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Austrian Environmental Technology Economy

Export, Innovations, Start-ups and Funding

Executive Summary 2020

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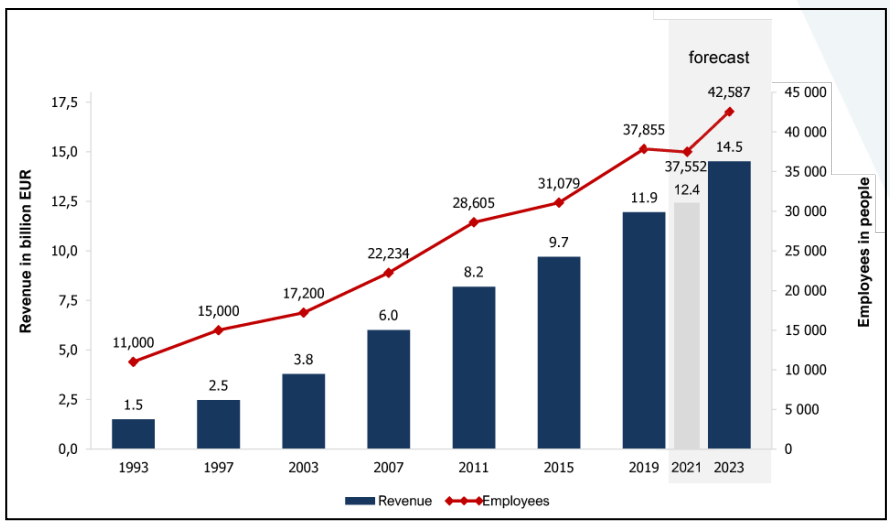

Development of environmental technology industry as a vital part of the environmental technology economy (Surveys by IWI/P-IC and WIFO)

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Vienna, December 2020

Chart on the cover: Dynamic structural comparison of the environmental technology industry by selected concrete benchmarks including forecast. Source: IWI/P-IC: Survey on Austrian environmental technology industry 2020 (2016, 2017, 2020, IWI projections), WIFO (1995, 2000, 2005, 2009, 2013)

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Austrian Environmental Technology Economy

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Executive Summary 2020

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In cooperation with:

Vienna, December 2020

On behalf of Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK), Austrian Federal Ministry for Digital and Economic Affairs (BMDW) and Austrian Federal Economic Chamber (WKO)

Foreword

The environmental technology economy in Austria has been quite successful throughout the present coronavirus crisis, compared to other sectors. Furthermore, the environmental technology economy is securing a great number of jobs and still displaying optimism for the future. However, the current challenging situation also requires a range of timely decisions from politics and business in order to swiftly overcome this crisis. The European Union's Green Deal points the way: economic growth and climate protection should mutually support each other.

With its growth dynamics, innovative power and export strength the environmental technology sector will contribute to meet the challenges during and after the corona crisis just as it did over the past three decades. The present study, the seventh of its kind, is showing a remarkable upward trend. By now in addition to the environmental technology industry, the study also covers environmental technology service providers.

The figures for the reference year 2019 compared to 2015 are impressive:

- Turnover in the environmental technology economy shows a strong increase from 12.3 to 15.24 billion euros between 2015 and 2019 with an above average annual growth rate of around 6 percent turnover in the environmental technology industry primarily comes from renewable energy technologies and energy efficiency (8.53 billion euros). About one third of turnover of environmental technology service providers is generated by waste management technologies and recycling (1.25 billion euros). Turnover from exports accounts for 71.8 percent of total turnover.
- Employment increased from 41,400 to 51,470 between 2015 and 2019 and as such, it is even more dynamic than turnover.
- The environmental technology industry generates 78 percent of turnover and 73 percent of jobs.
- Over the entire national economy of Austria, one job in the companies of the environmental technology economy secures or creates with two more jobs in other sectors thus providing more than 139,000 jobs. The economic power of 29.36 billion euros triggered by the environmental technology economy means that each euro from environmental technology economy triggers another euro in turnover in other sectors.
- A supplementary study on the effects of the corona pandemic shows that the environmental technology industry in particular is highly crisis-resistant, and is supposed to recover in 2021 faster than the service providers, returning to its old strength by 2023.

More than 2,700 companies, advanced technology suppliers with an excellent cost-benefit ratio, support Austria's image as climate and environmental protection pioneer. The extensive support measures provided by the Federal Ministry for Climate Action (BMK), the Federal Ministry for Digital and Economic Affairs (BMDW) and the Austrian Federal Economic Chamber (WKO) are important assets in this process. Strong investments into research and development today are a prerequisite for the growth of tomorrow.

Initiating and implementing strategies and economic stimulus packages such as higher investment premiums for ecologically relevant investments will trigger a rapid increase in domestic demand. Various activities to facilitate the internationalization support the environmental technology companies from Austria to seize the opportunities on export markets. These as well as other measures and initiatives support Austrian companies in successfully seizing the opportunities arising from the Paris Agreement on climate change.

In the coming years, our environmental technology economy is set to write the next chapter of its success story. We know: Combined efforts between the environmental technology enterprises and the public authorities will be needed to approach climate neutrality and further growth of this sector.

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Executive Summary – English

The global challenges derived from climate change are more topical than ever - environmental innovations, referring to products and services that generate a direct environmental benefit, represent an essential approach to mastering these ecological challenges. Currently climate-change, scarcity of resources and rapid population as well as economic growth poses the greatest challenges in terms of energy supply, sustainability and climate protection.

The Austrian Federal Government issues climate change mitigation and adaptation in compliance with the Paris Agreement, as well as the strengthening of a sustainable and competitive business location, as environmental cornerstones of its current government program. In combination with growing environmental awareness, this leads to an increasing demand for environmental technologies.

Austrian companies are at the forefront in numerous areas of environmental technology and in recent decades the national environmental technology sector has been characterized by above average growth and export success. The Austrian environmental technology industry is deeply research-oriented and among the most innovative in the world. It secures prosperity and high-quality jobs and coevally contributes to environmental and climate protection and improving the quality of life.

In the wake of the current Covid 19 pandemic, the Austrian environmental technology industry proves its role as an important resilience factor, which not only helps to overcome the current crisis, but also creates long-term and future stability in our economic system. This is shown by the results of a supplementary study carried out among companies of the environmental technology industry, which, after more than half a year since the beginning of the corona crisis, provides a good overview of their situation this year and also - as far as it seems possible from today's perspective - an insight into their expectations for the future.

A total of 871 respondents from companies in the environmental technology industry took part in two separate primary surveys, 554 in the main survey and 313 in the supplementary survey, which focuses specifically on the effects of the Covid 19 pandemic.

The economic importance of the Austrian environmental technology economy

The environmental technology sector is a vital component of the domestic economy. It shows a considerably beneficial development trend and is firmly anchored within the domestic economic network due to its resilient value chains. The environmental technology business activities of 1,080 industrial companies together with 1,652 service providers create around **51,500 jobs.** In 2019, Austria's environmental technology economy has directly generated **revenue** of around **15.24 billion EUR.**

In comparison with the previous study (benchmarks of the environmental technology industry in the reference year 2015: 12.30 billion EUR revenue and 41,371 employees), this represents an average **annual revenue growth** of **6.0%.** For comparison: The total

revenue of the Austrian manufacturing[2] sector shows an average annual growth of 3.9% between 2015 and 2019.

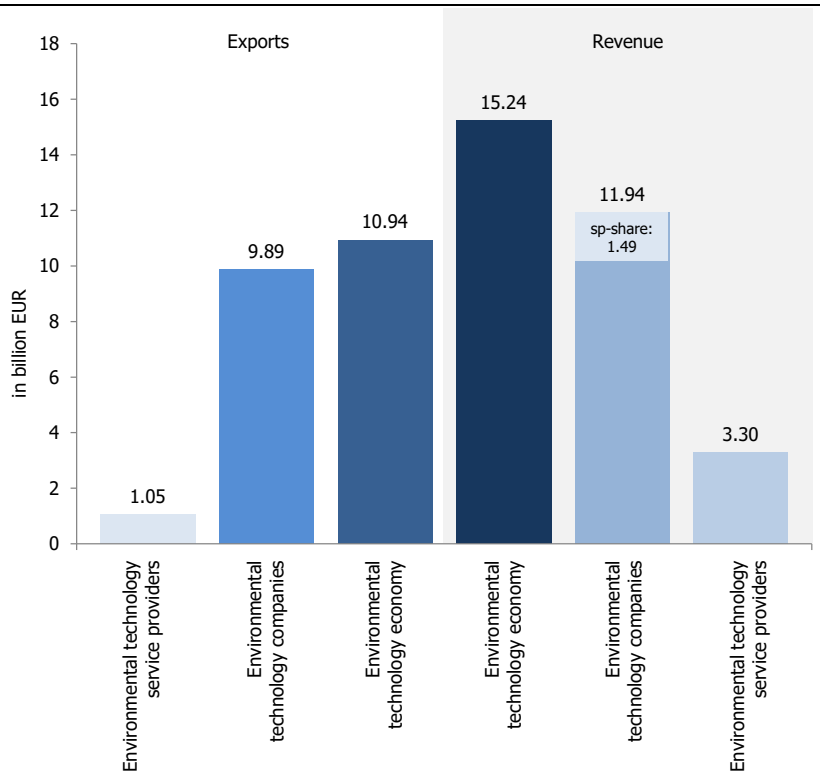
Table 1: Economic dimensions of the environmental technology industry (industrial and service companies)

Environmental technology industry	Number of companies	Revenue in billion EUR	Number of employees
2019	2,732	15.24	51,470
2015	2,492	12.30	41,371
Difference in %	9.6%	23.9%	24.4%
Average annual growth in %	*2.4%*	*6.0%*	*5.9%*

Sources: IWI survey on Austrian environmental technology industry 2020, IWI projections

Environmental technology companies within the **producing industry** are the **main driving force** of this growth. These companies generate **revenue** of **11.94 billion EUR** and provide more than **37,900 jobs.**

Figure 1: Structural comparison of the environmental technology economy (Industry and service companies) based on selected absolute measures (in billion EUR)



Annot.: For the year 2019. Rounding differences possible. Calculations based on the upper limit. sp=service providers

Sources: IWI survey on Austrian environmental technology industry 2020, IWI projections

2 Revenue oft he Austrian manufacturing sector 2015: 177,74 billion EUR; 2019: 205,81billion EUR, see Strucutral business statistics, Statistik Austria.

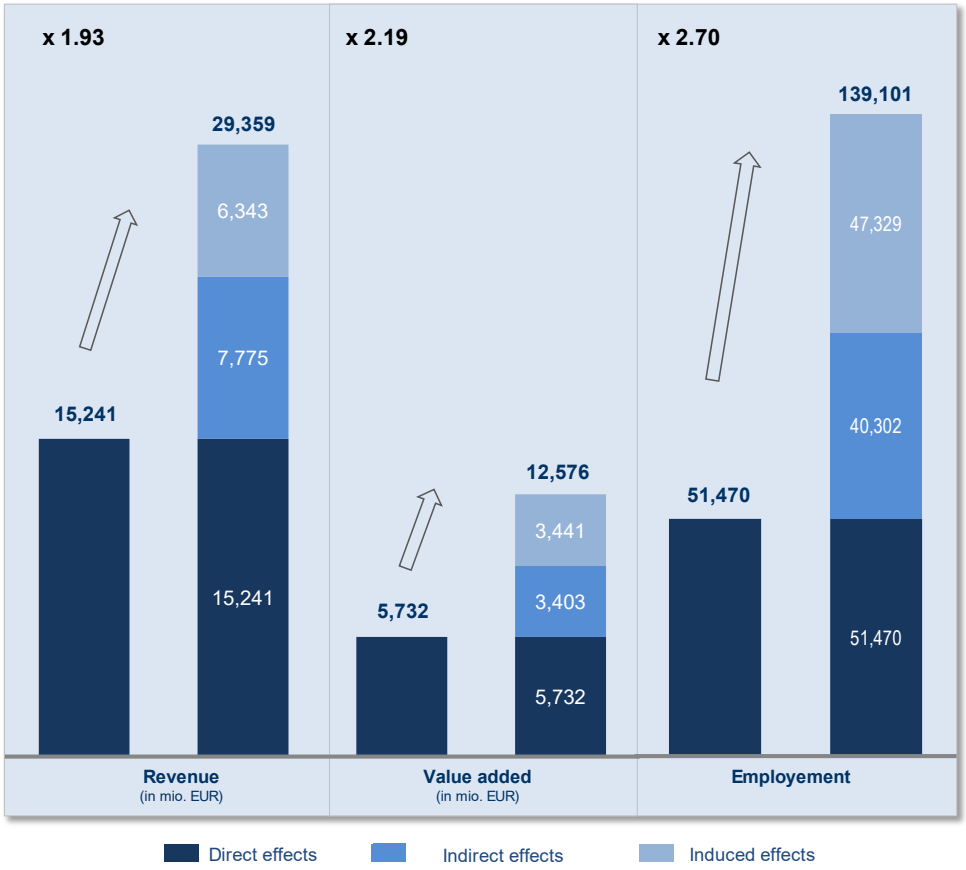
In the long-term development the environmental technology industry proves a continuous upward trend and is characterized by an outstanding, above-average revenue growth between 2015 an 2019, which on average reaches about 5.8% per year. It displays a stronger increase in revenue compared to the period 2011 to 2015, which shows an average annual growth of 4,6%. Thus, the environmental technology industry in Austria recently achieved a share of 3.1% of GDP.

A stable corporate and industry structure is a key characteristic of the domestic environmental technology industry and crucial for playing its role as a driver of growth. Resembling the diversity of environmental technologies, the domestic environmental technology industry shows a broad and heterogeneous setting of entrepreneurial activities, which range from the construction and operation of biomass, biogas, photovoltaic, thermal solar, hydro and wind power plants, to the production of engines for e-mobility, the production of PV modules and solar collectors as well as control technology for renewable energy sources. These activities are provided by companies of all sizes, with companies being highly networked among each other. Service providers in the area of environmental technology show an equally versatile range of sectors, which includes recycling activities, project development, technical planning and consulting, technical testing and assessment and last but not least research and development for environmental technology products and services.

With its far-reaching and stable linkages that extend beyond entrepreneurial boundaries, the environmental technology economy is a **driving force in extensive value-added systems.** By means of its considerably high multiplier effects (indirect value-added effects as well as effects on consumption and investment), it secures a total of more than **139,000 jobs** in the overall economic structure and initiates a **value added** of **12.58 billion EUR** in Austria.

Thus, only taken the industrial enterprises of the environmental technology industry, total economic revenue of 22.54 billion EUR is generated in the Austrian national economy and altogether more than 103,000 jobs are secured. The thereby released value added amounts to 9.16 billion EUR.

Figure 2: Macroeconomic effects of the environmental technology industry in Austria



Annot.: Calculations according to product allocation of the respective environmental technology main product.
Sources: IWI (2020) on the basis of Statistik Austria (2016c)

Performance range and structural data of the environmental technology economy

60% of environmental technology companies were founded in the last 30 years

In recent decades, challenges of environmental protection have become increasingly important, and thus the interest of domestic companies in dealing with this complex area of technology has grown accordingly. Since the 1960s, there has been a constant increase in the number of newly founded companies. In the **last three decades**, **one-fifth** of all environmental technology industrial companies have been **founded**, reaching its recent climax within the last decade, accounting for 21% of new founded companies. Environmental technology industrial companies are most frequently **located** in **Upper Austria, Styria and Lower Austria**; in total, more than half of the surveyed companies have their production site in these provinces.

Companies in the environmental technology industry develop towards being system providers

The field of environmental technology can be divided into three main areas: end-of-pipe technologies; clean (precautionary) environmental technologies; and measurement, control and regulation technologies for environmental monitoring. Most companies (57%) are active in clean environmental technologies, but contemporaneously more than **seven out of ten** companies already **offer several technologies** in **multiple focal areas**. There is a clear trend towards diversification, as companies in the environmental technology industry increasingly **develop towards being system providers** which offer an extended range of products and services.

Renewable energy and energy efficiency technologies top-selling focal areas

The largest share (6.07 billion EUR), and thus nearly half of the revenue of industrial environmental technology companies, is generated with products of renewable energy technologies such as the construction and operation of biomass, biogas, photovoltaic, thermal solar, and hydro and wind power plants. 2.46 billion EUR revenue of industrial environmental technology companies can be attributed to the focal area of energy efficiency technologies.

In the case of environmental technology service providers, the highest revenue (1.25 billion EUR or 38%) is generated in the focal area of waste technologies and recycling; followed by a fifth (0.65 billion EUR) that is generated from the water and wastewater technologies segment, which is almost entirely handled by SMEs.

Market position and market expectations

Environmental technology companies were able to increase market share

More than half of the responding **industrial environmental technology companies** have **increased** their own **market share** within the **last three years** (54%); while another third has not experienced any changes. The market shares of the **environmental technology service providers** have **also developed positively** in the last three years or have at least remained the same. Innovative technologies and the quality of their main products continue to represent the two most important success criteria for the competitiveness of the companies.

Despite Covid-19 pandemic, companies expect positive development of environmental technology market in upcoming years

Although the survey took place in midst of the nation-wide corona lockdown, a positive trend can be observed for the majority of environmental technology companies. A **growth of the market** for their environmental technology main product is **expected by 78%** of **industrial** environmental technology **companies** and **65%** of the environmental technology **service providers**. Especially in the main area of clean environmental technologies, the companies' perception is the most positive. Similarly, a positive perception can be seen with regard to the companies' expectations regarding revenue development: more than half of those surveyed expect an increase in revenue in the next three years, for the overall economy (53%) as well as the environmental technology sector (55%).

Increasing environmental awareness and legislation are drivers of demand

National legislation continues to be the **most important factor** that drives the demand for an increasing supply of environmental technologies. According to 92% of respondents legislation is assigned (very) high importance. The **second essential determinant** is represented by the **growing societal environmental awareness**, which has, with an increase of 12 percent points, clearly gained in importance compared to the previous study. EU legislation, governmental grants and subsidies as well as environmental taxes, fees or levies and certificates are further key factors influencing demand.

Internationalization and export

Austria's share of world-wide environmental technology exports at 1.4%

Key characteristics of the environmental technology economy are a **high degree of internationalization** and a **strong export orientation.** Major global trends and developments (e.g. the challenges of climate change, worldwide population growth) as well as a variety of economic stimulus programs (international, national and regional) address investments in climate protection and the "Green Transition", thus creating new export opportunities for Austria's environmental technology companies. In the period **2016-2018 Austria's share in world trade** was **1.4%,** which represents a slight decline, as can be equally seen for a number of other industrialized countries (e.g. Germany, Switzerland, UK, USA).

Above-average export ratio of environmental technology economy

The above-average international orientation is illustrated by the environmental technology economy's export benchmarks: **EUR 10.94 billion in export revenue** correspond to a stratified extrapolated **export rate of 71.8%**. Industrial environmental technology companies generate more than 80% of their revenue from environmental technologies within export markets in Europe and worldwide. The environmental technology service companies sold more than a quarter (32%) of their environmental technology services on export markets. Compared to the previous study, both aggregates show increased export intensity (export rate 2015: industry 75%, service companies 25%).

Table 2: Export rate 2013 to 2019 (industrial environmental technology companies and service providers)

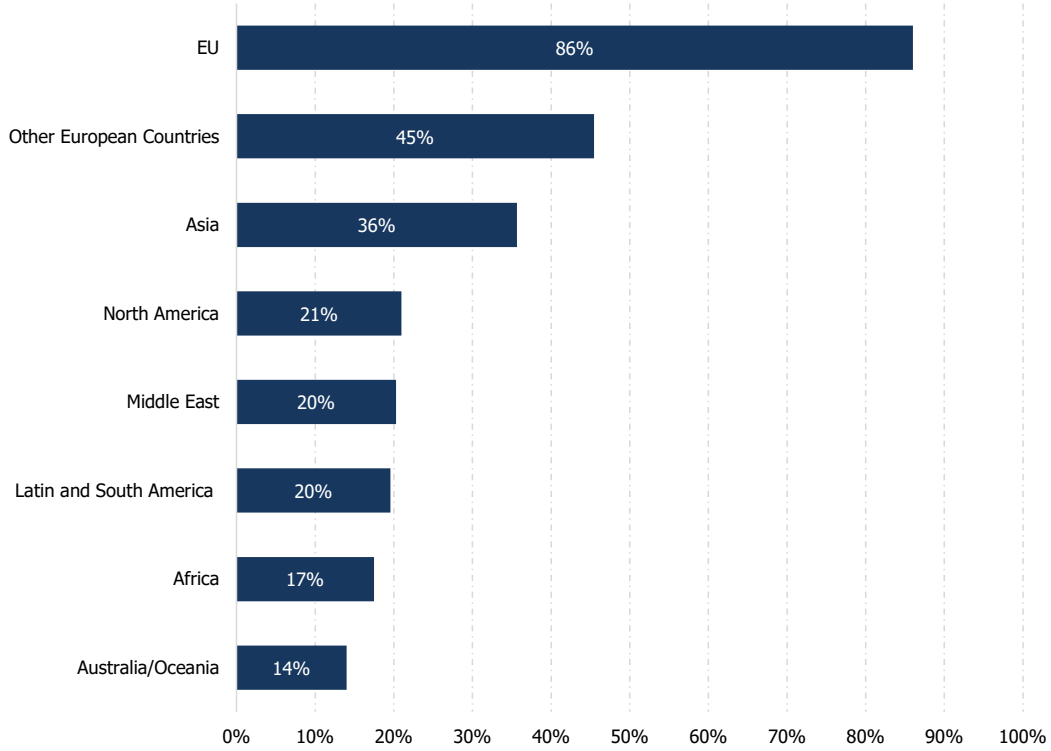
Export quota	Total revenue	Environmental technology revenue
Environmental technology companies		
Export quota 2019	81%	**83%**
Export quota 2017	79%	**80%**
Export quota 2015	73%	**75%**
Export quota 2013	72%	**73%**
Environmental technology service providers		
Export quota 2019	10%	**32%**
Export quota 2017	9%	**28%**
Export quota 2015	11%	**25%**
Export quota 2013	11%	**20%**

Source: IWI/P-IC: Survey on Austrian environmental technology industry 2020, Question 24f; industrial companies n=104, service providers n=55; number of responses

EU countries still most important export region, followed by Asia

The **EU-Member-States and non-EU European states** constitute the **most important export markets** for industrial environmental technology companies, followed by the Asian region. This is followed by almost equally shares of North America, the Middle East and Latin and South America.

Figure 3 International export markets (industrial environmental technology companies)



Sources: IWI/P-IC: Survey on Austrian environmental technology industry 2020, Question 24; industrial companies n=143; number of responses, multiple responses possible

In 2019, 78% of their total export volume of 8.03 billion EUR was generated in the EU member states, 7% or 0.75 billion EUR were generated in Asia. Another important export region is North America (4% or 0.44 billion EUR).

Asia and the EU are key future markets for Austrian environmental technology exports

In recent years the **highest growth** in market share could be seen in **North America** – 64% of industrial companies have been able to expand their market position. Exports to Asia, the EU, the other European countries and Africa have also developed positively (increase of 60%). In general, the **EU** and the **Asian region** are described as the **most important future markets** by the surveyed companies.

Direct subsidies are most important export-supporting measures for environmental technology companies

There is a multitude of export promoting measures available in Austria, and under a fifth of the responding companies take advantage of these promotional instruments. **Industrial** environmental technology **companies** described **export promotion programs** (53%) as the **most valuable instrument**, followed by the initiation of company cooperation for international market development (47%). For the environmental technology **service companies**, the provision of **market information** (e.g. studies, domestic events) (48%) is the **most important**, followed by monetary support for export activities (38%).

Legal framework and strong competition in target markets are main export barriers

Significant export barriers for companies in the environmental technology industry as well as for service providers are, above all, the requirements of **legal and administrative frameworks** (environmental technoly industry: 37%, service companies: 31%)and the **strong competition** in target countries (environmental technoly industry: 34%, service companies: 29%).

Planned increase in foreign investment by Austrian environmental technology industry

26% of Austrian industrial environmental technology companies have foreign subsidiaries, which are primarily used for sales, production and R&D purposes. The majority (**56%**) of these companies **plan** to **increase foreign investment over** the **next three years**.

Research and Innovation

Environmental technology – a research- and innovation-intensive sector

Research and innovation are crucial determinants of successful entrepreneurial development. In the environmental technology sector, increasing societal awareness, the developments of the legal framework for the use of energy and environmental technologies and public research and innovation funding have an influence on the R&D activities of companies.

Austria shows intensive participation in EU research programs and a high level of public spending on energy research

Austrian companies and research institutions show an **above-average participation** rate in environmental and energy-related program lines of **Horizon 2020** and have successfully acquired a total of 325.34 million EUR in EU research funding in recent years by participating in **588 projects**. This accounts for 3.1% of all EU-funding assigned to the three thematic areas of "Societal Challenges". In **2019**, with **151.4 million EUR**, the **energy research expenditure** reached a high level in Austria (compared to 128.4 million EUR in 2015). The highest share of these expenditures was assigned to the focal area of energy efficiency (50.2%), followed by renewable energies and transmission and storage technologies.

Very high and steadily increasing R&D rates in Austria's environmental technology industry

The responding environmental technology industrial companies showed an **average R&D rate of 6.5%** (total companies' intensity) and 7.0% (environmental technology R&D intensity) in 2019. This means that R&D intensity has **risen significantly** by a total of **1.1 percent points since 2013**. Among environmental technology service providers the R&D ratio has also continuously grown in recent years – with 5.0% in 2019 it has increased by 2.1 percent points since 2013.

Table 3 R&D intensity by fields of environmental action, 2013 to 2019 (industrial and service companies)

R&D intensity	Total revenue	Environmental technology revenue
Environmental technology companies		
R&D intensity 2019	6.5%	7.0%
R&D intensity 2017	5.3%	6.6%
R&D intensity 2015	6.1%	6.7%
R&D intensity 2013	5.4%	5.5%
Environmental technology service providers		
R&D intensity 2019	4.2%	5.0%
R&D intensity 2017	3.8%	4.3%
R&D intensity 2015	4.6%	4.6%
R&D intensity 2013	2.5%	2.9%

Source: IWI/P-IC: Survey on Austrian environmental technology industry 2020, Question 21i; industrial companies n=90, service providers n=55; number of responses

Technological improvements and development of new products main objectives of innovation activities

For the surveyed industrial environmental technology companies and service providers research activities are mostly focused on technological improvement, the development of new products and/or services and securing and expansion of market shares. By means of aspired novelty value of innovations, it can be stated that the companies' scope for market novelties is primarily set globally (51% of the innovations are described as worldwide market novelties). For comparison: According to the current innovation statistics CIS 2018, 23% of companies introduced market innovations in the period 2016 to 2018. More than half of the environmental technology industrial companies (55%) plan to increase their innovation activities in the next few years.

Increasing energy efficiency key focus of research and innovation

By analyzing R&D activities by thematic area it can be shown, that more than **80% of** the **innovations** (with positive environmental impact and brought to the market between 2017 and 2019) **deal with questions of increasing energy efficiency** and two thirds

with reducing soil, water or air pollution. More than one third (36%) of innovation-active companies in the environmental technology sector use industrial property rights for their inventions and apply for patents, utility models, brands and the like.

Lack of sufficient funding volumes often barrier to innovation

There is a number of barriers to innovation – but most importantly, the environmental technology industry (53%) and service providers (49%) deal with a demand for external financial resources, due to constraints in their own expenditures.

Impressive effect of R&D on revenue and employment growth

The effects of research and innovation on revenue growth and employment development in environmental technology companies are extremely impressive: **For 83%** of the industrial companies, **competitiveness has improved** in recent years as a result of innovation activities, and **48%** have been able to **increase** their **number of employees**.

The average annual revenue growth of the innovative companies in the environmental technology sector was plus 11.3%, the growth of employees plus 9.5% p.a. Companies that have used public funding for their R&D activities even show an increase in revenue of plus 13.1% and an increase in employees of 12.0%.

Table 4: Revenue and employment growth of the innovatively active environmental technology industry and impact of public subsidies 2017 to 2019

Revenue and employment growth of the innovatively active environmental technology industry	Revenue growth	Employee growth
Average yearly increase 2017 to 2019	11.3%	9.5%
Promoted innovations	13.1%	12.0%
Non-promoted innovations	9.7%	7.5%

Source: IWI/P-IC: Survey on Austrian environmental technology industry 2020, Question 29i; environmental technology industry n=65 (revenue growth), n=62 (employment growth); number of responses

Besides, the higher the R&D rates of the companies, the more impressive the growth in employment: enterprises with R&D rates higher than 10% increased the number of employees by an average of plus 11.4% per year between 2017 and 2019. For comparison: companies with an R&D rate of up to 4% have an average annual employment growth of 6.9%.

Business creation and startup companies

Specific features for setting up a company

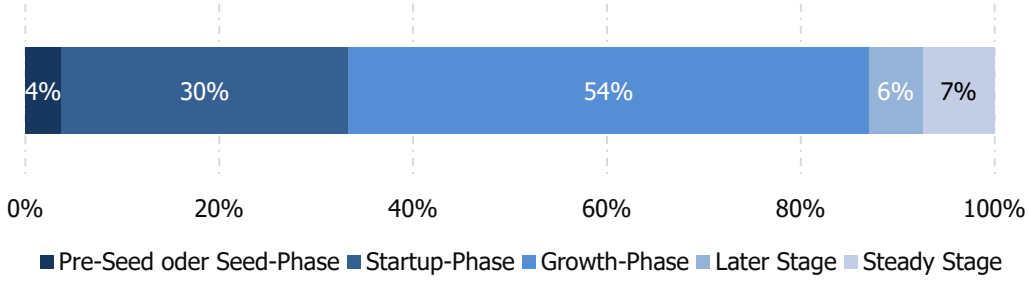
Startups in the environmental technology sector show specific features: For example, they are characterized by a stronger intrinsic motivation of the founders compared to other industries. Key trends in environmental technology, that have a major impact on the dynamics and development of start-ups, include the European Green Deal, the new govern-

ment program, electro mobility, renewable energies, hydrogen, energy storage, etc. Further specific features are intensive research and development activities, activities in the relevant funding programs for the energy and environmental sectors, as well as the early international orientation.

Majority of environmental technology start-ups is in the phase of growth and predominantly financed by savings and bank loans

13% of the responding companies in the environmental technology industry classify themselves as a start-up or young company. 54% of these start-ups stated that they were currently in the growth phase. The financing of the young companies comes from different sources; almost half of the responding start-ups (47%) are financed by bank loans and savings (financial means of the founders).

Figure 4: Phases of startups' development (environmental technology sector)



Source: IWI/P-IC: Survey on Austrian environmental technology industry 2020, Question 4a; environmental technology sector n=54; number of responses

When it comes to the export activities of the start-ups, a strong international character becomes evident – 62% said they were already actively exporting. Among the most important international economic areas are the EU (94% of start-ups), Europe as a whole and Asia (18% each).

Austria certainly attractive for startups in the environmental technology industry

Austria's attractiveness for start-ups was rated (very) positively by 27% of respondents, 39% assign Austria certain attractiveness. Suggestions of the responding start-ups for a stronger stimulation of start-ups in the environmental technology sector included increased support for environmental technology companies (e.g. targeted financing for facility investments, higher R&D subsidies), an easier access to financing and the creation of clear and long-term legal frameworks and strategies.

Subsidies (70%), legal regulations in the environmental sector (55%) and the abundance of qualified employees (43%) are described as positive stimuli for further start-up growth.

Covid-19 pandemic a huge challenge, especially for startups

Although the crisis represents an opportunity for the environmental technology industry due to new programs, especially with regard to the European Green Deal, and the stronger focus on sustainability and the environment, financing is a fundamental challenge for young companies in these times. In order to ensure liquidity, the Covid-19 Startup Support Fund, which was set up by the BMDW and the BMK at aws from May to December 2020, as well as bridging finance offer useful instruments.

Subsidies

Austria has a wide range of funding instruments at federal and provincial level, and companies in the environmental technology sector are supported by a number of relevant funding programs in the areas of research, exports, investments and start-ups. Besides, numerous support instruments are aimed at promoting environmentally relevant investments which has a positive effect on the determinants of demand in the environmental technology industry.

UFI has a positive impact on demand determinants of the environmental technology industry

In Austria all companies that make environmentally relevant investments find a **wide range of support**, especially within the framework of the **Austrian Environmental Promotion Agency (UFI)**, which has a positive effect on the demand for Austrian environmental technologies. The aws offers further sector independent investment support, through its financing services such as erp loans, guarantees and warranties and its program "Energie & Klima". In addition, since September 2020 an investment bonus ("Investitionsprämie") exists (with focus on sustainable development: subsidy of 14% of eligible investments), which is timely restricted until February 2021 and intended to support the Austrian economy in the wake of the corona crisis.

Permanent oversubscription of R&D funding programs in the environmental technology sector

In the field of energy and environmental technologies, Austrian companies are supported in their R&D activities by a number of relevant research funding programs. However, despite budget increases in the past years, the programs have been constantly oversubscribed.

Central R&D funding programs include the Energy Research Program, which is intended to contribute to the provision of safe, sustainable and affordable energy and mobility solutions, the RTI Initiative "Vorzeigeregion Energie", with which innovative energy technologies from Austria are to be developed and demonstrated as model solutions for intelligent, safe and affordable energy and transport systems of the future, and the programs City of the Future, Smart Cities Demo, Zero Emission Mobility, Zero Emission Mobility Implementation, Contaminated Sites Research, Water Management Research and Creative Impact.

Funding of demonstrational facilities provides important export support

Companies are supported in their export activities by the promotional initiative go-international (BMDW, executed by "Außenwirtschaft Austria" of WKO); Tecxport and the export initiative for the environmental technologies sector of the BMK, the aws program "Technologie-Internationalisierung" (formerly tec4market and kit4market) and the export financing instruments of OKB, Austria's Export Credit Agency. Experience has shown that in addition to direct funding, market information and particularly exhibitions provide good strategic access for SMEs to open up distant markets. Furthermore, the funding of demonstrational facilities offers an important instrument for technology internationalization.

PreSeed and Seedfinancing valuable instruments for promoting start-ups, but face persistent oversubscription

There is a wide range of support available for start-ups and the pre-seed and seed financing support provided by the aws are seen as particularly important, with more and more applications dealing with climate-relevant technologies and innovations. However, these two programs are heavily oversubscribed.

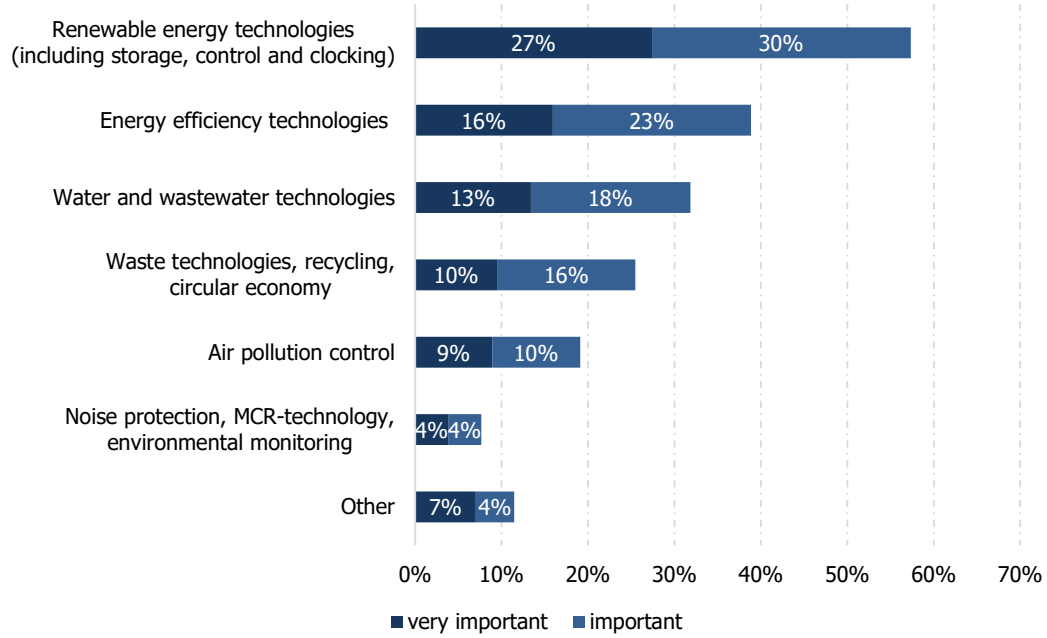
Half of the companies use R&D subsidies and 18% export subsidies

Nearly half of the responding environmental technology companies take advantage of R&D subsidies, the most common being the FFG programs, followed by various federal state subsidies. 18% of the companies make use of subsidies to support their export activities, the most frequent being the support offered by the initiative go-international (77%). Well-known barriers to the use of support programs are the high administrative effort involved in applying for and processing subsidies as well as a lack of information or a lack of an overview of subsidy opportunities.

State subsidies play an important role for the demand of domestic environmental technology products in the field of renewable energy technologies

More than half of those companies that postulate a (very) high importance of state subsidies as determinant driving force are active in the field of renewable energy technologies, followed by companies in energy efficiency technologies and water and wastewater technologies.

Figure 5: Allocation by focal area of all respondents, who have assigned state subsidies a high to very high importance as determinant of demand (environmental technology industry)



Source: IWI/P-IC: Survey on Austrian environmental technology industry 2020, Question 6; environmental technology industry n=157; number of responses

The Austrian environmental technology industry in the wake of the corona crisis

There is no economy that is not shaken by the impact of the Covid 19 pandemic. Nationwide lockdowns as well as travel restrictions have become the new normal in which its course domestic companies face severe challenges. Therefore a supplementary survey of the environmental technology industry has been conducted in order to assess the corona crisis and its consequences for the Austrian environmental technology industrial and service companies and, if necessary, to help to make conducive decisions for the business location. It can be said in advance that, even in the situation of the recent crisis, the environmental technology industry manages to prove its role as stable and resilient part of the economy.

Revenue development of the environmental technology industry

The corona crisis analysis shows for about half of the industrial companies in the environmental technology industry (49%) there was no decline or even an increase in revenue between March and September 2020 compared to the same period in 2019. However, the remaining half (51%) of the industrial environmental technology companies had to cope with losses. Among environmental technology service providers, more than three-fifths of the enterprises (61%) have seen their revenue increase or remain steady in recent months.

A weighted analysis of the revenue development by the size of the samples' responding companies shows that the revenue of the environmental technology industry fell overall by 3.2% in the period between March and September 2020. The industrial environmental technology companies (-2.9%) are not as strongly affected as environmental technology service providers (-4.3%).

In addition to the direct effects of the corona crisis in the first months, it is important to examine the long-term consequences. A weighted analysis (by number of employees) of the revenue development of the survey sample shows that revenues will stabilize by 2021 and in the next three years. Whereas in 2021 a lower revenue growth is expected, the respondents estimate to already achieve an average annual revenue growth (5.9%) in the next three years, thus almost reaching the average growth of the past four years (6.0%).

Table 5: Weighted revenue development analysis of environmental technology industry and broken down by industrial and service companies

Revenue development	environmental technology industry	environmental technology companies	environmental technology service providers
between march and september 2020 (compared to the same period in 2019)			
Total	-3.2%	-2.9%	-4.3%
until 2021			
Total	2.0%	4.2%	-6.2%
over the next three years			
Total	17.8%	21.5%	4.2%
Expected annual growth	*5.9%*	*7.2%*	*1.4%*

Source: IWI/P-IC: Survey on Austrian environmental technology industry 2020 – Supplementary study: Corona crisis analysis, Question 1a, 2a; industrial companies n=163, service providers n=117; number of responses

Employment development of the environmental technology industry

In contrast to companies' revenue, employment figures have been less affected between March and September 2020 compared to the same period in 2019. Only 14% of the surveyed industrial environmental technology companies and 8% of the environmental technology service providers have noticed a decrease in the number of employees between March and September 2020. On the other hand, 15% (industrial environmental technology companies) and 12% (environmental technology service providers) hired additional staff in these months. For the remaining enterprises there was no change. No changes were reported in the remaining companies.

The weighted analysis on the development of the number of employees in the survey sample shows that despite a decline in revenue, the number of employees remained stable between March and September 2020. Therefore it can be assumed that government measures such as short-time working ("Kurzarbeit") may have made a positive contribution to preventing short-term job cuts.

For the year 2021, the respondents in the environmental technology industry expect a slight and short-term employee downsizing by about minus 1.0%. On the other hand the respondents' picture for the next three years is already a very positive one. Thus, the respondents in the environmental technology industry expect an increase in the number of employees, which will probably amount to 10.5% within the next three years (average 3.5% per year). However, these highly positive expectations can mostly be attributed to industrial environmental technology companies, whereas the environmental technology service providers expect lower growth rates. Compared to the employment growth rate of the past four years (5.9%), the currently expected growth rate of responding companies therefore is slightly smaller.

Table 6: Weighted employment development analysis of environmental technology industry and broken down by industrial and service companies

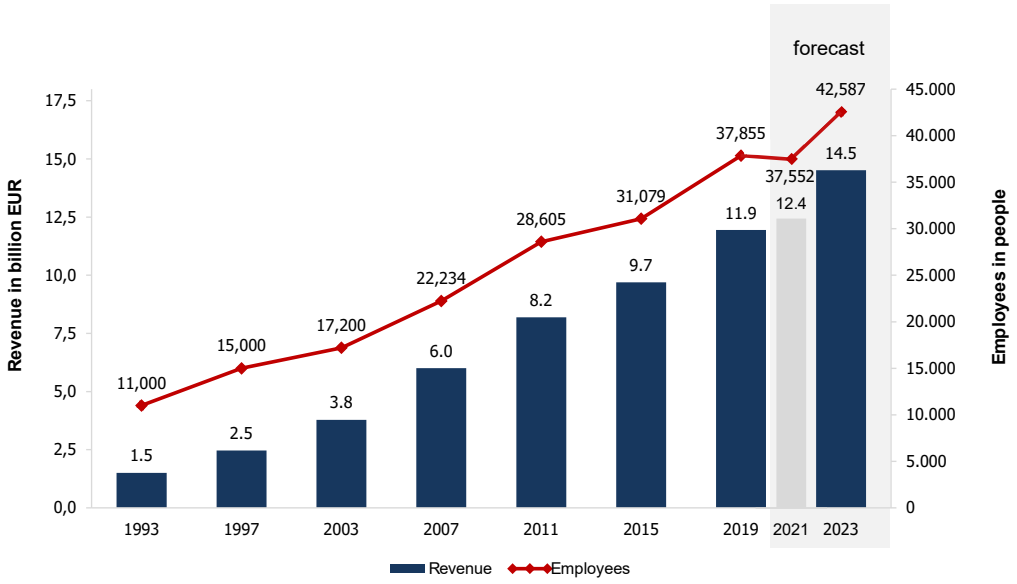
Employment development	environmental technology industry	environmental technology companies	environmental technology service providers
between march and september 2020 (compared to the same period in 2019)			
Total	0.2%	0.2%	0.3%
until 2021			
Total	-1.0%	-1.4%	0.2%
over the next three years			
Total	10.5%	12.5%	4.9%
Expected annual growth	*3.5%*	*4.2%*	*1.6%*

Source: IWI/P-IC: Survey on Austrian environmental technology industry 2020 – Supplementary study: Corona crisis analysis, Question 1a, 2a; industrial companies n=163, service providers n=117; number of responses

Revenue and employment forecast for the environmental technology industry

As the duration and total effects of the corona crisis are not yet predictable, a forecast for the economic development poses a difficult task. Nonetheless, revenue in the environmental technology industry is unlikely to increase in 2021 and employment is likely to stagnate or, for the first time since 1993, fall slightly. Despite this fact, there are positive perspectives for companies in the environmental technology industry for a rapid recovery in their development.

Figure 6: Dynamic structural comparison of the environmental technology industry by selected concrete benchmarks including forecast



Source: IWI/P-IC: Survey on Austrian environmental technology industry 2020 – Supplementary study: Corona crisis analysis 2016/2017/2020, IWI-projections, WIFO (1995, 2000, 2005, 2009, 2013)

Impact of Covid-19 on the export development of the environmental technology industry

The export activities of the environmental technology industry have experienced shrinkage in all target countries for the majority of respondents. Decreases are highest in Latin and South America, where 83% of companies show a negative development between March 2020 and September 2020, followed by the Middle East (decrease in 80% of companies), North America (72%) and the EU countries (65%). However, several companies were also able to increase their export activities in 2020, with 40% of these companies exporting to African markets and 36% to Australia.

Within the next three years (compared to 2019), more than a third of the respondents in the environmental technology industry expect export activities to grow in the EU, the remaining European countries, Australia, Asia and North America. The highest increases in export business are expected by the respondents in North America and Asia with +15.5% each.

Impact of Covid-19 on research and innovation in the environmental technology industry

In general, innovation activities have not changed significantly in 2020 for the majority of respondents in the environmental technology industry (59%). Almost a quarter of the respondents even intensified their innovation activities in the current situation, while 17% curtailed them. More than half of the companies in the environmental technology industry expect an increase in innovation activities in the next three years (compared to 2019).

For 39% of the respondents in the environmental technology sector, R&D expenditure has been curtailed in 2020, while it has been unaffected for 37%. Concerning the number of R&D projects, 41% of the companies stated no change for 2020, while 40% stated to reduce the number of R&D projects.

As far as their long-term development of R&D plans is concerned, positive expectations can be seen among companies in the environmental technology sector: 35% of the respondents expect an increase in the number of R&D projects and 37% plan to increase their R&D expenditure within the next three years.

The impact of Covid-19 on innovation activities in the environmental technology industry can be described as substantial: More than half of the respondents stated that the crisis was an impetus for new product and service developments and new business opportunities, and 43% of the companies intensified their research and innovation activities in order to open up new future fields.

Factors of influence for the demand of environmental technology services and products

For 74% of the respondents in the environmental technology industry, the investment bonus ("Investitionsprämie") represents a very important or important determinant of demand, followed by the climate billion ("Klimamilliarde", 66%) and the Renewable Energies Expansion Act (Erneuerbaren-Ausbau-Gesetz, EAG) (65%).

Conclusions and recommendations

From the results of this study (see in this context in particular Chapter 10) the following general and specific recommendations for strengthening the application and dissemination of Austrian environmental technologies can be derived:

General recommendations

1. **Take advantage of international economic stimulus programs** for rapid recovery from the consequences of the Covid-19 pandemic that include extensive investments for **greening** and **"Green Transition"**. Asses market opportunities of these programs through structured analysis and prioritization, intensive communication and consulting measures.

2. Extensive **clarification on the role of relevant legislation** and **growing societal environmental awareness** as **major determinants** of demand should be strengthened through targeted public relations work.

3. Enable **generally higher funding for the relevant support programs** for the environmental technology industry – especially R&D, export, and start-up support programs.

4. By the impact of the investment bonus (Investitionsprämie") **Austria's as home market** will act as an accelerator for the demand for environmentally relevant products and services. Therefore, concentrated market assessment within a limited period of time is necessary. Realize **extension of the investment bonus in general and in the priority area "greening"** ("Ökologisierung") beyond February 28, 2021, if necessary in terms of market and pandemic situation.

Specific recommendations: Internalization and export

5. Besides European States, international **developing and emerging countries**, in particular in **Asian and African** countries, continue to offer great market potential for domestic environmental technologies due to their economic development and urgent necessity to tackle ecological challenges. Thus, intensifying respective support measures, especially company cooperation, is recommended.

6. **International financial institutions (IFIs)** such as the World Bank invest approx. 40-50% of their funds in the construction and expansion of energy and environmentally relevant infrastructures. Thus, strengthening the awareness and competence of local companies regarding participation in IFI-financed projects should be achieved.

7. **Strengthen the internationalization activities of environmental technology service providers** through special support measures, e.g. subsidies for the use of services from market and technology experts or export coaches.

8. Strengthen information and **consulting measures on legal and administrative framework conditions** in the export target countries on the basis of existing support instruments and bilateral formats.

Specific recommendations: Research and Innovation

9. Foster the **development of digital environmental technology solutions** – setting research funding priorities to catch up internationally.

10. Implementation of **new research funding programs** in the fields of **biotechnology and circular economy** to catch up with international activities.

11. **Technology of the future: Hydrogen** - increase the visibility and networking of Austrian actors in industry and science.
12. Take advantage of Austrian R&D excellence in environmental technologies to **enable targeted settling of R&D centers of multinational companies in Austria**.

Specific recommendations: Business creation and startup companies

13. Develop and implement **startup programs for circular economy** based on international examples (e.g. France, Finland, and Sweden).

14. Intensify support of **export cooperation of startups** by e.g. go-international initiative, "Tecxport", environmental technology export initiative ("Exportinitiative Umwelttechnik") and environmental technology business clusters, as well as deliberate consulting measures on the legal framework of international markets.

Specific recommendations: Subsidies

15. Develop **support for pilot and demonstration plants** based on international examples (e.g. France, Belgium, and Denmark).

16. Strengthen **cooperation between the funding agencies** at federal level by developing joint priority topics and elaborating **integrated funding offers**.

17. Facilitate **simplification and more customer-friendly design of calls** for tenders through ongoing submission options, to support rapid realization of research and innovation projects.

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