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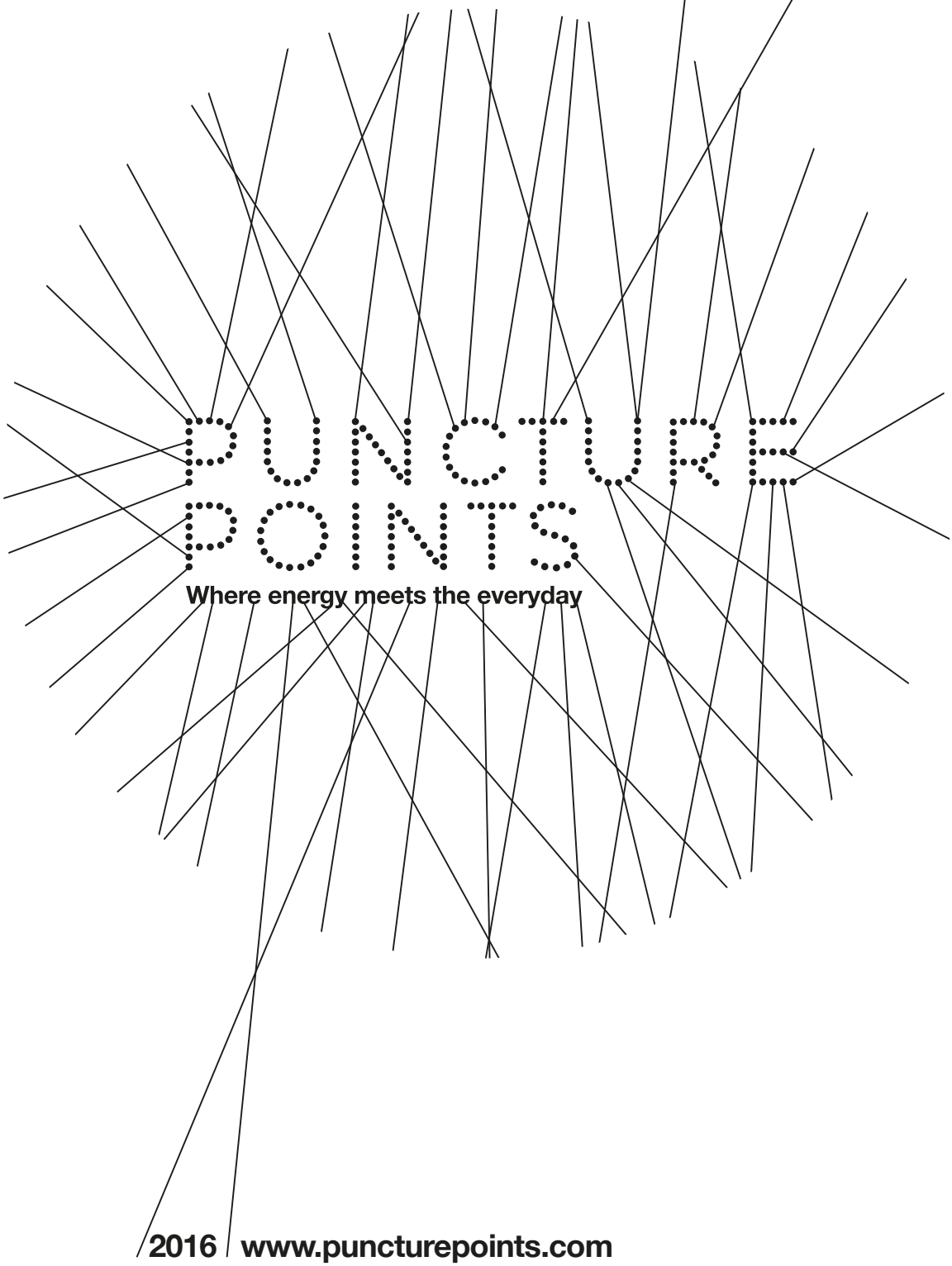

Where energy meets the everyday

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PUNCTURE POINTS

Where energy meets the everyday

Introduction and Concept

Puncture Points is an interdisciplinary art project that interrogates the nexus between energy and society in the context of the city of Cape Town. Departure points of inquiry are premised on the cause and effect relationship between energy and society as well as how to critically conceptualise intersections of energy and the everyday. *Puncture Points* speaks across disciplines in response to these questions in the form of an art project that seeks to creatively capture practices and processes around the coalescence of energy and the everyday in Cape Town.

The purpose of the research is to provide a solid background to the project, drawing together technical data as well as a critical analysis of the nexus between energy and society in relation to the everyday usage of energy.

This report starts by introducing the background to the project. It goes on to explain the research process, before providing a context of Cape Town. It then provides a brief glimpse of the energy industry, before unpacking five stories of how energy meets the everyday.

Background

Burgan Cape Terminals, the commissioner of this art project, is a major greenfield import terminal in the Port of Cape Town. The terminal will strengthen the security of supply in the region and bring new, environmentally-friendlier fuels there for the first time. Soil compaction and foundation work began in January 2016, and the terminal is scheduled for completion in Q2 2017.

As part of corporate social responsibility, and being a new player in the South African greenfield market, Burgan Cape Terminals wishes to engage with the communities it shall operate in. Interest emerged in developing an art project that would involve the art communities in the Western Cape. Cecile Wentges, an independent art practitioner from the Netherlands, was appointed to explore the best way in which to do this.

Through a series of workshops with a wide range of cultural organisations and related businesses, a team and ethos was pulled together to ensure that the project had local relevance and resonance. Khanyisile Mbongwa (independent curator) was appointed as the project curator, and Rike Sitas (African Centre for Cities) in collaboration with Ilze Wolff (Wolff Architects), were approached to ensure the research phase would adequately support the project (more details provided in the research process section).

Subsequently Gulfstream Energy came on board to support the research phase of the project. Being a local distributer of energy and a client of Burgan Cape Terminals, Gulfstream has provided this research with connections to various clients and people within the energy business that would normally be off limits or difficult to gain access to, especially given the time constraints of the project.

Connecting the energy industry and artful enquiry is intriguing to all the funders as an alternative way of engaging the metabolic flows of energy.

Research Process

Given the sheer scale and scope of the energy industry and the vast reach of energy into everyday life, the research process was quite selective. The purpose of the research was to scan the industry in order to find a series of narratives that tell compelling stories about the entanglement of energy in lived experience. The stories are therefore not intended to be definitive and all encompassing, but rather a selection of a few ways in which to imagine the complexities and multi-faceted nature of these interactions.

Research team

An interdisciplinary research team was formed to conduct the research in different phases of the process. The team was made up of:

Cecile Wentges from the Netherlands who runs an arts foundation called GET LOST. Cecile develops creative connections between the art world and the business world as a central element of her practice as both an independent artist and mediator. She believes that art and business can be inspirational to each other and create transformative interactions between people of different skills and backgrounds.

Rike Sitas was drawn into the project to advise on the research process. Rike is a researcher at the African Centre for Cities at UCT, and her research focus is on culture and cities. In addition, Rike is a co-founder of public arts organisation, Dala that has been running (primarily in Durban) since 2008.

Ilze Wolff is an architect who is fascinated by the engagement of art and architecture as strategies for architectural research. She was brought into the project to help visualise and spatialize the research process.

Tigere Mavura works in the academic field [visiting Politics lecturer at Rhodes University, and Visual Studies Consultant at the Stellenbosch Academy for Design and Photography]. He is also a creative researcher for the founding partner at Vasiki Creative Citizens. He was drawn into this research to support the research team with the editing of this document.

Masixole Feni is a photographer for progressive online news publication, GroundUp. Masixole is an activist photographer who is interested in utilising photography as a tool for finding new ways to represent social and spatial issues in Cape Town. He was enlisted to document essential moments in the research that reflect the concept.

Alcia Fortuin is an MA student in the Department of Architecture and Planning at UCT, with a background in environmental and geographical sciences. Her science – humanities focus of her studies placed her perfectly as a research assistant on the project.

Research questions

The following questions were used to frame the research process:

What is the relationship between energy and the everyday in the western cape?

And

What are the connection patterns and narratives between energy, people and society?

Research process

The research had three components: the first involved primary fieldwork through strategic site visits; the second involved a secondary research scan, coupled with follow up interviews; and the third used an analytical process of visual and spatial enquiry.

The first component involved a two-week intensive set of fieldwork activities of visiting various representatives of sectors across the metabolic flow. This involved: site visits to the Burgan Cape Terminals construction site in the Port of Cape Town and Transnet National Port Authorities in Saldanha Bay; an exploration of parts of the energy flows along the main road arteries that enable and are enabled by the flow of oil: The R27 along the west coast, and the N1; a visit to a truck stop and petrol stations; and interviews with various players and clients in the industry.

The second component was a rapid three-week secondary scan of the vital technical and contextual information, which included a desk scan of policy documents, technical and industry related data from company reports, energy-related press, and academic research. This was accompanied by follow up interviews, consultation with academic specialists, and photographic and visual explorations of the *Puncture Points* the research was revealing.
The third component involved a series of research analysis and visualisation workshops aimed at drawing the conceptual, contextual and visual threads together. These workshops were used as a mechanism to keep the research findings close to the research questions in relation to exploring the causal intricate connections and characteristics between energy *Puncture Points* and society.

In the context of an art project it was seen as vital to follow arts-based and interdisciplinary research methodologies in order to ensure that the research is able to adequately respond to the needs of the overall project and its related audiences (these visualisations will be available to artists if they are interested in the arts research process).

Research into this sector is multi-faceted and happening at numerous scales and through a wide range of institutions and organisations and therefore this report is not intended as an exhaustive study, but rather provides entry points into the industry. Additional resources are suggested throughout the document for further enquiry.

The research is written up in five cases that are made up of a series of notes linked to particular flows of energy. Each note introduces an aspect of or perspective on the case.

Research Limitations

Conducting this type of research has multifaceted challenges. The first is linked to access. This project was privileged that access was given to normally restricted sites of research, especially given the time constraints.

In addition, although different companies have their own data, according to the Energy Research Centre based at the University of Cape Town, a comprehensive mapping exercise of the metabolic flows of the multiple energy types does not exist. *Puncture Points* has explored some of the flows, but given the vast scope and scale of the industry, this is by no means exhaustive.

The complexities, nuances and power relations embedded in employer and employee relationships meant that some employees were reluctant to be part of the research. Ethical sensitivity was therefore necessary to protect the integrity of the research participants.

Despite the limitations, the project has surfaced a wide range of knowledge that gives an overview of the intersections of energy and the everyday that can operate as a starting point for artistic research, action and practice.

Useful references and resources

- *Cecile Wentges and GET LOST http://www.cecilewentges.com*
- *Hal Foster, 'The Artist as Ethnographer', in The Return of the Real (Cambridge: MIT Press, 1996).*
- *Ilze Wolff and Wolff Architects*
- *Rike Sitas and the African Centre for Cities:* http://www.africancentreforcities.net/people/rike-sitas/
- *Shane Jegels and Gulfstream Energy: http://www.gulfstreamenergy.co.za*

Context of Cape Town

Cape Town, the southernmost city in South Africa, has a population of around 3,8 million people which equals to 62,4% of the Western Cape provincial population (Western Cape Government, 2014). A coastal city flanked by the Atlantic and Indian oceans Cape Town is known for its natural beauty and iconic Table Mountain, and is regularly being voted as one of the best and most popular destinations in the world. It has a growing economy linked to finance and business services, manufacturing, and wholesale and retail trade.

However, historical and contemporary realities mean that Cape Town is still a vastly unequal city where large differences exist between the affluent suburbs and prosperous economic centres offering rich opportunities of all kinds and the overcrowded, impoverished settlements on the periphery. Like all other cities in South Africa, Cape Town has faced the twin challenge of overcoming the spatial divisions created during the pre-1994 order and addressing the endemic poverty that these divisions reproduced for over three centuries (Swilling, 2014: 3183).

Around 35% of Cape Town households live on R3500 per month and less. Cape Town has relatively high unemployment at 23,9% with 13% of households with no income (Western Cape Government, 2014). Recently, Cape Town has been placed in the top 10 most violent cities with for example 2,434 murders in 2013/14 which means a murder rate of 61.5 per 100,000 compared to the City of Johannesburg's is 28.2 per 100,000 (Africacheck, 2016).

On the other hand, Cape Town and the Western Cape are strategically located and have advantages over other cities in Africa and the global South, especially in the context of *Puncture Points*:

- The cape has access to global financial markets
- High rates of tourism mean that the cape is well positioned to have efficient metabolic flows in relation to energy
- Cape Town has a well-developed formal and informal creative economy and hundreds of cultural organisations in a good position to respond to the conceptual and contextual frame of the project

However, Cape Town is not the sum total of its divisions. Visions of these contradictions do not adequately reflect the reality of living, working and playing in this city. This context is important as it gives insight to the realities on the ground which serve to explain the nuances around energy and society intersections dependent on the realities of core /periphery urban design.

Useful references and resources

- *City of Cape Town and the Cape Town Partnership: http://www.capetownpartnership.co.za*
- *Edgar Pieterse, City Futures: Confronting the Crisis of Urban Development (Cape Town: Zed Books, 2008).*
- *Edgar Pieterse, Counter-Currents: Experiments in Sustainability in the Cape Town Region, ed. by Edgar Pieterse (Jacana Media, 2010)*
- *African Centre for Cities: CityLab research: http://www.africancentreforcities.net/programme/mistra-urban-futures/citylab/*
- *Statistics South Africa*
- *Africa Check : Is Cape Town's murder rate double that of Johannesburg? https://africacheck.org/spot_check/is-cape-towns-murder-rate-double-that-of-johannesburg/2016*
- *Western Cape Government Provincial Treasury: Socio-economic Profile City of Cape Town, 2014*
- *Keith Richard Calix, Wie is ek? Coloured Identity and Youth Involvement in Gangsterism in Cape Town, South Africa. Center on Democracy, Development, and the Rule of Law. Stanford University. 2013.*
- *Zackie Achmat, Apartheid geography and murder in Cape Town. http://www.groundup.org.za/2014.*
- *Mark Swilling, Contesting inclusive urbanism in a divided city: The limits to the neo-liberalisation of Cape Town's energy system. Urban Studies 51(15) 3180–3197, November 2014*

Energy Industry Overview

The energy industry in the western cape is well developed and marked by efficient metabolic flows in comparison to other cities in Africa and the global South. For the purposes of this research and in collaboration with energy industry specialists, the following sectors were identified. Although they are not always distinct categories, and are inextricably related in many cases, it was viewed as important to see how energy flows within and between these sectors.

Sectors

Agriculture: Agriculture is a big industry and largely refers to farming and the cultivation of the land for growing food crops and animal products. Although there has been a steady decline in the agriculture industry in South Africa, it is still a vital component of the economy. For the purpose of this project the agriculture sector is typified by the use of diesel to fuel agricultural machinery and equipment.

Aviation: Aviation refers to aeronautics or the operation of aircrafts. The entire aviation system is reliant on jet fuel, a by-product of diesel, which is used to fuel the aircrafts. The main role player in Cape Town is the Cape Town International Airport. Aviation has enabled global interconnectivity in unprecedented ways, but is also the producer of environmentally damaging carbon emissions.

Construction: The construction industry encompasses all forms of infrastructural development. It is a growing sector in South Africa. Big infrastructural projects are key to urban development, regeneration and job creation. The South African government has a commitment to public infrastructure development through the National Development Plan, which means it is an industry that enjoys on-going success. There are also numerous private development companies involved in urban development. Construction is fuelled by diesel that powers most of the equipment. For instance, for the construction of road asphalt or bitumen is used, a by-product of the refinement of crude oil.

Commercial Industry: The commercial industry encompasses a wide range of manufacturing processes. Cape Town has relatively low industrial energy consumption since much of the economy thrives on activities on the tertiary sector. Nonetheless, this sector is defined by the use of diesel and Illuminating Paraffin (IP) to enable the manufacturing and flows of goods through the sector, which enable other sectors to function as well. The commercial industry encompasses storage and supply entities to both the formal and informal sector as well as refineries which process crude oil into products such as such as petroleum, naphtha, gasoline, diesel fuel, asphalt base, heating oil, kerosene and liquefied petroleum gas.

Informal sector: The informal sector often refers to the informal economy or informal housing. Current thinking challenges the notion that the formal and informal are entirely separate, but it is still useful to consider how different economies and spatiality's work in Cape Town given that over 2,5 million people work in the informal sector in South Africa. Of particular interest to *Puncture Points* is how energy intersects with the everyday in the informal economy, and in poorer neighbourhoods around the city. In addition to the petroleum and diesel that fuel public transport so vital to the mobility of people around the city, in the absence of access to adequate electricity, many people rely on substances like paraffin.

Marine: The entire marine industry is fuelled by diesel and fuel oil. In addition, ships are one of the most important transporters of crude oil from oil producing countries to South Africa. Harbours are therefore crucial entry and exit points for fuel. In the western cape the Port of Cape Town and Saldanha Bay are the two most important marine interfaces. Run by Transnet National Ports Authorities, these ports facilitate the entry of fuel and the exit of a wide range of products. The Port of Cape Town is not a very deep harbour and therefore many of the larger ships dock at Saldahna Bay.

Mining: South Africa's economy is largely built on mining. The mining industry is heavily reliant on diesel and some of the biggest clients of energy companies are mines. There is a long history of mining various minerals, such as gold and diamonds. There is also a long history of tension between mining on the one side and labour and the environment on the other. Although mining as an industry has declined since the 1970s, it is contributing an average of 8% to the country's GDP over the last decade or 18% of the economy's activity including side-stream and downstream beneficiations (Antin, 2013). Although it may be dangerous and insecure employment, the mining industry still employs more than a million people. Despite the decline new mines are still emerging, and the Northern Cape is experiencing a growth in the mining sector. Diesel is also essential in the construction process, powering the machinery that produces the mines.

Public Sector: The public sector is another major consumer and producer of energy. National entities are the most prominent on the Cape Town landscape. For example, national entities produce and distribute 95% of electricity in South Africa. The public sector also includes public amenities such as hospitals and prisons. For example Robben Island is entirely run on diesel, as are the boats that transport people and goods between the island and Cape Town.

Retail: The retail sector in relation to this project refers to the points of sale: in particular service stations and truck stops. Public, private and commercial transport are all heavily reliant on these points of contact. These provide unleaded petrol, lead replacement petrol and diesel to a wide range of commercial and private customers. Petrol stations have become such a daily part of our lives that it is easy to forget how these transitional places enable the movement of people and goods around and in between cities.

Transport: Cape Town boasts high levels of transport fuel consumption predominantly driven by the growth of private passenger transport. 91% of all liquid fuel relating to passenger transport is consumed by private cars, this has an associated cost of R10-12 billion (Cape Town State of Energy Report, 2015). This is astounding as only half of the city's households actually own private cars. Public transport such as buses, taxis and Metrorail transports nearly half of the city's commuters and consume only 9% of all liquid fuel relating to passenger transport (Cape Town State of Energy Report, 2015)

Useful references and resources

- *African Pilot Magazine*
- *African Journal of Marine Science*
- *Centre for Transport Studies: http://www.cfts.uct.ac.za/*
- *Journal of Transport and Supply Management*
- *Oil & Gas – The African Business Journal*
- *Oil Review Africa*
- *South African Journal of Agricultural Science*
- *South African Journal of Oil, Gas & Energy Law*
- *The Energy Resource Centre: http://www.erc.uct.ac.za/*
- *The Journal of Construction*
- *The Journal of Energy in Southern Africa*
- *The Southern African Institute of Mining and Metallurgy*
- *Transport World Africa*
- *Daniel Antin, The South African Mining Sector: An Industry at a Crossroads. Daniel Antin, The South African Mining Sector: An Industry at a Crossroads. Hanns-Seidel-Foundation, 2013.*
- *Pampallis, John. Foundations of the New South Africa. Cape Town: Maskew Miller Longman, 1991.*
- *Cape Town State of Energy, 2015 https://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/State_of_Energy_Report_2015_2015-09.pdf Hanns-Seidel-Foundation, 2013.*
- *Pampallis, John. Foundations of the New South Africa. Cape Town: Maskew Miller Longman, 1991.*
- *Cape Town State of Energy, 2015 https://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/State_of_Energy_Report_2015_2015-09.pdf*

Energy and the Everyday

Introduction

The energy industry and flows of energy are globally interconnected and operate in a wide range of volumes – from shiploads of crude oil, to the smallest generator; from tankers to 750ml bottles. Energy permeates every space in cities and enables the majority of daily activities, at work, at home and all configurations of spaces in between. It is often invisible until it stops working: we only notice streetlights when they are off; we only think about petrol when it is about to run out.

However, narratives of energy and the everyday in this context do not constitute an intensive, universal and generic interrogation of energy flows. Instead, they constitute an in-depth glance using art and creative practices that speak to the local, the nuanced, the seemingly mundane and the complex in critically reflective processes of examining the energy society nexus within the context of Cape Town.

Energy

The concept of energy, most closely related to physics, relates to the transfer of properties from one form to another. The term ‘energy’ can be used to refer to a wide range of energy-related and power related substances from oil to electricity.

Energy is processed in refineries and of interest to this project are: crude oil, diesel, petrol, jet fuel, paraffin and bitumen. It is important to note that there are numerous other by-products of oil refineries, which include: lubricants, propane, petrochemicals, and sulphur.

In addition, there are thousands of products that are made from petroleum, including: solvents, ink, upholstery, clothes, Lego, motorbike helmets, umbrellas, roofing, stockings, deodorant, antiseptics, boats, nail polish, soap, paint, toothbrushes, candles, guitar strings, tennis rackets, antifreeze, dyes, cortisone, toilet seats, fertilisers, dice, glycerine, perfumes, lipstick, aspirin, speakers, balloons, crayons, hand lotion, artificial limbs, tents, cell phones, TVs, surf boards, fridges, car tyres, plastic water bottles… and thousands of other everyday household products.

Keeping this in mind, this project was primarily interested in the metabolic flows of energy and how they circulate around Cape Town and the Western Cape. Given the parameters of this project, the focus has been to consider how a few key forms of energy intersect with the everyday. The notion of energy for *Puncture Points* is not only about a tangible transferal of one type of energy into another, but also a social one, rooted in the neighbourhoods and homes, that shape the everyday lives of ordinary Capetonians.

The everyday

Although urban research has tended to focus on macro data, there has been a relational turn in urban studies that has recognised the importance of the everyday and the ordinary.

There is a growing body of southern scholarship that has been unpacking global financial flows through examining the interactions at the everyday level (AfricanCitiesReader I-III, 2015). Part of this stems from a miss-match between the portrayal of African cities as either in abject crisis, or as hotbeds of unbridled optimism and innovation (Pieterse and Simone, 2013), (Parnell, and Pieterse, 2014). Neither of these representations are accurate or necessarily helpful in understanding what is going on in African cities, which leaves a problematic basis for understanding their complex historical and contemporary realities in relation to structural inequalities for example. As such, the tectonic transformation underway in African cities can be understood as dynamic contestations through which different actors stake claims to represent urban space and negotiate sedimentations of community in everyday practice. Attention to the production of space emphasises the highly dynamic interrelations between the actors and the forces present in the urban landscape but not only in connection to elsewhere. Instead of boxing cities and their inhabitants and reducing understandings of their growth and form to endogamous factor, African cities need to be understood through the full range of extra-local practices and imaginaries that connect them to the global, the hinterland, other cities and even other worlds via cosmological imaginings (Diouf and Fredericks, 2014).

In the context of African cities rethinking the way we think of cityness as everyday hustles on the margins has become an important focus of urban enquiry that attempts to understand the nuance of the local without losing sight of global pressures. Researchers from various disciplines are taking the relationship between people, places and things more seriously as well as engaging in how aesthetics affect and shape local and global realities.

Artists are particularly adept at recognising how people, objects and aesthetics interact on an immediate level. Artists are also able to engage in the complexity beyond the real and the rational in ways that researchers and technicians may not be able to do, let alone fathom.

In the context of *Puncture Points,* it is therefore important to understand the contexts in which energy is operating at a very local, intimate and immediate scale, because this is happening at every moment of life – when we use our phones, get on a bus, watch something on TV, sit in a classroom or boardroom.

Useful references and resources

- *Michel de Certeau, The Practice of Everyday Life (Berkeley: University of California Press, 1984), ı.*
- *AbdouMaliq Simone, City Life from Jakarta to Dakar (London: Routledge, 2010).*
- *Filip De Boeck, Kinshasa: Tales of the Invisible City (Antwerp: Ludien, 2004).*
- *Mamadou Diouf and Rosalind Fredericks (Eds.) The Arts of Citizenship in African Cities: Infrastructures and Spaces of Belonging (Palgrave Macmillan US, 2014)*
- *Chimurenga and the African Centre for Cities, African Cities Reader Series I-III (Chimurenga and the African Centre for Cities,2015).*
- *Parnell, S. and Pieterse, E. (eds) (2014) Africa's Urban Revolution. London & New York: Zed Books.*
- *Pieterse, E. and Simone, A. (eds) (2013) Rogue Urbanism: Emergent African Cities. Johannesburg: Jacana Publishers in association with African Centre for Cities*

Case 1: Fuels and flows

The first case explores the different scales of energy by drawing on existing flows of fuel. It takes a snapshot look at the overall picture, hinting at the way in which energy moves through from one form to another.

Note 1: Crude oil

The first note looks at the type of energy as it enters the western cape.

Crude oil is a complex mixture of hydrocarbon molecules, which are molecules made of long chains or rings of carbon and hydrogen. Crude oil is an assortment of a very large number of carbon and hydrogen compounds, formed from the remains of dead plants and animals from around a million years ago. This is why it is referred to as a fossil fuel. The raw material is processed into various petroleum products such as petrol, diesel, jet fuel to name a few. Crude oil is pumped from the ground in the Middle East, West Africa, The America's and Asia.

Refining is the complex series of processes that manufactures finished petroleum products out of crude oil. While refining begins by heating and separating, called distillation, refiners must use more sophisticated additional processes and equipment in order to produce the mix of products that the market demands. Generally, the separating part minimizes the production of heavier, lower value products (such as, residual fuel oil, used to power large ocean-going ships) in favour of middle distillates (jet fuel, kerosene, home heating oil and diesel fuel) and lighter, higher value products (liquid petroleum gases (LPG, naphtha, and gasoline).

Note 2: Saldanha Bay

The second note explores the context where crude oil enters the western cape: the harbour of Saldanha Bay. Saldanha Bay is on the West Coast of South Africa, 60 nautical miles north-west of Cape Town. It is the largest and deepest natural port in the Southern Hemisphere.

Saldanha facilitates South Africa's main iron ore export. The port is unique in that it has a purpose-built rail link directly connected to a jetty bulk loading facility for the shipment of iron ore.

The port is also deep enough to berth ships carrying crude oil. The crude oil is pumped to a refinery through a 105km pipeline.

Tugs are required for all berthing, shifting and sailings and also have firefighting capabilities. Gulfstream Energy delivers diesel to service the tugboats, tugboats in turn supply the vessels when they require extra diesel.

Note 3: The refinery

The refinery in Cape Town has a crude oil capacity of 110 000 barrels a day. It produces diesel, petrol, jet fuel, gas, paraffin and the usual gamut of by-products. It currently produces the bulk of distribution for the western cape.

Note 4: Port of Cape Town and the Foreshore

The Port of Cape Town is one of the most interconnected and busy ports in South Africa. The Port of Cape Town has a wealth of commercial trade opportunities, but is also the home of retail spaces at the V&A Waterfront; heritage spaces such as the Robben Island Museum; and tourist entertainment destinations such as the aquarium. It also provides premium residential and tourist property options.

The Table Bay area encapsulates what is now called the Foreshore, which was under water before the 1940. On the South-Eastern and Southern shore of Table Bay 194 hectares of land was reclaimed from the sea to accommodate and service the trading that was taking place at the Port (Cape Town Government, 2011) Much of the area is occupied by rail infrastructure for passenger and freight transport. Currently the Foreshore is home to large-scale businesses, car showrooms and car services as well as distinguished venues such as Cape Town International Convention Centre, Cape Town Civic Centre and the Artscape Theatre. The Foreshore is a strategically located area that experiences high levels of congestion due to its position close to the port, the City Centre as well as the Paarden Eiland, the adjacent industrial area in Cape Town.

Note 5: Storage

The Port of Cape Town enables both commercial and leisure activities and is an important *Puncture Point* in the circulation of fuel around the western cape. Burgan Cape Terminals aims to strengthen the fuel flows for Cape Town and the western cape by providing an additional 118 million litres of storage capacity of mainly Petrol and Diesel, and through this, decreasing energy shortages for the country (SABC News, 2014). The terminal hopes to support the 3% annual anticipated growth.

Note 6: Scales of capacity

The following table shows the different tank volumes of different vehicles:

Oil tanker (ship)	10 000 – 550 000 tons
Tugboat	14 000 ltr
Road tanker	16 000 – 60 000 ltr
Bus	220 ltr
Truck	160-200 ltr
SUV	45-100 ltr
Bakkie	50-80 ltr
Car	45-70 ltr
Motorbike	10-35 ltr

Useful references and resources

- *Michel de Certeau, The Practice of Everyday Life (Berkeley: University of California Press, 1984), I.*
- *Oil & Gas – The African Business Journal*
- *Oil Review Africa*
- *South African Journal of Oil, Gas & Energy Law*
- *The Energy Resource Centre: http://www.erc.uct.ac.za/*
- *SABC NEWS, Cape Town harbour to produce 118 million litres of diesel, petrol (Thursday 18 September 2014) http://www.sabc.co.za/news/a/66298f8045841bab970fb7c7c599c9eb/C-Town-harbour-to-produce-118-million-litres-of-diesel,-petrol-20140918*
- *Cape Town Governement, 2011. http://www.capetown.gov.za/en/sdf/Documents/Draft_Vols_2011/Table_Bay_District_VOL1_SDP_EMF.pdf*
- *Cape Town State of Energy, 2015 https://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/State_of_Energy_Report_2015_2015-09.pdf*

Case 2: Machines and mobility

This case explores machines and mobility through various examples. The first explores how trucks and trucking move through diesel, while the second gives an example of how the mining sector is enabled by diesel.

Note 1: Diesel

Diesel is a heavy petroleum fuel derived from crude oil by methods of distillation. Diesel fuel is a combination of hydrocarbons that form long chains of carbon and hydrogen atoms. Thus it is a heavier fuel than petrol and evaporates more slowly. Its boiling points range between 150°C to 380°C. It is often described as being quite oily, compared to petrol. Diesel has a high energy density and is thus more efficient than petrol as it contains 10% more energy per gallon than petrol.

Diesel is rated by how easy it is to ignite it and how fast it burns, called its cetane. Diesel is thus safer than petrol as its vapours do not ignite as fast or explodes as easily as petrol vapours. There are two types of standardised diesel, diesel 1 and diesel 2, depending on the cetane number. The higher the cetane number, the higher the volatility of the diesel. Truckers usually use diesel 2 to transport heavy loads for long distances because it is less volatile than diesel 1. Also measured by its viscosity, it gets thicker and cloudier as it gets into conditions with colder temperatures.

Diesel is used by trucks, machinery in mining, and agriculture that have diesel engines. It also has a high energy density and takes less refining to get to the finished product. The demand for diesel is extremely high because it is used for so many different operations and industries such as diesel trucks, buses, equipment used in agriculture and mining, freight transport and power generators. This makes diesel incredibly important as an agent and a driver of the commercial and industrial economy in Cape Town.

Note 2: Diesel transport

Diesel is transported from the refinery into its various uses in fuel tankers. Diesel also fuels all the trucks that transport goods around the country.

Trucks in Cape Town travel around 8000km per month. Although diesel is the primary substance being transported, other forms of energy like petrol, paraffin and bitumen are also transported throughout South Africa. Separate tankers are used for paraffin due to its volatility, and for bitumen given its material properties.

South Africa is ranked as one of the most dangerous countries in the world when it comes to road accidents, with 25 related deaths occurring per 100 000 people annually, according to the

World Health Organisation's Global Status Report for 2015. The Western Cape road traffic injury mortality stands at 21:100,000pa. (Arrive Alive, 2015). This context of road safety in South Africa increases the risk of transporting fuel by road as besides road safety issues, the substances transported are highly volatile. For this reason, the trucks are carefully monitored. The concern is not only for driver responsibility, but also for other road users. Cameras installed in the truck cabs constantly film the driver and the road ahead. Any erratic driving triggers the recording device.

Note 3: Trucking and truck stops

Truck drivers earn an average of around R130 000 per annum before tax (R+/- R10 000 /month), but pay scales vary considerably with the lowest paid being as little as less than R60 000 per annum. Truck driving is a largely gendered profession as truck drivers are predominantly men. A 2015 report by the Business Day Live revealed a dire shortage of truck drivers noting that South Africa needs about 15,000 new professional truck drivers every year but is not able to recruit so many. As such, there is a significant gap between demand and supply. According to the Road Freight Association (RFA) "generally drivers are hard to come by as the hours are long or 'nonstandard' due to shifts, transit times, and product specific handling requirements of the times that other processes, like border clearance, mine operations, traffic congestion or retailers, may have. Risks related to crime are higher and there is greater exposure to traffic incidents." This shortage occurs in a context where on the N3 alone, 3,000 trucks travel on the Johannesburg-Durban corridor on average every day, according to research from the University of Stellenbosch.

Truck stops are vital spaces for truckers. They are important for refuelling, but they also function as important social spaces that punctuate the monotony of long drives. The Gulfstream Energy truck stop in Touwsrivier along the N1 is one such example. Touwsrivier is a small railway town in the western cape that is surrounded by farms and nature reserves. It largely functions as a refuelling station for cars and trucks traveling along the N1.

Truck stops offer more competitive diesel prices than most petrol stations, and this truck stop also offers simple and substantial meals. It also has enough space for 15 trucks to park overnight. Braai facilities allow truck drivers to prepare their own meals, which are largely social affairs. The truck stop is often full, where truckers coordinate to meet friends from the road.

The Touwsrivier Gulfstream truck stop is fascinating for another reason. The owner has been experimenting with sustainable energy solutions, providing power for the diesel pumps via solar panels. Solar panels also power the signage. This is an interesting juxtaposition of traditional and sustainable forms of energy.

Note 4: Machinery and mining

South Africa's economy is largely built on mining. Of particular interest to *Puncture Points* is the mining industry in Aggeneys Town in the Northern Cape. Located 65 kilometres west of Pofadder, on the N14. The town was established for the purpose of facilitating the Black Mountain Mine, Africa and Ireland's zinc/lead/copper/silver mine, an underground base-metal operation. The mine itself is situated west of the town.

The BMM is the largest private employer in the Bushmanland and Namaqua region providing employment to over 1300 people in the area. The Gamsberg has a major zinc deposit that is set to be mined via open shaft mining. The ranges of hills, mountains and inselbergs in the area display some of the most diverse and complex geology in Southern Africa including some of the richest known concentrations of copper, lead and zinc. In addition the region is a biodiversity hot spot.

Diesel enables the running of the mine, and the transportation of zinc to the port for export.

Note 5: Mining and biodiversity

The interests of economic development and environmental preservation often collide. Ecologists are increasingly concerned about economic development being touted as more important than addressing environmental issues.

The Gamsberg is deemed a vital Succulent Karoo Biome and there are concerns that the development of the mine will compromise ecosystems. Although environmental activists are wary of the development, the mine assures that steps are being taken through careful conservation planning strategies.

Useful references and resources

- *Kristal Maze, Amanda Driver and Susie Brownie, Mining and Biodiversity in South Africa: A Discussion Paper*
- *Business Day Live: Truck drivers 'in short supply'. http://www.bdlive.co.za/2015*
- *Arrive Alive, An Overview of Road Safety Issues Globally in South Africa and in The Western Cape: https://www.arrivealive.co.za/ 2015*
- *http://www.miningreview.com*

Case 3: Petrol and People

This case explores how petrol is used to power many of the public and private vehicles that move people around the city.

Note 1: Petrol

Petrol is also obtained from the refinement of crude oil, and consists of straightforward aliphatic hydrocarbons, which simply means that it doesn't consist of the more complex benzene ring. It consists of a mixture of hydrocarbons, additives and blending agents, and so the composition of petrol varies widely depending on the crude oil used, the specific refinery process, the product specifications and the balance of product demand.

The additives and blending agents are added to the hydrocarbon mixture to improve the stability and overall performance of the petrol. The additives include: anti knock agents, anti-rust agents, anti-oxidants, anti-icing agents, lead scavengers, upper cylinder lubricant detergents and dyes. At the final product, Petrol typically contains more than 150 separate compounds. It is a highly volatile and highly flammable substance, with an initial boiling point of 35°C and a final boiling point of 200°C. Most times, other small compounds are added to reduce the build-up of carbon in the engines that use petrol.

Petrol is primarily used for the internal combustion engines found in motorised vehicles such as taxis, cars and motorbikes. It is therefore vital to the mobility of people in and around cities. Petrol is largely distributed from petrol stations.

Note: 2 Petrol stations

There are hundreds petrol stations in the western cape. Petrol stations supply a range of fuel related services, such as lead replacement (LRP) and unleaded petrol. They also supply diesel and some provide LP gas refills. Petrol stations often have shops and ATMs, therefore functioning as refuelling sites for more than just petrol.

In addition, many petrol stations serve as social spaces. In small towns, petrol station restaurants can be popular eating destinations. Some petrol stations function as important nightlife meeting spaces for people en route to other social engagements, or in the case of 24-hour petrol stations, on the way home.

Taxi drivers convene at petrol stations and the airport petrol station has become a crucial meeting space for uber drivers. In the absence of formal employment through the uber system, and in the face of workplace challenges, uber drivers have found the airport petrol station an important meeting point for social engagement.

South Africa does not have self-service fuel options at petrol stations, relying on attendants to service customers, and handle transactions. Petrol attendants earn on average R50 000 per annum (around R4000/month). According to the Fuel Retailer's Association, petrol stations employ around 70,000 people across the country. The South African government is set to implement a national minimum wage in 2016 and is currently seeking council on what that amount should be. Petrol attendants fit within this minimum wage framework and analysis of the minimum wage context in South Africa can be followed via research by the International Labour Organisation.[1]

Note 3: Private and public transport

Cape Town's Transport Picture 2015 reveals that 48% rely on private transport, 95% of who are in high or middle-income communities. There are around 790,000 registered cars in Cape Town.

52% of Capetonians rely on public transport, and 98% of those who take public transport are low to low-middle income earners. The most well used form of public transport is minibus taxis (323 263 passengers a day), followed by trains, and finally buses (240,000 passengers a day). The average transport cost for people using public transport in South Africa is 45% as opposed to the global average that is 5-10%. It can cost around R800/month to transport children to school and back.

The public transport network is comparably efficient, but it still takes people living in Khayelitsha but working in town, an average of around an hour and a half to travel 30km in rush hour traffic. The City of Cape Town has tried to address this through the implementation of public transport lanes on incoming routes. This has allowed more rapid routes into the city, but the lanes are not yet allocated for the exit route. This means it takes people a long time to get home to families. Transport interchanges can be unsafe and people can wait for transport for long periods of time.

Given urban sprawl and persisting neighbourhood segregation, transit-oriented development (TOD) has become a priority for the City of Cape Town. TOD refers to the maximisation of public transport; the assurance of safe and high quality interchanges points and access points to the transit system; and the optimisation of land use mix and density across transport networks. TOD is seen as an essential way of addressing spatial segregation and finding more equitable access to the city.

1 See International Labour Organization, 2015. Towards A South African National Minimum wage. http://www.lrs.org.za/docs/National%20Minimum%20Wage%20Booklet.pdf

Useful references and resources

- *Kristal Maze, Amanda Driver and Susie Brownie, Mining and Biodiversity in South Africa: A Discussion Paper*
- *http://www.miningreview.com*
- *Centre for Transport Studies, UCT: http://www.cfts.uct.ac.za/*
- *http://www.tct.gov.za/docs/widgets/145/TCT_Infographic.png*
- *BusinessTech, How much money petrol attendants earn in South Africa. 2016.*
- *Integrated Public Transport Network Plan 2032 (City of Cape Town Transport Authority)*

Case 4: Jet fuel and Jetsetting

This case explores the role of jet fuel in fuelling global mobilties and local economies.

Note 1: Jet fuel

Jet fuel, also known as aviation turbine fuel and avtur is used to fuel aircrafts using gas-turbine engines. Jet A and A-1 are the most commonly used form of jet fuel, used predominantly in commercial aviation. Jet A-1 is the international standard and is unleaded kerosene based. Jet fuel is made up of difference hydrocarbons that are calculated according to freezing or smoke point. Jet A-1 has 8-16 carbon atoms per molecule. Jet B is a naptha-kerosene based fuel and is quite similar to diesel fuel.

The increase in commercial aviation has resulted in kerosene being over 5% of fuel products derived from crude oil. A range of additives, such as antioxidants, antistatic agents, corrosion inhibitors, fuel system icing inhibitors, biocides and metal deactivators contribute to the preservation of engines.

Jet fuel is translucent and a pale yellow and is produced in refineries through distillation. Jet fuels have a boiling point between 150-270 degrees. Around 3000 tonnes of jet fuel are produced in a typical refinery a day.

Jet fuel has a density of 775.0-840.0 g/L; a melting point of -47 degrees C; a boiling point of 176 degrees C; and a flash point of 38 degrees C.

Note 2: Cape Town Airport

Opened in 1954, Cape Town International Airport is the main airport serving the City of Cape Town. The airport now has 24 airlines operating across around 100 destinations. It is the third largest airport in Africa and more than 8 million people move through the airport in a year. It is therefore an important transit node on the continent, and given Cape Town's focus on tourism, is an important entry point into the city.

It is located on the periphery of the city, 20km from the city centre. It is neatly tucked into the surrounding low income areas such as Gugulethu, Nooitgedacht, Delft and Belhar on the East of the Metropolitan. In 2011 it had an estimated 4.5 million passengers passing through its terminals connecting the rest of the world to the City. It is accessible from the N2 to the city centre, the R300 to surrounding metro South East sectors and the M10, M12 and M22. The MyCiti bus rapid system provides a public transport via a shuttle service to the City centre and there are also private metred taxis that provide accessibility from the airport to the city centre. The official

address of the Airport is located in Matroosfontein, a poor, residential area. Martoosfontein is 13.5 square kilometres in size and has a population of 27 730 people and a density of 2047.6 people per kilometre.

Note 3: Tourism

Tourism is an important economic driver in Cape Town. In 2014 foreign direct spend in Cape Town was R13,6 billion and domestic spend was R1,9 billion. These figures are aligned to an urban development strategy adopted by the city of Cape Town in 1999 called city improvement districts (CIDs) [and on the public–private partnership (Cape Town Partnership or CTP) that oversees and manages them in the central city] centred on local development and revitalization. CIDs are selected zones or districts within the city where property owners pay additional fees to access superior services from the municipality with respect to policing, cleaning, and marketing. The Cape Town CID strategy was promoted as a means to fight "crime and grime," to bring in tourism, foreign investment and in short to turn Cape Town into "the Apple of Africa"—that is, a world class city (Miraftab, 2012:295). Thus for example the successful bid by Cape Town for the World Design Capital for 2014 was coordinated by the Cape Town Partnership (CTP).
In a sense, Houssay-Holzschuch (2015: 5) speaks of the CID framework as a neo-liberal strategy that generates "processes of commodification, touristification, beautification, and privatization of public spaces."

However, the value of tourism is contested along a core/periphery framework that benefits the core and the expense of the periphery. According to Miraftab (2007), to create the image of a world-class city and pose as a desirable destination for global capital and tourism, CTP uses regulatory practices that socially sanitize public space in the city's CIDs. This has consequences for car guards, informal traders, the homeless and street kids. It is therefore no surprise that demand for property from foreigners amounted to about 16% of actual sales in the CBD and 11% of the City Bowl for the year ended July 2016 with rising demand as "well-priced apartments literally still fly off the shelf within a month as buyers look to acquire an asset in this high growth area and turn it into an Airbnb money spinner" (Property Wheel, 2016). Given the historical context of Cape Town, the strategy to position the city as a global city and prime destination for tourism and capital potentially reinforces historical spatial divisions.

Note 4: Flight Paths

While aviation enables flows of people and capital, it also has a negative environmental impact. The carbon-based gases emitted from aircraft engines are contributing to climate change. Despite innovations in cleaner fuels, the environmental impact of flying is only set to increase. A single return flight between Cape Town and London results in 2,66 tons of carbon emissions.

In addition, high levels of air and noise pollution are recorded for areas surrounding airports. This has led to higher incidents of pollution-related asthma.

Useful references and resources

- *City of Cape Town Tourism*
- *Climate Care*
- *Faranak Miraftab, Governing Post Apartheid Spatiality: Implementing City Improvement Districts in Cape Town. Antipode , A radical journal of Geography. 2007.*
- *Faranak Miraftab, Colonial Present: Legacies of the Past in Contemporary Urban Practices in Cape Town, South Africa. Journal of Planning History 11(4) 283-307. 2012.*
- *Myriam Houssay-Holzschuch, Dis-locating public space: Occupy Rondebosch Common, Cape Town, Environment and Planning A*
- *0(0) 1–17. 2015.*
- *http://propertywheel.co.za/2016/09/tourism-airbnb-growth-boosts-cape-town-cbds-property-market/*

Case 5: Paraffin

This case explores the relationship between paraffin and society, particularly the urban poor in Cape Town given its widespread use as a cheap alternative by those who do not have access to electricity.

Note 1: Paraffin

Liquid paraffin is a highly refined mineral oil commonly used for various functions in the domestic, pharmaceutical, cosmetic and food industries. It is a transparent, colourless and mostly odourless liquid but may start to have an odour similar to petrol once heated. It has an initial boiling point of 175°C and a final boiling point of 253°C and is made through the distillation of crude oil.

Paraffin has been used as a lighting source since as early as the 9th Century, and was used to light streetlights in the 1800s prior to the distribution of electricity. Paraffin is stored and transported around the country in order to meet the demands of the population. Paraffin is stored in Cape Town harbour, transported by big transport companies and circulated around the country from mega trucks to the 750ml bottles used to light, heat and provide cooking facilities homes. It is currently used by around half of South African households but is also highly flammable.

Note 2. Paraffin distribution

Paraffin is produced at refineries, and also stored at storage terminals in the Port of Cape Town. Paraffin is collected in tankers of 16 000l / 30 000l / 40 000l, who in turn distribute smaller amounts to a wide range of clients. Clients generally order around 16 000 litre and then distribute to smaller subsidiaries. Wholesalers then sell to a range of buyers, including walk-ins with 10-25 litre drums. Paraffin is distributed widely throughout Cape Town's townships (such as Philippi, Gugulethu, Khayelitsha, Masiphumelele and Nyanga), and retails from supermarkets, spazas and street traders.

Note 3: Paraffin use

Paraffin is an essential household item in many people's homes. In the absence of reliable and affordable electricity, half of the population use paraffin for lighting, heating and cooking. Although gas is safer, the bottles are heavy and complicated to exchange without private transport. A 750ml bottle of paraffin is easier to manage than a 9kg bottle of gas.

Each year a major challenge is that paraffin runs out in winter. This poses a significant challenge to livelihoods and everyday life in Cape Town. The lack of paraffin stems from a two-fold problem.

The first is that even though there is high demand, the volume in demand is cumulatively not as much as substances such as diesel and therefore not always in abundant supply. The second is that scarce resources are lucrative resources so some stock pile paraffin for winter.

Many middlemen earn profits in between the harbour and the home. The price difference can fluctuate between R7 per litre bulk retail and R17 per 750ml domestic retail.

Note 4: Paraffin and Informal Settlements

The relationship between paraffin and informal settlements in unique as informal settlements exist within the periphery realm of cities such as Cape Town as outliers of complex urbanisation processes.

According to Pithouse [2008] “We need to accept that people will continue to migrate to the cities in search of opportunity, that shack settlements will continue to be an important safety net for city people who cannot afford formal housing and that being able to live close to opportunity will continue to be more important for many people than living in a formal house.” Most shack settlements are not electrified which leaves paraffin with its highly flammable nature as the primary source of energy for these communities. This intricate intersection between paraffin and informal settlements creates unfortunate risks and hazards.

38% of paraffin related fires come from stoves exploding, which is due both from the volatility of paraffin and cheaply manufactured stoves. 23% of fires start from stoves being knocked over. 2% are the result of stoves left unattended (PASASA). As such, the context in which paraffin finds itself as the primary source of energy is unfortunately seemingly already disposed for one disaster or another.

Case 6: Bitumen and Arteries of Asphalt

Asphalt (bitumen) is essential in enabling the metabolic flows of energy. This case therefore explores the role of bitumen and in particular roads are in the flows of fuel through the Western Cape and around Cape Town.

Note 1: Bitumen

Bitumen, alternatively referred to as asphalt, is primarily used in road making. It is a black, sticky substance and although occurs naturally in some instances, is largely a by-product of the crude oil refinement process. It is also used as a waterproofing product for roofing. Bitumen is made up of saturates, napthene aromatics, polar aromatics and asphaltenes. It is commercially produced from petroleum. It has a boiling point of over 500 degrees C. It is produced through a vacuum distillation process. it is stored and transported at 150 degrees C.

Bitumen was also used as early as in the 1800s in photography. A thin layer of bitumen was placed on a pewter plate and exposed to light in a camera. When washed with a solvent, only the light exposed areas remained. These early nature photos are the oldest on record. Bitumen was also used in paints, but proved unstable and corrupted other pigments.

Note 2: Roads

Roads are often taken for granted and are only noticed when they fail or fall apart. Roads connect cities, suburbs and enable the endless flow of people: coming and going and circulating from here to there and imaginable anywheres. Roads are made from bitumen, which is a by-product of turning crude oil into diesel and are the surfaces that trucks travel to distribute fuel and goods around the country.

Cape Town has 11700km of roads and 1500 traffic lights. 21% of people use walking as their primary mode of mobility, which signals the importance of pavements being included in the conception of roads. Pavement trade, despite restrictive urban by-laws, largely enables the informal economy.

The materiality of roads is also interesting. Bitumen is used because of its durability and its ability to tame nature in the interests of urban growth.

Note 3: Asphalt arteries

There are three main road arteries that distribute and connect the country's energy flows.

The R27 is the energy highway of the Western Cape. It runs from Cape Town, up the west coast to Velddrift. The dunes of Atlantis and the tropically warm lagoon of Langebaan are familiar to tourists and the R27 has its own tourism website (http://www.r27.co.za). The origin of the route was not tourism, but rather the energy industries running between Saldanha Bay and Cape Town. Crude oil moves between Saldanha Bay and the refinery. Also situated on the stretch of road is a power station, which is largely powered by diesel, and sends electricity out into the South African grid.

A national road, the **N1** stretches from Cape Town across the country, through towns like Bloemfontein and Johannesburg, and ends at the Beit Bridge on the border of South Africa and Zimbabwe. It is the main connector between Cape Town and Johannesburg and a route frequented by commercial, private and public transport. The N1 cuts through the city of Cape Town, connecting the central suburbs to those on the outskirts.

Also a national road, the **N2** stretches from Cape Town, along the coast connecting Cape Town to the Indian Ocean east coast cities such as East London and Durban. The N2 is a crucial connector between the western and Eastern Cape and thousands of people commute between their homes in in Cape Town and in towns all over the Eastern Cape. It also connects businesses between Cape Town and other coastal cities.

Note 4: Roads and Society

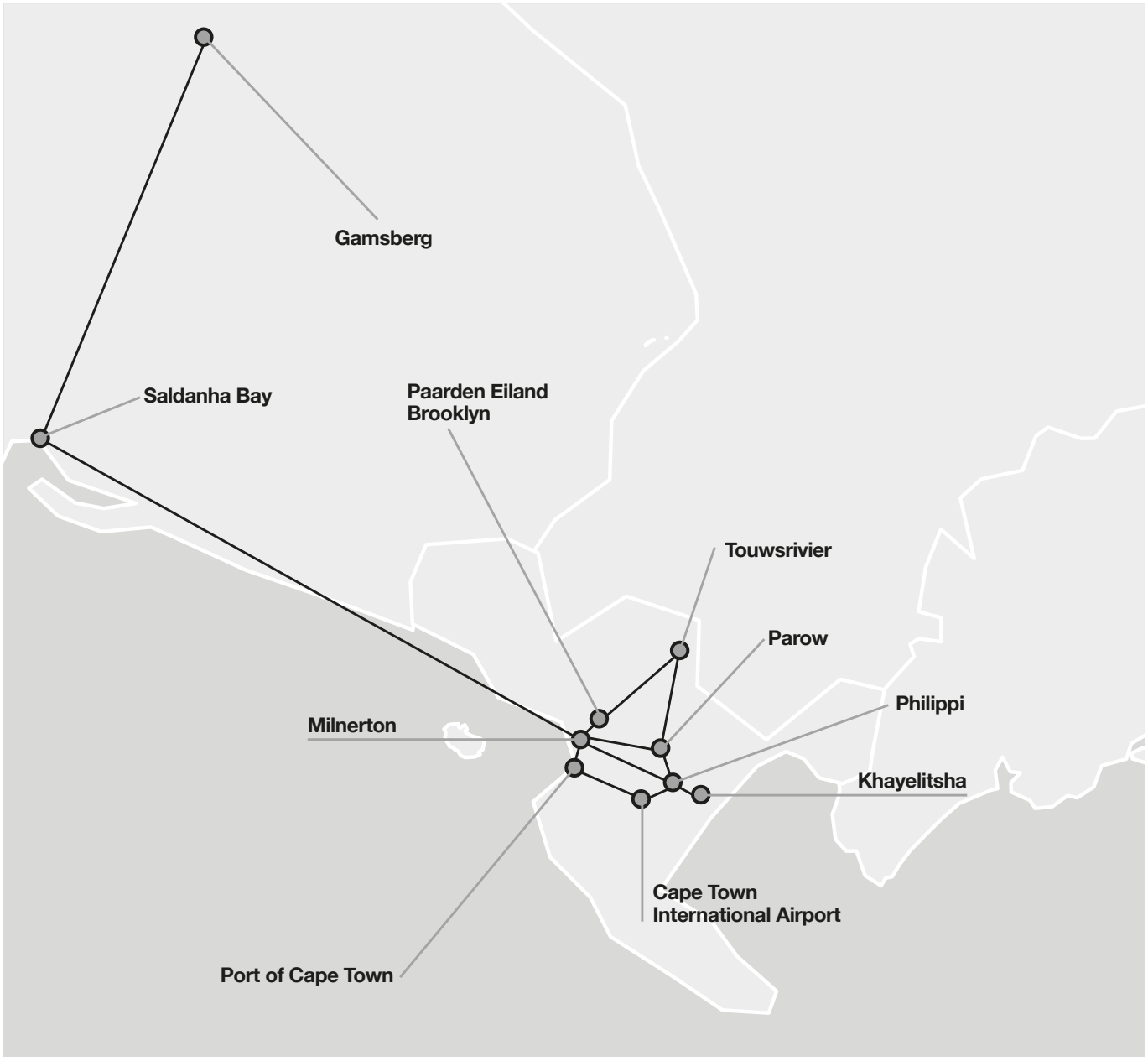
Roads are essential to functional economies and are the paths that connect our social and cultural lives. But roads can also be dangerous. There is a much greater risk of being hit by a car than being eaten by a shark, yet great whites have captured the imagination of our nightmares more than any stretch of asphalt. 4500 people were killed on South African roads 2014/2015.

Roads can also be divisive, especially in South Africa where roads as dividers between racial groups were previously used as an integral part in spatial planning. Townships were planned to have single entry and exit points to ensure police could monitor the mobility of people. Looking at Langa, the oldest township in Cape Town, this is mostly unchanged. Although Langa (historically Black), Pinelands (historically White) and Athlone (historically Coloured) are side-by-side, there are few connecting roads between the neighbourhoods. Roads not connecting with each other are one challenge, but large-scale infrastructural projects, like the N2 were also divisive strategies to ensure neighbourhoods remained separated. This has yet to be adequately dismantled.

- *South African Cities Network. The State of South African Cities Report. http://www.socr.co.za/wp-content/uploads/2016/06/SoCR16-Main-Report-online.pdf. 2016.*
- *The Guardian, https://www.theguardian.com/cities/2014/apr/30/cape-town-apartheid-ended-still-paradise-few-south-africa.*

Puncture Points on the Map

Based on the research, the following sites or *Puncture Points* were identified as starting points for engaging artists in the project. Following a snowball approach to the research sites and locations, the research identified the following neighbourhoods as starting points for public engagement. In alphabetical order:



Cape Town International Airport and surrounds

The Cape Town International airport is situated in between some of the poorest neighbourhoods in Cape Town such as Delft, Bonteheuwel, Crossroads, and Nyanga. These areas are also hotbeds of creativity, with many active cultural organisations to tap into. See case 1 and 3.

Gamsberg

Although the Gamsberg is not in the western cape, the intersection of energy and the everyday is typified in similar zones where development and ecology coalesce. See case 2.

Khayelitsha

Khayelitsha is the second largest township suburb in South Africa (next to Soweto in Johannesburg). Khayelitsha has a combination of low and middle-low income residents and also a large number of cultural institutions (such as Lookout Hill) and community based organisations (such as Moholo Livehouse, and many smaller affiliations). See case 4.

Milnerton

Milnerton is populated with both residential and light industrial complexes. It is centrally located within the municipal bounds and has a wide range of mixed-use businesses and organisations. It is also an area with a wide range of emerging cultural studios and spaces. Unitrans operated from Milnerton's industrial zone. See case 2 and 5.

Paarden Eiland / Brooklyn

Like Milnerton, the Paarden Eiland and Brooklyn areas are a combination of residential and light industrial zones. Paraffin is distributed from the border of these two neighbourhoods. This centrally located conjunction of neighbourhoods has high youth unemployment, yet active cultural groups, especially in Hip-Hop. See case 4.

Parow

Parow is a suburb in the northern suburbs of Cape Town where a series of interviews with petrol station attendants were enabled through the research process. Parow is also a culturally marginalised neighbourhood, yet has a rich history of music production in various genres (recently popularised by Die Antwoord and Jack Parow). See case 2.

Philippi

Philippi, neighbouring Khayelitsha, is also a low to middle-low income area. In addition to being residential it is also a key agricultural zone for the region. It is also undergoing rapid development as an alternative economic epicentre for Cape Town. Much like other neighbourhoods, there is a rich but largely marginalised culture and design industry. See case 4.

Port of Cape Town

The Port of Cape Town is an important storage node for fuel and this is set to intensify with the building of the Burgan storage site. It also holds an important position as an entry and exit point for economic flows for Cape Town. See case 1.

Saldanha Bay

Saldanha Bay is a key entry point for crude oil and exit point for various exports into the global market. See case 1.

Touwsrivier

Touwsrivier is one of the important refuelling points that enables fuel and goods flows throughout the western cape, and connects the *Puncture Points* in Cape Town with the rest of the country. See case 2 and 5.

Conclusion: Interacting at the *Puncture Points*

The purpose of this research has been to draw on a series of examples of how energy and the everyday intersect in the western cape as a background for artists proposing to participate in this project. It has shown how *Puncture Points* are marked by different social entanglements. They are the points at which one form of energy morphs into another: where crude turns into diesel and where paraffin turns into heat for millions of homes. They are refuelling points that enable the circulation of vehicles, and they are the social points where the people moving these vehicles fulfil communal needs. They are simultaneously physical places, and conceptual spaces where different interests may coalesce, and sometimes collide.

The stories in this research highlight the complex material and social relationships when thinking through energy and the everyday. On the one hand energy is the lifeblood of cities, enabling almost every facet of urban life, on the other it is also troubled by socio-environmental concerns. It is too simplistic to view energy as only either the former and the latter. This research proposes that the concept of *Puncture Points* provides a more nuanced lens through which to understand energy and everyday entanglements. *Puncture Points* are therefore moments of intimate interaction, where the global and local meet in myriad messy and magical ways. In the light of this, the research provides an entry point for artists: a set of provocations for analytical and artful enquiry and expression.

Disclaimer: this research does not necessarily represent the views of the donors.