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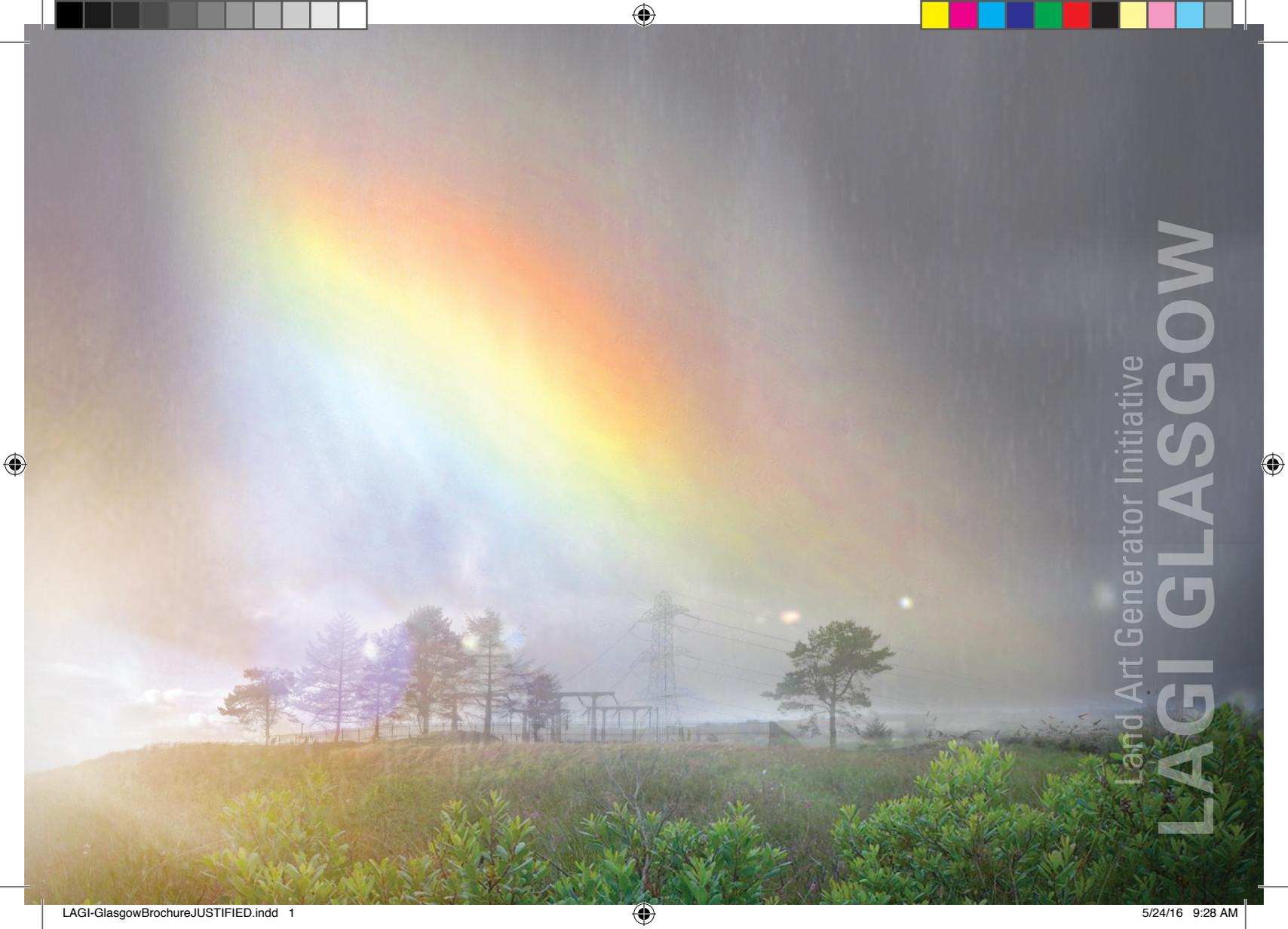
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Land Art Generator Initiative
LAGI GLASGOW



Wind Forest

Peter Foster Richardson (ZM Architecture)

Matthew Dalziel and Louise Scullion (Dalziel + Scullion)

Ian Nicoll (Qmulus Ltd.)

Peter Yeadon (Yeadon Space Agency)







LAGI GLASGOW PROCESS

What would a utility-scale renewable energy project for Glasgow look like if the design process was led by artists, architects, landscape architects, and urban planners, working in collaboration with engineers? How would such an installation relate to the community?

The Land Art Generator Initiative (LAGI) has created a new portfolio of ideas for cities and urban landscapes by providing a platform for interdisciplinary teams to conceive of renewable energy power plants as creative placemaking opportunities for public space that bring added cultural value to the neighbourhood and the city in addition to carbon-free electricity.

As we transition towards post-carbon economies and sustainable infrastructures become more prevalent, there is an opportunity to celebrate these new technologies as landmarks and destinations for recreation and education. Power plants designed as public art can help demonstrate a city's commitment to development in harmony with the natural world, allow electricity generation in cherished places that would not otherwise be amenable to utilitarian installations, point the way to greater energy democracy, and inspire the public about the promise of our sustainable future.

The consortium including Glasgow City Council, Scottish Canals, and igloo Regeneration, supported by ecoartscotland brought together overseas teams who participated in past LAGI open competitions (UAE 2010; NYC 2012; Copenhagen 2014) to work with Glasgow-based teams in order to research and develop LAGI artwork concept proposals for

Port Dundas. The site has a focus for urban regeneration with a strong creative dimension.

LAGI Glasgow formed part of Glasgow's Green Year 2015 and continued through 2016 as Glasgow's contribution to Scotland's Year of Innovation, Architecture, and Design—engaging local communities as well as those interested in art and innovation in renewable energy.

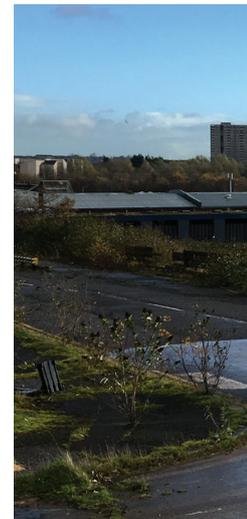
The project demonstrates the potential for artists, designers, architects, and landscape architects to contribute to renewable energy infrastructure and integrate it into a placemaking approach.

Glasgow is a place with a long and storied history with public art—from the Victorian Necropolis, to the contemporary Glasgow International Festival and the Turner prize. This opportunity at Dundas Hill is quite unique and important to the City Council, project partners, and to the whole of Glasgow.

This is the chance to build a large and site-specific artwork that will take its place atop a City that eats and breathes art. The scale is both exciting and overwhelming—the completed work has the potential to shape the image of the City.

Proposals were conceived and delivered with this context in mind. The project sought entries that were brave, bold, beautiful, honest, inspiring, and functionally elegant.

In the following pages you will learn more about the site at Dundas Hill and see a summary of the three proposals that resulted from the invited competition, all of which are indeed bold and beautiful.





19 November 2015
 Gary Watt of BIGG Regeneration addresses the design teams assembled near the top of Dundas Hill. Site Hill and Glasgow Centre City can be seen in the distance.



27 August 2015
 Bailie Elizabeth Cameron, Glasgow's Green Year 2015 Ambassador, speaking at the local practices briefing event on the importance of LAGI Glasgow, the design site at Port Dundas, and the role of public art and creative placemaking in Glasgow's green regeneration strategy.

land art generator initiative
 RENEWABLE ENERGY CAN BE BEAUTIFUL

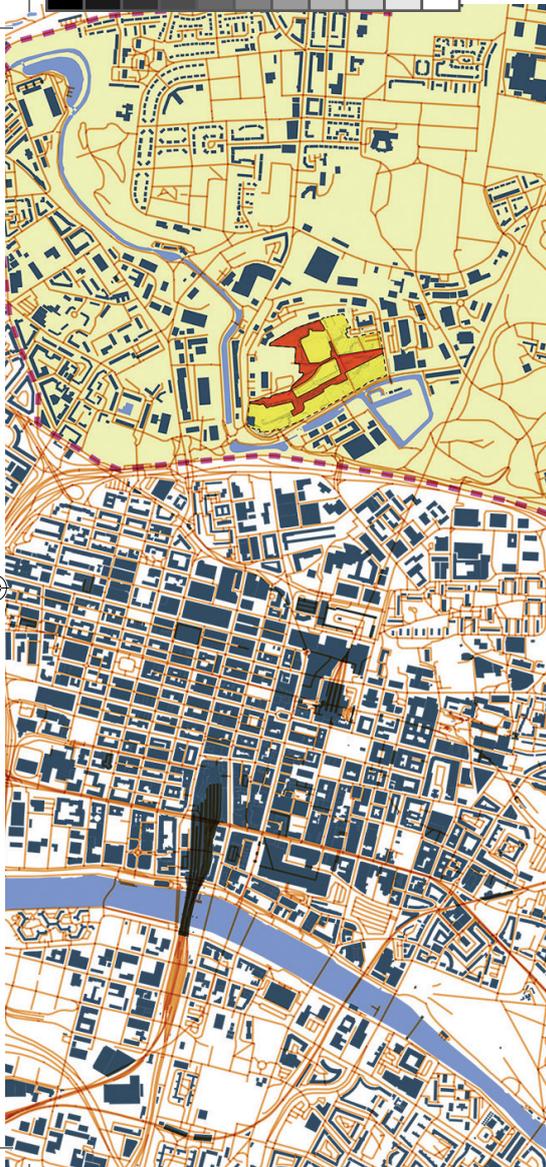


Scottish
 Canals



eco/art/scot/land
 A platform for research and practice





THE LAGI GLASGOW DESIGN SITE: PORT DUNDAS & DUNDAS HILL

Port Dundas is located within the Glasgow Canal Regeneration Partnership's area. This Partnership was formed between Glasgow City Council, Scottish Canals, and BIGG Regeneration with the aim of regenerating and transforming the canal to a vibrant local and city destination.

Dundas Hill (or 100 Acre Hill as it was first known) overlooks the city centre and is a central part of the plans for Port Dundas. It is currently the focus of a major regeneration project led BIGG Regeneration, itself a JV between Scottish Canals and the Igloo Regeneration Fund. The aim of the partners is to deliver a residential led, creative mixed use place—one that will foster and support the further growth of creative industries and urban sports pioneers in the neighbourhood, in an approach that has the potential to become ground-breaking for regeneration in Scotland.

Indeed, Scotland has set world-leading targets for renewable energy and the transition to a low carbon economy, and the LAGI Glasgow 2015 project will demonstrate the important role for designers, architects, urban practitioners and artists to imagine ways for utility scale renewables to be iconic as well as practical, integrated into communities as well as a landmark for the City's transition from Steam to Green.

PHOTO CREDIT Peter Sandground





PORT DUNDAS



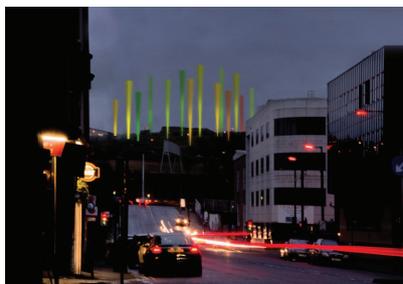
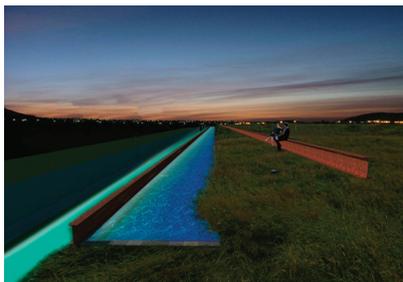
TEAM Peter Foster Richardson (ZM Architecture), Matthew Dalziel and Louise Scullion (Dalziel + Scullion), Ian Nicoll (Qmulus Ltd.), and Peter Yeadon (Yeadon Space Agency)

VORTEX BLADELESS

A revolution in wind energy design, this 'turbine' has no gears or bearings, reducing maintenance costs. It has low manufacturing costs, is easy to transport, and uses small foundations making it cost effective to install. It is noiseless and does not present a hazard to birds.



Wind Forest



WIND FOREST aims to transform the post industrial landscape of Dundas Hill with an enriched infrastructure, based on ideas around technology, landscape and context. On the site, forest groves with different spatial, sensory and environmental qualities are planned.

A forest absorbs energy from the earth's atmosphere and distributes this energy to its connected ecosystem. *Wind Forest* mimics this activity by absorbing energy from the wind passing through the site and distributing it to its diverse and connected community.

Wind Forest works with the physical landscape of 100 Acre Hill into which a forest of one hundred 4 kW single stem-like wind turbines is 'planted'. These are not like conventional wind turbines; they have no blades but rather work through oscillation. Within this 'boreal' forest are a number of large 'erratic' boulders, which conjure up the massive geological processes that once shaped this landscape—in particular, the glacial drumlin that is 100 Acre Hill.

The futuristic forest exists as three groves of the bladeless turbines that create characterful spaces within the site, while generating energy by the swaying motion at the top of each singular structure. One of the sites (shown in the diagram to the left) is to the East—the gathering place or central common—one in the centre wetlands around the natural SUDS (sustainable urban drainage system) basin, and one to the West—the glade—where the edge of the site spectacularly opens onto views of Park Circus and the west of the city. This particular grove is most visible from the city centre and it will be sited partially on one of the sloping and more difficult sites to build on. All sites are exposed areas in 'no build zones' within the current masterplan and will be interconnected through a path network.



ENERGY TECHNOLOGIES Vortex Bladeless™ wind turbines ANNUAL CAPACITY 900 MWh

HISTORY

The site has a rich geological history. 100 Acre Hill (or Dundas Hill, as it was later renamed) bears the fingerprint of the many different forces that have shaped it. As one of Glasgow's 118 drumlins, these small elliptical-shaped hills were formed through glaciation resulting in a distinctive egg-like form indicating the direction of the ancient ice flow. Typically, these hills occur in swarms and are arranged parallel to each other in 'drumlin fields'. Glasgow, is one of two examples (the other being Boston in Massachusetts) of a major conurbation built upon a drumlin field. The presence of these hills is captured by local names such as Jordanhill, Maryhill, Firhill, Garnethill, Dowanhill, etc.

The next great shapers of the Hill were the Victorian industrialists who carved canals into its side and erected huge brick chimneys, much later came adjacent concrete cooling towers. These industries left behind a legacy of materials including a great deal of rubble which now requires to be managed as the site is developed.

Wind Forest uses some of this material to create large manmade boulders reminiscent of the erratic boulders left behind by retreating glaciers. The 'moraine' from the site's industrial past is combined with hundreds of bricks excavated from the site, many of which still bear the name of the clay pits where they were made, often within 20 miles of the site.

Each of the stems will be coloured using a palette that draws from the year-round colours of natural deciduous woodlands. The 13-metre high wind stems (about the average height of a Rowan, Hazel or Hawthorn tree) generate power by oscillating from a fixed point in the lower half of the structure. The top of each stem has the capacity to circle up to 2 metres across which when amplified over the entire forest would be a unique and exciting spectacle to stand amongst.



TEAM ERZ Studio (Rolf Roscher, Felicity Steers, Murray McKeller, Euan Maharg, Chris Swan, David Hammett, and Aidan Cifelli), Alec Finlay, and Riccardo Mariano. Additional consultants include: Ramboll (mechanical / systems engineers), Bryan Byrne Consultants (cost consultant), David Narro Associates (civil & structural engineers), Enviro Centre (hydrology / ecology consultant), Ken Cockburn, Ben Spencer, Dr. Laura Watts, and Andrew Smith



Watergaw

WATERGAW is a beautiful, neglected Scots word meaning a patch of rainbow in the sky.

The Watergaw is a luminous ephemeral artwork whose breathtaking generosity will delight visitors and spectators throughout the city. It is the centerpiece for a system-based scheme of landscape design, energy production, and public artworks that support regeneration at a city and neighbourhood scale.

The LAGI artworks include *water-callers*, broadcasting river-themed poems from pipes, and *wind-callers*, recalling Aeolian harps. Together these focus awareness on the energy generating capacity of those familiars of daily Glasgow life—wind and water.

The rainbow artwork, conceived by Riccardo Mariano, is luminous and fleeting. It will come and go as lightly as the weather. The excitement of seeing it light the Glasgow skyline will become an ever-present possibility. Whenever *the watergaw* appears, it represents 1,000 kWh of energy produced on site—in large part by the *windcallers*—translating the passage of time into an inspiring measure of renewable energy generation.

The electricity generated will be used both on site and will generate income by exporting to the national grid. The heat that is generated in the water source heat pump will be ‘sold’ to the district heating system, and used in the growing glass. In these ways *the watergaw* will benefit the local community and the entire city.





ENERGY TECHNOLOGIES vertical axis wind turbines, water source heat pump, micro-hydro, biomass **ANNUAL CAPACITY** 1,000 MWh



SUMMARY OF DESIGN ELEMENTS

Energy Generating

— *water-caller*: micro-hydro turbine installation at Monkland Canal as it enters the Pinkston Basin — *give-and-take*: water source heat pump located in the vicinity of the Monkland Canal — *wind-callers*: array of 7 small-scale vertical axis wind turbines — *willow field*: biomass-producing willow plantation over the entire site.

Energy Communicating

— *watershed*: pedestrian walkway with landscaping representing Scottish river systems. — *growing glass*: community greenhouse heated for year-round food production — *espalier shelters*: wind-screen with benches warmed by hot water pipes from the give-and-take — *sweet gale*: planting of sweet-scented bog myrtle in the abandoned boat in Pinkston Basin.

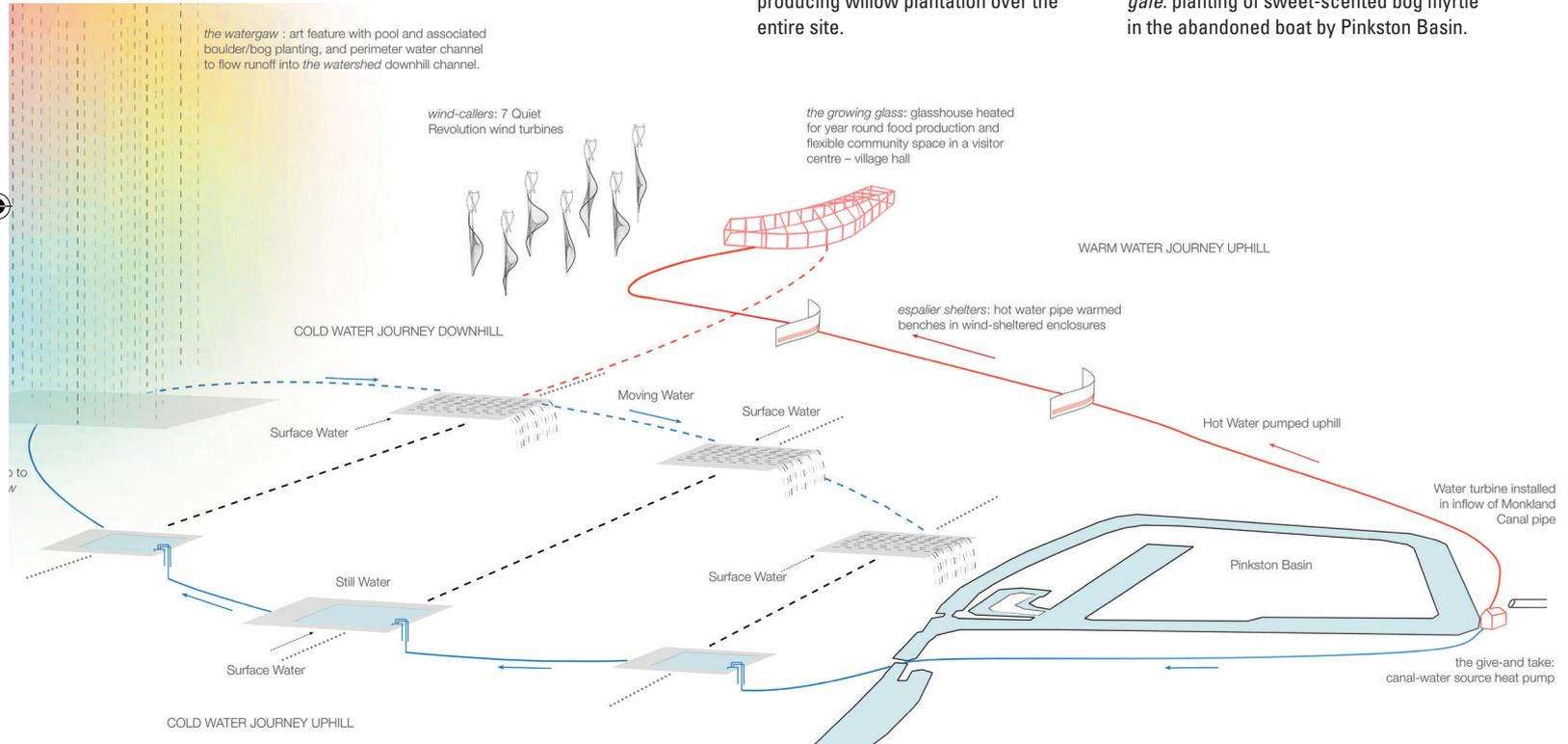
the *watergaw* : art feature with pool and associated boulder/bog planting, and perimeter water channel to flow runoff into the *watershed* downhill channel.

wind-callers: 7 Quiet Revolution wind turbines

the *growing glass*: glasshouse heated for year round food production and flexible community space in a visitor centre – village hall

COLD WATER JOURNEY DOWNHILL

WARM WATER JOURNEY UPHILL



COLD WATER JOURNEY UPHILL



Dundas Dandelion

TEAM Stellan Brand Architectural Design, Pidgin Perfect, Glasgow Science Festival, University Glasgow, M-Rad Architects (Matthew Rosenberg), Nich Smith Lighting, and Alan Blair Design & Fabrication



This proposal is inspired by the Dandelion's flowering head and its reliance on the wind to blow its feather weight seeds across the landscape—a favourite flower for children to playfully interact with and one synonymous with Glasgow's unkempt landscapes.



DUNDAS DANDELIONS imagines and reflects on what might happen when the seed of an idea is planted that connects directly with people's lives—creating a new type of learning space for them to playfully explore and take risks. This proposal considers the creation of a new place to share and investigate ideas in support of the 'Green Glasgow' initiative through new conversations, creative activities, cultural events, temporary interventions, semi-permanent spaces, and new urban architecture.

The artwork imaginatively harnesses available wind energy across Dundas Hill using existing wind turbine construction methods and technologies to create a building structure that is 'seed shaped', the source for spreading activity across the site, thereby encouraging site-specific learning programmes and spaces of activity to take root across and create a 'landscape of learning'.

In addition to tested turbine technology, the Dandelion structure will incorporate innovative technologies and serve as a site for energy exploration. This forward-thinking showcase for research excellence would also be an educational venue for the City of Glasgow.

Inspiration . Aspiration . Performance

Diagrammatically the sculpture can be broken down into three separate, yet equally important goals, each relating to a specific element of the composition.



ENERGY TECHNOLOGIES various models of wind turbines, kinetic (torque) generators, and piezoelectric disks **ANNUAL CAPACITY** 500 MWh

Inspiration.

At the heart of the scheme, and the base of the Dandelion is situated the Learning Lab, a permanent housing for an educational team of experts intended to engage, teach, and inspire local residents and school children about the project, its aims and ambitions, and the future of sustainable energy production and technologies. The Lab Building is also used to securely house the necessary equipment to control, monitor, convert, and redistribute the energy produced on site.

Aspiration.

The head of the Dandelion is the iconic focal point of the proposal, it is therefore we chose to use its robust yet lightweight structural framework as a test-bed for a cutting edge sustainable prototype technology. Flexible Carbon Fibre 'Wind Stalks' containing Piezoelectric discs generate electric charges as they sway and distort in the strong winds their elevated location commands. It symbolises the desire to innovate and explore the future of sustainable energy production, whilst still producing all necessary power required for the running of the lab and its own architectural lighting strategy.

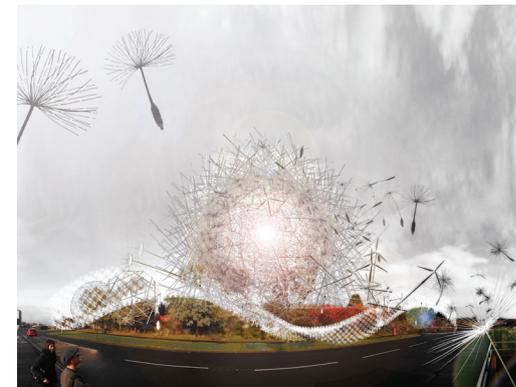
Performance.

The beauty of the Tensegrity structure used for the Dandelion is that it combines strength and rigidity with a structural elegance and sculptural aesthetic. Therefore as it deconstructs across the site it makes a perfect foil to both populate the areas identified within the masterplan with striking landscape elements, whilst also providing a structurally viable housing for strategically located propriety wind turbines. As the scheme evolves these will generate the primary energy source to be fed back into the developing masterplan.



DUNDAS DANDELIONS OVERLOOKING THE CITY

Locating the LAGI proposal above the Dundas Basin adjacent to the motorway and overlooking the City will provide for an exciting spectacle. Architectural lighting of the structure in the evening will provide an additional dimension.





LAND ART GENERATOR INITIATIVE

LAGI Glasgow marks an important advancement in the application of renewable energy infrastructure as a mechanism for creative placemaking and urban regeneration. This invited competition for Glasgow—with a focus on local creative practices—complements the ongoing biennial design competition model upon which LAGI was founded. Beginning with the LAGI open call ideas competition for Dubai/Abu Dhabi in 2010 and continuing through the most recent iteration for Santa Monica, California in 2016, LAGI continues to build a vast portfolio of ideas that can find application for a number of contexts—from reclaimed landfills and brownfields, to highway corridors and coastlines.

At the same time as LAGI is collecting these groundbreaking ideas, the project is also seeking to find pathways to construction of locally-driven and site-specific solutions. The “Glasgow Model” for renewable energy design integration, as it has now come to be known, will be duplicated in cities around the world that are looking to lower their carbon footprint while creating new and exciting places for recreation and learning.

LAGI has 800 design concepts—representing participation from over 60 countries—in its portfolio. Here are three examples of past entries to the LAGI open-call ideas competition.

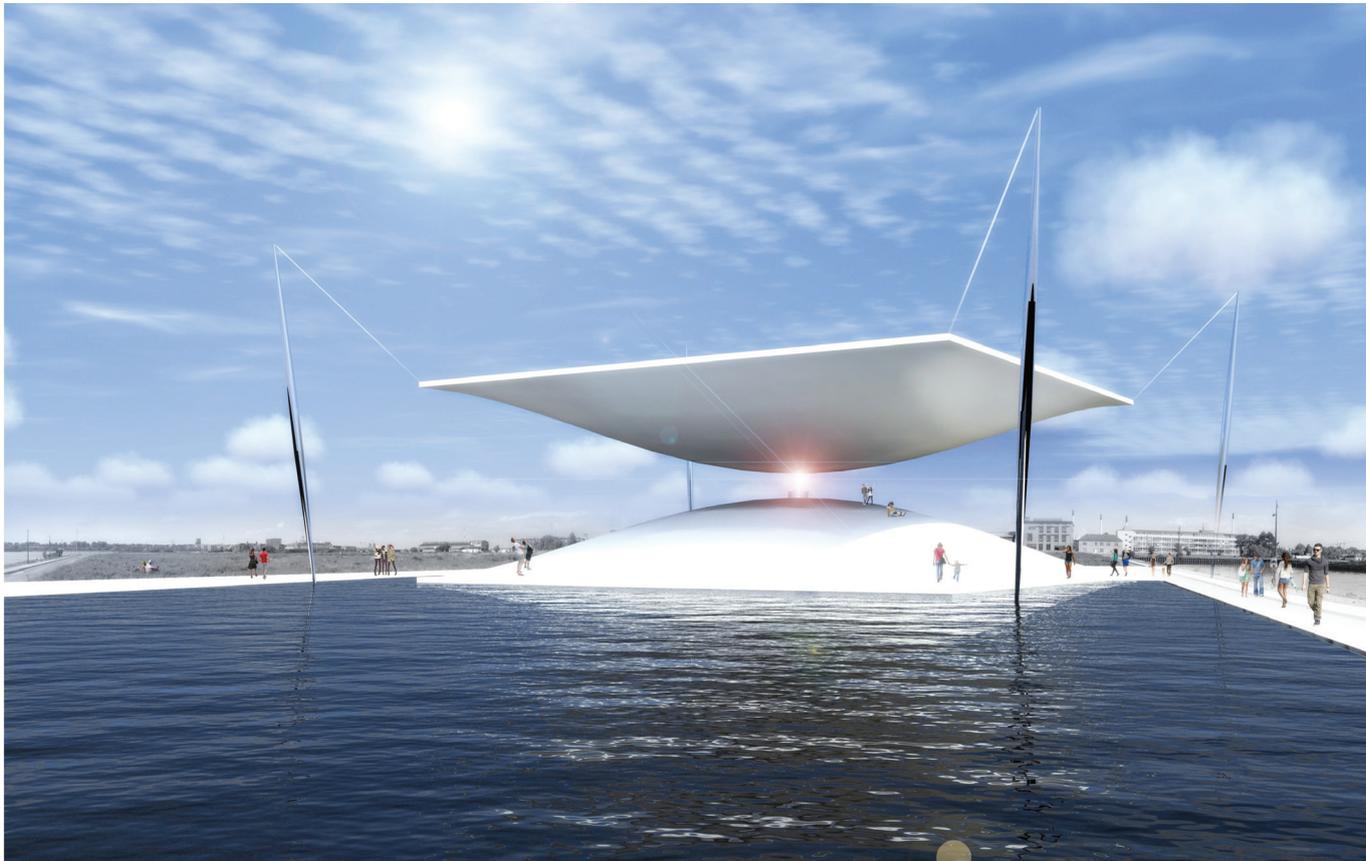
WINDSTALK: LAGI 2010 DUBAI & ABU DHABI

TEAM Concept and Design Atelier dna: Darío Núñez Ameni and Thomas Siegl; Narrative and Poetics Gabrielle Jesiolowski; Structure and Engineering; ISSE Innovative Structural and Specialty Engineering; Radhi Majmudar PE; Ecology and Renewable Energy Strategy eDesign Dynamics: Ian Lipsky **ENERGY TECHNOLOGIES** piezoelectric discs, linear alternator **ANNUAL CAPACITY** 20,000 MWh

SOLAR LOOP: LAGI 2012 NEW YORK CITY

TEAM Paolo Venturella, Alessandro Balducci, Gilberto Bonelli, Rocco Valantines, Mario Emanuele Salini, Pietro Bodria
ENERGY TECHNOLOGIES thin film photovoltaic
ANNUAL CAPACITY 10,000 MWh





SOLAR HOURGLASS: LAGI 2014 COPENHAGEN

TEAM Santiago Muros Cortés **ENERGY TECHNOLOGIES** concentrated solar power (thermal beam-down tower with heliostats)

ANNUAL CAPACITY 7,500 MWh





Port Dundas is fast becoming a place for the pioneer. LAGI fits perfectly with this philosophy and demonstrates a truly innovative way of green energy and public art helping to shape a regeneration project from the start, whilst stimulating real debate amongst participants and project partners about the roles of architecture, art, urban design and planning.

— **Chris Brown, Executive Chairman, igloo Regeneration**



FOR MORE INFORMATION

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www.landartgenerator.org/glasgow

LAGI-GLASGOW PROCESS November 19, 2015 site walk at Port Dundas with all three design teams

FRONT COVER *Watergaw*, see design team information inside