fig. 1

fig. 2

fig. 3

LINEAR FORM

A linear form attempts to house all the necessary elements below a defined horizontal datum and in a clear progressive sequence. With large scale industrial installations, this datum may relate to the height of any general surroundings, with only specific key parts rising above this. Linear forms are often used to define an edge condition, and as such can create strong relationships with the water's edge. Equally, if ill considered can provide a visual and physical barrier between places.

fig. 1 Daka Biodiesel
Architect CF Moller, 2007
Photogrpah courtesy of Julian Weyer

fig. 2 Kranspoor, Amsterdam
Architect OTH, 2007
Photograph courtesy of Christian de Bruijne

fig. 3 Supertanker

fig. 1

fig. 2

fig. 3

fig. 4

TRANSPARENCY

Transparency can achieve a range of effects and convey varying messages about the nature of a structure. It can be used to manipulate the perception of form. The relationship between solid and transparent elements on the skin of a building can blur or remove edges, highlight key areas, and generally allow a mass to be sculpted by the contrast between light and dark.

An entirely transparent frontage can also send a message of openness, that people are welcome to view the activities going on within, which is of particular relevance to the process driven nature of the renewable energy plant.

A semi opaque façade will create visual interest through luminosity, and can also convey a sense of mystery and drama due to the ambiguous nature of the activities concealed within.

fig. 1	Aalborg sludge drying plant Architect CF Moller, 2000 Photogrpah courtesy of Ole Hein Pedersen
fig. 2	Garstad plant Architect CF Moller, 2004 Photograph courtesy of Ake Eson Lindman
fig. 3	Nelson Atkins Museum of Art, Kansas City Architect Steven Holl, 2007
fig.4	Maison de Verre, Paris Architect Pierre Chareau, 1932

fig. 1

fig. 2

fig. 3

SKYLINE ELEMENT

The Renewable Energy Plant will be viewed from a range of distances, and will impact on the skyline. A recognisable, high level element is often used as a way of signaling a building's presence. Rather than attempting to conceal the presence of the building, it is celebrated, though careful emphasis is generally placed on the scale of the highlighted element to ensure the surrounding context is not completely overpowered.

fig. 1	Institute of Contemporary Arts, Boston. Architect Diller, Scofifio and Renfro, 2006
fig. 2	The New City Architect Antonia Sant' Elia, 1914
fig. 3	Tate Modern, former Bankside power statiion Architect Giles Gilbert Scott/Herzog and de Meuron, 1961/2000

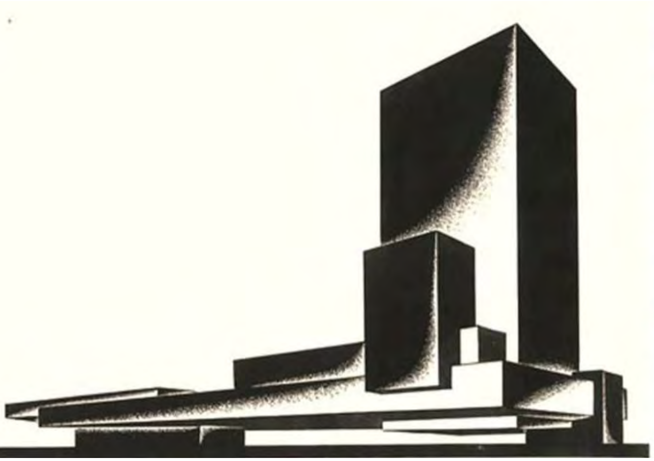


fig. 1

fig. 2

fig. 3

ELEVATED FORM

A means of reducing the apparent height of building elements is through the use of horizontal bands of different materials or planes. This not only reduces the perceived bulk, but allows the upper elements of the building to be separated from the surrounding context. The appropriateness of this as a strategy is dependent on the choice of materials used, with heavier, load bearing masonry materials such as stone and brick commonly being expected to be seen to meet the ground.
Using lighter materials such as metals, glass and plastics, with uses in other fields outwith construction, the upper levels can become suggestive of a different type of object, i.e. the train or the ship. The elevation of the building as a strategy is of particular relevance given the location of the Renewable Energy Plant at a strong edge defined by the water.

fig. 1 Construction of Architectural and Machine Forms
Architect Iakov Chernikov, 1925 – 1931
Image courtesy of Iakov Chernikov International Foundation

fig. 2 Smolensk, Russia
Photograph courtesy of Rosenergaatom, 2001

fig. 3 Institute of Contemporary Arts, Boston
Architect Diller Scofidio and Renfro, 2006

fig. 1

fig. 2

fig. 3

fig. 4

MODULAR ARCHITECTURE

Standardization of components and the application of modularization have become integral aspects of modern industrial processes. In the context of the port environment, this is typified in the use of standardised cargo containers for shipping.
These modules have subsequently been transformed, manipulated, reused and re-imagined for a variety of building programmes which retain strong visual connections back to the original industrial use.

fig. 1	Habitat 67, Montreal Architect Moshe Safdie, 1967
fig. 2	Kubik Barcelona, Barcelona Mudularbeat Ambitious Urbanists & Planers, 2007
fig. 3	Nomadic Museum, location varies Architect Shigeru Ban, 2002
fig. 4	Nakagin Capsule Tower, Tokyo Architect Kisho Kurakawa, 1972

fig. 1

fig. 2

fig. 3

HIGH AND LOW LEVEL SEPARATION

A technique commonly employed in the design of large scale industrial structures is a clear separation of high and low level elements, often driven on a functional level by the desire to enclose plant within the most efficient possible envelope.
This has the effect of decreasing the potential bulk of the building. Lower elements (often support, processing and storage areas) can relate to the general height of other buildings in close proximity. Higher elements (generally boiler and stack) rise above this in a tighter envelope which will have a presence on the wider skyline.

fig. 1	Dalmine Photograph courtesy of Neutrec, 2009
fig. 2	Uppsala Block-5, Sweden Photograph courtesy of vattenfall, 2006
fig. 3	Nikola Tesla B, Serbia Photograph Courtesy of EPS, 2001

fig. 1

fig. 2

fig. 3

fig. 4

fig. 5

GATEWAY

The scale and prominent location of the Renewable Energy Plant means that it can also serve the function of a landmark, or gateway. This often allows industrial structures to rise above their purely functional nature and become a recognisable visual symbol in the landscape.

fig. 1	Construction of Machine and Architectural Forms, 1925 – 1931 Architect Iakov Chernikov Image courtesy of Iakov Chernikov International Foundation
fig. 2	Luma Tower/Lamp Factory, Glasgow Architect Cornelius Armour, 1938
fig. 3	Leicester University Engineering Faculty Architect James Stirling, 1969 Image courtesy of Wikipedia
fig.4	Architectural Fantasies, 1925 – 1933 Architect Iakov Chernikov Image courtesy of Iakov Chernikov International Foundation
fig.5	Jawa Sandcrawler Designer Ralph McQuarrie, 1975

fig. 1

fig. 2

fig. 3

CONTAINER ARCHITECTURE

A development of the modular approach to architecture, the standard shipping container has been used as a simple, prefabricated, weather tight, self supporting building element in a wide range of projects. Transformation and manipulation of the basic unit, as well as considered use of the spaces left between, allows great variety in the scale and types of spaces created. The large basic module size also lends itself to larger scale industrial structures – individual parts remain legible even at medium range viewpoints.

fig. 1 Freitag lab.ag, Zurich.
Image courtesy of Wikimedia Commons

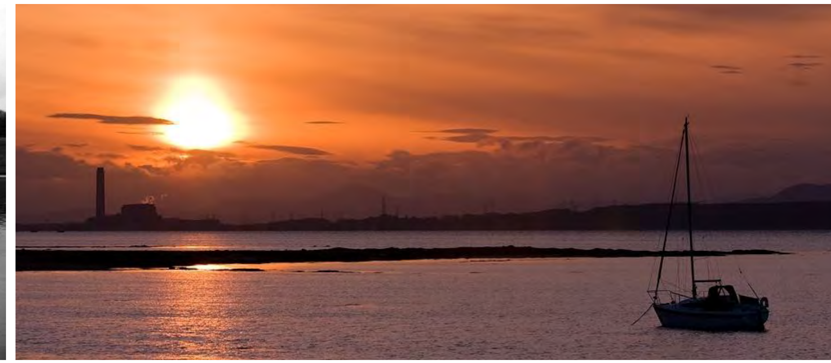
fig. 2 Platoon Kunsthalle, Seoul, South Korea
Architect Platoon + Graft Architects, 2009

fig. 3 PUMA City, various locations
Architect LOT-EK, 2008
Image courtesy of Wikimedia Commons





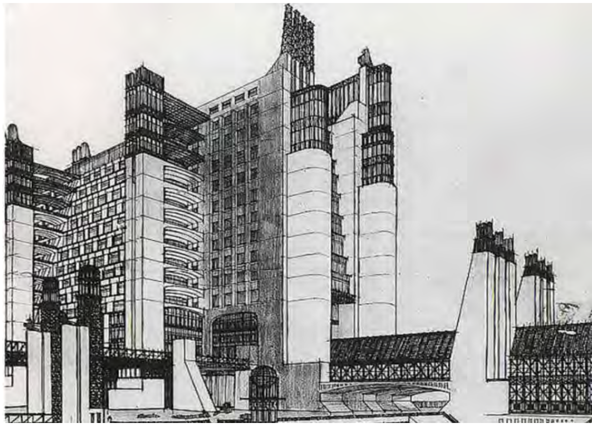


ASPIRATION

The design of the Grangemouth Renewable Energy Plant can lay the building blocks for an idea which will transform the industrial remnants of the site by utilizing the modular nature of the cargo container to create an architectural solution appropriate for Scotland's biggest container terminal. Recognising the opportunities afforded by the wide vistas of the Forth estuary, the scheme can also attempt to create a high level landmark on the skyline which can present a strong visual image of the potential of renewable energy. Along with the Falkirk Wheel and the Kelpies, the Renewable Energy Plant will form part of a series of designed objects linked by the Helix project and Forth and Clyde Canal route.

C O N C E P T   D E S I G N   A I M S :



SYMBOL

Create an identifiable symbol which will contribute positively to the Grangemouth skyline and the wider Firth of Forth, and which represents a celebration of new, environmentally sustainable technology.

MATERIALS, COLOUR, TEXTURE

Make appropriate use of colour, texture and materials to create strong visual connections between the maritime industrial setting and the proposed Renewable Energy Plant. Materials selected should be appropriate for the function of the Renewable Energy Plant and the port setting by being drawn from an industrial palette, but articulated in a manner which recognises the close proximity of sensitive visual receptors.

WATER AND METAPHOR

Understand the unique qualities of the site on the water's edge, by recognizing the visual references and connections provided by Grangemouth's maritime past and present and the industrial setting of the port and the opportunities afforded by the open qualities of the Forth setting when viewed from long range.

CONCEPT DESIGN AIMS:

:

TRANSPARENCY AND LIGHT

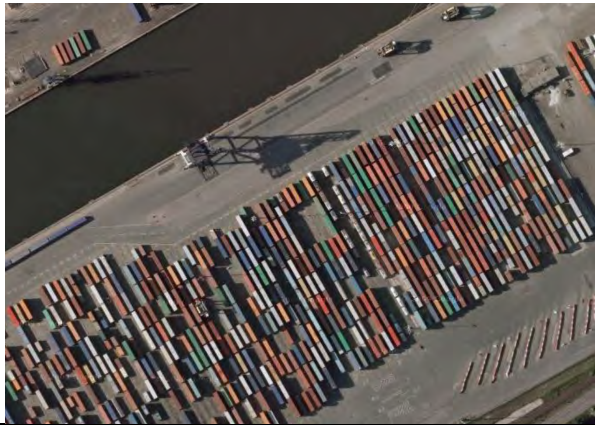
Explore the potential of transparency and light, and the contrast between solid and void to help define how the mass of the Renewable Energy Plant is perceived.

MASSING

Make use of the capability to have clear visual distinction between the lower linear storage structures and the high level boiler equipment and stack in order to reduce the sense of bulk and increase the drama of the architectural beacon which addresses the skyline. Consider the perception of the long, linear mass of storage structures, and how the individual elements which comprise this relate to the scale of the surrounding port and townscape.

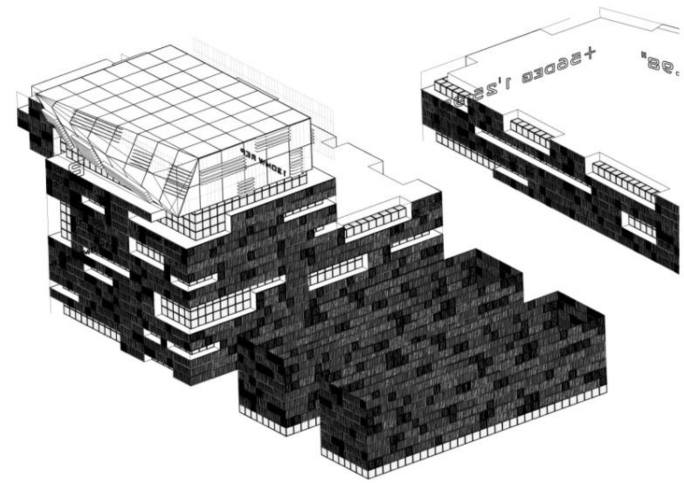
CONNECTION

Consider how the Renewable Energy Plant connects with the quayside by creating a translucent ground level. This would visually reduce the apparent height of the storage areas by increasing the horizontal emphasis, and give the sense the Renewable Energy Plant is hovering above the quayside, about to begin a journey towards a more sustainable future. Allow opportunities for discrete visual connections through the site of the Renewable Energy Plant between the city and the waterfront, to decrease the sense of separation.



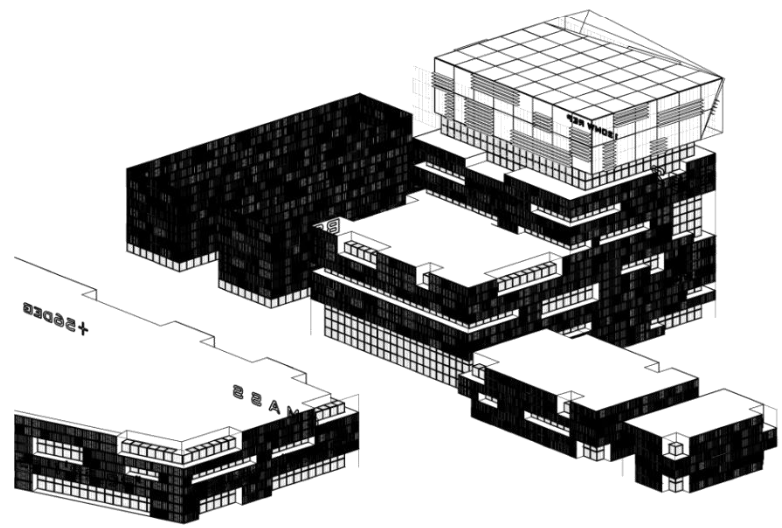
AN INDICATIVE APPROACH

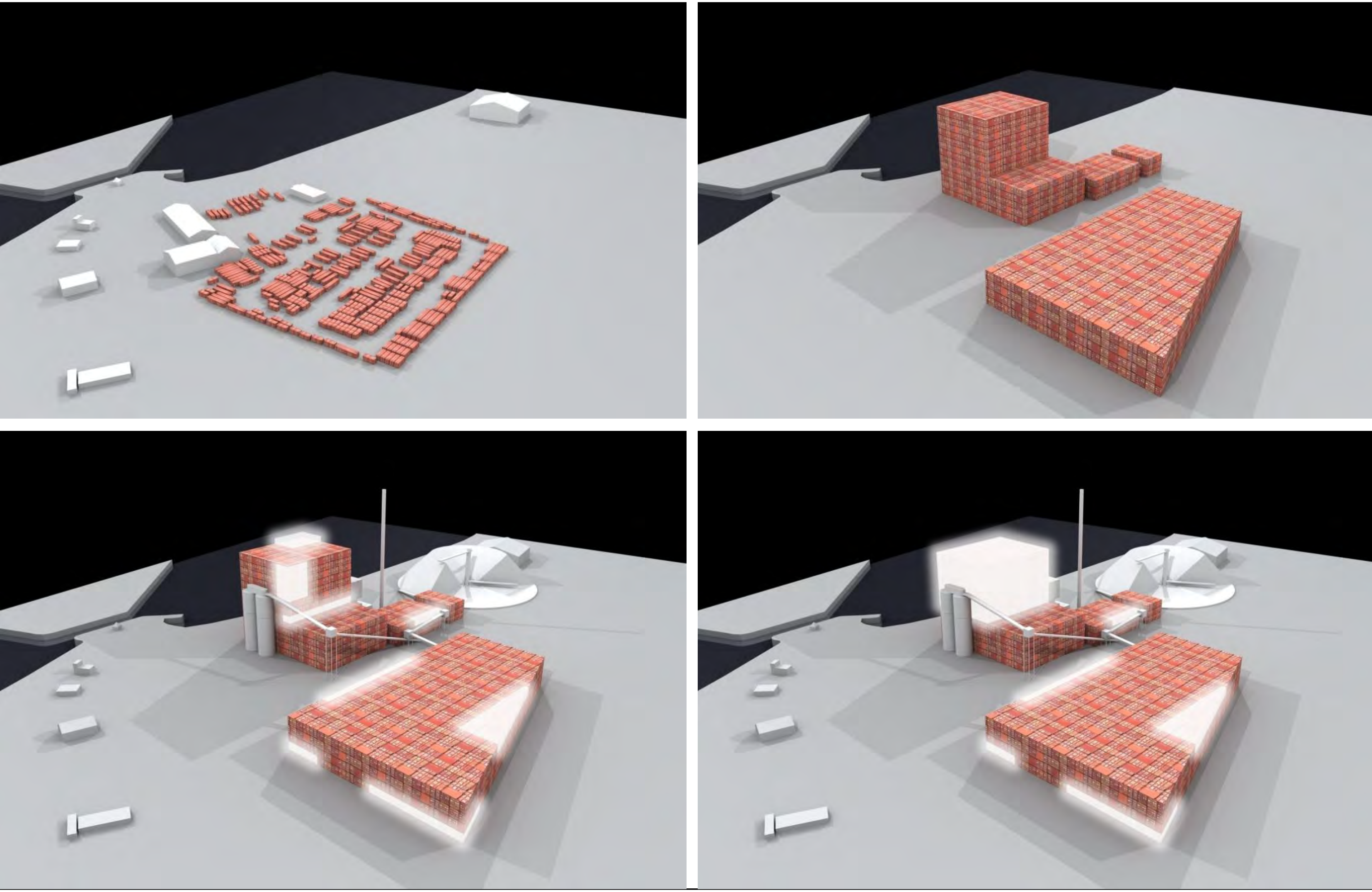
The principles above set out a conceptual design framework for developing an architectural treatment for the proposed Renewable Energy Plant. To prove the validity of these points, an indicative design solution has been developed using them as a guide, and to provide an illustration of a potential approach.



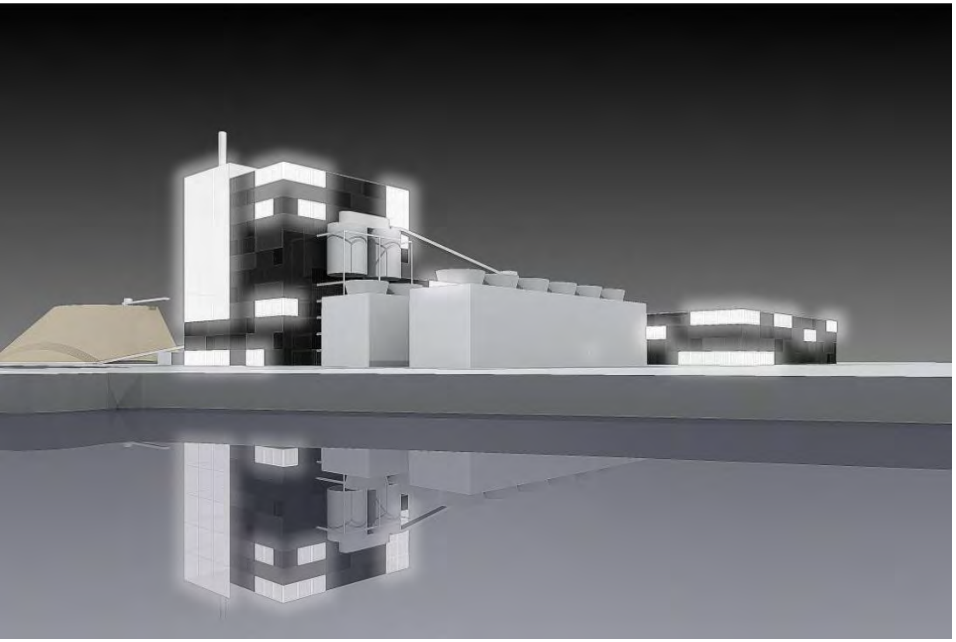
CONCEPT

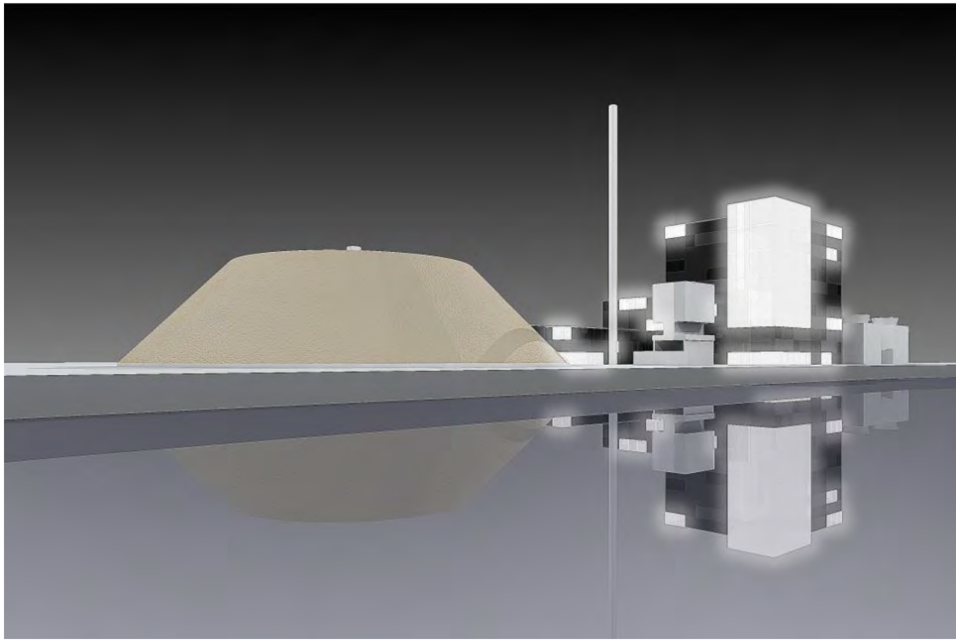
The indicative design could draw inspiration from the existing uses on the proposed site, a container storage yard, in order to reflect the industrial character of the surrounding area and create a clear visual connection with what is Scotland's largest container terminal. The indicative design could function at long range as a distinct element within the setting of the Firth of Forth and within the context of the Helix park project. At the medium range, careful manipulation of the contrast between solid, void and transparency can help define the massing of the Renewable Energy Plant in an appropriate manner, while at close range, the design of the surface texture should be considered carefully to create an architectural response which is robust and appropriate for the setting.





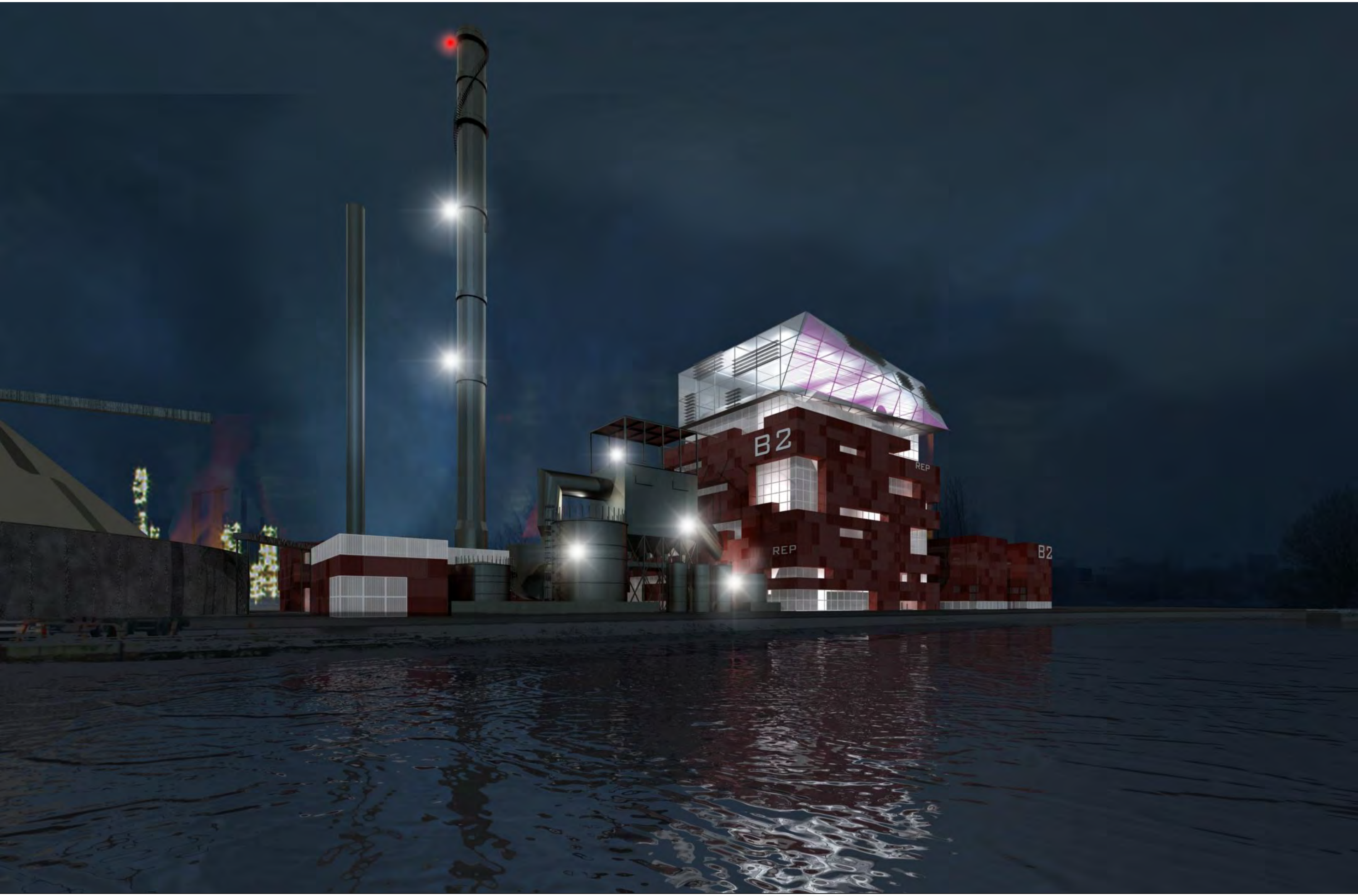
gordon murray architects





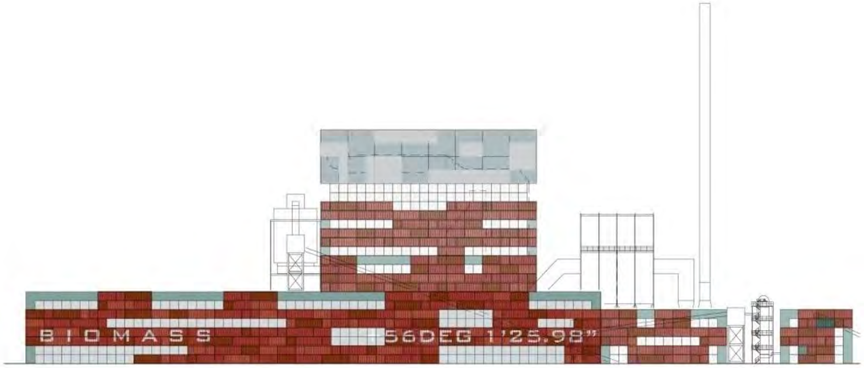
FORM

The initial move of the indicative design approach is to visualize the various elements which make up the Renewable Energy Plant as piles of building blocks, using the standard cargo container dimension as a module, reflecting the precisely arranged stacks of containers found in the cargo terminal to the east. The height of these stacks containing the storage and screening areas would generally relate to the scale of the surrounding port buildings, but increase in height towards the north where the turbine hall and boiler house are located. In order to create an identifiable element on the skyline, and also to reduce the apparent bulk of the Renewable Energy Plant, the upper levels of the boiler house could be realised as a translucent, sculptural object, in contrast to the more solid elements below. The storage structures might be separated from the ground by the creation of a translucent ground level, which would visually reduce the apparent height of them by increasing the horizontal emphasis.


B2
REP
REP
B2

MATERIALS

The skin of the indicative design for the Renewable Energy Plant could be conceived as a series of profiled metal sheet panels, giving the impression of a series of stacked containers. These stacks could then be pulled, pushed and blocks removed, with the spaces in between being filled with polycarbonate panels. This would allow light into the Renewable Energy Plant, and also help to break down the mass of the large scale elements. The colour of the profiled metal panels could be drawn from the range of colours found in the adjacent container yard, with large scale industrial graphics and text potentially being used to convey information about the Renewable Energy Plant.
The high level skyline element could be designed with a translucent skin, clearly separated from the metal paneling below. This could then read as a distinct object, but clearly part of the overall industrial landscape.




REP


B2


SHOP

CONCLUSIONS AND NEXT STEPS

This document presents a design interpretation of the development of the proposals for a Renewable Energy Plant in the Port of Grangemouth. The development of the design approach requires reflection on the process within which consent is being sought, and associated with this, the level of design detail available at this stage.

This Design Statement is submitted in support of the application under Section 36 of the Electricity Act (1989) and the accompanying Environmental Statement. The approach should be considered in the context of the assessment of Landscape and Visual effects as documented in the Environmental Statement. The Design Statement presents a series of suggested *Design Principles* and an interpretation as to how these could be translated into a design concept for the development in the future.

The applicant is committed to developing an appropriate design solution relative to the site location and deliverability of the development. It is envisaged that Falkirk Council, as a Statutory Consultee in the Section 36 Consenting process, would have an opportunity to review the potential approach, and consider this in the framing of suitable conditions to be applied to the decision, should Scottish Ministers be minded to grant consent.

7.0 CONCLUSIONS AND NEXT STEPS

P10

Grangemouth Refinery. Photograph courtesy of Brett Dunsmore

p12

Fig1: Kelpies, Falkirk. Designer: Andy Scott. Image courtesy of The Helix Project
Fig2: The Falkirk Wheel, Falkirk. Architect: RMJM. Photograph courtesy of RMJM

p15

Fig1: Corten screening. Photograph courtesy of Wikimedia Commons
Fig2: Container Port. Photograph courtesy of Wikimedia Commons
Fig3: Zorbau, Germany. Photograph courtesy of SITA Deuschtland 2005
Fig4:

p16

Fig1: Corten screening. Photograph courtesy of Wikimedia Commons
Fig2: Rusting ships. Photograph courtesy of Wikimedia Commons
Fig3: Derelict factory, New York. Photograph courtesy of Wikimedia Commons
Fig4: Skive CHP station. Architect: CF Moller, 2006. Photograph courtesy of Ole Hein Petersen

p17

Fig1: Reflected terrace
Fig2: Csepel 2, Budapest. Photograph courtesy of Alpiq, 2009
Fig3: Bangladesh Govt Centre. Architect: Louis Kahn, 1982
Fig4: Garstad Plant. Architect: CF Moller, 2004. Photograph courtesy of Ake Eson Lindman

p18

Fig1: Madevj, Denmark. Photograph courtesy of Friis and Moltke A/S, 2004
Fig2: Avedore 3, Denmakr, Photograph courtesy of Energi E2, 2002
Fig3: Museum of Graffitti, France. Architect: Massimiliano Fuksas, 1993
Fig4: Guggenheim, Bilbao. Architect: Gehry Associates,1997

p19

Fig1: Daka Biodiesel. Architect: CF Moller,2007. Photograph courtesy of Julian Weyer
Fig2: Kranspoor, Amsterdam. Architect: OTH,2007. Photograph courtesy of Christian de Bruijne
Fig3: Supertanker. Photograph courtesy of Wikimedia Commons

p20

Fig1: Aalborg sludge drying plant. Arhcitect: CF Moller,2000. Photograph courtesy of Ole Hein Pederson
Fig2: Garstad Plant. Architect: CF Moller, 2004. Photograph courtesy of Ake Eson Lindman
Fig3: Nelson Atkins Museum of Art, Kansas. Architect: Steven Holl, 2007
Fig4: Maison De Verre, Paris. Architect: Pierre Chareau, 1932

p21:

Fig1: Institute of Contemporary Arts, Boston. Architect: Diller, Scofidio and Renfro, 2006
Fig2: The New City. Architect: Antonio Sant'Elia, 1914
Fig3: Tate Modern, London. Architect: Herzog and De Meuron,2000

p22:

Fig1: Construction of Architectural and Machine Forms 1925-31. Architect: Iakov Chernikhov Image courtesy of Iakov Chernikhov International Foundation
Fig2: Smolensk, Russia. Photograph courtesy of Rosenergoatom, 2001
Fig3: Institute of Contemporary Arts, Boston. Architect: Diller, Scofidio and Renfro, 2006

p23

Fig1: Habitat67, Montreal. Architect: Moshe Safdie,1967
Fig2: KubiK, Barcelona. Architect: Kubik, 2007
Fig3: Nomadic Museum, various locations. Architect: Shigeru Ban, 2002
Fig 4: Nakagin Capsule Tower, Tokyo. Architect: Kisho Kurokawa, 1972

p24

Fig1:Dalmine. Photograph courtesy of Neutrec, 2009
Fig2: Uppsala Block 5, Sweden. Photograph courtesy of Vattenfall, 2006
Fig3: Nikola Tesla B, Serbia. Photograph courtesy of EPS, 2001

p25

Fig1 and Fig4: Construction of Architectural and Machine Forms 1925-31. Architect: Iakov Chernikhov Image courtesy of Iakov Chernikhov International Foundation
Fig2: Luma Lamp Factory, Glasgow. Architect: Cornelius Armour, 1938
Fig4: Leicester University Engineering Faculty. Architect: James Stirling, 1959. Photograph courtesy of Wikimedia Commons
Fig5: Jawa Sandcrawler, Tatooine. Designer: Ralph McQuarrie, 1975

p26

Fig1: Freitag lab.ag, Zurich. Image courtesy of Wikimedia Commons
Fig2: Platoon Kunsthalle, Seoul, South Korea. Architect: Platoon + Graft Achitects, 2009
Fig3: PUMA city, various locations. Architect LOT-EK 2008

p27

North Carr Lightship, image courtesy of Northern Lighthouse Board
Platoon Kunsthalle, Seoul, South Korea. Architect: Platoon + Graft Achitects, 2009
Kelpies, Falkirk. Designer: Andy Scott. Image courtesy of The Helix Project
The Falkirk Wheel, Falkirk. Architect: RMJM. Photograph courtesy of RMJM

p28

Fig1: The New City. Architect: Antonio Sant'Elia, 1914
Fig2: PUMA city, various locations. Architect LOT-EK 2008
Fig3: Carboniferous. Photograph courtesy of Scott Masterton

p29

Fig1: Aalborg sludge drying plant. Arhcitect: CF Moller,2000. Photograph courtesy of Ole Hein Pederson
Fig2: Tate Modern, London. Architect: Herzog and De Meuron,2000
Fig3: Grangemouth Container Port. Photograph courtesy of Google, 2009

p35:

Fig1: Freitag lab.ag, Zurich. Image courtesy of Wikimedia Commons
Fig2: Rusting ships. Photograph courtesy of Wikimedia Commons
Fig3: Skid Deck, Port Of Dundee. Photograph courtesy of Forth Ports PLC, 2010
Fig4: Garstad Plant. Architect: CF Moller, 2004. Photograph courtesy of Ake Eson Lindman
Fig5: Container Port. Image courtesy of Wikimedia Commons
Fig6: Nelson Atkins Museum of Art, Kansas. Architect: Steven Holl, 2007

IMAGE CREDITS