

Ever wondered what the future will look like?

Concerned about humanity's impact on the planet?

We asked hundreds of school children, writers, scientists, engineers and comic artists to visualise their ideas. This book, the sequel to the acclaimed 'Dreams of a Low Carbon Future', imagines a positive future where we are not only adapting to climate change but thriving in a sustainable, low carbon and equitable world.

The news is full of doom and gloom regarding the future. Through the medium of comics and science-fiction art, and informed by the ideas of leading thinkers, we instead celebrate the efforts to understand our impact on the planet, and to create a more sustainable future.

*"A Dream of a Low Carbon Future' attempts a very difficult task - to inspire people with a positive vision for a sustainable, low carbon future which avoids totally catastrophic climate change but doesn't shy away from some serious impacts we're already heading for. Unusually, comics and sci-fi art have been used to show what living in such a future might be like. When problem-solving, it is often vital to draw a rough sketch of the desired outcome as a guide. This graphic novel is the equivalent of that rough sketch"*

From the foreword by Jeremy Leggett, author of "The Winning of the Carbon War"

*"It is a huge challenge to create a positive narrative of the future. 'A Dream of a Low Carbon Future' adopts the unique approach of a collaborative graphic novel with contributions from scientists, artists, writers, students and school children to build a remarkable vision of tomorrow. If you are concerned about humanity's impact on the planet, and want to help create a better future, you should read this book for inspiration."*

Paul Gravett, author of "1001 Graphic Novels You Must Read Before You Die"

*"How incredibly refreshing to have a book about the future that is wonderfully positive, whilst remaining wholly realistic about the challenges that lie ahead. It's so creatively designed and executed, and so full of provocative and fascinating ideas, that it provides the perfect antidote to all those who feel crushed by despair at the still worsening fate of our dear and precious Planet."*

Jonathon Porritt, Founder Director, Forum for the Future

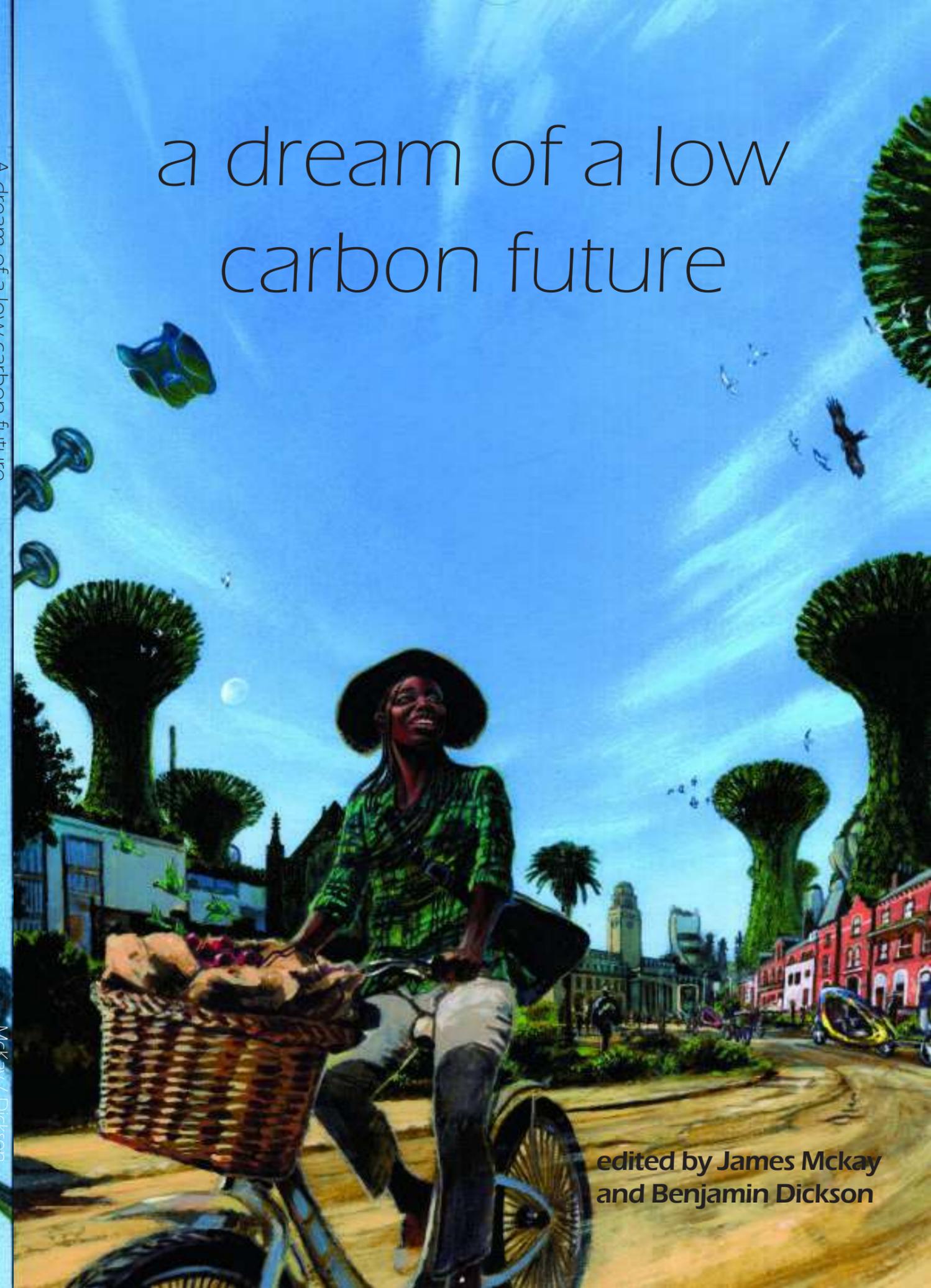
Cover art by James McKay  
Cover design by Benjamin Dickson

# a dream of a low carbon future

A dream of a low carbon future

McKay / Dickson

edited by James McKay  
and Benjamin Dickson



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Unless hand-drawn, all lettering, composition and design is by Benjamin Dickson

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 Page 7—Energy transition by Mark Wilkinson  
 Page 10/56/61/88-90— Art by Corban Wilkin, partial text by Corban Wilkin, based on a concept by Liz Stainforth  
 Pages 11-20 - Blue Pearl text adapted from 'Half Gone' by Jeremy Leggett  
 Page 16/17—Catalhoyuk landscape art by John Swogger  
 Page 22— Intro text (1st paragraph) by Sam Pickard  
 Page 23 and 80—Elmet maps by Jeffrey Linn  
 Page 24—edited text by Clare Linton and Rachael Unsworth  
 Page 26/27—edited text by Eddy Mitchell and Rachael Unsworth  
 Page 28—Lea text by Caroline Hellgren, Co-op text by Hannah McCann  
 Page 29—Myrtille text by Katrina Adam, Tiernan text by Eddy Mitchell  
 Pages 30-33—Permaculture Principles courtesy of the Permaculture Association, art by Emma Chinnery  
 Page 33—Forest Garden captions adapted from 'Forest Gardening' by Robert Hart  
 Page 38—tree art by Kirn Jutlla  
 Page 39-43— Energy text fragments by Steve Hall  
 Page 48—Transport text by Rachael Unsworth  
 Page 49—Cycle map by Robin Lovelace, Transport Hub by Grisha Grebennikov, Airships by Mark Wilkinson  
 Page 50/51—Health text by Iona McCleery, fragments from Jannik Giesekam  
 Page 52—Monday text by Elena Trowsdale  
 Page 53—Leeds Cycling art by Emma Chinnery  
 Pages 54-55—City text by Rachael Unsworth,  
 Pages 58-60—Blue Pearl text adapted from 'Half Gone' by Jeremy Leggett  
 Pages 62/63—Perils of Progress text and art by Joel Millward-Hopkins  
 Page 64-69—Gaian Bioeconomy text adapted from resources provided by Dan O'Neill  
 Page 68—Industrial ecosystem text adapted from 'Reinventing Fire' by Amory Lovins

Page 72—Ames Ruben text by Corban Wilkin  
 Page 73—Lynx and Dales habitat text by Mark Fisher  
 Pages 74/75—Salico text fragments by Dougie Phillips, Little Greenby art by John Swogger, 'Little Greenby' title by Gillian Finnerty  
 Page 76—Arcology art by John Swogger  
 Page 77—Sar-Zhen text by Justin Waine; concept by Paul Williams  
 Page 78—Doggerland art by John Swogger, maps adapted from National Geographic Dec 2012  
 Page 80 and 82—portraits by Hannah McCann  
 Page 83—Iat Chong Restaurant text by Aidan Smith  
 Page 84/85—Settlement by John Swogger, Phaedra portrait by Hannah McCann, Phaedra text by Eve Carcas, Sea King language by Mia Mckay  
 Page 86—Religion text by Andrea Franklin, quotes from Luther Standing Bear; "Evergreen"—poem by Jonathan Hirst aka Joe Nodus  
 Page 87—Leaving for PanArctica art by Hannah McCann  
 Page 88—90 text adapted by Corban Wilkin from story by Jamie Bright  
 Page 90—Elmet text by Rachael Unsworth  
 Page 94—Photos of workshop by Anna Woolman, art by students from Mirfield Grammar School; Skipton Girls High School; Wakefield City Academy; David Young Academy, Leeds; Nicolas Hawksmoor Primary School, Towcester; Priesthorpe School, Leeds; Leeds Grand Mosque Scout group; King James School, Knaresborough  
 Page 95/96—Knowledge and Imagination Resources reading list compiled by Rachael Unsworth  
 All other art and text by James Mckay

The editors apologise for any omissions or mistakes in the above attributions

Thanks to the following models!

"Cast" in order of appearance:

Maia—Michelle Akure  
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 Japhet—Kiran Parmar  
 Tina Vieri—Iona McCleery  
 Shamina Laloo—Paula McNamee  
 Governor Chimalagi—Yeshui Zhang  
 Ames Ruben—Ramzi Cherad  
 Sebastiao Salico—Dougie Phillips  
 Religious girl—Andrea Franklin

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# a dream of a low carbon future

edited by James Mckay and Benjamin Dickson  
with a foreword by Jeremy Leggett

*'The oldest task in human history – to live on a piece of land without spoiling it'*  
– Aldo Leopold



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# Acknowledgements

As editor and project manager, James McKay would like to thank Prof Paul Williams, Director of the EPSRC Centre for Doctoral Training in Low Carbon Technologies; Prof Jenny Jones, Director of the EPSRC Centre for Doctoral Training in Bioenergy; and Prof Piers Forster, Director of the Priestley International Centre for Climate at the University of Leeds for all their support and encouragement throughout the 'Dreams of a Low Carbon Future' projects.

This project developed from 'Dreams of a Low Carbon Future' supported by the Royal Academy of Engineering's INGENIOUS scheme for science outreach, shortlisted for the NCCPE Engage Awards 2014. Details can be found on the Academy's website.

Thanks also to:

George Monbiot, author of 'Feral' and 'Heat'; Jonathon Porritt, author of 'The World We Made'; Derrick Jensen, author of 'Endgame'; Jeremy Leggett, author of 'The Energy Of Nations' for use of his story 'The Blue Pearl'; Prof Sir David Mackay, author of 'Sustainable Energy Without the Hot Air'; Prof Kate Pickett, co-author of 'The Spirit Level' for delivering a workshop to the project students; Dr Dan O'Neill and Dr Rob Dietz, authors of 'Enough is Enough' for supporting and inspiring the project and content for the Gaian Bioeconomy section; Prof Thomas Stocker of IPCC; Prof Kevin Anderson, Tyndall Centre for Climate Change Research; Sir Alan Langlands, Vice-Chancellor, University of Leeds; Prof Patricia Thornley, SUPERGEN Bioenergy Hub; Paul Gravett, author of '1001 Graphic Novels you must read before you die'; Corinne Pearlman, editor, Myriad Editions; Lydia Wyzsocki, Applied Comics Network; Roger Martin, Population Matters; Gavin Wood, CTC Cycling; Joe Atkinson, UK Permaculture Association; Jeffrey Linn, for his amazing sea level rise maps; Laurie Goering, Thomson Reuters, for coverage of the project; Dr David Carlson, Director, World Climate Research Programme; Mara Dambour and Rowanna Cromerford of EUMETSAT, Darmstadt Germany, for an invitation to contribute art to the EUMETSAT Climate Symposium, October 2014; Paul Manners, Director of the National Coordinating Centre for Public Engagement (NCCPE), and Sophie Duncan, Becci Feltham for the invitation to host a project session at the Engage Conference December 2014; Tudor Gwyn and Liz Peniston at Eureka! Children's museum Halifax for invitation to a workshop on a new gallery based on Sustainability; Laura Winter, Jo Trigg, Manisha Laloo and Ben Gammon of the Royal Academy of Engineering INGENIOUS scheme; Justin Waine, for discussions on economics; Dr Rachael Unsworth; Miriam Unsworth for proofreading the book; Sara Kettle; Pete Short and Mark Cleaver, RSPB; Dr Simon Mair, Centre for Understanding Sustainable Prosperity; Joe Nodus for his poems; Prof Andrew Heyes, University of Strathclyde; Dr Timothy Foxon, University of Sussex, for use of the Thousand Flowers concept; Jeffrey Bennett, author of 'A Global Warming Primer'; Julia Meaton, University of Huddersfield, who encouraged us to incorporate Permaculture into our future vision.

**Support staff at the University of Leeds:** Emily Bryan-Kinns, Margo Hanson, Kate Lock, Andrea Franklin, Patricia Gray, Ged Hall, Nicola Smith, Deborah Fraites, Kerry Baker, Pre Carbo, Ruth Holland and the Access and Engagement Team, James Dixon-Gough, Mike Howroyd, Claire Bastin and the Sustainability Services Team, Lizzie Reather, Alexa Ruppertsberg, Liz Stainforth, Katie Tapply, Isabel Cotton, Emma Richardson, Jennifer Scattergood.

**Academics at the University of Leeds:** Prof Peter Taylor, Prof John Barrett, Prof Alison Tomlin, Prof Andrew Shepherd, Prof Piers Forster, Prof William Gale, Dr Charlotte Haigh, Dr Dominick Spracklen, Dr Robin Lawlor, Dr Iona McCleery, Dr Chunfei Wu, Dr Katy Roelich, Dr Catherine Bale, Dr Dan Trowsdale, Dr Andy Turner, Dr Steve Carver, Dr Mark Fisher, Dr Olivia Rendon, Dr Dan O'Neill, Dr Paul Chatterton, Dr Robin Lovelace, Dr Lauren Gregoire, Dr Cat Scott, Dr Steve Hall, Dr James Witts, Dr Jonathan Ward

## **PhD Research Students in the EPSRC Centres for Doctoral Training in Low Carbon Technologies, Bioenergy and Next Generation Nuclear:**

Katrina Adam, Robert Bloom, James Hammerton, Vicky Hoolohan, Kelly Marsh, Jennifer Norris, Kate Palmer, Dougie Phillips, Aidan Smith, Chris Vingoe, Dave Allen, Jamie Bright, Stephen Chilton, Joshua Cottom, Lloyd Davies, Ben Dooley, Harriet Fletcher, Eddy Mitchell, Morgan Tatchell-Evans, Thom Best, Ruth Bush, Andy Dixon, Ray Edmunds, Holly Edwards, Jannik Gieseckam, James Gooding, David Jacques, Ross Jarrett, Clare Linton, Rici Marshall, Paula McNamee, Richard Riley, Joanne Robinson, Helen Saunders, Chris Smith, Gemma Brady, Zarashpe Kapadia, David Wyatt, Jayne Windeatt, Philippa Usher, Ramzi Cherad, Tom Lynch, Sam Pickard, Hannah James, Gillian Harrison, Philippa Hardy, Shemaiah Weekes, Diarmaid Clery, Luke Conibear, Andrew Dyer, Gillian Finnerty, Oliver Grasham, Hana Mandová, Tomi Oladipo, Kiran Parmar, Lee Roberts, Charlotte Stead, Robert White, Richard Birley, Ella Blanquet, Natalie Brown, Julius Gane, Chris Holt, Christian Michelbach, David Potter, Iram Razaq, Samantha Sime, Daisy Thomas, Weiyi Yao, Nicola Wood, Jeni Spragg, Charlotte Weaver, Jessica Shiels, Charlotte Parrington, Jaiyana Bux, Helen Freeman

**Other students:** Jonathan Carruthers-Jones, Jonathan Acomb, Yeshui Zhang, Joel Millward-Hopkins, Elena Trowsdale, Mitchell Gregory, Anna Woolman

## **At King James and St John's C of E Schools Knaresborough:**

Teachers Mark Birch, Steve Hutchinson and Rowan Feltham; Amy Ross and Faye Pashby and their students

**At Leeds Grand Mosque Scout Group:** Ismail Saddiq and students

**At Priesthorpe School:** Teachers Tom Butterworth and Peter Solowka and their students.

**Artists:** Corban Wilkin, Emma Chinnery, Hannah McCann, Mark Wilkinson, John Swogger, Kirn Jutla, Grisha Grebennikov

National Geographic magazine provided the inspiration for the format of some parts of the book and reference for many of the pictures. The documentary photographs of Sebastiao Salgado, Don McCullin, Francis Frith, Frank Sutcliffe, Godfrey Bingley and Dorothea Lange were also an inspiration, along with 19th C Yorkshire scenes by the painter John Atkinson Grimshaw, the science-fiction and fantasy art of Jim Burns, Simon Stålenhag, Léo, James Gurney and Syd Mead; and the environmental art of Helen Mayer and Newton Harrison.

Some art was created as part of the EU-funded "Bottom-Up Climate Adaptation Strategies Towards a Sustainable Europe" (BASE) project 2016, a Department for Transport Funded "National Propensity to Cycle Tool" project, 2015 - 2016, Edinburgh International Science Festival 2015, British Science Festival 2015, Future Cities workshop Leeds 2014, Leeds 2050 Cycling Campaign 2014.

The Intergovernmental Panel on Climate Change (IPCC) 5th Assessment report 2014, and UKCP09 predictions by the Met Office were used as reference for climate and impacts but artistic license was taken. We used some of the most gloomy scenarios for climate (RCP 8.5) to illustrate negative impacts, then went further (e.g. for sea level rise). We used the most optimistic projections for reduced emissions (e.g. Shared Socio-Economic Pathway SSP1—Taking the Green Road after O'Neill 2014) and again took these further. The aim was to visually highlight some of the most damaging consequences of climate change at the same time as being as optimistic as possible about our ability to deal with them.

# Foreword

*“The combined effects of population growth and climate change, and the implications in terms of political upheaval, global health and energy, food and water security are almost unimaginable for someone of my generation. I want to live in a society that is ready for these challenges – willing to take on board new ideas, insights and technological innovations that challenge convention in defining and responding to human welfare challenges relating to health, education, environmental degradation, human rights, conflicts and governance.”*

Sir Alan Langlands (Vice-Chancellor, University of Leeds)

***“So we have to do the impossible and imagine the next century. The default probability is bad – not just dystopia, but catastrophe, a mass extinction event that we will have caused and then suffered ourselves. That’s a story we should tell, repeatedly, but it’s only half the probability zone. It is also within our powers to create a sustainable permaculture in a healthy biosphere.”***

Kim Stanley Robinson (author of *Red Mars*, 2312) quoted in *Nautilus* online magazine July 2014



The aim of this book is to illustrate some ideas about a positive, low carbon future, along the lines that Kim Stanley Robinson has outlined above. By all accounts this has been hard work! The implications of climate change, and the necessary transition to a low carbon future, provide a truly daunting challenge.

This book attempts a very difficult task - to inspire people with a positive vision which avoids totally catastrophic climate change but doesn't shy away from some serious impacts we're already heading for.

Unusually, comics and sci-fi art have been used to show what living in such a future might be like. Contributions have come from hundreds of school children, artists and other members of the public, dozens of PhD research students, and also from experts in many fields including energy, sustainability, low carbon housing, ethics and so on. The editors have tried to take into account many diverse contributors' perspectives throughout the book – very difficult to do.

There are many different potential outcomes to our present predicament, but how do we enable a positive future? Many have tried, and few can agree. Most admit their visions are troubling. Many people have closed their minds to “dystopia” (a bad future)—or succumbed to despair. This book is remarkable for the fact that it aims to influence

through optimism—by showing (literally) what a positive future would look like and feel like.

It is difficult to see a way forward when our problems are so large, complex and full of uncertainty. If we could be more certain of a good place we wanted to get to, it would be easier for us to make changes today.

This book shows one view. It's a start. The editors freely admit it is little more than a 'sketch' or a 'concept design'. When problem-solving, it is often vital to draw a rough sketch of the desired outcome as a guide. This graphic novel is the equivalent of that rough sketch. It's not a blueprint—there are many things left unresolved or only hinted at. The editors invite readers to use their imagination to fill in gaps or inconsistencies. If this inspires people to think more deeply about our future, it will have rendered an important service.

*Jeremy Leggett, author of 'The Winning of the Carbon War' and 'Energy of Nations'*

If you would like to find out more about this project, please contact editor James Mckay

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Or visit [www.engineering.leeds.ac.uk/dtclowcarbon](http://www.engineering.leeds.ac.uk/dtclowcarbon)

First published 2016 by University of Leeds  
We would be delighted if the project art and ideas were used and widely disseminated for educational purposes, but please notify the creators first (via the email above) and credit appropriately.

All art is © individual creators 2016

All mistakes and omissions are the editors'.

All views and opinions are those of the individual creators and do not represent the supporting organisations.

Printed on 100% recycled post-consumer waste.

**This project is dedicated to the memory of  
Prof David Mackay and Dr Andy Dixon**

### HEALTH WARNING:

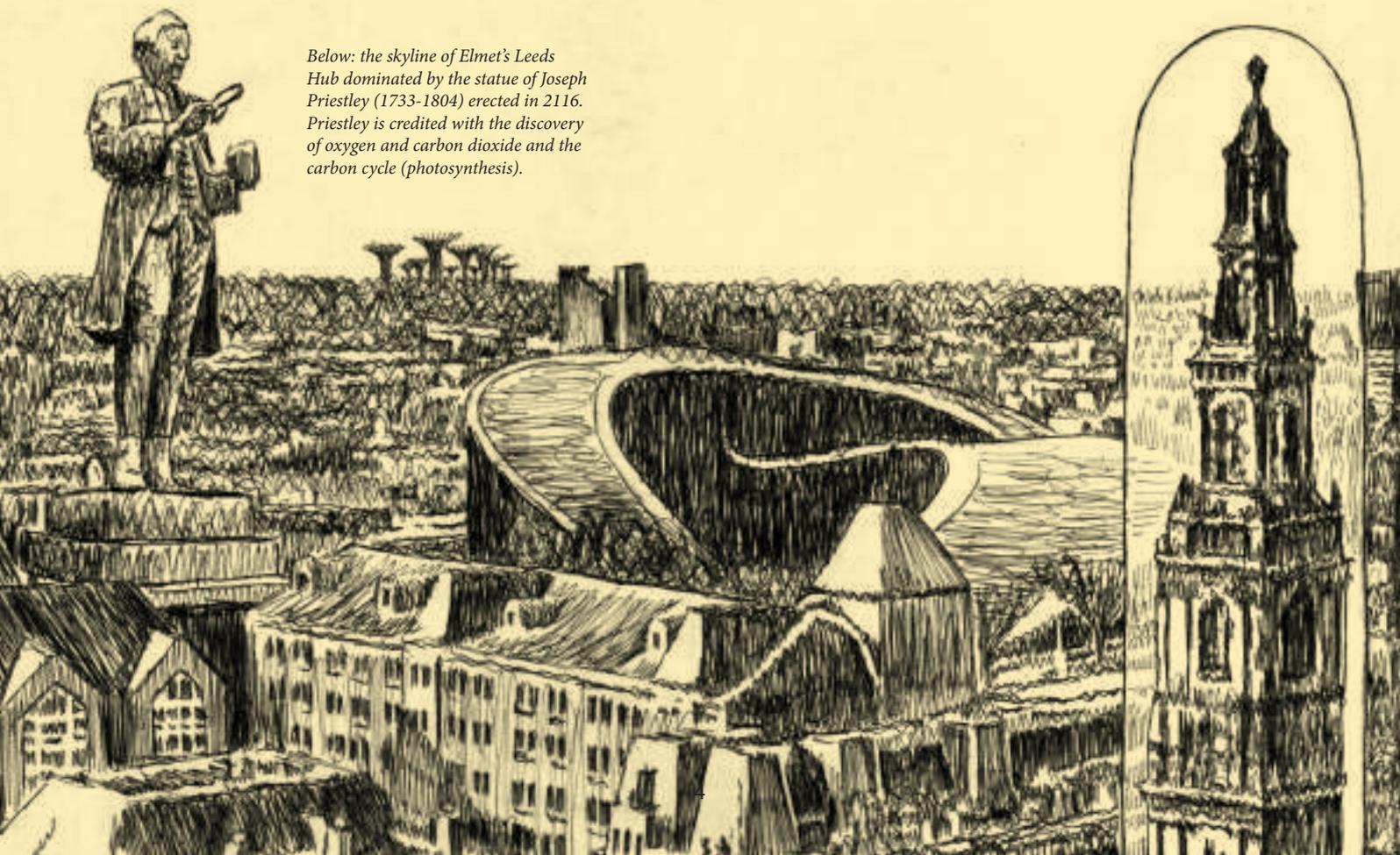
Many aspects of the future society in the following pages are **CONTROVERSIAL** and involve use of **IMAGINATION** and **WISHFUL THINKING**. Those of a nervous disposition should put the book down now!

Many of the contributors to the project **DON'T** accept the vision of the future presented in this book (we've tried to include their critical views).

While we have attempted to check facts and figures, this is not intended to be a textbook. It combines existing technologies and historical events with sci-fi inventions. We hope readers will understand this point.

We cannot possibly hope to cover all issues involved in a fair and balanced way—many people have spent their entire careers researching items that we brush past in a single sentence or picture. Those who want to find out more should turn to the 'Knowledge and Imagination Resources' section.

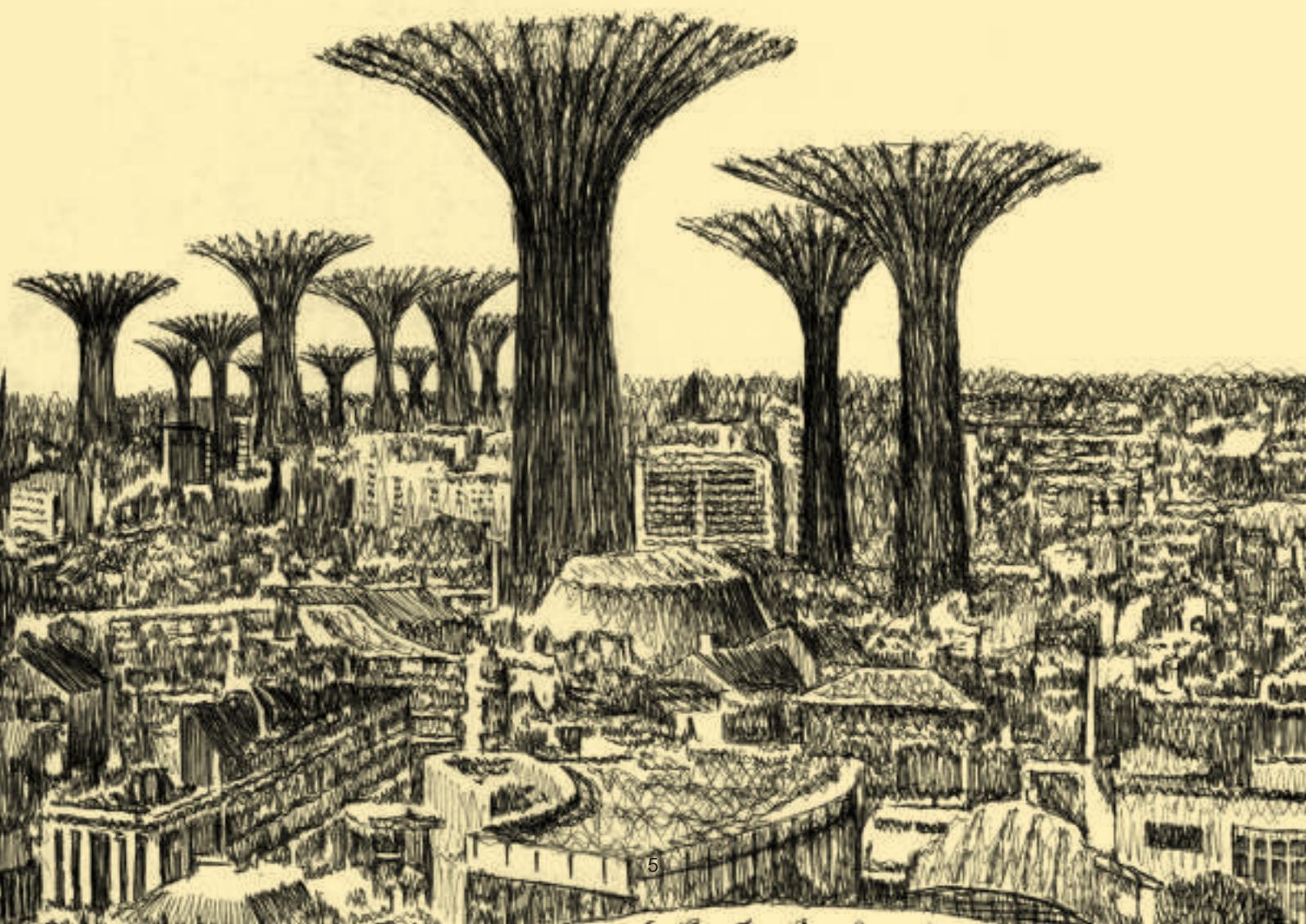
Some of the advisors to this project are world-leading scientific experts in their field. Some contributors are comics artists with no scientific background. Others are 12-year old school children! The editors believe all contributions given in good faith are equally important.



*Below: the skyline of Elmet's Leeds Hub dominated by the statue of Joseph Priestley (1733-1804) erected in 2116. Priestley is credited with the discovery of oxygen and carbon dioxide and the carbon cycle (photosynthesis).*

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# HOW TO READ THIS BOOK:

## **It's impossible to predict the future... that's not what this book is about.**

This is the story of one particular positive view of the future, designed as a way of illustrating some ideas about climate change and low carbon technologies. It is based largely on work carried out during dozens of workshops by school children and PhD research students as part of a educational project (for more on this see Page 94) .

No doubt people in 2050 or 2150 will laugh at the ideas in the following pages, just as we laugh at those from 1950 or 1850. Yes, our ideas are likely to be wildly off the mark. But science fiction is important as a way to enable us to understand our own situation better by looking back from some future time or foreign place. It's about projecting our hopes and fears into a neutral space and imagining how they will play out.

## **So think of this book as a thought experiment, based on the following premise:**

Our industrial civilisation has been built using fossil fuels (coal, oil and gas). We rely on them for everything we do, from driving a car, to watching TV, to sending an email, to being able to eat fresh fruit from the other side of the world in the middle of winter.

People's lives (in wealthy countries that have made the most use of fossil fuels) are longer, healthier, and more full of opportunity than at any time in human history, partly as a result of cheap, dense energy powering an ever-growing global economy. Note that the same cannot be said for billions living in poverty across parts of the developing world.

Unfortunately, due to their side effects – causing climate change due to release of greenhouse gases—we have to stop using fossil fuels immediately (in fact, preferably yesterday). We cannot continue to burn the fossil fuels that are locked in the ground, and leave the planet habitable for most life (let alone suitable for a complex civilisation).

Even if we decide to stop using fossil fuels, it will take some time to make the change, and we are already locked into some severe climate change problems because of the greenhouse gases we have put into the atmosphere over the last 200 years. In addition, replacements for fossil fuels tend to be less energy dense. You generally get less energy out for the amount of energy you put in (low 'Energy Return on Energy Invested' or EROI).

What does this imply for our future? How do you end up with a positive result and not a disaster? We are used to developing shiny new technologies to invent our way out of trouble, but that is unlikely to be sufficient. Much harder is to reduce our demand for energy and the earth's other resources.

Yet there is hope. Just at the point where we have developed the ability to destroy the planet overnight, our rapidly developing understanding of its systems may enable us to effectively solve our problems. As H G Wells said "Civilisation is a race between education and catastrophe".

## **It's easy to imagine the bad version. It's much more difficult but vital to imagine a POSITIVE future.**

We want to "make hope possible, rather than despair convincing". It is about imagining a future where, although some bad things are happening (like sea level rise) humans have learned how to adapt, and people have a reasonable quality of life without damaging the environment for future generations – in one definition, they 'meet the needs of the present without compromising the ability of future generations to meet their needs'.

## **This is a book of ideas, not a textbook; we use stories, comics and illustration to bring a different perspective.**

When an idea is sketched on a page, it can be examined and discussed much more easily than when it merely exists in people's heads.

Is the positive future outlined in the following pages plausible? Is it even a positive future? You are invited to make up your own mind. Critical voices have been included in the book and we would strongly encourage critical thinking. We hope that the effort of responding and reacting to our ideas will be worthwhile regardless of whether you agree.

Our positive vision is based on radical but achievable changes. We want people to be inspired to make those changes. If we act right now, it is still possible to avoid some of the worst impacts of climate change (for example the possibility of runaway global warming). Our positive society is not a utopia. We have already caused too much damage to the natural systems that support us for that. But if we make positive changes now, it will be far better than the alternative.

James Mckay - Editor



**London basin— The Thames Estuary.**

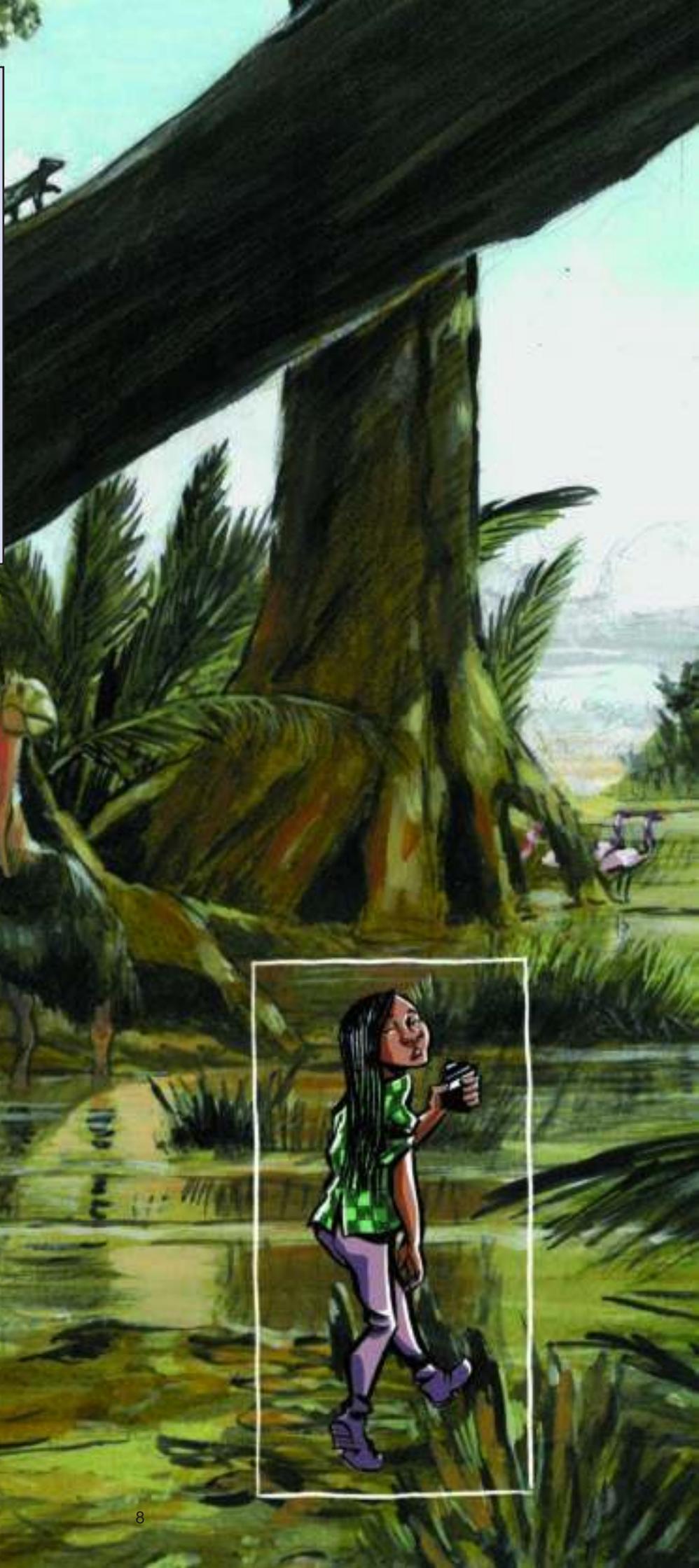
55.5 million years BC: the height of the Palaeocene –Eocene Thermal Maximum (PETM)

CO2 parts per million = 1000-3000? (compared to Holocene 280, Anthropocene 500)

Global temperature 5-10°C? above 2000AD

Sudden rise of 5-8°C in less than 200,000 years—but much slower than during the Anthropocene.

Mass extinctions of deep-seafloor organisms. Forests at the North Pole, animal migrations across land bridges into Europe. Few extinctions of land animals—but diversification including artiodactyls, horses and primates.





VOICE:  
"Maia! Maia!  
Time's up. It's DREAM curfew."  
MAIA: Awww...



CLICK

HONK  
HONK  
VRM

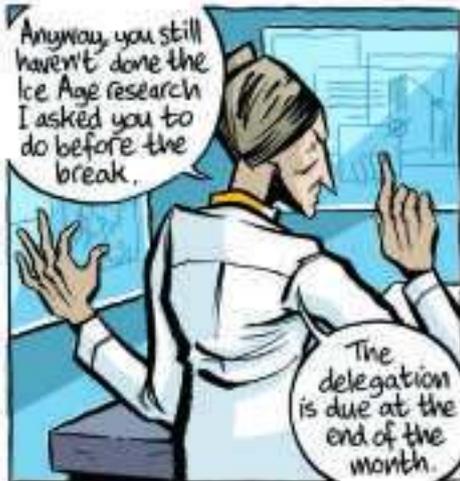
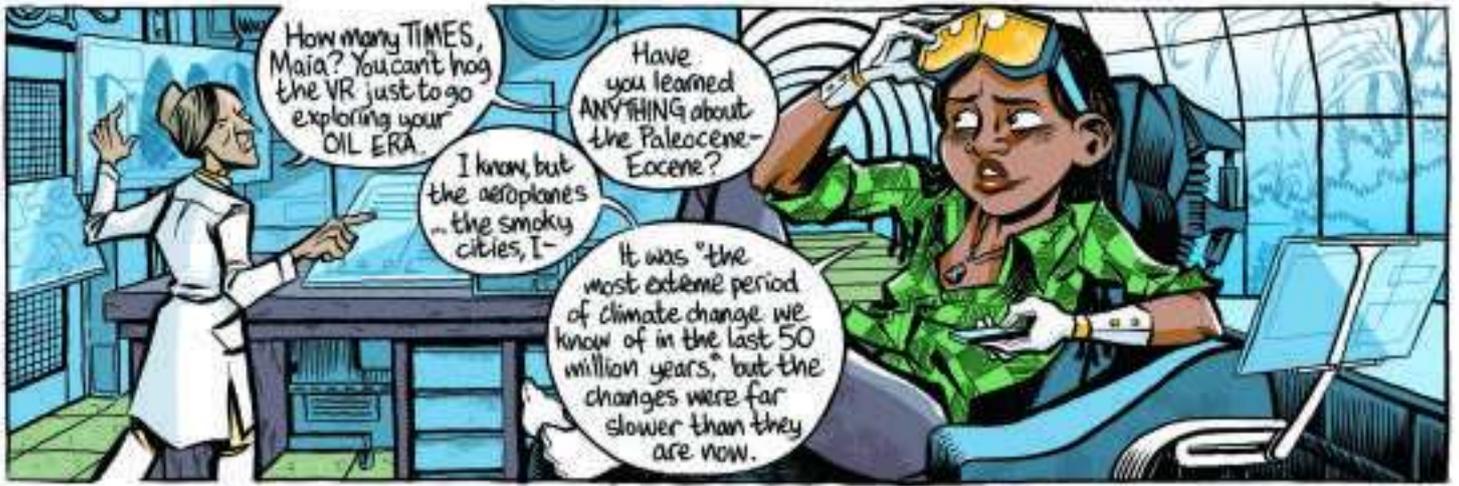
Maia?

MAIA!

HEY!

Time's  
UP, girl!

LONDON  
2020

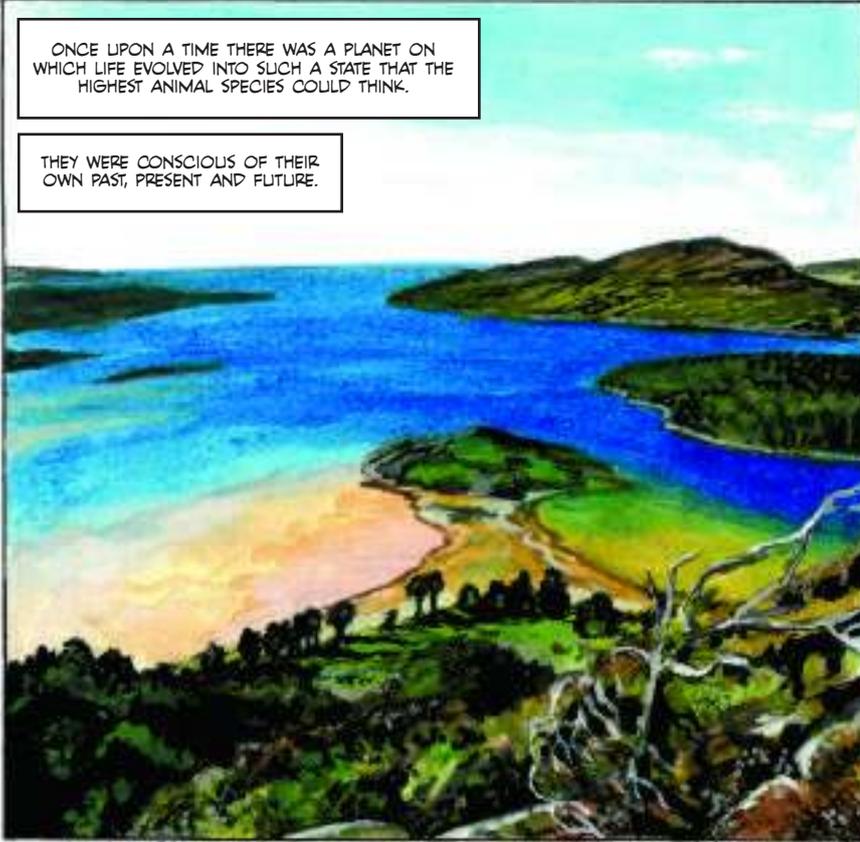


# THE STORY OF THE BLUE PEARL

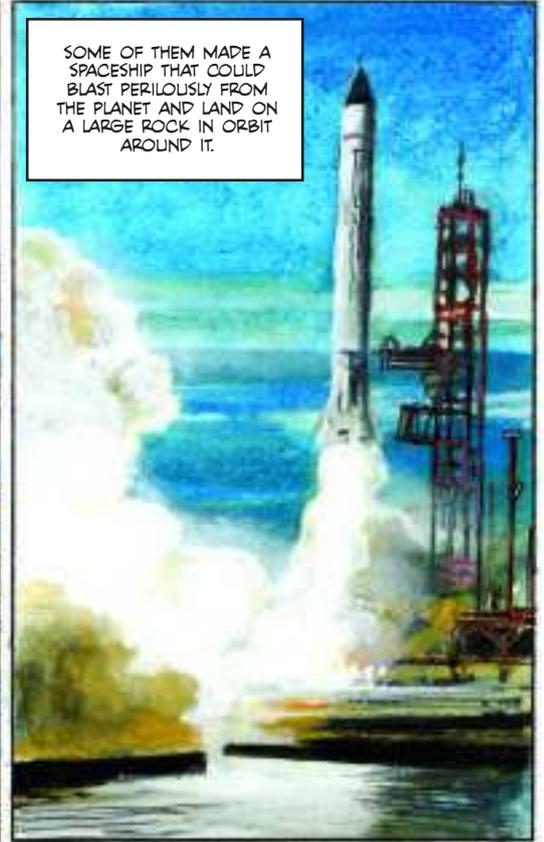
Adapted from the book 'Half Gone' by Jeremy Leggett

ONCE UPON A TIME THERE WAS A PLANET ON WHICH LIFE EVOLVED INTO SUCH A STATE THAT THE HIGHEST ANIMAL SPECIES COULD THINK.

THEY WERE CONSCIOUS OF THEIR OWN PAST, PRESENT AND FUTURE.



SOME OF THEM MADE A SPACESHIP THAT COULD BLAST PERILOUSLY FROM THE PLANET AND LAND ON A LARGE ROCK IN ORBIT AROUND IT.



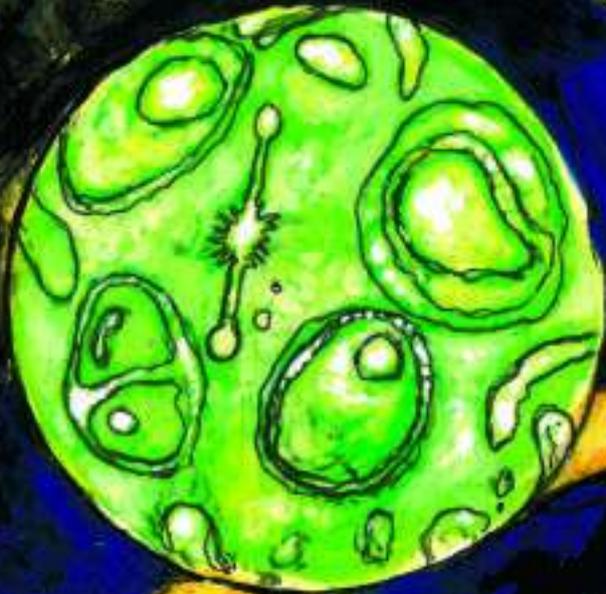
THEY STOOD ON THE BARREN AND LIFELESS SURFACE OF THE ROCK AND LOOKED BACK AT THEIR PLANET.

A SMALL BLUE PEARL IN A THICK SEA OF BLACK MYSTERY. THAT'S HOW IT LOOKED. THEY WERE MORE THAN ROUTINELY GLAD TO SURVIVE THE RETURN JOURNEY.



THE PLANET HAD NOT ALWAYS BEEN A BLUE PEARL. IT STARTED OUT AS A LIFELESS ROCK ITSELF. SOMEHOW, SOMEWHERE ON THE PLANET, SOME ATOMS COMBINED TO FORM MOLECULES THAT COMBINED TO FORM COMPOUNDS THAT COMBINED INTO STRINGS THAT WERE ABLE TO REPLICATE THEMSELVES -- LIFE HAD BEGUN.

THE MAIN BUILDING BLOCK OF LIFE ON THE PLANET WAS A CHEMICAL ELEMENT CALLED CARBON. TOGETHER WITH WATER, IT MADE UP THE SINGLE CELLS OF THE PLANET'S EARLY LIFE FORMS. THESE CELLS EVENTUALLY FOUND A WAY TO CREATE ENERGY THAT WAS SO INGENUOUS THAT MANY CELLS COPIED IT WITHOUT SIGNIFICANT IMPROVEMENTS FOR SEVERAL BILLION YEARS.

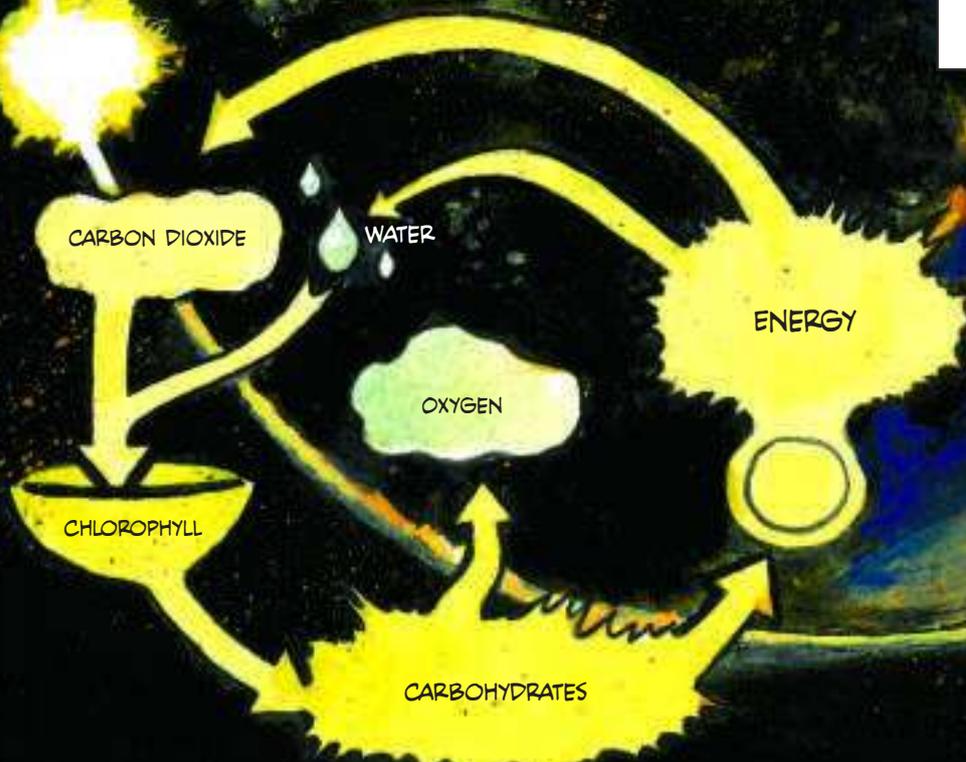


THE CELLS TOOK CARBON DIOXIDE, COMBINED IT WITH WATER, AND BUILT COMPLEX MOLECULES CALLED CARBOHYDRATES, GIVING OFF THE GAS OXYGEN IN THE PROCESS.

ALL THAT WAS NEEDED FOR THIS TO HAPPEN WAS LIGHT AND A CERTAIN VAGUELY MAGICAL PIGMENT IN THE CELL (CHLOROPHYLL). THE THINKERS LATER CALLED THIS PROCESS PHOTOSYNTHESIS.

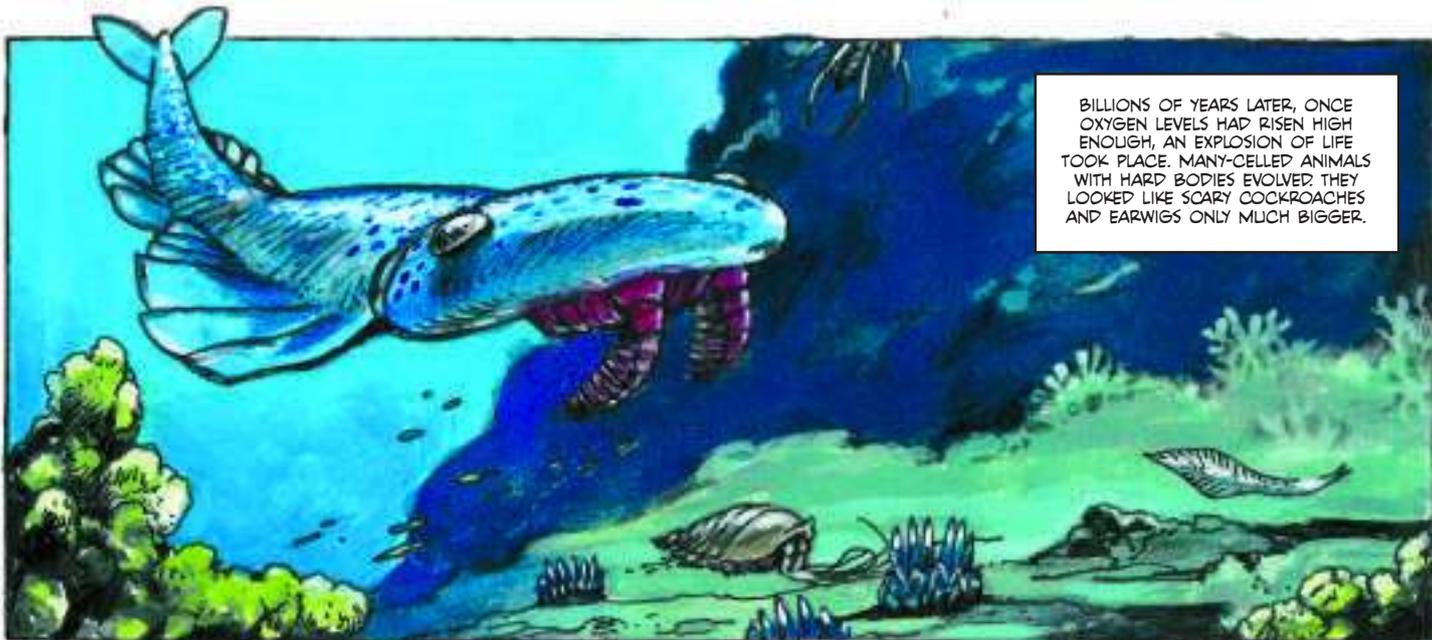
HAVING PHOTOSYNTHESED, THE PLANET'S EARLY LIFE FORMS COULD THEN BURN THE CARBOHYDRATE IN THEIR CELLS TO PRODUCE USEFUL ENERGY, RELEASING CARBON DIOXIDE AND WATER AGAIN.

A SIMPLE LOOP THAT CREATED ENERGY ALONG THE WAY. CLEVER OR WHAT?



SLOWLY OXYGEN BUILT UP IN THE ATMOSPHERE AT THE EXPENSE OF CARBON DIOXIDE. THE BLUE PEARL WAS SOME PLANET. ITS EVOLVING LIFE FORMS MADE THEIR OWN BREATHABLE ATMOSPHERE.





BILLIONS OF YEARS LATER, ONCE OXYGEN LEVELS HAD RISEN HIGH ENOUGH, AN EXPLOSION OF LIFE TOOK PLACE. MANY-CELLED ANIMALS WITH HARD BODIES EVOLVED. THEY LOOKED LIKE SCARY COCKROACHES AND EARWIGS ONLY MUCH BIGGER.



EVERYTHING LIVED IN THE SEA, BUT EVENTUALLY ENOUGH OXYGEN BUILT UP IN THE ATMOSPHERE FOR THE FIRST LIVING THINGS TO APPEAR ON LAND.



ABOUT 350 MILLION YEARS FROM THE END OF THE STORY, FORESTS GREW THICK UPON THE LAND OF THE BLUE PEARL. THEY GREW SO THICK, IN FACT, THAT DEAD TREES AND OTHER PLANTS BUILT UP SEAMS OF VIRTUALLY SOLID CARBON. THESE WERE BURIED BY SEDIMENT AND HARDENED INTO A BLACK SHINY ROCK.

THE THINKERS WOULD LATER CALL THIS PHASE OF THE PLANET'S HISTORY THE CARBONIFEROUS PERIOD, AND THEY CALLED THE ROCK COAL.

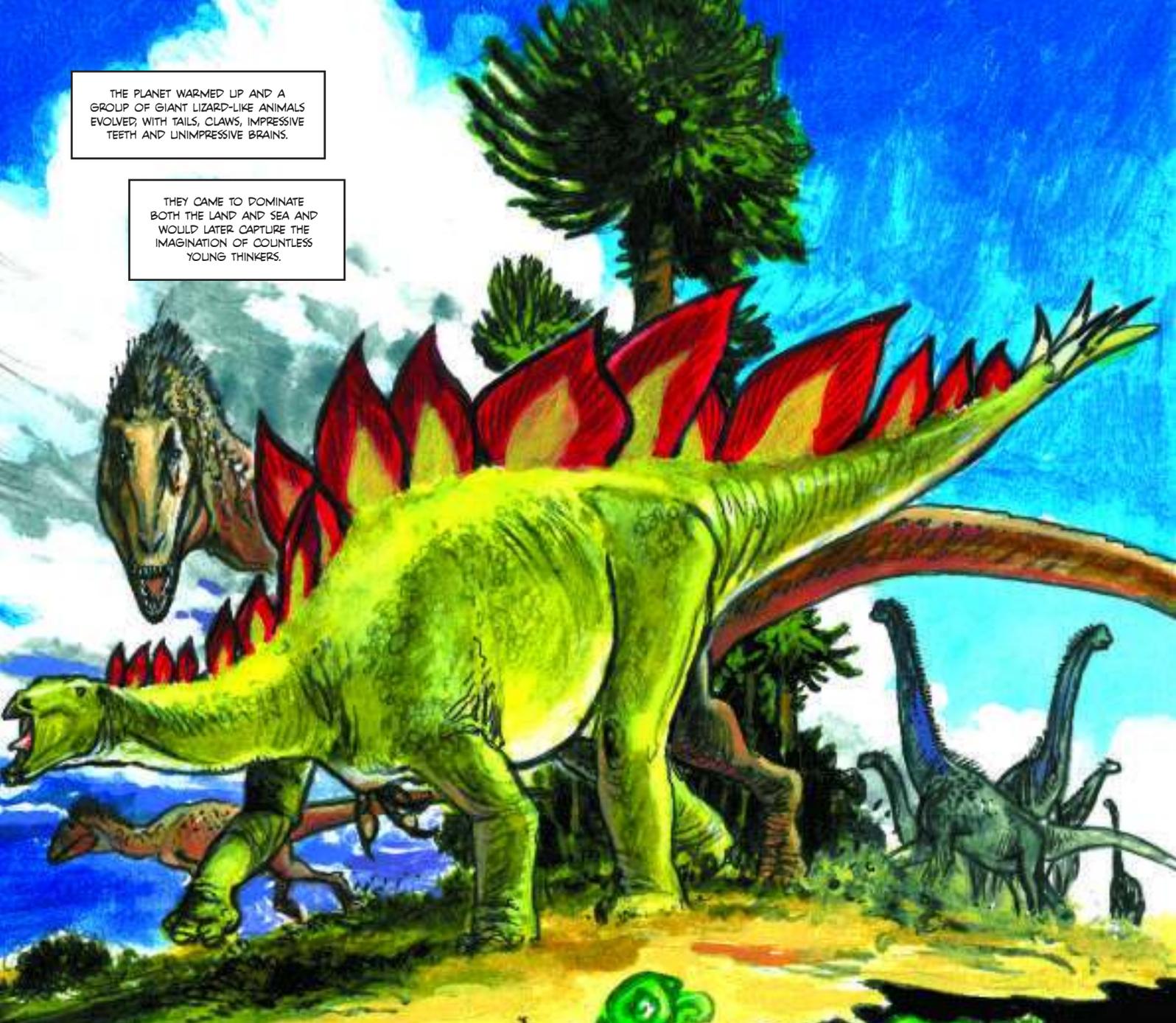
**APOCALYPSE ONE:** ABOUT 100 MILLION YEARS LATER, DISASTER STRUCK - A MASS EXTINCTION. THE THINKERS DISAGREED ABOUT WHAT HAD CAUSED IT -- MANY THOUGHT A RISE IN GREENHOUSE GASES DUE TO A VAST VOLCANIC ERUPTION HAD MADE THE ATMOSPHERE UNBREATHEABLE. WHATEVER, AROUND 90 PER CENT OF ALL SPECIES DISAPPEARED.



AS YOU CAN TELL FROM THE NAME, THERE WERE MORE APOCALYPSES TO COME.

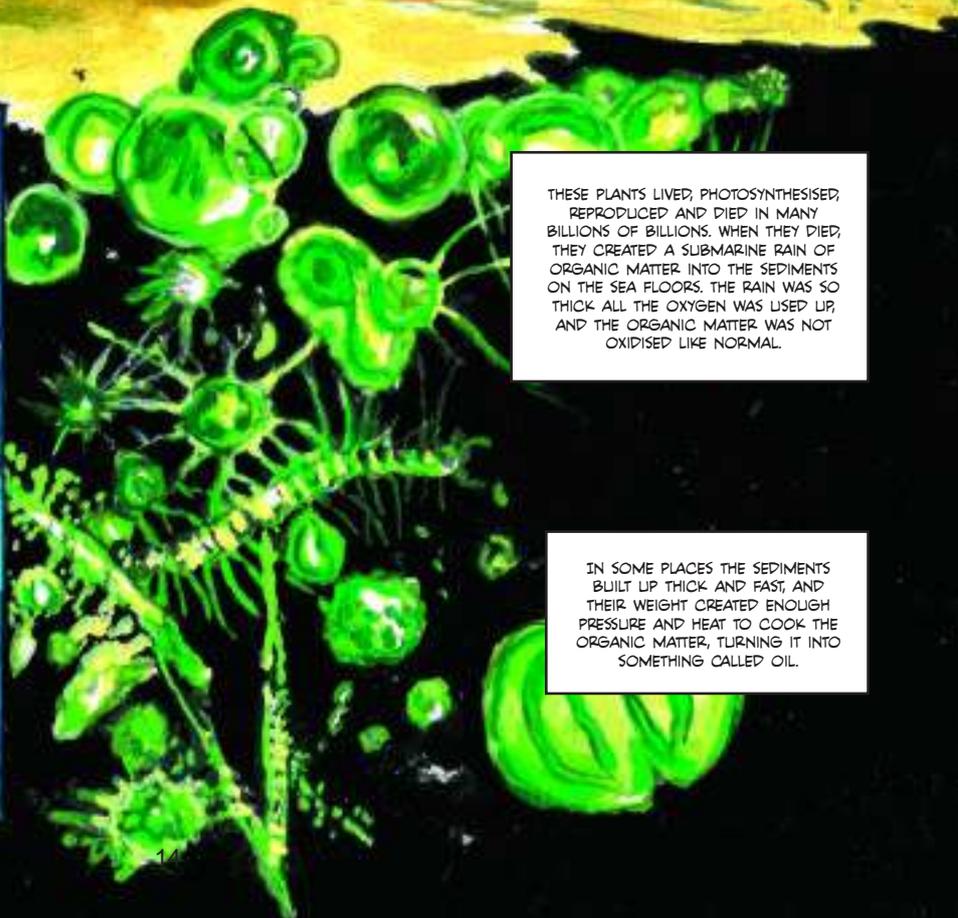
THE PLANET WARMED UP AND A GROUP OF GIANT LIZARD-LIKE ANIMALS EVOLVED, WITH TAILS, CLAWS, IMPRESSIVE TEETH AND UNIMPRESSIVE BRAINS.

THEY CAME TO DOMINATE BOTH THE LAND AND SEA AND WOULD LATER CAPTURE THE IMAGINATION OF COUNTLESS YOUNG THINKERS.



THE BLUE PEARL HAD BEEN HOME TO A NUMBER OF WEIRD NATURAL PHENOMENA, AND NOW ANOTHER ONE HAPPENED.

100 MILLION YEARS BEFORE THE END OF THE STORY GIANT BLOOMS OF MICROSCOPIC PLANTS FORMED IN THE PLANET'S SEAS.



THESE PLANTS LIVED, PHOTOSYNTHESISED, REPRODUCED AND DIED IN MANY BILLIONS OF BILLIONS. WHEN THEY DIED, THEY CREATED A SUBMARINE RAIN OF ORGANIC MATTER INTO THE SEDIMENTS ON THE SEA FLOORS. THE RAIN WAS SO THICK ALL THE OXYGEN WAS USED UP, AND THE ORGANIC MATTER WAS NOT OXIDISED LIKE NORMAL.

IN SOME PLACES THE SEDIMENTS BUILT UP THICK AND FAST, AND THEIR WEIGHT CREATED ENOUGH PRESSURE AND HEAT TO COOK THE ORGANIC MATTER, TURNING IT INTO SOMETHING CALLED OIL.

APOCALYPSE TWO: JUST AS BEFORE WHEN BIODIVERSITY WAS SETTING NEW RECORDS, DISASTER STRUCK. A GIANT METEORITE SLAMMED INTO THE PLANET. ONCE AGAIN, THE ATMOSPHERE TURNED FROM NURTURING TO UNLIVEABLE.

AROUND 50 PER CENT OF THE ANIMAL SPECIES BIT THE DUST THIS TIME, INCLUDING THE MEGA-LIZARDS.

MUCH SMALLER, AND GENERALLY HAIRIER ANIMALS SURVIVED THE CLIMATIC DISRUPTION AND TOOK OVER THE SUDDENLY DEPOPULATED NEIGHBOURHOODS.

THEY THEMSELVES SUFFERED A FEW MILLION YEARS LATER WHEN A MASSIVE, SUDDEN SURGE IN GLOBAL TEMPERATURES OCCURRED. TROPICAL FORESTS SPREAD INTO THE ARCTIC.

AFTER THIS EVENT, THE TREND WAS TO A DECLINE IN GREENHOUSE GAS LEVELS AND A GENERAL COOLING OF THE GLOBE.

NOT LONG BEFORE THE END OF THE STORY, GRASSLANDS EVOLVED. GRASSES HAD WORKED OUT A NEW TYPE OF PHOTOSYNTHESIS THAT WAS MUCH MORE EFFICIENT AT LOWER CARBON DIOXIDE LEVELS. THE CLIMATE COOLED FURTHER, HEADING INTO ANOTHER ICE AGE.

AROUND 2 MILLION YEARS BEFORE THE END OF THE STORY, UPRIGHT-STANDING, LESS HAIRY SPECIES EVOLVED.

SOON THESE GUYS DEVELOPED SIMPLE GRUNTS INTO COMPLEX SPOKEN LANGUAGE, AND DISCOVERED THAT BY RUBBING TWO STICKS TOGETHER YOU COULD GET FIRE.

THE THINKERS HAD ARRIVED.



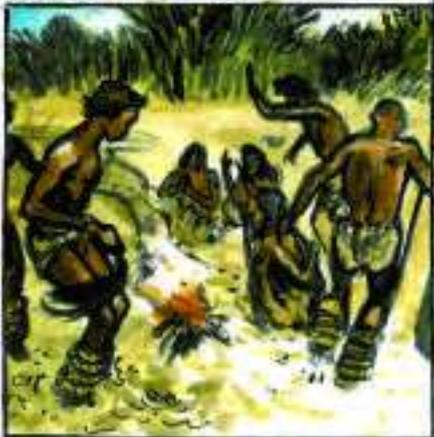
IF YOU THINK OF THE STORY OF THE PLANET AS A 24-HOUR CLOCK, THEY ARRIVED ONE SECOND BEFORE MIDNIGHT. BUT THEY BEGAN TO DOMINATE THE PLANET IN A WAY NO ANIMAL HAD COME CLOSE TO DOING BEFORE.

THEIR THINKING, IMPRESSIVE THOUGH IT WAS, STARTED OUT SHAKY WHEN IT CAME TO THEIR OWN SECURITY, AND STAYED THAT WAY UNTIL THE END OF THE STORY.

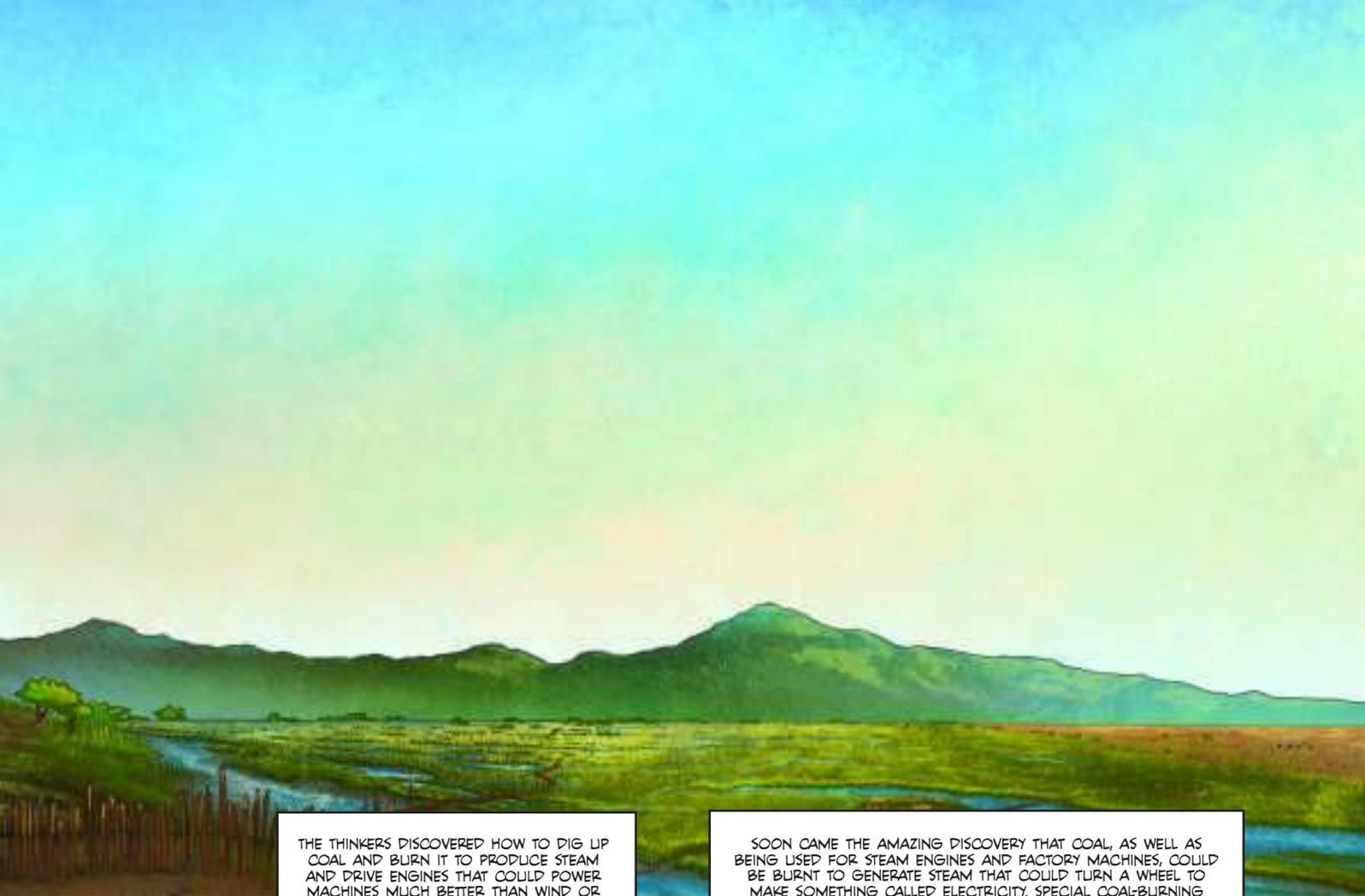
THEY DREW AND REDREW LINES ON MAPS TO SHOW WHERE THEIR COUNTRIES BEGAN AND ENDED.



MOSTLY THEY REDREW THE LINES BY WAGING WARS OF INCREASING SCALE AND BLOODINESS.

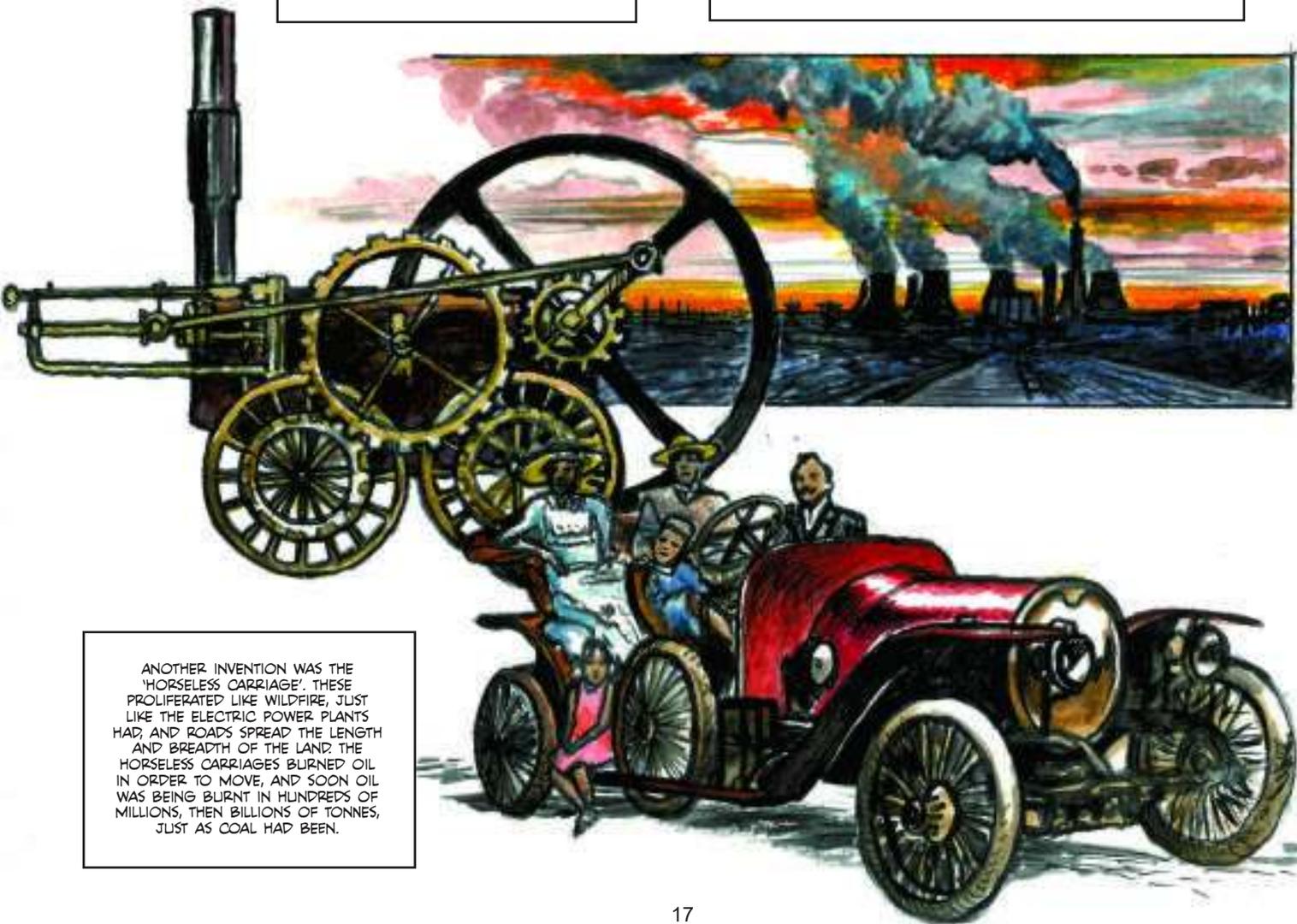


IT WASN'T ALL BAD. SOME THINKERS BEGAN A COLLECTIVE TRAIN OF THOUGHT ABOUT SCIENCE. OTHER THINKERS CREATED SUBLIME ART. PRETTY MUCH ALL OF THEM LIKED TO HAVE A GOOD DANCE.

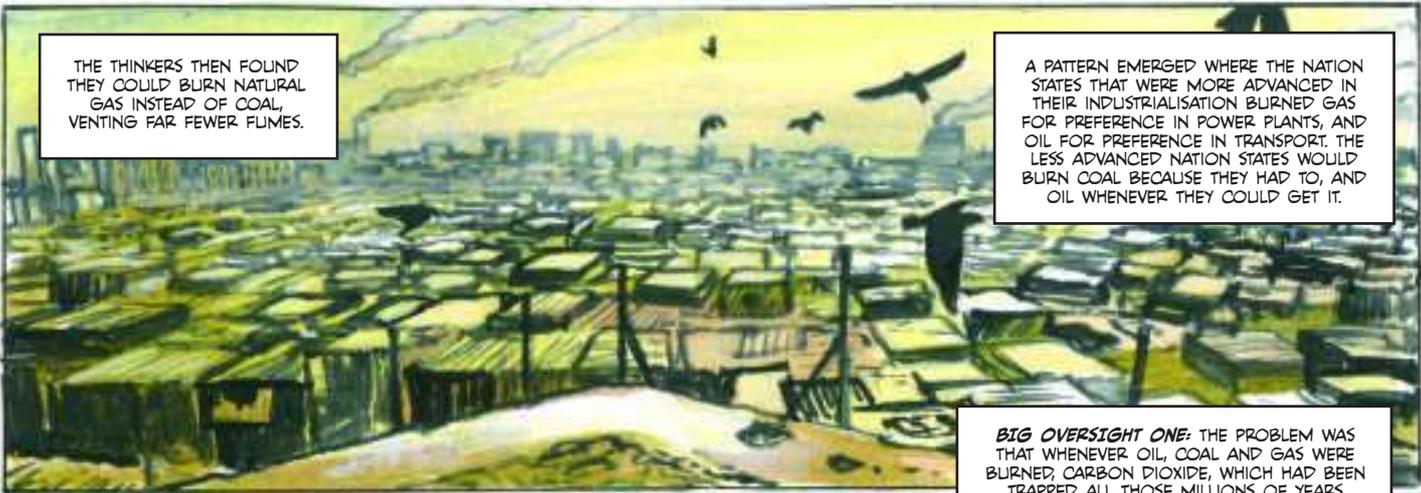


THE THINKERS DISCOVERED HOW TO DIG UP COAL AND BURN IT TO PRODUCE STEAM AND DRIVE ENGINES THAT COULD POWER MACHINES MUCH BETTER THAN WIND OR WATER COULD. THEY HAD CREATED WHAT THEY CALLED AN INDUSTRIAL REVOLUTION.

SOON CAME THE AMAZING DISCOVERY THAT COAL, AS WELL AS BEING USED FOR STEAM ENGINES AND FACTORY MACHINES, COULD BE BURNT TO GENERATE STEAM THAT COULD TURN A WHEEL TO MAKE SOMETHING CALLED ELECTRICITY. SPECIAL COAL-BURNING POWER PLANTS WERE BUILT. COAL WAS BURNT BY THE THOUSANDS, THEN THE MILLIONS, THEN THE BILLIONS OF TONNES.



ANOTHER INVENTION WAS THE 'HORSELESS CARRIAGE'. THESE PROLIFERATED LIKE WILDFIRE, JUST LIKE THE ELECTRIC POWER PLANTS HAD, AND ROADS SPREAD THE LENGTH AND BREADTH OF THE LAND. THE HORSELESS CARRIAGES BURNED OIL IN ORDER TO MOVE, AND SOON OIL WAS BEING BURNT IN HUNDREDS OF MILLIONS, THEN BILLIONS OF TONNES, JUST AS COAL HAD BEEN.

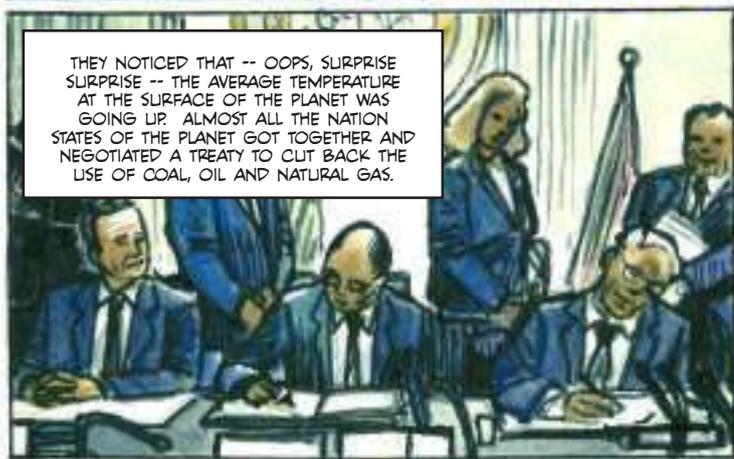


THE THINKERS THEN FOUND THEY COULD BURN NATURAL GAS INSTEAD OF COAL, VENTING FAR FEWER FUMES.

A PATTERN EMERGED WHERE THE NATION STATES THAT WERE MORE ADVANCED IN THEIR INDUSTRIALISATION BURNED GAS FOR PREFERENCE IN POWER PLANTS, AND OIL FOR PREFERENCE IN TRANSPORT. THE LESS ADVANCED NATION STATES WOULD BURN COAL BECAUSE THEY HAD TO, AND OIL WHENEVER THEY COULD GET IT.



**BIG OVERSIGHT ONE:** THE PROBLEM WAS THAT WHENEVER OIL, COAL AND GAS WERE BURNED, CARBON DIOXIDE, WHICH HAD BEEN TRAPPED ALL THOSE MILLIONS OF YEARS AGO BY THE ANCIENT PLANTS, WAS RELEASED, TRAPPING HEAT IN THE EARTH'S ATMOSPHERE. THE THINKERS CALLED IT A 'GREENHOUSE GAS'.



THEY NOTICED THAT -- OOPS, SURPRISE SURPRISE -- THE AVERAGE TEMPERATURE AT THE SURFACE OF THE PLANET WAS GOING UP. ALMOST ALL THE NATION STATES OF THE PLANET GOT TOGETHER AND NEGOTIATED A TREATY TO CUT BACK THE USE OF COAL, OIL AND NATURAL GAS.



BUT THERE WAS A PROBLEM. MORE THAN 100 YEARS OF BURNING OF OIL, AND TWO HUNDRED YEARS OF COAL, HAD CREATED QUITE A SET OF VESTED INTERESTS AMONG THE THINKERS.

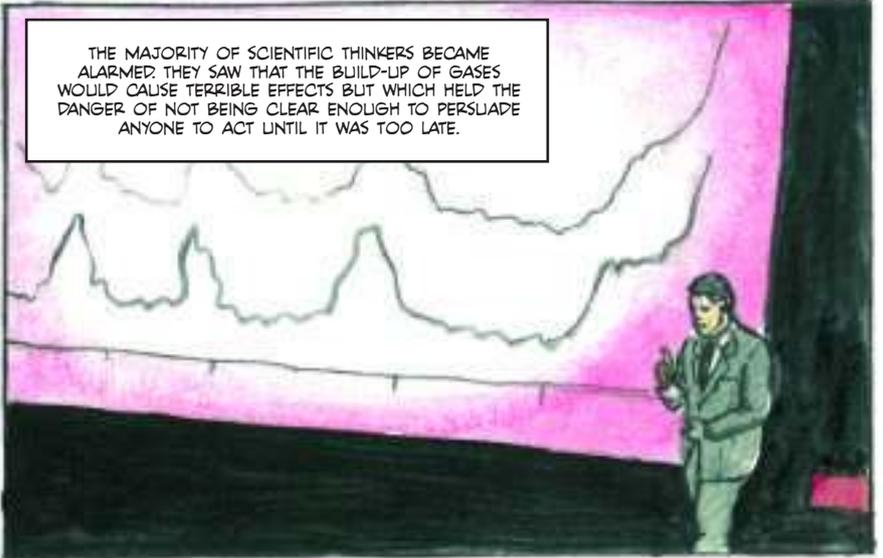


MANY ORGANISATIONS WERE IN DANGER OF BEING LEFT WITH WHAT THEY CALLED 'STRANDED ASSETS', AND THIS INCLUDED NOT A FEW OF THE NATION STATES, ESPECIALLY THE ONES WHERE OIL HAD ACCUMULATED IN LARGE QUANTITIES DURING THE GREAT UNDERGROUND COOK-UPS.

THESE VESTED INTERESTS HAD CREATED A WEB OF POWER, IN EFFECT A KIND OF EMPIRE -THE EMPIRE OF OIL. THIS WAS LOOSELY BOUND, AND EVEN CAPABLE OF CIVIL WAR, BUT IT WAS WITHOUT DOUBT THE MOST POWERFUL INTEREST GROUP ON THE PLANET. THE BIGGEST COMPANIES WERE ALL OIL COMPANIES OR COMPANIES MAKING HORSELESS CARRIAGES, IN WHICH MOST OF THE OIL WOUND UP BEING BURNT.

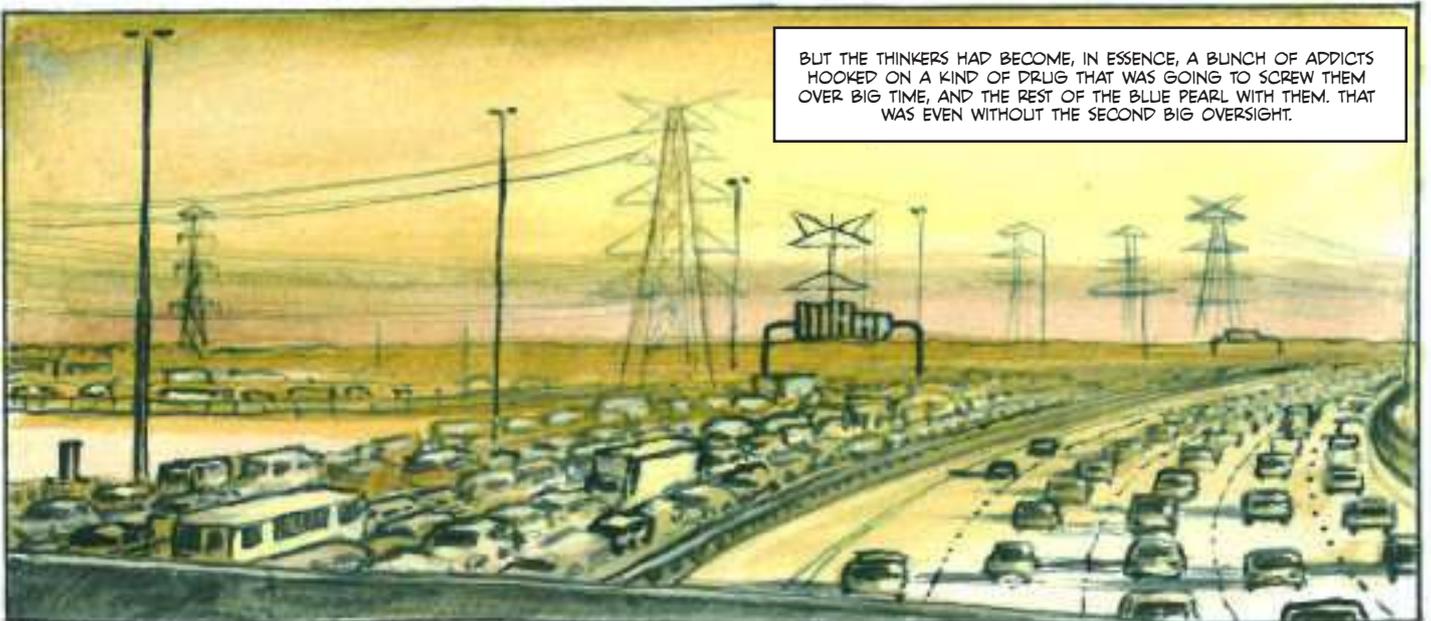
SO ALTHOUGH THE LEADERS OF THE NATION STATES GOT TOGETHER REGULARLY TO TALK ABOUT THE PROBLEM OF THE BUILD UP OF GREENHOUSE GASES, THERE WAS LITTLE MEANINGFUL ACTION.

THE MAJORITY OF SCIENTIFIC THINKERS BECAME ALARMED. THEY SAW THAT THE BUILD-UP OF GASES WOULD CAUSE TERRIBLE EFFECTS BUT WHICH HELD THE DANGER OF NOT BEING CLEAR ENOUGH TO PERSUADE ANYONE TO ACT UNTIL IT WAS TOO LATE.



THERE WERE ALTERNATIVES TO PROVIDE ENERGY THAT DIDN'T INVOLVE PRODUCING HEAT-TRAPPING GASES. MOST OF THESE ALTERNATIVES USED THE HEAT OF THE SUN, IN ONE WAY OR ANOTHER, TO MAKE FUELS AND ELECTRICITY.

BUT THE THINKERS HAD BECOME, IN ESSENCE, A BUNCH OF ADDICTS HOOKED ON A KIND OF DRUG THAT WAS GOING TO SCREW THEM OVER BIG TIME, AND THE REST OF THE BLUE PEARL WITH THEM. THAT WAS EVEN WITHOUT THE SECOND BIG OVERSIGHT.



*BIG OVERSIGHT TWO:* THIS HAD TO DO WITH THE BLUE PEARL'S GREAT UNDERGROUND COOK-UPS. THE FACT WAS THAT MOST OF THE OIL AND COAL HAD FORMED DURING SHORTISH PERIODS IN THE HISTORY OF THE PLANET, AND REQUIRED VERY SPECIAL CONDITIONS TO FORM.

IT MEANT THAT THE THINKERS KNEW THAT THE OIL TO WHICH THEY WERE ALLOWING THEMSELVES TO BECOME ADDICTED TO WOULD, WELL, KIND OF RUN OUT ONE DAY. HARDLY ANYONE QUESTIONED THIS. THEY JUST DIDN'T, YOU KNOW, TALK ABOUT IT MUCH.



AT SOME POINT IT WOULD BECOME CLEAR. THE THINKERS WOULD NO LONGER BE ABLE TO RUN THEIR LIVES AND THEIR INDUSTRIES ON *GROWING* AMOUNTS OF *CHEAP* OIL. ALL THEY COULD EXPECT THEREAFTER WERE *SHRINKING* SUPPLIES OF *EXPENSIVE* OIL.

TO MAKE THINGS EVEN MORE UNCERTAIN, IT ALSO BECAME CLEAR THAT THERE WAS STILL ENOUGH OIL, GAS AND COAL IN THE GROUND TO FRY THE PLANET. THERE WERE OTHER, MORE UNCONVENTIONAL WAYS TO EXTRACT THE HARDER-TO-ACCESS RESERVES. EACH NEW METHOD WAS MORE ENERGY-INTENSIVE AND DAMAGING THAN THE LAST. IT BEGAN TO DAWN ON THE THINKERS THAT *WHAT WAS LEFT HAD TO STAY IN THE GROUND*.



THEY WERE EITHER GOING TO DEFFY THE STATUS QUO AND VOLUNTARILY STOP USING THEIR DRUG, OR THEY WERE GOING TO COME UP AGAINST THE INESCAPABLE OVERSIGHTS ONE AND TWO-- WHICHEVER HIT FIRST.



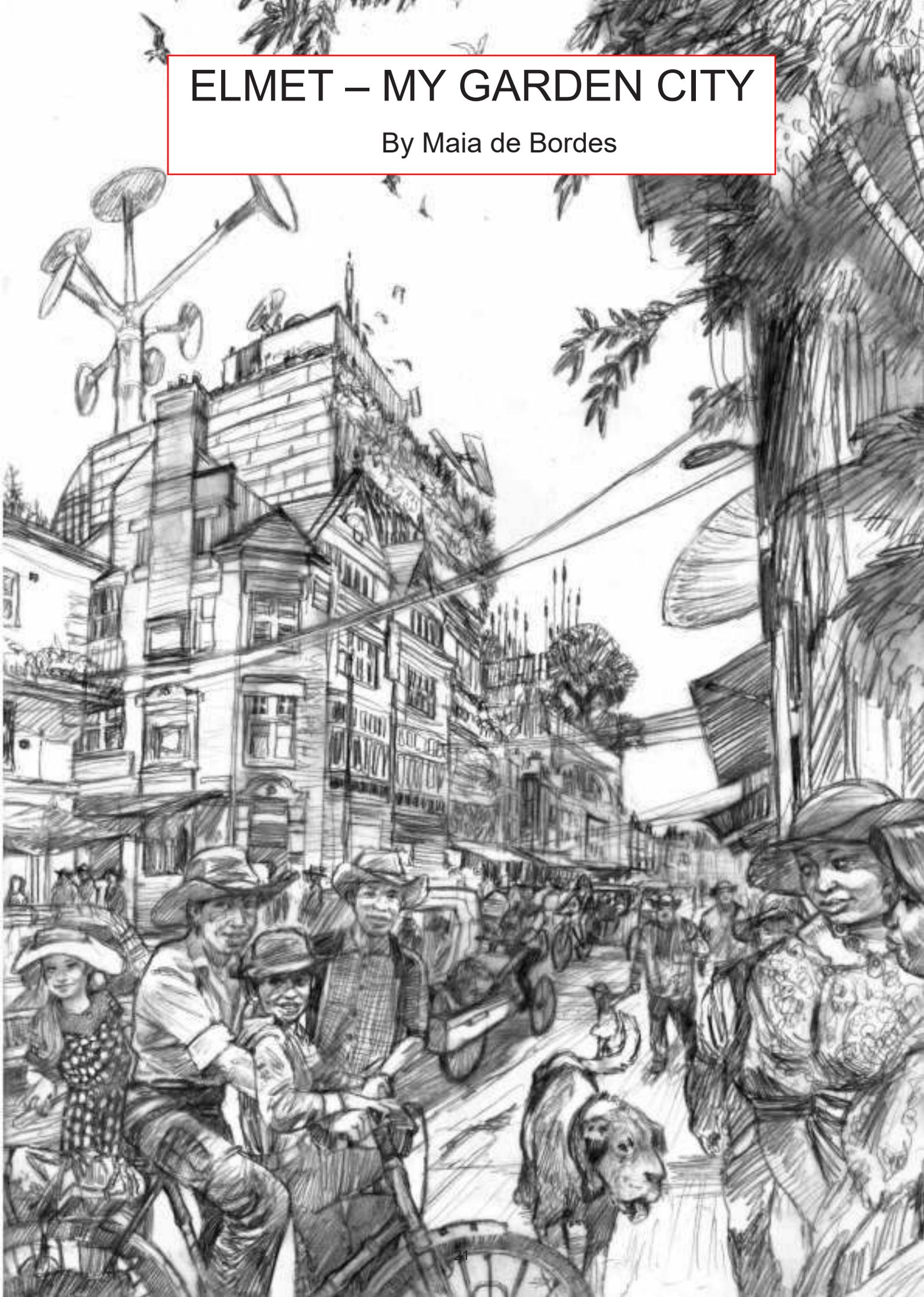
IT LOOKED LIKE THINGS WERE GOING TO GET DECIDEDLY NASTY.



AND THEN SOMETHING REMARKABLE HAPPENED...

# ELMET – MY GARDEN CITY

By Maia de Bordes



**Hello from Elmet!** First: sorry if this is an intrusion on your DREAM time. Although I hope that isn't the case I will bear no grudge if you'd rather not be on the mailing list—just let me know.

Second: for those not acquainted with my DREAM style, this is likely going to be an overly long ramble concerning a few things that I've put together in preparation for my Earthcorps presentation in September, along with Harjeet and the others.

Nujod asked us to present the delegation with an overview of Elmet society, its history and culture, and how we got here. I was lucky to be chosen (although I'm sure it's because Kingsley, who chaired the Global Adjustment Team alongside Alex McKay, is my great-great granddad). We had a hard job learning about the Big Shift and a lot of things we'd always taken for granted – such as how Elmet arrived at a sustainable level of technology. I knew more than the others initially because it's the kind of thing that Kingsley always tells me about—the 'good old days' of the Big Shift. I'm always pestering him for more DREAM time to explore the 'Energy Ascent'. He says I'm far too excited about all the old tech from before the Big Shift and that it's not healthy... hmmm...

So here we go:

We thought the first thing to do was to break this report into sections. There are several things that are key to understanding Elmet society:

- Anti-Fragile regenerative society, based on sustainable ownership of food, waste, energy and water.
- Permaculture food production
- Zero-carbon energy
- Sustainable transport
- Advanced communications technology and global cooperation
- Steady-state circular economy
- Re-wilding

We'll try to cover each of these in turn while describing how they affect our daily lives. Tsaone and Harjeet's project was to go up to the Dales Forests and meet some of the Dissenters, so they're included too.

*Aerial view taken from a Jragh Fligh, looking from the Bay of York towards Leeds and York Hub.*

**Around the turn of the millennium**, once climate change was recognised as a problem, the challenge was both to adapt to it and at the same time to reduce the chances of it becoming totally catastrophic.

Global society is therefore built around the principle of keeping carbon emissions to zero (or negative). We arrived at this point by the late 21st Century, but there were many delays and setbacks on the way, and it is still unclear if our actions were sufficient to prevent further climate change.

There are many variations on the theme, and here we focus on our home region.

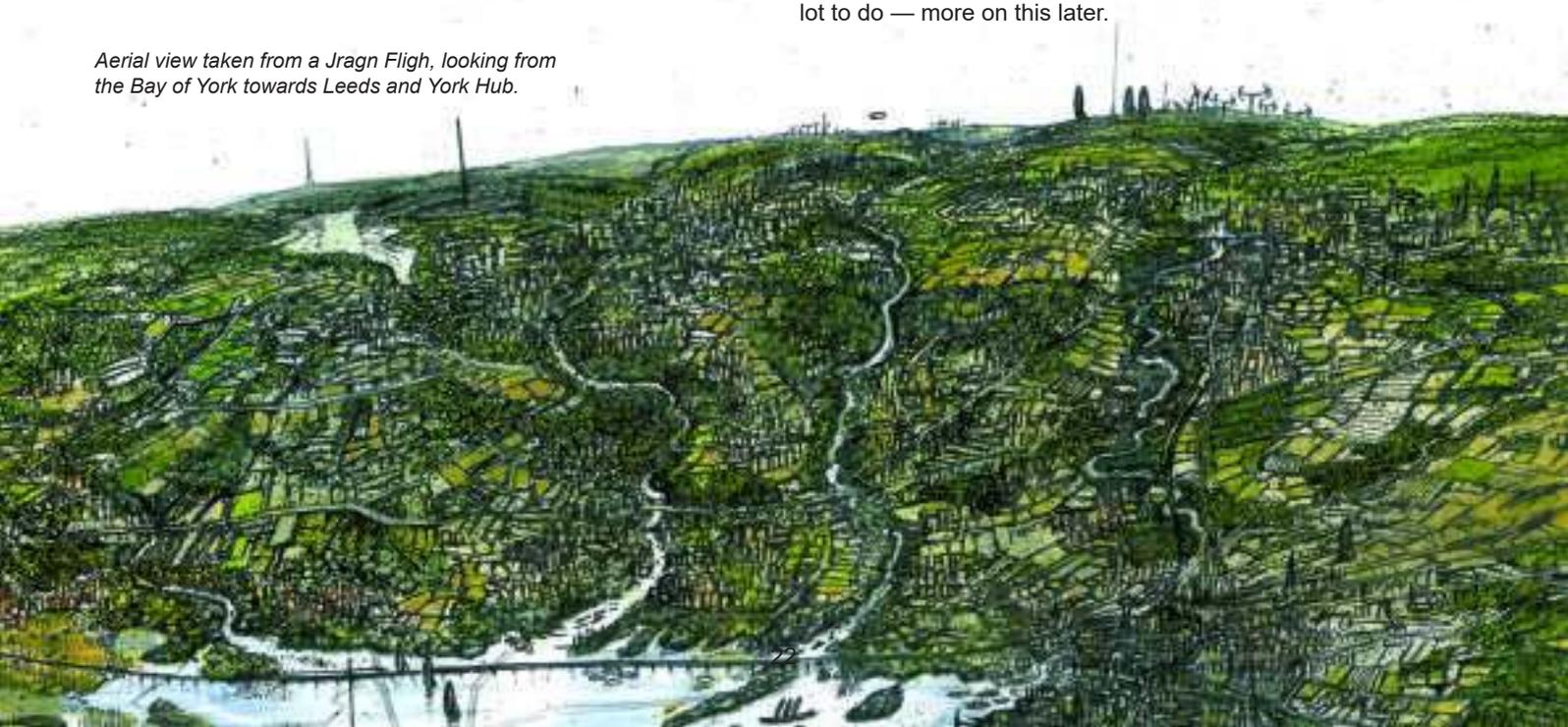
Elmet is a polyopolis made up of many 'hub' towns and cities across the southern bioregion of the United North (UNK). It stretches around the Bay of York and developed out of the old counties of West, East and North Yorkshire, covering the river catchments and thalwegs of the Swale, Ure, Nidd, Wharfe, Aire, Calder, Derwent and Don.

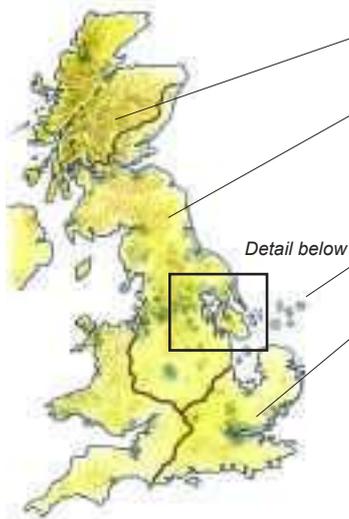
Elmet is one of the most fortunate regions of the world in terms of climate change. We're blessed by the following factors which may help explain our success:

- A moderate maritime climate with one of the world's smallest temperature anomalies, and plenty of fresh water
- A full catchment: from upland forest areas generating rainfall, to fertile river valleys, large areas of productive wetlands and a complex coastline, underlain by diverse geology
- Small dense cities, historically with a lot of green space
- A historical concentration of carbon emitters (factories and power stations) that could be adapted for Carbon Capture and Storage (CCS), right next to one of the most successful carbon dioxide storage reservoirs under the North Sea

Elmet is a regenerative anti-fragile society. We recognised 100 years ago that we couldn't just shrink our footprint on the earth – we have to find ways to actively regenerate – build soil, restore freshwater, pollinate, compost, decompose, re-wild.

Basically, we try to live in a way that won't end up hurting future generations. Our teachers always remind us it's a work in progress. Although we pride ourselves on our achievements since the Big Shift there are plenty of areas where we still have a lot to do — more on this later.





Highlands and Islands (Central Highlands, West Coast, islands)

United Northern Kingdom (Northampton up to Perth/Dundee). Capital: Edinburgh. The Scottish half of the UNK is much the stronger. Many important re-wilding initiatives were undertaken in the mid-21st Century leaving its landscape in much better shape. It has also lost fewer areas of arable land than the Elmet coast.

Yorscandia virtual state and Hanseatic Archipelago

Exclusion Zone (EZ): parts of Southern England abandoned due to fallout from Channel submarine nuclear disaster

Detail below

### Population

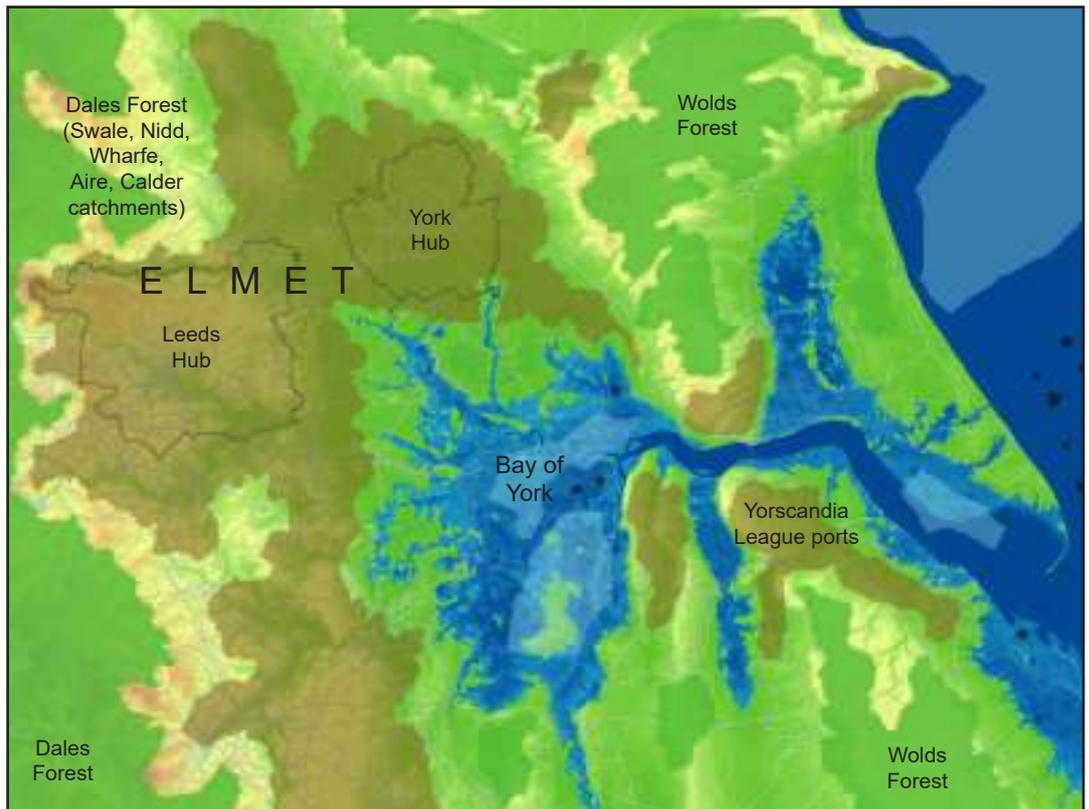
Guru Attenborough: *“All environmental problems become harder to solve, and ultimately impossible, with ever more people”*

Leeds, Bradford, Wakefield, Harrogate, Wetherby and York make up the main urban areas of Elmet.

Population 10 million (including 2 million EZ refugees, 2,200,000 east coast refugees, 1.5 million billeted Sea Kings, 3.5 million independent Da Hai You Min (very approximately – no accurate census exists)

Population of UK 85 million, rising more slowly than at the turn of the century. Fears about global population rise in the Age of Ascent turned out to be wide of the mark. In fact, the challenge was rapidly declining population, especially in Europe, with the added problem of migration and resettlement in response to climate change—with many refugees coming from Southern Europe and Middle East. The UNK, along with Yorscandia, is one of the few regions showing a significant increase in population due to its status as a refuge for those from more badly affected areas—for the reasons detailed opposite.

- Urban area
- Forest area
- Marine reserve
- Sea Kings

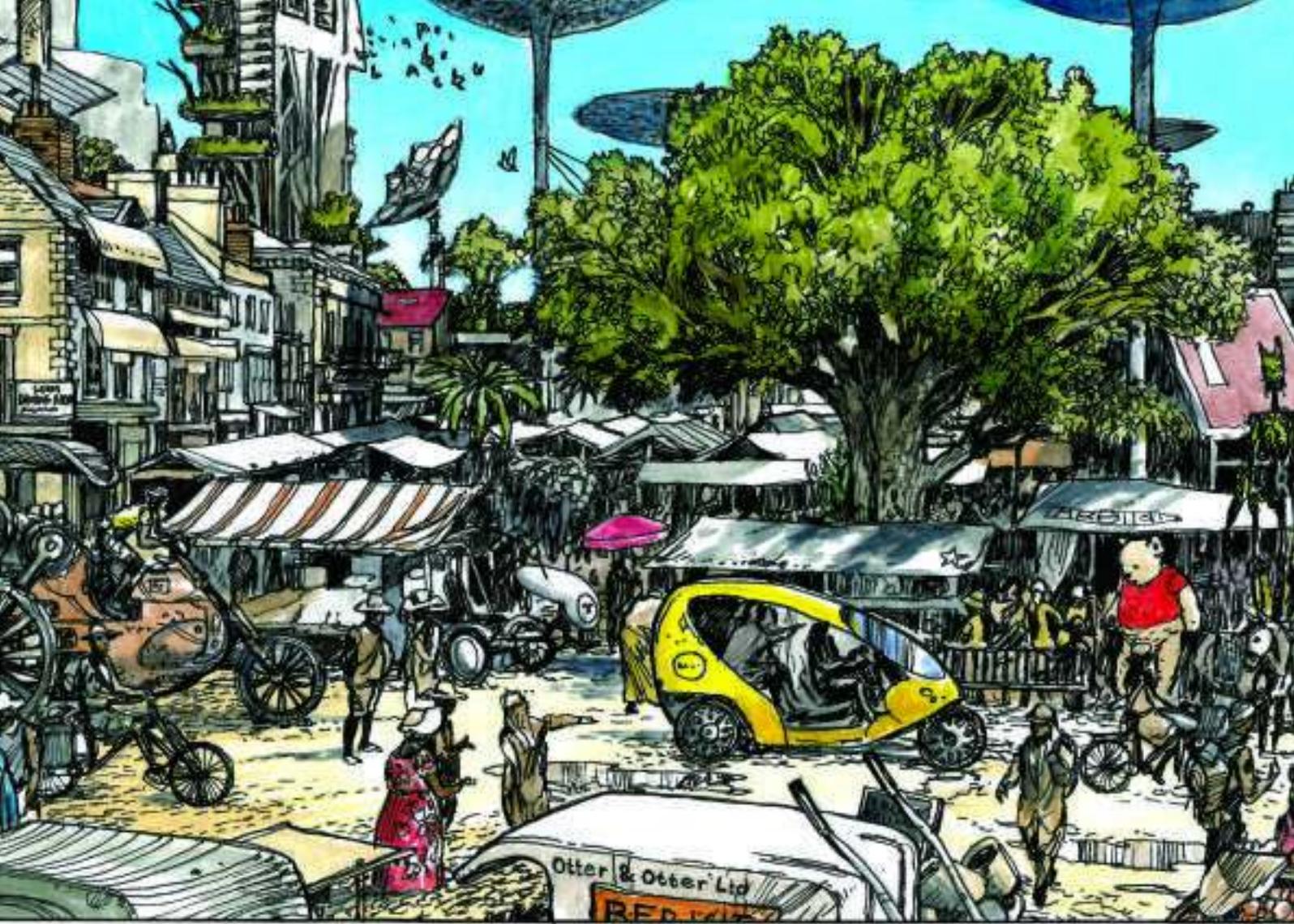


### Climate

Ask anyone about the weather in Elmet, and they'll tell you it's 'a bit rubbish'. This sentiment seems not to have changed for hundreds of years, however, the *climate* has changed a lot!

After the decade-long blip of the 'Big Freeze' following the Hekla eruption, temperatures globally are more than 2°C higher than the Holocene average reference point. In northern Europe, the temperature anomaly is higher but not as extreme as in PanArctica and continental interiors. Due to the delays in making the transition to a low carbon economy in the early 21st Century, the target of 1.5°C was missed. This in itself was catastrophic but worryingly could be the trigger for even larger changes in future centuries due to climate tipping points. It is still unclear if we have passed this point, though greenhouse gas rises seem to be levelling off. The Dry Season in the UNK is blisteringly hot, (with occasional monsoon conditions in July/August) and features unpredictable droughts. The Wet season begins in late September through to January with high-energy thermal storms leading to floods and widespread damage.

Central Elmet is dominated by the Bay of York, an inland lagoon, expanding every year as sea levels rise. Emissions of decaying matter in the lagoon cause electrical storms every evening (Catatumbo Lightning).



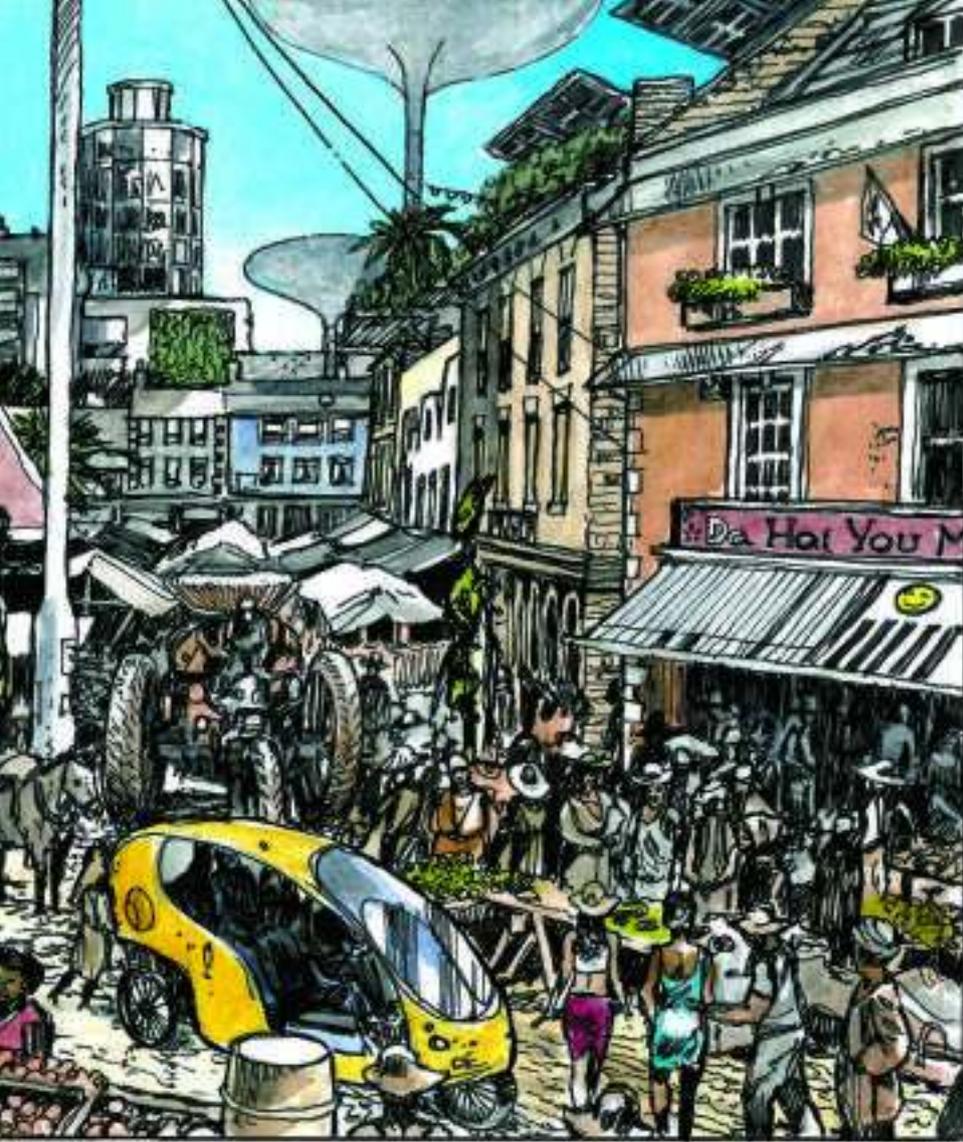
*Knaresborough in the Age of Energy Ascent*

I'm on my way from the tech monastery on the Chevin to Knaresborough in time for lights off. I need to get back early as we've had word that Mitchell is coming home! He's been away in the UNOColonial Navy on his Merantau for three years and we're preparing a big party for him.

Harvest festivals will be taking place shortly – there is frantic work going on to get the crops in before the storm season starts. It's also the 100th Anniversary of the Thousand Flowers.

I'm so glad it's getting towards the end of the summer. I mean it's always unbearable but this one just seemed so much worse. It's starting to ease up. I think... I hope! It's been too hot to even cycle most days. We had more than twenty Heat Calls.

Despite the weather, Elmet is a much happier place than it used to be during the days of the Sea King raids and the Big Freeze. Everyone accepts each other for who they are, and nobody is afraid to show their true selves. There is now a broadly shared sense that quality of life is more important than the high growth rates that came from working long hours and buying yet more gizmos to save time. Society has definitely changed for the better.



*The core of Knaresborough Hub is an ancient market town. It's one of the chain of hub towns within the wider Elmet Garden City circling the Bay of York, including Ilkley, Wetherby, Harrogate, Easingwold—all connected by the Light Rail system.*

*Knaresborough sits on the Nidd thalweg and is governed from Nidd council headquarters at the DREAM hub.*

*It's market day. Knaresborough has held a weekly market in this place every Wednesday since 1310. The Tudor tea rooms, formerly Ye Olde Chymist's shop, dates to 1720.*

*Things have changed in many respects since the 14th Century. No longer do livestock wander the streets, fouling them with manure as they did right up until the early 20th Century; nor are the streets choked with cars as they were around the turn of the millennium. However there is a surprising amount of continuity: ordinary life goes on; residents are well known for their Yorkshire humour and eccentricities including the annual Bed Race Festival.*

The challenges we have include rising population due to the Sea Kings and refugees from the Saharopean area; loss of arable land due to the formation of the Bay; high temperatures putting pressure on crops; invasive species and loss of biodiversity.

A bit about me: I'm 14. I'm still at our local Permaculture college, although obviously I'm seconded to the Chevin Tech Hub at the moment. My family is descended from French refugees from Paris, and of course the famous Kingsley Mason is my great-great granddad. There are some pictures of my family on Page 29. My dog Cu really belongs to Mitchell.

I'm training to be an engineer and am also in the Earthcorps service. This means getting hands on with a lot of our engineering kit, but also studying biodiversity, ecological economics, climate science and earth systems science. DREAM gives me a headache. We're only supposed to do one hour per day on it, but because of the delegation, I have to put in a lot more than that—more hours than is normally recommended (and way over credit).



## My LILAC

Here you can see my home community—it was one of the first stand-alone LILACS—a 'Low Impact Living Affordable Community', before the idea became standard for urban design. The key idea is to exist as a self-sufficient, sustainable housing co-operative, made up of zero-carbon dwellings optimised for storm and flooding resilience, energy production, waste treatment and water capture.

Homes with net-zero energy requirements became common by the 2040s, however, many originally built in the mid 20th Century were crumbling by the mid 21st. You can see they are a mixture of old and new, efficient and inefficient, as a result of piecemeal replacement during the Big Shift. Some utopians say we ought to start again from scratch—that the best way to reduce emissions would be to completely redesign our settlements. Others say that we should apply the Permaculture principles of small and slow changes.

It's amazing to think that in the early 21st Century something called 'Fuel Poverty' was a problem. This was because the houses were very inefficient and lost a lot of heat, so people were spending a lot of money keeping warm in the cold winters they had then.

Obviously, the problem now is cooling, ventilation and re Fridgeration! Some of the houses are raised above ground level to allow a cooling breeze underneath. Most south-facing aspects are shaded, with heavy shutters. Some of the more technologically advanced houses have old-style Mechanical Heat Recovery and Ventilation Systems. Others have Zone 5 green roofs, and the most modern houses are Planters—i.e. constructed from bio-materials and calcium hypercarbonate sourced from carbon scrubbers, maximised for plant growth and edible biodiversity (you can even eat some parts of the houses as they grow!) Houses are designed to support hundreds of species of animals and plants within and around the building fabric.

Biopylons—artificial photosynthesis

Permaculture college

Grain bins: keeping grain dry is a key problem in the hot wet weather. Most grain and preserves are stored underground in caverns

Workshop

Communal eating area

Aquaculture

Seedbank

Insect farm

## Waste:

All toilet waste is passed through reed beds to be broken down naturally. We have a device called an ElectroWaste which uses processes like microwave plasma gasification and hydrothermal carbonisation to turn everything into electricity using a fuel cell. All you have left at the end are these little black pellets which are really good for the garden – the flowers love it!

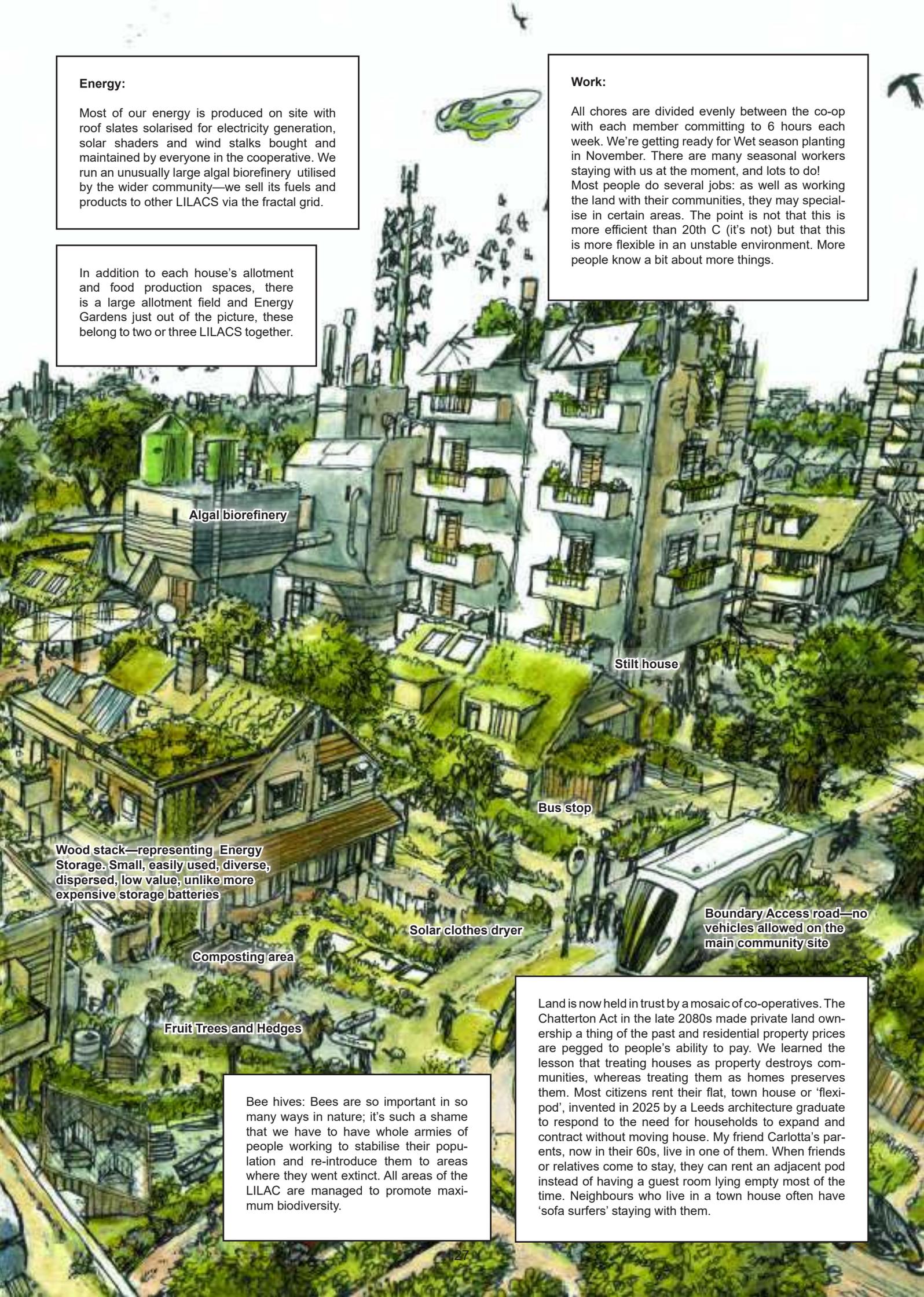
**Energy:**

Most of our energy is produced on site with roof slates solarised for electricity generation, solar shades and wind stalks bought and maintained by everyone in the cooperative. We run an unusually large algal biorefinery utilised by the wider community—we sell its fuels and products to other LILACS via the fractal grid.

In addition to each house's allotment and food production spaces, there is a large allotment field and Energy Gardens just out of the picture, these belong to two or three LILACS together.

**Work:**

All chores are divided evenly between the co-op with each member committing to 6 hours each week. We're getting ready for Wet season planting in November. There are many seasonal workers staying with us at the moment, and lots to do! Most people do several jobs: as well as working the land with their communities, they may specialise in certain areas. The point is not that this is more efficient than 20th C (it's not) but that this is more flexible in an unstable environment. More people know a bit about more things.



Algal biorefinery

Stilt house

Bus stop

Wood stack—representing Energy Storage. Small, easily used, diverse, dispersed, low value, unlike more expensive storage batteries

Solar clothes dryer

Boundary Access road—no vehicles allowed on the main community site

Composting area

Fruit Trees and Hedges

Bee hives: Bees are so important in so many ways in nature; it's such a shame that we have to have whole armies of people working to stabilise their population and re-introduce them to areas where they went extinct. All areas of the LILAC are managed to promote maximum biodiversity.

Land is now held in trust by a mosaic of co-operatives. The Chatterton Act in the late 2080s made private land ownership a thing of the past and residential property prices are pegged to people's ability to pay. We learned the lesson that treating houses as property destroys communities, whereas treating them as homes preserves them. Most citizens rent their flat, town house or 'flexipod', invented in 2025 by a Leeds architecture graduate to respond to the need for households to expand and contract without moving house. My friend Carlotta's parents, now in their 60s, live in one of them. When friends or relatives come to stay, they can rent an adjacent pod instead of having a guest room lying empty most of the time. Neighbours who live in a town house often have 'sofa surfers' staying with them.



Dinner in the de Bordes household: From left to right, Maia, Talbot, Tiernan, Myrtille, Kingsley Mason

It's Kingsley's leaving party. He's made up his mind to travel north to PanArctica! At his age (he's 113 next week)! Dinner consists of goneeeje mealworm rice and mitten crabs from the aquaponics centre, washed down with some vintage Dundee wine. There are a lot of Sea King farm workers here to help with harvest—a lot of mouths to feed.

#### CO-OP LIFE:

Within each LILAC, we live on a cooperative basis. Individual members can take on 'roles'. These include things like Energy Officer, Treasurer, Maintenance Officer, and Rent Officer. Once inducted into these roles, you are expected to follow the job description, fulfil duties, create and deliver reports on progress or issues at the monthly business meeting.

None of this is officially mandatory, but it wouldn't make much sense to join a housing co-op like ours if you didn't want to work. While the existence of these roles allows individual members to feel integrated, useful and a part of the co-op, they also endow them with useful skills applicable to other areas of life, and encourage a culture of knowledge - and skill-sharing.

We have two meetings a month: business and feelings. Business is where our officers report on the work they've been carrying out; finances (particularly large outgoings); proposals for things to do in the upcoming month; etc.

Feelings is where we check up on each other, to know what is going on in the individual members' lives, outside of the co-op and also how life in the co-op is affecting them. Both follow particular structures to help ensure productive meetings.

Business meetings involve a good deal of consensus decision-making [with the aid of hand signals] and are often in a communal area such as kitchen or living room.

We recognise there is a world of difference between 'informing and consulting' and 'empowering and engagement'. Decisions don't need to be perfect—just good enough. They're very much based on consensus.

Lots of skill-sharing and hands-on learning goes on as we try as much as possible to keep a DIY approach. In old 20th Century housing there are many issues surrounding any kind of refurbishment (at the moment, this is particularly centred around insulation work) and any building work must attend to specific needs of old houses. It's an interesting version of working with your environment – as well as this, we try to ensure our materials and methods are as eco-friendly as possible. Reusing and 'upcycling' are essential.

A small detail you might find interesting: we recently bought a 'log maker', which is basically a bioplas filter tube which helps create fuel for our stoves from old paper, leaves, teabags, and such. This is a simple device which goes a small way to help usefully eliminate waste.

#### Lea Salih

"I'm 8 years old. I'm Maia's cousin. My family are 3rd generation originally from Kurdistan. My granddad on my mum's side came with the Sea Kings in the 90s. I live with our extended family in a big pod in the Stockwell LILAC. (An old-style nuclear family is too small for many aspects of ecological living—you need 10-15 members). I have no siblings but there are other children in the pod that I love to hang out and play with, for example my best friend Mohammad (his family were from Sirte in what used to be a country called Libya in North Africa). Each person is responsible for 8 people in pastoral group — they themselves belong to

someone else's pastoral group. On the roof of the pod we have a communal garden, a solar thermal system and chicken coop. All of the children help out with the garden every Saturday, this is my favourite day of the week as I get to see the chickens and learn about how to grow food. I go to school every Monday to Thursday. I learn about so many things, about renewable energy and about how we need to take care of the planet better and ourselves. My favourite food is mussels in every form, my granddad has a mussel farm on the Bay and I love visiting him because he makes the best mussel soup. My great grandmother lives in the same house, she's 94 years old and often tells me stories of how it was growing up when

she was young and how much the world has changed. Unfortunately my great granddad passed away last year, he had Bieberia."



## Myrtille

"I'm a physical training instructor for the Otley militia—this is my service work, with my Hub earning-work focused on teaching about energy. My specialities are wind and water – mechanical conversion to electricity including assessment of the available resources – I'm told that the designs we have now are similar to those from 300 years ago, but few written records of those times remain outside of the Tech Hub. I'm sure Maia has been researching them..."

Anyway, both the water and wind generators are used all over the country now, with water filling in the gap for electricity when the wind isn't blowing, but being used

for mechanical jobs otherwise, like milling. The methane produced in the paddy fields is harnessed and stored for use underground in big salt caverns. I teach the next generation of engineers how to determine what each new LILAC needs in terms of energy resources, and how to decide on the best combinations of wind-stalks, waterwheels and paddy-power to be self-sufficient throughout the year. Luckily with our warmer climate since the Big Freeze, heating isn't so important, but refrigeration and ventilation are critical."



*This is my tything—my extended family (5-10 households); we all look after each other and under UNOColonial authority if one person in the tything breaks the law, we are all held responsible. The tythings also form the basic unit of our Virtual Power Plants in the Fractal Energy Grid, and provide the pool from which juries are chosen for voting on important issues—both locally and internationally via DREAM.*

*We recognised that the best adaption to climate change is to build an Anti-Fragile community where everyone looks after each other. Everyone receives six weeks' police training at age 21 and are then expected to serve the community, or leave and go on their 'Merantau' (military service or 'Walkabout')*

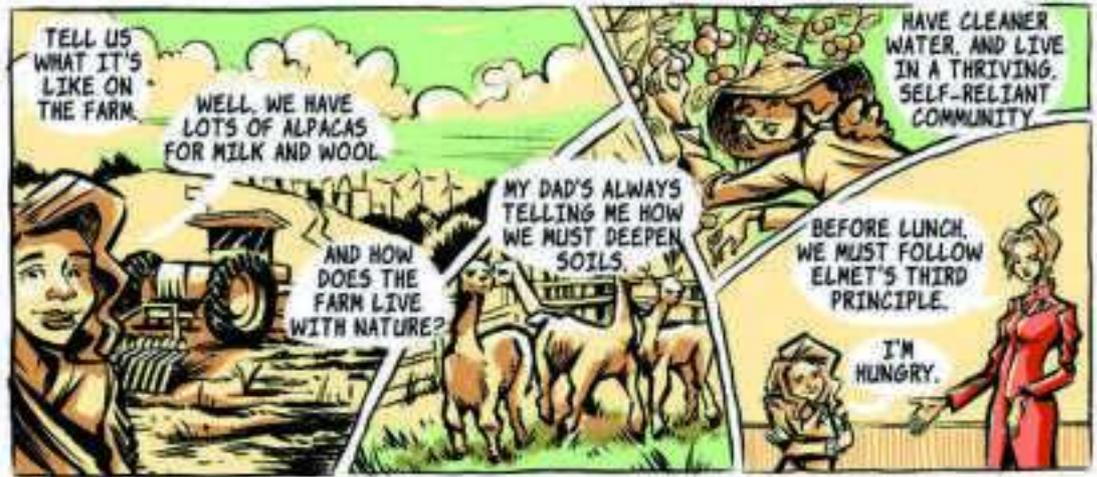
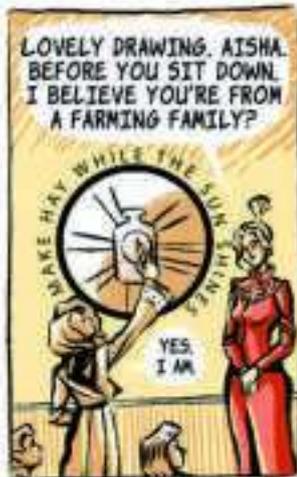


## Tiernan

"I'm a climate scientist working for an environmental consultancy. My main job is to track storms over the North Atlantic and try to predict when and where they will hit the UK and what impact they will have. We have some highly advanced technology to do this; including sophisticated DREAM models and hundreds of pup drones. My job is vital these days as some years we have been pummelled by enormous storms almost continuously for months on end, with intense flooding across much of the UNK. It seems odd but in some regions we've also had a water shortage

problem since the switch from the Big Freeze. Some years we have had barely any rain at all – 2146 was the worst. There was a huge civil engineering project to pipe water from Scotland which worked really well at first, but now it has reached its capacity and it struggles to cope with the unpredictability of rainfall. In the '46 drought, a lot of people in Elmet lived off water carried in by Cloud Shepherds for months. Of course, we're still much better off than other areas of the world such as the Saharopean desert (Spain, Southern France, North Africa). Clean water is such a precious resource now, I can't believe they used to flush toilets with it!"





NOW THAT WE'RE ALL FED AND WATERED, WE CAN FOCUS BETTER ON OUR FOURTH PRINCIPLE OF ELMET: CARING FOR OUR PLANET. PERMACULTURE CONTAINS THREE ASPECTS...

APPLY SELF-REGULATION

ETHEL! OUR FIRST ASPECT PLEASE!

UM... DESIGN?

THAT'S RIGHT. TO HAVE A DESIGN APPROACH IS VERY IMPORTANT.

UNDERSTAND HOW NATURE WORKS!

AND THE SECOND PRINCIPLE?

AND THE THIRD PRINCIPLE IS... UM...

HAVE AN ETHICAL FRAMEWORK?

GOOD! AND NOW FOR OUR FIFTH PRINCIPLE. IN MANY PLACES WE HAVE HAD TO ADAPT EXISTING SETTLEMENTS.

USE AND VALUE RENEWABLE RESOURCES

IN OTHERS WE HAVE HAD TO START FROM SCRATCH.

BOTH OFFER CHALLENGES AND OPPORTUNITIES.

LIKE THIS ECO-HOME, MADE FROM ORGANIC AND RECYCLED MATERIALS.

NOW OUR SIXTH PRINCIPLE LEADS US NICELY ONTO OUR SCHOOL PROJECT.

PRODUCE NO WASTE

REMEMBER WHEN WE EACH BROUGHT IN AN ITEM OF CLOTHING THAT WAS LOOKING WORSE-FOR-WEAR?

AND WE COMPOSTED THEM INTO SOIL?

YES, MISS, WE GREW COTTON FROM THE SOIL AND PICKED IT OURSELVES!

WELL, OUR LOCAL WEAVERS HAVE MADE OUR YIELD INTO NEW CLOTHES!

WOW, IT'S MY TROUSERS!

BEST DAY EVER!

MY DRESS!

AND NOW FOR OUR SEVENTH PRINCIPLE.

DESIGN FROM PATTERNS TO DIVULGATED  
STIVALD

HERE'S A PHOTO OF ME ON A FIELD TRIP DURING MY STUDIES. YOU CAN SEE FROM THE AIR THE COMPLEX PATTERNS IN NATURE.

YOU SEE THE PROBLEM AS THE SOLUTION.

AND THAT WE CAN MAKE THE LEAST CHANGE FOR THE GREATEST POSSIBLE EFFECT

IN OUR EIGHTH PRINCIPLE, WE CAN SEE FROM HISTORY THAT WHEN PEOPLE FIGHT AND WAR, THEY ONLY MAKE THINGS HARDER FOR THEMSELVES.

INTEGRATE NOT SEGREGATE

BUT WHEN WE WORK TOGETHER, LIFE IS BETTER FOR EVERYONE.

FARM WORK

THE YIELD OF A SYSTEM IS THEORETICALLY UNLIMITED.

IT IS ONLY LIMITED BY OUR IMAGINATIONS AND WHAT INFORMATION WE HAVE. OH DEAR, AISHA! SOME FRESH AIR WILL WAKE YOU UP.

LET'S GO TO THE SCHOOL GARDENS TO LEARN ABOUT OUR NINTH PRINCIPLE.

USE SMALL & SLOW SOLUTIONS

EVERYTHING MODIFIES, OR 'GARDENS' ITS ENVIRONMENT. WE MUST MAKE SMALL CHANGES, IF ANY, TO ENSURE WE DO NOT UPSET THE BALANCE.

NATURE HAS THE BALANCE WORKED OUT BETWEEN DEATH AND REGROWTH.

WE MUST BE CAREFUL TO KEEP THIS BALANCE.

ELMET'S TENTH PRINCIPLE IS ON THE SIGN TO OUR GARDENS AS IT IS SO IMPORTANT.

USE AND VALUE DIVERSITY

DIVERSITY IS ESSENTIAL TO OUR POLY-CULTURE.

IT ALLOWS US TO GROW CROPS WITHIN NATURE FOR AN INFINITE TIME.

NOT ONLY MUST WE VALUE DIVERSITY, WE MUST ALSO VALUE SOMETHING ELSE. CAN SOMEBODY TELL ME WHAT?

OOOOH! ME, ME! VALUE THE EDGES.

THE EDGES OF ENVIRONMENTS ARE OFTEN THE MOST DIVERSE ECOSYSTEMS.

LIKE WHERE LAND MEETS THE SEA.

OR WHERE WOODS MEET GRASSLAND.

USE THE EDGES

VALUE THE MARGINS

OR THE RIVER MEETING THE BANK.

YAWN! OKAY, AISHA, ELMET'S LAST PRINCIPLE. CAN YOU TELL US WHAT IT IS?

UM... CREATIVELY RE... RESPOND TO CHANGE?

THAT'S RIGHT. NOW EACH OF YOU TAKE A TREE SAPLING FROM MY BAG.

AND WE WILL PLANT OUR VERY OWN FOREST GARDEN.

CREATIVELY USE & RESPOND TO CHANGES

BASED ON ELMET'S TWELFTH PRINCIPLE: TO HAVE A VISION NOT OF HOW THINGS ARE NOW...

BUT HOW THEY WILL BE.

## The Permaculture Biointensive Landscape

Permaculture Principle 7: 'Design from Pattern to Details'. We recognise that just as humans are a part of nature, cities are a part of the landscape and surrounding ecosystem. The whole system needs to be considered with the human economy as a sub-set of the surrounding bioregion. Permaculture was developed by Mollison and Holmgren in the late 20th Century but didn't become mainstream until the time of the Thousand Flowers movement. Some regard Holmgren's book 'Principles' as the single most important book of the Age of Energy Descent, on a par with Wem Sheekes' 'Notes on What's What'. Permaculture is a 'way of seeing' - it is about stability and "anti-fragility"- a system that grows stronger when under strain, about deepening soils and cleaner water, thriving communities in self-reliant regions, biodiverse agriculture and social justice, polyculture rather than monoculture.

The key points:

- Work with nature rather than against it.
- The problem is the solution.
- Make the least change for the greatest possible effect.
- The yield of a system is theoretically unlimited (or only limited by the imagination and information of the designer).
- Everything gardens (or modifies its environment)

When we design to meet our needs, we must do so in a way that supports the bioregion as a whole. So we create wildlife corridors and engage in landscape-level rewilding. This is all enabled by the Global Earth Observation System set up in the mid-21st Century which via holistic DREAM models lets us instantly assess the ecological consequences of any action.

About 20% of population is engaged in food production. A farmer with 3-50 acres is typical.

Water management requires cooperation between those connected by rivers from source to sea (the 'Thalweg') and also between river valleys—for comparison and learning. Drainage systems are interconnected and interdependent.

Any slope over 18° is forested—protecting against erosion and flooding

### Biomass Cycle

Fringes of Yorkshire Dales—upland plantation mosaics; long rotation mixed forests, hazel coppices, miscanthus, bamboo and marabu feed biorefineries around Bay of York, carbon is captured and piped underground in North Sea reservoirs.



**Coastal Mangroves**—storm defence, protected fish breeding grounds



Blacktoft National Park and Marine Reserve (no fishing allowed)

**Da Hai You Min (Sea Kings)** chikshuj (hydropolis)—aquaculture, algal bioenergy



CCS pipeline

**Bay of York Energy Zone**—Bulrush fields, Solar Trees, algal bioenergy

Port of Beverley



Humber boom (tidal energy)

Zone 5 — Self-willed land, with re-wilding programmes connecting across the whole landscape. Also includes rooftops, hedges and underground spaces, the space between low and high water and coastal cliffs.



Catchment boundary

Catchment—Headwaters pure but infertile, estuaries fertile but accumulate toxins



Zone 4 — managed forest (freeholder woods), wood pasture, biomass plantations, coppicing, pollarding, Road Verge Gardens

The Thalweg (everything is connected): Decisions made at source affect all downstream. Riparian corridors (wide strips of trees), beaver dams, swales and johads help protect against flooding and capture nutrients, act as wildlife corridors.



Zone 3 — the wider micro-city or 'Hub', pastures, plantations, dams (swales, johads), large livestock



Zone 2 — LILAC communities: orchards, allotments, urban farms, Energy Gardens

Following Guru Lovelock, we aim to set aside 1/3 of land as natural woodland (forest mosaics and wildlife corridors), half of this as 'tabu' Sites of Special Scientific Interest where only the children who data collect are allowed permits; and 2/3 high-density urban micro-villages or 'Hubs'. 15% of the landscape should be under water—although management is needed to reduce breeding opportunities for the mosquitoes that carry Bieberia. Some areas are set aside for large-scale SMART-intensive farming, but most of our needs come from the urban Edible Landscape — permaculture market gardens.



Zone 1 — the 'Pod' or homestead and irrigated garden

# An Edible Urban Landscape: The Forest Gardens of Elmet

Permaculture Principle 3: 'Obtain a Yield': food is not optional! One of our biggest challenges during the Big Shift was to provide food at the same time as reducing greenhouse gas emissions to zero.

Elmet food production is based on permaculture, using every square inch and every microclimate available in our urban spaces—walls, roofs, shaders, balconies, road verges—visitors often remark how untidy and ramshackle our communities appear to be! Production is intensive and above all local. Importantly, about 20% of population is engaged in food production—about the same as in 1900, far more than during the peak of the Ascent.

Diet is seasonal and rationing is sometimes imposed—as in the '46 drought. It's harvest time now, so plenty to go around. However, we often have problems during the 'Hungry Gap' in late Spring.

We follow a mainly plant-based diet with animal protein supplied by our insect farms—(see facing page). We try to strategically grow the highest calorie, most nutritious foods—other foods are a luxury. For this reason it's illegal to grow coffee or tea outside the Yorscandia Economic Zone areas; caffeine smuggling is endemic though.

Due to rapidly changing conditions since the Hekla eruption and Big Freeze in the 90s, we assist in the migration of certain fruit and vegetable crops, for example vineyards have moved to Scotland.

Restoration of topsoil is our top priority, following Guru Holmgren's maxim "Rebuilding soil is the most important contribution we can make to the survival of humanity". In fact some of our soil is exported to the new regions in PanArctica that lack it.

7. Vertical garden—  
climbing berries,  
nasturtiums,  
runner beans,  
vines

## The Five Steps

During the Big Shift, there were 5 main changes in our approach to food driven by the Thousand Flowers Permaculture movement:

Freeze ecological footprint—deforestation stopped; nitrogen emissions reduced by a third by planting winter cover crops

Obtain a yield—high technology precision growing e.g. smart irrigation

Use renewable resources more efficiently—for example, making use of invasive species

Shift diets to less meat and dairy

Produce no waste—unbelievably at the peak of the Energy Ascent, people were wasting nearly half of all food produced! Our food production also utilises waste (such as humanure) for nutrients

Guru Fukuoka's 4 principles:

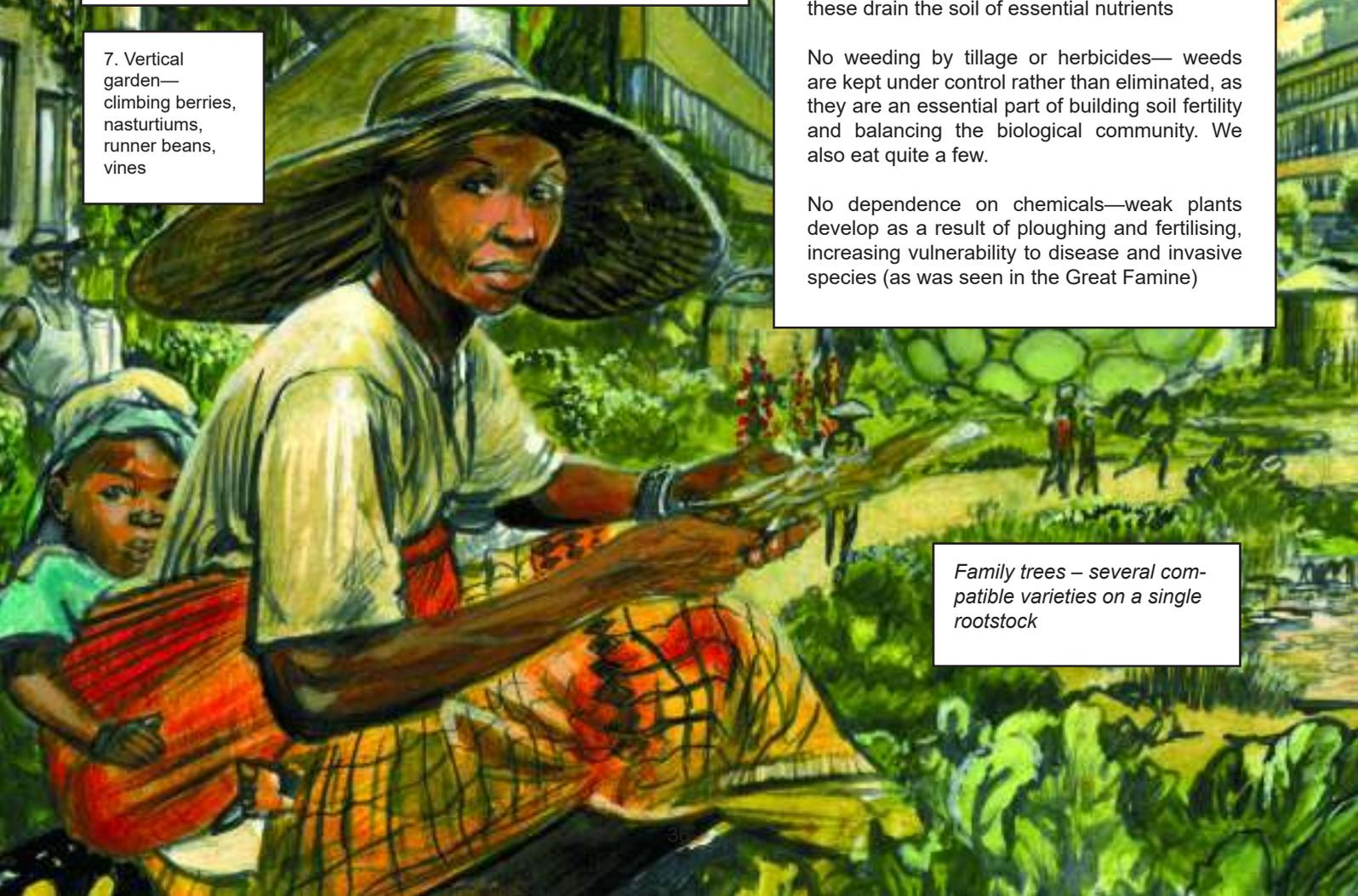
No ploughing or turning of the soil. The earth cultivates itself naturally

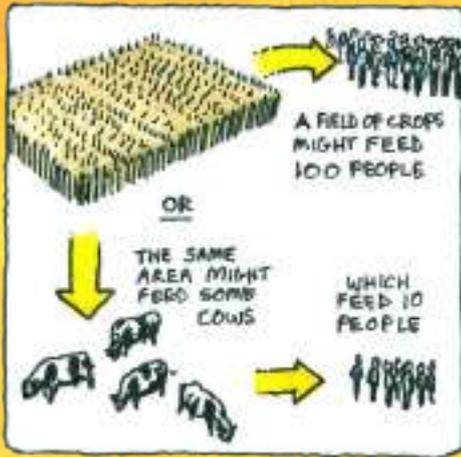
No chemical fertiliser or prepared compost—these drain the soil of essential nutrients

No weeding by tillage or herbicides—weeds are kept under control rather than eliminated, as they are an essential part of building soil fertility and balancing the biological community. We also eat quite a few.

No dependence on chemicals—weak plants develop as a result of ploughing and fertilising, increasing vulnerability to disease and invasive species (as was seen in the Great Famine)

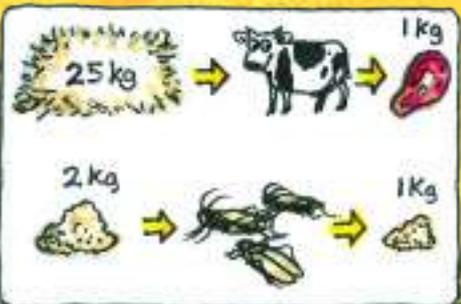
*Family trees – several compatible varieties on a single rootstock*





In the Age of Energy Ascent there was a global shift towards eating animal protein across the world, resulting in a huge increase in greenhouse gas emissions and food production intensity. During the Big Shift there was an equally rapid move back again (for richer societies) - this time with protein supplied by invertebrates. Many people in Elmet eat no meat at all, others believe in utilising animal protein as part of a balanced use of the surrounding bioregion.

Seven Stories of a Forest Garden:  
1. Canopy – tall energy coppice and pollarded fruit trees



It seems every year there are new pest species, and new diseases (especially of crops). Until the Big Shift, people regarded pests as a problem. However, according to Guru Holmgren, we know that pests and invasive species represent surplus abundance—they can be useful. They are often the result of lack of management of a previously managed environment.

Typically within an Insect Farm it takes 2kg of meal to produce 1kg of insect protein, whereas it takes 25kg of feed (or more) to produce 1kg of beef. Insects are a great source of micronutrients e.g. iron and zinc

Insect farm and Aquaponics system: uses only 2% of the water of a conventional irrigated farm.

Rearing Tank—raising and feeding fish

Biofilter—nitrification bacteria grow and convert ammonia into nitrates

Hydroponics subsystem—plants grown by absorbing excess nutrients

2. Low tree layer—fruit and nuts on dwarfing rootstocks and bamboo

3. Shrub layer e.g. currants, gooseberry

4. Herbaceous layer—herbs and perennial veg

5. Ground cover—creeping plants

6. Rhizosphere—shade tolerant and winter root plants

Soil—managed as a carbon sink—vital for carbon storage

Above: Dryads preside over a forest garden on the site of the pioneering Sustainable Garden on the campus of the University of Leeds

# The Trees of Elmet — Our Life Support System



Here's my Home Oak... or you could call it a solar energy generator with advanced carbon and energy storage facilities, along with atmospheric scrubbing, nitrogen fixing and oxygen generation. A single oak can support 300 other life forms, many thousands more are sustained by the wood-wide web.

During the Big Shift, there was a sea-change in our understanding and appreciation of trees. People realised that a tree planted in the 2020s would long outlast fossil fuels—and would act as carbon storage for centuries. Billions were then planted across the globe, forming the basis of our bioeconomy.

Naming individual trees and treating them as citizens of our community was one way to prevent careless abuse. So the Home Tree Movement began. Each tree is named after a child. Each person has the following:

## **A Birth Tree**

**A Home Tree** (an old, significant tree growing within the community) that they share with everyone else in their LILAC

**A Landbase Tree** (a significant tree far away, either in someone else's community, or in a Children's Forest)

As a further protection, the forests also benefit from their famous guardians, the Dryads.

## ENERGY TECHNOLOGY IN THE AGE OF ENERGY DESCENT

Permaculture Principle 5: 'Use and value renewable resources'. The key to our survival when faced with climate change was the shift from fossil fuels to renewable energy to reduce carbon emissions to zero (or negative).

The Big Shift in the 2020s to 2040s could also be called the 'Second Industrial Revolution', or the 'Second Energy Revolution'. Right up until the early 21st Century mid-Victorian tech was being used—burning fossil fuels in big power stations to generate steam to turn a turbine. The Big Shift used radically alternative technologies. We have to throw everything at the problem—no one technology is sufficient on its own. The Big Shift was enabled by the introduction of the Carbon Tax—straight away this meant that the old fossil fuels couldn't compete with low carbon energy technologies because of the environmental costs.

None of the alternative technologies can fully replace the cheap, dense fossil fuels of the Age of Energy Ascent and in many cases they are *more* resource intensive, but as Guru Holmgren shows, limited and erratic technology gives us valuable feedback telling us when we are putting too much strain on our surrounding environment.

For a long time during the 'Wobble' energy curfews, power cuts, 'brown-outs', and rationing of some goods (and in some cases over-supply) were a normal state of affairs in Elmet. Eventually the Thousand Flowers movement began, using LILACS as individual fractal micro-grids. Each LILAC microgrid can optimise with neighbours and build energy security from the bottom up. Our co-operative power plant is plugged into DREAM and managed to balance supply and demand across the Saharopean Union.

Within a permaculture society, energy is just one component of a nexus— the FOOD/WATER/ENERGY nexus. For example obtaining food requires both energy and water. No single resource can be considered on its own.

Renewable energy use has led to a more peaceful planet. If you don't rely on oil, for example, then you don't need to go to war over it.

In addition, with less energy available, there is more work that needs to be done by human or animal power—a lot more jobs. Note—more labour doesn't always mean more jobs: slavery returned in some areas of the world in the mid-21st Century—especially in the wilder micro-states of the North Sea and Baltic.

### The Saharopean Energy Union



The North African and European fractal super grid extends from the Sahara desert north to Iceland and PanArctica, ensuring that renewable low carbon energy can be shared among many nations. For example, when wind speeds are low on the giant Dogger Arrays in the North Sea, extra energy from the Saharan solar farms can be carried north to compensate. No one area can survive on its own, it is a system built on collaboration and unity.

Each fractal LILAC unit has an energy officer who looks after energy infrastructures and sits on the board of the next fractal level up, the ELMET Fractal Unit. The ELMET unit is responsible for commissioning and co-producing the larger CCS infrastructures, floating wind platforms, Biopylons and other gen-tech suited to our bioregion. They then share this with higher and lower fractal levels to achieve balance and secure, if not always abundant, supply.

CO<sub>2</sub> taken in by plants

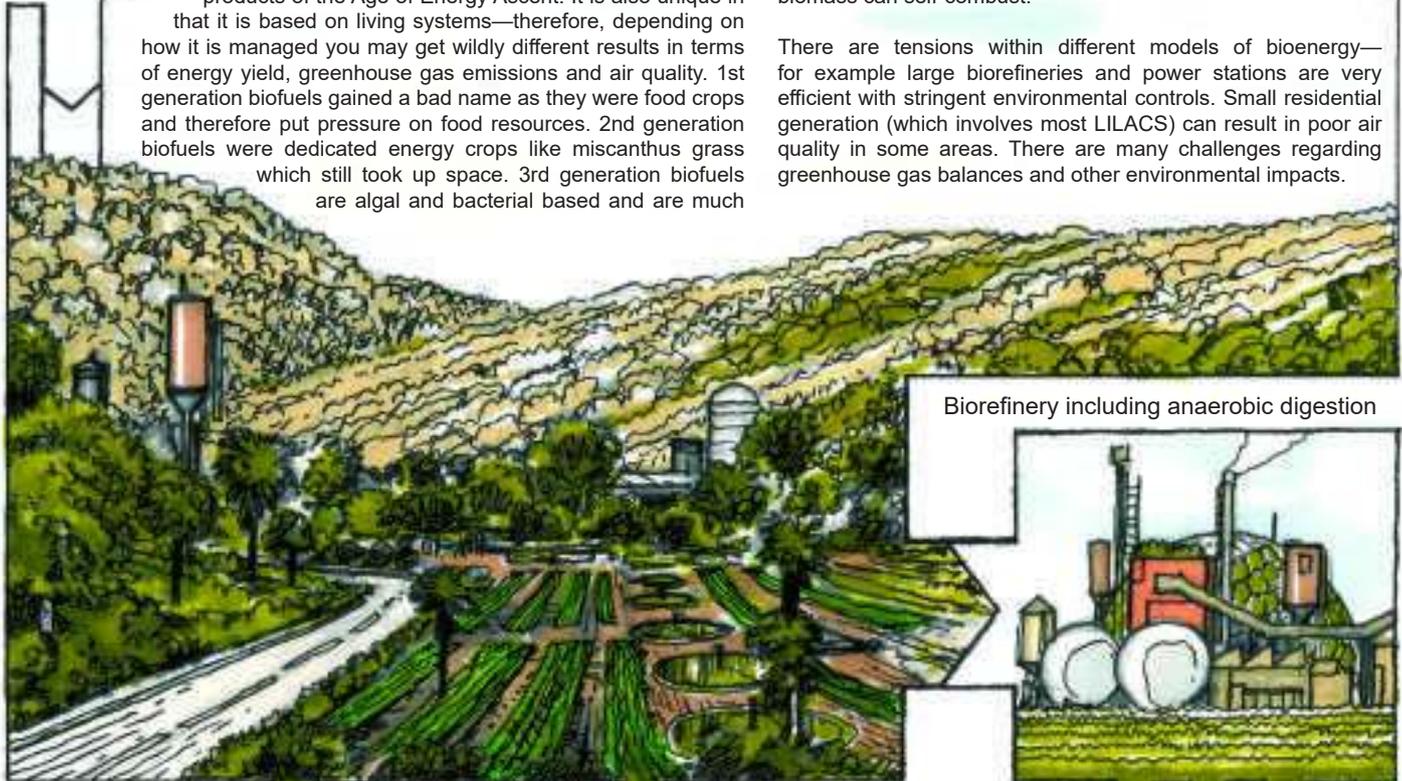
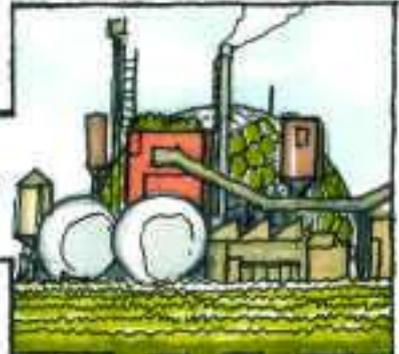
### BIOENERGY

Bioenergy is unique as a renewable energy source because it not only provides power, but also heat, fuels, and products that replaced the petroleum-based products of the Age of Energy Ascent. It is also unique in that it is based on living systems—therefore, depending on how it is managed you may get wildly different results in terms of energy yield, greenhouse gas emissions and air quality. 1st generation biofuels gained a bad name as they were food crops and therefore put pressure on food resources. 2nd generation biofuels were dedicated energy crops like miscanthus grass which still took up space. 3rd generation biofuels are algal and bacterial based and are much

more successful, reducing pressure on food and other systems. No aspect of energy impacts on public life more than Bioenergy. Most of the population are engaged at one time or another in biomass-processing and life cycle. Elmet energy officers learned early on to manage biomass carefully—dried and stored biomass can self-combust!

There are tensions within different models of bioenergy—for example large biorefineries and power stations are very efficient with stringent environmental controls. Small residential generation (which involves most LILACS) can result in poor air quality in some areas. There are many challenges regarding greenhouse gas balances and other environmental impacts.

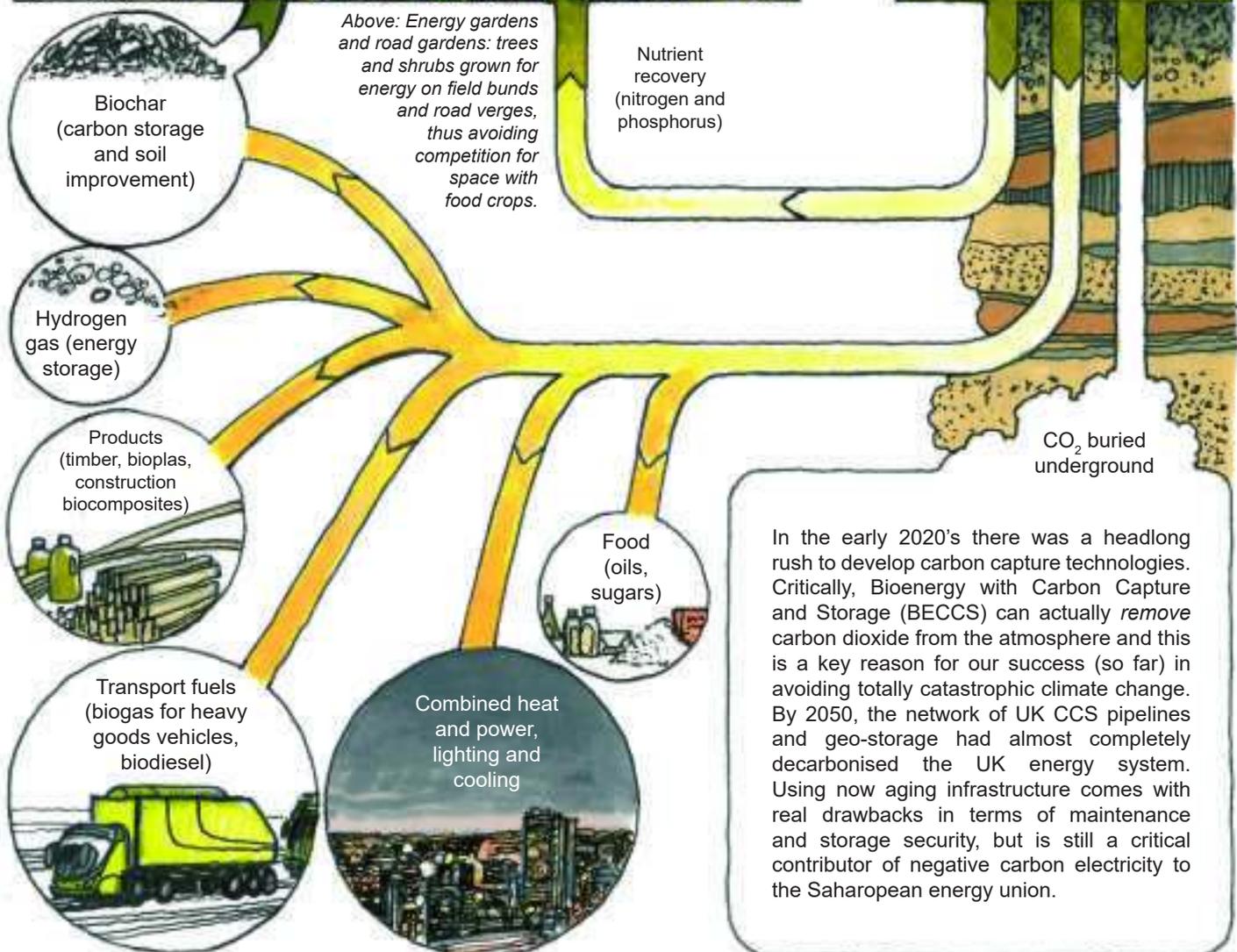
Biorefinery including anaerobic digestion



Above: Energy gardens and road gardens: trees and shrubs grown for energy on field bunds and road verges, thus avoiding competition for space with food crops.

Nutrient recovery (nitrogen and phosphorus)

CO<sub>2</sub> buried underground



Biochar (carbon storage and soil improvement)

Hydrogen gas (energy storage)

Products (timber, bioplas, construction biocomposites)

Transport fuels (biogas for heavy goods vehicles, biodiesel)

Combined heat and power, lighting and cooling

Food (oils, sugars)

In the early 2020's there was a headlong rush to develop carbon capture technologies. Critically, Bioenergy with Carbon Capture and Storage (BECCS) can actually *remove* carbon dioxide from the atmosphere and this is a key reason for our success (so far) in avoiding totally catastrophic climate change. By 2050, the network of UK CCS pipelines and geo-storage had almost completely decarbonised the UK energy system. Using now aging infrastructure comes with real drawbacks in terms of maintenance and storage security, but is still a critical contributor of negative carbon electricity to the Saharopean energy union.

## ENERGY FROM WASTE:

Energy can be recovered from waste agricultural residues, but our most important source is mining old landfill sites and generating biogas (methane).

In keeping with the permaculture principles of our bioeconomy there is huge emphasis on recycling of nutrients.

As well as wastes, invasive species like marabu are utilised. It's interesting that the Dryads themselves are created from Japanese Knotweed-derived biocomponents.

Crop wastes are converted into biochar, used for carbon sequestration with the pyrolysis heat used for electricity generation and household warmth. Over time we sequestered megatons of carbon in this way. Biochar is great for holding solid nutrients and water, contributing to crop fertility in nutrient leached areas and holding onto water in soils.

We use biochar as a carbon based biofilm reactor which soaks up nutrients and grows algae on a solar waterfall. Most people think the solar waterfalls are beautiful, but I think they look like mouldy curtains!

As we regenerated soil life we were able to better use that life to incorporate soil-based microbial fuel cells into our wastewater treatment and bio-energy production. Bio-based supercapacitors are used for round the clock algal cultivation, they reduce parasitic energy loss. In this way we made our soil regeneration work for us over and over again. Soil regeneration produces more and better food, which is recycled through wastewater treatment and diverted into algal production.

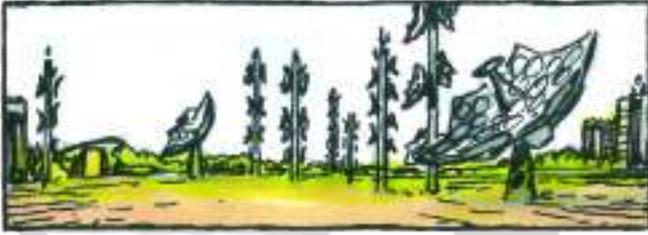
## BIOPYLONS or 'JACKS' \*

Above: The unmistakable Biopylons rise above Elmet like giant green trees.

Nature has evolved an extremely efficient means of generating energy—photosynthesis. We mimic nature by creating artificial photosynthetic structures—these were developed and widely deployed by the 2070s. Of course, the 'leaves' which capture energy from the sun only do this during the day. A means of energy storage for times when the sun is not available was found—a 'pumped storage' system. During the day the power generated by the 'leaves' pumps water high up into the top of the structure. During the night and at times of high demand, valves open allowing water to pour down the interior of the tree into an underground reservoir. The descending water drives turbines that generate the electricity.

In some cases this process uses more energy than it consumes, but by combining with other energy sources, it reduces the need for extra provision at times of high demand. In parallel, Hedgefox bio-batteries utilise synthetic enzymes to store energy as sugars. The batteries form huge power blocks in the trunks of the trees. New research is finding ever more ingenious ways to reduce the size of the batteries and increase their efficiency.

*\*possibly from 'Jack and the Giant Beanstalk'*



**SOLAR**

By the mid 21st Century solar power was the largest source of electricity via the giant Saharopean arrays. Solar desalination plants like the Sunflowers are vital for producing fresh water during the Dry Season when most of the Elmet rivers run almost dry. Solar energy is also used in combination with other technologies e.g. to torrefy biomass for use in slurry engines and to scrub carbon dioxide from the air within the Solar Trees.

**WIND**

The most common large scale wind technologies are the Bulrush fields in the Bay of York. The Humber Array was severely compromised during the Sea King disorders at the turn of the century, but now provides a large fraction of Elmet's energy, and is twinned with the Yorscandian North Sea and Dogger Bank Arrays stretching across to Denmark.



**HYDROPOWER/MARINE**

The Humber Barrage Pelamis is the most large-scale manifestation of the use of water power for energy. Throughout the permaculture landscape, water is used through waterwheels, mills, dams, Pumped Storage stations (for example within the biopylons), and all use is managed with flood defence in mind.

**NUCLEAR**

Small modular reactors now provide reliable baseload energy for Elmet communities. Though many campaigners for low carbon energy during the Big Shift were opposed to nuclear, the fact remained that whereas nuclear waste is a local problem, climate change is global. Eventually smart modular reactors with a closed cycle (which meant that waste never came out of the reactor) were established. Following permaculture principles (the problem is the solution) they were even able to use the waste from the old 20th Century reactors and were thus part of the clean-up operation. Even more amazingly, after Manson NDela's successful campaign to rid the world of nuclear weapons, the leftover warheads were used as a fuel. However, new installations had to be built to treat the waste first, which in some cases was crippling expensive. Clearing up nuclear waste from early, primitive nuclear sites will be a long-term job lasting hundreds of years.



# Reducing Energy Demand—the Easier Option

In order to get to zero carbon emissions, new technologies were not enough. It required a massive reduction in energy demand—a change in the whole economy (see pages 64-69) and a change to how energy is managed. But importantly, it didn't need any complicated and expensive new tech—just new ideas.

## Energy Storage

The “Holy Grail” of successful energy systems. Easily accessible energy storage = water, fertile soil, seed, good timber forests, peat land. In the Energy Ascent storage of fossil fuel energy was easy (huge piles of coal and billions of barrels of oil). Storage for renewable energy systems was much more difficult. It wasn't until the Big Shift that viable ‘Generation-Integrated Energy Storage’ methods were developed, for example molten salts, heat-exchange systems, liquid air and Hedgefox bio-batteries.

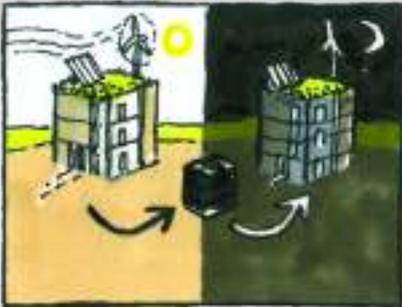
## The Anti-Fragile Fractal Grid

We run different autonomous but interconnected systems side by side: Community energy (Thousand Flowers), Regional energy (e.g. Dogger Arrays), Transnational Energy—the Saharopean Energy Union



## Virtual Power Plants

Thousand Flowers communities time their energy demands and trading based on energy forecasts via DREAM and globanking. This is balanced by feeding in their own energy at the right time to avoid mismatches of supply across the fractal grid. One of the most important jobs of the LILAC energy officer is to communicate the ELMET Energy Forecast each day. We maximise power use during the sunny or windy spells so the better we are at responding to useful conditions the more efficient we can be with our energy resource.



## Dealing with those other emissions...

There are two areas where it is impossible to reduce greenhouse emissions to zero: agriculture and heavy industry, for example metallurgy and cement manufacture.

Even with our permaculture food production methods and shift to vegetarianism, agriculture is still an emitter of greenhouse gases—not just carbon dioxide but also methane and nitrogen oxides. However, as our permaculture approach beds in, we are seeing the soil in some areas return to being a carbon sink. It has taken years of careful and patient recycling of nutrients, biochar addition, grazing management and compost production to get to this point.

We have mostly moved away from construction methods requiring concrete and steel, through use of bio-materials and hypercarbonate composites. However, we have always struggled to reduce the emissions in these areas, and we're not there yet.

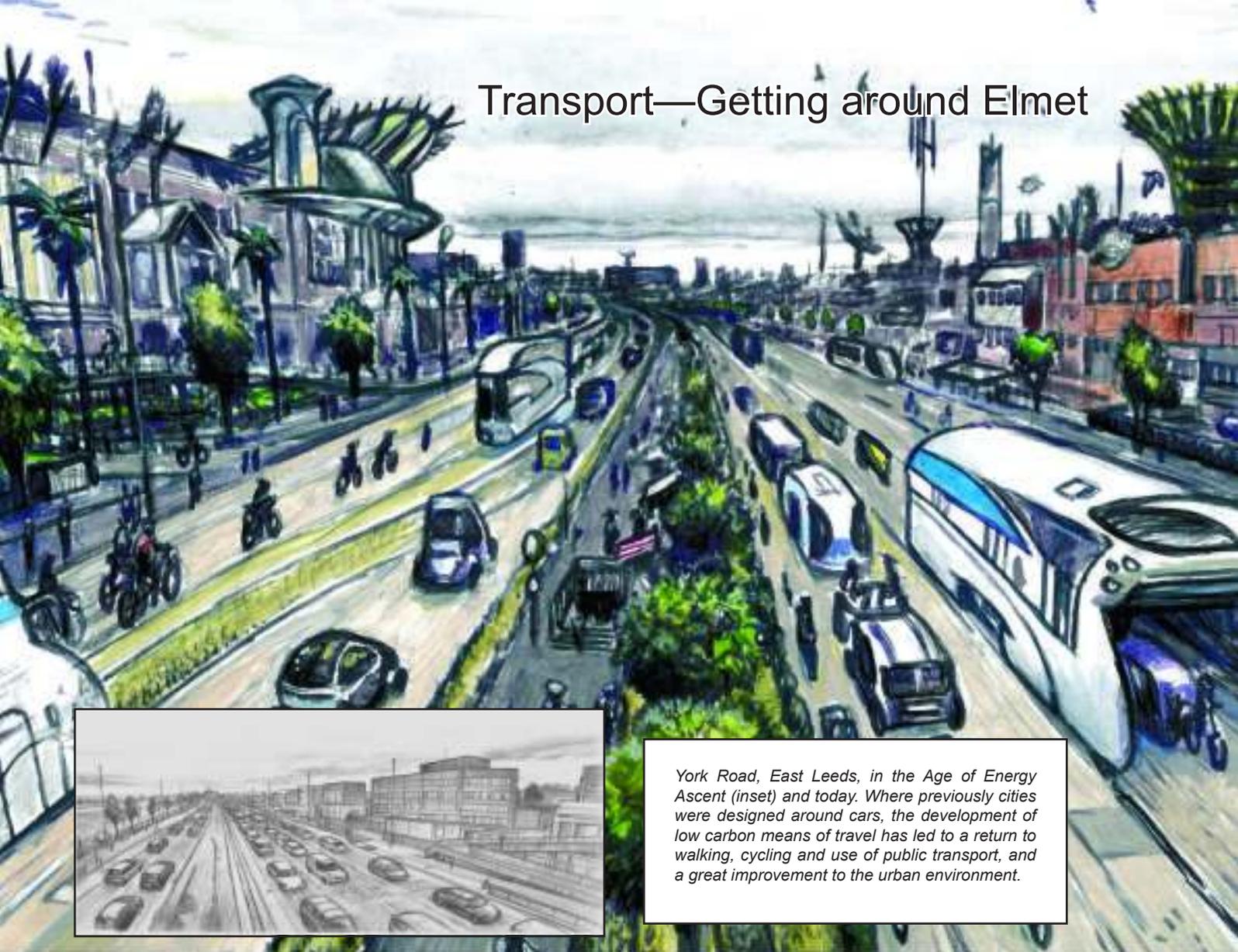
## Energy service companies

Communities don't need a particular fuel, they just need heating, cooling, light and power to do work. Energy service companies manage this through complex DREAM networks utilising every available source of energy within the Fractal grid.

Large carbon emitters are linked to the White Rose Carbon Capture and Storage pipeline, taking carbon dioxide out for burial in North Sea reservoirs. This is the best we can do at the moment.



# Transport—Getting around Elmet



*York Road, East Leeds, in the Age of Energy Ascent (inset) and today. Where previously cities were designed around cars, the development of low carbon means of travel has led to a return to walking, cycling and use of public transport, and a great improvement to the urban environment.*

## A History of Transport through the Age of Ascent and Descent— York Hub Museum, Elmet



*Water was the most efficient way of getting around—expansion of overseas trade routes and canal networks. Much-needed improvements to roads through unpopular tolls.*

### 18th Century Transport



*First flight—hot air balloons*



*First rail vehicles—used for hauling coal*

*Early trains and the first railways. First bicycles—'Dandybikes' (often called 'Boneshakers')*

### Early 19th Century Transport

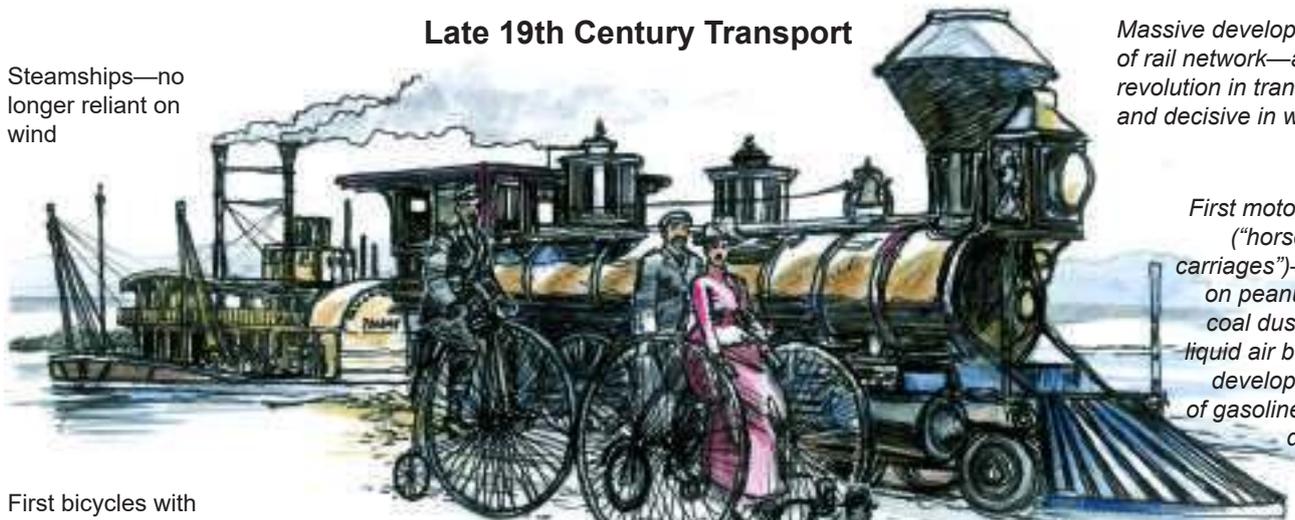




## Late 19th Century Transport

Steamships—no longer reliant on wind

*Massive development of rail network—a revolution in transport and decisive in wars*



*First motorcars (“horseless carriages”)—run on peanut oil, coal dust and liquid air before development of gasoline and diesel*

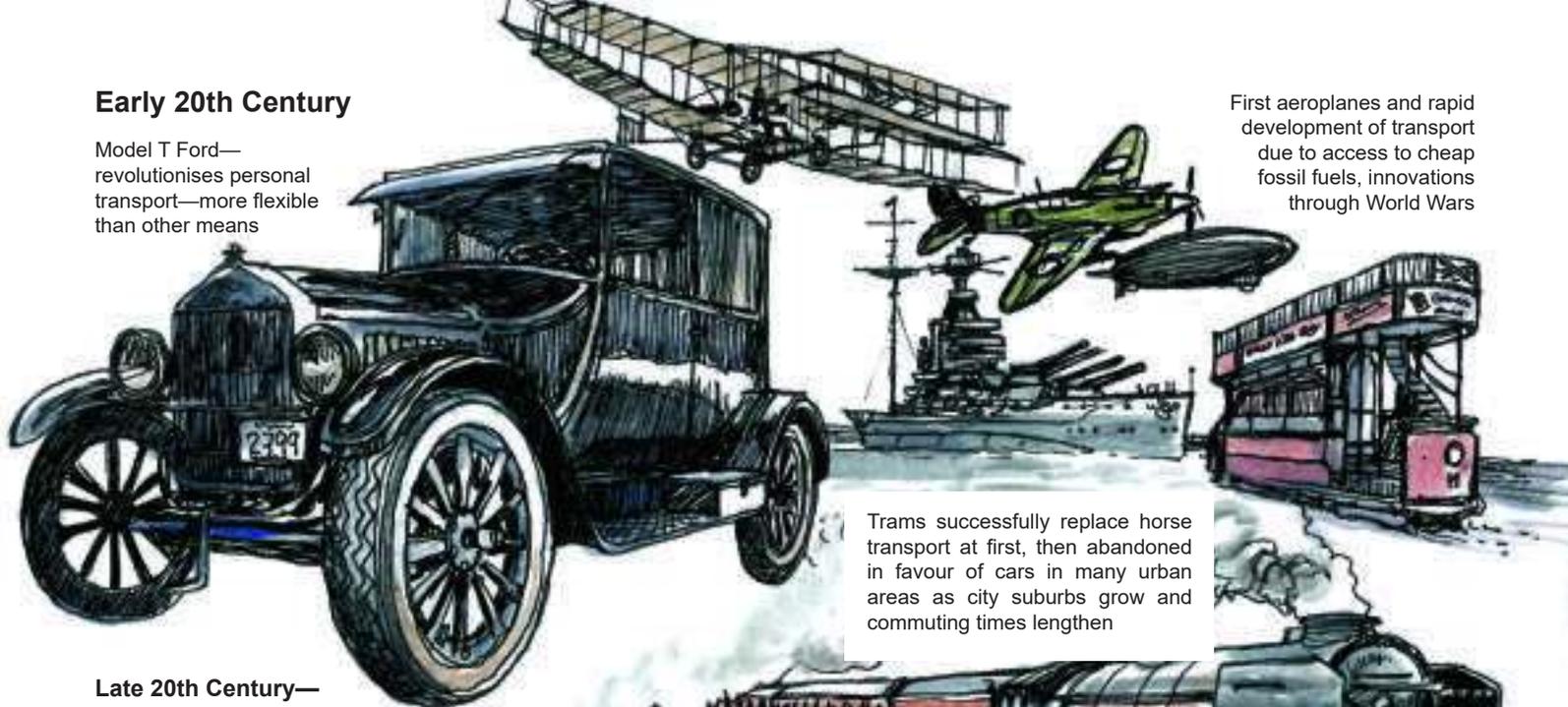
First bicycles with rubber tyres—pave the way for motor vehicles by requiring smooth road surfaces

*Horses still provide much of the power for urban transport—and a lot of manure! Increasing public awareness of hygiene problems*



## Early 20th Century

Model T Ford—  
revolutionises personal  
transport—more flexible  
than other means

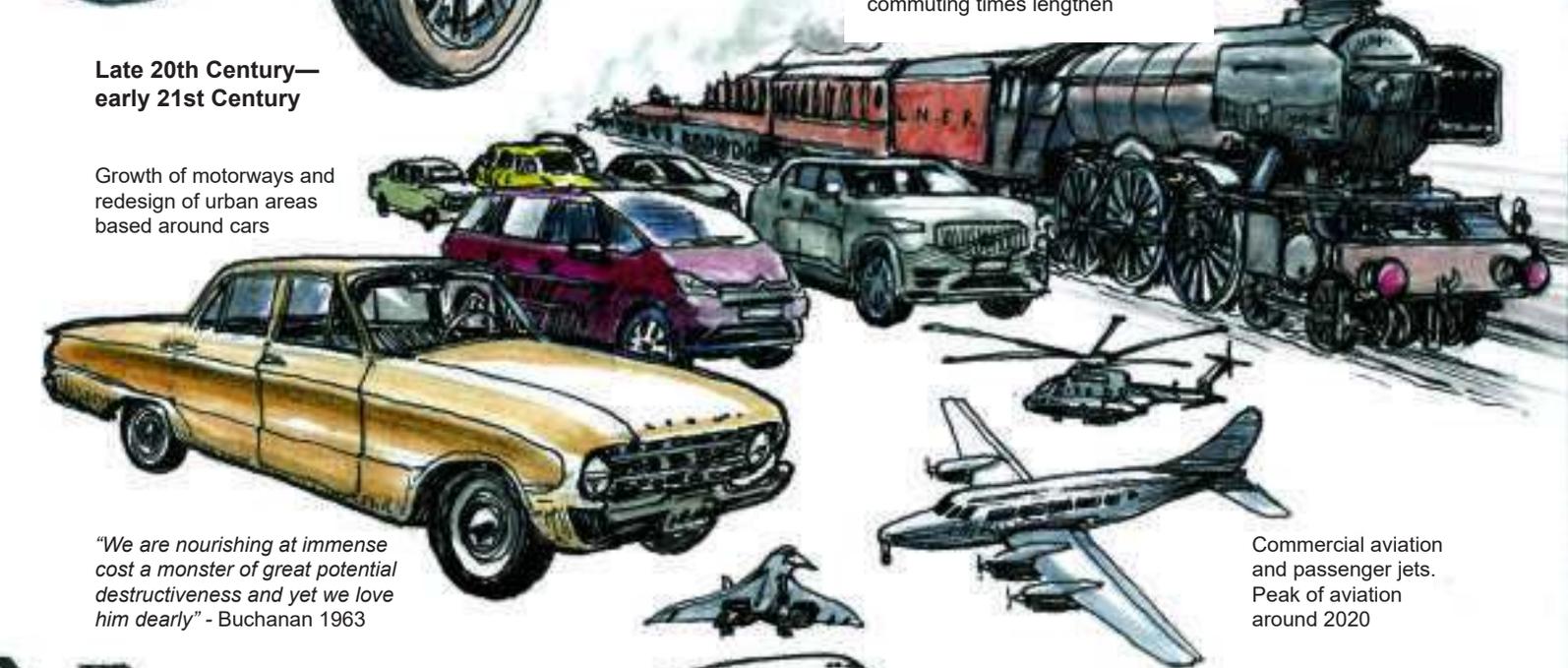


First aeroplanes and rapid  
development of transport  
due to access to cheap  
fossil fuels, innovations  
through World Wars

Trams successfully replace horse  
transport at first, then abandoned  
in favour of cars in many urban  
areas as city suburbs grow and  
commuting times lengthen

## Late 20th Century— early 21st Century

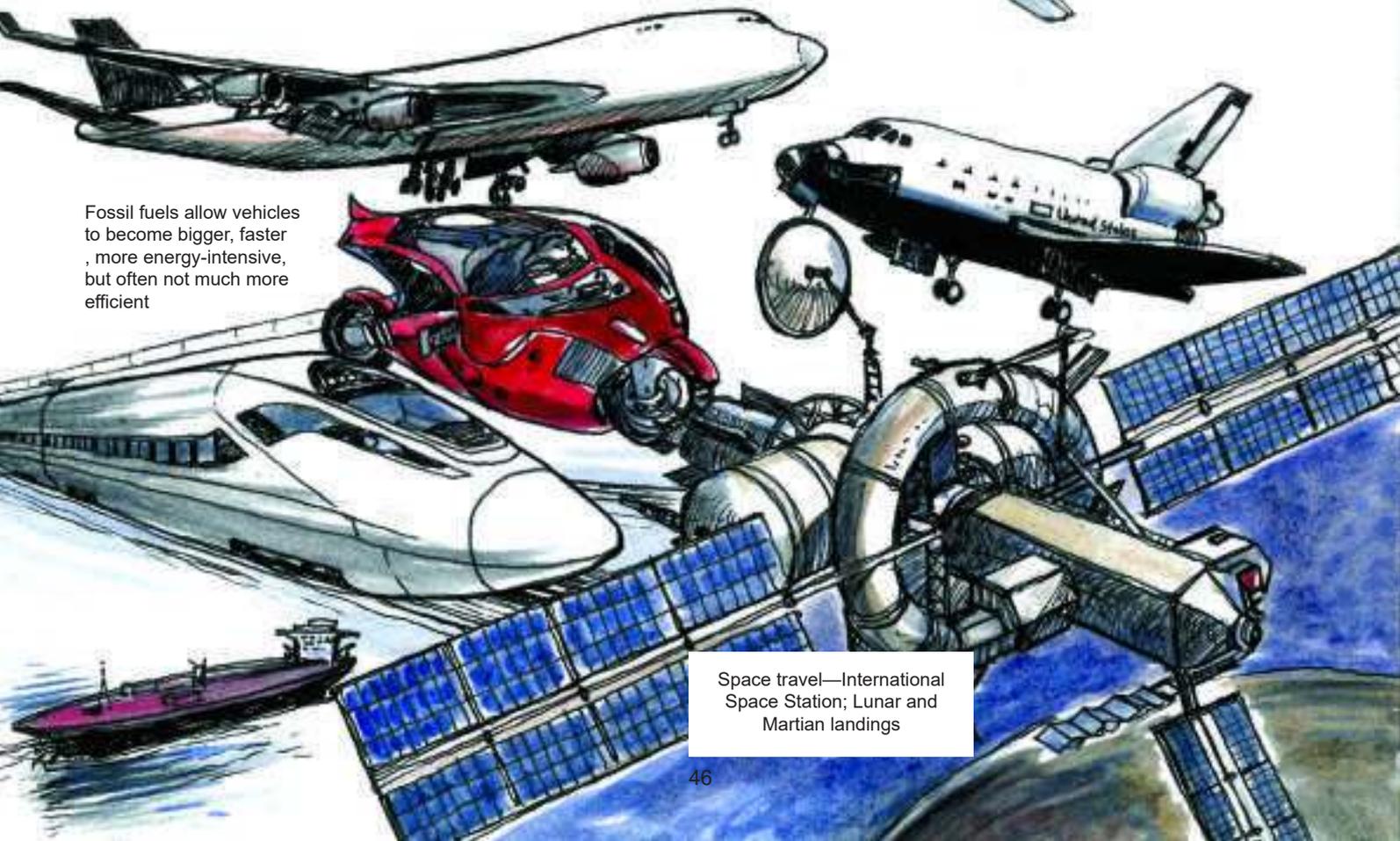
Growth of motorways and  
redesign of urban areas  
based around cars



*"We are nourishing at immense  
cost a monster of great potential  
destructiveness and yet we love  
him dearly"* - Buchanan 1963

Commercial aviation  
and passenger jets.  
Peak of aviation  
around 2020

Fossil fuels allow vehicles  
to become bigger, faster  
, more energy-intensive,  
but often not much more  
efficient

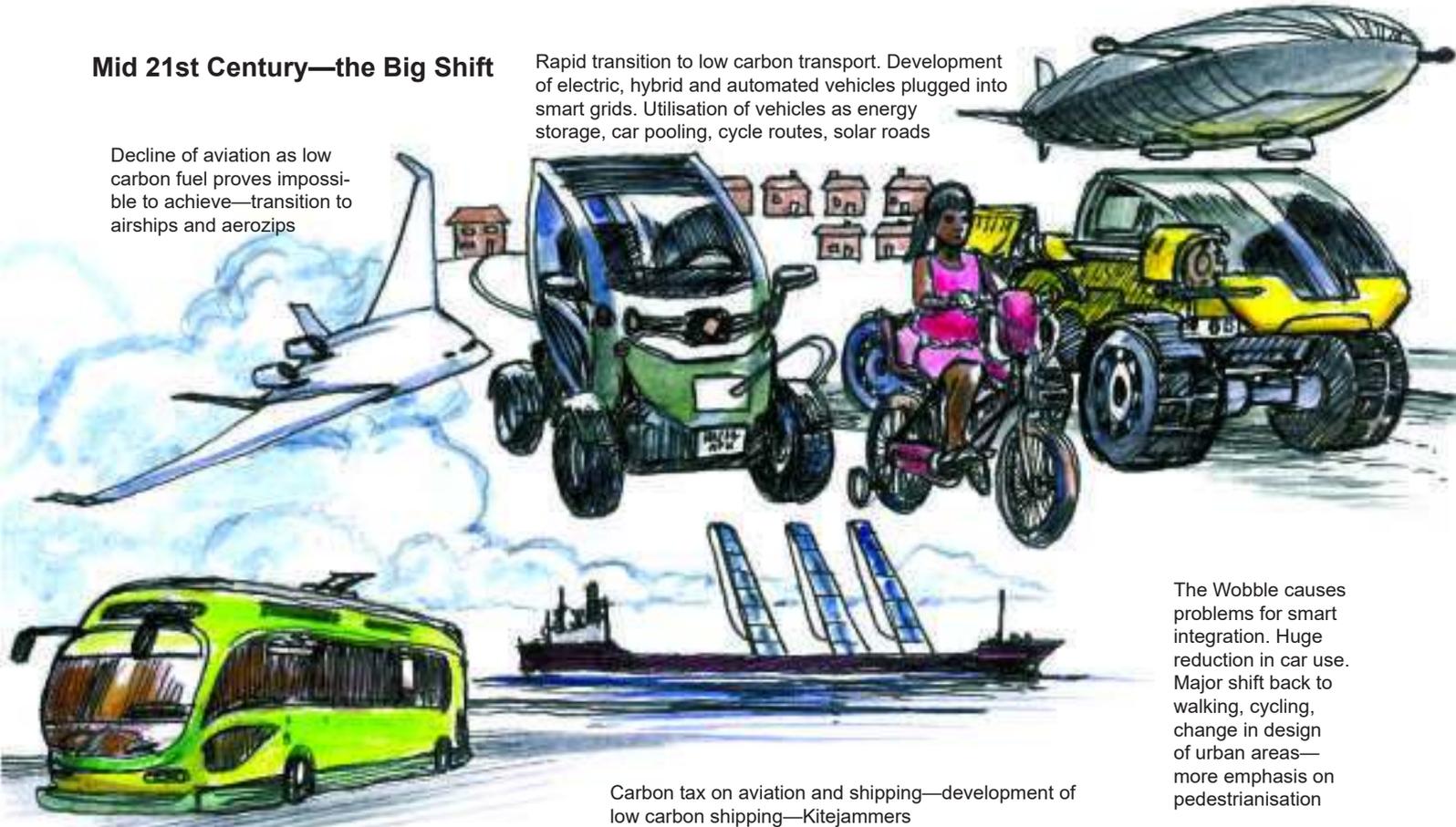


Space travel—International  
Space Station; Lunar and  
Martian landings

## Mid 21st Century—the Big Shift

Decline of aviation as low carbon fuel proves impossible to achieve—transition to airships and aerozips

Rapid transition to low carbon transport. Development of electric, hybrid and automated vehicles plugged into smart grids. Utilisation of vehicles as energy storage, car pooling, cycle routes, solar roads

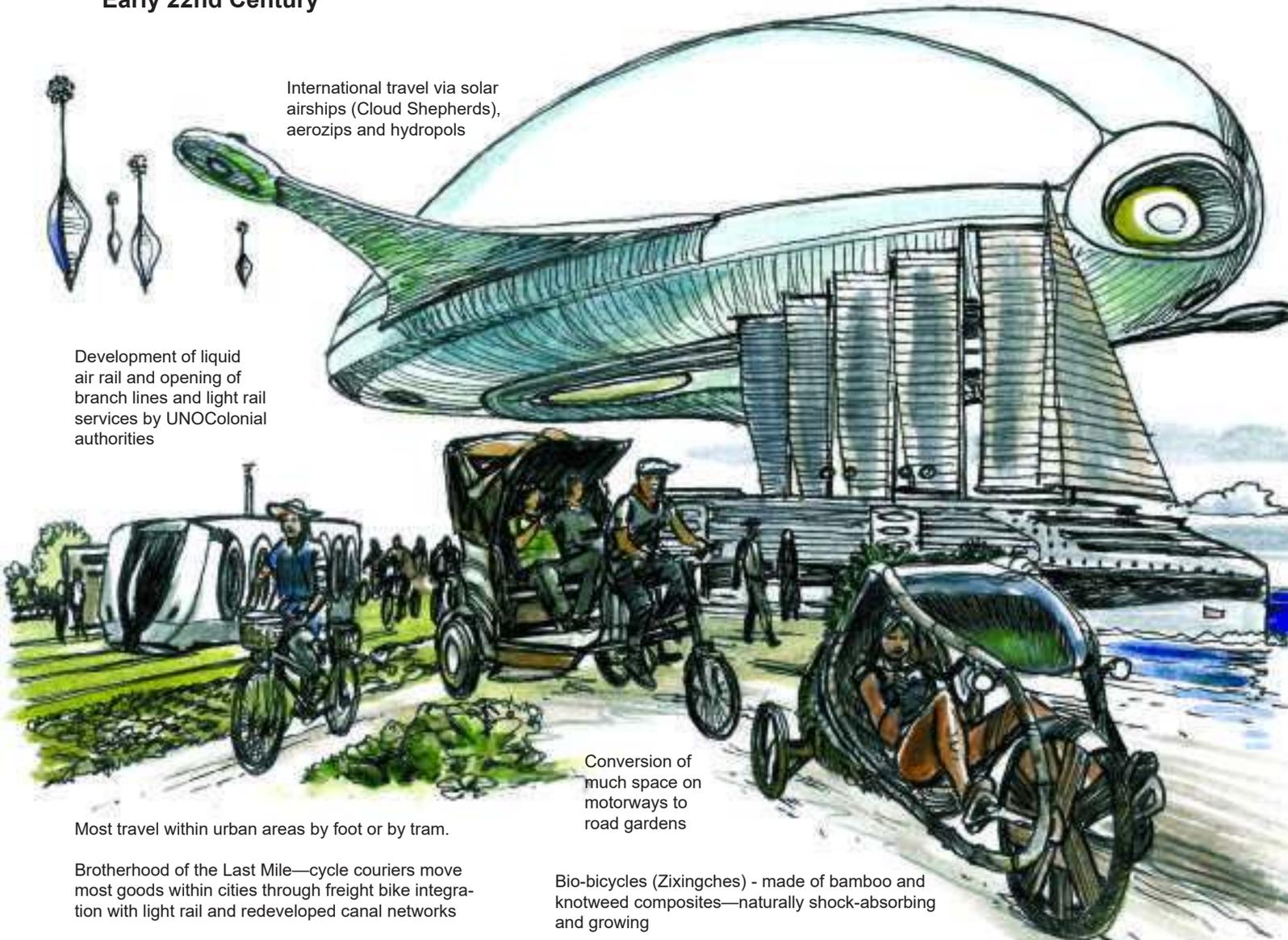


The Wobble causes problems for smart integration. Huge reduction in car use. Major shift back to walking, cycling, change in design of urban areas—more emphasis on pedestrianisation

Carbon tax on aviation and shipping—development of low carbon shipping—Kitejammers

## Early 22nd Century

International travel via solar airships (Cloud Shepherds), aerozips and hydropols



Development of liquid air rail and opening of branch lines and light rail services by UNOColonial authorities

Most travel within urban areas by foot or by tram.

Brotherhood of the Last Mile—cycle couriers move most goods within cities through freight bike integration with light rail and redeveloped canal networks

Conversion of much space on motorways to road gardens

Bio-bicycles (Zixingches) - made of bamboo and knotweed composites—naturally shock-absorbing and growing

## TRANSPORT:

### Where have all the cars gone?

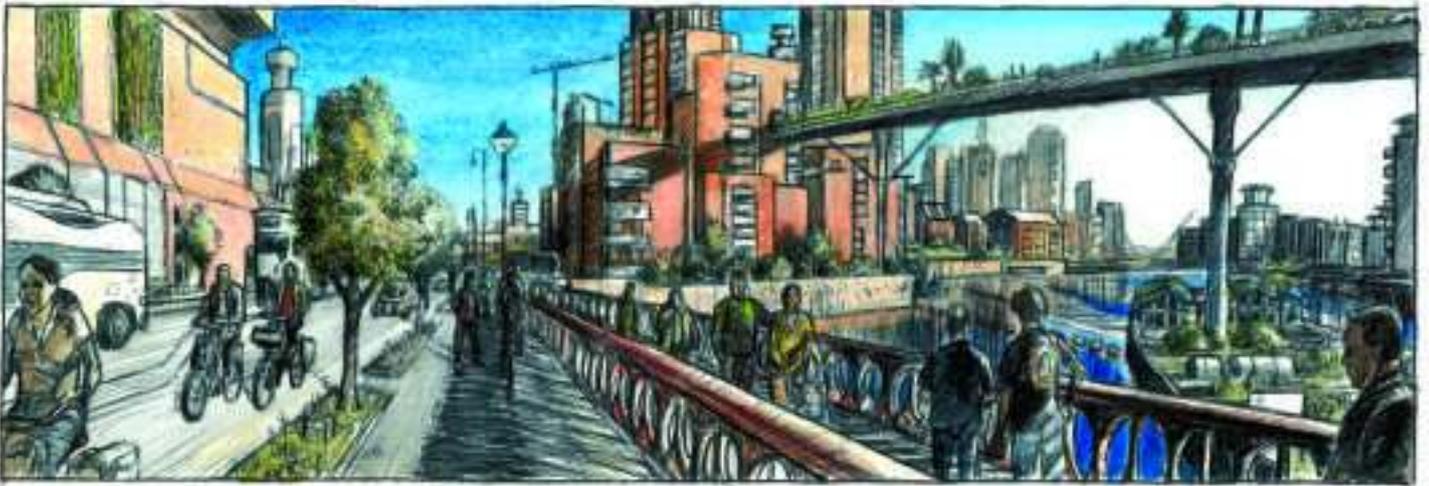
Since recognising in about 2020 that cheap oil was a thing of the past and that carbon taxes could minimise the use of the remaining fossil fuels, lives were surprisingly rapidly reorganised so that travel for work, education, shopping and leisure was minimised. Even the most efficient electric and fuel cell cars required huge resources (materials like aluminium, hydrocarbons and carbon composites) for the bodyshell, tyres, interiors and batteries. Now we mine the graveyards of 20th Century cars for useful resources.

Travel in urban areas used to be dominated by the badly-named 'rush hour', but now many more people work part-time or flexi-time, work from home or commute by bike, on foot or by electric vehicles. All this means that there is no congestion and very little noise or pollution. There are still plenty of delays though—Elmet trams are notorious!

When traffic was re-routed and reduced, it opened up many opportunities for redevelopment as well as vastly improving quality of life in urban areas. Whereas ease of access by car used to be a major selling point for any business building, the much more tranquil feel of the city centres helped to stave off relocations to business parks and indeed, many firms moved back.

It's odd to hear about how some folk who used to live in villages up in the Dales but had jobs in Leeds had to spend hours going to and fro by car. Places in Elmet are much more self-contained than they used to be.

For local and regional travel, trains are still useful. The whole rail system, the most aged parts of which are now more than 300 years old, has been upgraded to take the latest rolling stock, all powered by liquid air and high-efficiency solar skins. An extensive tram system, integrated with heavy rail, makes for a useful network connecting the city centre with outlying neighbourhoods.

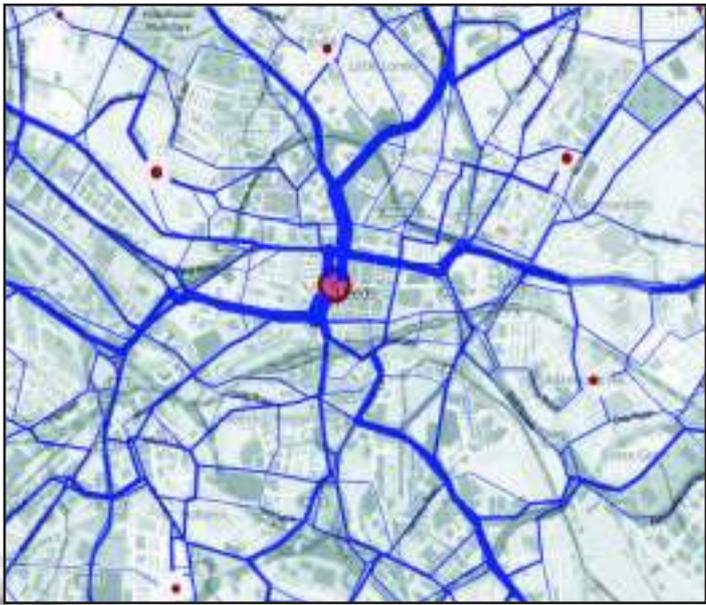


### The Brotherhood of the Last Mile

*Left: Japhet McCleery*

"Bike couriering is a tough job. I ride a Nidd 2130 Multiplier traction bike – it can clear 3 tons. I store it out at Thistle Hill depot near the Great North Road as it's too heavy for the town's road gardens. The typical working week is 3 and a half days but varies depending on season. There are some important tasks, such as transporting documents for the UNOColonial force. In the event of disorder involving the Sea Kings or Red Kites, I could get drafted. My friend Mitchell was called up for six months on his return from Pan Arctica – he's due home any day now.

Bike couriers are used to transport most items across Elmet – on 'last mile' drop-offs. Transportation further afield is undertaken using Light Rail and the Keels and Kitejammers on the Bay."



Map identifying roads most frequently used for cycle journeys within Leeds Hub

Travel mode priorities for current urban design (in order):

Walking

Cycling

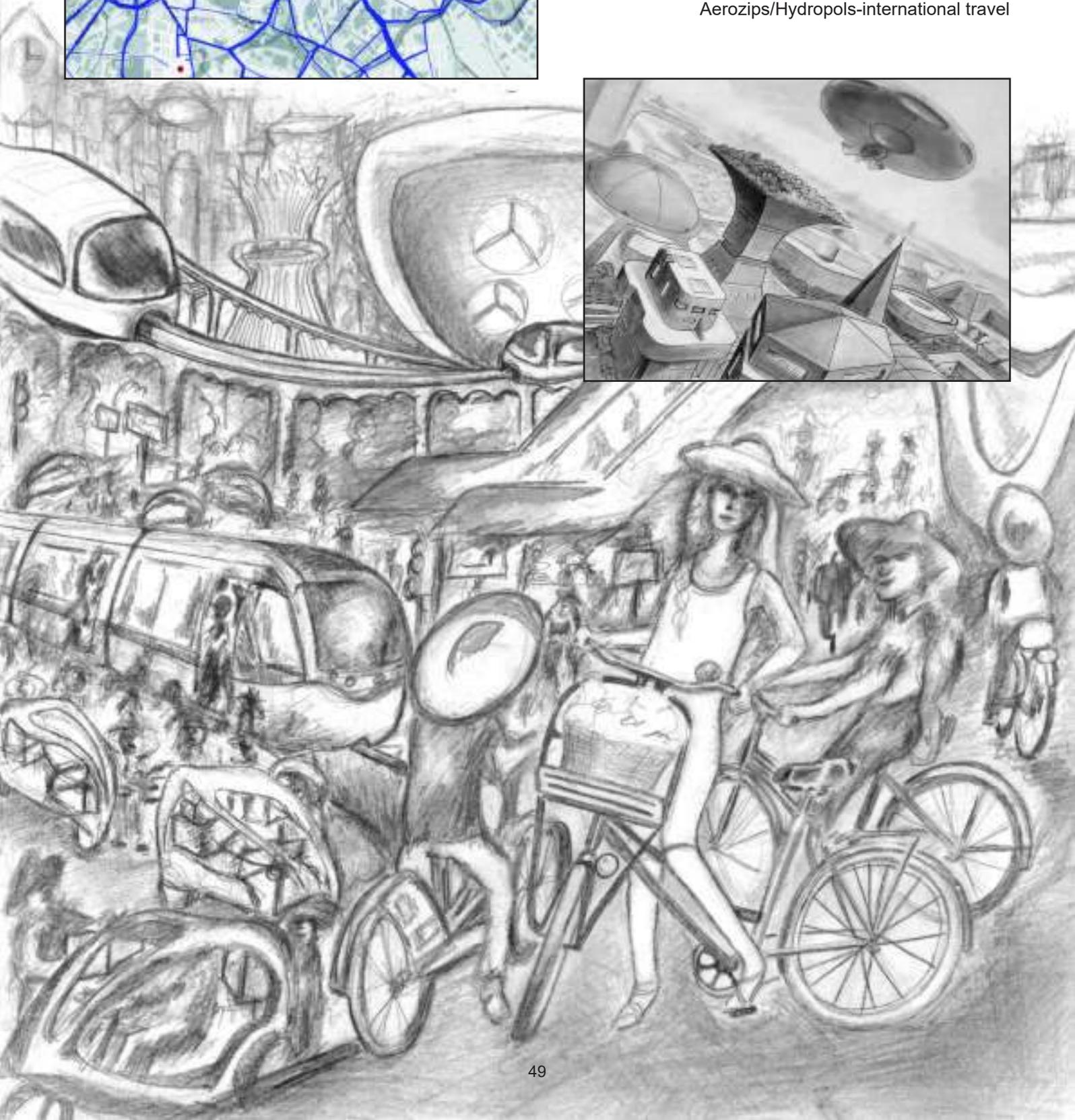
Trams

Train

Bus

Electric/Hybrid cars—remote areas only

Aerozips/Hydropols-international travel





**“Sometimes the little success stories mean a lot”** says Tina Vieri, 48. She works as a nurse and nutritionist at a health centre she runs under UNOColonial jurisdiction for the benefit of the Da Hai You Min community at Bramham west of the Bay of York.

“The centre sits in the middle of extensive forest gardens that used to be owned by the Chevin Tech Hub. At the far end there is a quarantine centre with its own kitchens and water supply; this is for refugees who might arrive sick and in need of care but also could carry diseases and parasites that we are anxious not to introduce to the area (e.g. the type of mosquito that acts as a vector for Bieberia). Most people respond well to a clean, comfortable environment, good food and plenty of sleep. Most of the sick and newly arrived refugees just want to talk or find some peace.

She explains, “my team and I do our best to patch up minor injuries and diagnose more serious conditions. One man arrived in Elmet seeking his family. He had dreadful leg ulcers that would not heal even after plenty of rest and convalescence. I made him a plaster cast, covered the foot of the cast with a remnant of an old rubber tyre and I then popped a few maggots into the cast and sent him on his way. Six months later he returned, not having found his family but with a completely healed leg – thanks to the maggots which had gorged on the rotten flesh, turned into flies and flown away.

Other than cooking, cleaning and comforting those I care for, my main responsibilities are gardening and pest control. The garden covers several acres and provides fruit and vegetables for the centre and the wider community. We also have a field of Bulrushes out on the hill that power our diagnostic equipment. I keep large numbers of hardy chickens and goats for eggs and milk products. We only eat the old hens and cockerels when they are no longer productive; same with most of the goats, although we do eat the male kids especially at festivals. A community needs a good feast on occasion in order to feel alive! Everything that we eat is grown in the garden – apart from seafood which we get from the Sea Kings out on the Bay.

I have a complicated drip irrigation system based on wooden and clay pipes and straw. In the wet winters we collect the water in covered clay-lined tanks which are kept clear of vegetation and silt. I have a series of water wheels that run on bicycle power. We take it in turns to pump the water around the garden and keep it aerated. Not only is the garden crucial for food, but it produces the essential vinegar, alcohol and honey that I need to keep wounds clean and to make the health centre as aseptic and germ-free as possible.

My still room is constantly busy in the autumn as the apples come in. I also convert potatoes and cereals into distilled butanol and ethanol – purely for medicinal purposes! In between the fruit trees and the rows of roots and herbs, I have large numbers of bee hives. We monitor hives all over the community and ensure that there are plenty of flowers for them throughout the season. The bees pollinate everything but also provide us with honey and wax, which have many different functions.

The bane of my life: Ticks, nits, gnats, mozzies, midges, bed-bugs, flies, fleas, cockroaches!

As far as Bieberia is concerned, this is a major worry. Most Sea King adults get doses of tertian or quartan fever from time to time and they live with it. In some people it saps their strength. For the children, however, it can be fatal. Many of them die of malaria-like symptoms or dysentery before they are two and there is little we can do about it except prevention. The buboes from Derwentvirus (endemic in the Bay region) are horrible.

Every window here is covered with a mesh of waxed linen (flax is something else that I grow in the fields around my garden). Genetically engineered spider silk is also a help, but most people find it unbearably hot in summer as it blocks the breeze too much even if it plays a major role in preventing mosquito-borne diseases. I constantly struggle to get people to use screens around their hot, screaming children.

Three times a year we load up the Angel Rail (Dales monorail) with food and medical supplies and visit as many communities up in the Dales Forests as we can along the line. Mostly we provide a good meal, hygiene advice and psychological support. That goes a very long way. We also deliver babies, pull teeth, set bones and perform cataract operations and other minor procedures. Sometimes the pain of the condition is such that people will submit to major procedures such as hernia repair and amputations.

Maternal mortality in Elmet is much better than it has been at any time since the start of the Big Freeze, I think. We train midwives in how to deal with a wide range of complications and birth positions and send them out to the communities.

Since antibiotics ceased being viable in the mid-21st Century (due to bacterial resistance) and in situations in remote communities without anaesthesia the chances of the women surviving a caesarean are very slim. It can only be done in the direst emergency e.g. to save the baby (only after the mother's life is no longer viable as she would usually take priority) because of the dangers of shock and infection. This was the case before the 1950s (and certainly before the 1860s - there's limited evidence of women surviving at all before then). The same goes for any kind of major operation involving the chest or abdomen.

The most important thing about our work though is giving people hope and showing that somebody cares."

### Health in a Low Carbon World

Decarbonisation was a huge health opportunity. Poor air quality due to fumes from cars and fossil fuel burning was once one of the biggest killers. Our shift to more plant-based diets, and the increased levels of physical activity from working on the land helped too. Healthcare today is geared towards prevention rather than cure, with individual control over health monitoring via DREAM tech. As Guru Taleb pointed out, humans don't deal with abundance well—scarcity can be better. Physical health in times of rationing—for example in late spring—can often be better than average. People grumble about the imposition, but crucially they agree the system is fair.

### Healthy places = healthy people

A permaculture approach to urban design and the rise of LILACS improved conditions within urban areas by increasing the amount of green space and biodiversity. Access to urban green spaces is key to lowering stress levels and improving mental health in general. The impact on the elderly is particularly evident.

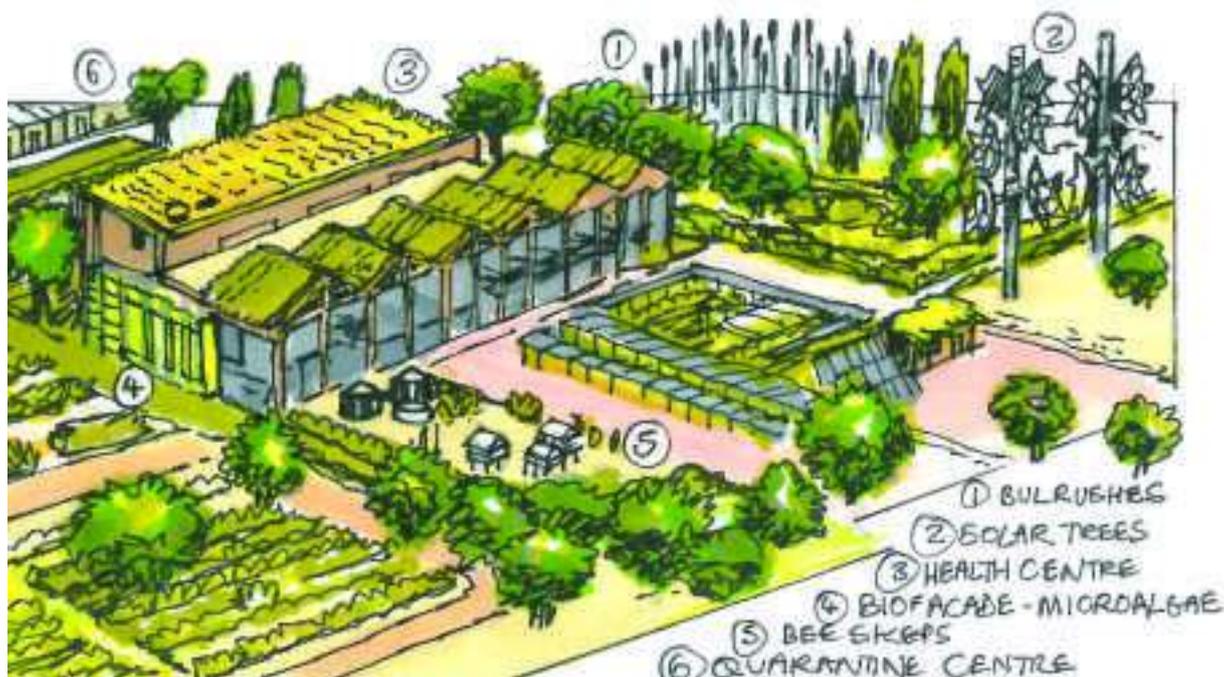
Green spaces reduce the impact of heatwaves and trees cool the air through evapotranspiration.

Trees and green walls (in narrow streets) help soak up particulate pollution, very important for those communities that use a lot of bioenergy—such as in the Dales where conditions are often basic.

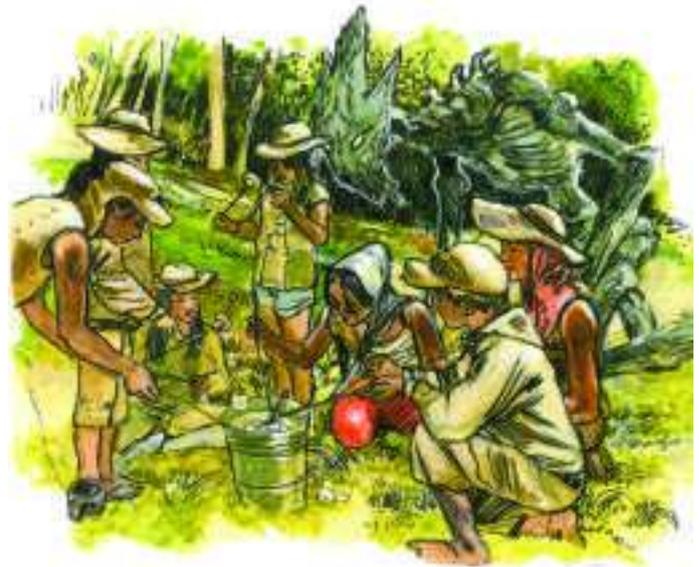
### Reproductive Health

Over the last hundred years, in the same way as with energy, radical developments in healthcare struggled to keep pace with accelerating challenges such as the demise of antibiotics. The ability to swiftly sequence an individual's genome led to immense improvements in human health. However, new fertility technologies allowed people in some countries to select only for boys, for example, or children with particular characteristics, and this led to an imbalanced society in gender and skills.

The widespread availability of more effective contraception drastically reduced birth rates. After all, during the Age of Energy Ascent, the rise in global population each year was about the same as the number of unplanned pregnancies! We shouldn't forget these more mundane interventions in everyday life which often have a much greater effect on populations and lifestyles than more visible technology.



# A DAY IN THE LIFE.... by Shamina Lalloo



MONDAY. 32°C Sunshine and showers

It's morning. I am sat on the roof of my dad's workshop, the tallest building in our LILAC. I can see the sun rising—it's golden light streaming through the tall green biopylons of the City of Elmet. As it rises higher and higher I can see every leaf, every branch of the giant tree-like structures. Birds all around me are singing their different songs. I can feel the chill now evaporating, becoming the warm and wet morning fog with the warmth the sun has bestowed. The world is waking up.

In the distance on the south fields I can see the farm workers chugging along down the grassy roads on their traction bikes. I hear the church bells chime for 7 – end of curfew. Then I climb down the ladder into the hydroponics and make sure the algal bioreactors are working, the different gas chambers are functioning and that the humidity and all that hooaha is working fine by looking at the gauges. After this I go through a quick decontamination and into our little clean room to check all the equipment is on and start to heat up the big machines like extractors by connecting them to the AE. At about this time my dad and the team are starting to stir downstairs so I hop through the old glass windows we have up there and down one of the outer trees.

The workshop itself is the best part of the building. It has recycled walls of Driftplastic and bioplas— if you look you can see bottle tops, plastic scissors and even toy car parts. Things dating from nearly two centuries ago that would have just been forgotten about have been recycled. Dad takes DREAM calls from businesses all around Elmet. Mostly, like all community workshops, the farmers, cobblers, bakers, potters and all the other tradespeople and crafts people come to him with their problems and he tries to come up with a Permaculture compatible solution. He really enjoys just coming up with new ideas to do with the lab work. Occasionally they're useful!

He's even looking over the traction bikes to see if he can improve them. He doesn't have any Hub jobs at the moment so sometimes I like to sneak into the comms room and just call a random number; it's like nothing else being able to shake hands with someone knowing they are however many thousand of miles away. My dad said my name would magically appear on the cleaning roster every day if I ever did it again after the escapade with the Hanseatic collaboration.

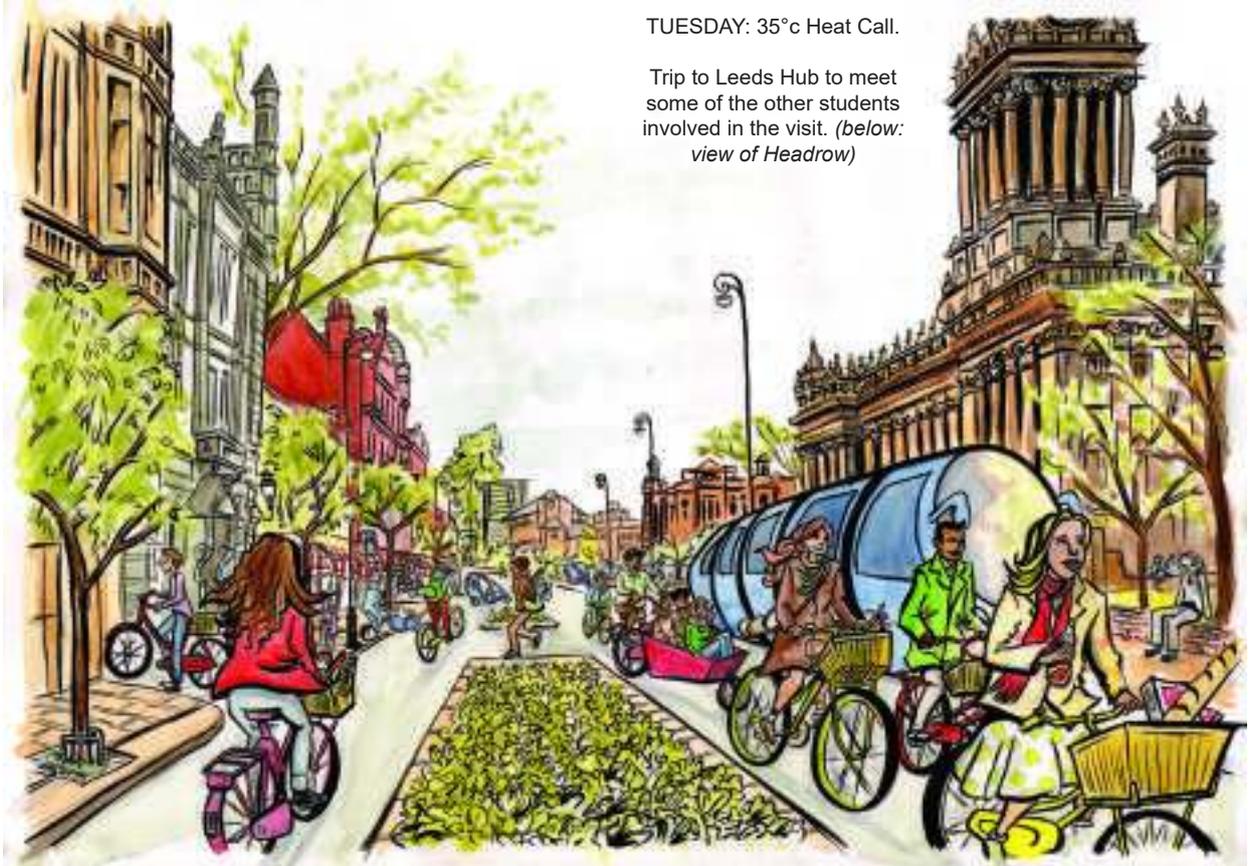
After a hasty lunch gathered from the allotment the work resumes downstairs and I go down the road to study. I learn terotechnics (maintenance engineering), design, chemistry and Mandarin. Also they have an old-fashioned solar powered DREAM interface that we can use to study programming. School is easy here because everyone speaks English but I have a cousin who lives in Edinburgh whose lessons are taught in about ten different languages simultaneously.

After school and after the farmers finish work I go foraging in the Children's Forest with my friends. People say the mushrooms from Foolish Wood are the best ever so we get lots, as many as its Dryad will allow us to take. My friend Benny owns a Sol-Ute we all use. If I'm perfectly honest, that's the best thing about going. That and my dad likes me to search for seeds for the seed bank.

Just before dusk when the night time church bells ring I get home with my earnings from the market crowd and sit to a lovely mealworm stew and garden salad. I go to sleep soon afterwards in our roof garden where we have a nice breeze and soft spider silk hammocks that my dad engineered to be the ultimate in bug-resistant ventilation. I fall asleep to the insects humming and the chatter of parakeets as they settle down for the night.

TUESDAY: 35°C Heat Call.

Trip to Leeds Hub to meet some of the other students involved in the visit. (below: view of Headrow)

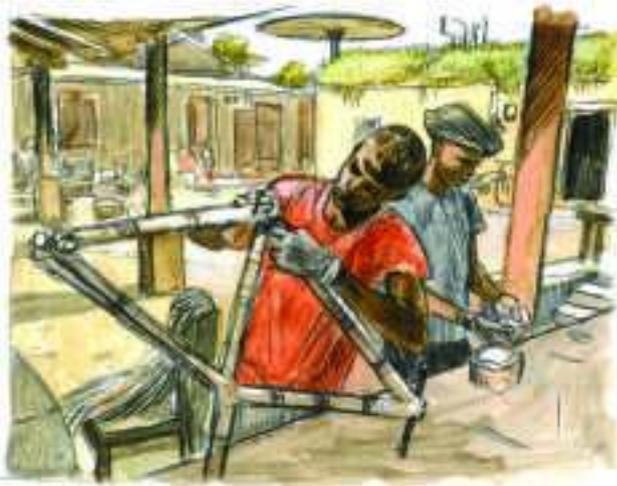


WEDNESDAY: 30°C Workshop day

*“Man shows his best when he is in a position to apply his usually varied capacities to several pursuits in the farm, the workshop, the factory, the study or the studio, instead of being riveted for life to one of those pursuits only”*

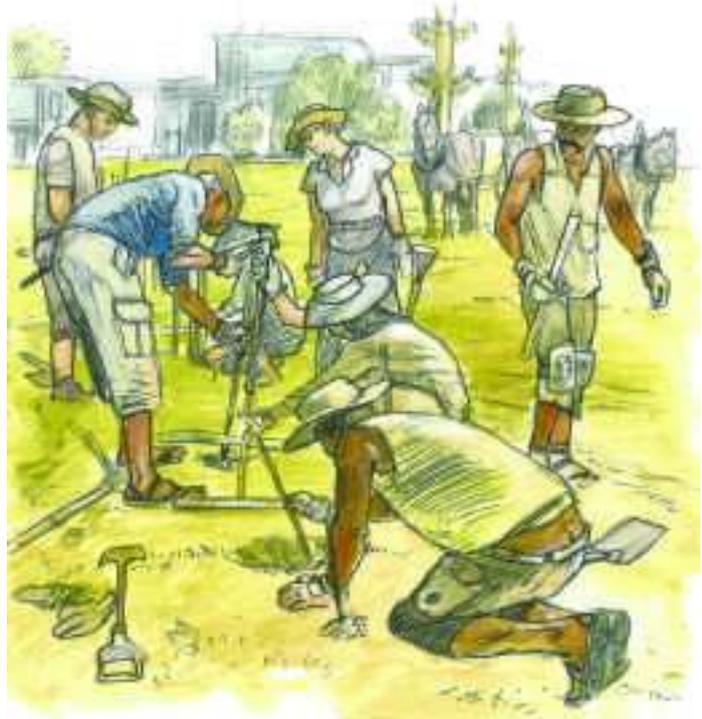
P Kropotkin 1898

Elmet technology is lamprasim-based: so-called “intermediate technology” designed to be Long-lived, Anti-fragile, Multi-Purpose, Renewable, Adaptable, Simple to Maintain.



THURSDAY: 24°C - Storm/rain

Farm day on Jacob Smith fields. Jonfei gave me a long lecture about soil condition – he’s the most serious teacher. Big storm in afternoon – about 3.30. Talbot didn’t get the armour out in time and fist-sized hail smashed all the greenhouse windows. River was 3m higher than normal from all the rain in the last few weeks, and washed out the Marigold, but the Sea King floating restaurant was ok.

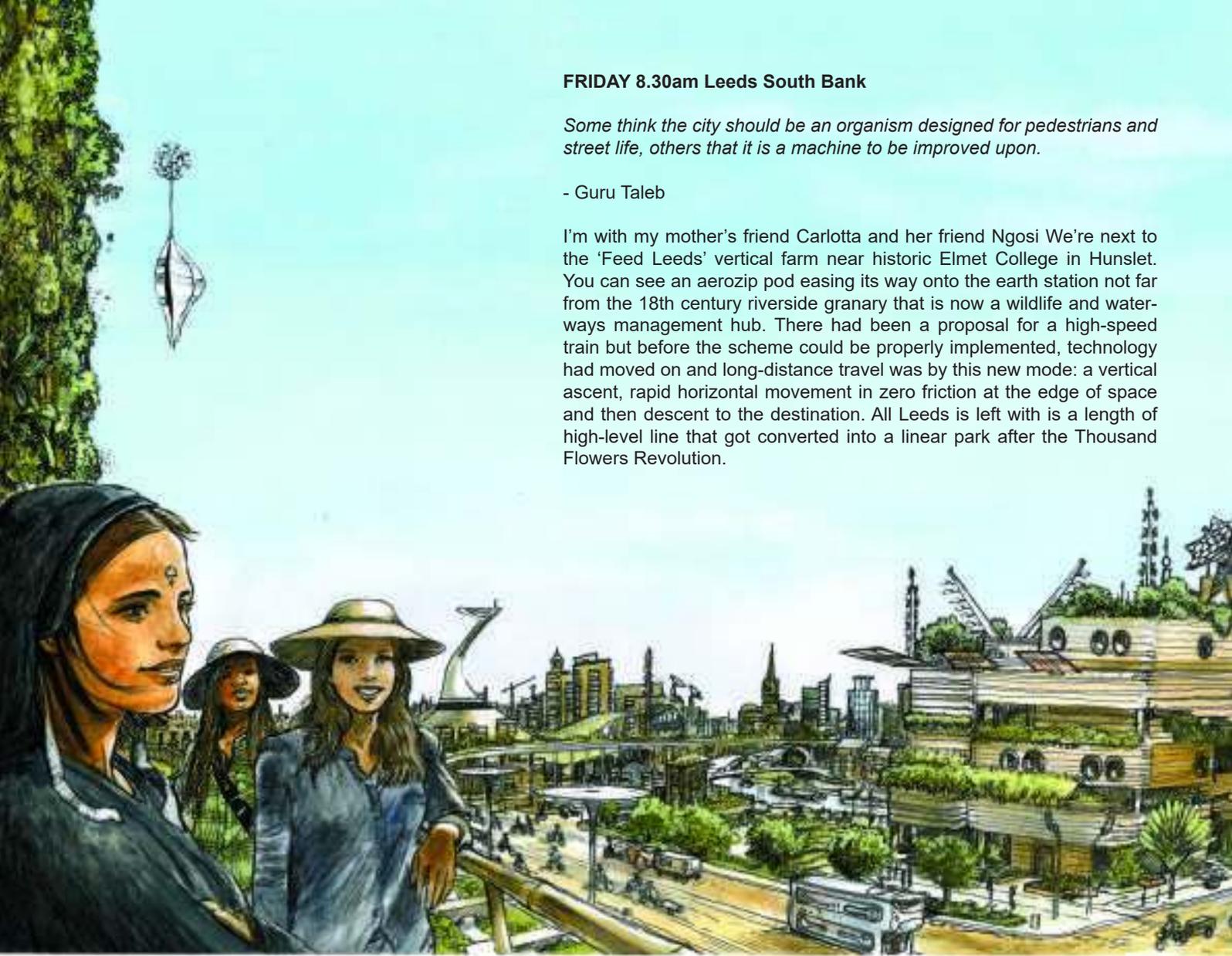


## FRIDAY 8.30am Leeds South Bank

*Some think the city should be an organism designed for pedestrians and street life, others that it is a machine to be improved upon.*

- Guru Taleb

I'm with my mother's friend Carlotta and her friend Ngosi We're next to the 'Feed Leeds' vertical farm near historic Elmet College in Hunslet. You can see an aérozip pod easing its way onto the earth station not far from the 18th century riverside granary that is now a wildlife and waterways management hub. There had been a proposal for a high-speed train but before the scheme could be properly implemented, technology had moved on and long-distance travel was by this new mode: a vertical ascent, rapid horizontal movement in zero friction at the edge of space and then descent to the destination. All Leeds is left with is a length of high-level line that got converted into a linear park after the Thousand Flowers Revolution.



Students of various ages are already at work in the farm, learning hydroponics, protein simulation, algae culturing and farm maintenance and turning out a useful percentage of the city's food supply. The district greywater system meets all the water needs of the farm so my filtered morning shower water is making its way to the vegetable roots. Carlotta just dropped off her son Ricardo at the College Nursery and is about to begin her flexi-shift mentoring the students and helping them shape up their learning plans for the next 5 years. They are all part-timers who fit learning into their schedules around various other streams of work. 'Pay' is in the form of spendable points into their Globank accounts.

Talking of history, it's an interesting point that there are very few buildings around here surviving intact from my great great grandmother's era at the turn of the second millennium. They proved too expensive to run and insufficiently adaptable, so they have mostly been dismantled and the components re-used or recycled. There are no extremely tall buildings because they belonged to

the era of private land ownership, when maximising returns from each square metre of what used to be called 'real estate' was the driving force, rather than how people prefer to live and work. In addition, it's very difficult to cool a building that's more than seven stories high—very wasteful of energy. The whole macho symbolism of one-upmanship has faded as an urban design impulse: you can see there are some decorative spires but no towers. There is a great mix of places to live, including houses of white-washed straw bale and bio-composites—pretty, quirky buildings all designed by different architects, they have features in common but all look similar in terms of their height and proportions. Just beyond South Bank in Beeston, there are hundreds of old back-to-back houses (Leeds has more of these than any other city in the UNK, even accounting for the fact that many were destroyed in the 90s). All have super-quick broadband, DREAM screens, a communal CHP boiler and clever insulation – a special film over the traditional brick.

## SATURDAY: 24°C—cloudy

Thousand Flowers centenary festival! Woke at 5am! Ouch! Had to take the bus to Leeds. I was with the girls from class – we were marshals. Thousands of people turned out. We played Jingling! Won a prize! Had a great time with Lea and her family. BBQ – totally stuffed! Watched the Rugby League match. Amazingly managed to get 1 hour's DREAM time (Nujod will be pleased).

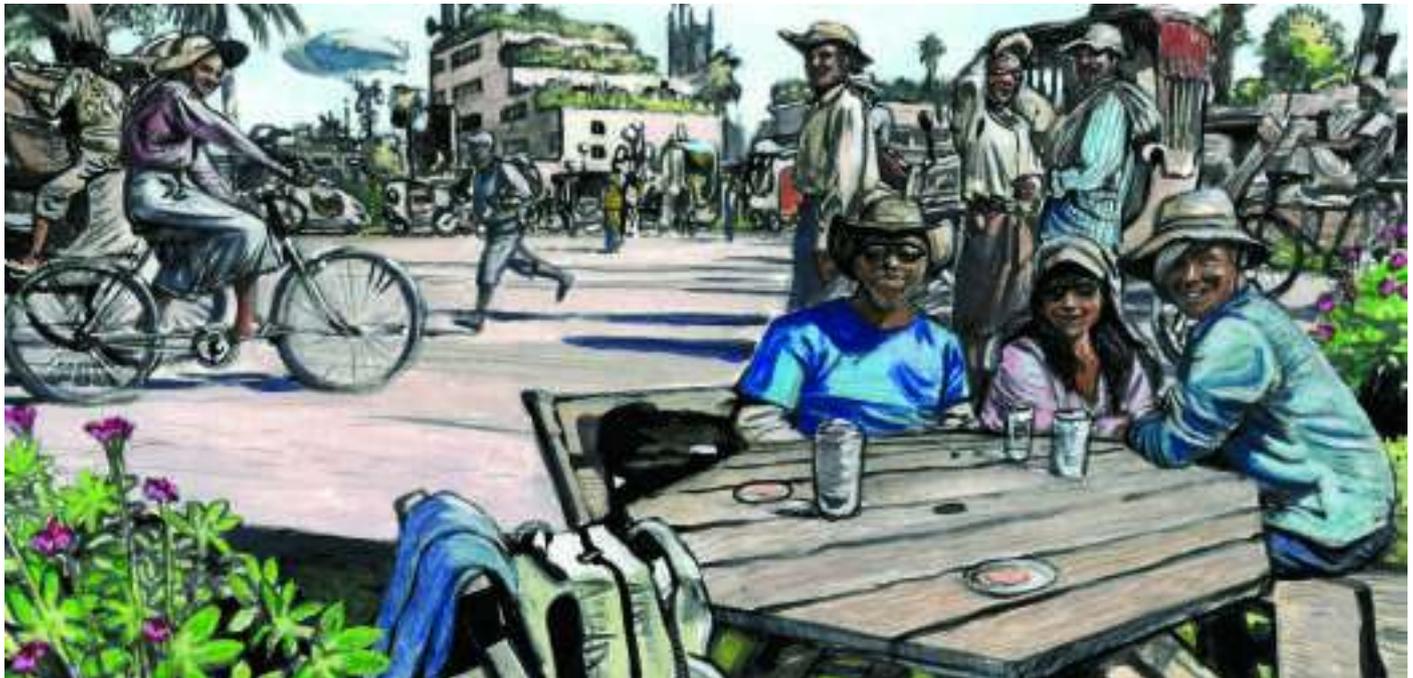
The festival this year includes a renewal of many of the fields and forest gardens initiated 100 years ago, with a whole month of celebrations. Revisiting past times may not be possible outside of DREAM, but an appreciation of insights from the past has grown – hence the 10,000-year library.

“Improving ‘green infrastructure’ created an enormous number of high-quality and rewarding jobs. I’m employed in a small firm that designs building components from 100% recycled bio-materials. It’s an example of the vastly expanded environmental goods and services sector that over the last 20 years has helped to lift Leeds and the whole Elmet region out of the doldrums. My civil partner, Imtiaz, works from home, designing the latest generation of 4D printers which are prototyped here in Hunslet, one of the original cradles of engineering entrepreneurship more than 250 years ago. The designs will be exported all over the Yorscandia economic zone. The cluster of buildings in Holbeck became one of the first exemplary ‘green’ developments, built to the highest environmental standards. This is just one part of a much greener scene than my great great grandmother tells of in her memoirs about the city in the time before the Big Shift, when development proposals rarely met sustainability criteria and hardly ever included green open space.



Eventually, by the middle of the 21st century, a city centre wilderness park was completed just south of the river. It has specialised in re-introducing native species and cultivars of traditional ones that are resistant to the various diseases that spread as the climate changed. Every tree in the park is adopted by residents as a Name Tree, Home Tree etc. As

well as many more trees than there used to be, there are miles of green “herepaths” (people’s paths) and many rooftops covered in sedum or turned into gardens – all helping to reduce the ‘Urban Heat Island Effect’ on a day like this. Greenery also takes up carbon dioxide and helps to reduce run-off during thermal storms and flash flooding.

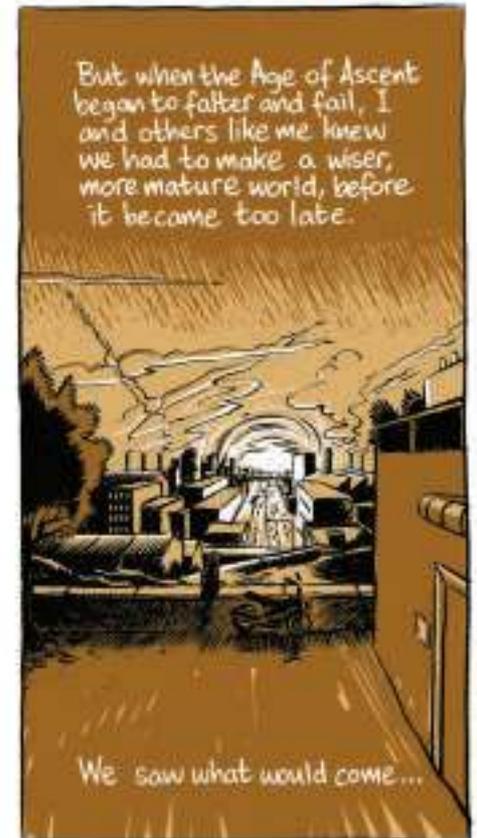
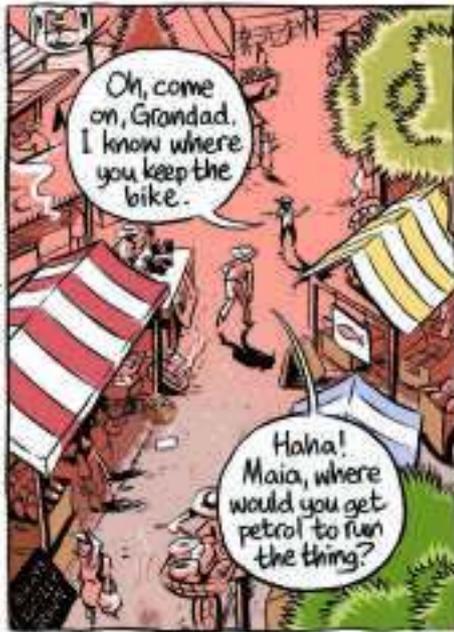
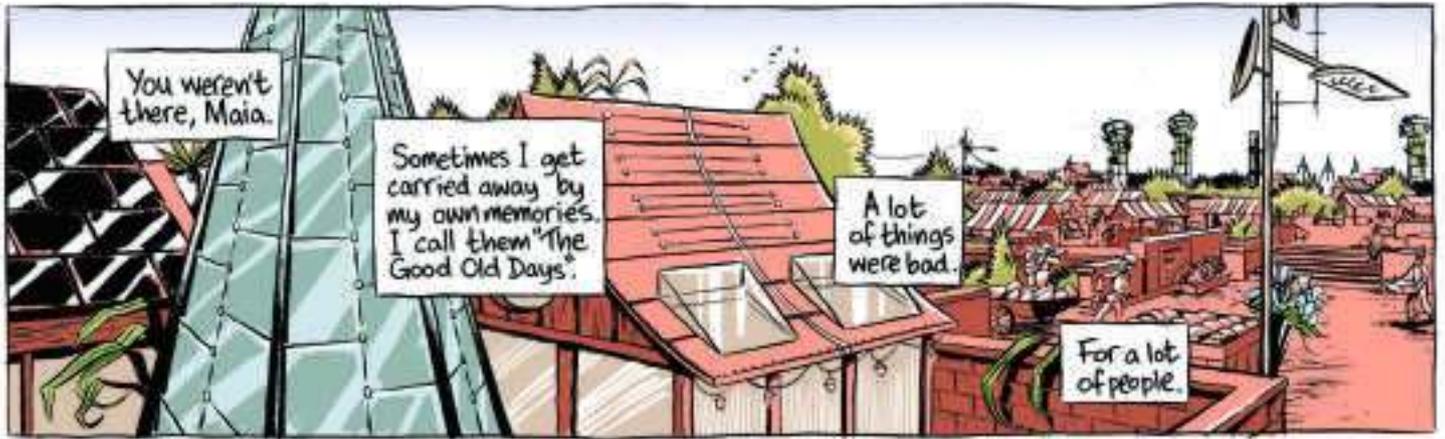


**Fang Sheng Gai Xin—The Thousand Flowers Movement**

By the 2030s the failure of the previous steps towards tackling climate change meant the AfroSindian Alliance tired of trying to negotiate with various rogue/failing states over sustainability. Having recognised the mortal danger that humanity was in, with fearsome climate change taking hold, water stress across many regions, species extinction and ecosystem collapse, they devised a way to bring about a bloodless revolution, shifting decision-making towards sustainable options, instituting a more or less completely circular economy and influencing behaviour in all spheres of life towards lower consumption of primary resources—the Gaian Bioeconomy. This was backed up by the Emerald Planet reforestation and re-wilding under the Global Adjustment Team.

A key aspect was the introduction of new strains of plants developed by an international team of botanical engineers (led by a descendant of the famous 21st century botanist, Meriel O’Conor) to provide food, pollution processing, topsoil stabilisation, natural fibres and healthcare products.

The original formulation of the Thousand Flowers was in relation to energy—moving away from centralised provision to community— led solutions. It became a much wider symbol of communities taking control of their own solutions in every aspect of life, at the same time preserving international links—for example, through the Fractal Energy Grid and Jury Tythings. So a massive cultural change was brought about towards active and positive engagement with life support systems that had been largely ignored or poorly understood and widely abused.





**Mayor (Elmet Bioregion)  
Chimalagi**

“I lead the Bioregional Assembly based at Elmet’s Yeadon Hub and work closely with the UNOColonials, in preparation for their scheduled departure in 2152. The Chevin Tech Hub is essentially our HQ, with UNOColonial comms at Menwith Hill in North Yorkshire, and Forward Operating Bases at Knaresborough, Ripon, Leeds, York, Scarborough and the Central Bay Arcology. Recently there have been conflicts between Nidd Thalweg and the Dissenters in the Dales National Forest. The Red Kites are a problem for all communities in the Dales. Since they are advocating a return to using fossil fuels urgent action is needed to prevent proliferation.”

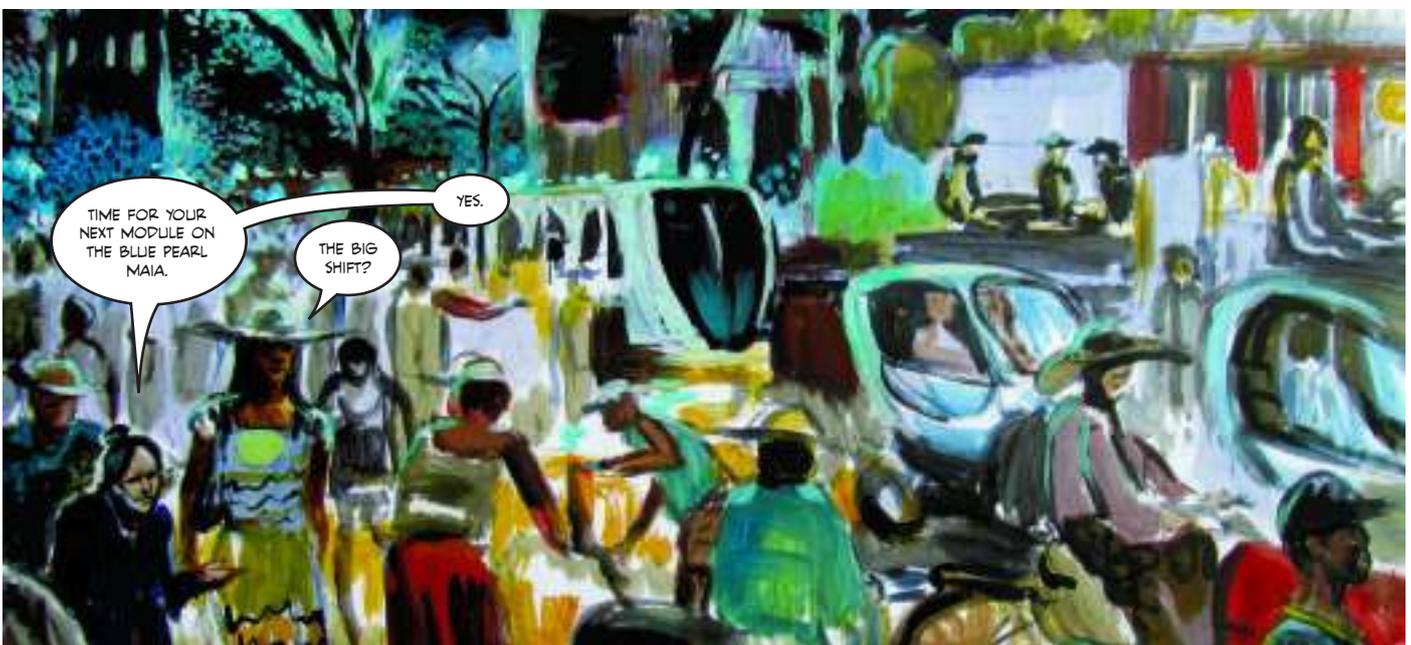


**A FORTRESS OF LEARNING: Ke Ji Zhong Xin (Chevin’s Tech Hub Monastery)**

The Tech Hub was created on the site of the old Leeds Bradford Airport when it was realised during the ‘Wobble’ that a break in technology of one generation would mean all civilised structures would be lost – due to the fact that resources easily recoverable without advanced technology had been used up. The intention was to preserve as much as possible, especially communications and records, and offer an impregnable redoubt for the UNK DREAM node. One challenge was the difficulty of remastering digital information from the early 21st Century—a key period in the Big Shift, but one we have few accessible records for. At the time of the creation of the Clouds, little thought was given to historical storage (except for ventures like the 10,000 year library), leaving us with a major gap in our knowledge. We know more about the early 20th Century than the early 21st!

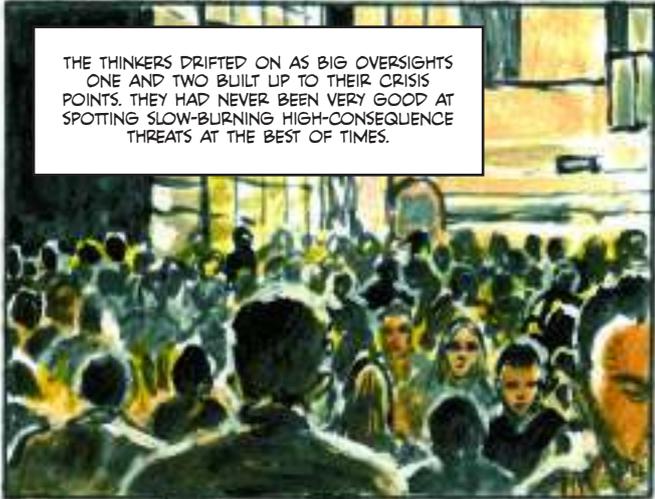
The DREAM node allocates all work options for Service work in the Elmet City region, in addition to the satellites at Knaresborough, Skipton and York Hubs.

As with many structures in Elmet, a large fraction of it is underground.

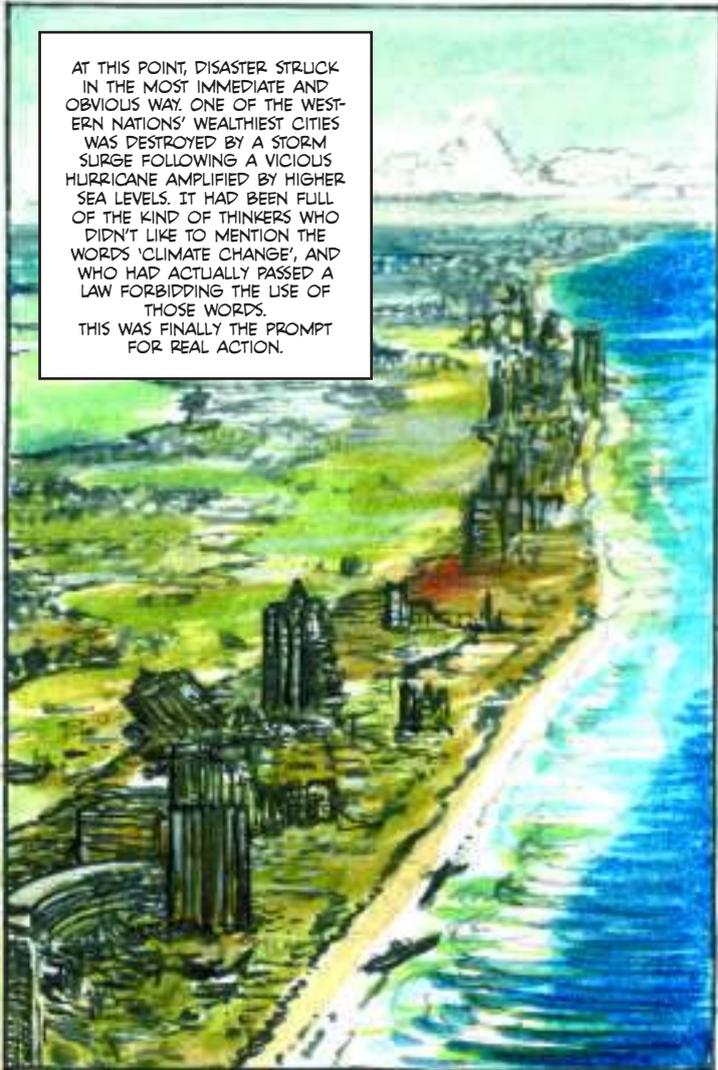


# BLUE PEARL - Part Two

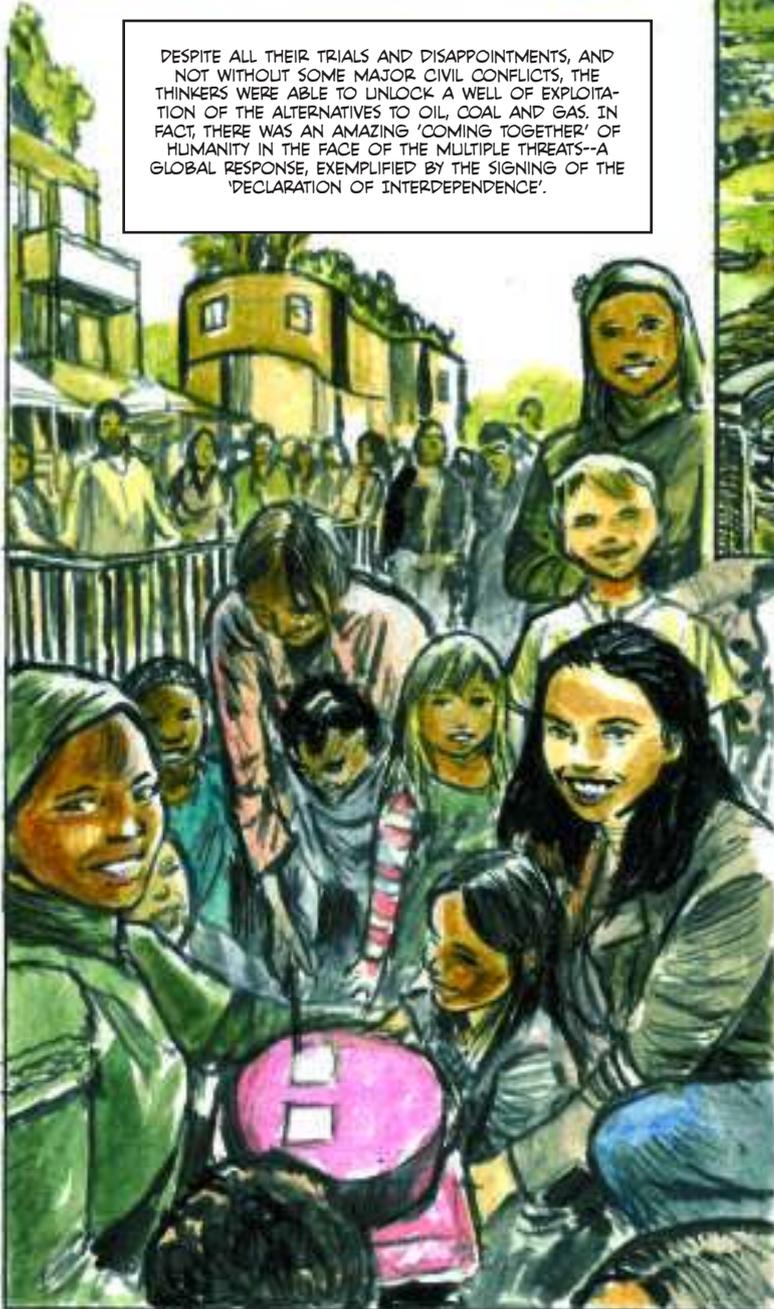
THE THINKERS DRIFTED ON AS BIG OVERSIGHTS ONE AND TWO BUILT UP TO THEIR CRISIS POINTS. THEY HAD NEVER BEEN VERY GOOD AT SPOTTING SLOW-BURNING HIGH-CONSEQUENCE THREATS AT THE BEST OF TIMES.



AT THIS POINT, DISASTER STRUCK IN THE MOST IMMEDIATE AND OBVIOUS WAY. ONE OF THE WESTERN NATIONS' WEALTHIEST CITIES WAS DESTROYED BY A STORM SURGE FOLLOWING A VICIOUS HURRICANE AMPLIFIED BY HIGHER SEA LEVELS. IT HAD BEEN FULL OF THE KIND OF THINKERS WHO DIDN'T LIKE TO MENTION THE WORDS 'CLIMATE CHANGE', AND WHO HAD ACTUALLY PASSED A LAW FORBIDDING THE USE OF THOSE WORDS. THIS WAS FINALLY THE PROMPT FOR REAL ACTION.



DESPITE ALL THEIR TRIALS AND DISAPPOINTMENTS, AND NOT WITHOUT SOME MAJOR CIVIL CONFLICTS, THE THINKERS WERE ABLE TO UNLOCK A WELL OF EXPLOITATION OF THE ALTERNATIVES TO OIL, COAL AND GAS. IN FACT, THERE WAS AN AMAZING 'COMING TOGETHER' OF HUMANITY IN THE FACE OF THE MULTIPLE THREATS--A GLOBAL RESPONSE, EXEMPLIFIED BY THE SIGNING OF THE 'DECLARATION OF INTERDEPENDENCE'.

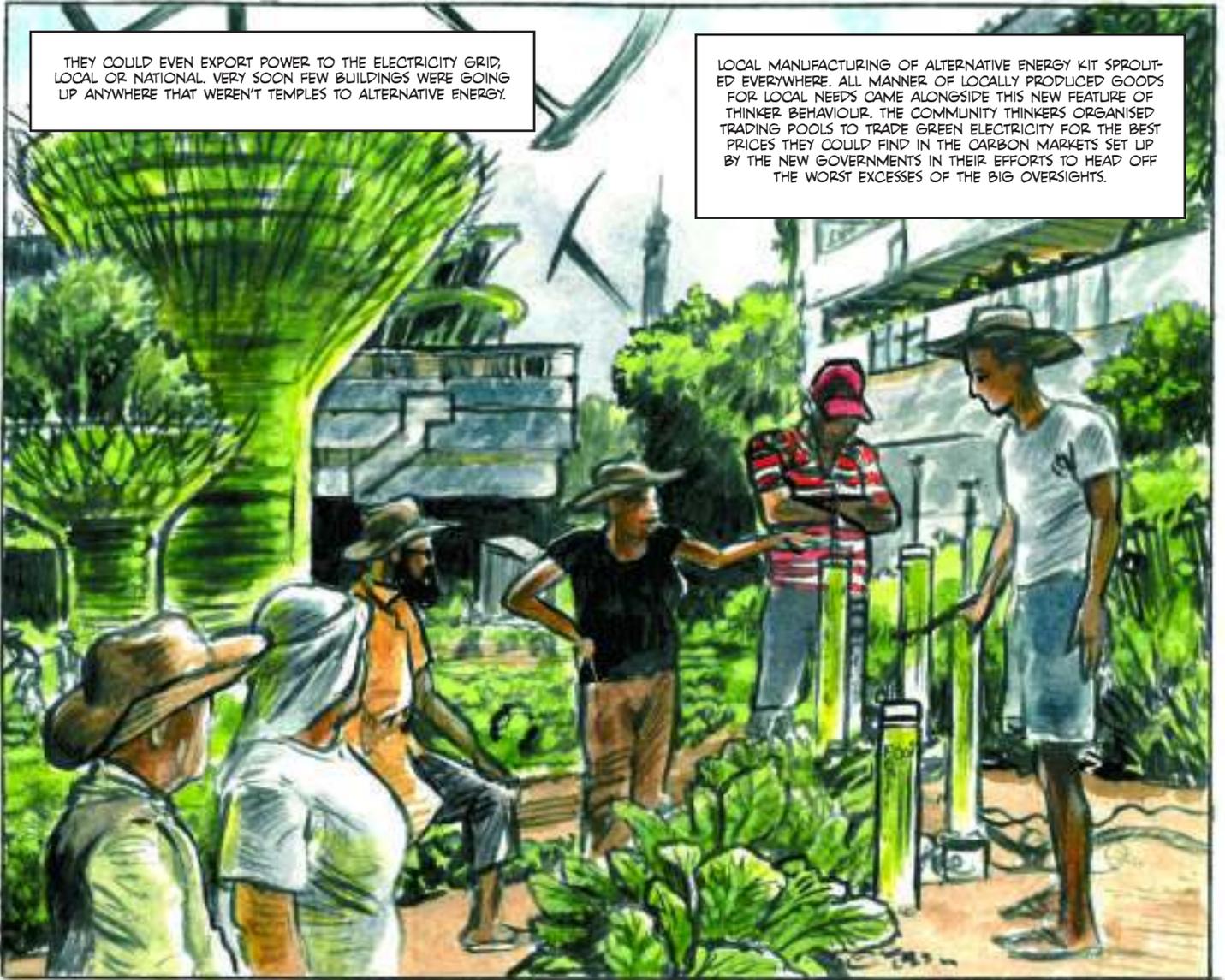


AMID THE HARD TIMES, MANY THINKERS HAD DEVELOPED AN UNDERSTANDABLE INTEREST IN INSTALLING ALTERNATIVE-ENERGY GADGETS THAT COMBINED ELECTRICITY AND HEAT DERIVED FROM THE SUN.



THEY COULD EVEN EXPORT POWER TO THE ELECTRICITY GRID, LOCAL OR NATIONAL. VERY SOON FEW BUILDINGS WERE GOING UP ANYWHERE THAT WEREN'T TEMPLES TO ALTERNATIVE ENERGY.

LOCAL MANUFACTURING OF ALTERNATIVE ENERGY KIT SPROUTED EVERYWHERE. ALL MANNER OF LOCALLY PRODUCED GOODS FOR LOCAL NEEDS CAME ALONGSIDE THIS NEW FEATURE OF THINKER BEHAVIOUR. THE COMMUNITY THINKERS ORGANISED TRADING POOLS TO TRADE GREEN ELECTRICITY FOR THE BEST PRICES THEY COULD FIND IN THE CARBON MARKETS SET UP BY THE NEW GOVERNMENTS IN THEIR EFFORTS TO HEAD OFF THE WORST EXCESSES OF THE BIG OVERSIGHTS.



THEY ORGANISED PENSION CLUBS, AND USED MONEY MADE FROM ALTERNATIVE ENERGY GENERATION TO TOP UP THEIR FUNDS. GROWING NUMBERS OF THINKERS SEEMED TO HAVE LEARNED THE LESSON ABOUT INTERDEPENDENCE.



THE COMMUNITY THINKERS LIVED AND WORKED QUITE HAPPILY IN THEIR NEIGHBOURHOODS, BUT THEY SHARED IDEAS AND PLANS WITH OTHER LIKE-MINDED COMMUNITIES IN THEIR OWN AND OTHER NATION STATES. THEY WANTED TO KNOW THAT THEIR NEIGHBOURS WERE AS SECURE AS THEY WERE!

AS THE CRAZE FOR ALTERNATIVES SPREAD, SO DEPENDENCE ON OIL FIRST WITHERED AND THEN VANISHED.

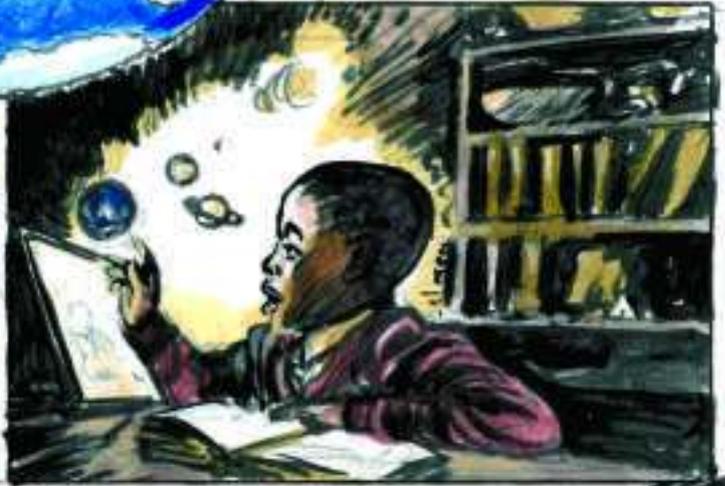
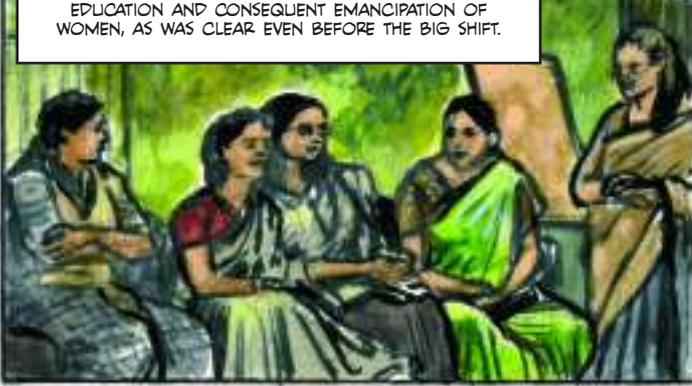
MANY OF THE ROUTINE ASSUMPTIONS CURRENT AMONG TRADING THINKERS IN THE AGE OF OIL ADDICTION SIMPLY EVAPORATED. FOR EXAMPLE, ONCE IT HAD MADE SENSE THAT WIDGETS SHOULD BE MANUFACTURED ON ONE SIDE OF THE BLUE PEARL BECAUSE LABOUR WAS CHEAP AND SHIPPED TO MARKETS ON THE OTHER SIDE, AT GREAT BUT ENTIRELY UNACCOUNTED POLLUTION COST. BALLAST TRANSFERRED INVASIVE SPECIES, NEARLY HALF OF ALL SHIPPING WAS OF FOSSIL FUELS, AND IT TOOK HUGE AMOUNTS OF FUEL JUST TO POWER THE SHIPS.



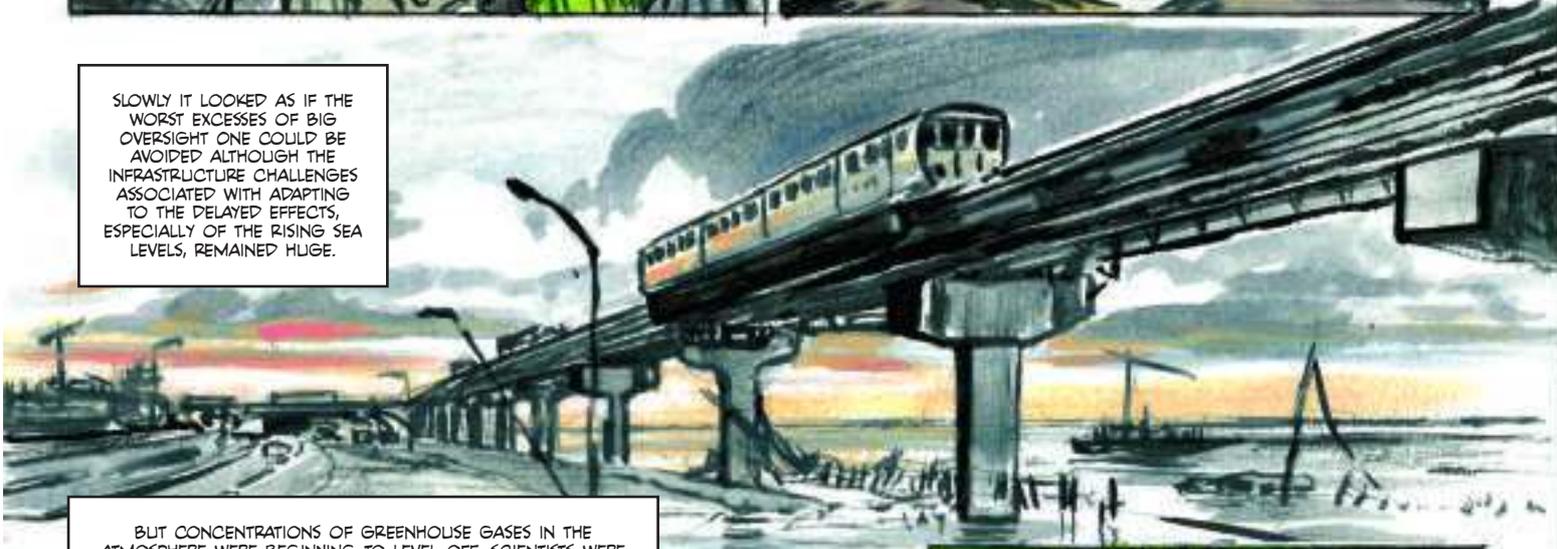
THINKERS BEGAN TO TALK AS MUCH ABOUT 'LOCALISATION' AS THEY DID GLOBALISATION. THEY STILL HAD GLOBALISATION OF COMMUNICATIONS OF COURSE. THAT WAS A BIG FACTOR IN THE RENAISSANCE OF HOPE AFTER THE SECOND GREAT DEPRESSION.

THE SPREAD OF ALTERNATIVES IN THE POORER NATION STATES, AND THE DELIVERY OF ELECTRICITY TO THE THIRD OF THINKERS WHO HADN'T HAD IT AT ALL BEFORE THE GREAT AWAKENING MEANT A VERY SIMPLE THING: LIGHT AT NIGHT EVERYWHERE. ENTER THE TEXTBOOKS.

THE THINKERS BY NOW BEGAN TO LOOK AS IF THOUGH THEY MIGHT BE ON COURSE TO STABILISING THEIR GLOBAL POPULATION. THE KEY, OF COURSE, WAS THE EDUCATION AND CONSEQUENT EMANCIPATION OF WOMEN, AS WAS CLEAR EVEN BEFORE THE BIG SHIFT.



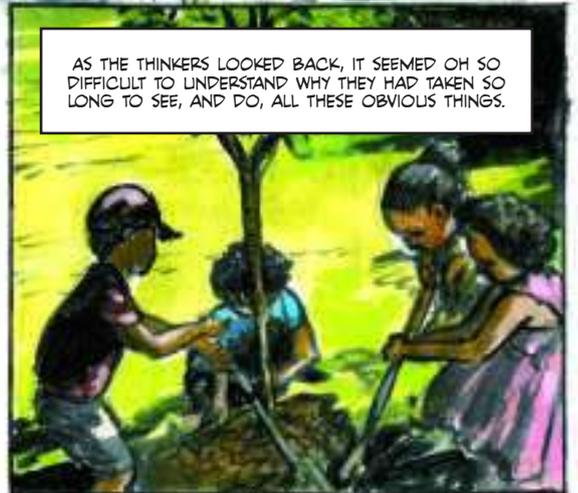
SLOWLY IT LOOKED AS IF THE WORST EXCESSES OF BIG OVERSIGHT ONE COULD BE AVOIDED ALTHOUGH THE INFRASTRUCTURE CHALLENGES ASSOCIATED WITH ADAPTING TO THE DELAYED EFFECTS, ESPECIALLY OF THE RISING SEA LEVELS, REMAINED HUGE.

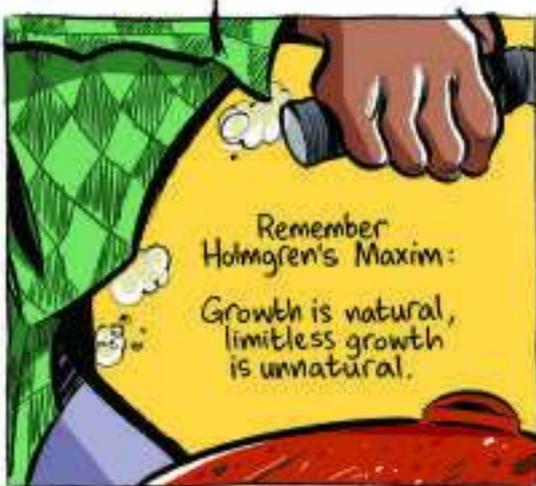
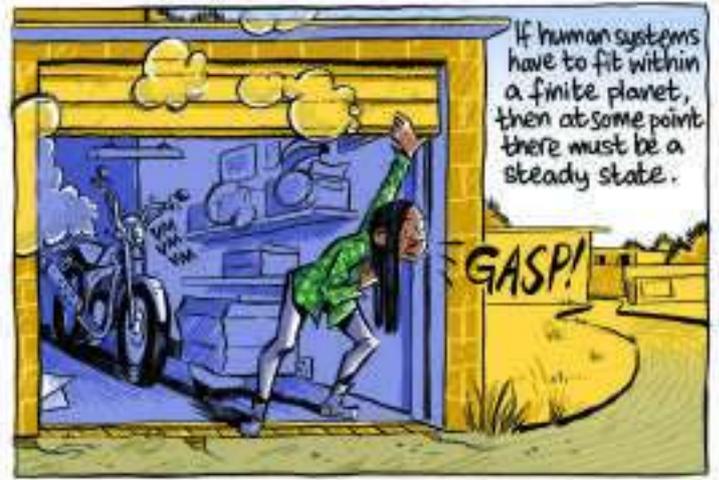


BUT CONCENTRATIONS OF GREENHOUSE GASES IN THE ATMOSPHERE WERE BEGINNING TO LEVEL OFF. SCIENTISTS WERE BECOMING LESS ANXIOUS. INNOVATIONS IN THE TECHNOLOGIES OF BOTH ABATEMENT AND ADAPTATION WERE BREAKING OUT ALL OVER IN THE ALTERNATIVE ENERGY COMMUNITIES.

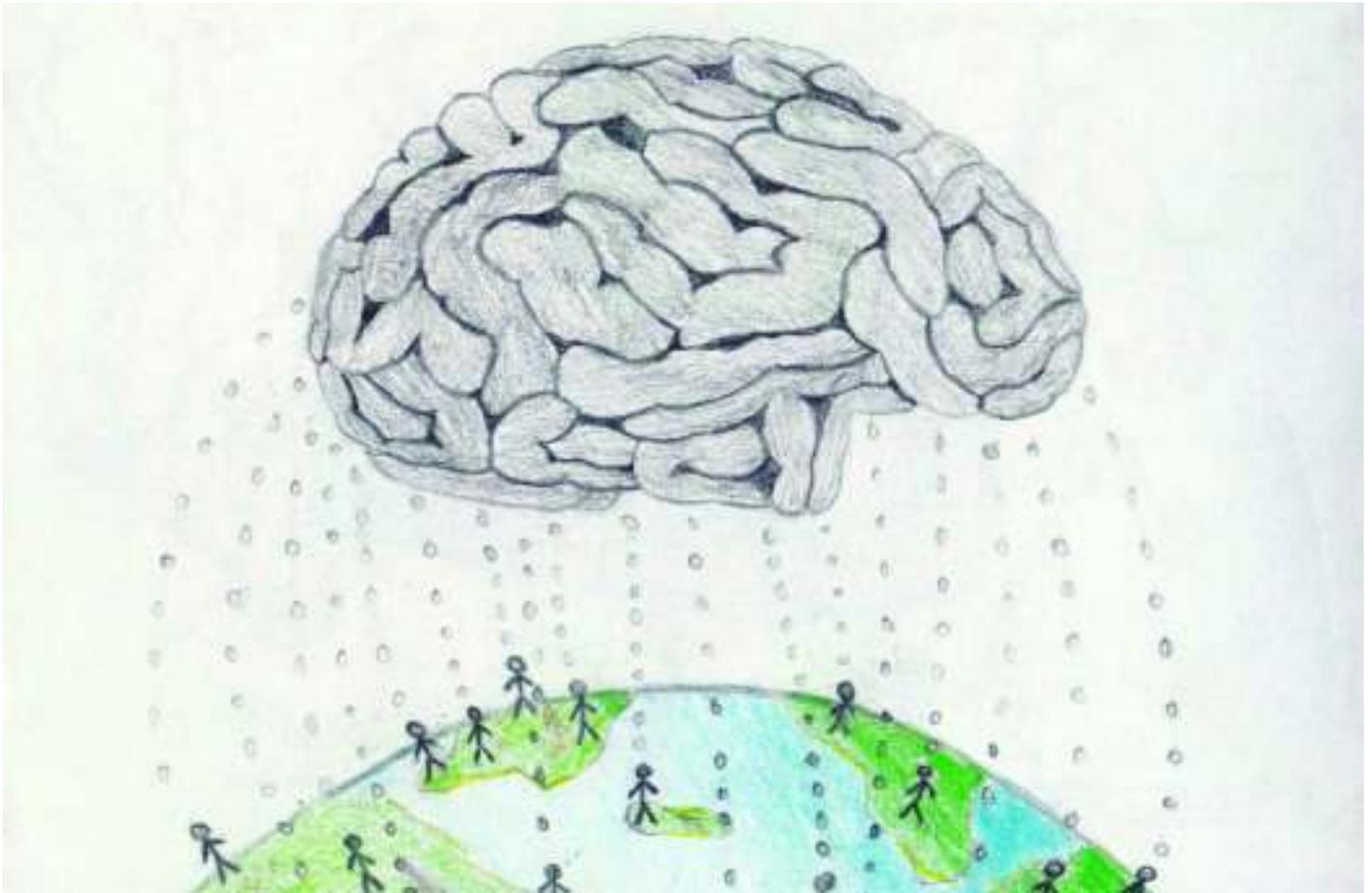


AS THE THINKERS LOOKED BACK, IT SEEMED OH SO DIFFICULT TO UNDERSTAND WHY THEY HAD TAKEN SO LONG TO SEE, AND DO, ALL THESE OBVIOUS THINGS.





# The Perils of Progress—Joel Millward-Hopkins



In the centuries of the Energy Ascent the Thinkers began to realise something...they really were phenomenally clever. They had travelled to the moon, split the atom and played with the secrets of life.

Their collective brain had grown unfathomably large, but this presented some problems. In comparison an individual brain was minute, so no single Thinker could really come close to fully grasping their collective knowledge.

Unfortunately, the fact that they knew so much led them to believe that they couldn't, at the same time, be incredibly stupid... often more so than their 'primitive' ancestors.

Even though it became almost impossible for any Thinker to become an expert in even a relatively small subject, they were still obsessed with finding out more, inventing bigger, faster and more complex things, and becoming, by their definition, ever more intelligent; they were pushing forward the boundaries of knowledge and technological progress without really understanding how or why.

In building their civilisation they were like bees building their hive: no individual bee designs a hive themselves...they design only an individual cell, based upon those few cells around them.

But where a hive works, this tower into the sky was unstable. The Thinkers in the nations that had done most to build the tower had no idea where it was going, but from every corner of society could be heard a chorus of enthusiastic proclamations...

*We're moving forward!  
Progress is being made!  
Don't panic!  
Everything is under control!*

... so they rushed recklessly towards their misconceived goal, and they looked down on those cultures refusing to build towers like theirs – surely they must not be as capable as us!

But what didn't cross their minds was that, unlike the bees and their hives, their tower was not the product of tens of millions of years of evolution... and it was leading them, running, climbing, flying, straight into a trap...because the further the tower protruded into the sky, the more incapable they became of living down on the ground, in the real world...and the tower, too, had no safe destination - they couldn't see that it was taking them ever further into thin air.

Then came the floods and the storms, the droughts and the famines, the wars and rationing. Now they could no longer remain blind to their self-destruction, the fragile base of their tower that they'd believed would support eternal consumption.

Their tower ruptured at its foundations and fell back to earth.

Finally, the Thinkers understood that a healthy civilisation must grow as a whole, with its mythology, culture and politics evolving in harmony with its geographical and technological expansion. After all, how healthy would a human body be if the growth of its heart, lungs and mind did not keep pace with that of its flesh and its bones?

For too long they had focused only on flesh and bone – the pulse of their civilisation had grown weak, it was gasping for breath, while its mind lay frozen.

So they began to attend to these neglected, undernourished organs, to synthesise where they could the spirit of both the old and the new.

They realised that their individual freedom had come hand in hand with a sense of isolation and separation, and that it was a strange type of freedom, directed by economic deliberation.

When they began to aim for a more sustainable society they rediscovered a community spirit of the past, but one where each individual retained their liberty - their freedom of expression, sexuality, and spirituality.

They realised that money had come to preside over every aspect of life, separating them from the impacts of their actions, corrupting the value of things upon which you cannot put a price.

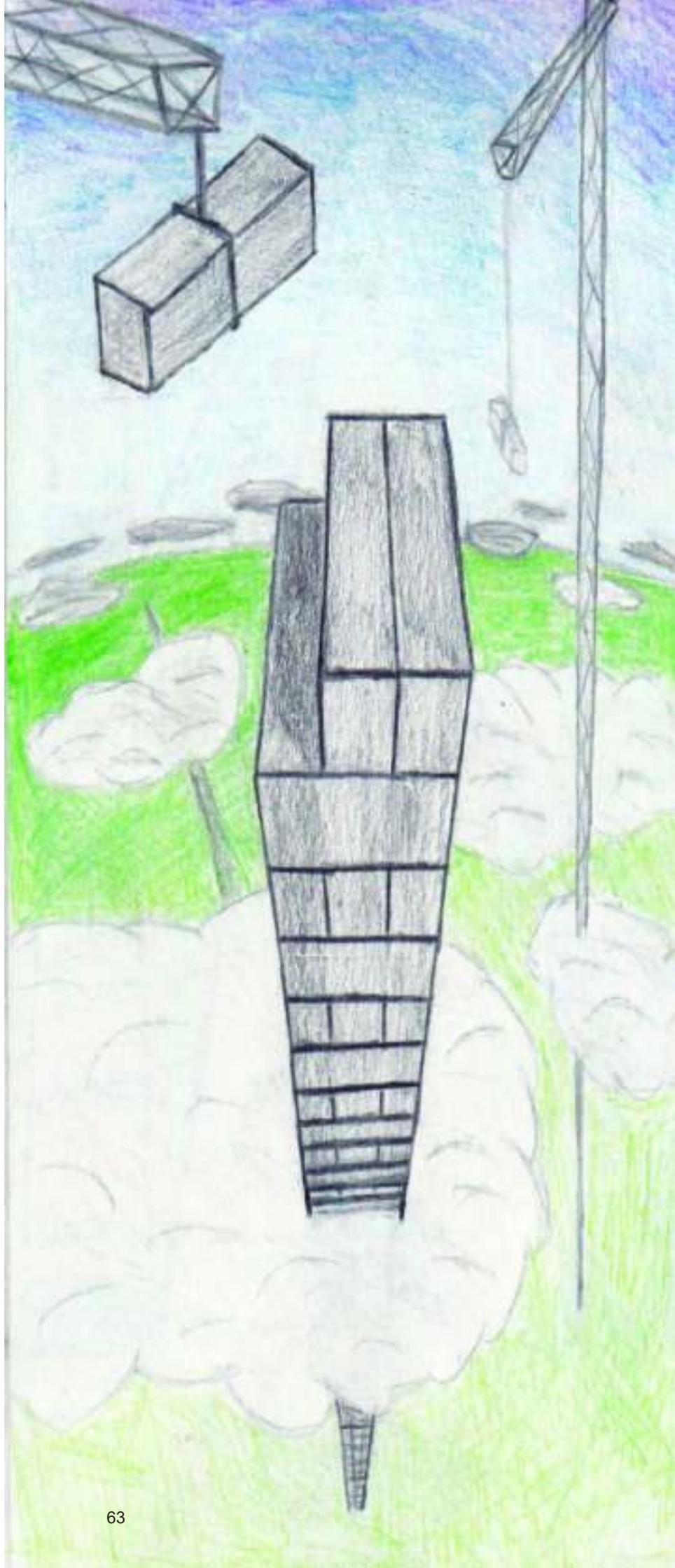
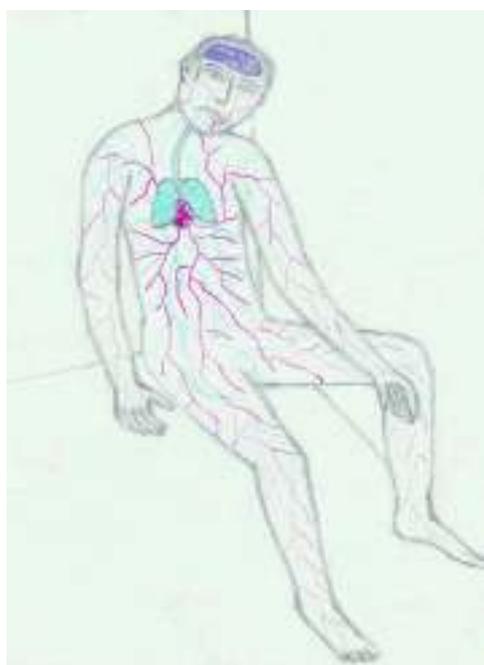
So, without forgetting its value as a means of exchange, they began discussing how to demonetise those things that should always have remained out of financial range.

They realised that the path from holistic hunter-gatherer to hyper-specialised modern human had cast them as expendable parts in a directionless machine.

So, recognising the power of cooperation and a collectively shared goal, they carefully divided their labour and skills while ensuring that each and every person remained aware of the whole.

There was no doubt that during the Age of Energy Ascent they had achieved many miraculous things, but their methods had cultivated a tragic dependence upon a manmade world that they should never have hoped to sustain and while their cultural knowledge was driven to extinction, they had clung to their brave-new-world in vain.

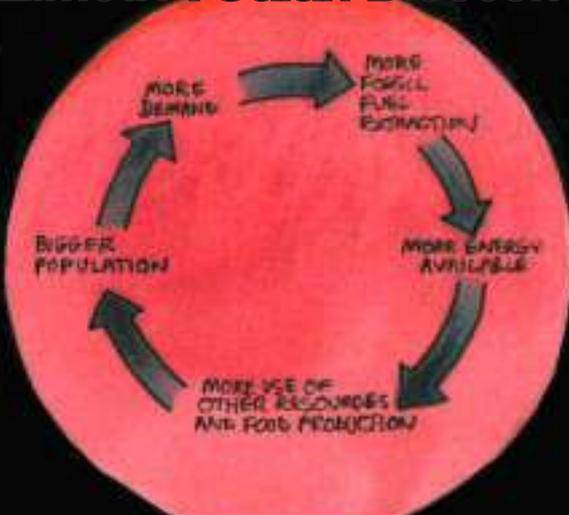
On the day they no longer called this progress, things began to change.



# Elmet: A Gaian Bioeconomy



PLANET EARTH--GAIA--IS A FINITE OBJECT. THIS IMPLIES THAT THERE HAS TO BE A LIMIT TO GROWTH.



FOR 200 YEARS IN THE AGE OF ENERGY ASCENT, SOCIETY WAS BASED AROUND LIMITLESS GROWTH--RELYING ON FOSSIL FUELS TO PROVIDE MORE AND MORE ENERGY TO INCREASE FOOD PRODUCTION, WHICH DROVE A GROWING POPULATION, WHICH USED MORE STUFF, AND SO ON.



ANY CHILD COULD HAVE TOLD YOU THAT THIS WOULD BE A BIT OF A PROBLEM.

MEANWHILE, THE THINKERS WERE AT IT AGAIN--ON THEIR WAY TO THE MOON FOR THE THIRD TIME.



THE EXPLOSION IN THE OXYGEN TANK CAUSED A DANGEROUS BUILD UP OF CARBON DIOXIDE IN THE CABIN.



THEY WERE A VERY LONG WAY FROM HOME.



THEY HAD LIMITED, BASIC TOOLS AND NOT MUCH TIME. NEVERTHELESS, A WAY WAS FOUND TO STOP THE BUILD UP OF GAS IN THE CABIN AND TO BRING THE TRAVELLERS SAFELY HOME.

ON A LARGER SCALE THIS WAS THE STORY OF GAIA--SPACESHIP EARTH.

1. We knew what the problem was—a dangerous build up of greenhouse gases leading to climate change.

2. We knew the solution—keep emissions to zero (and try to remove what had already been released)



3. We had the tools: carbon pricing, new technologies, changes in behaviour...



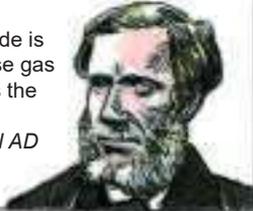
...but what to do exactly?

## The Timeline of the Big Shift

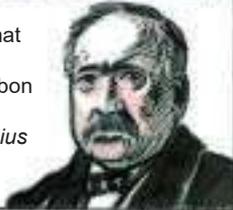
I recognised oxygen, carbon dioxide and the natural carbon cycle  
*Joseph Priestley*  
 AD 1772



I discovered carbon dioxide is a greenhouse gas which keeps the earth warm  
*John Tyndall*  
 AD 1860s



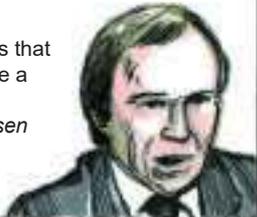
I discovered that humans were increasing carbon dioxide levels  
*Svante Arrhenius*  
 AD 1890s



I saw levels of carbon dioxide in the atmosphere rapidly rising  
*Charles Keeling*  
 AD 1958



I informed governments that this would be a problem  
*James Hansen*  
 AD 1988



We (195 nations) agreed warming must be limited to 1.5°C  
*COP21*  
 AD 2015



We (200 nations) signed the Declaration of Interdependence, triggering the Big Shift  
*COP28*  
 AD 2022



I chaired the Global Adjustment Team at the time net zero carbon emissions were achieved  
*Maari Wangarathi*  
 AD 2098



We created a new kind of society... a society with a stable population and use of resources that keeps within the boundaries of its home ecosystem.



We used our creativity to mimic nature and turn our system from one based on limitless growth to one based on a dynamic, self-regulating steady-state: a Gaian Bioeconomy.



Permaculture Principle 7: Apply Self-regulation:

**“All living systems have in common that they sustain a steady state by being dynamic and self-regulating”**

*Guru Lovelock*

Crucially, a Gaian dynamic equilibrium is not static—it reacts, evolves and grows more resilient in response to a rapidly changing environment: it is Anti-Fragile.

Guru Taleb: *“The richer we are, the harder it is for us to live within our means”*

Most emissions were created by the richest nations. The poorest nations had no choice but to increase emissions as they brought people out of poverty. In order to reduce total emissions, this meant the first step towards zero emissions was for the richest nations to go through a process of degrowth.

## The Thousand Flowers Movement



Keeping emissions to zero required global cooperation—this was the philosophy of the Thousand Flowers movement as expressed in the Declaration of Interdependence.

For example, international trade meant that emissions generated within a country were dwarfed by the emissions associated with food and consumer goods imported from outside. It was no good if one country acted alone—a global approach was needed.

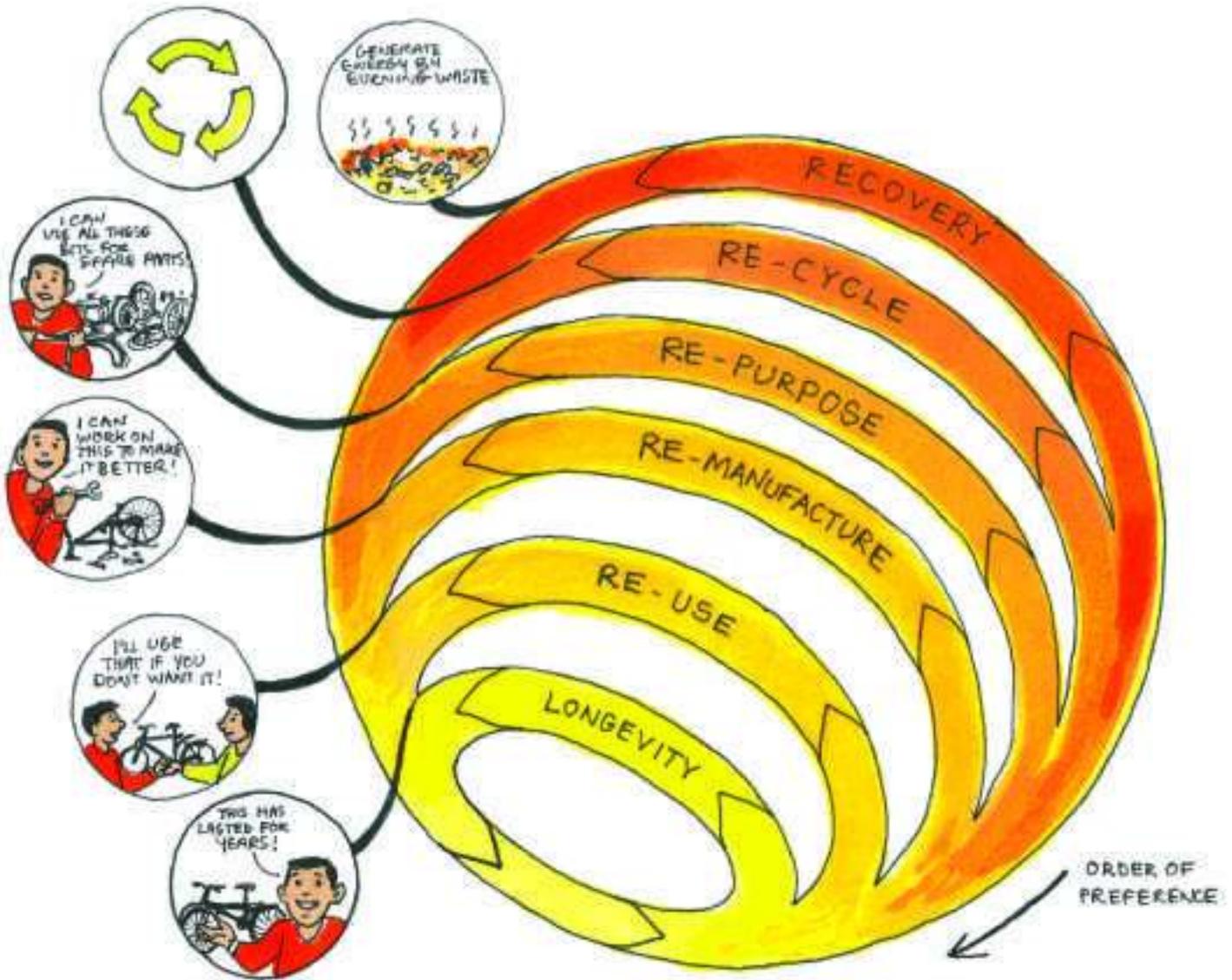
In fact, the reality of the world even during the Age of Energy Ascent was a drive towards ‘globalisation’ - ever closer integration and cooperation. The overconsumption and corruption of the Age of Energy Ascent did not negate all the good that had been achieved. The spread of ideas and expertise improved the lives of millions of people.

Thus during the Big Shift, there was a ‘great release’ of the human spirit. The idea of the ‘Brotherhood of Man’ common in many religions became a practical necessity. Humans across the globe were no longer in competition, but were bound together in the face of adversity. This was the essence of the Thousand Flowers.



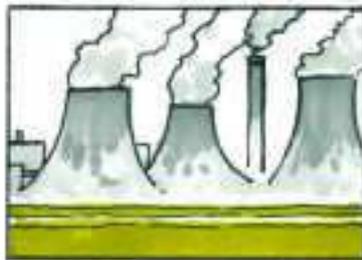
# The Circular Economy:

A system where nothing is wasted and resource use is minimised—Permaculture Principle 9: Produce no waste



This is all well and good, but there are things that do not fit the circle...

...in the Age of Energy Ascent nearly half of all materials were burned to generate energy

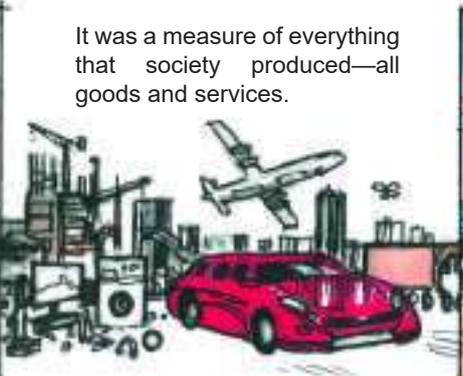
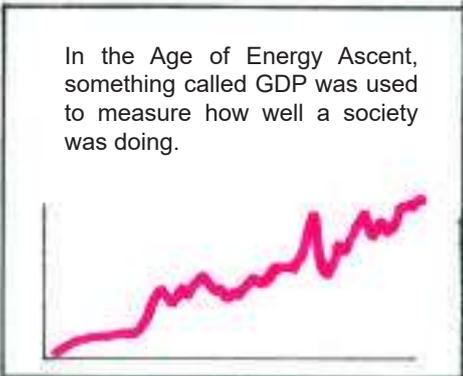


There had to be a full shift to zero carbon energy



By the 2040s, all the benefits of a circular economy had been eaten up by economic growth. Something more was needed...

Around a quarter of all materials were used to build roads, bridges, houses...  
There had to be no overall growth in the built environment.



Crazily, it also included bad things. For example, an oil spill required huge amounts of money to clean up—and this counted towards GDP.

So if you wanted a better GDP score you needed a few more disasters!

A Gaian Bioeconomy has 0% GDP but since this measure of success was discarded during the Big Shift it is *no longer relevant*.

Other measures of success are now used—for example levels of health and wellbeing. There are four characteristics of a typical Gaian Bioeconomy:

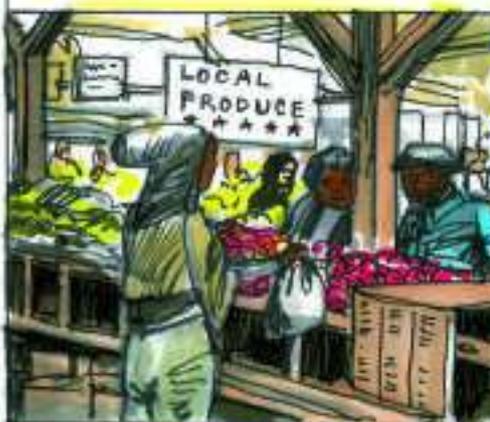
1. Sustainable Scale: stable population and consumption. Nature largely did this for us—by the start of the 22nd Century populations were declining in most areas (though not Elmet)



2. Limit inequality through the Citizen's Income. Growth was a substitute for hope in an unequal world. Inequality was a big problem resulting in poorer health—even for the rich.



3. Efficient allocation of resources through Globanking—a DREAM piggybank. Transactions are geo-coded so local trade is encouraged.



4. Measuring things that matter: health and happiness. Instead of GDP, we have GDW—Gross Domestic Wellbeing—including the following 4 measures:

A) Keep connected: for example DREAM cafes allow us to connect with anyone anywhere, trading, learning and sharing talents and expertise.



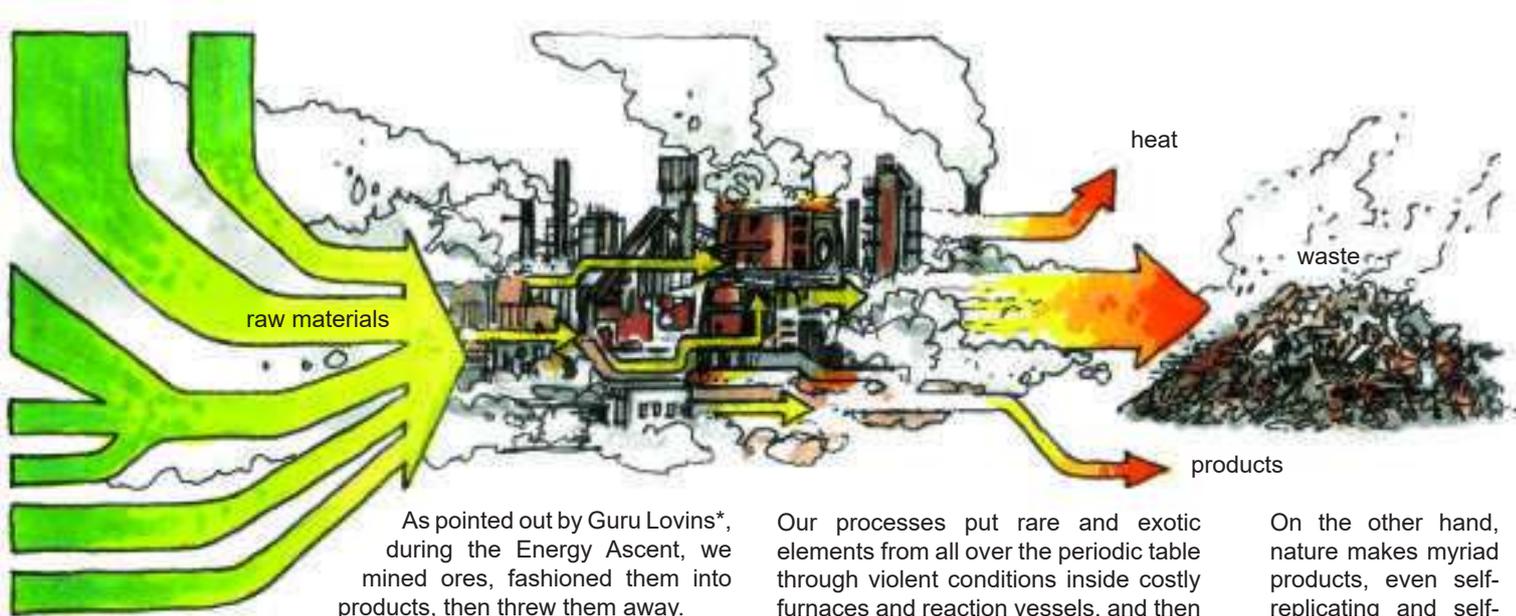
B) Keep Active: our system of Permaculture and Hub jobs ensures that everyone has something physical to do within their working day.

C) Keep Giving: DREAM gives us the chance to build credit by volunteering and contributing our expertise to help solve problems anywhere.



D) Keep Learning: Our DREAM environments mean that the youngest child can access learning beyond the wildest dreams of those living only a century ago.

Those societies who score highly in all of the above report the greatest levels of good health and satisfaction, at the same time as keeping emissions to a minimum.



As pointed out by Guru Lovins\*, during the Energy Ascent, we mined ores, fashioned them into products, then threw them away.

Our processes put rare and exotic elements from all over the periodic table through violent conditions inside costly furnaces and reaction vessels, and then discarded most of the results as waste.

On the other hand, nature makes myriad products, even self-replicating and self-reproducing ones, from just:

- Air
- Soil
- Water
- Sunlight

## Biomimicry and a Regenerative Economy

Nature uses only a handful of common elements, reactions are catalysed by enzymes at lightning speed under normal temperatures and pressures, and there is zero waste.

Each step's products are food for the next in an endless cycle.

Although we still have a long way to go, through mimicking nature we aim to achieve our regenerative society.

Our aim is for every person to leave the planet in a healthier state than it was when they were born. Any negatives (for example, the materials we consume just in order to stay alive) must be outweighed by the restoration we engage in.

It's kind of ironic that one of our biggest uses of energy is just to deconstruct old materials and resources from the Age of Energy Ascent and reintroduce them into natural cycles.



"You have noticed that everything we do is in a circle, and that is because the Power of the World always works in circles, and everything tries to be round... the sky is round, and I have heard that the earth is round like a ball, and so are all the stars. The wind, in its greatest power, whirls. Birds make their nests in circles, for theirs is the same religion as ours... Even the seasons form a great circle in their changing, and always come back again to where they were. The life of a man is a circle from childhood to childhood, and so it is in everything where power moves."

Black Elk

Nitrogen cycle



\*Source: Amory Lovins "Reinventing Fire"

There are 9 planetary boundaries:

Climate Change—apparently stabilising following falls in greenhouse gases

Biodiversity Loss—uncertain recovery in some areas following re-wilding

Biogeochemical Flows—recovering following Permaculture approach to food production

Ocean acidification—major worries and global impacts. No sign of recovery so far

Land Use Change—problems increasing due to competition between food, energy and ecosystem services

Freshwater use—recovering in Elmet, under severe pressure globally

Ozone depletion—recovering following Montreal Protocol in late 20th Century

Atmospheric aerosols—recovering, but problems resulting from use of biomass for energy

Chemical pollution (toxics, plastics, heavy metals, radiation) - recovering

*"When one tugs at a single thing in nature, one finds it attached to the rest of the world"*  
-John Muir

Energy from the Sun

Carbon cycle

Water cycle

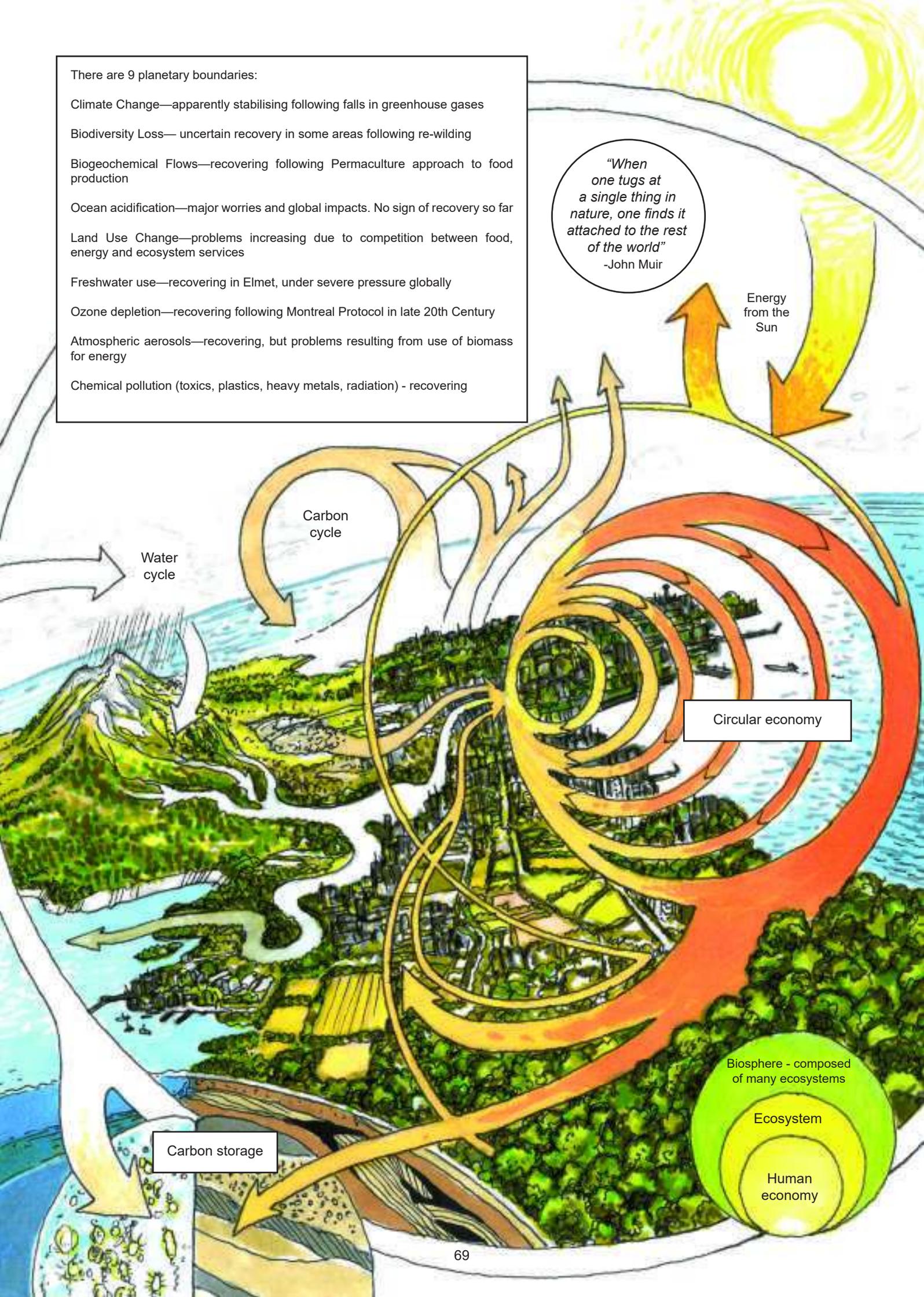
Circular economy

Carbon storage

Biosphere - composed of many ecosystems

Ecosystem

Human economy



# The People of the Pennines

## A walk through the communities of the United North

by Tsaone Fishner-Kroos

*“As it is useful that while mankind are imperfect there should be different opinions, so it is that there should be different experiments of living; that free scope should be given to varieties of character, short of injury to others; and that the worth of different modes of life should be proved practically, when anyone thinks fit to try them.”*

J S Mill – On Liberty

*“The wealth of nations is measured by the quantity and quality of their forests”*  
- Holmgren, “Principles”



*The glory of the Pennine Forests— seemingly unbroken temperate rainforest from horizon to horizon in the hazy evening light. Appearances can be deceptive however. This, the Dales National Forest, is a working landscape, full of people. Large areas of the forest are coppiced for biomass, and tended as forest gardens. The Littondale Arcologies (abandoned in 2096) can be seen in the distance..*

*Biodiversity is high, and rising, with the re-wilding of the landscape proceeding apace after initial reforestation in the mid-21st century.*

## Elmet is by no means a utopia...

Although we have been fortunate in the development of our low carbon society, there are critical voices, none more so than in the upland areas of the country that have gone through radical changes in the last hundred years. While the defining feature of the urban areas of Elmet is of a coming together of groups and an increased degree of cooperation, not everyone has bought into this vision. The Pennine forests are inhabited by a bewildering variety of communities, sects and factions united only by their desire for separation from the mainstream.

The growth of the forests through the late 21st Century, and the rises in temperature, allowed for colonisation of the infertile uplands by quite a dense population, descended in part from refugees and environmental and religious groups, not to mention a few outlaws. Many of these communities feel that the sustainability culture of Elmet does not go far enough. For some, civilisation itself is the problem. However, at least one group advocates a dangerous re-birth of a fossil-fuel economy, and have deliberately set themselves up in conflict with everyone in the region...

The people of the coast have several names for the uplanders, including the derogatory 'Feral'. The most general terms in use are 'Dissenters' or 'Experimentals'. They

have a great deal to offer by giving a practical demonstration of many different concepts of humanity's relationship to the land, of their ability to be sustainable, the treatment of different races, sexes, religions and minority groups. They can help answer pressing questions such as the value of technology vs primitivism, capitalism vs communism, nomadism vs settled life, specialism vs generalism in a rapidly changing environment and the efficiency of cities vs self-sufficient rural districts/communities.

Oh, and they're also famous for their music—after all, Little Greenby is the birthplace of Angelina Nazee of 'Yorscandian Rhapsody' fame.

Keeping in mind the Permaculture principle 'Use and Value Diversity' we have to consider the Experimentals' response to our drive for sustainability—why exactly do they not share our views? By questioning us, they help us define ourselves.



## A Dales Visionary



**Deadman Communities:** One of the largest groups in the Pennine area, characterised by militant environmentalist and anti-authoritarian views. Members go barefoot, live in tree houses and pueblo-style eco-villages; mostly vegetarian apart from ritual feast days; religious views include the 'live simply so others may simply live' movement.

**Sons of Fire:** Often called the 'Green Dictatorship', life is dominated by draconian punishments for environmental infringements like littering, including the notorious 'eco-prisons'. A 'dry' community (no alcohol allowed).

**Meughers:** an all-female group, using artificial means of reproduction. Level of technology very high, focused on advanced renewables especially micro-hydro technologies, wind and solar, with a combination of organic farming and genomic engineering.

**Cornucopians/Free Marketeers:** closely aligned with the Red Kites (whom the colonials regard as a terrorist organisation) – core beliefs are a revival of early 21st Century free-market philosophy—a 'winner takes all' attitude—in addition to denial of climate change, extractivist use of fossil fuels, child labour and slave labour. They are conspicuous meat eaters—and poachers of the Dales Forest animals. These groups also include "Cargo cultists" who worship the material goods of the Age of Energy Ascent.

**Limiters:** A bizarre neo-Buddhist sect. Religious views include the right to excrete only a certain amount of CO<sub>2</sub> in their lives, followed by ritual suicide. Practise extreme meditation and starvation techniques to slow metabolism.

**Nomads:** Groups of Travellers, itinerant farm workers, wandering poets, Sea King refugees, and others. Appleby Horse Fair is a focus for these communities. Included in this group are the travelling medics of the Angels Rail, taking their life-saving skills from settlement to settlement.

**Survivalists:** Small groups and individuals who choose to avoid community living for various reasons including apocalyptic and fundamentalist religious beliefs.

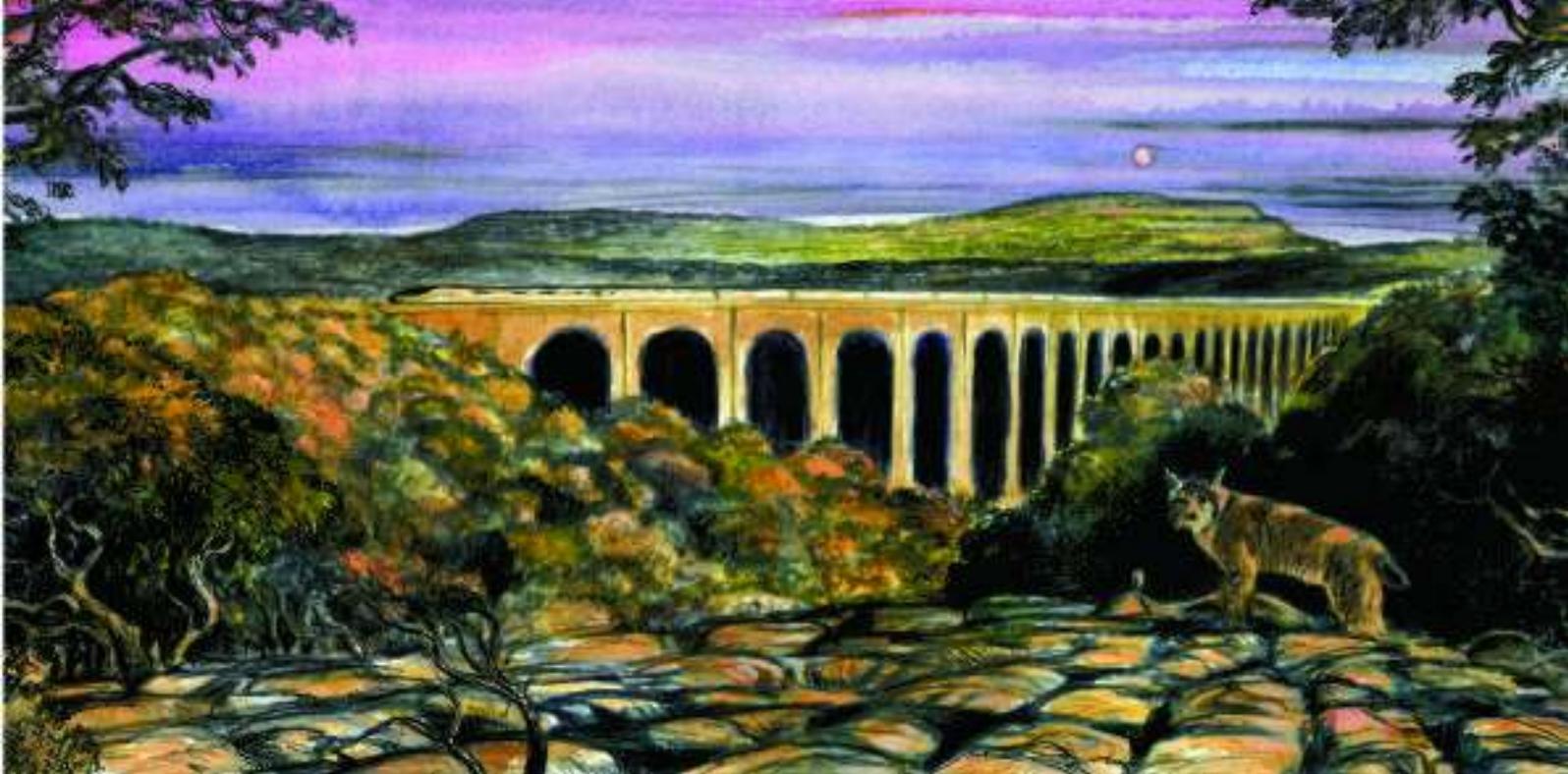
**Old Timers:** Original farming inhabitants of the Dales who have managed to adapt to the changes over recent decades and are now thriving.

Ames Ruben is a 40-year-old tech-entrepreneur who is planning on opening a research facility in the Dales Forest for nuclear fusion power, with the eventual aim of, in his own words, "ending the world's energy problems within 50 years, and facilitating economic growth indefinitely". At the press conference that was held to mark the opening of the pilot-stage facility a terrorist incident occurred, still under investigation by the authorities. A Parasite was set off, injuring 23 people. A militant group claimed responsibility, objecting to his search for essentially free energy, pointing out that there would then be no limit on humanity's use of the earth's other resources.

Rubens' long-term plan is in fact to re-wild large sections of the earth, and he believes that producing an infinite, clean energy source in underground power stations will allow this to happen. He argues that "through developing powerful technology utilising 'free energy' we will end up mostly eliminating the need for factories, roads, cities and so on, i.e. goods can be produced locally using printing manufacturing technology, transport can be via an underground network of 'vacuum cars', telecommunication will remove the need for urban congregations, and people will be able to live in suitable dwellings within a largely natural surface landscape."

*Below: Ribblehead viaduct in the early 20thC—moorland burning led to loss of diversity. It's shocking to think that 150 years ago there were almost no trees in the area. Now it's a rich ecosystem: animals need a three dimensional environment to inhabit. Top of facing page: the same area today.*





One of the iconic Dales Lynxes with roe deer prey at Ribblehead viaduct, near Little Greenby, Dales National Forest.

There are finds of British Eurasian lynx bones dating from as little as 1,700 years ago. The animal then went extinct in the UK, and was reintroduced in 2029; the first lynx in this area were recorded during the Big Freeze of the 2090s.

Understory vegetation is critical for Eurasian lynx, and is a measure of suitable quality of habitat, since they prefer woodland with structural diversity, good cover for stalking prey (the woodland dwelling roe deer) and dense thickets for resting.

The limestone landscape of the Dales may in fact give them an edge – giving sufficient cover in some places to hang on in small numbers across a wide area. Looking to the future, a combination of limestone geology, with a returning woodland cover and an associated increased presence of roe deer attracted to the woodland, suggest that the lynx will do well.

## Self-willed Land —Zone 5 of Permaculture

In the early 21st Century, the turmoil of the Big Shift resulted in many people returning to using biomass (wood) for energy on a huge scale. Deforestation was catastrophic. At the same time, in many areas of Europe, people were abandoning rural areas to move to cities. Fortunately the global reforestation programme then took place under the auspices of the Global Adjustment Team. In the UK, the Pennine grouse moors had disappeared under a thick canopy of carbon-absorbing woodland by late in the century.

The re-wilding movement and Children's Forests, a key part of the Thousand Flowers regeneration, began with reintroductions of birds like sea eagles and red kites, the return of salmon to rivers, and continued through the 21st and early 22nd centuries driven by advocates such as Guru Wem Sheekes, the Brazilian earth systems scientist.

In the forests, ash is thriving, at least in the damp crevices in the limestone. Juniper is obviously also suited to that environment. Across the region we see vast beech forests, hazel, rowan (mountain ash), blackthorn and even wild cherry. Silver birch is the pioneer tree par excellence. It is known for improving soil quality and preparing the ground for other species.

Reintroductions are still continuing—the latest debate is over bears. Public acceptability of large mammals—especially predators- is a huge issue in the UNK, however we are learning much from neighbours on the continent where re-wilding is much more advanced. Each reintroduction helps to reconnect the strands in the web of life— including humans and their communities.

A few examples:

Beavers: Extinct in UK by 1000AD, reintroduced early 21st C, (Pennines: 2028) Beaver are a keystone species and are called 'ecosystem engineers'— that is, they make habitat for many other animals—lush meadows, small pools, luxuriant riverside vegetation. European beavers don't make large dams, and are frequently hard to detect.

Boar: Extinct in the UK by 1500AD, reintroduced late 20th C (Pennines: 2020s) Boar eat rhizomes of bracken and prevent it spreading. Their rooting through the soil makes space for wild flowers to establish themselves. However, they damage crops and are implicated in the spread of Derwentvirus.

Lynx: Extinct in the UK by 800AD, reintroduced early 21st C (Pennines: 2090s) Top predators are essential to an ecosystem. Lynx predate on roe deer, preventing them from overgrazing, especially in the limestone areas of the Dales. They (along with wolves) have become icons of the National Forest, and a big tourist draw.

Wolves 2045AD (Pennines: 2090s) Wolves too alter the behaviour of prey species, encouraging a cascade of positive changes to the landscape. The effect on humans is also profound: senses become heightened when travelling through a landscape containing a potentially dangerous predator.



*Left: Sebastiao Salico, like the trees he loves, is craggy, weathered and solid. Over six foot, swarthy and built like a bear, he exudes an air of unshakeable authority, essential in holding his fractious community together.*

## The Pennine Eco-Community of Little Greenby

Early morning. We are standing near the firewatch tower on the watershed above Mossdale Scar near Little Greenby, on the trail of roe deer. Smoke from a forest fire hangs over the valleys ahead and shimmers in a heat haze.

I'm with Sebastiao Salico, leader of one of the most successful Deadman Communities (famous as the birthplace of Angelina Nazee). I ask him about the continuing dispute between the Ridge Experimentals (mostly from Salico's community) and the people of the Nidderdale conurbations over poaching and tree-

falling in the Brimham catchment – especially the Children's Forest of Guisecliff Woods.

SALICO: "First, I'd like it on record that this is a long-standing problem. We've been working with the AfroSindians at Knaresborough Hub to stop the infringements in the national park area but they've so far seemed unable (or unwilling) to intervene."

FISHNER-KROOS: "Tell us a bit about you and your community..."

*Right: the Pennine community of Little Greenby.*

*Built on the remains of a 19th century village, communal apartments are constructed within the tree canopy on top of the older buildings.*

*Power is provided by sun, water and high-altitude kytoons, protein by termites housed in artificial mounds.*

*Community members regard the Earth as alive and wounded by technology; they avoid walking on the ground where possible.*



SALICO: "I'm the leader of Little Greenby—one of the Deadman Communities. It's an environmentally driven Rhizome commune. Although the final judgment on decisions lies with me, the socialist ethos of the commune leads to the majority of decisions being made by the people's council.

I'm a driven individual who, ultimately, gets the job done. I will fight tooth and nail for my beliefs and the philosophy of the commune. It is vital that people are made aware of the necessity to embrace the ways of the forest. Holmgren said 150 years ago that 'The measure of a nation's wealth is the quantity and quality of its forests' and "forest must be the predominate land-use in uplands of the catchment". These forests are already under threat from invasive species and fires due to rising temperatures and mismanagement. Trees are struggling from elevated CO2 levels and heat stress, reducing their resistance to diseases that are turning parts of the forests into dead zones. The re-education of society in the ways of Mother Nature is a must and we, within this community, will strive to achieve this by any means possible."

The commune members are of the belief that all of the earth's issues stem from the inherent unsustainability of a complex industrial civilisation and therefore have made a conscious effort to promote a move towards a 'pre-urban society', reverting back to a community which is reliant upon the sustainable utilisation of the Earth's natural products. The commune members see themselves as part of a symbiotic relationship with the earth, the trees and the ecology they consequently sustain.

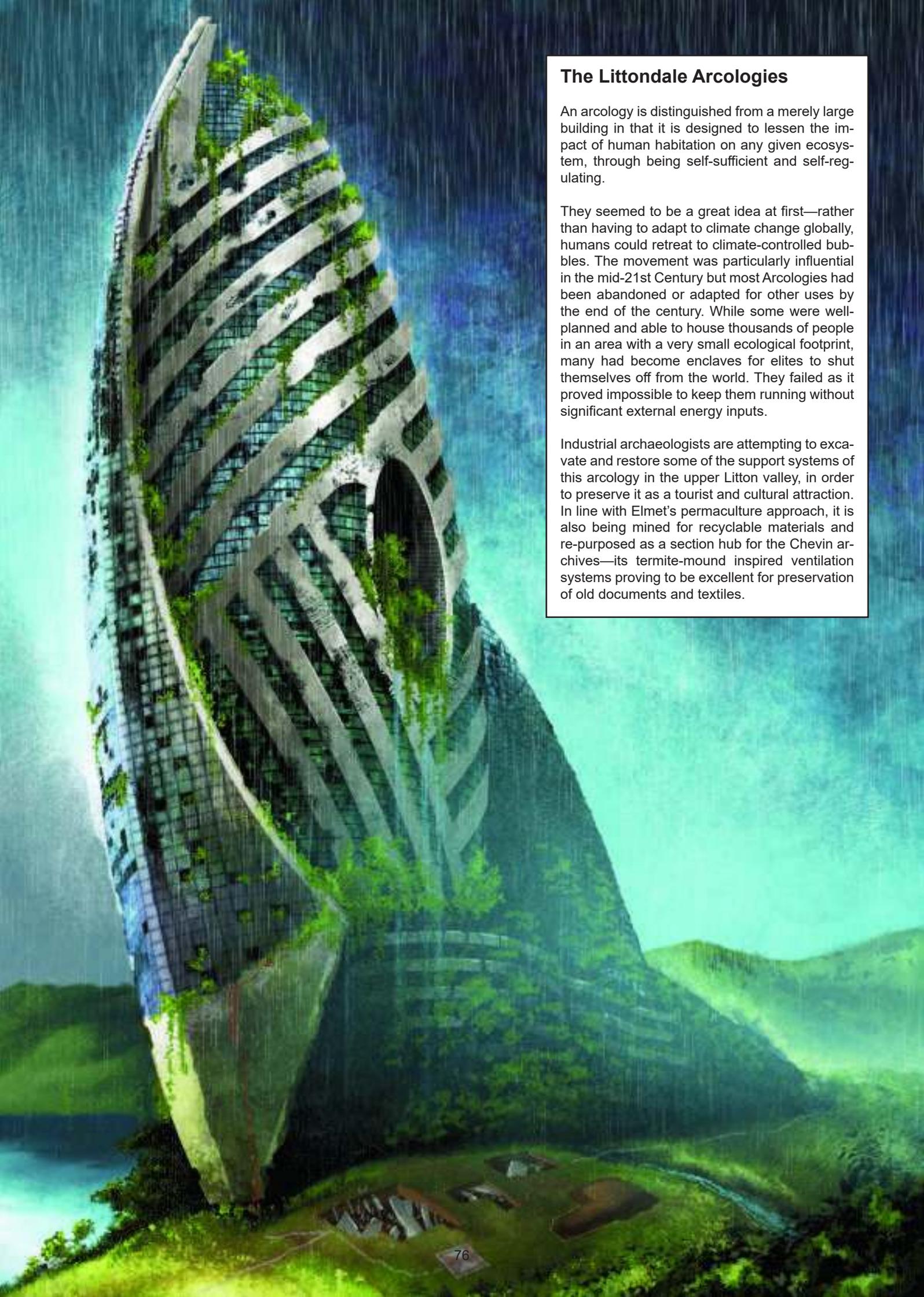
FISHNER-KROOS: "You have been quoted many times to the effect that civilisation itself is not sustainable. Civilisation is based on cities, which by their nature require imports of raw materials from somewhere else. However, some would say your eco-village communities are trying to return to a rosy-tinted vision of the past. What do you say to those who think it's irresponsible to advocate a pre-industrial lifestyle out in the forests when the population is so dense? The UK could support a million people living your lifestyle at most. Instead, we have a population of upwards of 80 million. Your groups only survive in fact because of protection by the authorities."

SALICO: "Yes, we believe civilisation itself is the problem. Technology and techno-fixes are not the answer...Think carefully about how many people your hub in Elmet could support if you did not import energy and resources from elsewhere. To us, it is obvious that we have to find a way to survive in the long term on our 'landbase'—those few square miles surrounding our settlement. Only then can we claim to have achieved a truly sustainable culture."

FISHNER-KROOS: "But, in effect, you imply that even in an almost zero-carbon society like Elmet most of the population is surplus to requirements—and doomed? That there will be some kind of crash?"

SALICO: "We try to avoid making these kind of predictions. We are there to show there is another way—we are the reservoir of ideas that will be called upon when the time comes. Perhaps in the long run people will think of us as pioneers to a better future. It will not be a future where complex civilisation exists."





## The Littondale Arcologies

An arcology is distinguished from a merely large building in that it is designed to lessen the impact of human habitation on any given ecosystem, through being self-sufficient and self-regulating.

They seemed to be a great idea at first—rather than having to adapt to climate change globally, humans could retreat to climate-controlled bubbles. The movement was particularly influential in the mid-21st Century but most Arcologies had been abandoned or adapted for other uses by the end of the century. While some were well-planned and able to house thousands of people in an area with a very small ecological footprint, many had become enclaves for elites to shut themselves off from the world. They failed as it proved impossible to keep them running without significant external energy inputs.

Industrial archaeologists are attempting to excavate and restore some of the support systems of this arcology in the upper Litton valley, in order to preserve it as a tourist and cultural attraction. In line with Elmet's permaculture approach, it is also being mined for recyclable materials and re-purposed as a section hub for the Chevin archives—its termite-mound inspired ventilation systems proving to be excellent for preservation of old documents and textiles.

## The Red Kites—The Real Dissenters of the Dales

*“Climate change causes conflict like it causes storms”—Francois Hollande*



### **What are your views of Elmet society?**

“People in Elmet talk about a sustainable equitable society, but none of their ideas stand much scrutiny. Their so-called community consists of a computer programme running every aspect of their lives, backed up by UNOColonial military force if they step out of line.

This so-called low carbon life that they aim for is nasty, brutish and short. They can't stop looking to the past but I am pretty sure that those agricultural-based societies prior to 1750 were grossly unequal, grossly discriminatory of women and underpinned by slave or peasant classes. They were marked by periods of starvation, poor health and short life spans.

Then after 1750 and the start of the Energy Ascent there was rapid economic growth: over that period there was a significant reduction in inequality be it economic or sexual, and in addition a huge improvement in public health and life span, industrialisation and urbanisation. The social structure went from autocratic to broadly democratic rule over the same period.

Meanwhile the attempts at egalitarian societies such as Soviet Russia and Communist China resulted in rapid and dirty industrialization and massive abuse of human rights. Those societies were not egalitarian, instead they just allocated resources to a small elite in a different way. They were also highly polluting.

So the idea that you will end up with an egalitarian society in a steady state system is not supported by any historical evidence. A low carbon, zero growth society is likely to be highly unequal, bigoted with poor healthcare and short lifespans.”

*Above: The notorious Sar-Zhen O'Byrne is the leader of the Red Kites, a Free Market group. He is rumoured to run illegal goods up and down the East Coast, and was implicated in the murder of the UNOColonial liaison officer Da Shi Thomas Haymer in 2148.*

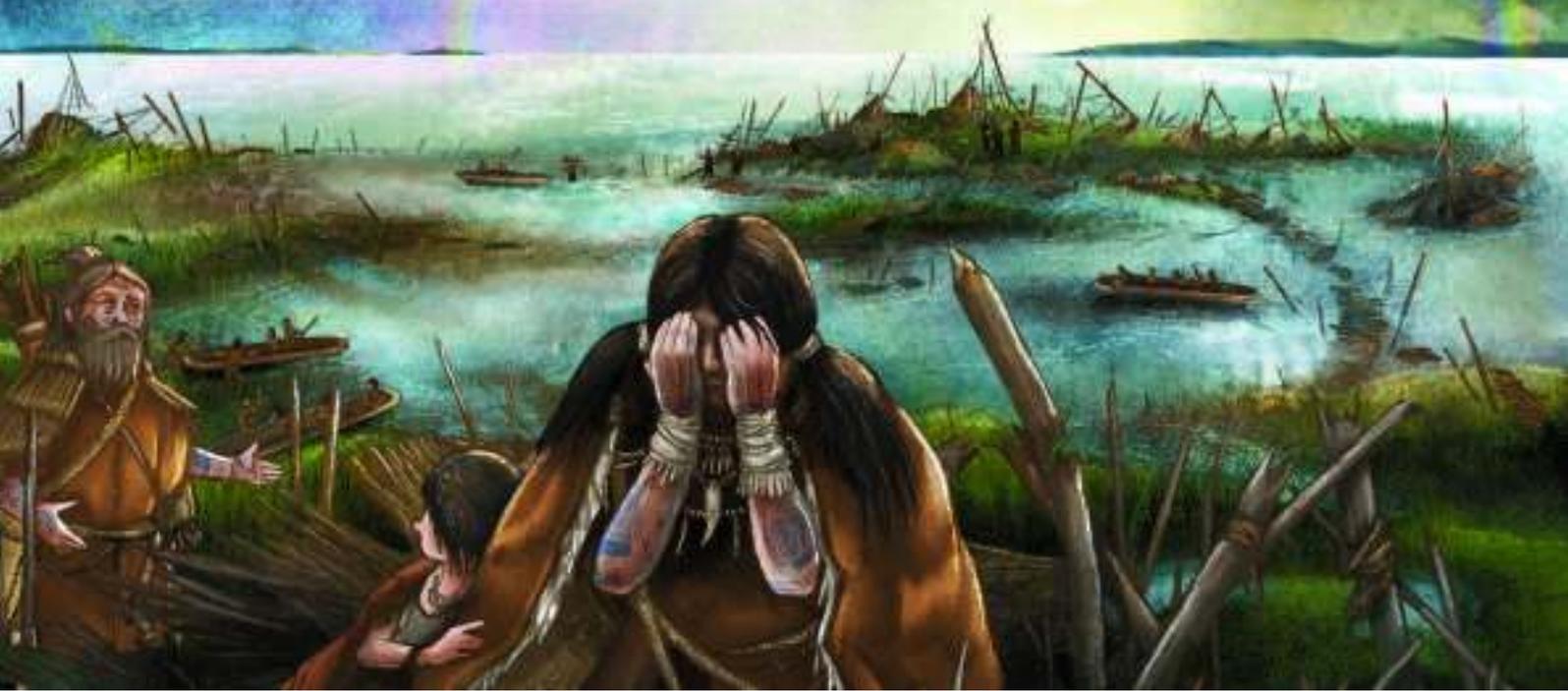
*The Red Kites have a 'winner takes all' world-view, in direct conflict with the prevailing Interdependency culture of Elmet and the more extreme Experimentals, whom they despise. In many cases they are the descendants of the elites who created the arcologies in the mid-21st Century, but who lost out when many of the fossil fuel and other resources they monopolised were no longer needed.*

*They regard attempts to foster community living as being equivalent to 20th Century-style state communism. Most of the 'community' seems to consist of young men who feel that the peaceful Elmet culture offers them little in the way of excitement, despite the ethos of the Merantau Walkabout between age 16-24. They aggressively promote their outlook and cause endless trouble for their neighbours.*

*Recently, this has taken a threatening turn, with the rise of Syed Goodfellow and the Rebel Coal climate change deniers in South Yorkshire. In love with the ideals of the Age of Energy Ascent, they believe it is their God-given right to return to the 'days of glory' when the mining communities of the coalfields were at their most prosperous. There have been several clashes with the Thalweg assembly authorities – in 2147 and 2149 – and currently the whereabouts of Goodfellow are unknown.*

## THE RISING WATERS: DOGGERLAND—6200 BC

“The sea has risen before. We know now, from discovery of the Doggerland ‘Tundra Towns’ in the mid 21st Century, that North European civilisation was developed to a large degree in the low areas that were drowned as the Ice Ages ended.

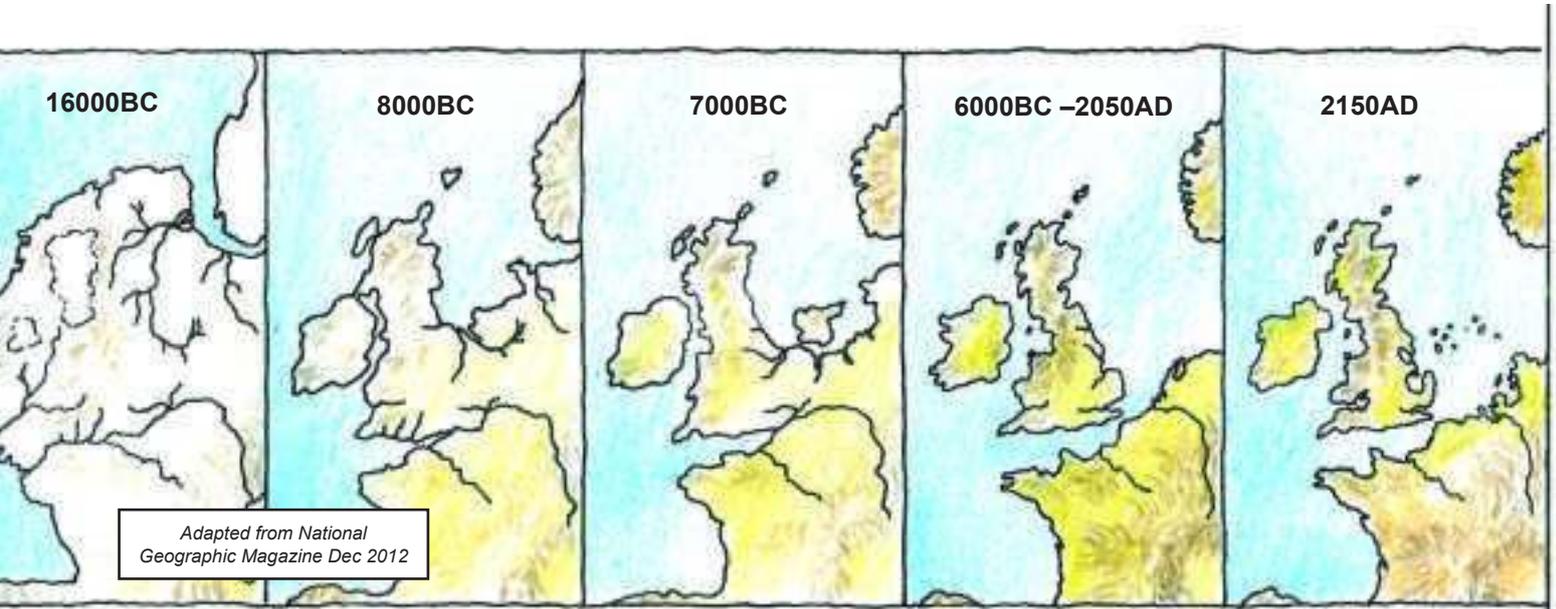


*It's quiet. No buses, no bikes, no tech. Silent. The trickling of water catches my attention. I tread carefully. "Who's there? No answer. "Hello?" Still no answer. A fluttering of wings – it was just a bird.*

*The storm has been and gone. I watch as a distant stream of refugees wind their way up towards higher ground.*

You've no doubt noticed that we're proud of Elmet's sustainable society. We've achieved a huge amount, but great challenges remain. The Big Shift took just a little too long (although as always we have to remember it's amazing that it happened at all). We reached zero emissions a few decades too late to avoid a temperature rise of less than 2°C. It remains to be seen whether, with our carbon capture technologies, we'll be able to keep positive feedbacks in check (that is, to prevent runaway global warming). The danger is not a slow buildup of problems; we know that instead earth systems can respond by lurching into a new state—like the abrupt differences between Ice Ages and warm periods. Although we've managed to stabilise greenhouse gases, and they fell quite rapidly after the Big Shift, it will be hundreds or even thousands of years before they decline to pre-Ascent levels. The next hundred years are crucial in many ways. One tipping point that has definitely occurred as a legacy of the Age of Energy Ascent is ice sheet melt leading to sea level rise.

*Below: Timeline of sea level rise in Northwest Europe. Note that between roughly 6000BC and 2050AD sea level was stable. In that time, humans went from being farmers and hunters to living in skyscrapers and walking on the moon. Stable conditions were vital for stable societies. It is likely that full ice melt is now inevitable, and will probably take an equivalent amount of time. So for the period 2050AD—10,000AD humans will have to deal with ever increasing sea levels—a moving target. Do you evacuate coastal towns now, or in a hundred years? Human societies will have to constantly adapt.*



## Climate and Sea Level

*"The danger lies in those places we aren't looking, because we don't have the imagination to look"*  
Paulo Bacigalupi

In the late 20th Century when climate change first attracted attention, films and stories focused on the entire world's landmasses being drowned. People's imaginations were captured by tsunamis, storm-surges, and apocalyptic destruction. Science fiction writers imagined underwater living pods and Seabed Cities.

The reality was very different.

In the first half of the 21st Century the impacts from climate change were revealed to be much more complex than anyone had imagined, and taking place far more quickly. Huge efforts were made by scientists to constantly improve the predictions of their computer models, through rapidly growing understanding of climate processes. Much knowledge was gained by a comparison with the rapid warming at the end of the last Ice Age (see below).

By the mid-21st Century, decades of observation and improvements in computational power meant that the gap between models and real-world changes had in most cases vanished. The consensus from the 2000s through to 2050 was that sea level rise would be around half a metre by 2100. A metre or so at worst.

Although this seemed small to some, it still meant that hundreds of millions of people were displaced from low-lying areas across the globe.

The unprecedented bursting of a giant sub-surface lake in East Antarctica put paid to previous confidence. From that date, a cascade of changes guaranteed catastrophic sea level rises within decades rather than hundreds of years as previously thought.

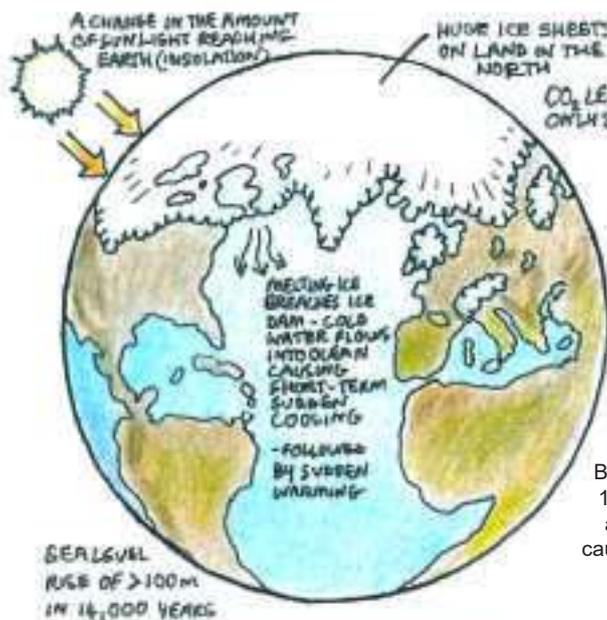
It is true there were many instances of terrible impacts earlier on, including Miami in 2018, but this was in a different league. Day after day, year after year, communities in low-lying areas found themselves under siege from the rapidly rising waters. Storms consolidated the rise...2m was reached by the end of the century, with another 2m in the next forty years.

In the UNK, the timing was bad. In 2093, as a result of the Sea King disorders, work on the Humber and Wash barrages was abandoned, and the sea flooded in to form the Bay. A new ecosystem had been formed.

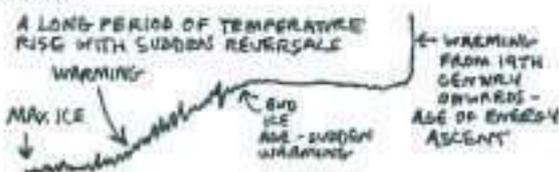
Sea level rise is, however, not the worst problem associated with climate change—it is just easier to comprehend. For example, ocean acidification and the breakdown of oceanic ecosystems is perhaps a more insidious threat. In principle, we can cope with sea level rise. We can deal with mass migration, with floods and droughts. We have no means of surviving fundamental change within the global oceanic system.

## End of the Ice Age

Greenhouse gases contributed only around a third of warming. Orbital forcing triggers deglaciation 19,000 years ago, greenhouse effect noticeable 17,000 years ago.

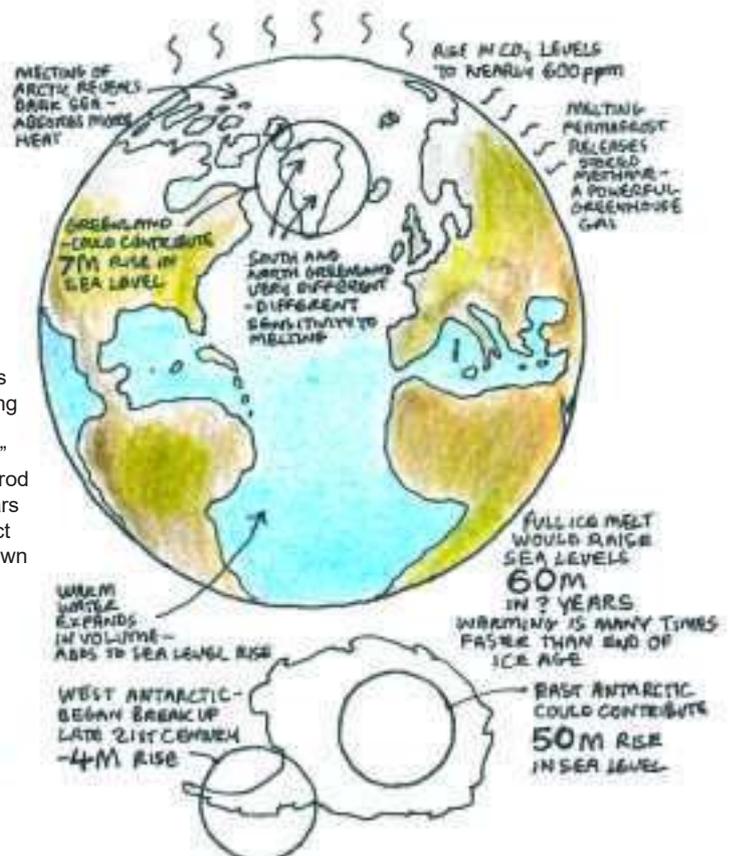


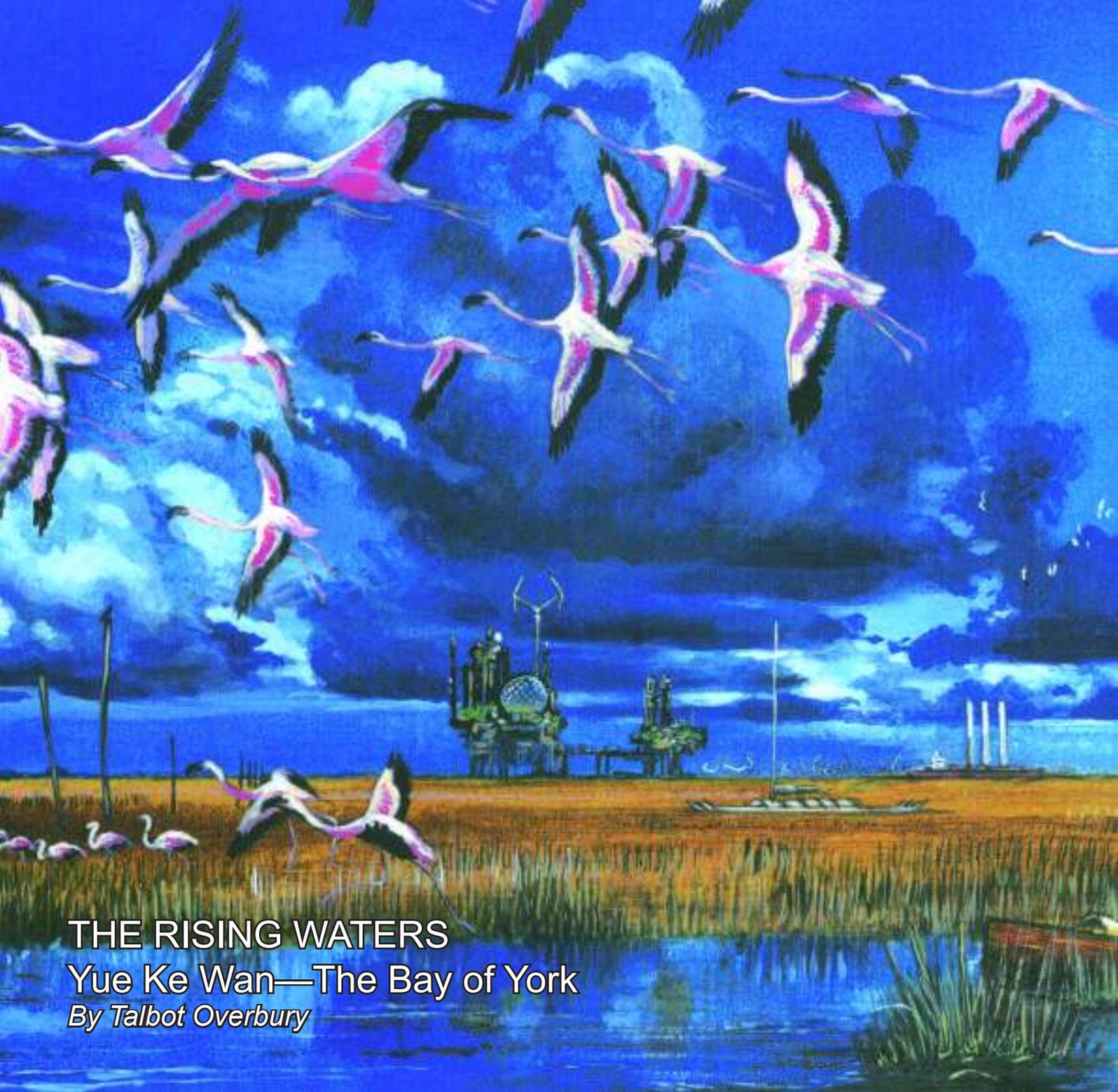
4-5 degrees of warming "within decades" Bolling-Allerod 14,600 years ago—exact cause unknown



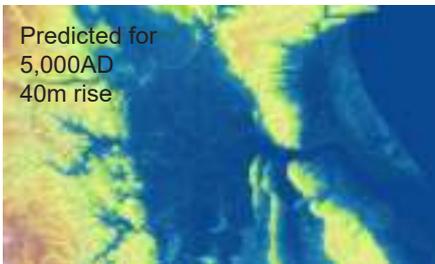
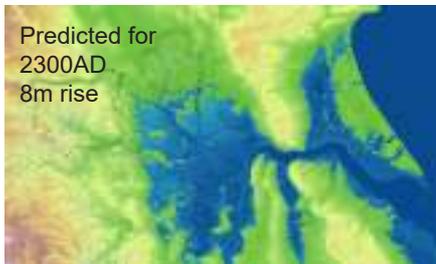
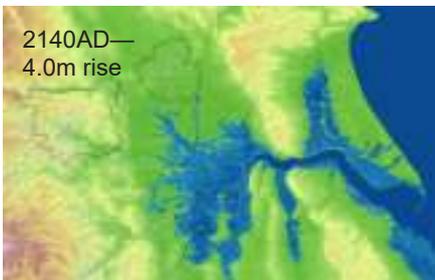
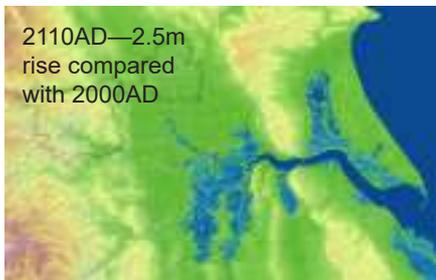
## Post-2000AD

Antarctic could contribute 3m over 340 years. 1.3m over 150 years. Plus Greenland = 1-2m = 3m in total. Thwaites Glacier possibly 0.5m—non linear effects—rapid changes.





**THE RISING WATERS**  
**Yue Ke Wan—The Bay of York**  
*By Talbot Overbury*





*Like a living dawn, greater flamingos rise above the western end of the Bay within the nature reserve. The shy birds seek out brackish ponds where they feast on plankton and bottom-dwelling organisms. In spring, some 2,000 migrants from Southern France join the hundreds of permanent residents in this, the second largest flamingo colony in North Europe after the Wash. By June, the Bay begins to dry, with eutrophication sometimes causing mass die-offs of fish and other wildlife*

**“As our Permaculture principles state: you have to think landscape-scale:**

Wild birds have large reproductive potential—but large numbers in one place doesn't mean large numbers globally. Management over whole landscapes is needed—including monitoring across the UNK using the Earthcorps cadets”

So says George Durayh, an emeritus professor of terotechnology (maintenance engineering), looking out over the Bay. By the 2120s the new ecosystem of the Bay was being threatened by proposed barrages and reclamation schemes, as well as sprawling Sea King settlements

Durayh, from Scarborough, moved to York to set up a business in the York area, but fell in love with the Bay. Where others saw a land ripe for development, Durayh saw a geographically peculiar and biologically diverse treasure.

“The idea of creating a national park in the Bay had been circulating even before Mayor Chimalagi's appointment, but no one was taking any action. I helped establish the Bay Marine Reserve Association, under the auspices of the UNK SPB.”

In fact, he became its tireless, stubborn, single-minded director. Durayh became a missionary for the park project, spreading his gospel to anyone who would listen.

He envisaged a national park extending from the barrier islands of Hornsea and Wolds Island north to York and south to Doncaster – more than a million acres that would make the Bay the largest marine reserve in the U.N.K. Durayh's plan, which antagonised too many people, wasn't implemented, but it proved to be prophetic. When Mayor Chimalagi dedicated the Bay Marine Reserve in 2137, the barrier islands were excluded; ten years later the colonials made the area a national park.



Left: Otlaadisa Mahmud, an octogenarian living on Hornsea Island, likes to watch fast sailing ships – Kitejammers - leaving for PanArctica from her beach home – a small dwelling made from reclaimed materials such as Driftplastic.

One focal point of the aesthetic is a huge window (almost an entire wall) made from recycled glass – like a stained glass window in a church, the design depicting a beautiful shoal of fish speaks of the veneration of sea life. A greater respect for the vast power of Mother Oceania has recently inspired a resurgence in water deities rather than the sky gods of the Age of Energy Ascent.

Below: “Use Edges, Value the Marginal”: Seaweed harvesters near Beverley, East Elmet. Most of the surrounding area having been submerged over the course of the past century, and having suffered more than most from Sea King troubles, a new economy has emerged based on settlers making a living from shallow-marine ecosystems.

Ocean acidification has caused many problems but at least within the Bay and Barrier Islands technologies that reduce acidification have made some progress in preserving stocks of bivalves such as mussels. Purifying stations use genetically modified algae and bacterial cultures to rid the water of heavy metal pollutants and radiation.

Life on these small islands is quiet now – most citizens moved to cities for protection when coastal areas became more risky to live on at the turn of the century. Restoration has been slow.



The Bay National Park is now a huge avian sanctuary. Different degrees of salinity create a choice of habitats for Sea Eagles, Eurasian cranes, Great Egrets, Spoonbills, Little Bittern, Bluethroat, Black Kite, Marsh Harrier, Teal, Gadwall, Flamingos, Avocet, Whiskered Tern, Penduline Tit and Kingfishers among many others.





*The famous Inn on the Bay, above, established 2113, is a major draw for tourists and meeting place for young and old*



## The Inn on the Bay



lat Chong “Larry” Goodwood’s ancestors moved to the then Vale of York some 100 years ago.

Over the latter half of the 21st century extreme weather had become normal for the UK, with disasters coming too thick and fast for many communities to recover in between. However, the low pressure which hit the evening of 2nd March 2081 was exceptional even by modern standards; it was made much worse by the spring tide which happened to coincide with the storm. It was about 3 am when the combination of river flow and sea water broke through the levees, engulfing thousands of homes. In his view Larry’s family were “appropriately prepared” however. Foreseeing that the great flood may one day arrive the Goodwoods had been in the forefront of designing modular floating communities. Their experimental community rode out the flood, merely having the inconvenience of tidying the gardens afterwards.

The waters in the Vale of York retreated but soon returned and within 20 years the Vale of York was no more, replaced by intertidal salt marshes and eventually continuous water. Larry still resides on a large and rather impressive floating complex built by his family following the great floods. He explains:

“I’ve lived in other locations but the Bay of York is in my mind a magical location and the place I feel most at home. It’s such a calm, beautiful, place and after the eventual construction of the tidal boom at the mouth of the bay (the Humber Gateway) which single-handedly meets the whole area’s energy demand, the waters are almost always millpond smooth. The quiet tranquillity

offered by this location is almost unmatched—unlike the dense urban areas of Elmet. DREAM holidays are ok when you have enough credit, but people want real-life beauty. It is a combination of the quiet and the astounding bird life which I think attracts people to the area”.

While the restaurant and hotel provide Larry and his family with all their needs, his real calling is permaculture of the aquatic variety, and it is through the restaurant that he can indulge this passion. All the food is produced within the Bay of York and surrounding marshes, mostly in the form of exotic algae and jellyfish grown in Larry’s submarine farms which flank the complex. Larry has always been enchanted with this form of permaculture ever since he can remember and spends almost all of this time developing new strains of algae with different tastes and textures to serve to his guests, in combination with the best of Sea King cuisine. It is for this reason, and also the nightly Catatumbo lightning show, that guests flock from far and wide to dine at the complex.

The fame of the restaurant and hotel has now provided Larry with a platform to promote the floating settlement concept and the idea that simply larger and larger levees and dykes cannot overcome nature. He regularly dines influential leaders who flock to his complex to sample the exquisite food and better understand his approach. As he says:

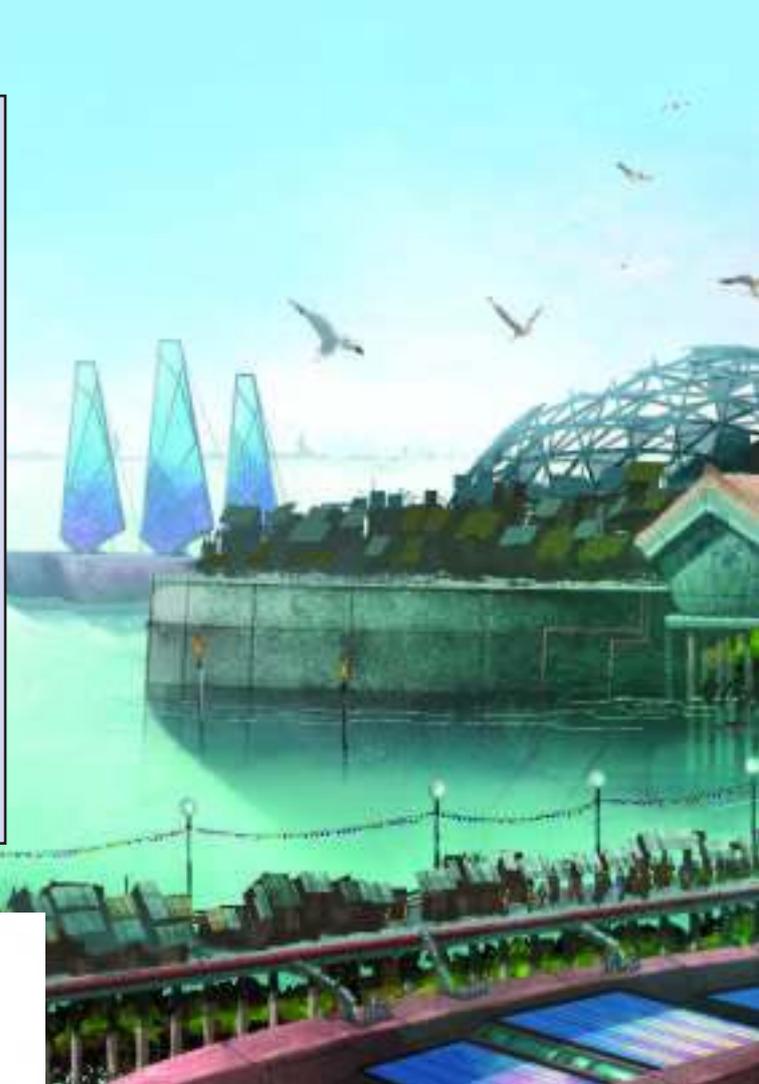
“Aquatic permaculture is the future. My algae farms require little in the way of input and produce vastly greater yields of food than even the once highly productive soils of the Vale of York”.

## The Da Hai You Min (Sea Kings)

Permaculture Principle: 'Creatively Use and Respond to Change'. One of the most serious impacts of climate change during the 'Wobble' was the mass movement of people from Southern Europe and the Middle East, their poor treatment and the resulting destabilisation of communities in Northern Europe. In Elmet, billeting of refugees with native families, under the auspices of the UNOColonial authorities, was the preferred option. In some areas this worked well, but in many others there were protests—often the refugees were billeted with those least able to cope. By the early 22nd Century, a more stable and dynamic society had formed, and the bad old days had faded from memory.

Now some of these communities are flourishing, and have developed a unique cosmopolitan culture (indeed, some have become tourist destinations in their own right).

Many people think of the Sea Kings as a single group. In fact, they comprise a combination of deprived recently-arrived refugees living on floating hulks out in the North Sea, settled communities living among the experimentals of the Dales, high-tech micro-states, and the true Da Hai You Min—the Bay of York and Doggerland West communities.



Above: Morning light picks out VAWTS (vertical axis wind turbines) surrounding a Da Hai You Min settlement—Drax Chikshuj—a key hydropolis settlement in the southern area of the Bay.



Phaedra Flit, aged 12, talks about her home on the Bay.

"I live in the Arachnas-Kychy. Many years ago, due to global warming, the levels of the sea rose, and we had to find new ways of surviving. My people built a spider's web of kibbutz hydropolis islands – chikshuj - each with its own purpose:

The central island is where we harvest our energy. We have smart SOVAWTs (Solar vertical axis wind turbines) that turn to face the sun throughout the day, to collect as much energy as possible, and these also desalinate seawater.

The next circle of floating islands are 'home domes'. They are scattered with tinted geodesic domes made from solar-thermic glass that filters out UV, but still collects the energy. The individual triangles of glass automatically turn towards the sun to collect energy. It is said that from space, the home domes would look like giant dewdrops in a spiders web.

The outside ring is for permaculture and manufacturing, things like bee skeps, metalworking shops, desalination. All these islands are connected by PELAMIS booms and sub-surface turbines. In a storm, gyroscopes in the bases of the domes keep them steady and they ride out the waves. Everything is built from recycled Driftplas.

We eat lots of fish and exotic fruit and veg grown in the hot domes. Most of our plants are grown hydroponically underwater and we're famous for our sehkachb (bivalve) farms. We don't eat vertebrate or dairy products as it would take up valuable resources. We keep bees of course. Birds eggs (made into the classic dish beshkich) come from the wildfowl islands (with occasional poaching from the Marine SSSI).

Every day we do a different job, whether it is teaching children how to work in the domes, grinding flour or supervising the turbines. If one person is especially good at their job, they become a teacher to those who take longer to learn.

We may seem advanced, but some aspects of life are basic, like medical care. In comparison to Elmet, people have shorter life spans but happier lives.

From a world where everyone could be your enemy, we have become a symbiotic society where not only is everyone equal, but we rely and depend on each other – we couldn't survive otherwise. Picture a camping trip: everyone relies on each other's skills and equipment to survive, no-one can possibly carry everything they need to keep going." As Sea Kings say "if you want to walk fast, walk alone. If you want to walk far, walk together".



There are clouds on the horizon though. The Da Hai You Min are often threatened by Triad gangs; in the Bay of York area this includes the Red Kites and the Sons of Fire. It is believed that the notorious gang leader Sar-Zhen O'Byrne is behind recent problems.

*Right: A Da Hai You Min (Sea Kings) family make an evening meal in one of their floating settlements around Hull as Catutumbo lightning flickers over the Bay. Two little girls play on the floating barge garden (chinampas/hugelkultur—seaweed based agriculture) outside.*



*Below: This particular chikshuj generates some power through heat-stacks which exploit the geothermal temperature differential of the foundation reef of Barlow Mound, central Bay area.*



# Live Simply so Others may Simply Live

A new religion of regeneration for the UNK?

*Conversation with an adept*

By Harjeet Overbury



## ***Tell us about your religion...***

The religion is strange because its origin cannot be traced back to any one person, although it was prefigured by Arne Naess' Deep Ecology movement. I suppose the most tangible thing we can point to was the 1968 view of Earth from the Moon – the famous Earthrise photo, that showed how alone we are in the Universe, and how vulnerable, at the same time as the fact that we're all one family. Human beings are merely one of an enormous number of created beings all of which are woven together in the vast tapestry of life, with ties of kinship that stretch back into the mists of Deep Time.

The religion does not promise reward of everlasting life (at least not in the way of many previous religions). There is no anthropomorphic 'god' that is worshipped. People talk about the religion but do not proselytise. People appear to take up the religion with no human prompting, but it seems to occur most often in people who spend a lot of time in the 'new' forests, or around the many lakes and rivers springing up. Luther Standing Bear said "Every act in life is a religious act. We recognise the spirit in all creation, and draw from it spiritual power. The elements and majestic forces in nature – lightning, wind, water, fire, frost – are regarded with awe as spiritual powers. Spirit (or 'breath') pervades all of creation and every creature possesses a soul."

It's a simple religion – spend your time undoing human damage; regenerate the world; avoid excessive reproduction; leave this life when you feel the time is right, and in a way that will leave your body fit for animals to eat, or to fertilise the land. The followers do not seem to feel fear or doubt, but rather increasing excitement as the time of leaving approaches.

## ***Which 'human damage' do followers spend their time undoing?***

Humans recognised that though we exceeded the carrying capacity of the planet during the Age of Energy Ascent, we can't reduce our population except very slowly. There are billions of us. We all have a responsibility to generate life rather than take it. The economic system in the Age of Energy Ascent turned living systems into garbage. Our new systems are designed instead to promote life. Cleaning the plastic and other garbage out of the sea, digging up concrete and tarmac and planting trees to finish the job, dismantling dams, reintroducing locally extinct animals and plants (rewilding), guarding against overconfidence in genetic engineering... Wow – there's a lot to be done!

## Evergreen By Joe Nodus\*

Rhododendron and holly leaves; shroud, leaf-mould,  
ever-green;

Bare trees, reach, high above; moss capped rock.

Rosehip, and pink berries; spot, ivy-clad escarpment,  
water flows; beside, the path.

Clouds come from ocean; river from clouds;  
cycle unbroken; ever new.

River, relentless; as time;  
estuary like entry; to real life

Fish, to sea; we progress;  
to the limitless.

Beyond changing nature;  
vapour, condensation;

sadness, gladness,  
Summer, Winter.

Mortal feelings  
come and go;  
deciduously.

Love Supreme;  
Evergreen.



\*the famous "Pilgrim Poet" of Elmet

# LEAVING FOR PANARCTICA

*Below: Embarkation at Port-of-Beverley*

## Elmet among others:

Before we finish our tour of Elmet and journey onwards, it's worth considering for a moment how Elmet compares to the other groups and societies we met.

What is our response to those who advocate a different lifestyle?

Why exactly is Elmet a good place to live?

Can Elmet be a truly sustainable culture?

We advise you to devise your own DREAM and always keep exploring.

As Guru Fukuoka said: *"Before researchers become researchers, they should become philosophers. They should consider what the human goal is, what it is that humanity should create."*

They know they are unlikely to see the UNK again. Passengers boarding the U.N.K. Nansen at Beverley October 27th 2050, for the voyage to Nuuk, Greenland, are fully aware that a hard life awaits them in the new North, but they are full of hope.



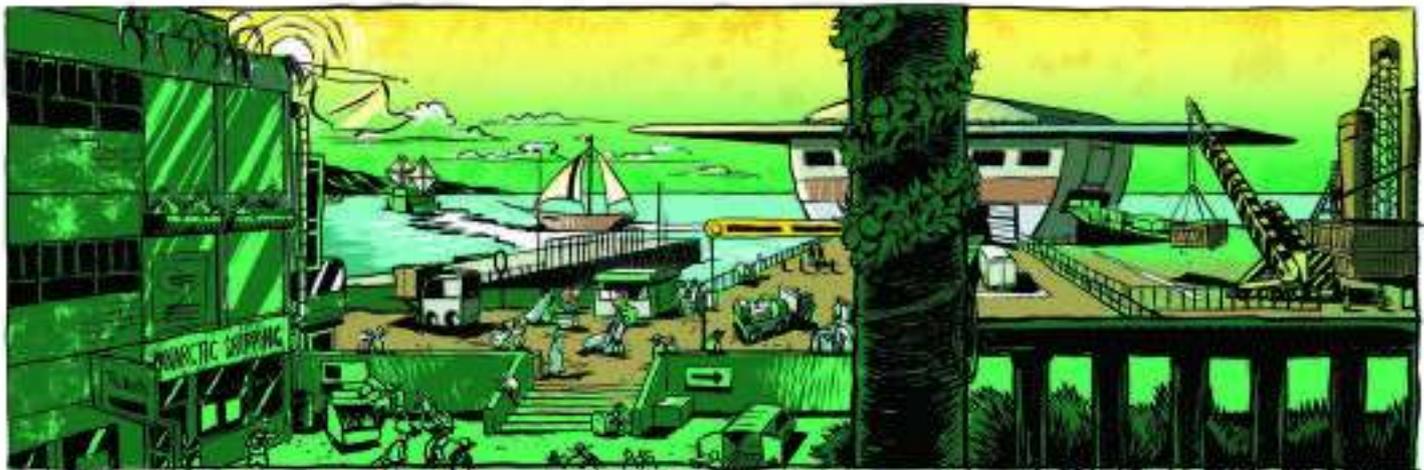
NW Europe and Arctic



*PanArctica is loosely the region opened up by the thawing Arctic, but also the nation state of the same name comprising northern Siberia, Canada, Greenland and Arctic Sea islands. The Arctic Sea sometimes freezes over for several months in winter, making travel dangerous. In comparison to the conditions prevailing for most of the past few million years, this is balmy. The melting ice sheets have allowed settlement along the west coast of Greenland, northern Canada and elsewhere. The new lands exposed by retreating ice are*

*hostile, lacking soil and fresh water, and subject to massive changes - permafrost thaws inducing sinkholes, coastal erosion and carbon and methane releases. Not least, it is dark for several months of the year. It is possible that the methane releases could overtake all our efforts to stabilise the climate and they represent a menacing threat. At the moment, however, capture and storage technologies are managing to keep the situation just about under control, and colonisation of the new lands in the north proceeds apace.*



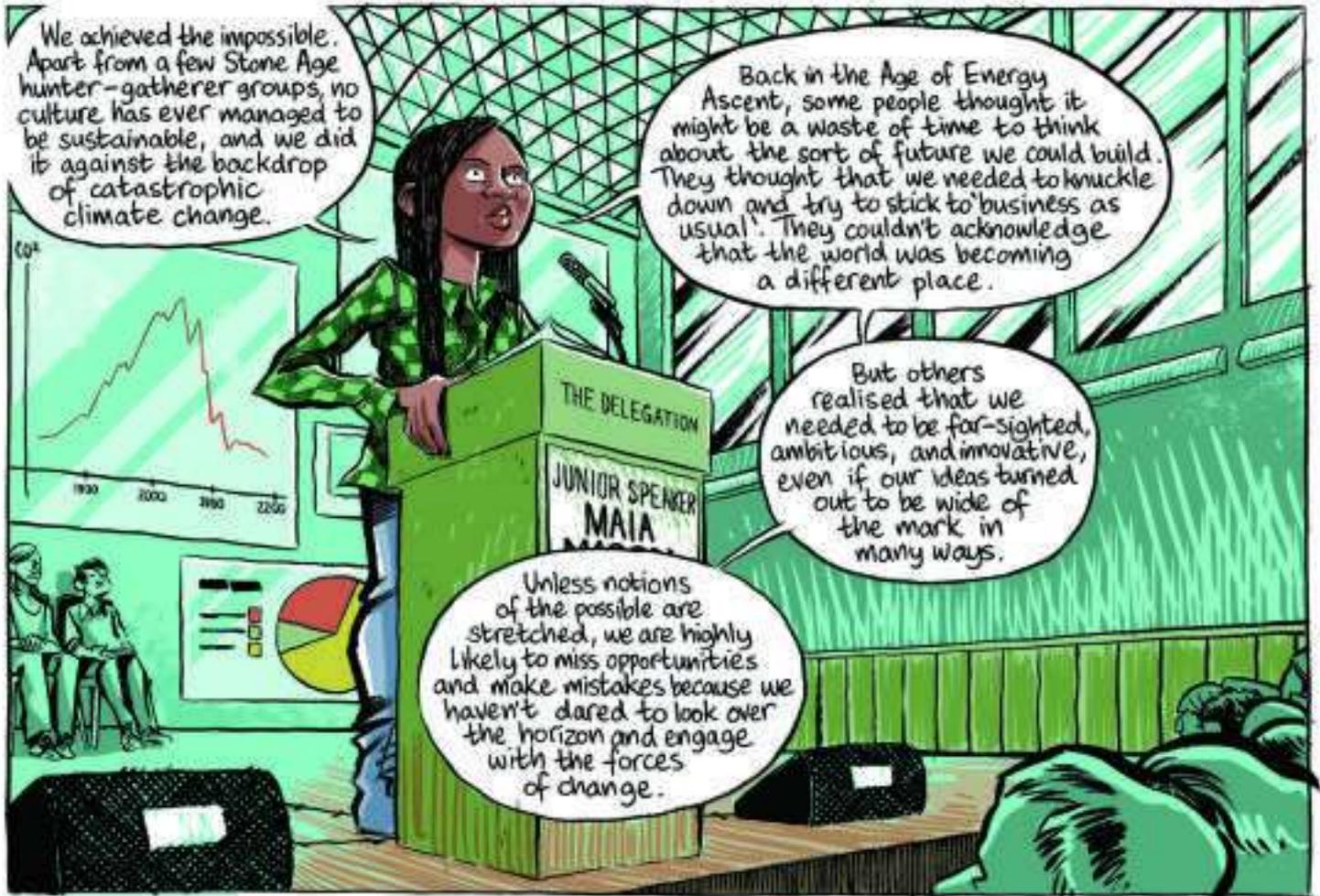




But promise that you'll write to me about Ponarctica.



I want to know everything.



We achieved the impossible. Apart from a few Stone Age hunter-gatherer groups, no culture has ever managed to be sustainable, and we did it against the backdrop of catastrophic climate change.

Back in the Age of Energy Ascent, some people thought it might be a waste of time to think about the sort of future we could build. They thought that we needed to knuckle down and try to stick to 'business as usual'. They couldn't acknowledge that the world was becoming a different place.

But others realised that we needed to be far-sighted, ambitious, and innovative, even if our ideas turned out to be wide of the mark in many ways.

Unless notions of the possible are stretched, we are highly likely to miss opportunities and make mistakes because we haven't dared to look over the horizon and engage with the forces of change.



People are always resistant to change, but it happens anyway. Better to steer towards the future with open eyes than to be swept towards it with blinkers on.

CO<sub>2</sub> levels are starting to level off and the world is regenerating. Elmet is such a wonderful place to live, to work, and to be, and this was thanks to people like my great-great-grandfather Kingsley, those people living during the Big Shift who were pulled forward by a clear and compelling vision.

WOOO SSSSH!!

## TIMELINE OF THE ENERGY ASCENT

1600 – Start of the Anthropocene (1st occurrence of maize pollen from the New World in European sediments, dip in CO<sub>2</sub> due to re-growth of American forests)  
1698 – First steam engine – Thomas Savery Steam Pump  
1712—Newcomen Steam Engine used to pump water from a mine at Dudley Castle, Staffordshire  
1769 – James Watt steam engine  
1770 – Enclosures Act  
1772—Joseph Priestley of Leeds, UK, discovers biological CO<sub>2</sub> Cycle  
1776 – Adam Smith writes ‘The Wealth of Nations’, James Watt 1st commercial steam engine  
1789 – French Revolution  
1801 – First demonstration of steam transport  
1816—The year without a summer—global temperature dip causing famines as a result of Tambora volcanic eruption  
1829 – Rocket Steam Engine  
1842—Experiments with electric cars  
1844—Rochdale Society of Equitable Pioneers—1st Co-operative  
1848 – Revolutions and Karl Marx ‘The Communist Manifesto’  
1859 – Darwin ‘Origin of Species’  
1859 – Edwin Drake drills for oil, Titusville Pennsylvania  
1860s – John Tyndall recognises greenhouse effect  
1860s – First bicycles, steam cars

## TIMELINE OF THE ENERGY DESCENT

2025 – Wem Sheekes ‘Notes on What’s What’ - Great Famine occurs. ‘Declaration of Interdependence’ and introduction of global carbon tax.  
2026- Construction of first offshore artificial island as micro country off mainland US- develops into pirate state  
2028 – US civil war triggered by 3-day blackout on East Coast. Nuclear disaster during war; secession of Texas and California  
2030 – UN Re-Wilding Act & European Energy Union completed; peak phosphorus  
2031-2040 – Thousand Flowers movement established in China  
2035 – First full-scale floating cities Rotterdam & New Orleans  
2038—Chinese abandon moon mining  
2040s – Re-wilding of UK, Amazon reforestation; space-based solar arrays established  
2045 – Greenland ice-sheet collapse, sub-ice lake burst in East Antarctica  
2047 – Abuja nuclear disaster  
2042 – Mars Mission discovers fossilised life. Global Earth Observation System completed.  
2045—Extinction of tigers in wild. Wolves

1866 – First Atlantic Telegraph Cable laid  
1870— Rockefeller founds Standard Oil company  
1881—World’s first electricity supply driven by water wheel—Godalming, Surrey, UK  
1886 – First motorcar  
1890s – First long distance AC transmission, electric trams replace horse transport in US  
1896 – Svante Arrhenius theorises that humans are causing climate change  
1903 – First heavier than air flight – Wright Brothers  
1913—Haber-Bosch Process first used commercially to produce ammonia fertiliser (the ‘detonator of the population explosion’)  
1914 – Outbreak of World War I  
1933 – Hitler comes to power in Germany  
1939—Outbreak of World War II  
1942—Beveridge introduces rationing during WWII  
1943 – Battle of Stalingrad – Hitler fails to gain access to Soviet oil—a major factor in the defeat of Nazi Germany. Development of Fischer-Tropsch process (synthetic gas from coal) as a replacement  
1948 – Welfare State in UK (National Health service creation)  
1951 – UK Clean Air Act  
1957—Windscale and Kyshtym nuclear accidents  
1958 – Measurements of rising carbon dioxide in atmosphere(Keeling Curve)  
1960s – Green Revolution—new miracle crops  
1962—Rachel Carson ‘Silent Spring’

reintroduced to UK  
2046 – Middle East famine  
2050s – The ‘Wobble’, mass migration from Mediterranean, Russia & significant sea level rise; Billeting Act  
2051—Submarine nuclear disaster in English Channel—parts of Southern England and Northern France evacuated (Exclusion Zone)  
2055 – Grid crash, development of Tech hubs and Arcologies.  
2050s—Bioenergy CCS established on a huge scale—begins to draw significant CO<sub>2</sub> out of atmosphere  
2060s – Major expansion of sustainable food production in Africa through Thousand Flowers movement—Golden Rice converted to a C4 plant  
2061—Lagos Earth Summit, Saharopean Energy Union  
2069 – Last petrol cars  
2070s – Artificial photosynthesis commercially available; global population begins to decline  
2074 – last regular conventional aeroplane flights  
2075 – Doggerland incident—refugee crisis  
2076— Human-level machine intelligence arrives, start of DREAM  
2081 – Floods, Thames Barrier fails, Hull

1968 – Earth rise photograph  
1960s—UK conversion from town gas (made from coal) to natural gas (from new North Sea sources)  
1973 – OPEC oil crisis and Peak Oil for USA reserves  
1979—Three Mile Island nuclear accident  
1980s – Thatcher and Reagan – neoliberal policies  
1986—Chernobyl nuclear disaster  
1988 – Hansen testimony on climate change Toronto World conference on Changing Atmosphere:  
“Humanity is conducting an unintended uncontrolled globally pervasive experiment whose ultimate consequences could be second only to global nuclear war”  
1989—Montreal Protocol limits CFCs  
1991 – Fall of USSR  
1992 – Rio Earth Summit  
1990s – Cubans adapt to fossil fuels being cut off  
2001 – 9/11 attacks, start of War on Terror  
2000s – Peak Oil (from conventional sources)  
2010s – Floods in UK attributed to climate change  
2011—Fukushima nuclear disaster  
2015 – Paris protocol on Climate Change— aim to limit global warming to 1.5°C rise  
2015—Slump in oil prices  
2016—Grid parity for photovoltaics across most of EU  
2018 – Miami Wipeout  
2023—Oil and gas prices shoot up and hit highest point

flooded  
2080s—Founding of PanArctica—union of Svalbard, Greenland and Novaya Zemla  
2080s—rise of ‘Live Simply so others may simply live’  
2093 – Sea Kings disorder  
2090s - near zero carbon emissions achieved for the first time  
2090s - Hekla eruption, Big Freeze, Foot and Mouth. Norway and Iceland devastated after being dominant in Big Shift  
2103 – ‘Gojira’ earthquake destroys Tokyo  
2110—AfroSindian Alliance restores order, reconstruction under UNOColonial government; Biopylons widely deployed  
2114 – Further flooding, formation of Bay of York. Hull barrage fails  
2120s—Floating settlements established in the area of Hull and Bay of York. Building of Port of Beverley  
2130s—Forest cover reaches over 50% in Pennines  
2139 – PanArctica gold rush – mass migration  
2147—Bay of York National Park created  
2148— Record of 2 consecutive decades of declining CO<sub>2</sub> levels

## Glossary

- **Anti-fragile**-Concept taken from the book 'Anti-Fragile' by Nassim Taleb: not just robust, but actually growing stronger under stress, as, for example, bones do.
- **Aquaponics**-A combination of aquaculture (farming of aquatic animals, e.g. fish) and hydroponics (growing plants in water). The aquatic waste feeds the plants and the plants provide a filter for the aquatic life to live in; they form an integrated system.
- **Arcology**-Derived from the words 'architecture' and 'ecology', this concept refers to a self-sustaining city that is designed as a densely populated, eco-friendly community.
- **Biochar**-A solid material obtained from pyrolysis of biomass that can be added to soils, improving fertility, drainage and carbon storage.
- **Biodiversity**-The variety of all living things, including plants, animals, microorganisms and how they relate to one another. Maintaining biodiversity ensures clean air, water and fertile soils and is the foundation of the healthy, functioning ecosystems upon which all life depends.
- **Biomass** -Organic material made from plants and animals, containing stored energy from the sun. Biomass is a renewable energy source because we can keep growing more trees and crops. Examples are wood, manure and seaweed.
- **Biopylon**-In this book: a giant artificial photosynthesis structure.
- **Bulrushes**-In this book, a type of wind-generating device that resembles a giant field of reeds.
- **Capitalism**-A social, political and economic system where a country's trade and industry are controlled by individuals, rather than by the government. Examples of things that individuals and companies own in a capitalist society are land, oil and factories.
- **Carbon Capture and Storage**-Carbon dioxide from power stations and factories is captured and sent through a pipeline to underground rock formations where it can be stored safely and permanently (in theory anyway).
- **Carbon Cycle**-Carbon is a key component of living systems, and cycles in and out of the atmosphere. Throughout the earth's history, it has fluctuated and extinctions have occurred when there have been anomalies.
- **Catchment**- The area of land drained by a river and its tributaries.
- **Civilisation**-A society with complex legal, political and religious organizations and division of labour. All civilisations so far have been unsustainable because they require the importation of raw materials.
- **Climate**- The average of the weather over the long term e.g. the UK has a cooler climate than Brazil, despite the fact that on a given day, it might be hotter in the UK than Brazil.
- **Cloud Shepherd**-In this book: a solar-powered airship
- **Coal**-A fossil fuel formed from land plants which are buried and transformed over millions of years by heat and pressure.
- **Communism**- A social, political and economic system where property, land, oil, etc. are owned by the community as a whole, or the government.
- **Desalination**- Processes that remove salt and minerals from sea water so that it is safe for drinking and for industrial use.
- **DREAM**-In this book: An immersive Virtual Reality experience that pervades life in many ways, for example in learning (children can enter past worlds). Regulates many aspects of the bioeconomy.
- **Dryad**- In this book: a plant-based robot, used as 'guardians' of children's forests.
- **Dystopia**-This is the opposite of Utopia, an unsustainable society where the majority of people lead miserable lives. Within a dystopia, it's possible that a few people (the wealthiest) may have a very pleasant life (for a short time) by using everything for themselves, while others miss out.
- **Economy**-This comes from the Greek words 'oikos' (home) and 'nomos' (management) that is, managing the affairs of your home. The buying and selling of products and services make up an economy.
- **Ecosystem**-Also derives from 'oikos' - our 'home' system. The plants and animals that are found in a particular location are referred to as an ecosystem. These plants and animals depend on each other to survive. Obviously an 'economy' must be part of an 'ecosystem', but this is not the case at present where the economy is instead destroying ecosystems.
- **Ecosystem Services** -Beneficial services provided to humans by natural systems - clean air, water, decomposition of waste, regulation of climate. Includes spiritual and cultural benefits.
- **Energy**- Energy is defined as the ability to do work. It is what moves cars along the road and makes aeroplanes fly. Energy is needed for our bodies so that we can grow and move about and also for plants so they can make flowers and fruit. Energy demand is the amount of energy needed to do things. Lowering global energy demand may be vital to the prevention of further climate change.
- **Energy Storage**-Energy can be stored for use at a later time. A wind-up clock stores potential energy (in this case mechanical, in the spring tension).
- **Eutrophication**- dense growth of plant life in an aquatic environment e.g. algae following pollution by excess nutrients from agriculture.
- **Evapotranspiration**-The process that involves water evaporating from soil and plants into the atmosphere. It is integral to the water cycle.
- **Extractivism**-A way of life based around the extraction of natural resources, such as fossil fuels, minerals, and timber.
- **Fossil Fuels**-Coal, oil and gas, made from the remains of ancient organisms that captured sunlight through photosynthesis, then were buried.
- **Fuel Cells** -Cells that produce electricity by oxidation of fuel (hydrogen and oxygen or zinc and air); for use in electric cars and smaller gadgets e.g. mobile phones.
- **Geoengineering**-Large scale alterations to the planet, for example, restoring forests to increase the amount of carbon drawn from the atmosphere.

- **Green Roof** - A roof of a building which is partially or completely covered with plants. This acts to regulate the building's temperature, air quality, and also provide a habitat for some plants and animals.
- **Haber-Bosch Process**-This process is the primary technique for producing ammonia (a compound of nitrogen and hydrogen). This artificial nitrogen fixation process was developed by German chemists Fritz Haber and Carl Bosch.
- **Hydrogen Energy**-Hydrogen can be used as an alternative fuel to power vehicles, or devices like mobile phones. Hydrogen fuel cells (batteries) make electricity. They are very efficient, but expensive to build. When hydrogen is used for fuel in a car, water comes out of the exhaust pipe instead of harmful chemicals.
- **Hydropolis**-In this book, a floating settlement.
- **Hydroponics**- Growing plants in water using mineral nutrient solutions, without the use of soil.
- **Hydropower**-Generating energy through the power of water e.g. using dams and turbines.
- **Jragh Fligh**-In this book: an observation drone linked to the operator's visual cortex via a DREAM interface
- **Meanwhile Space**- Use of land and buildings to provide sought-after space for communal activities, such as pop-up allotments, areas for community projects or exhibitions.
- **Merantau**- An Indonesian concept: young people go off to seek their fortune, before returning to bring the benefits back to their community.
- **Microalgae** -There are several groups similar to vascular plants called microalgae. Just like seaweed, microalgae lack true leaves, roots, flowers, and other structures. They can be utilised as a source of bioenergy that does not compete with land-based crops.
- **Monoculture** - In agriculture, growing a single crop over a large area. Vulnerable to disease, requiring huge energy and fertiliser inputs, but efficient at feeding large numbers of people.
- **Nuclear Fission**-Some atoms are unstable and split apart - termed nuclear fission. The energy released in most nuclear reactions is much larger than that for chemical reactions.
- **Nuclear Fusion** -This is a process in which two nuclei join to form a larger nucleus, thereby giving off energy. Nuclear fusion is the energy source which causes stars to "shine".
- **Oil** - A fossil fuel formed from marine micro-organisms like bacteria and phytoplankton which fall to the seabed and form a liquid trapped in layers of rock.
- **Permaculture**- From 'permanent' and 'agriculture' - agricultural systems that are designed to be self-sufficient and sustainable.
- **Photosynthesis**- The process used by plants and other organisms to convert energy from sunlight and carbon dioxide and water to make food. The food is made up of sugars and gives these plants and organisms energy to grow. Oxygen is given off as a waste product.
- **Phytoplankton**-Phytoplankton are microscopic plant life floating in surface waters and photosynthesising like land plants, capturing huge amounts of carbon dioxide from the atmosphere and providing a lot of our oxygen.
- **Polyculture**- The cultivation of several species of crops or animals in the same space. Polyculture tries to imitate nature by creating many layers, varying distances between one other, and different varieties of species in one place.
- **Polyopolis**-In this book, an urban area made up of many 'micro-cities' separated by green space.
- **Pumped Storage Power Station**-Here, water is stored behind a dam. When the water is released, it runs down pipes to turn a turbine. The turbine is connected to a generator to produce electricity. The water is then pumped back into the reservoir when there are periods of low power demand, for example when there is excess energy being produced by other power stations.
- **Pyrolysis**-Burning substances e.g. biomass in the absence of oxygen, creating products such as char, gas and oils
- **Resource**-A person, asset, material, or money which can be used to accomplish a goal. When parts of the world e.g. water, soil, fish stocks, plants and animals are regarded as a resource, it usually means they will be destroyed or not looked after.
- **Solar Energy**-Solar energy is the sun's rays (solar radiation) that reach the Earth. This energy can be converted into other forms of energy, such as heat and electricity.
- **Sustainability**-Usually meant in a positive way - to act in a way that doesn't regard the planet as a resource to be used up: "Meeting the needs of the present, without compromising the ability of future generations to meet their needs".
- **Tar Sands**-Also referred to as oil sand or bituminous sand, tar sands are a combination of clay, sand, water, and bitumen. Tar sands are mined for the oil rich bitumen which is refined into oil.
- **Thousand Flowers** - A concept taken from research into energy futures: a proposed future scenario where energy generation is decentralised. In this book, the idea has been expanded to cover areas other than energy.
- **Tidal Energy**-The moon's pull on the Earth results in tides; i.e. rises and falls in water level. There are several ways to turn this tidal energy into electricity, including tidal fences, tidal barrages (like dams) and tidal turbines. Each uses the movement of the tides to spin turbines, or electromechanical generators.
- **Torrefaction**- A process that converts biomass, e.g. wood, into a coal-like material, which has better fuel characteristics than the original biomass. Torrefaction is a mild pyrolysis and occurs at temperatures typically between 200 and 320°C.
- **Tything**- A historic legal, administrative or territorial unit - a grouping of ten households.
- **Utopia**- This is a society that is in perfect balance and harmony, where everyone's needs are met. For the purposes of this book, a utopia would be a sustainable society where humans are living in harmony with their surrounding ecosystem.
- **Weather**- Variations in environmental conditions from day to day (see Climate)
- **Wind Energy**-Like old fashioned windmills, today's wind turbines use blades to collect the wind's energy. The wind flows over the blades creating lift, just like aeroplane wings, which causes them to turn. The blades are connected to a drive shaft that turns an electric generator to produce electricity.



## KNOWLEDGE AND IMAGINATION RESOURCES (NON-FICTION)

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DECC Energy Futures Scenarios Calculator [http://www.100resilientcities.org/#/-/\\_/](http://www.100resilientcities.org/#/-/_/)

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## ARTISTS DETAILS

Jeffrey Linn (maps page 23/80)

[www.spatialities.com](http://www.spatialities.com)

Corban Wilkin (Maia comic strip)

[www.corbanwilkin.com](http://www.corbanwilkin.com)

Emma Chinnery (Permaculture comic)

[www.emmachinnery.com](http://www.emmachinnery.com)

Ben Dickson (Contents page)

[www.bendickson.co.uk](http://www.bendickson.co.uk)

Hannah McCann (page 80,82,84,87)

[www.behance.net/hannahmccann](http://www.behance.net/hannahmccann)

Mark Wilkinson (page 7, 49)

<https://inspiredartsuk.com>

John Swogger (page 74,76,84,85)

<http://johnswogger.wordpress.com>

Kirn Jutlla (page 38)

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James Mckay (cover and art throughout)

[www.jamesmckay.info](http://www.jamesmckay.info)