



## Using multiple forms of greening to cool a city square

### Summary

- Improvements were made to an enclosed area, near the city centre, part of an area wide renovation scheme.
- Currently the square is enclosed by buildings presenting ugly backyards onto an area used for parking and deliveries
- The design solution to improve the area, reducing heat stress and creating a cool pleasant area for residents and passers-by included building a framework to support climbing plants as well as surface area planting.



### Location

Ostend, a coastal city in Belgium, has a population of 71,000 people, living on a very restricted area of 37 km<sup>2</sup>. Almost the entirety of the city centre, which has a high population of senior citizens, is paved, which causes heat stress during the summer. This is mitigated to some extent by the breeze from the sea.

### Site Description

The Lijnbaanstraat, a square adjacent to the main shopping street, is currently used for car parking. It is almost completely enclosed by buildings, reducing air circulation and with heat stored in the brickwork. The south facing wall on the northern side of the Lijnbaanstraat works like a “radiator” on summer days. It has been converted into a green space, reducing heat stress and making this area ‘liveable’.

### The decision-making journey

The original design for the site included roof terraces with planters and a pergola structure. As heat stress is now an issue, this was changed to adding an extra green layer to the walls by adding climbing plants. The building facades are private property, and so as not to damage them a structure, anchored

in the facade in two places was designed by Technum architects and engineers. Climbing plants were selected depending on the orientation in consultation with the owners and users. On the ground a design was created comprising a varied mix of shrubs, trees, herbaceous plants, and grassed lawns to attract biodiversity and provide an attractive cool place for the public. A wide-ranging consultation on the proposal was held with all information made available in an accessible container placed in the square for 12 weeks so residents and passers-by could see a model and add their views. Also, an example of the climbing construction was placed on site as an example for all residents to see. A pop-up (temporary) garden was made in the summer of 2019 as well, with the participation of VLAM (the Flemish Centre for Agricultural & Fisheries Marketing). This was a great way to show local residents how the current greening policy was working in the city centre. Designing this area was an incremental process. After the ground works were finished, the participatory process of selecting the climbing plants, and the permissions for the supports was carried out. It was not possible to do everything in one phase.

### Implementation

- Political support and courage were needed to make this happen as this intervention affected private property and owners needed to be convinced of the advantages of a green wall
- The construction needed a building permit. This was a site-specific design and needed to consider that some facades had publicity or special lightning on the walls. The final design needs to be approved and put in the permit procedure.
- There was a lot of resistance due to the loss of car parking.
- Time is an important issue! Plans were originally presented in autumn 2019. The procurement process began in April 2020 with work starting in February 2021, ending in December 2021.
- The participation of local residents in the design and selection of the facades with climbing plants is scheduled for Autumn 2022 with and construction in spring 2023. This long planning process is necessary as it enables people get used to the new situation and the advantages of the improvements.
- During installation access was an issue as there are many commercial properties; restricted access for these led to resistance.
- To ensure the climbing plants thrive a drip irrigation system will be installed connected to a 35 m<sup>3</sup> underground water reservoir.

**Indicative costs:** please note that costs have been rounded and, while accurate at the time of implementation, can only be used as an indication of cost.

Capital Costs: Phase 1	€	£ = 1.15 €
Single Tree in grass Grass 78m <sup>2</sup> Tree x 1	507 680	440 590
Planting 50m <sup>2</sup> of shrub areas	1,840	1,598
Grass 125m <sup>2</sup>	812	707
Single tree in shrub planting Tree Shrubs 120 m <sup>2</sup>	370 2,200	322 1,915
<b>Total</b>	<b>6,409</b>	<b>5,567</b>

<b>Annual Maintenance Costs:</b>	<b>€</b>	<b>£ = 1.15 €</b>
Single tree in grass		
Pruning tree (1x/3 years)	38	33
Watering (9 times/year)	35	30
Mowing (22x/year)	86	75
Shrub planting (50m <sup>2</sup> )		
Weeding (7 times/year)	175	152
Watering (9 times/year)	22	19
Fertilizer (3kg/100m <sup>2</sup> /year)	3	2
Pruning (1x/year)	25	22
Grass 125m <sup>2</sup>		
mowing 22 x per year	138	120
Single tree in shrub planting		
Pruning Shrubs (1x/year)	60	52
Pruning tree (1x every 3 years; cost annualised)	38	33
Watering (9 times/year)	54	47
Fertilizing (3kg/100m <sup>2</sup> /year)	6	5
Weeding (7 X /year)	420	365
<b>Total</b>	<b>1,099</b>	<b>955</b>

<b>Capital Costs: Phase 2</b>	<b>€</b>	<b>£ = 1.15 €</b>
Constructed support for climbing plants	181,190	157,443
Soil	9,300	8,081
Drip irrigation & underground water reservoir	168,167	146,143
Climbing plants	2,671	2,321
<b>Total</b>	<b>361,328</b>	<b>313,986</b>

<b>Maintenance Costs: Phase2</b>	<b>€</b>	<b>£ = 1.15 €</b>
Watering	5,000	4,346
Shearing/cutting back	5,000	4,346
Weeding	750	652
<b>Total</b>	<b>10,750</b>	<b>9,340</b>

**Reflection: what went well/what could have gone better?**

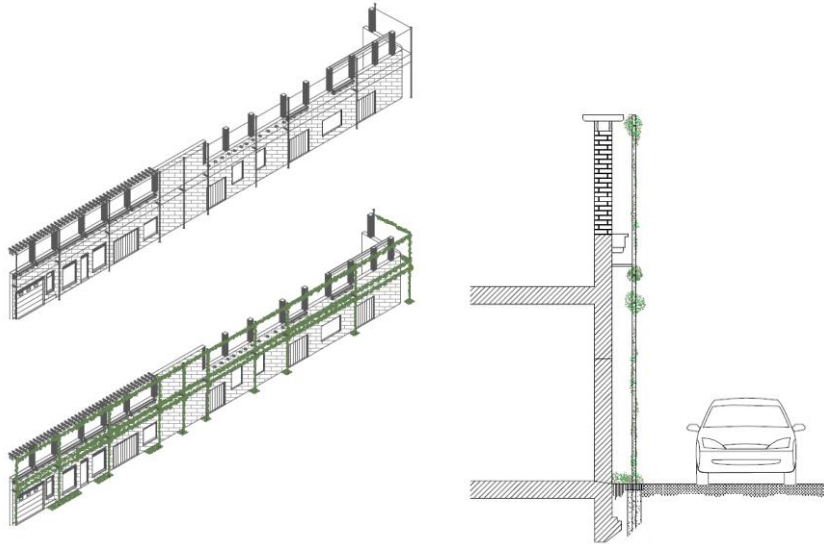
- We were able to implement a lot of cooling measures in a former parking area;
- Thanks to the participation process there was little disagreement on the options;
- The process was time consuming due to issues such as reducing parking spaces, procurement procedures, change in political legislature.

Concerns raised during the public consultation:	Reactions after completion
<ul style="list-style-type: none"> <li>• <i>“we don’t want to lose our parking place”</i></li> <li>• <i>“You need parking places in the centre of the city for the shops”</i></li> <li>• <i>“We need short term parking’</i></li> <li>• <i>“Can we make this space a catwalk for a fashion parade?”</i></li> <li>• <i>Better public lighting (safety).</i></li> <li>• <i>fear of moisture penetration through climbing plants constructions</i></li> <li>• <i>Adaptation for wheelchair users</i></li> <li>• <i>No public toilet close to my shop!</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>“Beautiful magnolias”</i></li> <li>• <i>“VEEEERY well done, thank you for all the hard work”</i></li> <li>• <i>“I love the benches on the walls of the oval green areas”</i></li> <li>• <i>“A lot tidier, it used to be a grim parking lot in the city centre. Now it can grow to be a resting place near the city shopping street and attract new businesses.”</i></li> <li>• <i>“Glad to see again the house sparrows in the city”</i></li> <li>• <i>“Nobody stayed in this place. Now we see people sitting on benches. You’re never alone in this place.”</i></li> <li>• <i>“Very glad with the lightning. In the past I avoided this place when it was dark.”</i></li> </ul>

MEASURES OF SUCCESS	EVIDENCE
Reduction in PET value (baseline vs result values, comparison with reference point)	A PET reduction of 4.51°C was measured when the pilot was partly installed
Size of the area (m2) with improved heat resilience (the total area that benefits from the measures approximate this by using the same approach used for the initial estimation in the application form)	4450m <sup>2</sup> has been improved.
Number of daily users benefitting from the intervention (if relevant/available: are there specific times of day or the year when there is heavy use?)	5,000 daily users, mostly used in the daytime during summer. Lots of tourists and elderly people benefitting from the made interventions.
Co-benefits achieved (for example biodiversity, pollution reduction, economic benefits, influence on property value, long-term savings, aesthetic improvement, psychological impact, increased health and wellbeing)	Even during the construction phase we saw an improvement of the biodiversity (see comment regarding sparrows)
Any other results observed	More people actually staying in the Lijnbaanstraat versus just getting in their cars.

**Technical and financial specifications:**

Technum-Tractebel engineering office  
 Esplanadestraat 1  
 8400 Oostende



Design for the climbing plant support

Relevant information about the intervention(s) (for example construction material, suppliers)

-High quality soil

-Tailor made climbing construction made from galvanized (corrosion class C4) and painted (RAL 7021) steel with a guaranteed lifespan of at least 50 years.

-Custom made rainwater & drip irrigation management system consisting out of the following parts:

- System for filling irrigation trucks
- Irrigation pipe and individually adjustable and pressure-controlled drippers for the façade gardens
- flushing point for drip irrigation
- Circulation pump (single stage centrifugal pump)
  - 5L/s
  - Fast filling possibilities for irrigation trucks
  - EN 1092-2
  - Very high performance
- Pump strainer 25 liters manufactured out of Polyester and optical fibers
- Valves; Vents
- Irrigation computer; Sensors
- 4G remote control
  - Underground water reservoir (35m<sup>3</sup>; 20kN/m<sup>2</sup>; D400 lid)
- Separate manhole/control room

List of climbing plants: all in 2L pots

<ul style="list-style-type: none"> <li>• <i>Wisteria Sinensis 'Prolific'</i></li> <li>• <i>Wisteria Floribunda 'Alba'</i></li> <li>• <i>Wisteria Floribunda</i></li> <li>• <i>Rosa 'Alchemist'</i></li> <li>• <i>Rosa 'American Pillar'</i></li> <li>• <i>Rosa 'Bobby James'</i></li> <li>• <i>Rosa 'Climbing Iceberg'</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Rosa 'Guirlande d'Amour'</i></li> <li>• <i>Rosa 'Madame Alfred Carriere'</i></li> <li>• <i>Rosa 'Madame Isaac Pereire'</i></li> <li>• <i>Rosa 'Masquerade'</i></li> <li>• <i>Rosa 'New Dawn'</i></li> <li>• <i>Trachelospermum Jasminoides</i></li> </ul>
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Further information: [www.oostende.be/lijnbaanstraat](http://www.oostende.be/lijnbaanstraat)