01

[EN]POWERING THE POLYKATOIKIA

80%

Percentage of Greek waste sent to landfill, far above the EU restriction on waste management.

"Pollution is nothing but the resources we are not harvesting. We allow them to disperse because we've been ignorant of their value."

~ R. Buckminster Fuller

14%

The percentage of Greek waste that is recycled.

6%

The percentage of biomass that is utilised for compost in Greece.

Climate zones according to the
existing thermal insulation regulations of 1979

Zone 1 //: Thessaloniki
Zone 2 //: Athens
Zone 3 //: Heraklion

Athens Heating Degree Days

1100

Cooling Degree Days

550

Dry Bulb Point (˚C)

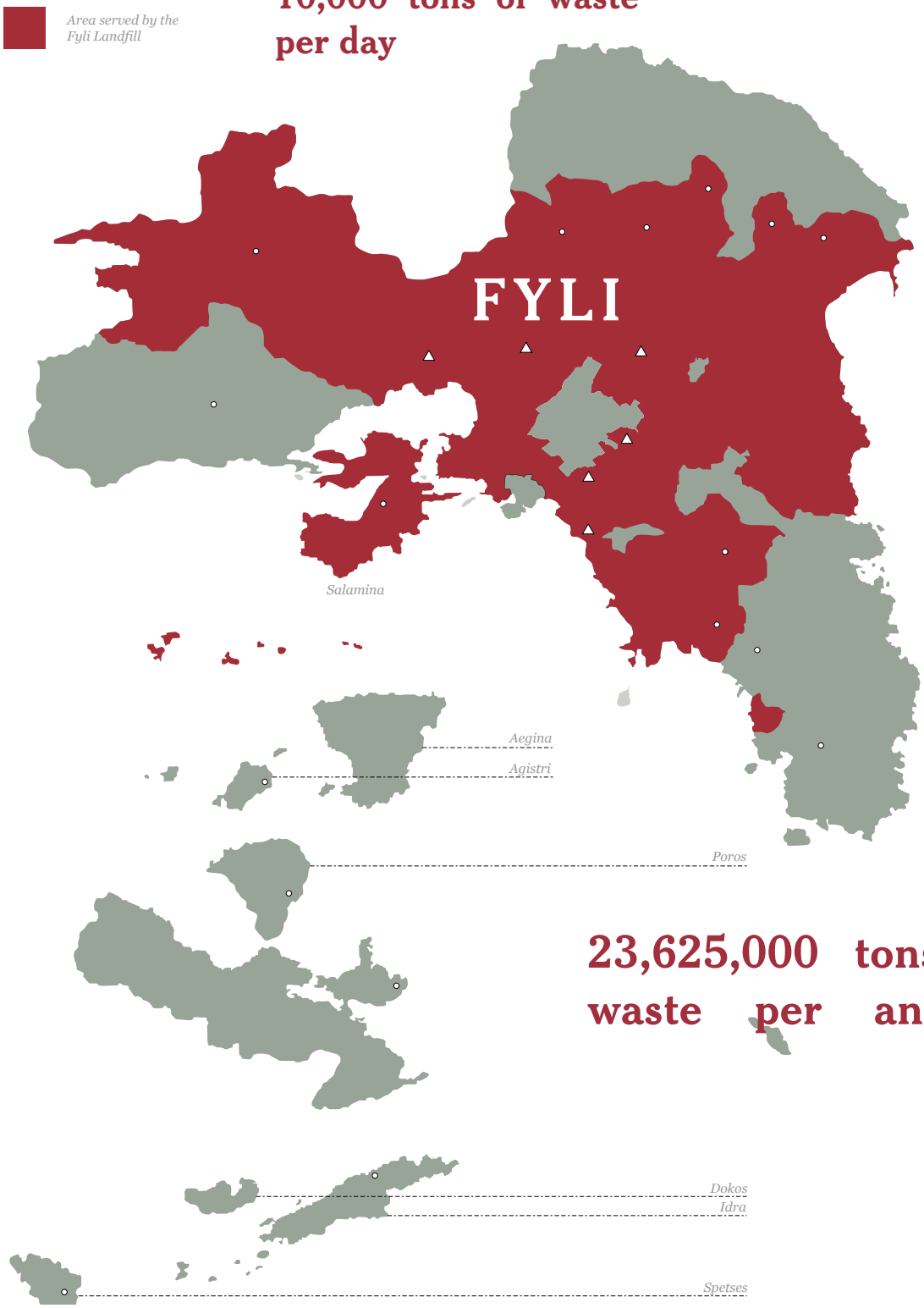
34.5

Wet Bulb Point (˚C)

25

Overfilling the Landfill

A huge service area for one landfill



Operational 10 hr/d, 6 days a week

A datascape documenting the volumes of waste collection within Attica. With the highest peaks correlating to the greatest volumes of collection.

Population: **667,000** – this doubles in the summer from tourism

Waste management system: provided **365** days a year

Waste produced: **311,000** tonnes a year

Fleet: **45** waste collection vehicles driven by **245** drivers

Operation: vehicles and staff are based at a central depot and offices, near all the central road networks, aiding efficiency.

Collection rounds: two for non-recyclable waste and two for recyclables.

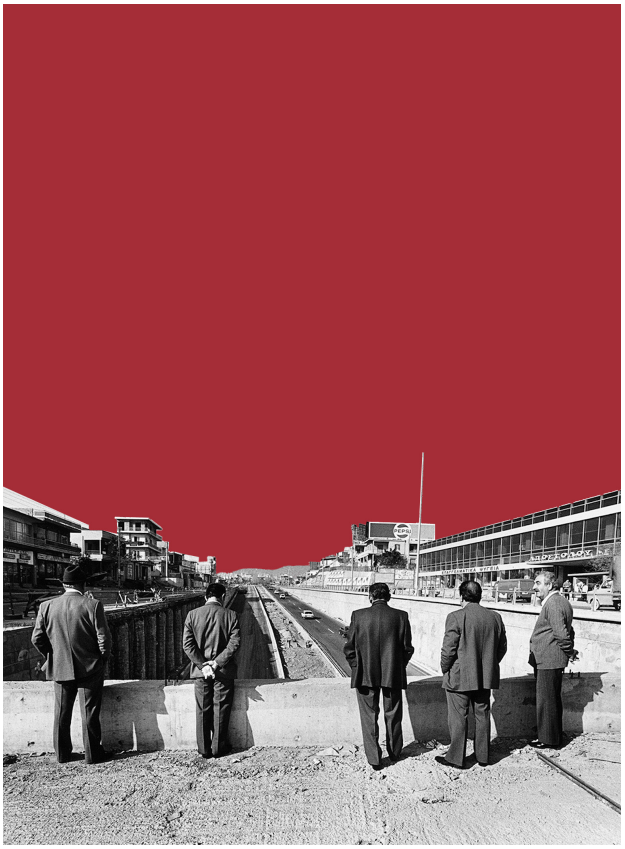
Waste collection program: 167, so that waste may be collected in certain districts in the night, the early morning or mid-morning; in some city centre areas waste is collected three times a day.

Containers: green 1,100-litre containers for non-recyclable waste, sited at communal collection points along the street; blue 1,100-litre containers for commingled dry mixed recyclables.

(N)IMBY

(NOT) IN MY BACK YARD

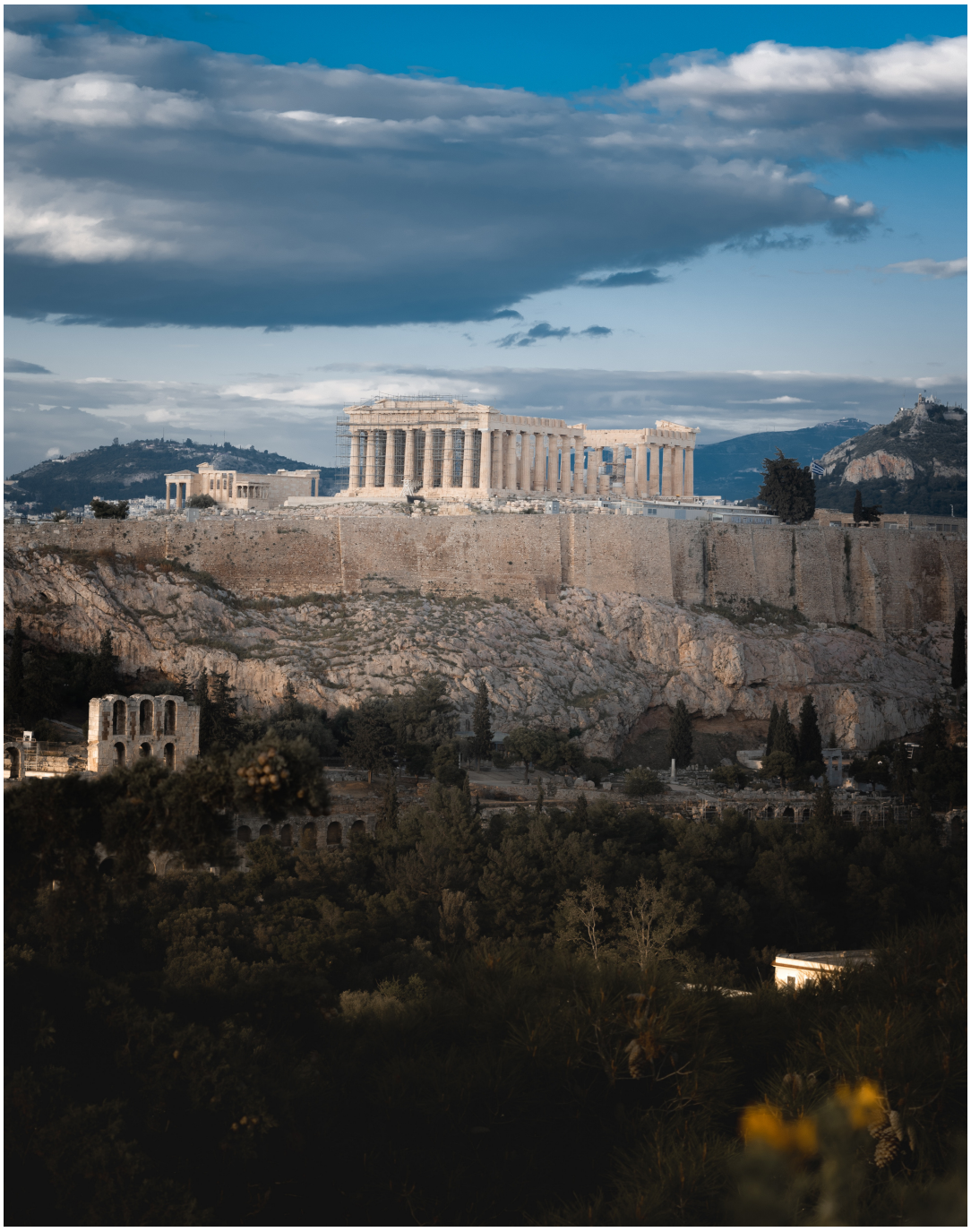
The have been considerable protests to the formation of a new landfill to replace Fyli, with no community willing to see the government impose waste management ineffectively in their area. This has resulted in violence and occupation of proposed sites as there is little trust in the abilities of the Attican government to provide adequate resources to deal with an ever growing issue.



At the same time that protests have arisen against the creation of a new landfill, similar protest have taken place against the perceived lack of investment in the civic space. Athens has often experienced decisions directed from the top down. The formulation of the major ring-road was contrived from a stance that did not fully comprehend the nuances of urban conditions and the distinct personalities of areas.

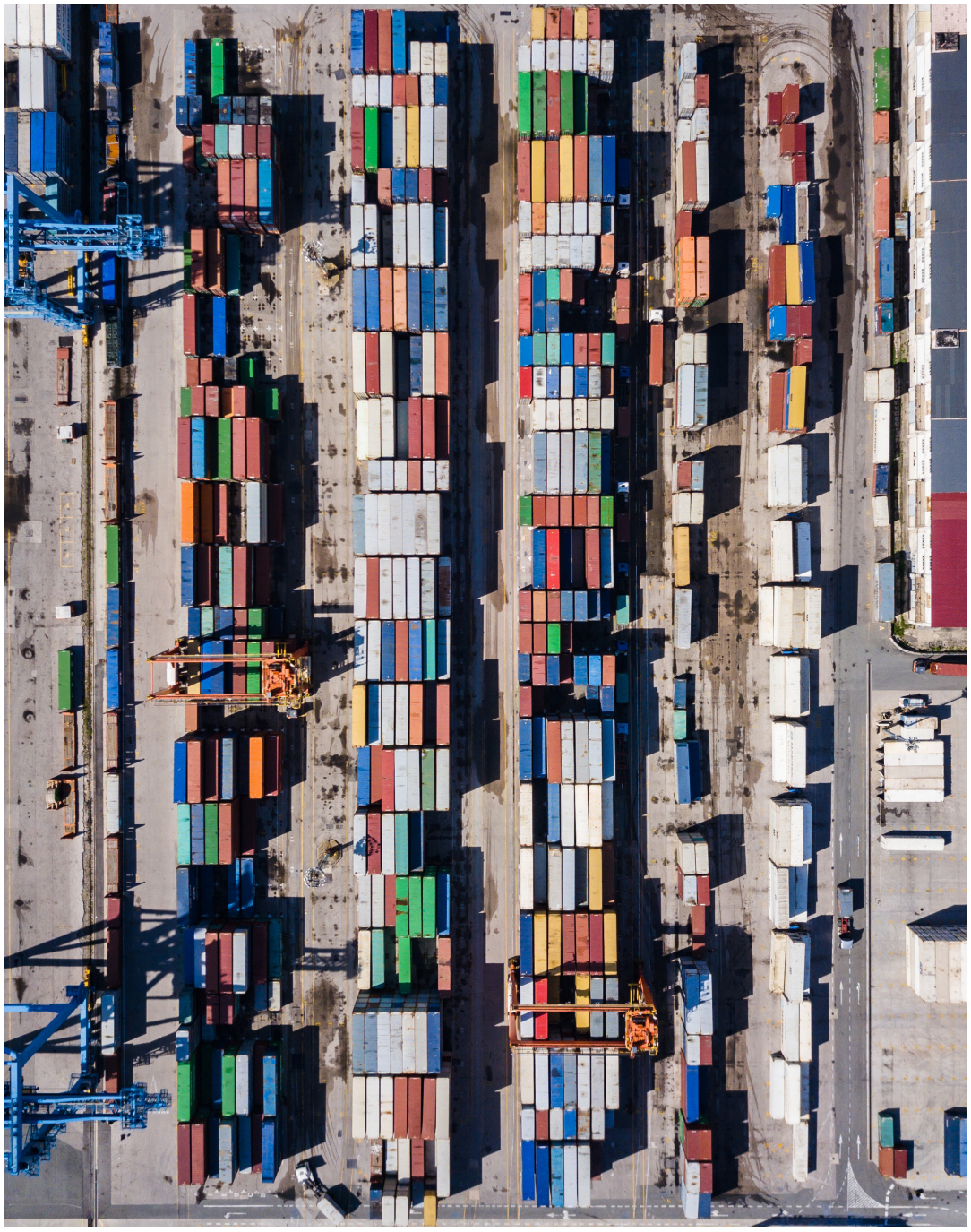
In Athens, the garbage of Mykonos is being transported, as inspectors have found. In particular, on 12 June, the auditors of the Attica Region travelled after a complaint in the place of Kalymbaki, which is the area of the Elefsina Port Authority. It was found that there were 16 containers of municipal waste from Mykonos that would be temporarily parked in the port of Elefsina and then led to a recycling company. According to the Region, there is a procedure for the transfer of waste to a plant in Aspropyrgos in order to separate the recyclable materials. However, after this process the remaining waste does not return to the landfill site of Mykonos but is taken to the Race.

“I will not talk about the justification of our choices in waste management. They confirm the facts. Others carry garbage with containers in secret and we in Attica are promoting integrated waste management systems. I want to emphasize the lack of education and solidarity in this crucial area. It does not manage an area or a carrier to manage its garbage and the solution is immediately to get rid of them in any direction. We, either EDSNA or the Region, can not be warned and spied not to get rid of its garbage in Attica. This is not our job. Our job is to steadily manage the waste of our region, to respond to our daily routine, but also to have a vision for the future. Let the others in the country learn their job, take their responsibilities and get the education and culture they need to manage such serious problems as waste management.”



€70,000,000

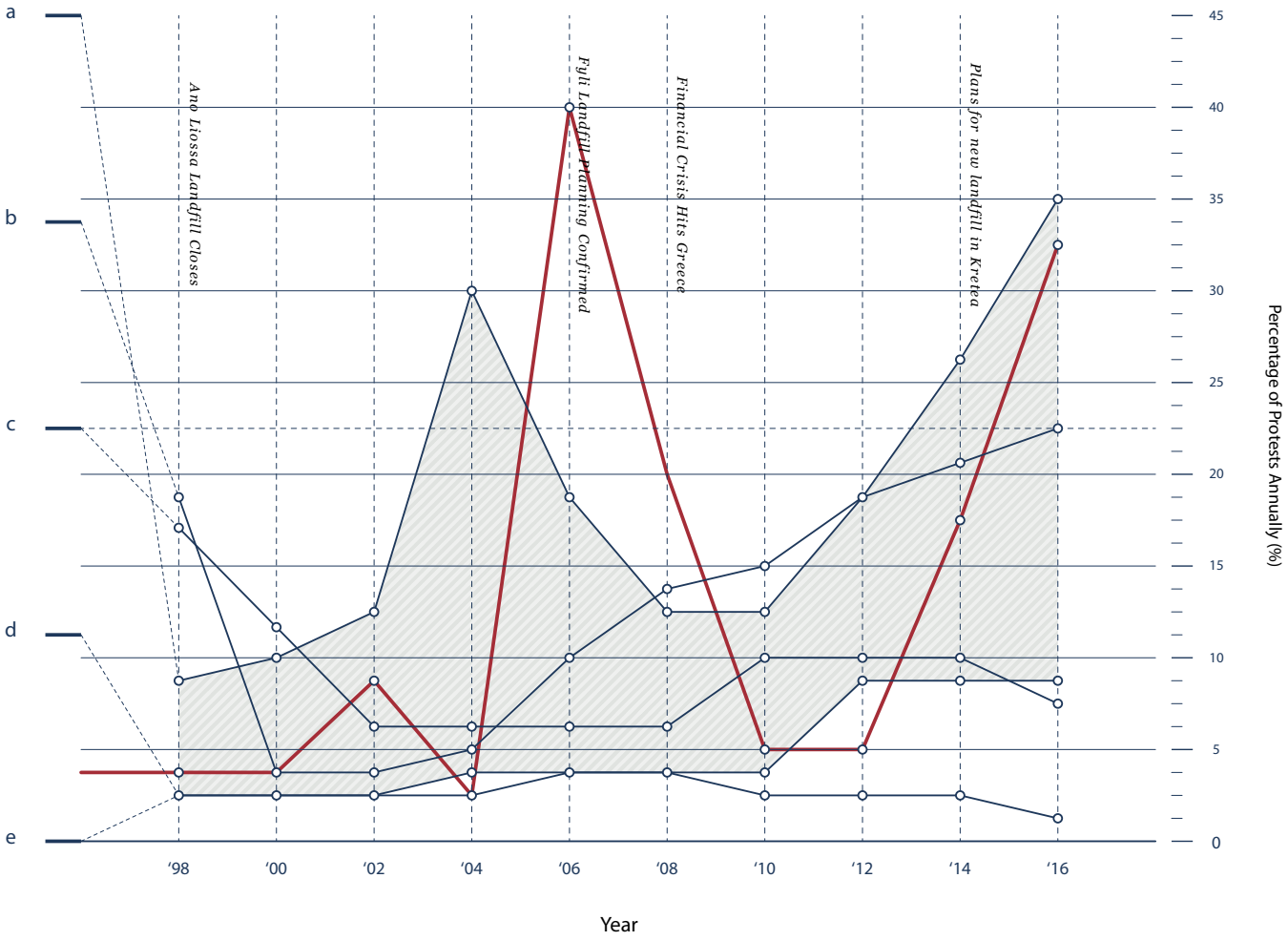
The amount spent on the refurbishment of the Parthenon between 2005 and 2019, a sum that is expected to continue to rise.



€400,000,000

The amount being invested by Costco in the purchase and subsequent redevelopment of the Piraeus Port.

Greek Uproar



Key

a //: Against a proposed landfill

b //: Delays in Planning / Action

c //: Political Corruption

d //: Existing landfill to close

e //: Existing illegal landfill to close

There is a strong correlation between the impacts of waste management and the number of protests that occur in response. As Greece emerges from the environmental crisis, the issues that were masked by it are coming to a head, as rubbish piles up on the streets, the people are taking to the streets to voice their concern and anger.

Greek Pride

The Greek people have a great deal of pride in being Greek, A survey by EY has shown that up to 89% of Greeks believe their culture and heritage is superior to fellow EU states. This sense of cultural identity and pride suggests that the solutions for Athens and the waste problem has to be realised from within, without the turmoil and conflict that arose with sanctions and dictation from fellow European countries during the economic crisis.

The wheels of society continue to be lubricated by mesa (connections) and rouspheti (the reciprocal dispensation of favours).

From my visit to Athens I experienced the ad-hoc approach to how people create solutions to problems that regulations may prohibit, the city is full of industrious ways to subvert the rules and to deal with the sometimes chaotic and fiery nature of the populace. This is something that I do not see as a negative, but more an excellent quality needed to provide dramatic solutions.

The departing Athenian mayor requires solutions to deal with a populace that see little difference being provided on an administrative level as to how the daily issues that Athenians face will be resolved.

1:5 earn less than €500 per month.
According to the survey, the average monthly net earnings is 806 euros, while women and young workers earn less.

The area of Psychiko is an affluent area to the North East of Central Athens. The area has been surveyed aerially to see the undeclared pools that are avoiding tax payments.

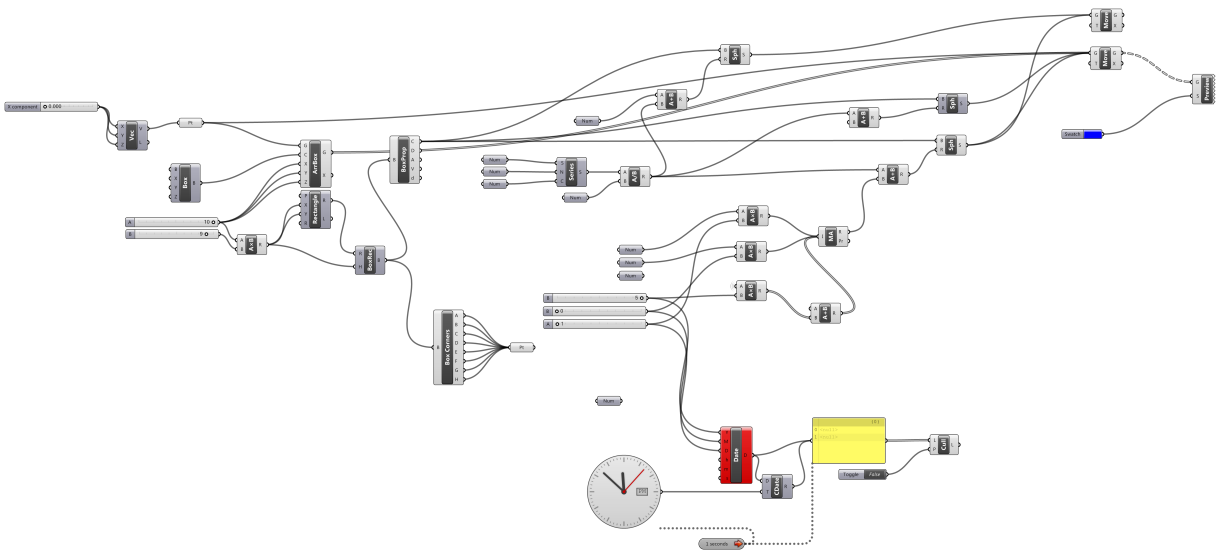
Issues of waste and a biodigested future

01.1

An example of a large scale bio-digestive bladder from the UK that converts food-waste and manure into useful and usage fuel.

To commence, I decided to look at the volumes of waste being produced and determine when the Fyli landfill would reach capacity and therefore look to determine how much potential energy was being lost through not biodigesting a portion of this waste locally.

Total Waste in Landfill	*Total Capacity*	*Amount of Capacity Remaining*	*Total Capcity / Amount of Waste p/W*	*Amount of Waste to Landfill*	*Amount of Waste Added p/a*
13,625,000.00	18,000,000.00	4,375,000.00	4,375,000.00	80%	3,120,000.00
Total Waste added p/D	*Operational Time p/D*	*Amount of Waste added p/W*	/		
10,000.00	6.00	60,000.00	60,000.00		
			Weeks until Capacity	*Years until Capacity*	*Months until Capacity*
			72.9	1.4	16.8
Average Quanity of Waste Per Person	*Average Number of Units per PolyK*	*Average residents per block*	*Average Waste Per Block p/a*	*Average Waste per Day*	
498kg p/a	13.00	39.00	19,422.00	53.2	
Average Amount of Food Waste					
179kg p/a	13.00	39.00	6,981.00	*Water Necessary*	*Total Volume p/m*
Total Food Waste Per Month					
14.9		39.00	581.75	116.35	698.1



72 Weeks

A prescedent for how waste is processed and engaged with in the city can be found in Tokyo, which has plants that deal with localised waste and converts it into creative solutions such as hot-tubs and swimming pools.

THE PINK PONY EXPRESS

Art Project

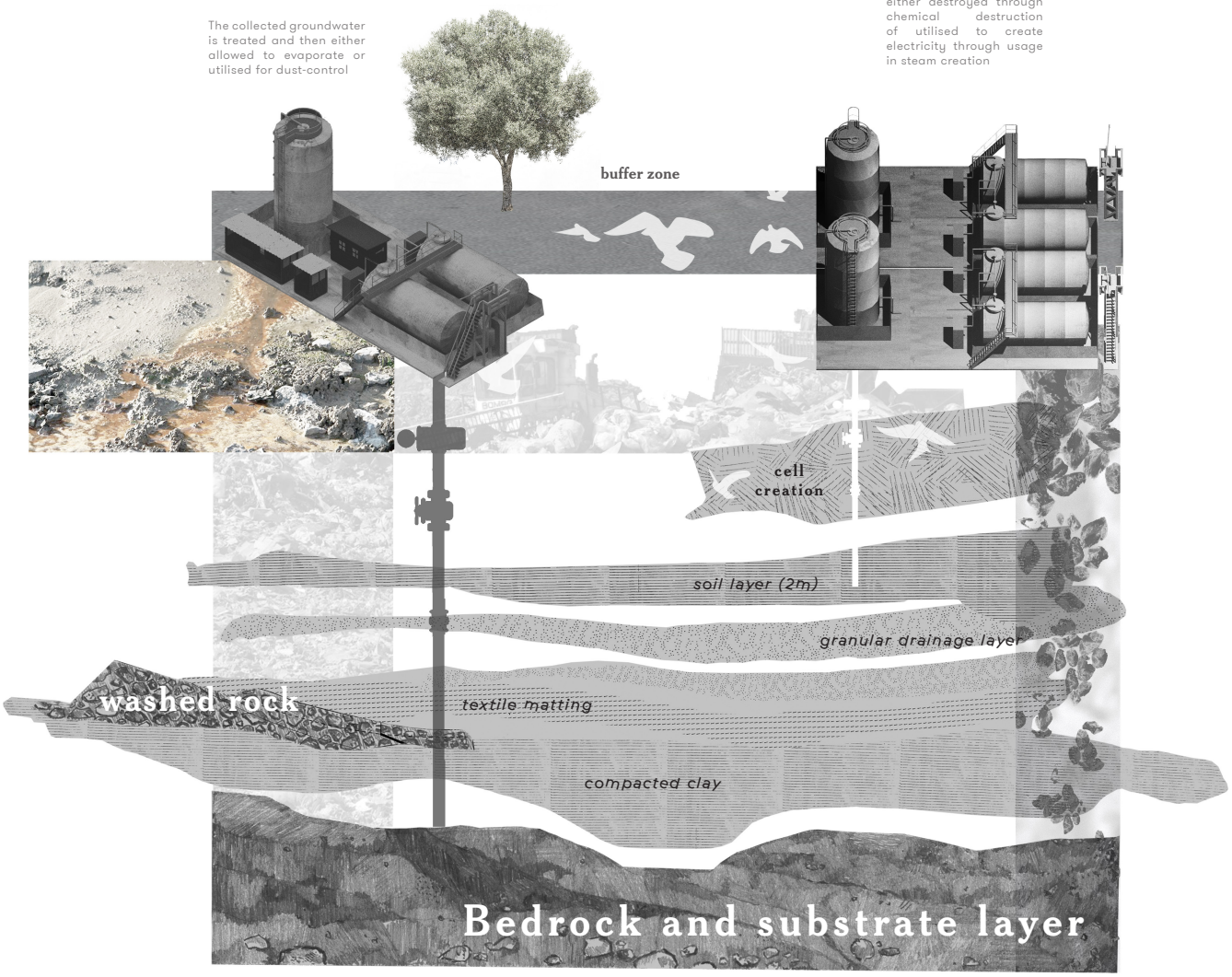
This project in Berlin took bread from local Turkish communities in Berlin and biodigested it into gas that was utilised to cook meals to bring the community together.

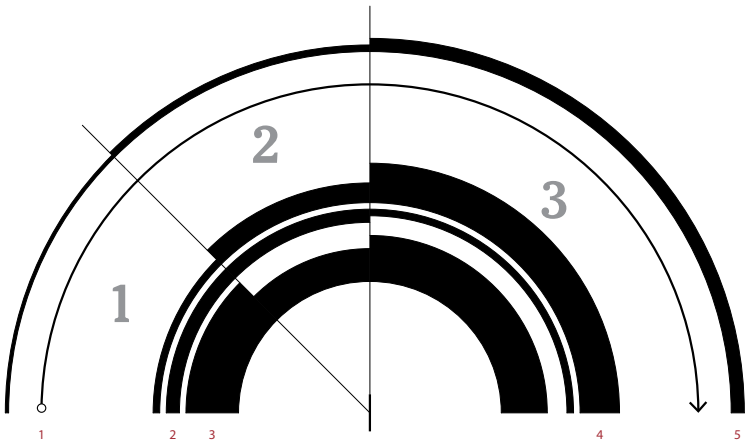
Impacted Groundwater and Leachate Disposal

The collected groundwater is treated and then either allowed to evaporate or utilised for dust-control

Landfill Gas Disposal

The collected methane is either destroyed through chemical destruction of utilised to create electricity through usage in steam creation





1 // : Aerobic Phase (<1 Year)

2 // : Anaerobic Phase (1-5 Years)

3 // : Methane Phase (5-20 Years)

1 // : Levels of Iron in leachate

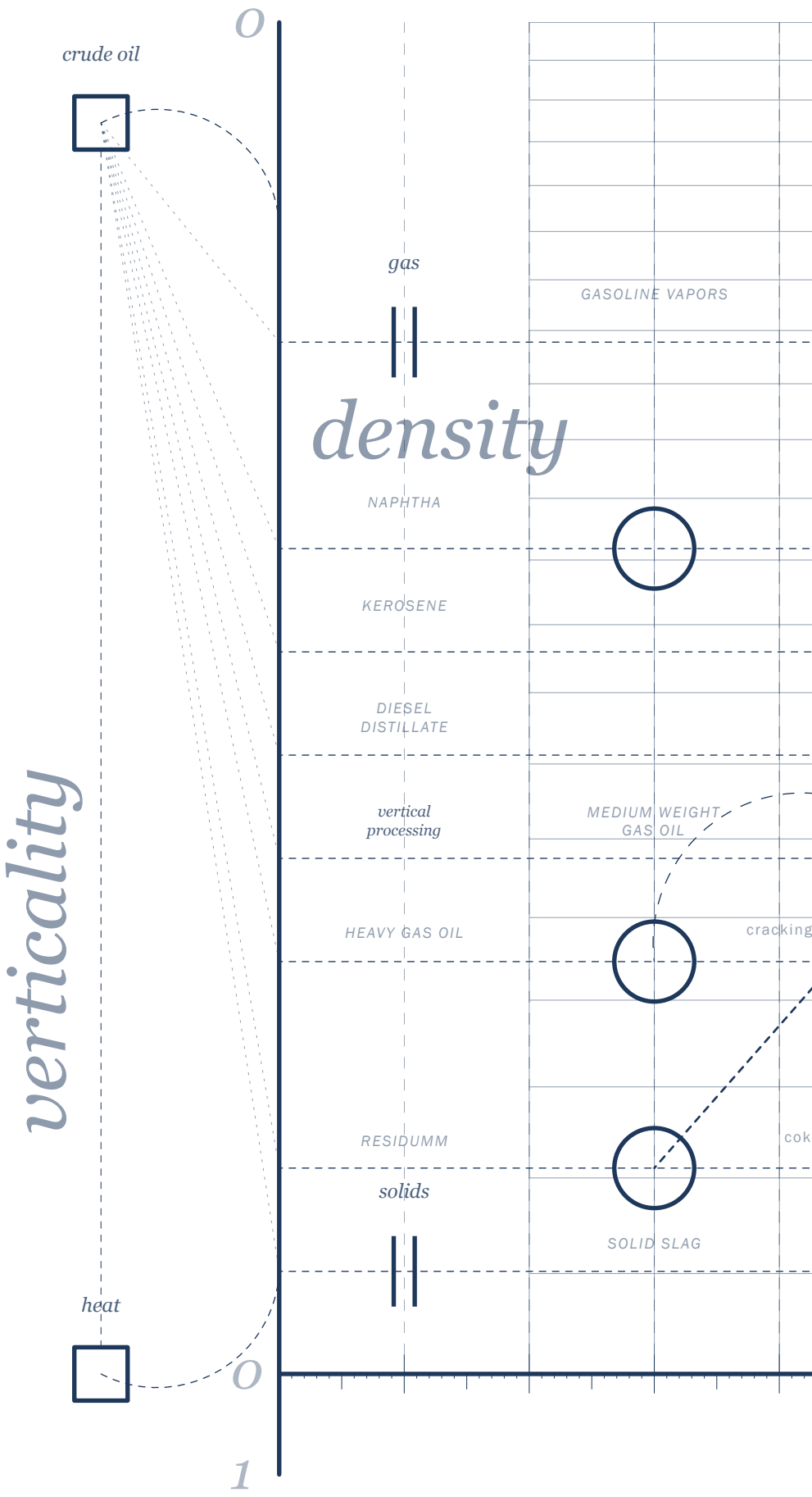
2 // : Levels of Heavy Metals

3 // : pH levels

4 // : Levels of COD (Chemical Oxygen Demand)

5 // : Levels of Methane (NH_4-N)

If a solution was to be found for the waste problems of Athens locally, then it would have to negotiate the existing urban fabric and distance itself from the sprawling practises of landfill. This prompted me to look at the process of oil refinery which utilises verticality and the properties of its input, in this case the evaporation point to extract multiple useful by-products at different time-scale and locations.



quantity
LPG
GASOLINE
JET FUEL
DIESEL FUEL
LPG
GASOLINE
MOTOR GASOLINE
JET FUEL
DIESEL FUEL
FUEL
alkalination
output
INDUSTRIAL FUEL
ASPHALT BASE
time
1

Reuse is the practice of using items multiple times to prevent waste. It is typically done to reduce costs and environmental impact. The following are common types of reuse.

Adaptive Reuse

An urban design term for re-purposing old buildings and infrastructure as opposed to building new ones. For example, a warehouse may be converted to a residential building or a power plant may become an art museum.

Closed Loop Reuse

Closed-loop reuse is a system whereby items are reused by a process in a systematic and repeatable fashion. For example, a supply chain may package things in reusable containers that are returned from point of consumption to point of production.

Collectables

Things that are popular with collectors such as toys. Collectables represent a lively economy of reuse such as e-commerce auction sites.

Deconstruction

Carefully de-constructing buildings as opposed to demolition to reuse materials such as wood, pipes and bricks.

Downcycling

A general term for reuse of an item that results in something of lesser value than the original.

Durability

Durability allows for primary reuse of items. For example, a bicycle build to last five years typically achieves more reuse than a poor quality model that falls apart within weeks.

Recycling

Breaking things down to their basic materials to create completely new items. Tends to be energy intensive and wasteful as compared with reuse. Recycling tends to scale well.

Refilling

Refillable containers such as returnable bottles.

Repair

Repairing items as opposed to throwing them out. Things can be designed to be more easily repaired with features such as standard component parts.

Calculating the solution and scale

The size of the digester, i.e. the digester volume Vd, is determined on the basis of the chosen retention time RT and the daily substrate input quantity Sd.

[m3 = m3/day × number of days]

The retention time, in turn, is determined by the chosen/given digesting temperature. For an unheated biogas plant, the temperature prevailing in the digester can be assumed as 1-2 Kelvin above the soil temperature. Seasonal variation must be given due consideration, however, i.e. the digester must be sized for the least favorable season of the year. For a plant of simple design, the retention time should amount to at least 40 days. Practical experience shows that retention times of 60-80 days, or even 100 days or more, are no rarity when there is a shortage of substrate. On the other hand, extra-long retention times can increase the gas yield by as much as 40%.

The substrate input depends on how much water has to be added to the substrate in order to arrive at a solids content of 4-8%.

Substrate input (Sd) = biomass (B) + water (W) [m3/d]

In most agricultural biogas plants, the mixing ratio for dung (cattle and / or pigs) and water (B:W) amounts to between 1:3 and 2:1.

Calculating the Daily Gas Production G

The amount of biogas generated each day G [m3 gas/d], is calculated on the basis of the specific gas yield Gy of the substrate and the daily substrate input Sd.

The calculation can be based on:

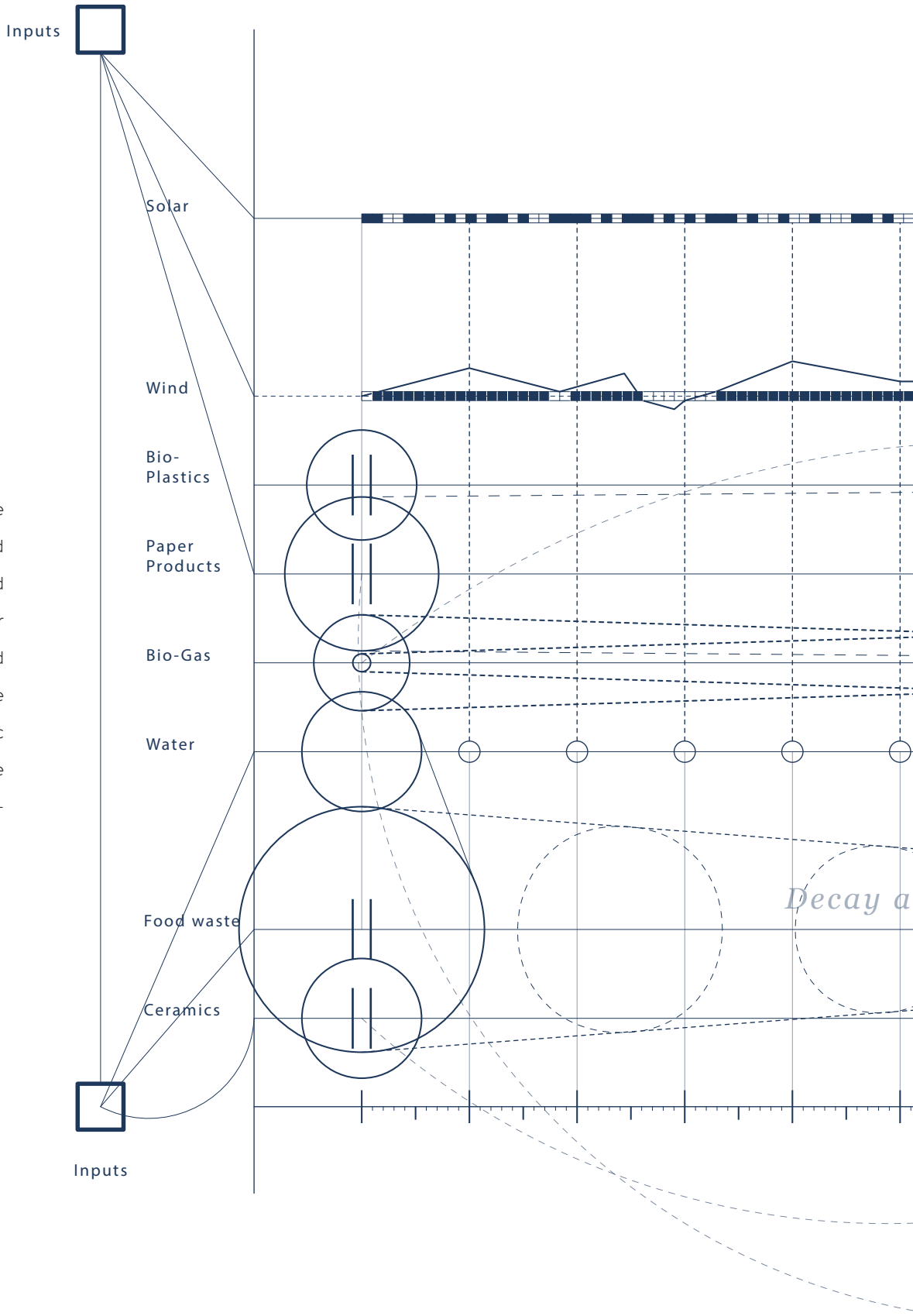
The volatile solids content VS

G = VS × Gy(solids) [m3/d = kg × m3/(d×kg)]

the weight of the moist mass B

G = B × Gy(moist mass) [m3/d = kg × m3/(d×kg)]

Through assessing the criteria of what I would like to achieve, I placed all the inputs and their respective locations and plotted them against time to allow for a holistic view of what I would like to achieve and the time-scales required to do so.



Solar Shading
Smoke
Fuel
Misting and Collection
nd Digestion
Mulch
Aggregate
1 Calender Month

02

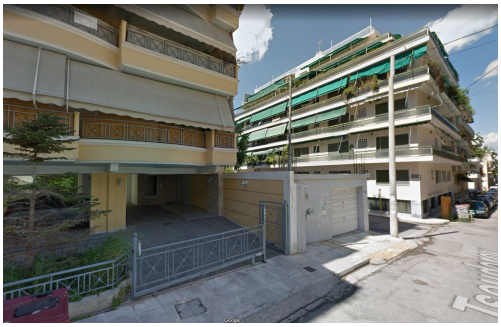
[EN]POWERING THE POLYKATOIKIA

The Polykatoikia

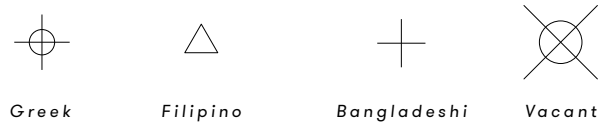
The polykatoikia was originally conceived in the 1930s as a multistorey apartment building for the Athenian bourgeoisie.

The proliferation of this type was supported by the State in the form of a general building regulation and a property law, which directly produced the basic rationale behind the architecture of the polykatoikia . This law allowed landowners to barter tax-free their buildable ground in exchange for built indoor space, effectively deregulating the construction industry. Another goal of the polykatoikia as promoted by the State was to advance (and thus appropriate) local construction knowledge towards a coherent and yet flexible system of building techniques, materials, details and structural schemes. Like in the Dom-ino model this system combined advanced industrial solutions with low-skilled manual labour. Through the apparatus of the polykatoikia , the project of the city was advanced no longer through top-down master planning, but through the production of abstract legislative frameworks, which materialised in the bottom-up practice of self-building.

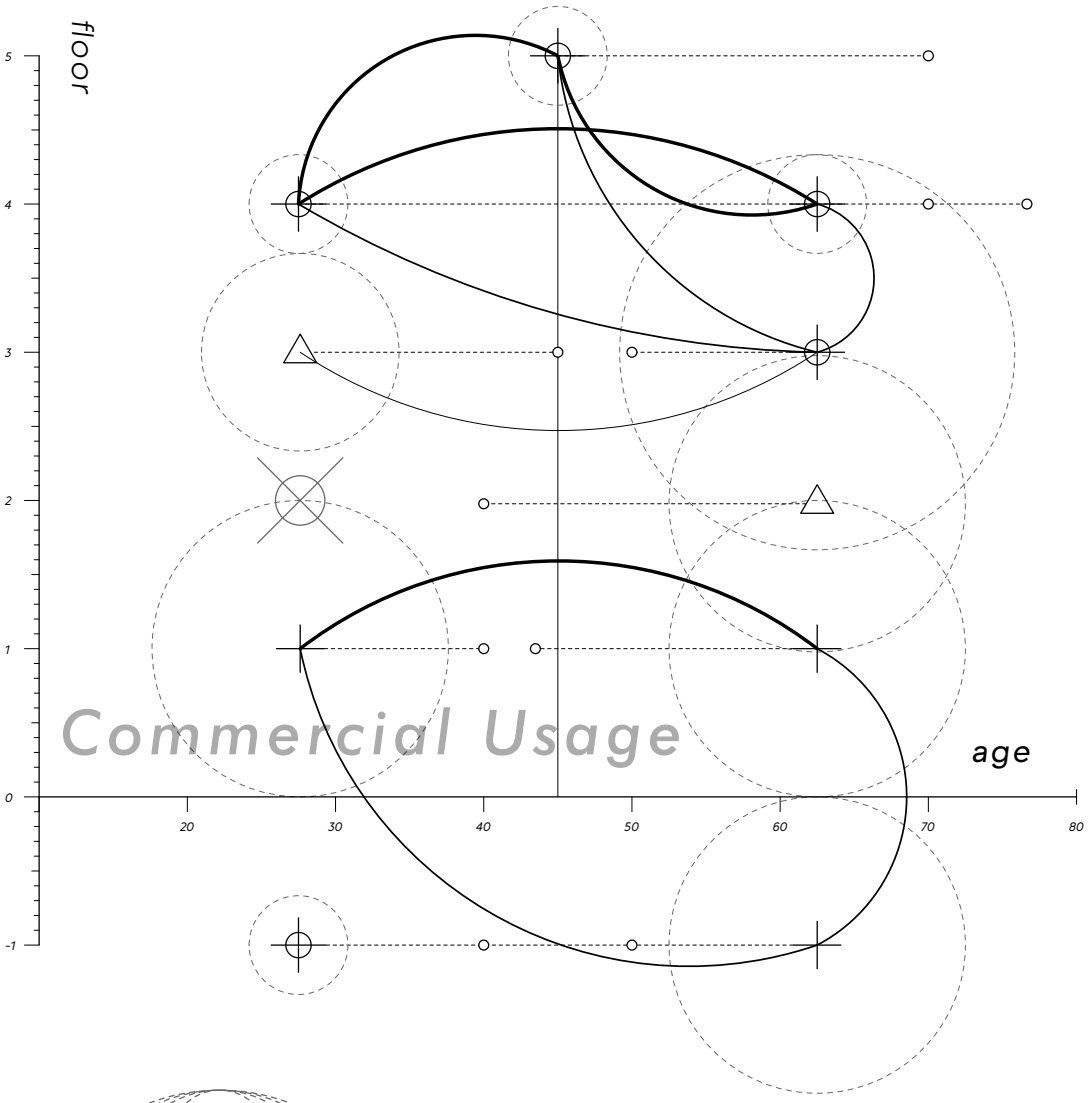
Πολυκατοικία

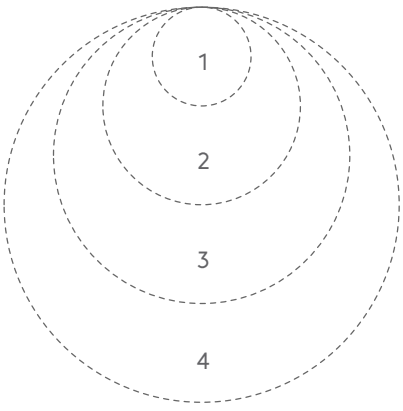


I began wanting to assess the polykatoikia and the demands that it placed upon its residents along with the implications that it has upon the city of Athens. My attention was drawn to the corner plots of the city and the way in which vacant lots and pieces of prominent land could be the site for my projects.



Average Age 2019: 45.2
Average Age 2030: 51.2





Social Dynamics of Polykatoikias

Vertical segregation is a major issue within the polykatoikias of Athens with a large percentage of the upper floor occupied by wealthier older Greeks and the larger immigrant households being located closer to street level. There is little cross-pollenation between residents of different social statuses and this is something that my proposal would ultimately try and challenge.

First Appearance in Athens

1917

Introduction of Horizontal Ownership

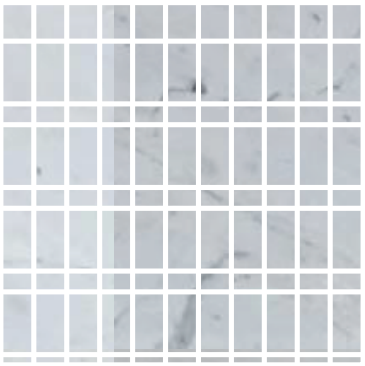
1929

Laws of Antiparochi (Αντιπαροχή)

1959

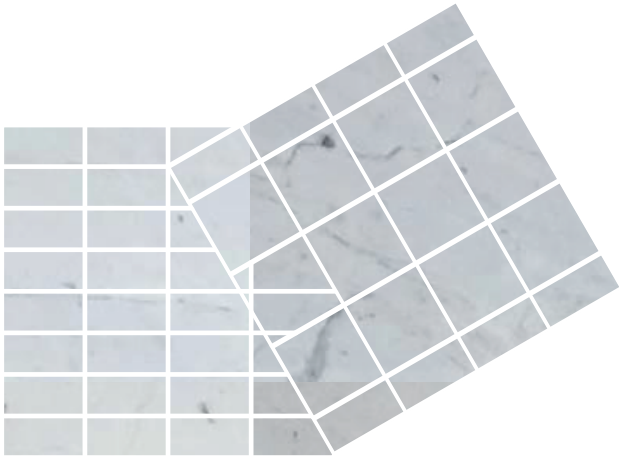
The antiparochi system was constituted with a 1959 law according to which a landowner could turn over the plot to a constructor, usually a small scale construction company, in order to build a multi-storey apartment block receiving in exchange an agreed number of apartments in the finished building.

1930s



The starting blocks of the city with the demands of a new growing populace were the creation of small compact city blocks

1960s



By the 1960s the demands for further housing in addition to the geographic challenges of the terrain, meant the grids began to intersect and fracture

A view over the city from Lebbetus Hill looking North (circa. 2018)

Athens is a curious city in the homogeneity of its built environment.

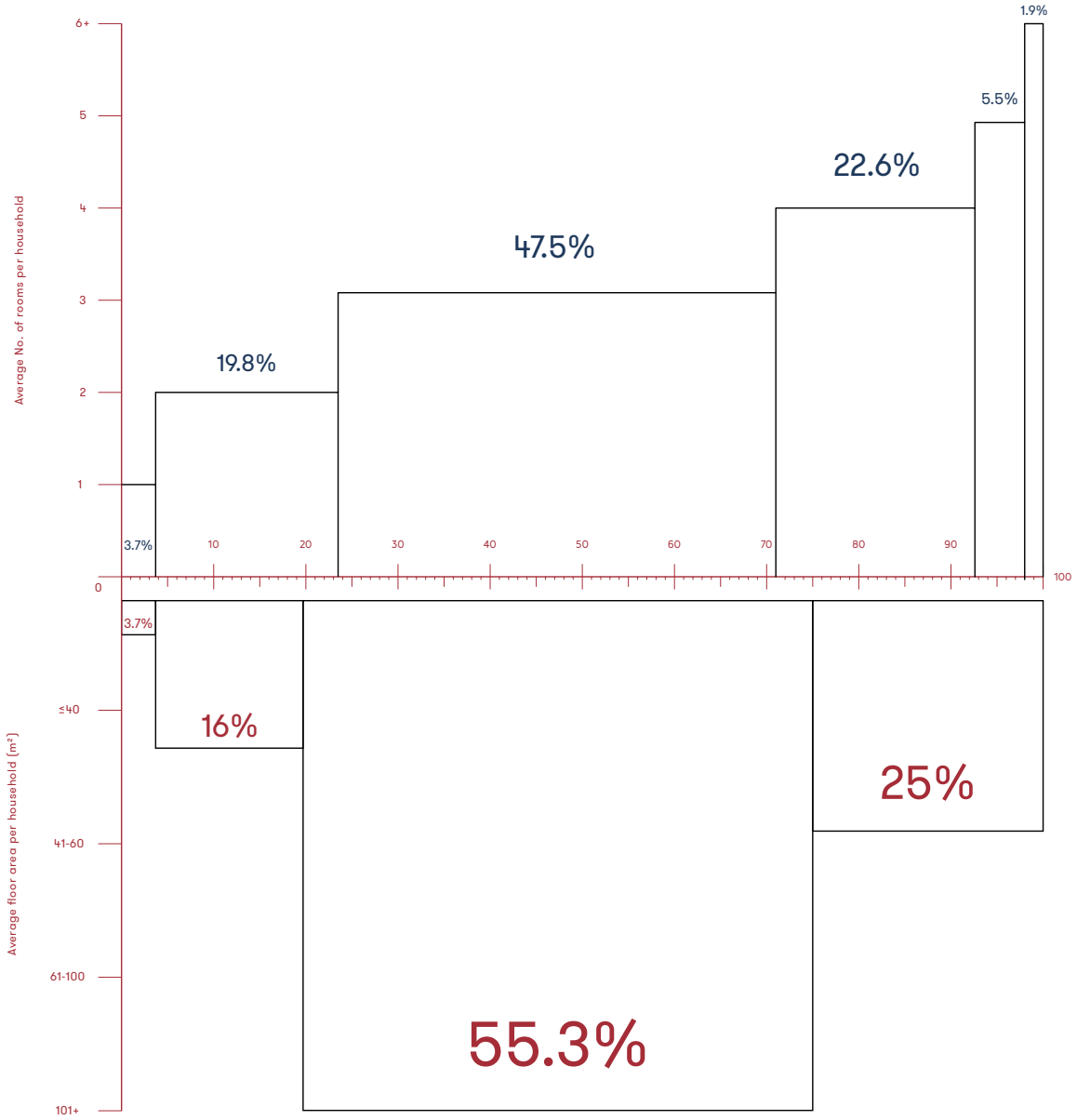
The Polykatoikia covers up to 90% of the city with the freedom allowed in its construction providing a framework for the city to expand.

Occupation of an empty polykatoikia frame prior to occupation (circa 1990)

This photograph demonstrates the way in which a Polykatoikia is constructed and the stages that it takes in formation. The frame and the provision of balcony spaces is cast in concrete with infill coming at a later stage. With the financial crisis of 2008, several of these frames lay vacant waiting for a purpose, several blocks that have been occupied now lay half vacant as a result of an exodus from the Athenian centre.

Documenting the typical plot and rooms of a Polykatoikia

The Polykatoikia covers up to 90% of the city with the freedom allowed in its construction providing a framework for the city to expand.

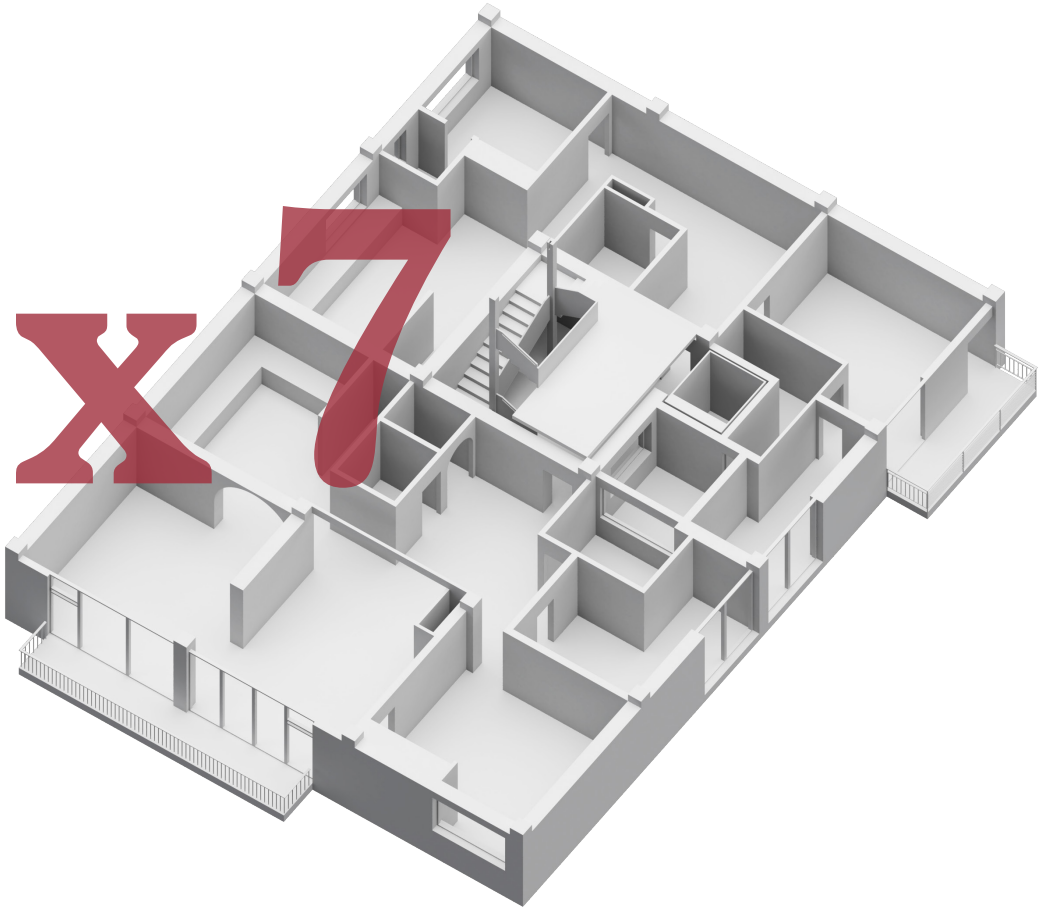


The typical Athenian apartment is usually constituted of 4 rooms or less, this is lack of privately owned space should be rectified in a new celebration of civic and civilian engaged elements of architecture.

The Tale of the 7-Storey City

Athens as a whole rarely excedes 7 storeys in height, this is something I would look to exploit in gaining maximum exposure for my buildings and their integration into the existing urban fabric.

By making the buildings slightly taller and manipulating the standard slab and beam construction I look to embed my propostions within Sepolia yet still maintain their prominence as a place of civic enterprise and collaboration.



Analysing the volumetric properties of different typical polykatoikia varieties

1

2

3

03

[EN]POWERING THE POLYKATOIKIA

The demographics I aim to target and design for:

The City Planners

The Elderly

Families with young children

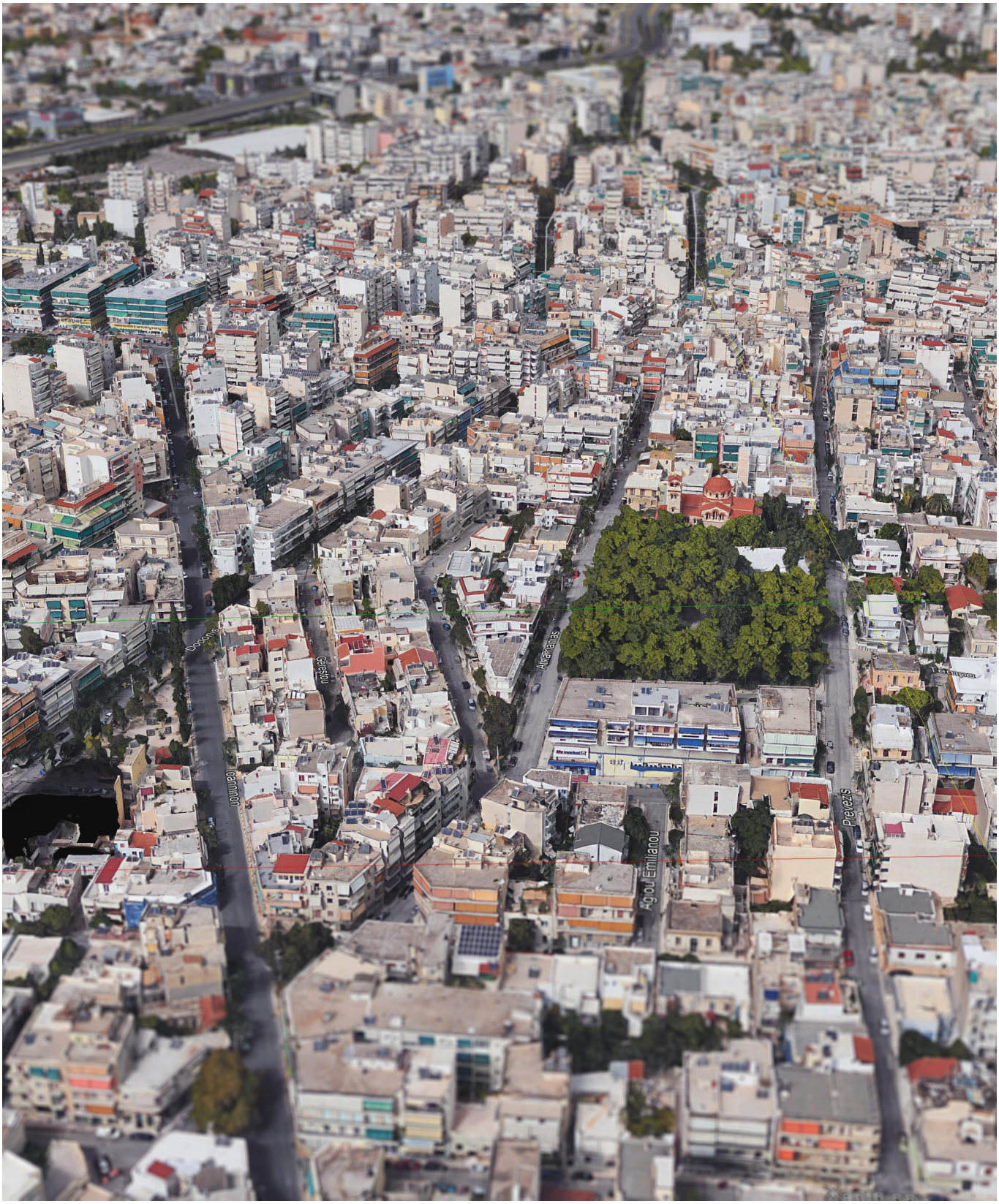
Urban Gardeners

Homecooks

Independent Food Vendors

Local Sports Fans

An aerial photograph of Sepolia, and the density and homogeneity of the urban lanscape which I seek to disrupt.

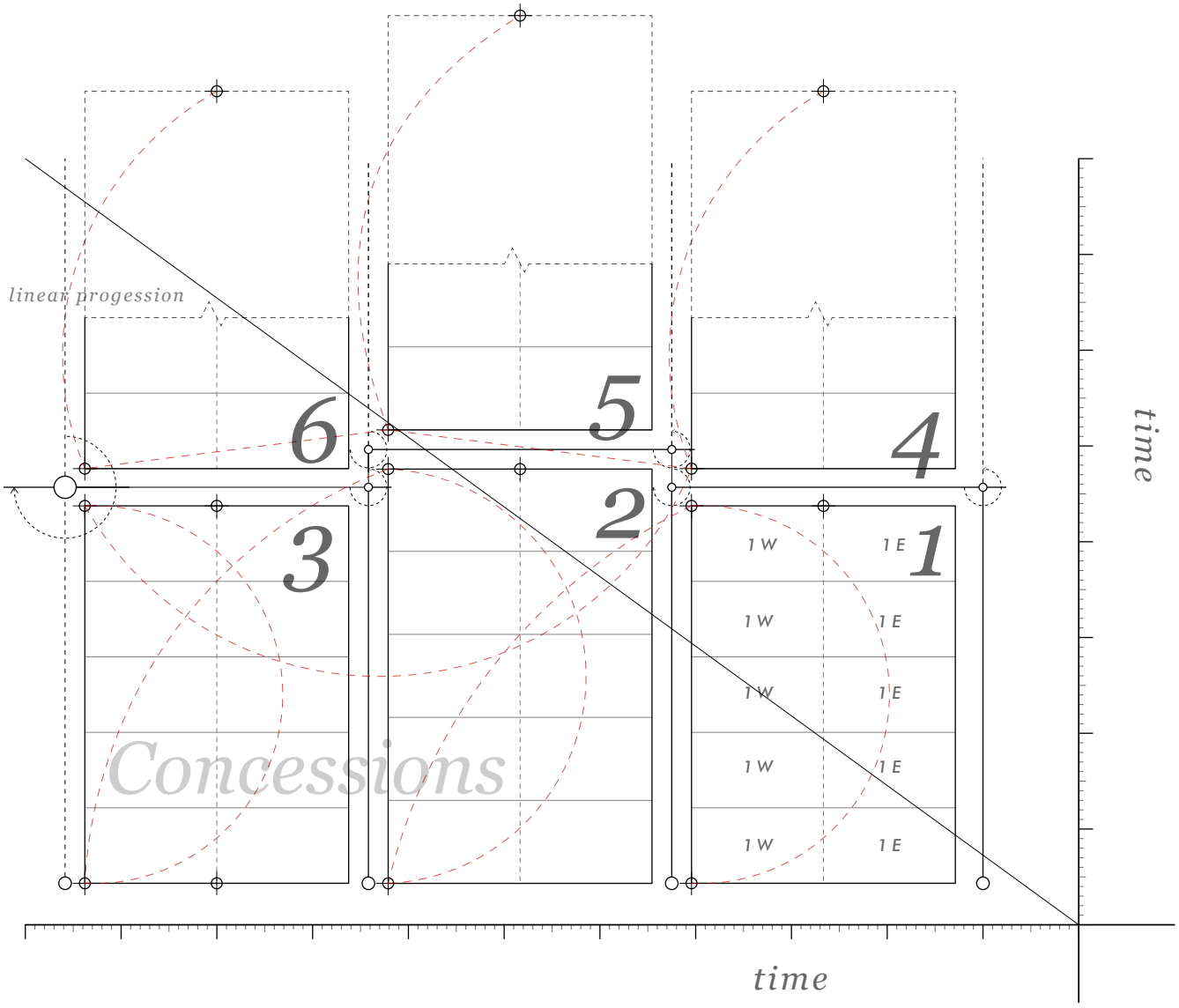


Why are corner buildings so important in a city?

Corner buildings are placed in an important location, the intersection of two streets. These intersections are the places where people are most likely to congregate. The overall ambition of the project is that by being located on the corner the buildings are highly visible. A typical urban building will have one major facade facing the street with the other 3 sides tucked into the block. A corner building has 2 main facades facing the street. More visibility suggests more importance and helps to become the local place to dispose your waste for two streets, thus providing incentive to socialise and communicate.

In ancient Greek and Roman times, the relationship of the viewer to the building based on the corner condition was used for both social and political purposes. The Greeks intended space to be conceptualized and seen by a viewer at 45-degree angle to the building. The approach to the Acropolis along the 45-degree angle created a deliberate alignment with the sun that signified not only directionality but also spatial and political hierarchy. This diagonal relationship drew particular attention to the corner, manifesting a particular vantage point known as Greek Space.

A diagram showing how the Canadian consessions were gained from the British in the early 1800s.



I forsee this project as working much like the Canadian aquisition of land from the British, in which plots were obtained piece by piece in a strategic fashion. In my example, I propose that the Athenian local government will look to acquire empty or prominent locations within Sepolia and gather them into a collection in which this scheme can be deployed and eventually expand to encompass the whole city.

ΑΝΑΚΟΙΝΩΣΗΩΣΗ

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Αγαπητοί κάτοικοι,

Υπάρχει πρόβλημα με την πόλη μας. Η Αθήνα είναι γεμάτη σκουπίδια. Η περιοχή Σεπόλια έχει οριστεί για να συμμετάσχει σε πειραματικό sxedio αντιμετώπισης των οικιακών αποβλήτων.

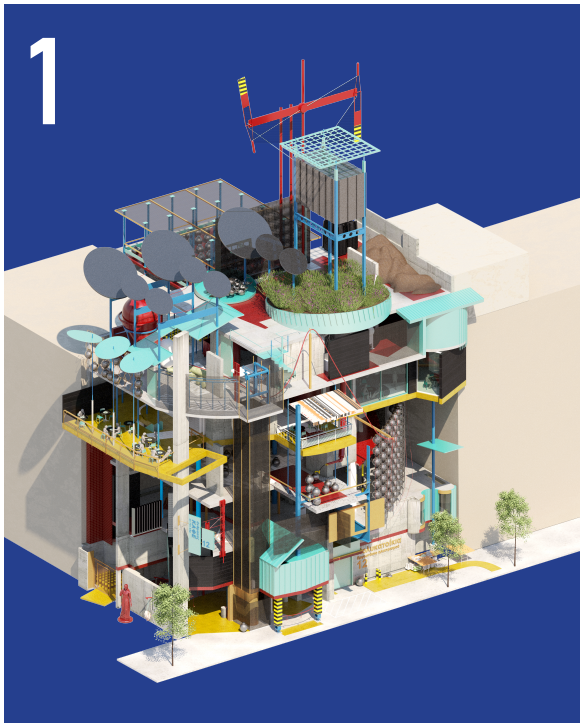
Αστικά εργοστάσια θα βρίσκονται στις διασταυρώσεις. Ελπίζω να σας δείξω ότι η κυβέρνησή σας άκουσε. Μαζί μπορούμε να κάνουμε την Αθήνα πιο καθαρότερη και πιο ευημερούσα.

Επισκεφθείτε το περιφερειακό εργοστάσιο ηλεκτρισμού πολυκατοικιών σας για να βρείτε περισσότερες πληροφορίες για το μέλλον της Αθήνας.

υπογράφηκε

Γεώργιος Καμίνης
Δήμαρχος Αθηναίων

Ξεκινώντας: Μάρτιος 2020

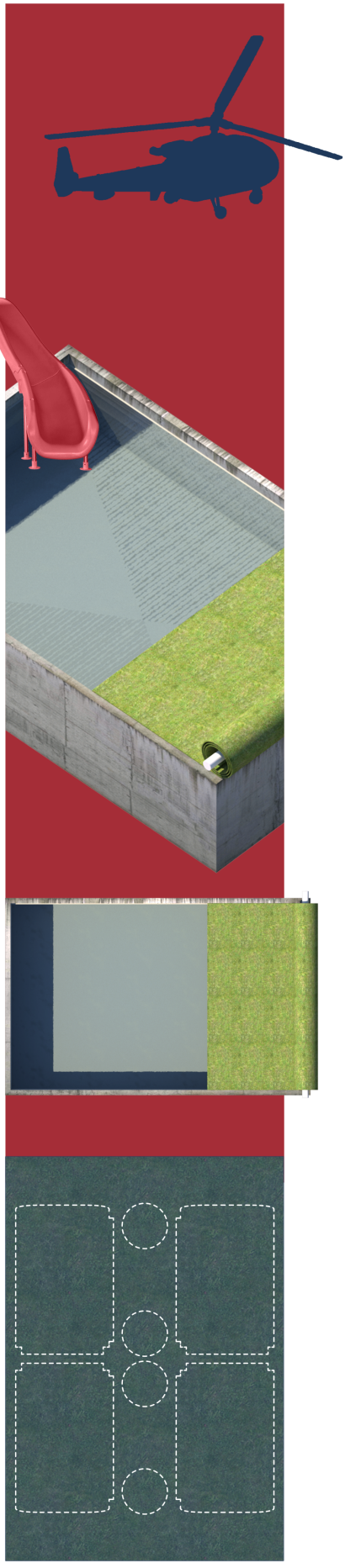


Τύπος 1, Ψηφιακή απεικόνιση

ΣΕ ΣΥΝΕΡΓΑΣΙΑ ΜΕ:

ΔΕΣΦΑ
ΔΙΑΧΕΙΡΙΣΤΗΣ ΕΘΝΙΚΟΥ ΣΥΣΤΗΜΑΤΟΣ ΦΥΣΙΚΟΥ ΑΕΡΙΟΥ Α.Ε.

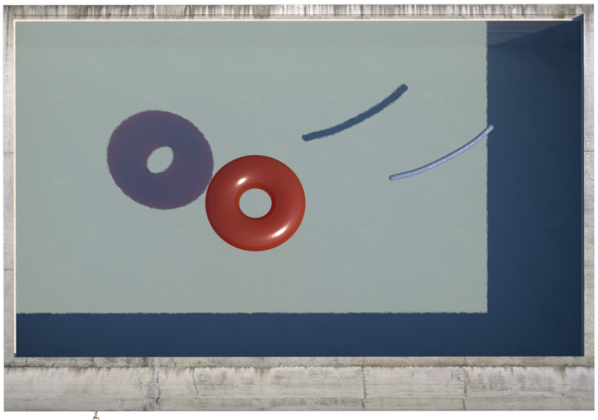
φυσικό αέριο
ΕΛΛΗΝΙΚΗ ΕΤΑΙΡΕΙΑ ΕΝΕΡΓΕΙΑΣ



The populace of Athens is wary of the trust that they place in their local government due to all the wastes of money and effort that have occurred. The lack of transparency in the number of pools in the city means a large amount of tax revenue is lost to the shadow economy. A new use for the pool covers that are concealing these pools will provide a fiscal incentive to remove them and continue to pay for a rebate.

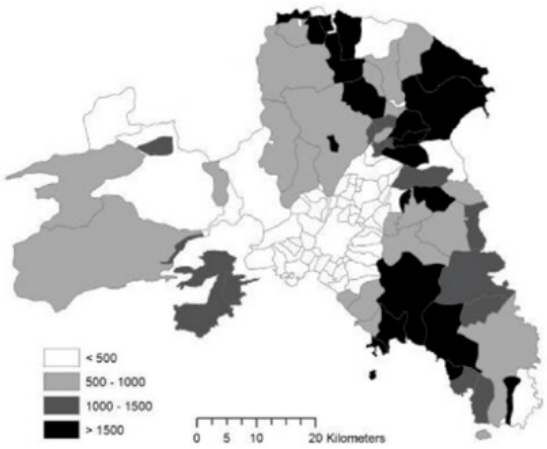
Location of Use

1/2

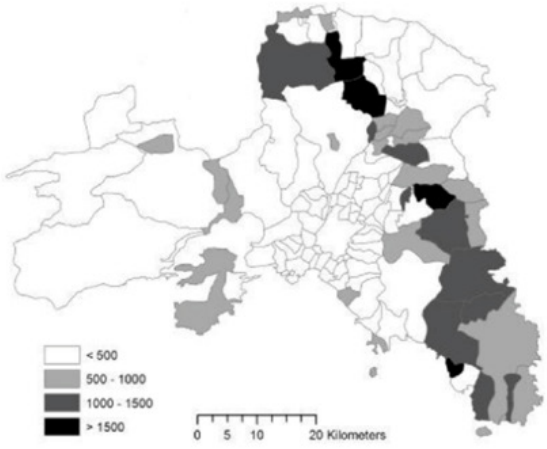


The pool covers will be cut to size to create duffle bag type sacks that will be utilised to move material around the stages of the process and they will ultimately end up being recycled and repurposed.

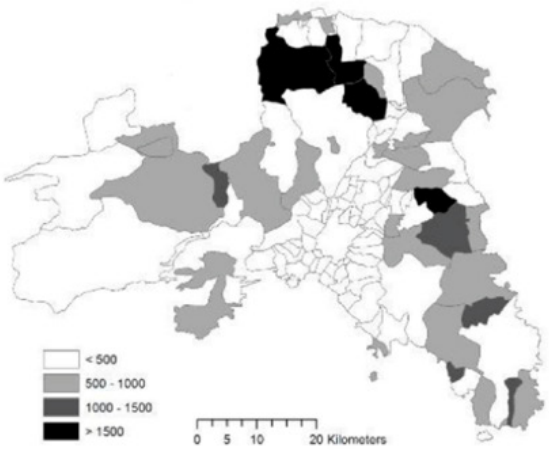
Tracking the movement of people out of Athens since 1980 in response to the rise in squalor and lack of opportunities in the city



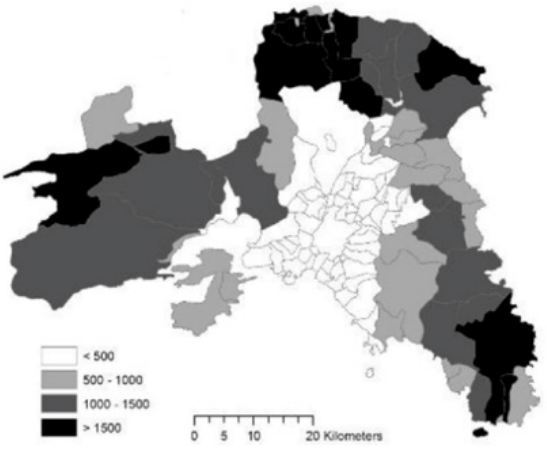
1980



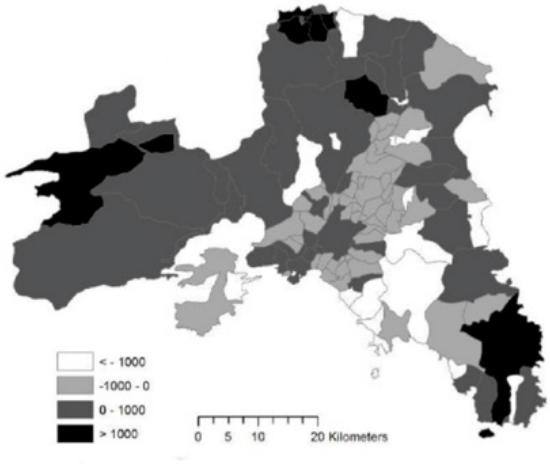
1990



2000



2010



Absolute Change

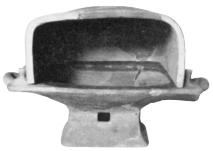
It can be argued that more can be learnt about a culture through the study of what it discards than what it retains. Waste gives a truer indication of the scale and scope of a societies drivers than valuable objects simply due to the fact that waste is ejected from peoples lives and collected in mass deposits. Valuable items could travel with the owner over thousands of miles or through multiple generations. Waste however, due to its lack of inherent value, piles into time capsules of trends and lifestyles that is far more revealing of issues far larger than the some of its parts.

MONTE TESTACCIO

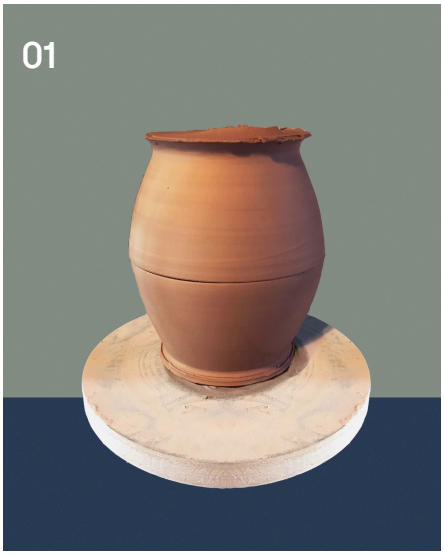
ROME
ITALY

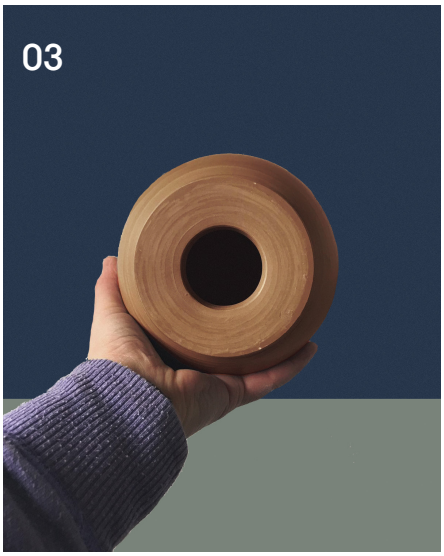
This leads to Monte Testaccio in Rome, a huge pile of pottery that became a landscape and a feature of the city in of itself.

The amphorae (oil vessels) deposited in the mound were often labelled with tituli picti, painted or stamped inscriptions which record information such as the weight of the oil contained in the vessel, the names of the people who weighed and documented the oil and the name of the district where the oil was originally bottled. This has allowed archaeologists to determine that the oil in the vessels was imported under state authority and was designated for the annona urbis (distribution to the people of Rome) or the annona militaris (distribution to the army). Indeed, some of the inscriptions found on mid-2nd century vessels at Monte Testaccio specifically record that the oil they once contained was delivered to the praefectus annonae, the official in charge of the state-run food distribution service.

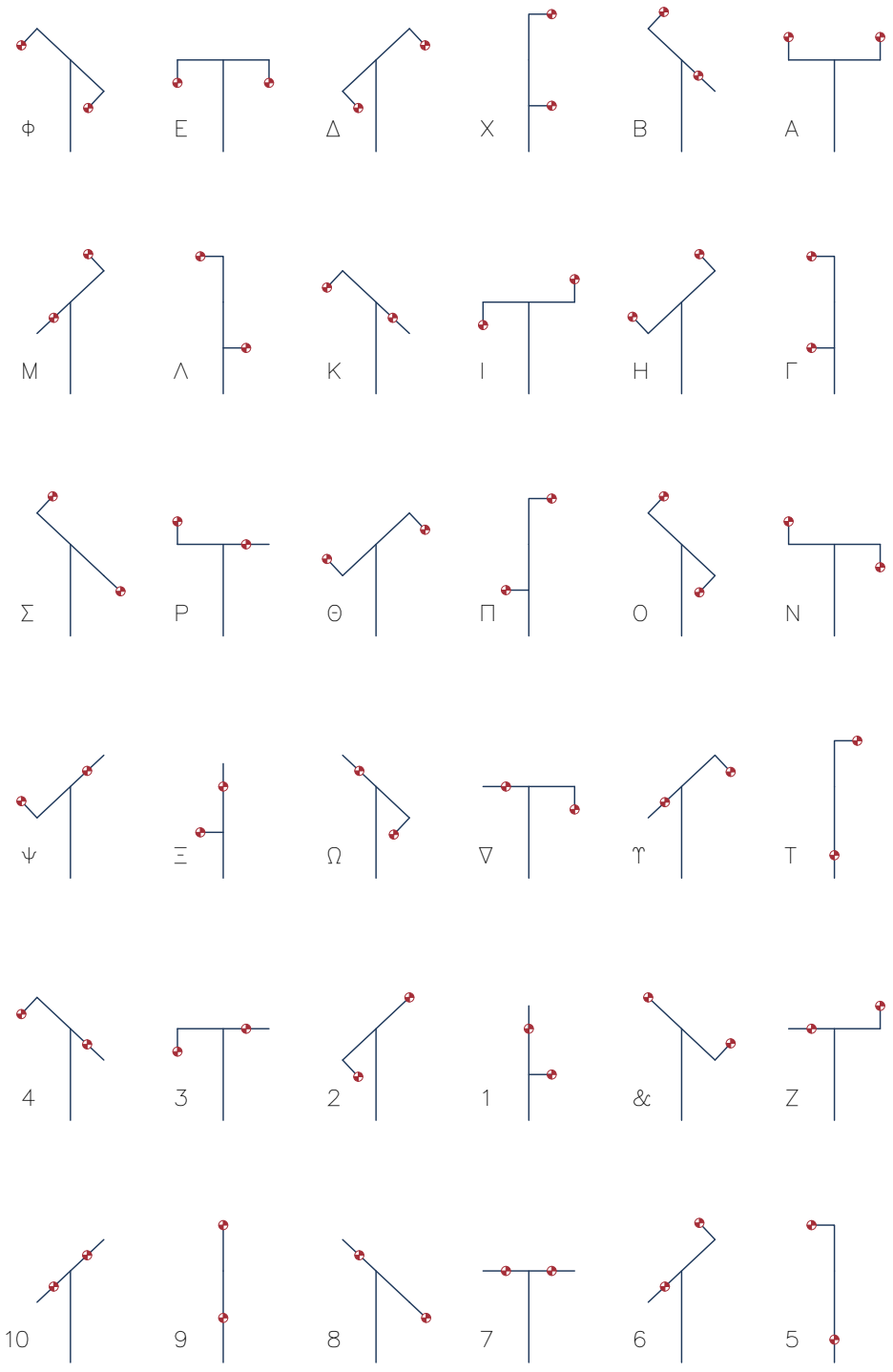


The process of creating my ceramic vessels to aid in processing the food waste of Sepolia, these pots will be handmade and then ultimately disposed of to create urban middens and track usage and change over time. Their glaze will gain its black tint from the ash of the incinators of building type 2.

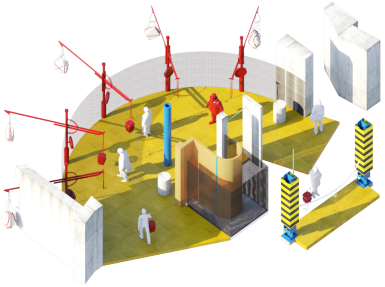


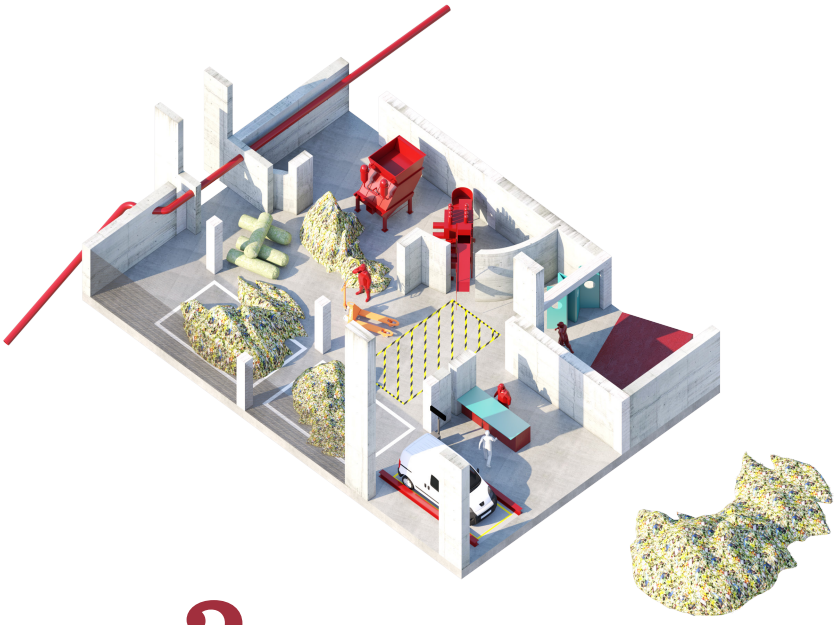


These values are something that a new system could foster in a new Athenian model, a waste solution with large amounts of historical and archeological residue, to be assessed and witnessed for years to come, a true confrontation with our detritus.



Semaphor is a longstanding means of communication through visual symbols, I acknowledge that the buildings I create have to be able to communicate with on another and deal with communication from the top floor to the bottom due to the verticality of my processing. This means that I have integrated semaphor into my design through the introduction of an armiture that protrudes far above the existing cityscape.





1

2

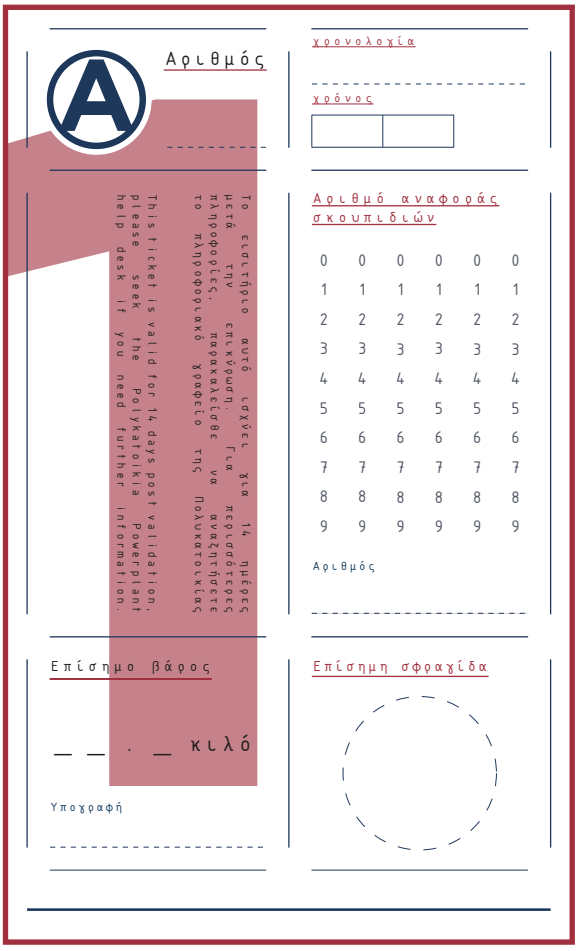
The exchange within my buildings that works towards the incentivisation within the scheme is found in the waste drop off points within my buildings, with the bringing of food waste to the building, upon getting a weighing of what you have brought. There will be the issuing of a token that can be exchanged for either a coffee, a swim or a discount on a cyclinder of biogas to be utilised for heating or cooking.

1 kg

Is exchangable for a coffee

5 kg

Is exchangable for a swim



16

The number of Public Swimming Pools in Central Athens

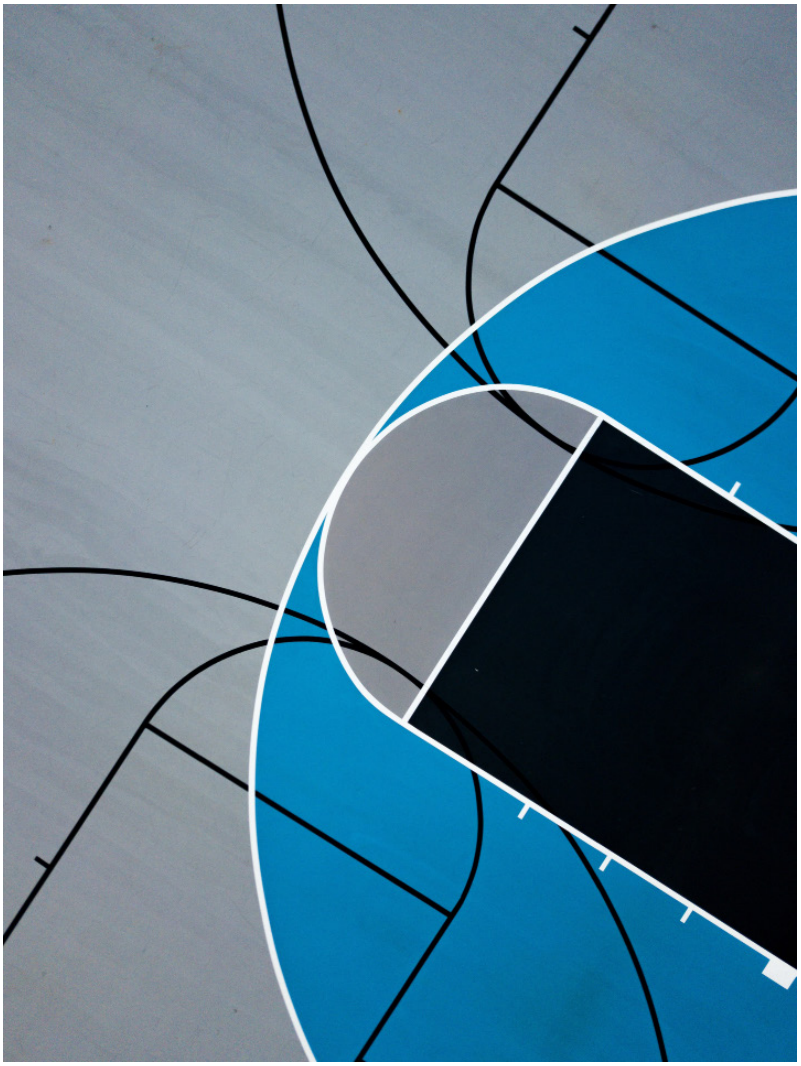
€12

The average cost of a Day-Pass for access to a private hotel swimming pool in Central Athens

1

The number of Public Swimming Pools in Sepolia

The access that people have to swimming pools is limited, the pools are not free for use in many areas with the wealthier neighbourhoods being abundant with private illegal pools. With sweltering mid-summer temperatures, swimming pools are a major contributor to the summertime leisure activities of the city. But in Athens this comes at a cost.



370,000

The estimated number of Panathanaikos supporters in the Greater Athens Area

600,000

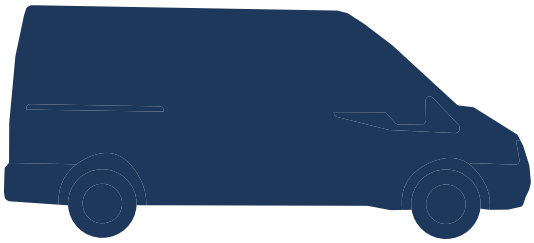
The estimated number of Olympiakos supporters in the Greater Athens Area

Transport And Movement Of Materials Inter-Programmatically

I.W.R - Incoming Waste Receptical
O.R.T - Outgoing Resource Transport

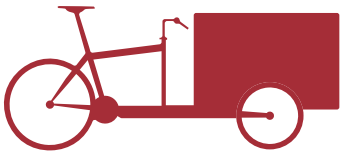
IWR1
Bin Caddy
Volume 30 Litres
User Sepolia Residents

IWR2
Cargo Bike
Volume 200 Litres
User Sepolia Residents +
Sepolia Business Owners

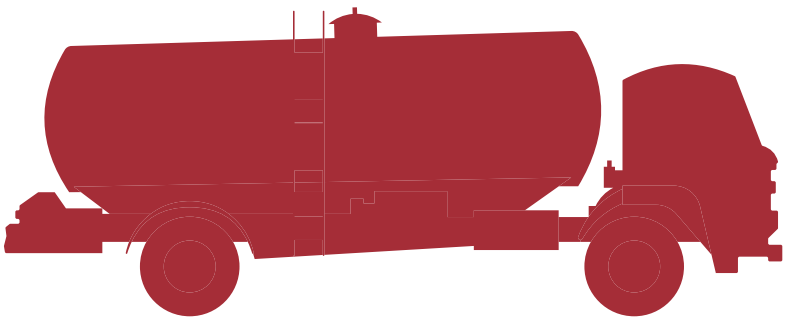


IWR3
Small Goods Vechicle
Volume 2000 Litres
User Sepolia Business Owners

ORT1
Waste Trolly
Volume 200 Litres
User Polykatoikia Powerplant
Employees



ORT2
Cargo Truck Bike
Volume 500 Litres
User Polykatoikia Powerplant
Employees



ORT3
HGV
Volume 5000 Litres
User Athenian Municipal
Government

IWR1

Location of Use
Quantity

1
7,000

Utilised to allow local residents to bring waste to Powerplant Type 1 for the drop off of food in exchange for tokens that can be traded for both coffee and swimming along with a discount on gas cannisters for heating.

IWR2

Location of Use
Quantity

1/2/3
50

Utilised to transport food waste from local businesses and collectives of residents to each Type and allow for larger qunatities to be delivered without the need for large amounts of space for loading and waiting.

IWR3

Location of Use
Quantity

2/3
n/a

Utilised to allow businesses in paticular bakerie s and cafes to drop off food waste and bread to allow for re-inbusements forthe business in terms of a tax break.

ORT1

Location of Use
Quantity

2/3
100

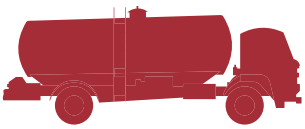
Utilised to transport food waste material that has been collected or shredded in one Type and move them to another Powerplant that may be running low on a certain input or is more suited to the task required

ORT2

Location of Use
Quantity

1/2/3
35

Utilised to transport output materials such as gas cannisters or elements such as bags of soot from one Type to another and therefore allowing the cycle of production to continue.



ORT3

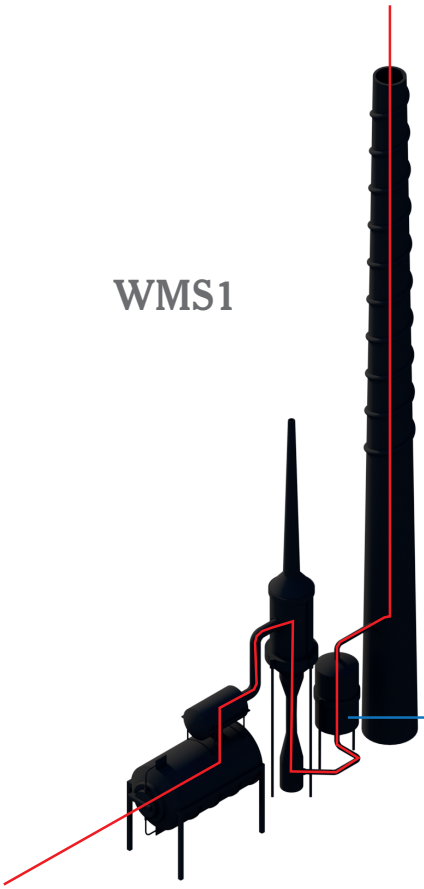
Location of Use
Quantity

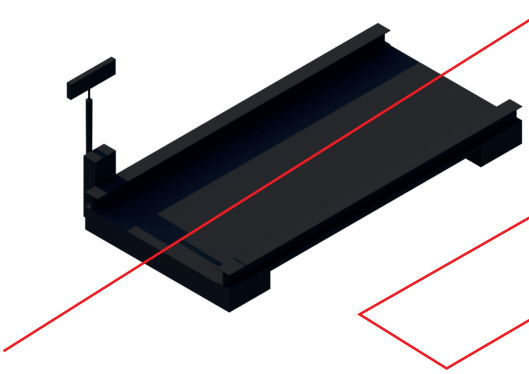
1/3
20

Utilised to extract end of cycle matter to be utilised for compost or other uses outside the system.

WMS1

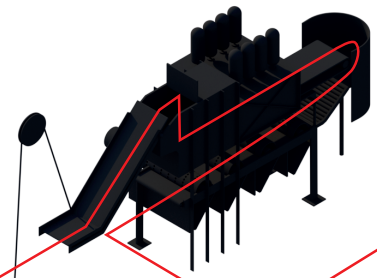
The machine sequence that deals with human waste, the waste is burnt at high pressure and then quenched to minimise particulates before being released through the chimney





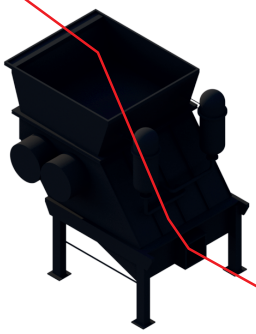
1

Vechicle Scale: This scale is located at the ground floor drop off zone and is the place in which the weight of a full vehicle is measured and the weight dropped off is reimbursed with a token for a tax break.



2

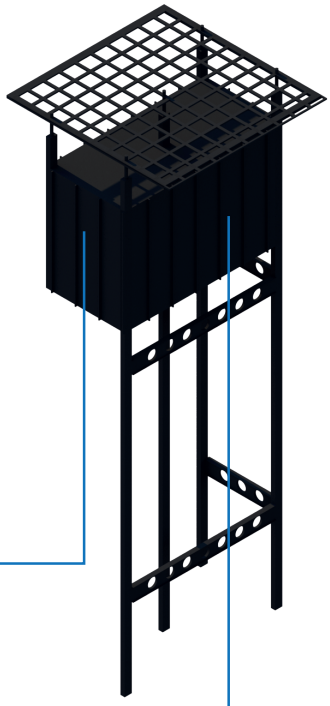
Waste Sorter: This machine will sort and remove any metal or foreign objects from the foodwaste and allows small material to be transferred to Type 1 for digestion in pots.



3

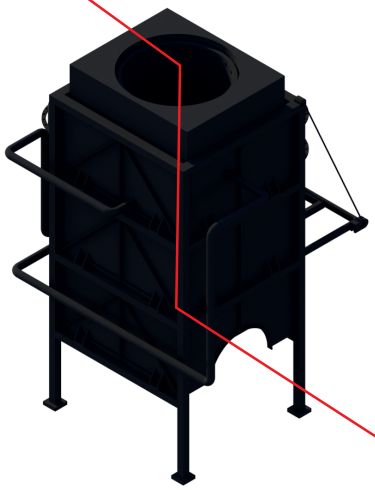
Shredder: This machine will shred the material down to a consistent size as to allow for an even burning of material and prevent the possibility of the machines becoming jammed with inconsistent elements passing through them.

A



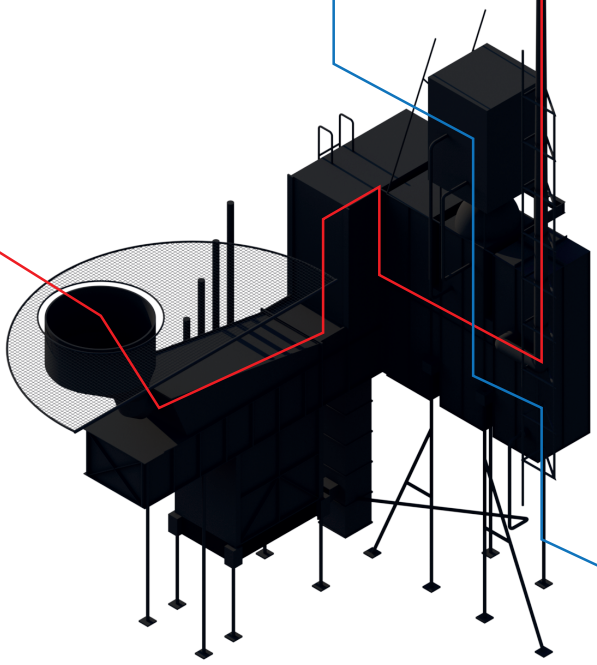
The watertower provides a storage space for the water used in the process mainly for quenching the smoke to reduce the amount of particulates released and to provide water to the boilers that supply the hottubs.

4



Spinning Dehydrator and Dryer: The use of this machine will help dry the food material our to help with incineration and to reduce the amount of black smoke that will produced as a result.

Incinerator: The waste is diven by a worm drive that pushes the material into an incinerator. The burning process provides heating for water and the smoke is quenched minimise pollution.



5