

BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS

235 years tradition
and experience in higher technical education

STRATEGY
2016–2020



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INTRODUCTION | 1

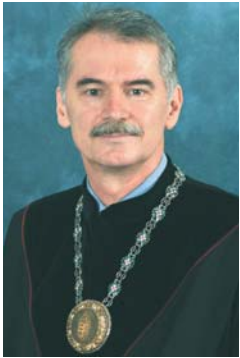
The Budapest University of Technology and Economics (BME), Hungary's leading higher education institution in engineering, is celebrating in 2017 the 235th anniversary of its predecessor's foundation.

Our strategy is in line with the government's objectives, outlined in the publication entitled *A Change of Pace in Higher Education*:

Each university and college needs to focus on its own distinguishable and prioritised field of study, meaning that the institutions should have a clear programme profile and provide world-class education in their own field.

This publication is the summary of the Strategy adopted by the Senate of the University, supplemented with the latest statistical data of our institution.





As a prestigious institution of Hungary's higher education system, the mission of the Budapest University of Technology and Economics (BME) is to provide differentiated, multilevel quality education and scientific training, built on strong bachelor programmes, carry out research, development and innovation, and employ an academic staff with PhD degrees and above in engineering, natural sciences and certain fields of economics and social sciences.

- The aim of our university is to issue prestigious diplomas which are among the most highly regarded in the labour markets of Hungary, as well as Central and Eastern Europe, and to train graduates who would be the most sought after by the best companies and institutions. Our further aim is to play a dominant role in research and development and contribute to the country's economic development in a tangible way.
- The basic mission of BME is to establish the conditions for the students' studies and encourage their scientific development. The University wishes to do its utmost to maintain an environment of equal opportunities among its students, support them on the road to becoming intellectuals, promote healthy living and help them to reach their potential and develop as individuals and professionals. Our goal is to provide an education and training which enables every student to reach the highest possible level of qualifications in line with their talents and academic efforts.
- As one of the centres of Hungary's scientific, technological and economic life, BME has a close relationship with professional organisations and the economic sector, and focuses on the utilisation of mutual benefits.
- BME strives to establish harmonious working relationships with other Hungarian higher education institutions.
- BME considers as its duty the fostering of international relations in order to further increase the expertise and international recognition of its academic staff, researchers and students.

Scientific activities, scientific research, publication and the continuing status as a research university are goals which are inseparable from our educational activities. By participating in international research programmes and playing a leading role in research trends in Hungary, BME's activities span the entire innovation chain of basic and applied research, the development of technical and economic products and services, as well as complex quality assurance, while aiming to utilise research findings.

Our university is an outstanding base for the education of future scientists; an integral part of this is played by the pool of doctoral students and the recipients of postdoctoral scholarships who join our doctoral schools. After the completion of doctoral programmes or following individual studies, BME awards doctoral degrees in sciences (PhD) and, in the Faculty of Architecture, doctoral degrees in arts (DLA). In certain scientific fields and disciplines our university conducts habilitation procedures and awards habilitated doctoral (Dr. habil.) diplomas and, in the Faculty of Architecture, habilitated DLA diplomas.

BME considers its task the pursuit of theoretical research into the deeper context of basic issues in natural sciences, as well as issues raised by the engineering profession and economic players, and to find *practical answers* to these questions. This twofold research background, coupled with the deeper understanding of phenomena, together with the practical and technological developments based on them, have provided for almost two and a half centuries the foundations for our institution's academic programmes, diverse engineering programmes and the various programmes in natural sciences and economics which complement the former successfully. We believe that the twofold approach of combining theory and practice must be applied to both our academic and research activities.

2016, Budapest



1. Socioeconomic Environment

1.1. BME's Economic Environment

The Budapest University of Technology and Economics (BME) is a nationally important institution, thanks to its higher education programmes, professional R+D+I activities and preparatory programmes. Its primary task is to train professionals in the fields of engineering, information technology, natural sciences, economics, business and management for the relevant sectors of the national economy. Currently around half of BME's budget comes from state subsidies and the other half from own revenues, so our faculties have access to resources by covering a wide range of activities.

The regional location of the institution has positive and negative consequences. On the one hand the economic prosperity of the Central Hungary Region, the level of which is above the EU's average, the availability of properly prepared and capable students and the institution's human resources have a positive impact on our operations, while on the other hand our regional location means that we do not qualify for most EU grants, which tend to focus on supporting the convergence regions.

1.2. BME's Demographic Environment

There is a constant level of interest in the programmes of the BME in spite of the fact that due to demographic reasons the number of prospective students is decreasing.

We received over 11,000 applications for our programmes starting in September 2017, which is 10.5% of the total of applicants in the country.

This is a proof of BME's increasing prestige in the Hungarian higher education market.

1.3. BME's Academic Environment in Hungary and Abroad

The University's "catchment area" differs by faculties and programmes, and certain programmes attract applicants from abroad also.

BME's programmes are successfully adjusted to the structure of Hungary's economy.

The central location, transit role and international embeddedness of the region and the University all increase the international relevance of the R+D+I activities, in which the university plays a vital role as a mediator and R+D actor. The primary focus of the region, the national economy and the innovation economy in line with our international relations includes the manufacturing and engineering industries, information technology and the construction industry, while the creative industries, the energy industry and logistics are also highly important.

BME's strategic competitive edge is guaranteed by the fact that we offer several unique programmes. The success of fee-paying courses for foreign students highlights the international character and role of the institution.

1.4. The Reception of our Graduates in Hungary and Abroad

Thanks to our wide-ranging and high-quality bachelor training programmes, BME's graduates have very good employment prospects both in terms of work profile and location. Our graduates are also sought after abroad, be it participation in part-time studies, further studies or the labour market, which is shown by the fact that they choose to continue some of their studies in foreign languages. Our diplomas are highly prestigious in Hungary and also abroad.

Foreign-owned companies usually organise the obligatory work-practice at the parent company, which often leads to long-term employment and settlement abroad. Also many of our former students are pursuing successful careers in foreign universities (especially in Europe and North America).

1.5. BME's "Recrutation Area"

Our "Recrutation area" covers the whole country, although the ratio of successful applicants from the Central Hungary Region is somewhat higher compared to the region's population. The ratio of foreigners among the new entrants is around 2%, however the actual rate within the total number of students is 4.5-5.5%, thanks to those arriving through the exchange programmes.

2. Assessment of BME's Competitors in Hungary and Abroad

2.1. Competitors in Education

BME primarily competes with Hungarian institutions for Hungarian students. We rank first in the country in terms of student excellence.

BME also scores well in international comparisons. Its diplomas are regarded highly throughout the world. There is a wide range of affordable English-language graduate programmes abroad in engineering and economics, where the programmes are taught in near-native level English. BME's success lies in the exchange programmes, which has already been proven by the Science Without Borders programme (for students from Brazil) where the high number of participants was notable even by international standards.

2.2. Competitors in Research and Development, and in Industry Connections

The comparison with domestic competitors is best described by our publication scores, as well as the financing from the Research and Technology Innovation Fund (KTIA) and direct financing from the EU's Seventh Framework Programme for Research and Technological Development (FP7). According to the Scopus data for 2010-2014, BME scores highest among Hungary's public higher education institutions both in terms of total publications and average publication per person per year (1.00). According to the WoS database for the same period, BME is ranked third among Hungary's public higher education institutions in terms of the average publication per person per year (0.82). As for the average annual financing per lecturer/ researcher, BME came top among the large universities within KTIA financing in the 2007-2013 period and within FP7 for 2007-2014.

International rankings which compare the institutions by complex indicators place BME around 2nd-5th among the Hungarian universities.

2.3. BME in the International Rankings

In recent years Budapest University of Technology and Economics has

achieved prestigious positions in an increasing number of international (global and European) higher education rankings. Although not always considered to be the most objective of indicators, these rankings provide useful comparisons with the most esteemed institutions in the world according to certain criteria and methodologies.

Being ranked among the best 200-800 internationally means being among the top 2-6%, which definitely makes BME part of the world's elite. In 2017 our university made it to the elite list and was ranked among the top 701-800 in the world by the Shanghai Ranking. Among the academic subjects, our Mechanical Engineering and Mathematics courses ranked 201-300, Materials Science and Information Technology ranked 301-400, while Electrical Engineering and Chemical Engineering ranked 401-500.

2.4. BME's Programmes from a Domestic and International Perspective

2.4.1. Human Resources Involved in BME's Programmes

BME employs around 6,000 people in an average year. Half of our employees work as civil servants and the other half sign individual service agreements, which are dynamically adjusted to the volume of actual tasks and duties. Around half of the civil servants are lecturers, researchers and professors, while the other half make up the support staff for our academic and research activities.

The ratio of full-time lecturers and researchers having at least doctoral degrees has been increasing since 2007. Their average ratio is over 70% (between 59-88%, depending on the faculty). The number of full-time lecturers and researchers has been around 1,150 for several years. The actual number on 15 March 2017 was 1,175. In addition we have another 100 teachers (mostly in physical and language education).

The median age of full-time lecturers and researchers with minimum doctoral degrees fell between 2010 and 2015 from 48 to 42, as the number in the 35-40 age bracket increased. BME wishes to pay special attention to this group, while also focusing on supporting young lecturers and researchers who are just starting their career and working towards their doctoral degrees.

In addition to monitoring their academic achievements, the quality of our lecturers' work is also evaluated by the students. This option has been available since 1999 at the University. In several faculties the students' opinion of their lecturers is included in the criteria which influence the faculty's budget.

BME is currently equipped with the staff, necessary for its educational and research activities, both in terms of quantity and quality. The number of students per lecturer at the institution is among the highest in the country, resulting in excess workload.

Half of BME's non-academic and non-research staff (1,300 people) work at the various organisational units of the faculties and the other half work in the central organisations supporting the faculties.

2.4.2. BME's Programme Portfolio

The Budapest University of Technology and Economics is a distinguished institution in Hungary's higher education system, thanks to the diversity and quality of its programmes. In spite of having over 20,000 students, it not only provides education and training for large numbers, but also offers unique, mostly master programmes.

Currently we offer 23 bachelor, one single-cycle and 42 master programmes in eight fields of study, as well as 13 doctoral school and several postgraduate specialisation programmes, adjusted to the current educational needs.



Programmes



Faculty of Civil Engineering

BSc in Civil Engineering

MSc in Structural Engineering

MSc in Infrastructural Engineering

MSc in Land Surveying and Geographical Information
Systems Engineering



Faculty of Mechanical Engineering

BSc in Mechanical Engineering

BSc in Mechatronics Engineering

BSc in Energy Engineering

BSc in Industrial Design Engineering

MSc in Mechanical Engineering

MSc in Mechanical Engineering Modelling (in English)

MSc in Mechatronics Engineering

MSc in Energy Engineering

MSc in Industrial Design Engineering

MSc in Building Service and Process Engineering



Faculty of Architecture

BSc in Architecture

Five year integrated architect education

MSc in Real Estate Development Architecture

MSc in Structural Architecture

MSc in Architecture



Faculty of Chemical Technology and Biotechnology

BSc in Chemical Engineering
 BSc in Biochemical Engineering
 BSc in Environmental Engineering

 MSc in Chemical Engineering
 MSc in Biochemical Engineering
 MSc in Environmental Engineering
 MSc in Pharmaceutical Engineering
 MSc in Polymer and FibreTechnology Engineering



Faculty of Electrical Engineering and Informatics

BSc in Electrical Engineering
 BSc in Computer Science Engineering

 MSc in Electrical Engineering
 MSc in Computer Science Engineering
 MSc in Business Information Systems
 MSc in Biomedical Engineering



Faculty of Transportation Engineering and Vehicle Engineering

BSc in Transportation Engineering
 BSc in Vehicle Engineering
 BSc in Logistics Engineering

 MSc in Vehicle Engineering
 MSc in Logistics Engineering
 MSc in Transportation Engineering



Faculty of Natural Sciences

BSc in Physics
 BSc in Mathematics

 MSc in Physics
 MSc in Applied Mathematics
 MSc in Mathematics
 MSc in Cognitive Studies



Faculty of Economic and Social Sciences

BA in Business Administration and Management
 BSc Engineering Management
 BSc Vocational Technical Instruction
 BA in International Business Economics
 BA in Finance and Accounting
 BA in Communication and Media Studies

 MA in Economic
 Master of Business Administration
 MSc in Marketing
 MA in International Economy and Business
 MSc in Finance
 MSc in Regional and Environmental Economic Studies
 MSc in Accountancy
 MSc in Management and Leadership
 MSc in Engineering Management
 MA Teacher of Engineering
 MA Teacher of Economics
 MA in Communication and Media Studies
 MA in Psychology

2.4.3. The Success of our Programmes

BME awards 4,500 diplomas a year at various levels of qualification (the number of postgraduate diplomas is 1,000–1,500).

We have a relatively high number of students whose student status is terminated for academic reasons. Most of them reapply to our university. Others either completed their courses (10%) or even passed their final examinations (3.5%), but they did not have the foreign language examinations required for the issue of the diploma.

The main reason for dropping out is the lack of adequate maths and/or chemistry and physics knowledge from secondary school. The relatively

high drop-out rate can also be explained by the lack of entrance exams. BME has been evaluating the adequacy of its programmes in the labour market for almost 15 years. BME's diplomas lead to higher than average salaries even in the case of new graduates entering the labour market.

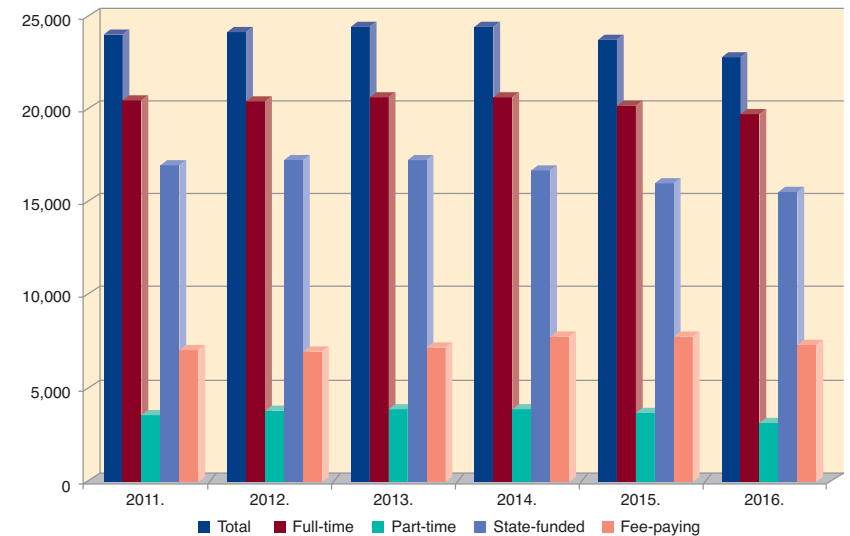
2.4.4. Student Demand for BME's Programmes

In engineering actual excess demand by applicants can only be observed in our bachelor programmes. In order to maintain our standards, in recent years we decided not to fill the available quotas and use the minimum scores.

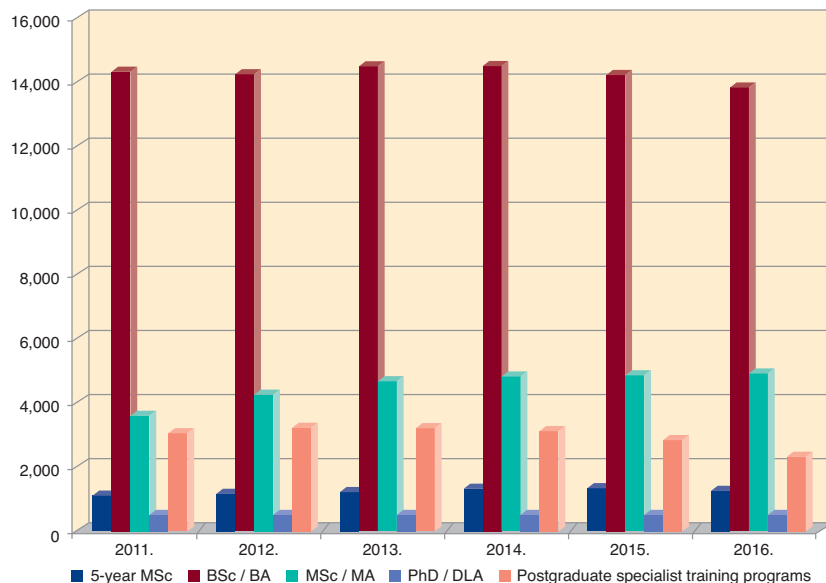
62% of the students in master programmes received their bachelor degrees from our university.

5.5% of our students come from abroad from 80 countries. One quarter of our foreign students participate in full-time English-language graduate programmes, around 20% of students in our Hungarian-language courses are ethnic Hungarians from abroad and the rest are students in English-language part-time programmes.

Number of BME students by enrollment type and financing source 2011–2016



Number of BME students by level of qualification 2011–2016



2.5. BME's R+D+I Activities

2.5.1. Research Portfolio

Budapest University of Technology and Economics is Hungary's leading higher education institution in the field of engineering and one of the most important universities in the fields of economics and natural sciences. BME's competencies make it a key actor in the country's competitiveness and sustainable development.

As a research university it focuses on the following priority research areas:

- Sustainable energy
- Vehicle technology, transport and logistics
- Biotechnology, health and environmental protection
- Intelligent environment and e-technologies
- Nanophysics, nanotechnology and materials science
- Disaster prevention: modern engineering methods

There are several research groups at the University, receiving priority support from the Hungarian Academy of Sciences (HAS).

The special areas of our research groups, supported by the HAS:

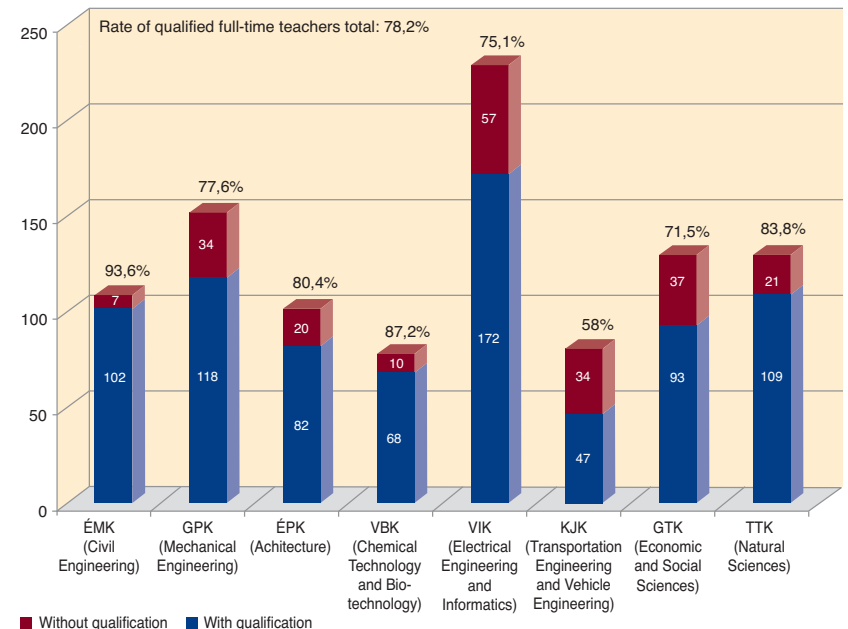
- Water management
- Research and development of composite materials
- Dynamics of machines and vehicles
- Chemical analysis based on selective molecular interaction using nanostructures and biomimetic receptors
- Dynamic systems modelling and optimal control
- Physics of condensed matters
- Stochastics
- IT systems
- Regio- and stereoselective reactions of organometallic compounds, environmental-friendly synthesis methods

BME has a real estate portfolio of approx. 300 thousand m², of which an area of approx. 30 thousand m² includes laboratory infrastructure for R+D+I, where many of the devices and equipment used have national or even international significance.

The high level of involvement in domestic and international R+D+I is a proof of BME's significant achievements in research and development and its extensive connections with the economy.

The number of publications in the WoS database is over 20 thousand and the number of citations exceeds 192 thousand. The strategic goal of the University is to establish and operate an R+D+I system based on the service provision approach. In this endeavour the leadership of the institution can rely on the help of the Department of Research and Innovation and BME's two strategic advisory bodies: the Scientific Advisory Council and the Innovation Advisory Council. Enhancing the efficiency of the R+D+I activities basically entails the improvement of four areas: (i) fundraising, management of applications; (ii) project management; (iii) management of intellectual assets; (iv) R+D+I information system built on a database.

Full-time teaching staff of BME by faculties, 2015



The age distribution of full-time lecturers and researchers having at least doctoral degrees shows that colleagues under 40 are represented in great numbers. The ratio of lecturers having at least doctoral degrees is over 70%. Every year 200 new doctoral students enter one of our 13 doctoral schools which cover 5 areas of science.

Currently there are 35 impact factor journals in Hungary, 8 of which are published by higher education institutions and 3 of those are BME publications. Express Polymer Letters is ranked top among the Hungarian periodicals (IF 2,983), Periodica Polytechnica Chemical Engineering is ranked 25th (IF 0.557) and Periodica Polytechnica Civil Engineering 28th (IF 0.313).

3. Activities within BME's "Third Mission"

BME is open to domestic and foreign partnerships, professional cooperation and the utilisation of the synergies offered by them. These are partly aimed at disseminating our training culture and partly at playing a pioneering role in the establishment and management of interdisciplinary programmes.

BME also scores well in international comparisons. Its diplomas are regarded highly throughout the world. The University is able to participate successfully in international training and exchange programmes,

- as proven by our outstanding results in the Stipendium Hungaricum, the Science Without Borders and the Erasmus programmes, as well as in research programmes, as shown by
- our achievements in the FP7 programme.

BME's lecturers and researchers are involved in the activities of key international scientific organisations and visit foreign universities as guest lecturers.

The number of internationally renowned lecturers, coming to BME to hold lectures and seminars, however, is relatively small.



As a result

- the number of foreign students coming to the University and the number of our students visiting abroad universities has increased over the years;
- the ratio of BME's funding from international resources within its total revenues (15%) has been increasing for years;
- BME ranks among the top 10% of higher education institutions globally;
- according to the Scopus data, BME scores first among Hungary's higher education institutions in terms of the number of publications per person.

Budapest University of Technology and Economics is an active and at times founding member or the sole Hungarian member of several international higher education organisations, primarily in engineering studies.

Membership in international organisations

- ATHENS (Advanced Technology Higher Education Networks/Socrates),
- CEEPUS (Central European Exchange Program for University Studies),
- CESAER (Conference of European Schools of Advanced Engineering Education and Research),
- Conference of Rectors and Presidents of European Universities of Technology,
- Cooperation Platform of Central and East European Metropolitan Universities of Technology, EUA (European University Association),
- SEFI (European Society of Engineering Education),
- T.I.M.E. (Top Industrial Managers for Europe),
- 4TU League (regional cooperation of BME, CTU in Prague, SUT in Bratislava, TU Vienna).

These memberships increase BME's significance in terms of education and within that elite education on the one hand and participation in education, R+D and innovation grant applications on the other.

3.1. The Institution’s State Subsidies

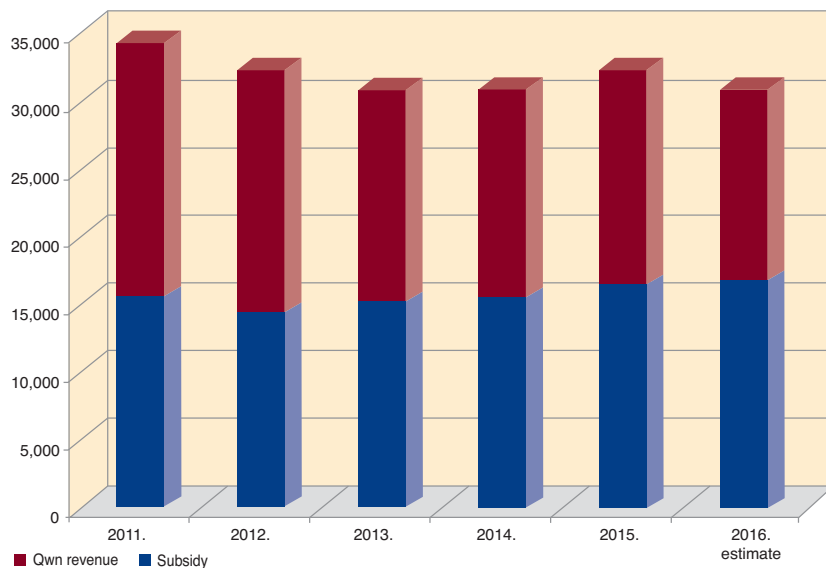
State subsidies and its own revenues make up BME’s budget in a roughly equal proportion, which allows for the necessary flexibility when responding to the challenges of our operations.

Around 1/3 of its own revenues comes from education and training activities, another 1/3 from various grant applications, 20% from providing external services, 7% from the facility management (excluding the halls of residence), 4% is related to the utilisation of the halls of residence and the rest from other resources.

As for the average annual funding per lecturer/researcher, BME came top among the large universities in Hungary in the FP7 applications in the 2007-2014 period.

The University wishes to play a larger role as a coordinator in the H2020 programme, launched in 2014, instead of being an invited partner only, but the competition for the available funding is much greater than in the previous FP7 programme.

Subsidy and own revenue of BME 2011–2016 (billion HUF)



4. Strategic Directions and Action Plans

4.1. Strategic goals in education

- Maintaining the student numbers and quality in all programme levels in spite of the unfavourable effect of the demographic conditions;
- Strengthening our quality education by maintaining our high standards, reducing the drop-out rate and maintaining the current number and quality of graduates;
- Intensive internationalisation of our programmes;
- Strengthening talent management by improving the selection of talented students, serving them better and utilising the potential of these talents.

Education - strategic goals	Actions	Indicators
		Values and benefits
I. Maintaining the student numbers in all programme levels in spite of the unfavourable effect of the demographic conditions	Increasing the intensity of domestic PR and marketing activities in order to ensure the supply of new applicants	I.1. Maximum 8% decrease in the number of students admitted to the bachelor programmes
	Maintaining our programmes to promote the university and intensifying current activities	
	Establishing a Base School System in order to support secondary schools which regularly send well prepared pupils who go on to become successful undergraduates at BME (new element)	I.2. Increasing the number of students admitted to the master programmes by 5%
	Supporting secondary schools to help them prepare their pupils for their university studies as successfully as possible	I.3. Establishing and operating a Base School System
	Encouraging our students, especially the members of Colleges for Advanced Studies to participate in teaching	

Education - strategic goals	Actions	Indicators
		Values and benefits
II. Strengthening quality education – maintaining our high standards, reducing the drop-out rate and maintaining the current number and quality of graduates	Regularly reviewing the bachelor training programmes, continuously improving the curricula and the requirements (BSc, MSc, PhD)	II.1 Increasing the ratio of renewed training programmes by 80%
	Programme development, modernising education (lobbying for the requirement of the advanced level secondary qualifications)	
	Implementing teaching methodology improvements	II.2. Participating in internal methodology training (courses): 200 people
	Encouraging students to be engaged in individual work that requires creativity and helps their development, increasing the ratio of subjects with teamwork assignments – outlining the educational development directions in line with the above	
	Continuously developing the abilities of our teaching staff, selecting young students who are best suited for this profession and creating the opportunities for an attractive career path they can choose – in line with the objectives of the area of science in question	II.3 Reducing the current drop-out rate by 10%
	Reforming the system and topic of late submissions: while keeping the option of late submission for students who have substantial reasons for requesting this, reducing the number of late submissions offered to everybody without restrictions which demand too much energy and effort from the lecturers	
	Developing a new teaching infrastructure, continuously improving the learning and teaching environment	

Education - strategic goals	Actions	Indicators
		Values and benefits
III. Intensive internationalisation of the programmes	Accreditation of foundation subjects in BSc programmes and accreditation of popular English-language specialisations which attract many students; accreditation of our English language MSc courses	III.1 Increasing the number of accredited English-language programmes by at least 5%
	We plan to extend the number and ratio of subjects (credits) also available in a foreign language	
	Expanding the pool of English-language thesis selection and project tasks	III.2 Increasing the number of available English-language courses by 25%
	Launching goal-oriented part-time programmes: increasing cooperation with economic actors, intensifying external connections with companies and Hungarian institutions involved in innovation – in line with the objectives of the third mission topic/area	
	Preparing English-language versions of written learning materials, translating such materials currently available in Hungarian into English	III.3 Preparing English-language learning materials for 50% of the subjects
	Encouraging joint trips, lecturer or student exchanges, increasing the number/duration and quality of such exchange options	
	Undertaking a more active role in international organisations, joining new organisations	

Education - strategic goals	Actions	Indicators
		Values and benefits
III. Intensive internationalisation of the programmes	Signing new bi/multilateral agreements, expanding the geographical base of our foreign students participating in full-time and part-time programmes, expanding and supporting our agency network. Expanding the "recruitment area" of our English-language programmes mostly to the Far East while maintaining our current relations	III. 4 Increasing the number of foreign students by 100%
	Promoting participation in international mobility financing applications/projects	
	Launching intensive international PR and marketing activities, setting up the organisational unit for this	
	Launching the alumni programme for international students	
	Creating a properly organised and adequately managed system for the accommodation of our foreign students	
	Improving and developing the conditions for the receipt of foreign students (infrastructure, welfare elements)	

Education - strategic goals	Actions	Indicators
		Values and benefits
IV. Strengthening talent management – improving the selection of talented students, serving them better and utilising the potential of these talents	Further development of knowledge enhancement methods	IV.1 Minimum 50% increase in the number of subjects helping with knowledge enhancement
	Promoting Scientific Student Associations (TDK)	
	Providing the infrastructure background for the students' research activities	IV.2 100% increase in student scholarships disbursed for talent management
	Launching special courses for the best students	
	Introducing a new scholarship system for talent management, financed from the appropriations of budgetary expenditures for students	IV.3 100% increase in the number of students in double degree programmes
	Intensifying the communication between the talent points of the faculties	
	Continuing BME's "Talent for Talents" programme	IV.4 100% increase in the number of special courses for talented students
	Continuing the support of students who are talented in music, arts and sports	
	Increasing the number of students in double degree programmes	IV.5 Developing the research infrastructure, purchasing new devices and equipment
	Acknowledging hard-working lecturers at departmental, faculty and university levels, establishing the career path model	



4.2. Strategic goals in R+D

- Establish and operate the career path model for researchers;
- Internationalisation in research activities;
- Cultivating existing and building new relationships with industry;
- Improving the conditions for research;

R+D – strategic goals	Actions	Indicators
		Values and benefits
I. Establishing and operating the career path model for researchers to mitigate the effects of “brain-drain”	Supporting young lecturers and researchers	I.1 5% increase in habilitations and the number of university lecturers
	Distinguished acknowledgement of the best lecturers and researches	
	Supporting lecturers and researchers in gaining academic titles	
	Establishing and operating the “sabbatical” system	
	Distinguished acknowledgement of lecturers and researches actively involved in talent management and in the supervision Scientific Student Association projects	
II. Internationalisation in research activities	Involving foreign experts and professors in education and qualifications	II.1 10% increase in guest lecturers
	Intensifying the joint research activities with our partner universities, expanding the range of obtainable joint PhD degrees	
	Inviting internationally renowned researchers to hold seminars	
	Supporting our lecturers and researchers in attending conferences, establishing and operating the related internal application system	

R+D – strategic goals	Actions	Indicators
		Values and benefits
II. Internationalisation in research activities	Establishing the Professors' House (renovation of our guest house)	II.2 Increasing the number of scientific events and seminars
	Intensifying our role in international research forums/bodies, organising events	
	Active participation in international funding schemes (e.g. H2020, ERC)	
III. Cultivating existing and building new relationships with industry	Establishing the Centre for University-Industry Cooperation (FIEK)	
	Establishing pilot plant laboratories and technologies which can be successfully utilised in education, further training, research and services	
	Integrating the operation and infrastructure of programmes previously included in the University's institutional development plan (Demola programme, Industrial Campus Programme, SME programme)	
	Establishing training centres specialised in dual training and accrediting such centres	
	Establishing spin-off ventures in the vicinity of the university	
	Operating company-specific incubator teams, primarily for companies with interest in the industry campus	
	Operating an advisory service unit on intellectual property protection	

R+D – strategic goals	Actions	Indicators
		Values and benefits
III. Cultivating existing and building new relationships with industry	Establishing the Industry Professor title (promoting the participation of renowned engineering professionals in educational and development activities)	
IV. Improving the conditions for research, launching complex institutional development projects which increase the efficiency of R+D processes	Establishing, operating and utilising the R+D+I IT system	IV.1 Number of IT systems established (1)
	Establishing a system for the management of all knowledge accumulated at the university	
	Improving the management of intellectual assets (registration, protection and utilisation of intellectual property)	
	Intensifying our grant application activities to ensure an adequate research infrastructure	IV.2 Establishing the Department of Research and Innovation

4.3. Strategic goals – third mission

- Strengthening industry's role in higher education, contributing to stimulating the economy;
- Treating environmental aspects as a priority in our research activities;
- Focusing on the environmental impact of construction and building operations on the physical and intellectual environment;
- Promoting sciences and disseminating general knowledge;
- Achieving efficient institutional management and establishing new business models;
- Implementing the Healthier BME Students Programme;
- Participating in the urban development projects of Budapest.

Third mission – strategic goals	Definition of actions	Indicators
		Values and benefits
I. Strengthening industry's role in higher education, contributing to stimulating the economy	Introducing the "Industry Professor" title	I.1. 5% increase in the number of lecturers with industry backgrounds
	Establishing the Centre for University-Industry Cooperation (FIEK)	
		I.2 Establishing FIEK
II. Treating environmental aspects as a priority in our research activities	Priority focus on making processes and technologies greener, developing environmentally friendly alternatives to toxic compounds and reducing the energy demand of technologies	II.1 5% increase in the ratio of research focusing on environmental aspects
	Focusing on research on the replacement of fossil fuels with natural raw materials and new recycling methods when specifying the research areas	
	Preference to research and development projects that focus on the reduction of CO ₂ emission in transport	
	Preference to research on renewable energies	
III. Focusing on the environmental impact of construction and building operations on the physical and intellectual environment	Strengthening the community, solidarity aspect of architecture	

Third mission – strategic goals	Definition of actions	Indicators
		Values and benefits
IV. Cross-border relations	Within the unified educational area of the Carpathian Basin BME wishes to increase its share within foreign engineering programmes, the number of students participating in such engineering programmes, and increase the competitiveness of future graduates by offering education in their homeland (in the form of part-time studies)	15-25 students per year participating in part-time programmes
V. Promoting sciences and disseminating general knowledge	Regularly featuring audio-visual contents	V. 1.5% increase in events that promote sciences
	Launching science promoting projects (competition for writing articles)	
	Establishing a visitor and information centre at the university	
	Organising the Children's University	
	Increasing access to higher education knowledge bases (expanding the "Researchers' Night" programme)	
	Supporting events that also focus on the intellectual heritage of the University	
VI. Achieving efficient institutional management and establishing new business models	Establishing a uniform system for property protection and the protection of lives	
	Establishing a centre for labour safety	
	Managing the risks associated with IT systems	
	Educating university staff and students on fire safety, labour safety, IT security and the protection of intellectual property	

Third mission – strategic goals	Definition of actions	Indicators
		Values and benefits
VII. Implementing the Healthier BME Students Programme	Developing sports facilities close to our campus	
	Expanding the supply of snack bars and cafeterias	
	Converting the youth camp in Balatonlelle into a versatile sport tourism centre	
VIII. Participating in the urban development projects of Budapest	Engaging with the touristic life of Budapest	
	Structural reconstruction of historic buildings, energy-conscious developments, new infrastructure	



While being too limited to include all the successes, accomplishments and good practices of the university's academic and research activities, this publication offers a selection which truly reflects the diverse excellence of our academic staff and students.

1. Examples of the activities of Budapest University of Technology and Economics (BME) to promote science, technology, engineering and mathematics (STEM) in the young generation

1.1. Children's University

BME started a summer science camp in 2015 to encourage children aged 8 to 14 years to develop an interest in natural sciences and engineering. Lasting two weeks, the camp offers activities resembling real university lectures and seminars for nearly 700 children. The Children's University also uses a point earning system and now has regular activities organised for this generation during the school year as well.



1.2. Science Camp

BME first introduced a summer camp called Science Camp for students aged 14 to 18 in 2016. The one-week camp gives an insight into natural sciences and how this knowledge is applied in fields such as nuclear energetics, computing science, medical physics, solid-state physics or quantitative finance and participants also visit the laboratories of the university's industrial partners.



1.3. Girls' Day

BME has been organising Girls' Day every year since 2013 – joining other national and international programmes – helping girls in their career choices. Multiple social prejudices need to continuously be overcome in order to increase the number of female applicants in certain engineering disciplines who succeed just as well as their fellow students both in their studies and their work. These events and websites targeting specifically girls have also contributed to the rate of female applicants admitted to the computer science engineering course reaching over 12 per cent in 2017.

1.4. Brutal Physics – Hungarian educational television series

Hosted by and developed with the collaboration of a staff member at the university's Department of Experimental Physics, this scientific educational TV series called Brutal Physics was created in 2013 to introduce and explain basic physical phenomena and to demonstrate everyday use of the laws of physics.

2. Successful spin-off businesses and unique products

2.1. Hand-in-Scan

Hand-in-Scan developed an innovative device to control the hand hygiene technique of health care workers which won a Red Dot award in 2015. This compact digital hand scanner designed to control hand hygiene also offers complex services. After using a special disinfectant, Hand-in-Scan measures the efficiency of hand disinfection and provides immediate and objective feedback to users. It can effectively help radically reduce the number of hand transmitted hospital infections.



2.2. Tresorit

Founded by BME's students, this spin-off business focuses its development efforts on secure, encrypted cloud-based data storage allowing flexible sharing. Their easy-to-use, cloud-based, secure file sync software was specifically designed to support the sharing of confidential data of enterprises. The Tresorit system is based on the encryption of data before upload allowing access to decode them only and exclusively to authorised users. Tresorit has won several awards and accolades in Hungary and internationally including the national ICT innovation of the year award in 2017.

2.3. Malaria diagnostic testing

In 2013, BME's researchers developed a low-cost and efficient malaria diagnostic device supporting early detection of the infection that is based on a new magneto-optic method to detect evidence of parasites in human blood. This device offers a cheap and efficient alternative option to test antimalarial medications. Testing the agents of these medications is a key research area these days as the fast adaptability of parasites has led to the emergence of new strains in the 20th century which are resistant to the majority of widely used antimalarial medicines.

2.4. SmartVineyard

This crop protection decision support system relies on local sensors recording microclimatic data to offer a comprehensive view of the risks of crop diseases. This unique innovation, based on sensor technology and developed by BME's spin-off business, can help significantly minimise losses with a network of solar energy powered sensors which are attached to the posts of vines, are able to communicate with one another and the computer cloud via GPS adapters and are remotely accessible from any online device. This innovation is supported by the EU's Horizon 2020 programme.



2.5. Sybrillo

A team starting in BME developed a waterproof stabiliser for Go Pro cameras offering remote control, three-axis stabilisation, time-lapse function that can even be mounted on crash helmets. Top target customers include film production companies, extreme athletes and photographers. What started as a student innovation project has by now grown into a small business which has already started the mass production of Sybrillo, partly from funds earned through Kickstarter, the American crowdfunding platform and pre-orders.



2.6. Go mobile, do JS!

Miutcánk.hu is one of the most popular and largest community websites and community building platforms in Central Europe which helps us meet people living in the same neighbourhood easily and realise the benefits of good neighbourliness. So far nearly 40 000 people have joined this initiative which began in BME. This project helps promote a more open and friendlier social culture. A world is being built where people living in the same community organise garage sales, carpools, barbecues and engage in social responsibility activities to improve their neighbourhood while saving each other time and money by sharing knowledge and resources.



2.7. MOGI Robi and MOGI Ethon

Etho-robotics research in BME has led to the development of a robot called Robi able to demonstrate attachment to its owner. For the first time,



researchers were able to programme complex ethological behaviour – supported by scientific evidence based on ethological tests – into a robot. They also developed Ethon, a robot combining porter and cleaner functions. This project involved teachers and students from BME and ELTE University and also some researchers from Japan.

2.8. Masat-1



The first indigenous Hungarian satellite was developed by BME's teachers and students. This cube-shaped technology picosatellite with a mass of approx. 1 kg and an edge length of 10 cm was launched on the first mission of ESA's Vega carrier rocket in February 2012. This small satellite remained in orbit until 2015 while data collected by its camera and equipment supplied long term information about changes in the core systems, on-board computer, communication and thermal balance offering valuable input for further satellite development projects at BME (in addition, another exclusive BME development, SMOG-1, the world's first 5x5x5 cm picosatellite will be launched in 2018).

3. Results of international student team competitions

3.1. Odoo



In 2012, a team from BME was the first from Central Europe to compete in the prestigious Solar Decathlon competition – to design a house most effectively using solar power and most sustainably constructed – where they finished in an excellent 6th place. In addition to using the project in training, it played a key role in demonstrating eco-friendly architecture. BME is one of the national organisers of the 2018 international competition.

3.2. !SpamAndHex

The experts of BME's Laboratory of Cryptography and System Security, in short Crysys Lab were the first to detect many malicious programmes.



They established the Crysyst Student Core whose members formed the !SpamAndHex team that won the world's most prestigious hacking competition, the American International Capture The Flag in 2015 and qualified for the third time in 2017 as one of the teams competing in the final of the world's most highly acclaimed hacking competition, DEFCON CTF where professional teams compete.

3.3. BME racing teams

Students from BME's various faculties formed 10 university racing teams which design and build a wide variety of vehicles ranging from two-wheeled portable generators through fuel efficient and alternative fuel prototypes to solar powered boats. The oldest one is the Formula Racing Team from which several former members have made international careers in professional auto racing. In 2016, the Formula Racing Team was selected as one of the ten best teams in the world in the electric car category. These racing teams are regular participants and medal winners in national and international competitions.



3.4. Mistory



This interactive, story-based, city tour mobile application guides players around with stories filled with logic and clue finding exercises offering the pleasure of exploration and challenges for the mind. In 2015, students from the university involved in the project won the people's choice award in the Microsoft Imagine Cup innovation competition. Having established their own business later, they now have a workforce of 8 (including six former or current students from BME).

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