European Commission

European Construction Sector Observatory

Policy fact sheet

Austria

City of Tomorrow RTD Programme

Thematic Objective 1

November 2019

In a nutshell

Implementing body	Federal Ministry of Transport, Innovation and Technology (BMVIT); Die Österreichische Forschungsförderungsgesellschaft - FFG (Austrian Research Promotion Agency); Austria Wirtschaftsservice GmbH (AWS); Österreichische Gesellschaft für Umwelt und Technik - ÖGUT (Austrian Society for Environment & Technology)
Key features & objectives	The City of Tomorrow research and technology programme aims to research and develop urban technologies, systems and services for sustainable and future-oriented cities
Implementation date	Since 2013
Targeted beneficiaries	Companies of any legal form, research organisations (e.g. universities, polytechnics, non-university research institutions, innovation intermediaries, technology transfer organisations, and other science-based organisations), and other non-economic institutions - municipalities and autonomous bodies, as well as NGOs.
Targeted sub-sectors	Residential and commercial
Budget (EUR)	39.1 million (2013-2019)
Good practice	★★★★★
Transferability	★★★☆☆

Climate change is intensifying the so-called 'Urban Heat Island' effect[1] in Austrian cities, affecting the environment, the economy and the quality of life of citizens. Although the construction sector is considered key for addressing climate change due to the energy savings potential of the building stock[2], greenhouse gas emissions from Austrian manufacturing industries and construction represented 20% of total emissions in 2017, having increased by 12% between 1990 and 2017[3].

Together with climate change, drastic shortage of natural resources and rapid population growth in urban areas are the other main challenges that Austria is facing[4]. Aware of the key role of innovation and technology in fighting climate change and making urban development more sustainable, business enterprise R&D expenditure (BERD) in the construction sector is highest for professional, scientific and technical activities, accounting for an expenditure of EUR 634.9 million in 2013 and marking a 22.1% increase with respect to 2011[5]. Furthermore, Austria is among the best EU performing countries in ecological construction, particularly regarding passive house building[6].

To address the urban sustainability challenge, the City of Tomorrow (CoT) Research and Technological Development (RTD) programme ('Stadt der Zukunft') was launched by the Federal Ministry of Transport, Innovation and Technology (BMVIT) in 2013.

CoT builds on the results of previous RTD programmes – mainly Building of Tomorrow[7] ('Haus der Zukunft') and Energy Systems of Tomorrow[8] ('Energiesysteme der Zukunft') – and addresses four strategic objectives set by the Austrian Climate and Energy Strategy 2030[9]:

- Promoting sustainable energy systems;
- Reducing climate change impact;
- Boosting the competitiveness of construction companies; and
- Increasing the quality of research and development activities[10].

Over 140 projects have been funded since 2013. Based on the success of the CoT programme, similar projects have been implemented in other countries, such as the construction of the Passive House office building in Zhuozhou (China)[11].

1.

General description

The City of Tomorrow RTD programme was launched in 2013 by the Division of Energy and Environmental Technologies Programme of the BMVIT, in collaboration with:

- Die Österreichische Forschungsförderungsgesellschaft (FFG) (Austrian Research Promotion Agency), which manages the funding;
- Austria Wirtschaftsservice GmbH (AWS), which manages business-related issues;
- Österreichische Gesellschaft für Umwelt und Technik (ÖGUT) (Austrian Society for Environment and Technology), which manages the programme's dissemination activities[12].

City of Tomorrow supports the development of urban technologies, technology (sub-) systems and services for smart and sustainable cities. The programme focuses on reducing energy consumption (electricity, heating and cooling) and promoting the use of renewable energy in new construction and renovated buildings to make cities more attractive and liveable for residents and business. The programme also contributes to the optimisation of building technologies, new low-tech approaches and the development of new, energy-efficient construction materials that use resources sparingly[13].

The main goal of the programme is to create and implement intelligent energy solutions in buildings and districts.

These solutions are intended to[14]:

- Contribute to the development of resilient cities and districts by promoting the use of renewables and improving energy efficiency and the quality of life;
- Optimise and adapt urban infrastructures considering ongoing urbanisation and the associated increase in resources and energy consumption;
- Develop and secure both the technological leadership and the international competitiveness of Austrian companies and research institutions.

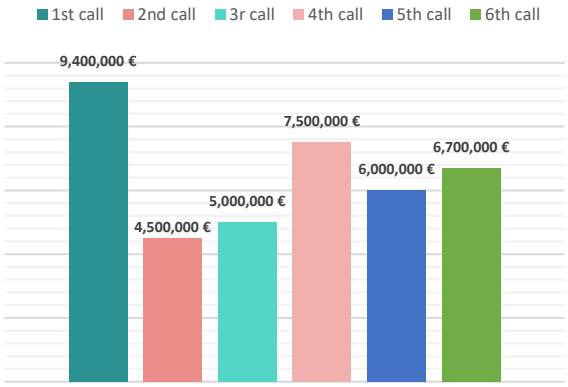
Four categories of projects are funded under the City of Tomorrow programme:

- R&D cooperation projects to develop new products, processes or services or to substantially improve existing ones[15];
- Individual industrial research projects[16];
- Exploratory projects for the preparation of R&D and innovation projects ('Sondierungen'): these exploratory projects assess the feasibility of a project through an analysis of its strengths, weaknesses, opportunities and threats and the identification of the resources needed. They can also include the organisation of workshops or a stakeholder consultation[17];
- R&D services to generate new knowledge in the public interest using scientific methods[18].

The targeted beneficiaries are companies of any legal form, research organisations (e.g. universities, polytechnics, non-university research institutions, innovation intermediaries, technology transfer organisations, and other science-based organisations), and other non-economic institutions - municipalities and autonomous bodies, as well as NGOs. However, universities, polytechnics and municipalities are excluded from individual industrial research projects.

Figure 1 supplies an overview of the budget per call for proposals, a total so far of EUR 39.1 million.

Figure 1: Budget per call for proposals (EUR)



Source: City of Tomorrow website[19]

Projects are selected for funding through calls for proposals. The focus areas of those calls are chosen by means of a consultation process. The process brings together different stakeholders (e.g.: programme / project managers; key international experts, members of the National Smart City network; and results from the thematic and networking workshops) to find new research questions that project proposals need to address each year[20].

As an example, the last call for proposals ran from October 2018 to February 2019 and focused on[21]:

1. Digital planning, construction and operation:

    1.1 Digital planning, construction process and operations management;
    1.2. Real-time data acquisition;
    1.3. Augmented / mixed reality; and
    1.4. Robotics and 3D printing in construction.

2. Plus-energy districts:

    2.1. Energy-flexible building;
    2.2. Demonstration building;
    2.3. Municipal energy storage, sector coupling;
    2.4. Flexible heat / cooling networks testing and use of low-temperature waste heat; and
    2.5. PV self-consumption.

3. Innovative greening technologies and solutions:

    3.1. Reduction of 'Urban Heat Island' effect and summer overheating;
    3.2. Multifunctional wall, roof and façade systems; and
    3.3. Impact of innovative urban greening technologies and efficient applications.

Table 1 provides an overview of the features of the last call for proposals launched under the City of Tomorrow programme.

Table 1: Main features of the 6th call for proposals

	R&D cooperation projects	Individual industrial research projects	Exploratory projects for the preparation of R&D and innovation projects	R&D services
Funding (EUR) (max.)	500 000	500 000	200 000	NA
Funding rate (max.)	85 %	70 %	80 %	NA
Financing	NA	NA	NA	100 %
Project duration (max.)	3 years	3 years	1 year	-
Cooperation requirement	Yes	No	No	No

Source: 6th Guide to project submission[22]

Project proposals are submitted electronically[23] and there are four guides for submission[24] (one per type of project) that include detailed information about the procedure to apply for funding such as the definition of the type of project, consortium requirements, eligibility criteria, eligible costs, submission process, evaluation and award procedure, reporting, etc.

2.

Achieved or expected results

Six calls for proposals have been run since the City of Tomorrow programme first opened in 2013, as shown in Table 2. The 7th call is expected to open in October 2019.

Table 2: Calls for proposals

Calls for proposals	Opening date	Closing date
1st call	26/09/2013	30/01/2014
2nd call	29/09/2014	29/01/2015
3rd call	29/05/2015	28/01/2016
4th call	29/09/2016	30/03/2017
5th call	03/10/2017	27/02/2018
6th call	18/10/2018	15/02/2019

Source: Results of the City of Tomorrow calls[25]

The BMVIT is working on the definition of indicators related to the climate and energy targets such as energy savings or impact in the quality of life in cities. In addition, an external evaluation of the programme is expected in 1 to 2 years[26], similar to the evaluation of the Building of Tomorrow programme[27].

An average of 24 projects[28] have been funded under the City of Tomorrow programme every year since 2013 (6 calls), as shown in Table 3.

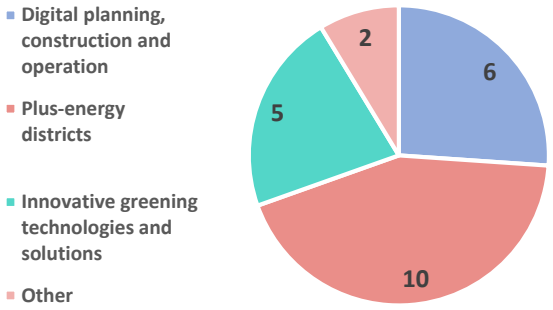
Table 3: Number of projects selected under each call

Call for proposals	Number of projects
1st call (2013-2014)	24
2nd call (2014-2015)	19
3rd call (2015-2016)	26
4th call (2016-2017)	27
5th call (2017-2018)	23
6th call (2018-2019)	23
Total	**142**

Source: Results of the City of Tomorrow calls[29]

In terms of focus areas, Figure 2 shows the number of projects funded under the three main areas of the 6th call for proposals:

Figure 2: Results of the 6th City of Tomorrow call



Source: 6th call results[30]

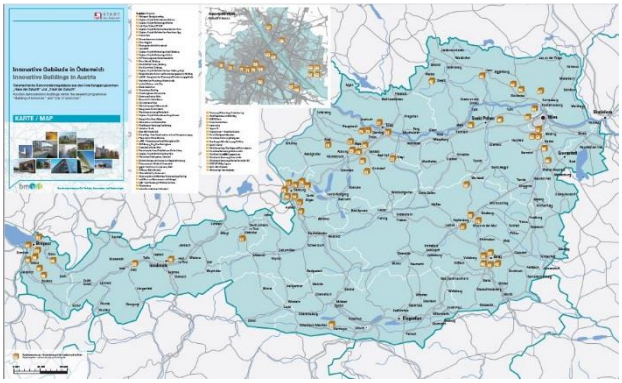
Some examples of projects[31] funded under the City of Tomorrow programme are the following:

- The project '50 Green Houses' ('50 grüne Häuser')[32] aims to develop a cost-efficient all-in façade greening system ('Greening-Toolkit') in the Kreta-Viertel in Favoriten district in Vienna. The expected result of the project is to create a business model that can be transferred to other urban areas and cities in Austria and Europe;
- In the 'GrünPlusSchule' project, carried out in Kandlgasse school in Vienna's 7th district and involving the pupils, ultra-efficient systems were developed to equip buildings with plants and substrate in conjunction with photovoltaic modules (PV). Its main results have been the reduction of both CO_2 emissions and noise level in the classrooms[33];
- One of the projects selected in the second call was the exploratory project Smart.Monitor[34]. Its goal was to develop basic information and data required to conceptualise indicators and a monitoring system for the Smart City Wien Framework Strategy. The objectives of this strategy are threefold: to offer optimum quality of life, to ensure the highest possible resource preservation, and to use comprehensive innovations;
- 'GrünStattGrau'[35] is the Austrian innovation laboratory for the green city, launched in 2017

with over 300 network partners. It is a holistic competence centre for greening buildings aiming to research innovative greening technologies, improve the quality of public spaces, create new plant structures in densely built-over areas, and expand the social functions of greening building complexes and open spaces[36].

Figure 3 maps the 74 demonstration buildings (new construction and renovation) that benefited from the City of Tomorrow programme and one of its predecessors, the Building of Tomorrow programme, as of 2017. Most of the demonstration buildings are located in the north and northeast of the country, in the regions of Vienna (18), Lower Austria (13), Upper Austria (12) and Salzburg (9).

Figure 3: Demonstration buildings in Austria



Source: Building of Tomorrow website[37]

Finally, the results of the projects funded under the City of Tomorrow programme are presented every year in three thematic workshops which focus on different topics (e.g. sustainable renovation of buildings, PV consumption optimisation, energy-flexible building, etc.). Around 150 attendees come together to share experiences and bring about new research topics. In addition, a networking event takes place every year bringing together participants from the call.

3.

Perspectives and lessons learned

Experience is a very important factor in the successful implementation of a policy measure.

BMVIT contends that their experience in running long-term programmes, such as the Building of Tomorrow programme over the last 20 years, has been a major contributor to the success of the City of Tomorrow programme[38].

The involvement of a broad range of research and industry stakeholders and the strong cooperation between City of Tomorrow partners and stakeholders have played an important role in the success of the programme.

According to BMVIT[39], these factors are not only strengths of the programme, they are the main reasons that Austrian companies, researchers and citizens continue to benefit from the results of the programme. City of Tomorrow is helping Austrian companies to improve their products and services and boost their competitiveness. It is also enabling the country to meet its climate and energy efficiency targets.

The Municipality of Vienna shares BMVIT's opinion on the value of stakeholder involvement in City of Tomorrow. The say that broad stakeholder participation has helped to generate research findings that are designed to meet the needs of cities and address the challenges they face[40]. Projects implemented under the City of Tomorrow programme, they contend, are essential to improve the wellbeing of citizens. As an example, the '50 grüne Häuser' project reduced traffic noise and provided an important habitat for plants and animals. As a result, the project made the Viennese district in which the project was implemented feel 'more natural'[41].

From an industry perspective, the City of Tomorrow programme motivates industry and researchers to work together to develop interdisciplinary work[42]. However, some construction companies are still struggling with the high construction costs related to green buildings[43].

It is vital to raise awareness of the importance of sustainable cities among all city stakeholders, including citizens of all ages, communities and businesses.

The Green Plus School (GrünPlusSchule) project serves as an example of successful awareness raising and community involvement – in this case involving pupils – in making buildings more sustainable. According to the Institute of Building Construction and Technology from the Vienna University of Technology, today's children and young people are tomorrow's residents and policymakers. These types of actions underpin the positive results of the City of Tomorrow programme[44].

From a research perspective, the Universität für Bodenkultur Wien (BOKU) claims that research is focused on improving the maintenance of greening systems in buildings, even for private individuals[45].

From a citizen perspective, the City of Tomorrow programme is helping to raise awareness of the importance of fighting climate change and the need to make cities more sustainable. According to a Viennese resident and landscape architect, many residents want to finally change something[46].

In spite of the success of the City of Tomorrow programme, the Federal Ministry encountered a few barriers during implementation[47]:

- Although the programme focuses on funding as many as demonstration projects as possible to create real impact, the current budget only allows the financing of small-scale projects;
- The current funding limits set up by the legislative framework do not match the financial needs of companies. As a result, many companies do not take part in the programme

because the potential project costs are too high to take on;

- The City of Tomorrow programme needs strong management. However, the skills and expertise needed to create a multidisciplinary team to manage all aspects of the programme are difficult to find (e.g. legal, communication, economic, policy, technology, etc.).

4.

Conclusion and recommendations

The City of Tomorrow programme is not just a continuation of earlier RTD programmes, i.e. the Building of Tomorrow and the Energy Systems of Tomorrow programmes. City of Tomorrow is a mission-oriented programme whose focus areas are updated every year.

The consultation process to select the focus areas of each call for proposals allows that all stakeholders involved, from citizens and project leaders to policy makers and researchers, can contribute with their knowledge and experience. This makes the City of Tomorrow programme a 'living' programme adapted not only to new technological trends but also to new citizens' needs. Moreover, the fact that the City of Tomorrow programme aims at creating real impact on citizens' lives, make the results more visible to them.

Overall, the City of Tomorrow programme is a very good practice measure. On a scale of 1 (low) to 5 (high) stars, this programme is rated at 5 stars. There are several reasons to support this scoring, of which three are particularly important. First, lessons learned from earlier RTD programmes have been applied to the City of Tomorrow programme and the management and implementation have been improved compared to previous programmes. Second, the fact that all stakeholders take part in the design of the call for proposals means that all relevant aspects are considered (e.g. economic, technological, social, etc.). Finally, the focus of the City of Tomorrow programme has evolved from + energy buildings to + energy districts, becoming a programme which finances projects that are implemented in a small smart city scale.

On a negative note, as no measurable indicators are in place to assess the impact of the different projects (e.g. energy savings, use of renewables, competitiveness indicators, etc.), the overall results of the programme cannot be measured. In addition, the implementing authority does not have the means to monitor the results of each project implemented under the programme. Given the importance of ensuring that the right mechanisms are in place to monitor the results and the impact of the projects funded under the programme, in terms of transferability, the City of Tomorrow programme is rated at 3 stars, on a scale of 1 (low) to 5 (high) stars. With improvements however, the CoT programme has the potential to achieve a higher score for transferability.

Despite the lack of measurable indicators, some innovative projects have been successfully implemented in other countries based on the Austrian experience. For instance, the Passive House office building built in Zhuozhou (China) used sustainable energy-efficient construction, becoming a good example of successful knowledge transfer. Another example is the Sheikh Zayed Desert Learning Center. Built in the United Arab Emirates, the building uses technology that allows saving up 80 % of water and 40 % of energy consumption.

Endnotes

1 Build Up, Overview – Alleviating Urban Heat Island in the Context of Climate Change, 2017: https://www.buildup.eu/en/news/overview-alleviating-urban-heat-island-context-climate-change-0

2 European Commission, European Construction Sector Observatory (ECSO) - Country profile Austria, 2018: https://ec.europa.eu/docsroom/documents/30286/attachments/1/translations/

3 United Nations Climate Change, Austria - National Inventory Report (NIR), 2019: https://unfccc.int/documents/194891

4 Smart City Wien, Monitoring for a smart city – Research project results, 2017: https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008486d.pdf

5 European Commission, European Construction Sector Observatory (ECSO) - Country profile Austria, 2018: https://ec.europa.eu/docsroom/documents/30286/attachments/1/translations/

6 EIO Bi-annual report, Policies and Practices for Eco-Innovation up-take and Circular Economy Transition, 2016: https://ec.europa.eu/environment/ecoap/policies-and-practices-eco-innovation-uptake-and-circular-economy-transition_en

7 The Building of Tomorrow programme website: https://nachhaltigwirtschaften.at/de/hdz/

8 The Energy Systems of the Future programme: https://nachhaltigwirtschaften.at/de/edz/

9 BMNT and BMVIT, #mission2030 Austrian Climate and Energy Strategy, 2018: https://mission2030.info/wp-content/uploads/2018/10/Klima-Energiestrategie_en.pdf

10 Klima- und Energiefonds, City of Tomorrow programme: https://smartcities.at/foerderung/programm-stadt-der-zukunft-des-bmvit/

11 European Commission, European Construction Sector Observatory (ECSO) - Country profile Austria, 2018: https://ec.europa.eu/docsroom/documents/30286/attachments/1/translations/

12 BMVIT, Workshop of the 5th call, 2018: https://nachhaltigwirtschaften.at/resources/sdz_pdf/events/20181025-sdz-vernetzungs-ws/01_Vernetzungsworkshop_Programmteam.pdf?m=1540827479

13 BMVIT, Austria's way into the future of energy – Strategies and success stories, 2019: https://nachhaltigwirtschaften.at/resources/nw_pdf/mission-innovation-austria-broschure-en.pdf

14 The City of Tomorrow website: https://nachhaltigwirtschaften.at/en/sdz/mission/

15 FFG, R&D cooperation projects Guidance, 2018: https://www.ffg.at/sites/default/files/dok/il_kooperativefueprojekte_v30.pdf

16 FFG, Individual projects of industrial research Guidance, 2018: https://www.ffg.at/sites/default/files/dok/il_einzelprojekteindustrielleforschung_v30.pdf

17 FFG, Exploratory projects for the preparation of R&D and innovation projects Guidance, 2018: https://www.ffg.at/sites/default/files/dok/il_sondierung_v30.pdf

18 FFG, R&D services Guidance, 2018: https://www.ffg.at/sites/default/files/dok/il_fuedienstleistungen_v231.pdf

19 City of Tomorrow website: https://nachhaltigwirtschaften.at/de/sdz/ziele-inhalte/

20 Interview with Mr. Volker Schaffler, Coordinator of the City of Tomorrow Programme from the BMVIT, on 20th September 2019

21 BMVIT, 6th Guide to project submission, 2018: https://www.ffg.at/sites/default/files/allgemeine_downloads/thematische%20programme/Energie/1_sdz_leitfaden_6.ausschreibung_v2_2018.pdf

22 Ibid

23 FFG Submission portal: https://ecall.ffg.at/

24 FFG, Download Centre 6th call: https://www.ffg.at/stadt-der-zukunft/downloadcenter-6AS

25 City of Tomorrow website, Mission: https://nachhaltigwirtschaften.at/en/sdz/mission/

26 Interview with Mr. Volker Schaffler, Coordinator of the City of Tomorrow Programme from the BMVIT, on 20th September 2019

27 Building of Tomorrow Evaluation:

https://nachhaltigwirtschaften.at/de/hdz/publikationen/programmevaluierung-haus-der-zukunft-1999-2013-2016-7.php

28 Final reports of the implemented projects:
https://nachhaltigwirtschaften.at/de/sdz/publikationen/projektberichte.php

29 Results of the City of Tomorrow calls:
https://www.ffg.at/stadt-der-zukunft-programmlinie

30 6th call results:
https://www.ffg.at/sites/default/files/allgemeine_downloads/Ergebnisse%20Stadt%20der%20Zukunft%206.%20Ausschreibung%202019.pdf

31 City of Tomorrow website, Projects:
https://nachhaltigwirtschaften.at/en/sdz/projects/

32 50 green houses project website:
https://50gh.at/

33 Futurezone, Solar and plants: TU project redesigns buildings, 2017:
https://futurezone.at/science/solar-und-pflanzen-tu-projekt-entwirft-gebaeude-neu/301.929.197

34 City of Tomorrow website, Smart.Monitor:
https://nachhaltigwirtschaften.at/en/sdz/projects/smart-monitor-smart-city-indicators-and-monitoring-for-smart-city-objectives-based-on-the-example-of-the-smart-city-vienna-framework-strategy.php

35 Grünstattgrau website:
https://gruenstattgrau.at/en/

36 BMVIT, Innovations for cool urban oases, 2018:
https://nachhaltigwirtschaften.at/resources/nw_pdf/eia/eia_183_en.pdf

37 Building of Tomorrow website:
https://nachhaltigwirtschaften.at/de/hdz/projekte/demonstrationsgebaeude-2017.php

38 Interview with Mr. Volker Schaffler, Coordinator of the City of Tomorrow Programme from the BMVIT, on 20th September 2019

39 Ibid

40 Smart City Wien, Monitoring for a smart city – Research project results, 2017:
https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008486d.pdf

41 A3BAU, Compact façade greening modules, 2018:
https://a3bau.at/kompakte-fassadenbegruenungs-module

42 Interview with Wilfried Pohl, Head of Research of Bartenbach Gmbh, 13th September 2019

43 BMVIT Infothek:
https://infothek.bmvit.gv.at/gruen-statt-grau-wie-lebendige-fassaden-wachsen/

44 BMVIT, Innovations for the city of tomorrow, 2016:
https://smartcities.at/assets/Uploads/eia-04-16-E-fin3.pdf

45 BMVIT Infothek,
https://infothek.bmvit.gv.at/gruen-statt-grau-wie-lebendige-fassaden-wachsen/

46 Die Presse, Mein Lieblingsplatz ist Wien, 2018:
https://diepresse.com/home/immobilien/wohnen/5496202/Graetzeltour_Mein-Lieblingsplatz-ist-Wien

47 Ibid