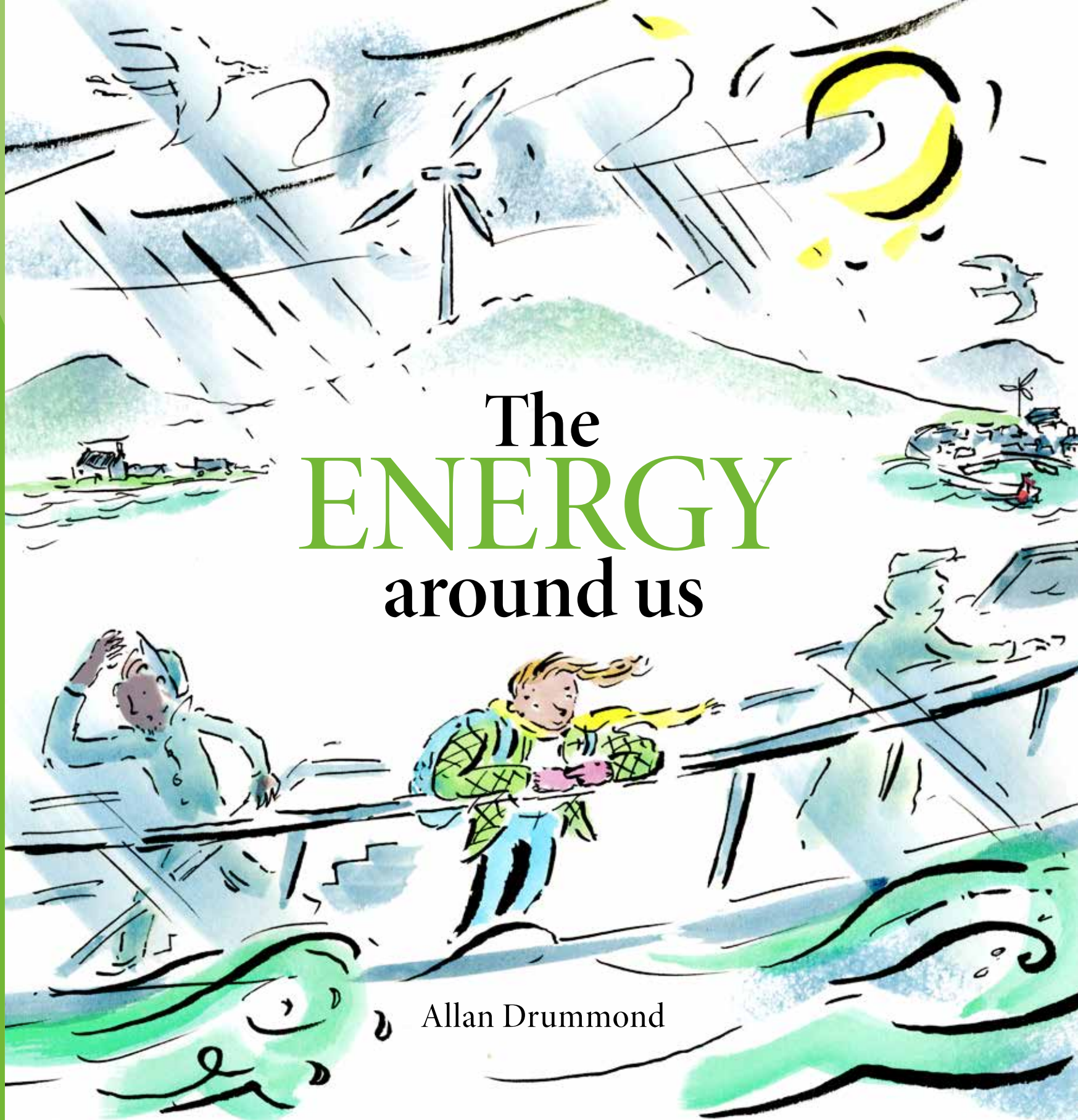
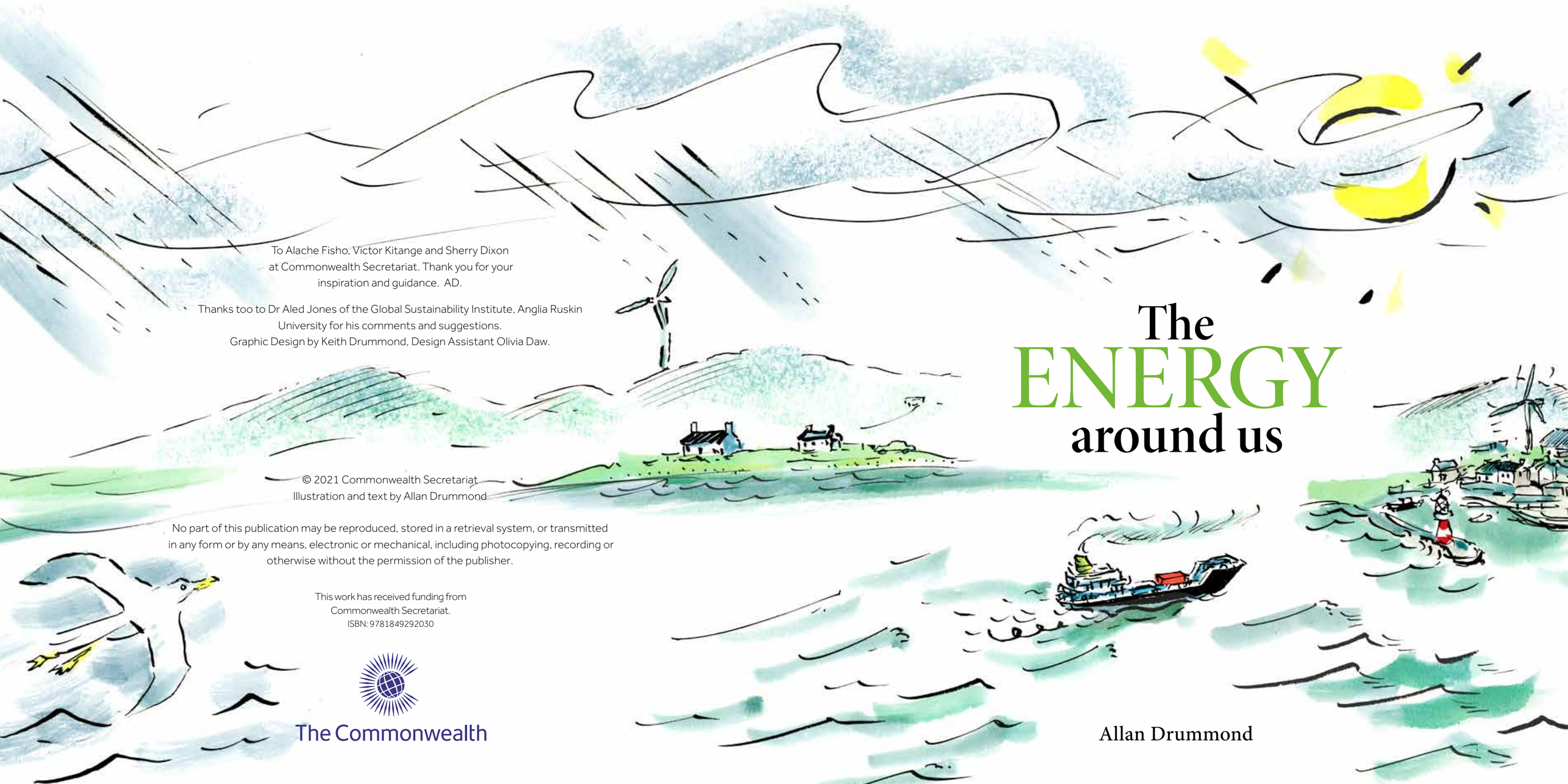


The ENERGY around us

Allan Drummond



To Alache Fisho, Victor Kitange and Sherry Dixon
at Commonwealth Secretariat. Thank you for your
inspiration and guidance. AD.

Thanks too to Dr Aled Jones of the Global Sustainability Institute, Anglia Ruskin
University for his comments and suggestions.
Graphic Design by Keith Drummond, Design Assistant Olivia Daw.

This work has received funding from
Commonwealth Secretariat.
ISBN: 9781849292030

The Commonwealth

The ENERGY around us

Allan Drummond

WE LIVE on an island
in a cold climate.

Getting to it can be very scary!

Huge waves!

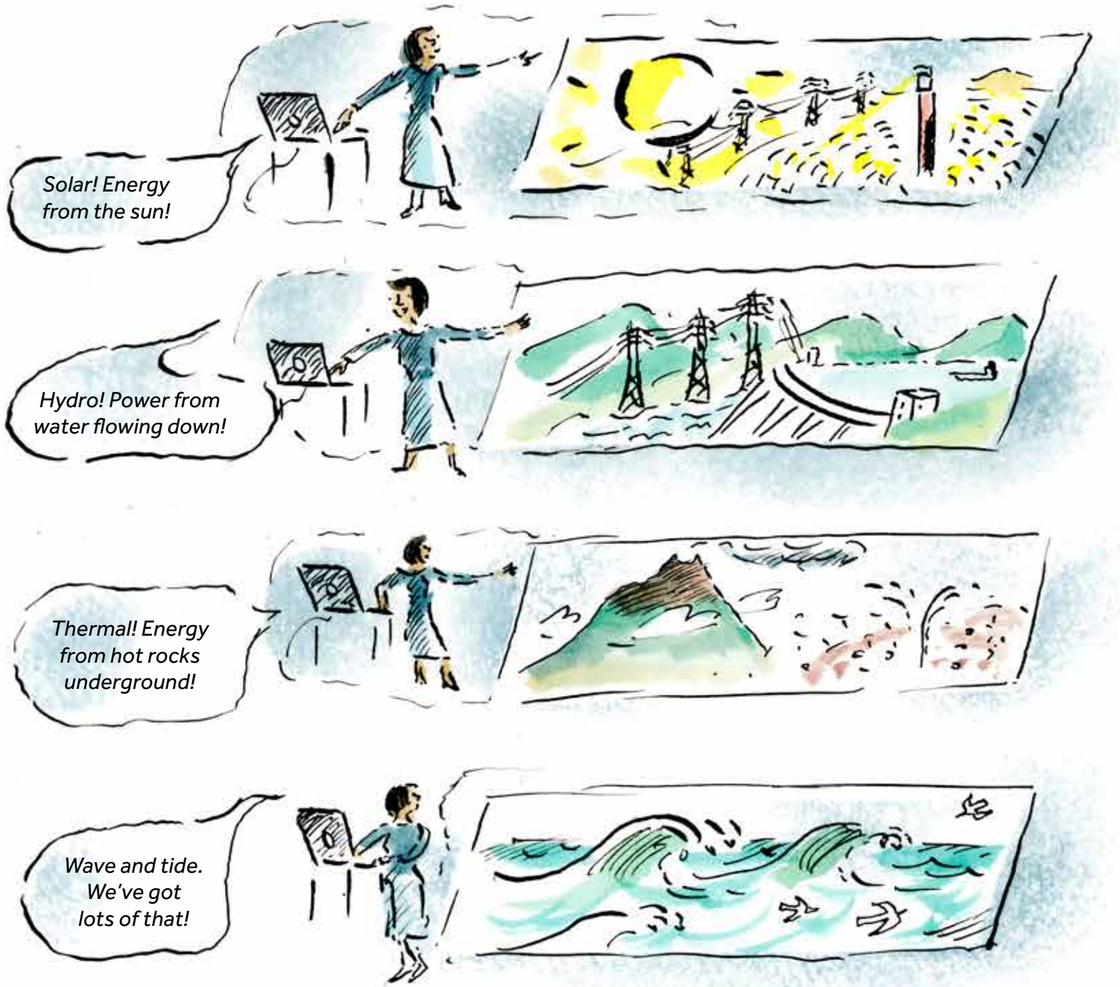
Howling winds!

Just look at the energy all around us!

Luckily our school is a warm and safe place.

And we have a great science teacher.

She makes sure we know all about the familiar sources of renewable energy.



Lots of experts travel here to work on our turbines.

And they've even found a way to store the energy from the wind.

But what about where you live?

Energy where you live

This small island is interesting. It's in one of the really windy places on Earth. For more than ten years now electricity has been generated through wind turbines.

It takes modern technology to make good use of energy such as wind power. This book is about the renewable energy technology at work all over the world today. Renewable energy is becoming more available, and cheaper – which is good news.

In fact this island is Energy Independent and makes so much electricity that it sends power out to other islands and to the mainland. There's plenty of energy for this community's small population.

Some of the world's best scientists and engineers are not far away from the island. This has enabled the work to progress fast. And there are experiments going on in the sea around the island using waves and the strong currents to make electricity.

Even more excitingly, the island has also started a new project – storing the extra energy they capture by using liquid hydrogen as clean fuel.

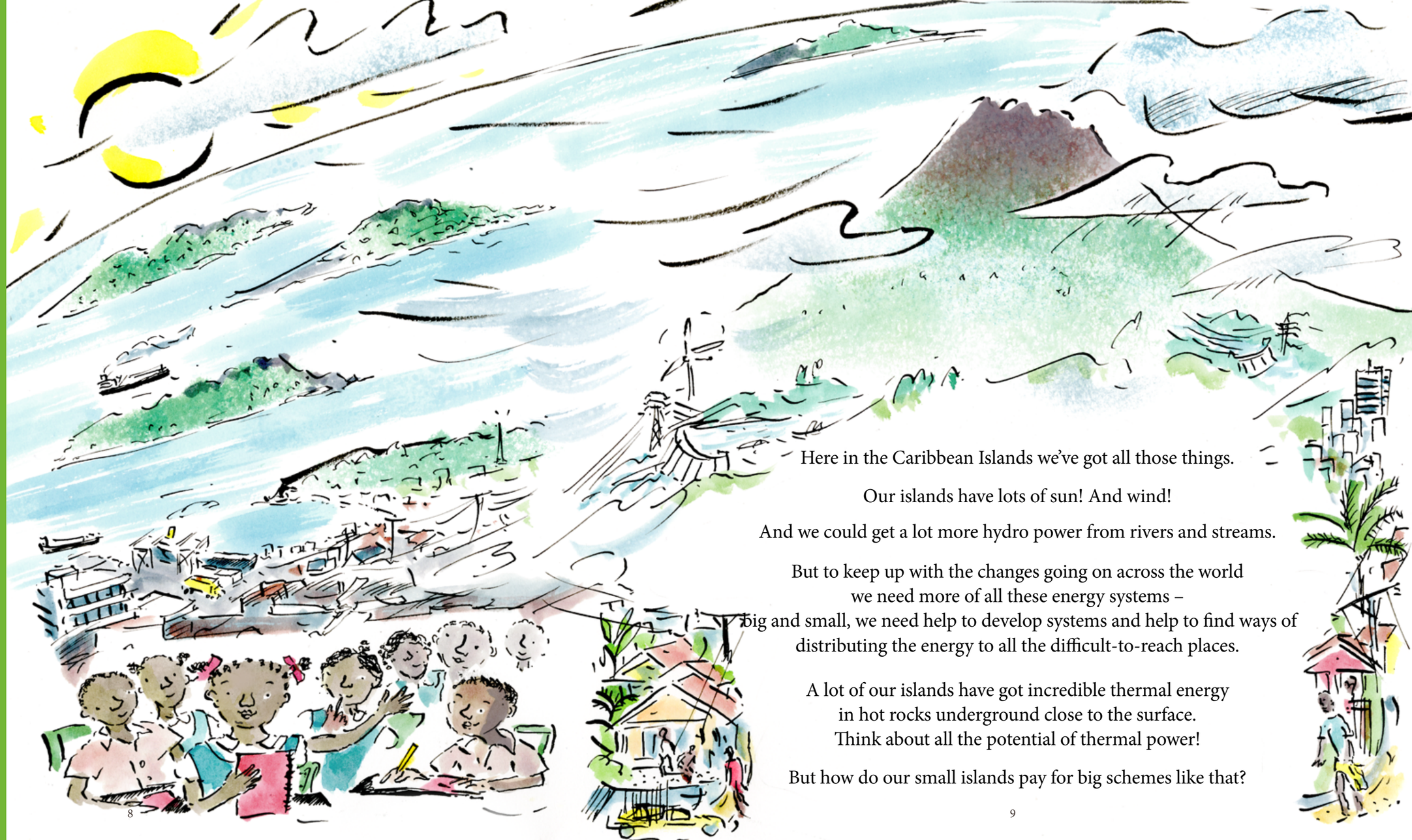
Islands in the sun

The Caribbean Islands area has plenty of sunshine. It is an ideal place for renewable energy. At the moment most of the islands depend on oil from other countries, and natural gas. Both these fuels are non-renewable, meaning they could run out. And both are not good for the climate. But there is plenty of sun in the area, so solar power has huge potential.

Many Caribbean islands have very hot rock formations deep underground, meaning thermal energy can be used. Mountains and rivers offer possibilities for more hydroelectric power. And there's plenty of wind too – the area could build lots of wind turbines.

Each country, in fact each island, has different renewable energy projects. Some are large, and some are small and local. They need more. But how can that be achieved? It will take money and experts, investors and governments working together to make it happen.

And the systems themselves need to work together in order to deliver the power to areas far away from the towns and cities.



Here in the Caribbean Islands we've got all those things.

Our islands have lots of sun! And wind!

And we could get a lot more hydro power from rivers and streams.

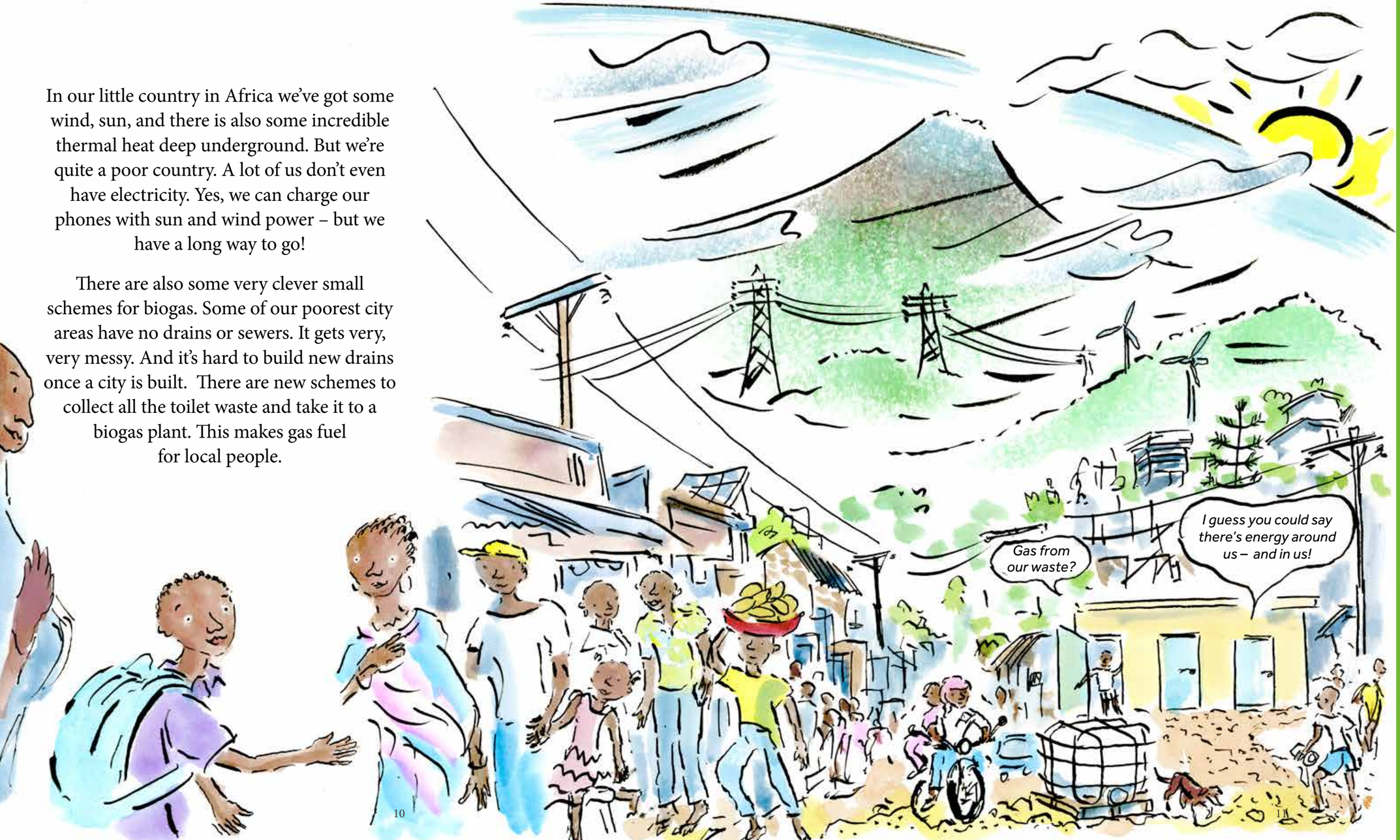
But to keep up with the changes going on across the world
we need more of all these energy systems –
big and small, we need help to develop systems and help to find ways of
distributing the energy to all the difficult-to-reach places.

A lot of our islands have got incredible thermal energy
in hot rocks underground close to the surface.
Think about all the potential of thermal power!

But how do our small islands pay for big schemes like that?

In our little country in Africa we've got some wind, sun, and there is also some incredible thermal heat deep underground. But we're quite a poor country. A lot of us don't even have electricity. Yes, we can charge our phones with sun and wind power – but we have a long way to go!

There are also some very clever small schemes for biogas. Some of our poorest city areas have no drains or sewers. It gets very, very messy. And it's hard to build new drains once a city is built. There are new schemes to collect all the toilet waste and take it to a biogas plant. This makes gas fuel for local people.



One country in Africa

This country, for example, has wind, sun and geothermal, and lots of small local schemes.

The problem here is how remote some of the homes are – most of the population live in villages that are far away from the cities and towns and the cables and connections don't extend to their homes. And even if they did, some people simply cannot afford the cost of electricity. Instead, they use wood fires to cook on and very often it's the women who have to go out and collect firewood.

A Transition to Renewable and Clean Energy for these areas would have huge benefits. But it calls for lots of help from leaders and from the rest of the world.

The transition to renewable energy must be for everyone, not just those people who live near good sources of energy.

South Asia – Challenges and Opportunities

Each country here has different regions when it comes to renewable energy sources. Large areas are very poor, and millions of people have no electricity at all. But there are also big cities. South Asia does have big challenges, but also big opportunities.

Many farmers burn the straw and stubble in the fields after harvests. This causes smoke to blow everywhere and it tends to hang over the big cities adding to pollution and to warming the planet.

New systems are starting where farmers can now sell this straw and it is taken away to make biogas. This means it does not need to be burned.

Here in South Asia we have lots of different regions, and we can do all of the same kind of things.

We've got many local schemes...

Biogas from waste. Local solar plants, and small, local hydro dams.

But getting the power to all the places is a big problem.

In this region we used to burn all the left over straw from rice crops. The cities filled with choking smoke from the countryside.

Now there are schemes to make biogas from all the waste from crops.

Countries with big ideas

For wealthy countries with good infrastructure (roads, bridges, water supply, housing, schools, hospitals for example), there is enough money and resources to make the change to clean energy and to try new ideas. But in one big country, for example, coal is still big business. And in another oil is found in sands near the surface of the ground. These resources provide lots of jobs, lots of energy, and they support big cities. But they are non-renewable. How will that work?

A lot of heating and cooling of buildings happens in these countries. New technology can use the temperature of the ground and the air around the buildings to provide cleaner cooling and heating.

And of course planes and ships are still using traditional non-renewable fuels. Something has to be done about that.

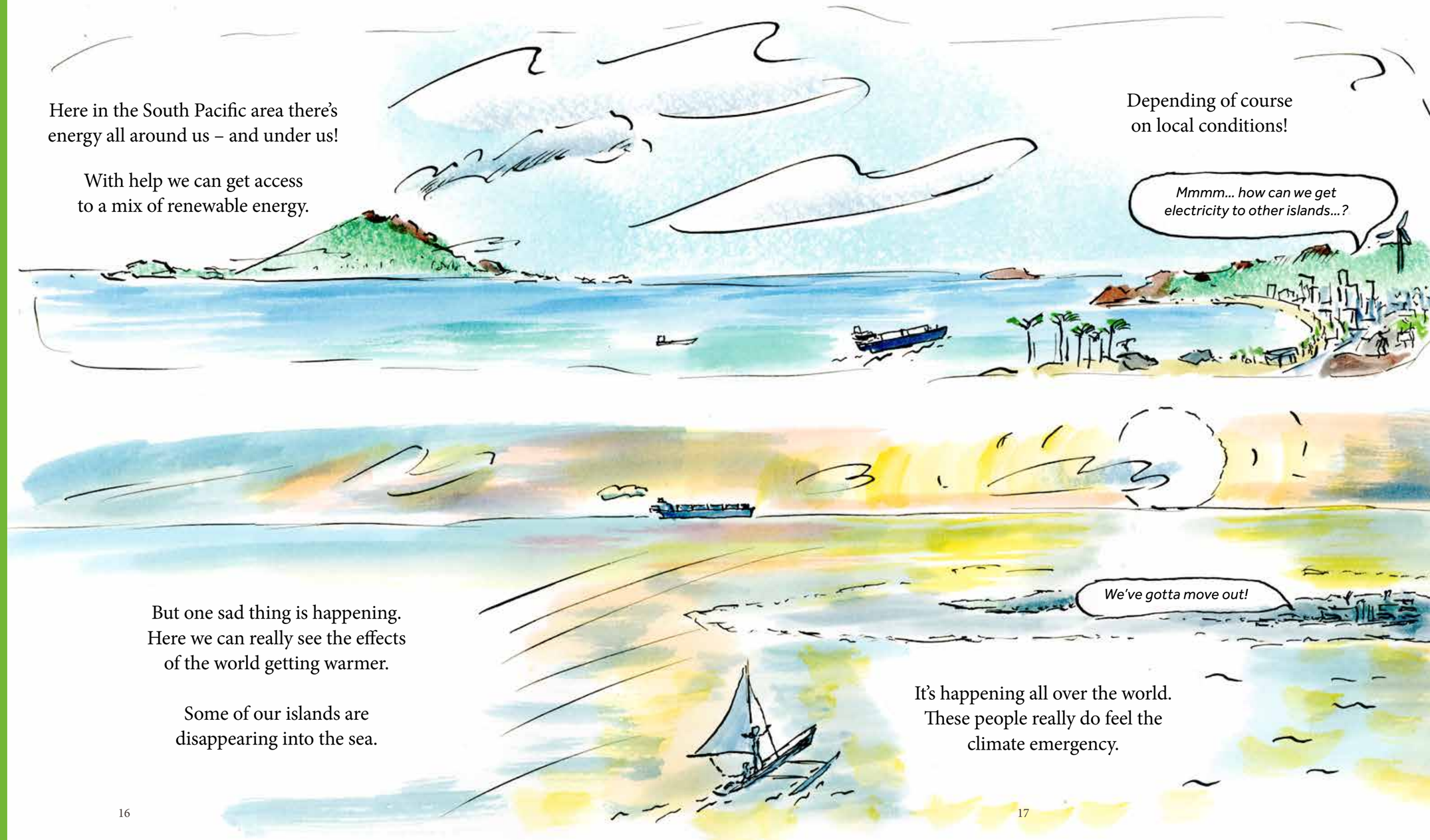
So big, wealthy countries have big problems to solve as well.

Small can be beautiful

Here in the South Pacific area there are literally hundreds of islands and small countries. Just like the Caribbean area they are facing similar opportunities and challenges.

On islands that have mountains and rivers there is lots of potential for hydropower. There are also sunny places with potential for solar energy systems big and small. Wind energy is also a strong possibility throughout the region.

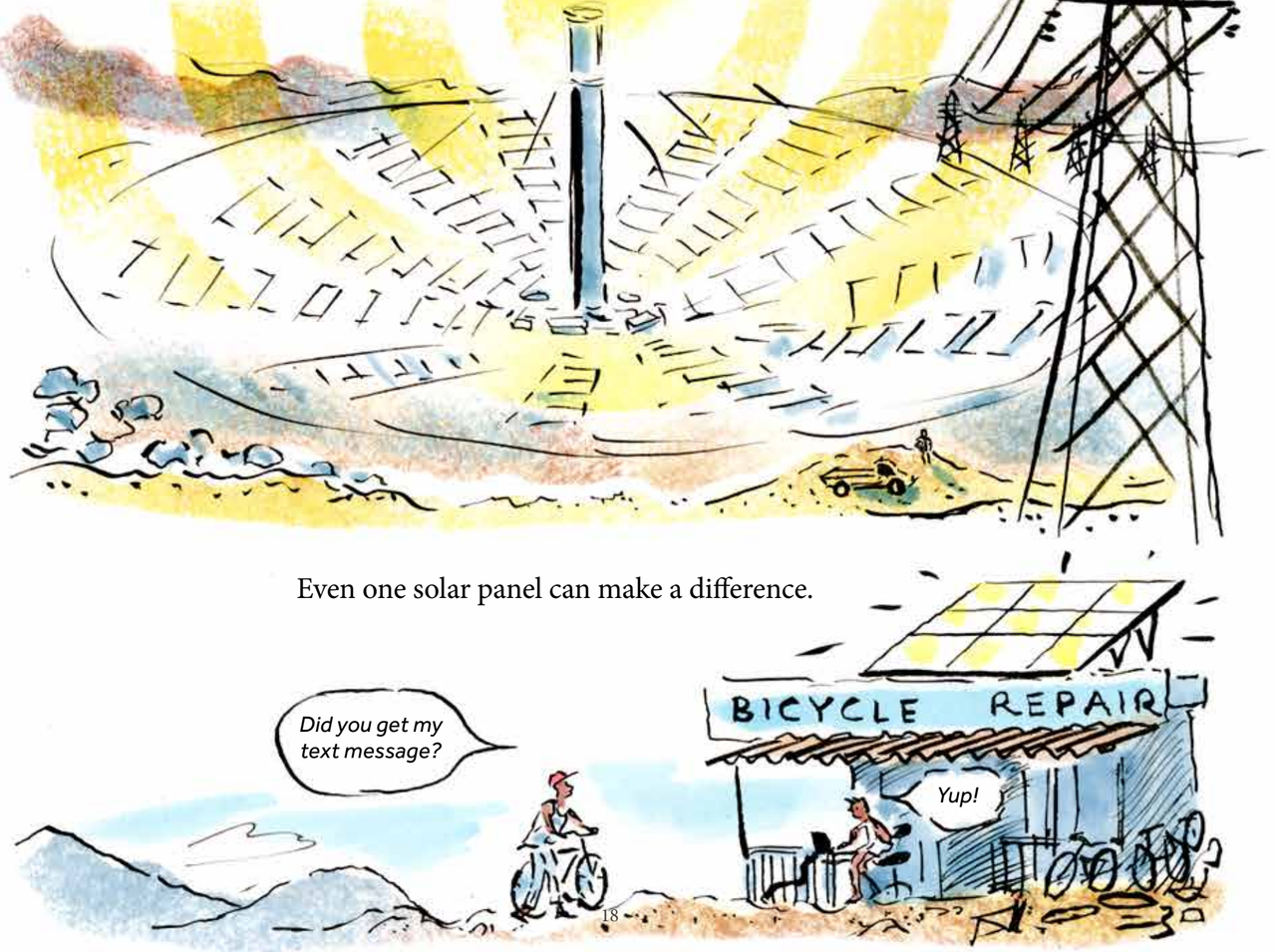
Because of Global Warming some of the islands are disappearing under the sea due to rising ocean levels. This problem really highlights the need for a change to renewable energy. It also means that people have to be treated fairly and supported as they are forced to move.



With new clean energy systems it's important to think big and to think small. Some places have enough space or money or resources to make giant installations like this solar plant near the desert.

In other places smaller can be more effective for local people.

Even one solar panel can make a difference.



Hydro power doesn't have to mean a massive dam.

Small systems can be built.

Ok, the biggest and best wind installations are in the sea.

But smaller turbines are also useful.

Biomass and biogas schemes depend on the kind of waste available locally.

They can make a significant difference.

Here, back where we started our story, there's one more amazing thing about our wind energy system...

Often we get far too much wind. And our turbines make too much electricity.

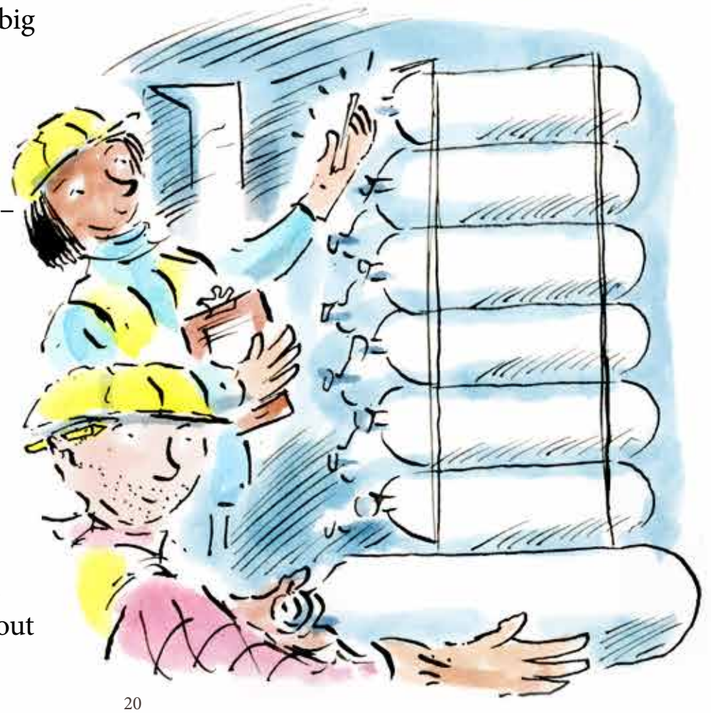
Now there's a special way to save a lot of that extra power.

And it's clean. There's no need for big batteries made from lithium.

In a building beside the school is a machine that uses the electricity to turn water into gas – and the hydrogen gas that is produced can be used for heat and power.

So, on our island we have a completely clean renewable energy system.
We've made the transition.

And we're energy independent. Now is the time for us to think about what else can be done...



...to get the best from the energy all around us.

Can we store wind power?

On this island they are finding exciting new answers to the big question: Can we store electricity?

Batteries can be used to store electricity, and in the world there are some huge ones as we've seen. But these batteries are made from lithium, which has to be mined and carried to other places.

Here, right next to the little school, is a machine that changes all of that. It uses electricity from the wind turbine to change water into two gases: Hydrogen and Oxygen. The Hydrogen can be used as a clean fuel and can be stored in tanks that can be carried anywhere. The Hydrogen powers the ferries and can also be sent to the mainland or indeed anywhere. The school is actually heated by this hydrogen. This is an exciting new way to capture the extra power that comes when the wind blows too much. And more excitingly, the method can be used for storing electricity from any generating system, not just wind, so it will be an important new way to store and transport energy in the future.

Left, a small wind turbine charges this family's electric car. Above, on top of a wind turbine on a small island that is energy independent thanks to wind power, solar power and biomass.
Photographs by Allan Drummond.

AUTHOR'S NOTE

Our energy, where it comes from, and how we use it plays a big part in how we live our lives. It always has done. Today more than ever it is important for teachers and students to consider the big picture… how the emerging new energy systems impact people's lives, and the exciting opportunities that this transition offers to everyone in the world. A massive movement is happening all around us. And it has the potential to benefit everyone equally.

I have visited several countries around the world and been into schools where students are learning about many aspects of Sustainability and the Transition to Clean Energy. I am always amazed to hear just how much children already know about the subject.

For this book I imagined just a few scenarios developed from personal experiences on my travels. My aim is to start discussions and to encourage students and teachers to think about the part they can play in the Transition to Clean Energy.

PUBLISHER'S NOTE

This book is published under the Commonwealth Sustainable Energy Transitions Agenda; a platform for collaboration amongst Commonwealth member countries to accelerate action in the transition to low carbon energy systems and towards achievement of SDG 7. With more than 60 per cent of the Commonwealth's population under the age of 30, the Commonwealth Secretariat is committed to investing in children and young people, placing them at the centre of sustainable and inclusive development. Please contact sustainableenergy@commonwealth.int to find out more about this exciting initiative to grow energy literacy and innovation amongst school age children across the Commonwealth.

The ENERGY around us

Allan Drummond

There's energy all around us. Renewable, clean energy is an exciting possibility for all countries and regions in the world. But it's different in each place. This book looks at some of the opportunities for Clean Energy all over the globe.

Funded by Commonwealth Secretariat
ISBN: 9781849292030

The Commonwealth

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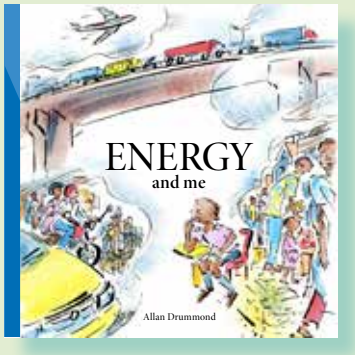

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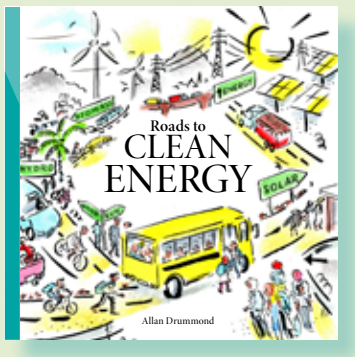

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By Allan Drummond

ISBN 978-1-84929-203-0
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