Even though manure offers many advantages, mainly those of being rich in nutrients and of coming from a renewable source, its widespread use on pastures and meadows over the years has led to the building up of excessive concentrations of nitrate in the environment. This is particularly true in some valleys of South Tyrol, where the high density of cattle raising farms per hectare naturally leads to the production of very high quantities of animal manure on very small areas of land. As a way to naturally remediate to this problem, new processes to turn manure into fertilisers that can be used elsewhere, namely in orchards, vineyards or crop fields, were developed. One such example in South Tyrol can be found at the Biogas Wipptal facility, located in Sterzing/Vipiteno. In this facility, around half of the incoming animal waste necessary for the production of biogas is then kept for the production of fertilisers. To be more precise, out of 70 000 tons of cattle manure entering the facility, 33 000 tons are kept for the production of fertilisers following anaerobic fermentation¹⁰. From these 33 000 tons, 18 000 tons get purified to be then thrown away as pure water while 13 500 tons end up as liquid mineral fertiliser and 2500 tons end up as solid organic fertiliser, in the form of pellets¹⁰. By allowing a close to 50% reduction in the amount of manure having to be spread on the neighbouring grazing fields as well as the processing of close to 25% of the manure into fertilisers which can be used for other crops, the Biogas Wipptal facility is a great example of how animal waste can be turned into valuable biomass for the circular economy.

2.1.3 Fruit production

A) Overview

In terms of added value and economic importance, fruit production is by far the biggest of all agricultural sectors in South Tyrol. One way to understand it is to look at the importance of the province's fruit production relative to its size: despite making up only 2.5% of Italy's area, the province produced 40.6% of the country's apples (in kg) in

⁹ <http://www.provincia.bz.it/agricoltura-foreste/agricoltura/maso/biogas.asp>

¹⁰ <http://www.biogas-wipptal.it/it/aktivitaeten/beschreibung-der-anlage.html>

2018¹¹. This is made possible by the province's highly favourable growing conditions as well as the on average very high density of its orchards. When it comes to grape production for the purpose of wine making, the region does not stand out for the amount it produces. However, South Tyrol is well known for the quality of the wines it puts on the market: in 2018, 99% of the wines coming from South Tyrol had either the DOC or IGT certification, the highest percentage of all Italian regions¹².

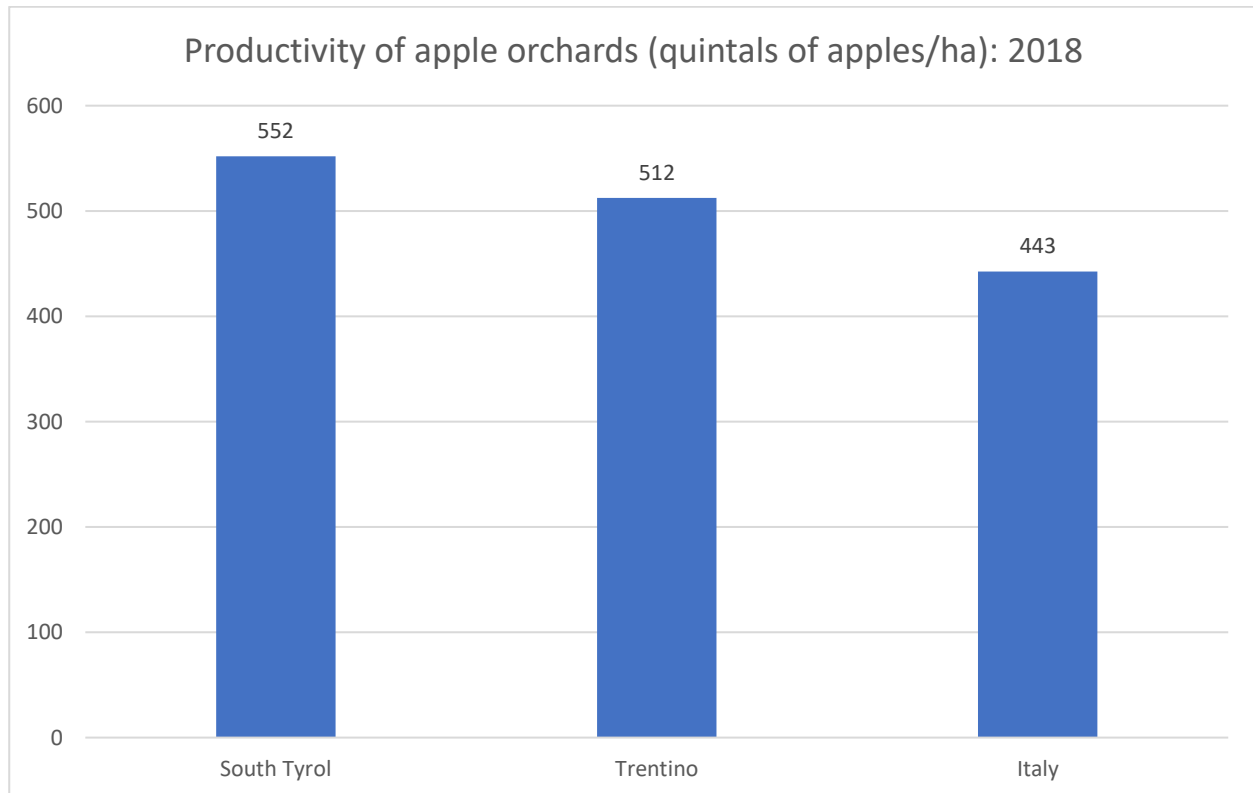


Figure 3: Productivity of apple orchards (quintals of apples/ha) 2018. (Source: ISTAT, banca dati sull'agricoltura, 2019).

B) Current and potential applications:

With around 980 million kg of apples¹³ produced in 2018 and with an estimated 20% to 25% of this volume¹⁴ being considered waste (cores and peels), the potential to make valuable products from apple waste in South Tyrol is considerable and has therefore started to draw the attention of local companies and teams of researchers.

¹¹ ISTAT, banca dati sull'agricoltura, 2019

¹² <http://www.provincia.bz.it/agricoltura-foreste/agricoltura/relazione-agraria-forestale.asp> (Relazione agraria e forestale 2018)

¹³ ISTAT, banca dati sull'agricoltura, 2019

¹⁴ <https://www.freshplaza.it/article/4099636/un-brevetto-dell-universita-di-bolzano-per-riutilizzare-gli-scarti-della-lavorazione-delle-mele/>

Bio-based materials

In the field of bio-based materials, a Bolzano-based firm called Frumat¹⁵ recently pioneered a technology enabling the use of apple peels and cores for the production of “Apple Skin”, a cellulose-base material similar to leather that can be employed in the fashion and furnishing industries. The same firm also produces green paper from apple waste. Regarding the use of waste deriving from wine grapes, no South Tyrolean company currently operates in the field. However, a Milan-based firm of the name Vegea¹⁶ has recently patented a process that allows the production of biomaterials using grape skins and seeds among other things. Given that the firm already collaborates with wineries from the Province of Trento through the “Progetto Manifattura”, a further expansion of their activities could reveal itself as an opportunity for South Tyrolean wine producers to turn part of their waste into valuable biomass. Another interesting initiative in the field of biomaterials comes from the Project Interreg AlpBioEco¹⁷, in which the NOI Techpark located in Bolzano is involved. Among other things, this project currently explores the possibility of synthesizing wax from apple waste with the ultimate goal of producing bioplastic for the packaging industry.

Bio-based chemicals

In the field of bio-based chemicals, a team from the University of Bolzano recently patented a process to extract antioxidants (polyphenols) from apple peels and seeds using supercritical carbon dioxide. The antioxidants can then be used as natural conserving agents in the food industry or in cosmetics. It is estimated that for 1 kg of waste entering the process, 70g of antioxidants can be extracted (7% return)¹⁸. Supposing that 10% of the 980 million kg of apples produced in South Tyrol in 2018 were destined for processing, and that 25% of this volume consisted in waste (cores and peels), it can be assumed that up to 1.72 million kg of antioxidants could have been extracted during that year alone.

2.1.4 Other sectors

Of all agricultural sectors other than dairy farming or fruit production, potato production is by far the most important one in the province, with around 9.54 million kg of potatoes harvested on a surface of about 300 hectares¹⁹ in 2018. Most of the production is concentrated in the Pustertal/Val Pusteria area, where the majority of producers are members of the Pustertaler Saatbaugenossenschaft (a local cooperative). Together, they produce yearly around 5.4 million kg of potatoes on a surface totalizing around 150 hectares²⁰.

¹⁵ https://www.repubblica.it/economia/affari-e-finanza/2017/12/11/news/frumat_il_nuovo_tempo_delle_mele_carta_tessuti_ecopelle_da_bucce_e_torsoli-183742915

¹⁶ <https://www.vegeacompany.com/>

¹⁷ <https://noi.bz.it/de/magazine/wachs-aus-abfallstoffen-von-aepfeln-und-andere-geschichten-der-biooekonomie>

¹⁸ <https://agronotizie.imagelinenetwork.com/agricoltura-economia-politica/2018/06/11/a-bolzano-si-estrael-valore-dai-torsoli-di-mela/59010f>

¹⁹ ISTAT, banca dati sull'agricoltura, 2019

²⁰ <https://www.saatbau.it/it/chi-siamo/cooperativa-produttori-sementi/>

Given its high content of starch, the flesh of potatoes can be used for the production of bioethanol or biodiesel. Moreover, potato peels have the potential to be used for the production of biomaterials. To which extent these potential applications are relevant for the South Tyrolean industry is however unclear, as this entirely depends on the amount of waste generated, something for which no data is available. Nevertheless, since most of the potatoes produced in the province are directly sold on the fresh market, one could expect that only little waste is generated by the industry.

Another relevant agricultural sector in the province is that of cereals. For centuries, cereals have played a central role in South Tyrolean agriculture. However, over the last decades, most of the areas where cereals used to be grown have been turned into orchards for the purpose of apple production. From 2011 until 2014, a European project named Regiokorn²¹ was carried out with the aim of promoting cereal cultivation and processing in South Tyrol. Unfortunately, the project had no lasting impact, as between 2014 and 2018, the total surface area on which cereals are grown remained more or less the same, going from 214 to 219 hectares²². Despite the failure of recent efforts to relaunch the sector, a new European project named Brotweg is currently underway, this time with the goal of developing new technologies to facilitate the cultivation of cereals in mountainous areas. The eventual success of this project could help to relaunch the cereal industry and to make the waste it generates an important source of biomass in South Tyrol again.

2.2 Forest biomass

2.2.1 Overview

With 42% of its territory covered by forests, the equivalent of 60 million m³ of wood, South Tyrol is a region which possesses considerable timber resources²³. As a consequence, forestry plays an important role in the province's economy. In 2015, it was estimated that 1 504 807 m³ of wood were extracted from South Tyrol's forests²⁴. This represents 88.43% of Lombardy's production with only 31% of its area²⁴. This reality is only made possible by the high density of the province's wood cutting activities compared to all other Italian regions, due to the fact that a higher share of its territory is covered by forests. More specifically, in 2015, South Tyrol produced 142.58 m³/ha of wood, by far the highest ratio in Italy. This is 77.26% higher than for the Province of Trento and 185.24% higher than for Lombardy²⁴. According to the latest available statistics, which go back to 2015, around 23% of the wood cut in South Tyrol is used for energy production (either heat or electricity), while the rest ends up used as raw material for the industry²⁴. Given that a high share of South Tyrol's wood is well suited for processing into high quality material or products, energetic use plays a far less important role than in other major timber producing regions such as the province of Trento and Lombardy, where 34% and 46% of timber resources end up used for the production of energy, respectively²⁴.

²¹ <https://ec.europa.eu/eip/agriculture/en/find-connect/projects/regiokorn>

²² ISTAT, banca dati sull'agricoltura, 2019

²³ <https://ambiente.provincia.bz.it/energia/biomassa.asp>

²⁴ ISTAT, banca dati sull'agricoltura, 2019

Despite the large quantities of wood already being extracted, South Tyrol's stock of wood biomass still has room to grow in the future, for two main reasons. First, the rate of wood extraction is much lower than the rate at which the province's forests regenerate, namely 43% lower in 2015²⁵. Second, compared to other important timber-producing regions in Italy, South Tyrol is characterized by high losses during the wood processing phase taking place in the forests. In fact, while in Lombardy, only about 3% of the extracted wood biomass ends up lost during processing in the forests (Italy's second biggest producing region following Trentino-Alto Adige), the same rate is about 6.4% in South Tyrol²⁶. In theory, this means that the volume of usable wood biomass could potentially be augmented without the need to increase forest exploitation. In practice, however, South Tyrol's mountainous territory makes wood cutting and processing at the forest stage more difficult than in other regions such as Lombardy, where a high share of forest exploitation takes place in poplar tree plantations, located in plains.

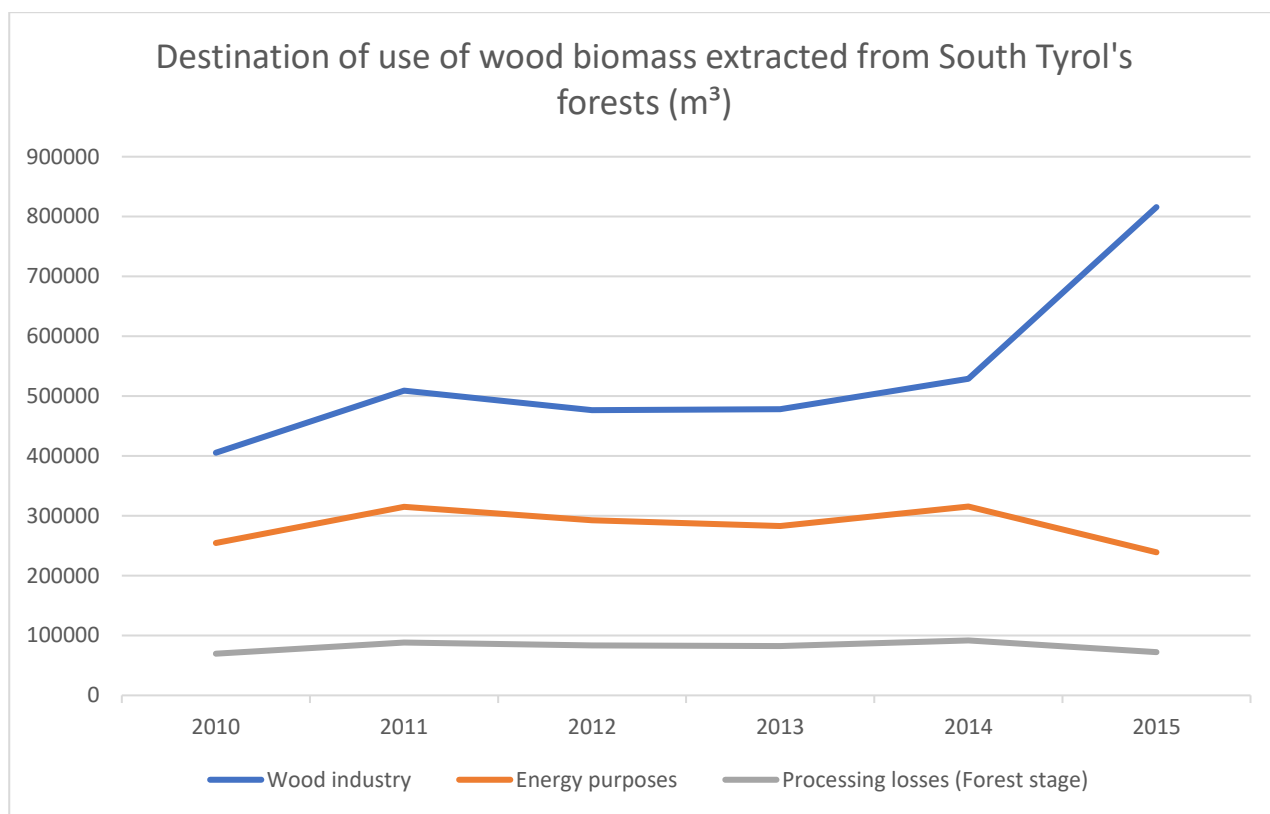


Figure 4: Destination of use of wood biomass extracted from Forests in South Tyrol (m³). Source: ISTAT, banca dati sull'agricoltura, 2019

²⁵ <http://www.provincia.bz.it/agricoltura-foreste/agricoltura/relazione-agraria-forestale.asp> (Relazione agraria e forestale 2018)

²⁶ ISTAT, banca dati sull'agricoltura, 2019

2.2.2 Current and potential applications

A) Energy production

When it comes to energy production, most of the wood biomass is used for heating rather than for electricity generation. In fact, in 2014, 284 GWh of electrical power and 1980 GWh of heat were generated in the province using biomass, most of which is assumed to be wood²⁷. Of the 1980 GWh of heat generated, 551 GWh came from district heating plants²⁷. In 2015, there were 77 of these plants spread across South Tyrol. These plants all run on wood chips, of which 45% were by-products of sawmills and 25% came directly from wood cut on forest parcels in 2018²⁸. The remaining chips were imported from neighbouring countries. The heat produced with biomass outside district heating plants is generated through decentralised wood heating systems (either residential or commercial). As for the electricity produced from wood biomass, it all stems from the cogeneration process used in some of the district heating plants.

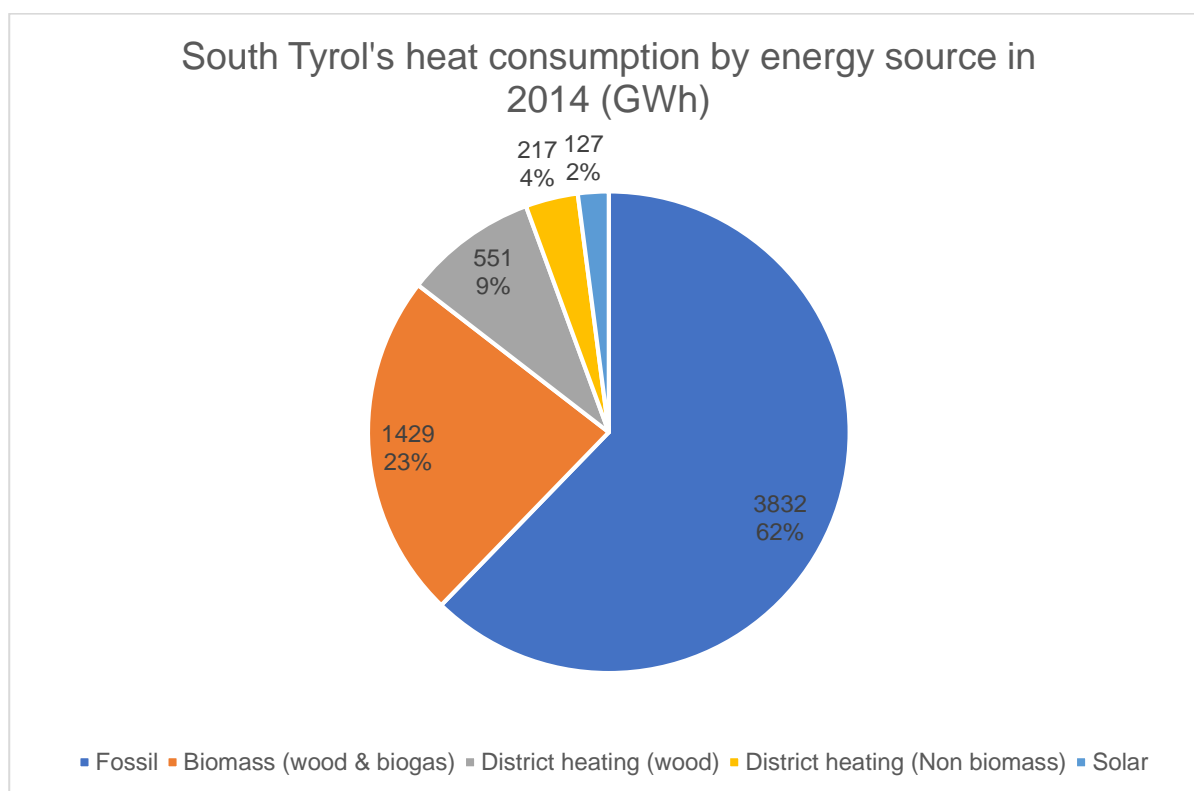


Figure 5: Heat consumption by energy source in South Tyrol (2014)²⁹.

²⁷ https://ambiente.provincia.bz.it/downloads/Energiebilanz_Suedtirol.pps.pdf

²⁸ https://ambiente.provincia.bz.it/downloads/Impianti_di_teleriscaldamento_Alto_Adige_2014.pdf

²⁹ https://ambiente.provincia.bz.it/downloads/Energiebilanz_Suedtirol.pps.pdf

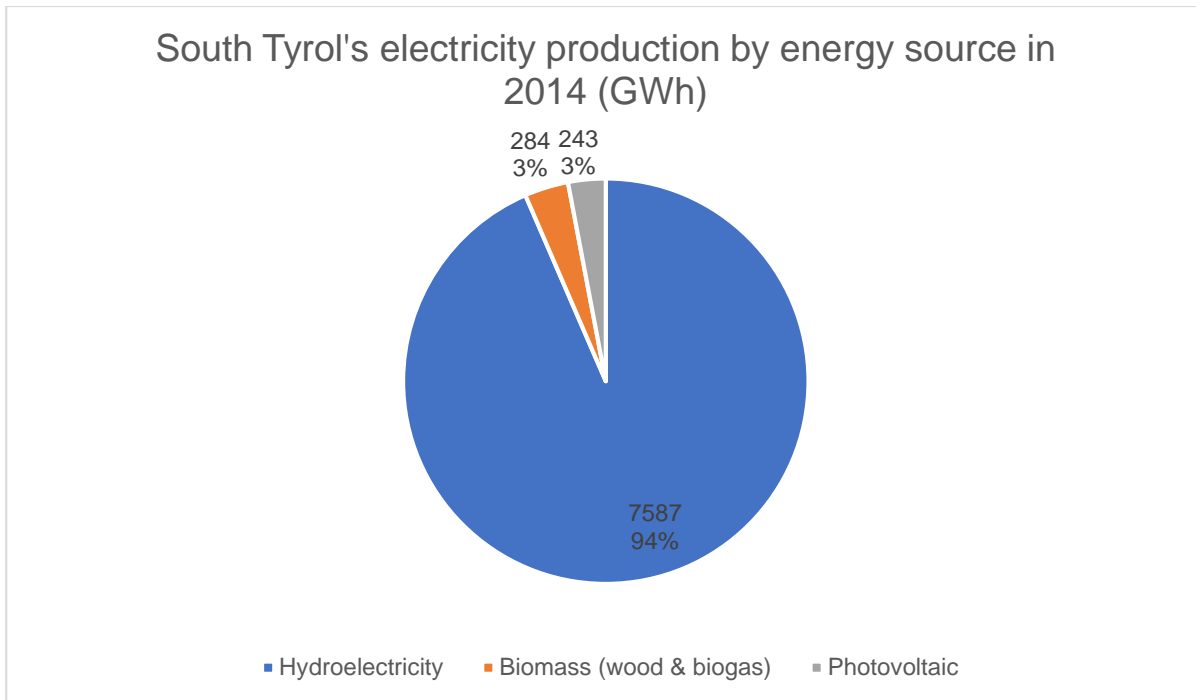


Figure 6: Electricity production by energy source in 2014 in South Tyrol (GWh)³⁰

B) Other uses

The use of wood biomass for scopes other than energy production is twofold. On the one hand, some valuable biological compounds can be extracted from wood biomass prior to its use for the production of heat or energy. These compounds can then be employed as chemical agents in various industries, among which the pharmaceutical, cosmetic and food industry. On the other hand, when pyrolysis or wood gasification is used to produce energy, a by-product named biochar is formed. Biochar is a kind of charcoal that is very rich in carbon and that has the potential to be used as a soil amender in agriculture because of its capacity to improve the retention and absorption of key nutrients. In the context of a European project called Wood-up³¹, the Laimburg Research Centre, located in Laives, in cooperation with the Free University of Bolzano, is seeking to evaluate the potential of biochar and biological compounds extracted from wood biomass in the context of the South Tyrolean economy. More emphasis is being put on biochar, because of its potential to be used as an amender in the province's orchards and vineyards. The project is financed by the European Fund for Regional Development (EFRD).

³⁰ https://ambiente.provincia.bz.it/downloads/Impianti_di_teleriscaldamento_Alto_Adige_2014.pdf

³¹ <https://woodup.projects.unibz.it/en/wood-up-project/>

2.3 Urban waste

2.3.1 Overview

According to the most recent available data, around 60 820 tons of organic waste are produced annually in South Tyrol³². The province boasts a rate of “waste separation” of 68.5%, something considerably above the Italian average of 55.5%³⁰. However, some provinces boast higher rates, meaning there is still room for improvement when it comes to maximising the amount of municipal organic waste available for revalorisation. The organic waste gets handled in two different ways: composting (aerobic digestion) and anaerobic digestion. Thanks to the province’s Waste Management Plan (Piano gestione rifiuti/Abfallbewirtschaftungspläne), first introduced in 1993, the province has made considerable progress in handling and valorising organic waste. As a result, eight composting plants as well as one anaerobic digestion plant are located on South Tyrol’s territory as of today. However, despite the presence of these plants, 15 000 tons or the equivalent of 28% of all organic waste produced in the province were still sent abroad in 2013 because of the lack of treatment capacity, meaning that considerable amounts of potentially highly valuable biomass are still left unexploited on South Tyrolean ground³³.

2.3.2 Current and potential applications

A) Composting

Composting, also known as aerobic digestion, consists in the decomposition of organic matter by aerobic microorganisms. It leads to the formation of compost, a humus-like material rich in nutrients that can be used as a fertiliser for agricultural soils. In South Tyrol, seven composting plants are in charge of turning organic waste into compost. Together, in 2013, they processed around 27 000 tons of organic waste³¹. Most of the compost is then used as a fertiliser either in agriculture or for the purpose of gardening.

B) Anaerobic digestion

South Tyrol has one anaerobic digestion plant specifically designed for the treatment of urban organic waste, located in the town of Lana. Each year, the plant processes around 14 615 kg of organic waste, from which 501 MWh of electrical energy are produced³¹. This is enough to satisfy the power needs of about 1000 households³¹. Just like in the biogas facilities running on animal waste, the energy generated derives from the combustion of the biogas produced during the digestion process.

³² <https://www.catasto-rifiuti.isprambiente.it/index.php?pg=provincia&aa=2017®id=Trentino-Alto%20Adige&width=1366&height=768&advice=si>

³³ <https://ambiente.provincia.bz.it/rifiuti-suolo/Impianti-compostaggio-e-digestione.asp>

3. Programmes, policies and infrastructure supporting bioeconomy in South Tyrol

3.1 Overview

Although South Tyrol has still not elaborated any official strategy for the development of its bioeconomy, the region has many programmes, policies and structures in place to support research and innovation in a wide range of sectors, of which some are either directly or indirectly linked with the bioeconomy. Among the particularities of the region is the fact that despite boasting a very high per capita GDP by European standards (148% of the EU average in 2017), it finds itself considerably below both the Italian and the European average with regard to expenditures in research and development.³⁴ For instance, in 2016, South Tyrol spent only 0.68% of its GDP on research and development, something 55% below the Italian average and 62% below the European one³². Nevertheless, the picture is positive when it comes to patenting activity, as the per capita number of patent applications lies 39% above the Italian average and 44% above the one for Europe³². This contradiction could be a sign that the region is very successful at targeting the right sectors in which to spend on research and development, thereby making a very efficient use of its funds compared to other regions. This partial success may be in part related to the fact that over the last 15 years, the provincial administration has put considerable effort in supporting and promoting innovation at various levels, starting with the adoption in 2006 of the provincial law on research and innovation, which laid the grounds for most of the province's initiatives in the years that followed. Among the most prominent initiatives of the recent years were the creation of many provincial funds for research and innovation as well as the foundation of the NOI Techpark, which aims to facilitate knowledge and technology transfer as well as scientific collaboration.

3.2 The bioeconomy and the Regional S3 Strategy

Most of South Tyrol's research initiatives and attempts to innovate are being made in the sectors that were identified as strategic in the region's Smart Specialisation Strategy, released in 2014 for the 2014-2020 European Programming Period. The sectors identified were Energy and Environment, Alpine technologies, Food technologies, Medical Technologies and Natural Treatments, ICT and Automation as well as Creative Industries³⁵. At least three of these sectors are linked to the bioeconomy in some way, in the sense that they require or may require the use and the processing of biomass at some point in their value chain. In the field of Energy and Environment, the need to make further and better use of biomass as a source of renewable energy in the future is explicitly stated in the province's S3 Strategy. In the field of Food Technologies, biomass is even more crucial, as it constitutes the primary input of any industrial process. Finally, the use and processing of biomass also plays a key role in the field of Medical Technologies and Natural Treatments. The Smart Specialisation Strategy is a very central aspect of the region's research and innovation

³⁴ <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/bolzano>

³⁵ http://www.provincia.bz.it/politica-diritto-relazioni-estere/europa/downloads/RIS_3_Bolzano_ITA_DEF.pdf

policy insofar that its elaboration is a key prerequisite for the access to the European Regional Development Fund (ERDF), one of the biggest sources of funds for research and innovation in South Tyrol, including research and innovation in the bioeconomy.

3.3 Provincial programmes and policies

Since the introduction of the provincial law on research and innovation in 2006, South Tyrol's public administration has set up various funding programmes to stimulate research and innovation on its territory. The programmes are divided into two categories, namely those for the support of scientific research and those for the support of innovation.

For the support of scientific research, three main programmes are in place: Research Südtirol/Alto Adige, Joint Research Projects and Seal of Excellence. Together, these three programmes provide up to € 4 million per year in funds to researchers³⁶. These programmes do not target any specific scientific field and are therefore open to all recognised research organisations, whether public or private. Whereas the programme Research Südtirol/Alto Adige does not impose any condition aside from the submission of research projects to an international peer-reviewing process, the programme Joint Research Projects is only available to projects involving the collaboration between South Tyrolean and Austrian research entities. As for the Seal of Excellence project, it was specifically designed for research projects that were given the Seal of Excellence by the European Union, a seal which highlights projects deemed worthy of recognition, but which did not get funded under one of the EU's programmes because of a lack of funding resources.

For the support of innovation, most of the provincial administration's programmes are geared towards sustaining innovation directly within enterprises. In fact, the province offers financial support for the conduction of research and development inside enterprises, whether it be fundamental research, industrial research or experimental development. Moreover, the projects can either be carried out independently by the enterprise or in collaboration with external research organisations. In addition to support to research and development, the province's public administration also provides funding for projects in the field of process or organisational innovation, as well as for the hiring of consulting services meant to help with the implementation of innovative solutions. Finally, at a more macro level, the province fosters the creation of new innovative companies through the providing of venture capital and supports the formation of so-called innovation poles, which consist in networks of open collaboration between enterprises and research organisations that operate in connected fields.

To which extent all the above-mentioned initiatives have until now proved beneficial for the development of the bioeconomy in South Tyrol remains an open question, especially given that they do not specifically target projects tied to the use of biomass. Nevertheless, the fact remains that they represent a considerable source of financial support for any research or innovation project conducted on South Tyrolean ground, including projects in the bioeconomic sphere.

³⁶ Provincia di Bolzano, Programma annuale per la ricerca e l'innovazione 2019

3.4 National and European programmes and policies

Italy's national bioeconomy strategy (Strategia Italiana per la Bioeconomia), in line with the European Bioeconomy Strategy and last updated in 2019, aims to improve by 15% the performance of the country's bioeconomic sector by 2030³⁷. To achieve these goals, the country's governing institutions plan to rely to on a wide range of financing tools designed to support research and innovation, mostly within small and medium enterprises (SMEs). Both national and European programmes can be found among these tools.

At the Italian level, a new national fund for innovation (Fondo Nazionale Innovazione) was created in 2019 and makes € 1 billion per year available for the financing of innovative small and medium enterprises through venture capital, either directly or indirectly via venture capital funds³⁸. The targeted sectors are those considered strategic for the competitiveness of the Italian economy, of which some are directly linked to the bioeconomy, like New Materials (which can include biomaterials), EcoIndustries and AgriTech/Foodtech. In addition to this fund, the Italian Research Grant Programme for Smart Manufacturing, Agrifood, Life Sciences and High Performance Computing (Bando Fabbrica intelligente, Agrifood, Scienze della vita e Calcolo ad alte prestazioni) makes funds available to enterprises that conduct research and development projects in the fields previously mentioned. For Italy's economically most developed regions, among which is South Tyrol, up to € 64 million can be granted annually for projects in the fields of agrifood and life sciences, which are both tied to the bioeconomy³⁹. Complementarily to these large funding programmes, the Italian government also promotes scientific collaboration between public research institutes and private enterprises through the financial support of the so-called National Technological Clusters (Cluster Tecnologici Nazionali). Once again, the goal is to stimulate innovation and competitiveness in sectors that are seen as crucial for Italy's future economic development. Among the clusters relevant for the bioeconomy are the Agrifood cluster (CL.A.N), which the Free University of Bolzano is part of as research partner, and the Green Chemistry (Chimica Verde – SPRING) cluster. Although no South Tyrolean enterprise has registered in any of these two clusters yet, future participation remains a possibility.

At the European level, the most important funding programme is by far the European Regional Development Fund (ERDF). For the 2014-2020 programming period, the fund made € 32 789 088 available to research and innovation projects conducted in South Tyrol⁴⁰. Half of these funds came from the European Union, while the remaining part was split between the Italian government (35%) and the South Tyrolean provincial administration (15%)³⁸. Each year, the funds are being allocated to specific research and innovation projects that belong to one of the six strategic sectors outlined in the province's S3 Strategy. For the bioeconomy, this means that the projects belonging to the Food Technologies and the Energy and Environment sectors are eligible for funding under the programme. Examples of South Tyrolean projects related to the bioeconomy

³⁷ http://cnbbsv.palazzochigi.it/media/1785/bit_en_2019_02.pdf (BIT II, Bioeconomy in Italy)

³⁸ <https://www.mise.gov.it/images/stories/documenti/presentazione-fondonazionaleinnovazione.pdf>

³⁹ <https://www.mise.gov.it/index.php/it/incentivi/impresa/nuovo-bando-fabbrica-intelligente-agrifood-scienze-della-vita-e-calcolo-ad-alte-prestazioni>

⁴⁰ Provincia di Bolzano, Programma annuale per la ricerca e l'innovazione 2019

and which were funded by the ERDF programme during the 2014-2020 programming period are Micro4Food and Wood-Up. The Micro4food project aims to build a microbial and food proteomics platform that offers new technological possibilities, among which is the creation of new processes to exploit biological waste and its by-products. In the case of the Wood-Up project, the emphasis is being put on the valorisation of wood extracts and of by-products deriving from the pyrolysis and gasification of wood biomass. Other important European funding programmes for the South Tyrolean bioeconomy are the series of Interreg Programmes, which promote cross-border cooperation within the European Union, as well as the LIFE Programme, which supports projects that seek to tackle environmental and climatic issues. Examples of projects linked to the South Tyrolean bioeconomy and that were funded under either one of these two programmes are the AlpBioEco project (Interreg), which aims at creating innovative value chains based on food and botanical resources in the Alpine space, as well as the Biogas Wipptal project (LIFE), which seeks to optimise the management of nutrients derived from livestock in South Tyrol through the production of biogas. Finally, despite not being focused on the bioeconomy, the European Union's SME Instrument, which financially supports small and medium enterprises wishing to expand their business activities through innovation, has the potential to financially support South Tyrolean enterprises willing to innovate in the bioeconomic sphere.

3.5 Research and enterprise support infrastructure

In addition to the many funding programmes and supporting policies, South Tyrolean enterprises operating in the bioeconomy have access to considerable research infrastructure and to a wide range of consulting services.

First and foremost, the NOI Techpark, which opened in 2017, now constitutes the backbone of research infrastructure in South Tyrol. Entirely financed by the provincial administration, the technological park is meant to be a working environment allowing for the gathering of entrepreneurs, researchers and students, thereby fostering innovation and the foundation of new start-ups. Among other things, the NOI Techpark provides entrepreneurs and researchers with access to around 30 different laboratories⁴¹. Some of the laboratories were specifically designed for research in food technologies and thus make up what could be considered research infrastructure for the bioeconomy. In addition to its laboratories, the NOI Techpark promotes technology transfer by offering consultancy services and R&D project support to enterprises in five different fields, all of which coincide with the six strategic sectors defined in the province's Regional S3 Strategy. Other pillars of South Tyrol's research infrastructure are the Free University of Bolzano, the Laimburg Research Centre, which directly impacts the bioeconomy through applied research in agriculture and food technology, Fraunhofer Italia, which mostly carries out applied research for the province's small and medium enterprises, as well as Eurac Research, which conducts research on a wide range of topics linked to the particularities of the South Tyrolean society and territory, but which contrarily to Fraunhofer Italia, obtains funding for its projects uniquely through public channels. It is to be noted that all the above-mentioned research organisations carry out some of their activities at the NOI Techpark.

⁴¹ <https://noi.bz.it/en>

Regarding consulting services, support for innovation management, business development and marketing is being offered by IDM Südtirol/Alto Adige, a business service provider jointly run by the provincial administration and the Bolzano Chamber of Commerce.

4. Outlook 2020

The future of the South Tyrolean bioeconomy beyond 2020 will likely heavily depend on the orientation of future European, Italian and provincial programmes and policies meant to sustain the bioeconomy. First and foremost, given that 2020 marks the transition between the EU's 2014-2020 and 2021-2027 Multiannual Financial Frameworks, the amount of funding available for South Tyrol's bioeconomy will soon change in accordance with the renewed versions of the EU's funding programmes targeting research and innovation. Despite discouraging prospects for the amount of funding that will be made available under the 2021-2027 European Regional Development fund (ERDF) programme, considerable financial resources for projects related to the bioeconomy should be accessible through other European funding channels. For instance, the European Commission recently proposed that under the Global Challenges & European Industrial Competitiveness pillar of the Horizon 2027 programme, € 52.7 billion be made available for research and innovation projects fitting into one of six different clusters, among which is the Food, Bioeconomy, Natural Resources, Agriculture & Environment cluster⁴². Furthermore, the European Union recently announced the implementation of the European Green Deal, under which it promises to invest € 1 trillion to make Europe carbon neutral by 2050⁴³. Indeed, it is to be expected that a significant share of these funds will go to projects related to the bioeconomy if the plan's objectives are to be reached. At the provincial level, though there is no immediate intention to modify the regional S3 Strategy, the provincial research and innovation programmes may eventually be revised in such a way that they become better aligned with the European Commission's new priorities for its 2021-2027 agenda. At a more practical level, some of the research and development initiatives related to the bioeconomy which are currently underway in the province could soon turn into industrial applications. Examples of such projects are those aiming to valorise organic waste derived from the apple and wood processing industries, which together make up a significant share of South Tyrol's industrial base. Should this scenario come true, the region could witness the birth of new bio-based value chains on its territory in the foreseeable future. Finally, as part of the measures which must be taken to reach the objectives of the province's Climate Plan 2050, the amount of wood biomass, agricultural waste as well as organic urban waste directed towards the production of renewable energy will likely keep on increasing over the years to come.

⁴² https://ec.europa.eu/info/sites/info/files/research_and_innovation/ec_rtd_he-presentation_062019_en.pdf

⁴³ https://ec.europa.eu/regional_policy/en/newsroom/news/2020/01/14-01-2020-financing-the-green-transition-the-european-green-deal-investment-plan-and-just-transition-mechanism

AlpLinkBioEco Partners



AlpLinkBioEco develops

1. Database to map existing resources, actors and relevant policies in the Alpine Space
2. Methodology to match actors for new value chains
3. New (cross)-regional value chains
4. Policy recommendations for the development of bioeconomy in the Alpine Space

FOLLOW US ON

<http://www.alpine-space.eu/projects/alplinkbioeco/en/home>



Scan me

#AlpLinkBioEco