

Food & Catering

Eco-innovative vending machines at the University of Turin



Purchasing body:	University of Turin
Contract:	Provision of vending machine services for a university community of 70,000 people. 3+(3) years, 235 vending machines, 5 lots Tender published: March 2018 – Likely to be awarded in June 2018
Savings:	<ul style="list-style-type: none"> • 33.8 tonnes/year of CO₂ emissions saved • Primary Energy saving of 0.36 GWh /year

SUMMARY

- Tender promotes energy efficiency, healthy and affordable food and drink, comprehensive waste management, sustainable delivery options, and awareness raising
- Number of machines rationalised across the university buildings
- Includes the introduction of water dispensers and local spring water
- Estimated value of € 9.367.610,57 for a tender of 3(+3) years.

Procurement Approach

This contract relates to the delivery of vending concessions services for students, staff and visitors (around 70,000 people) for the University of Turin (UniTo), Italy. Within the context of the SPP Regions project, the University has taken the opportunity to fundamentally re-think its vending requirements in order to stimulate eco-innovation and to explore an alternative procurement

UniToGO

The University is highly committed to sustainability. In order to reach its goal of “Increasing social, economic and environmental responsibility”, the UniTo Green Office (UniToGO) has been established within its Division for Administration and Sustainability. UniToGO is an interdisciplinary network composed of professors, researchers, technical and administrative staff and students with the purpose of analysing and promoting the Environmental Sustainability Action Plan” (ESAP), and runs a series of working groups on food, energy, GPP, waste and mobility. Since May 2016, University of Torino has only used electricity from renewable sources.

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approach by carrying out a unique contract for all the sites.

The contract is the result of exchange and consultation within a working group made up of the UniToGO (see box), the Procurement Office with the Logistics Department, the Prevention and Protection Service and experts from the University of Turin in legal, economic, environmental, energy food and health issues.

The tender was inspired in general terms by the principles of eco-innovation according to the definition set by the European Commission in the communication COM (2011) 899¹ along

with principles of economic accessibility, spatial distribution, as well as accessibility to a healthy diet² as defined by the international debate and in particular by the WHO and the Italian Ministry of Agriculture and Forestry in collaboration with INRAN³.

In particular, this means:

- economic accessibility: giving access to the whole University Community to the various products at low prices, ensuring equal economic conditions within the University;
- spatial distribution: optimising proximity for staff and students to the vending machine service in the different University buildings and sites;
- accessibility to healthy food: the availability in vending machines of healthy products in terms of nutrition and suitable for different needs and food choices.

Needs Analysis and Community Engagement

The starting point for this initiative was a comprehensive needs analysis complemented by a process of community engagement. A study of the location, quantity, type and model of all the vending machines located in the different buildings, together with an overview of the status of the various vending machine contracts, was carried out between April and June 2017. UniToGO also measured the energy consumption of the different vending machines (hot drinks, cold drinks, confectionery) to get an insight into the overall energy consumption.

In order to define the volume of consumption and estimate the overall economic value of the tender, data from 2017 was collected from the suppliers.

279 vending machines were identified, located in 60 university buildings (offices, libraries, classrooms, laboratories, departments) throughout the city. The study showed a varied picture in terms of suppliers (15), contractual conditions, types of distributors, goods and services offered, prices for users. The survey therefore revealed a clear need to regulate the automated vending service within a common frame of reference.

The study and supplier sales data indicated that there was an excessive number of vending machines given the number of users, with a potential reduction in the number of vending machines to about 15%.

In July 2017 the whole university community was invited to respond to a short on-line questionnaire titled "*What are you looking for in an eco-innovative VM?*" 1,245 answers were collected. The analysis of the responses highlighted a strong interest amongst the community for eco-innovative solutions improving the sustainability of the service. The community proved to be particularly sensitive to energy efficiency and environmental sustainability. Responses also show a strong demand for healthier food and drink as well as for food suitable for different dietary requirements (food regimes, allergies, intolerances). The student community expressed interest in making water dispensers available to decrease the impact of plastic bottles.

Market Engagement and benchmark analysis

A market consultation process was launched in July 2017 during the pre-procurement stage. Suppliers and stakeholders were invited to attend an open consultation workshop (24 July 2017), where they were asked to respond to several questions about the feasibility of eco-feature requirements for vending machines, market readiness and capacity to offer eco-innovative solutions. The University met 9 different suppliers. It was clear from the market responses that some suppliers (especially the bigger ones) are moving toward the more sustainable provision of goods and services. It was also clear that the form of an open supplier workshop affected the quality of the answers. In the case of new technologies or dealing with business peculiarities that could have represented a competitive advantage, answers were generic. A draft market engagement report was put together to provide a record of the market engagement process.

At the same time, a benchmark analysis was carried out. Starting from the guidelines of the Joint Research Centre working group “Green Public Procurement for Food and Catering Services”⁴ and the Italian Ministry of the Environment’s “Environmental Minimum Criteria” (CAM in Italian) related to Canteen services and food supplies for public contracts, UniToGO Staff analysed the most relevant eco-features in 20 green contracts from Universities and public institutions. The aim of this analysis was to find best practices and new starting points for reference.

Circular procurement

A distinctive feature of this tender process was the shift from a linear to a more circular approach, reflected during the stakeholder engagement process and in the technical specifications and award criteria of the tender model.

With the aim of promoting circular economy practices the University has included award criteria relating to the recovery/reuse of coffee dregs from the hot drink distributors. The use of recycled PET plastic bottles or bio-based plastic will also be considered in the award criteria with the aim of fostering recycling.

Joint Procurement

The new contract will be managed centrally, unlike previously when the various departments / schools / libraries managed their contracts autonomously. The tender is split into 5 lots, which takes into account the functional organisation of the university, structured into 7 organisational poles.

Tender specifications and Verification

TECHNICAL SPECIFICATIONS

- Set number of vending machines per lot to be installed at strategic locations
- All vending machines to meet energy class A, according to EVA-EM;
- All vending machines to use LED lighting;
- Water dispensers to be provided to allow users to fill their own bottles;
- A minimum of 8 healthy food products for each vending machine, as suggested by the University’s nutritionists;
- Affordability of products (fixed price for water and coffee, determination of maximum threshold for other products);
- Bottled water only from spring water;
- Installation of smart meters for energy consumption monitoring;
- Quarterly sales volume reports for monitoring purposes.

⁴ Boyano, A. Espinosa N., Rodriguez R., Neto B., Wolf O., (2017) Revision of the EU GPP criteria for Food procurement and Catering Service, 2nd Technical Report. In the report there is a detailed section dedicated to vending machines.

AWARD CRITERIA (70 POINTS)

ENERGY CONSUMPTION AND REFRIGERANT GASES (14)

- **Award criteria 1 (9)** : Number of vending machines meeting energy class A+ or superior, according to EVA-EM 3.0 or EN50597
- **Award criteria 2 (5)**: Number of vending machines for cold products (drinks, snack and drinks) using refrigerant gases with a GWP lower than 150

WASTE MANAGEMENT (10)

- **Award criteria 3 (4)** : Proposals for efficient waste management for waste generated by vending machines
- **Award criteria 4 (3)**: Project for recovery or reuse of coffee grounds arising from vending
- **Award criteria 5 (3)**: Use of water bottles from recycled plastic bottles (rPET) or Bio Based PET

MANAGEMENT SERVICE AND DELIVERY OF PRODUCTS (6)

- **Award criteria 6 (6)** : Evaluation of transport's environmental impact of delivery service, determined according to the type of vehicle used, and the use of a telemetry system for optimising delivery

COMPANY COMMITMENT TO ENVIRONMENTAL AND SOCIAL SUSTAINABILITY AND COMMUNICATION MEASURES (10)

- **Award criteria 7 (4)** : Number of environmental certifications and registrations (ISO 14001; ISO 22000; ISO 18001; SA 8000; EMAS; F-GAS register, TQS Vending or similar)
- **Award criteria 8 (6)** : Proposal for an information and educational campaign about the nutritional value of healthy food

PRODUCTS (SNACKS & DRINKS) CHARACTERISTICS (30)

- **Award criteria 9 (6)** : Number of vending machines for cold drinks or snacks and drinks distributing local spring water
- **Award criteria 10 (6)** : Number of coffee vending machines distributing instantly ground coffee
- **Award criteria 11 (6)** Number of organic products
- **Award criteria 12 (6)** Number of fair trade products
- **Award criteria 13 (6)** Additional fresh products

VERIFICATION

Suppliers were asked to provide evidence for each technical specification and award criteria

A regional approach to SPP

The contract is the result of the exchange and collaboration among the SPP Region projects partners ARPA Piemonte and Città Metropolitana di Torino, as well the APE Network. Information exchange was also undertaken with other universities that had recently published a tender for vending machines.

Results

Environmental impacts

The new service is estimated to lead to savings of **151.6 tonnes CO₂/year**, and **1.1 GWh/year** of primary energy.

Positive environmental impacts relate to the decrease in the number of vending machines (reduced from 279 to 226), the improved energy efficiency of the machines, and the substantial reduction in the use of plastic bottles thanks to the introduction of water dispensers.

This is a conservative estimate to the savings as it does not take into account the likely improved energy efficiency of the future models, nor embedded CO₂ emissions savings related to the use of organic produce and recycled plastics. In addition, if the university did not purchase green electricity the savings relating to energy consumption would have been even higher.

Table 1: Environmental savings related to the reduction of the number of vending machines

Tender	Consumption (GWh)	CO ₂ emissions (tonnes/year)	Primary Energy consumption (GWh)
Baseline (2017)	0.68380894	11.6	0.8
Low carbon solution (2018 tender)	0.527370	9	0.6
Savings	0.156476	2.7 (22.88%)	0.2 (22.88%)

Table 2: Environmental savings related to the reduction of the use of plastic bottles thanks to the introduction of water dispensers

Tender	Consumption (GWh)	CO ₂ emissions (tonnes/year)	Primary Energy consumption (GWh)
Baseline (2017)	1.51	609.3	3.8
Low carbon solution (2018 tender)	1.43	578.2	3.6
Savings	0.08	31.2 (5.11%)	0.2 (5.11%)

CALCULATION BASIS

SAVINGS RELATED TO REDUCTION OF VENDING MACHINES:

- Baseline: 279 vending machines (103 coffee and hot drinks, 80 cold drinks, 96 snack and drink)
- Low carbon solution: 226 vending machines (93 coffee and hot drinks, 53 cold drinks, 80 snack and drink)
- Energy consumption based on average energy stand-by consumption of the various models currently installed.
- CO₂ emissions from RES sources set at 0,017 g/kWh
- For primary energy consumption a PEF (Primary Energy Factor) of 1.1 was used for RES (as the university only buys green electricity)

SAVINGS RELATED TO REDUCTION IN PLASTIC BOTTLE USE:

- Baseline: Consumption of water in plastic bottles, calculated at an average of 50 bottles/day, 176 distributors (cold drinks + snack and drinks), 220 days per year = 1,936,000 plastic bottles per year
- Low carbon solution: introduction of 9 water dispensers, each assumed to provide 25l per day, therefore replacing 99,000 0.5l plastic bottles per year.
- Energy consumption for the production of a 0.5 l plastic bottle is 5.6 MJ (P H Gleick and H S Cooley 2009 Environ. Res. Lett. 4 014009)

Financial impact

A financial saving of €34,410.41 (VAT included) on energy costs has been estimated from the optimisation of the number of vending machines and the relative improvement of energy efficiency (as a minimum requirement class A).

Thanks to the introduction of water dispensers providing free water, the overall saving for students and staff has been estimated at €24,750 per year.

For each vending machine, the University will receive a concession fee. Once the costs of electricity and water consumption are taken into account a yearly revenue of € 72,500 has been estimated. This amount however does not account for the costs for cleaning services, and waste disposal.

Social impacts

The availability in vending machines of healthy products in terms of nutrition and different dietary requirements will increase the accessibility to good food in the University. The awareness raising campaign that will accompany the new contract will help inform the University community about healthy choices.

Contract management

The Concessionaire will be required to report to the University, quarterly, in electronic format, on the sales volume of the products day by day and on the overall energy consumption. The University reserves the right to apply penalties in case of not-compliance with the obligations set in the contract.

Lessons learned and future challenges

- Given the complexity of the tender the procurement process requires a minimum of 12 months;
- It is critical to identify priorities and principles clearly at the beginning;
- Market engagement was fundamental to ensure transparency and the confidence of suppliers, and to understand the potential challenges of certain solutions;
- Engagement of technical and environmental expert is crucial for identifying the right approach and choosing the right solutions. The vending machine sector is very complex and therefore a wide range of in house expertise related to energy, food, waste, legal issues, mobility and other technical aspects is needed;

- It is fundamental to structure the tender on the basis of a needs analysis involving the University community through an on-line survey and on-site visits to understand the features of the various locations;
- The introduction of healthy food should be accompanied by an educational campaign and the price must be competitive with traditional products;
- Promote accessibility to small and medium-sized enterprises subdividing the tender into several lots.

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Annex 1 - Calculation of environmental savings

1) Energy consumption and cost saving

Types of Vending Machine	Annual consumption in kWh	n° vending machine (present)	n° vending machine (future)	Annual consumption x n° vending machine (present) (kWh)	Annual consumption x n° vending machine (future) (kWh)	Variation (kWh)	Percentage variation
Coffee	1.322,18	103	93	136.184,13	122.962,37	13.221,76	9,71%
Cold drinks	3.798,92	80	53	303.913,60	201.342,76	102.570,84	33,75%
Snacks and drinks	2.538,65	96	80	243.710,21	203.091,84	40.618,37	16,67%
Total	7.659,74	279,00	226,00	683.807,94	527.396,97	156.410,97	22,87%

	Energy consumption (kWh/a)	CO ₂ emissions (t/a)	Primary energy consumption (GWh/a)
Current contract	683.808,54	11,62	0,752189394
Future contract	527.397,50	8,97	0,58013725
Savings	156.411,04	2,66	0,172052144

2) Reduction in plastic bottle use

	Daily distribution of water (l): Total 440l		Annual distribution of water (l): 968.000l		Number of 0.5l plastic bottles distributed annually	Consumption (kWh) (1 bottle = 0,7778 kWh)
	In plastic bottles	Tap water from dispenser	In plastic bottles	Tap water from dispenser		
Before tender	4.400	0	968.000	0	1.936.000	1.505.820,80
After tender	4.175	225	918.500	49.500	1.837.000	1.428.818,60
				Savings:	99.000	77.002,20

	Energy consumption (kWh/a)	CO ₂ emissions (t/a)	Primary energy consumption (GWh/a)
Current contract	1.505.820,80	609,33	3,76
Future contract	1.428.818,60	578,17	3,57
Savings	77.002,20	31,16	0,19

3) University revenue

Types of Vending Machine	Cost of electricity	Cost of water	Total cost	Concession fee	Economic benefits***
Coffee	27.051,72 €	271,71 €	€ 27.323,43	€ 55.800,00	€ 28.476,57
Cold drinks	44.295,41 €	- €	€ 44.295,41	€ 53.000,00	€ 8.704,59
Snacks and drinks	44.680,20 €	- €	€ 44.680,20	€ 80.000,00	€ 35.319,80
Total	116.027,33 €	271,71 €	116.299,04 €	€ 188.800,00	€ 72.500,96

***Does not represent the total net revenue because cleaning and waste disposal costs cannot be quantified.

About SPP Regions

SPP Regions is promoting the creation and expansion of 7 European regional networks of municipalities working together on sustainable public procurement (SPP) and public procurement of innovation (PPI).

The regional networks are collaborating directly on tendering for eco-innovative solutions, whilst building capacities and transferring skills and knowledge through their SPP and PPI activities. The 42 tenders within the project will achieve 54.3 GWh/year primary energy savings and trigger 45 GWh/year renewable energy.

SPP REGIONS PARTNERS



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