

# switch

To the power of renewable energy  
in the Highlands and Islands

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## I don't believe it!

Challenging  
the renewable  
energy myths

page

04



## Why we have to act now

Switch talks to Scottish  
Natural Heritage

page

07



# Meet the young engineers shaping our energy future

page

07



## Scotland on target

How we're leading the  
way in renewables

page

08



# Welcome from HIE

Welcome to the second issue of Switch, the magazine all about renewable energy in the Highlands and Islands. In this issue, you'll find out about the commitment Scotland is making to cutting carbon emissions, discover the fact and fiction about renewable energy in our myth-busting feature, and see how eco-schools are taking steps to go green.

In the news recently, the Marine Energy Group, set up by the Scottish Government to investigate the potential of tidal and wave power, found that more than 12,000 new jobs could be created if we increase our investment in these forms of renewable energy. New marine power technologies developed in Scotland could mean as much as £2.5 billion will be generated for the economy. Scotland already leads Europe in the development and

testing of marine energy projects, and with the right investment, the Highlands and Islands could become Scotland's marine energy powerhouse.

Switch has been produced as part of Highlands and Islands Enterprise's commitment to raising awareness of the important role renewable energy will play in the economic growth of our region, and ensuring a secure, sustainable energy future.

## Get switched on - where to get advice about renewable energy

**If you are interested in finding out more about renewable energy, its development in the Highlands and Islands or how you can switch to alternative forms of energy in your community or home, here are some sources you will find useful:**

### HI-energy

The Highlands and Islands of Scotland is home to an abundance of renewable energy resources, appropriate infrastructure and skilled people. Find out more about different renewable energy forms and technologies and how this emerging sector can impact on the region. Fact sheets are available for download and you can also find out more about the projects taking place throughout the region. There are also useful links to other sources of advice and support.

Visit [www.hi-energy.org.uk](http://www.hi-energy.org.uk)



### Highlands and Islands Enterprise

Highlands and Islands Enterprise (HIE) is committed to raising public awareness and understanding about the important role that renewable energy can play in the growth of the Highlands and Islands' economy. This website provides help and advice for businesses through its 15 local area offices throughout the Highlands and Islands. This website has help and advice for people thinking of starting their own business or for business owners who need support to grow their enterprise. Find up-to-the-minute news about HIE's developments in the region and the work it is doing to contribute to the economic growth of the region.

Visit [www.hie.co.uk](http://www.hie.co.uk)



### Community Energy Scotland

Community Energy Scotland (CES), formerly known as Highlands and Islands Community Energy Company, is an independent Scottish charity. Providing free advice, grant funding and finance for renewable energy projects developed by community groups to benefit their community, CES delivers the Scottish Government's Community and Household Renewables Initiative (CARES). If you want to fit renewable energy equipment into a building to reduce running costs and use of fossil fuels, CES can assist from installation to project completion. CES has assisted in 200 installations across Scotland. For help and advice about developing a project to generate energy for your community or to read about the past projects CES has supported, visit [www.communityenergyscotland.org.uk](http://www.communityenergyscotland.org.uk)



### Energy Saving Trust

The Energy Saving Trust is a non-profit organisation that provides free, impartial advice to help you save money and fight climate change by reducing carbon dioxide emissions from your home. There are lots of hints and tips for saving energy in your home from home improvements such as insulation and glazing to buying energy saving recommended products. Find out how energy efficient your home is with the online home energy check. The Energy Saving Trust also has advice and information for people thinking of installing renewable energy technologies in their homes.

Visit [www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)  
Tel: 0800 512 012







# The big picture

The 194-tonne Oyster hydro-electric wave energy converter being lowered into position at the EMEC testing centre in Orkney. Aquamarine Power, who are developing Oyster, say 10 of the devices could generate enough clean energy to power 3,000 homes.



## Read all about it - renewable energy in the news

### Highlands wind capacity increased further

Three wind farms which will generate enough energy to supply over 80,000 homes in the Highlands and Islands have been given the go-ahead. Beinn Mhor, on the Isle of Lewis, will have the capacity to generate 140MW, while Berry Burn, on the Altyre Estate near Forres, will generate 78MW. The Millennium Wind Farm at Fort Augustus will see its capacity increased from 15MW to 65MW.



### Scotland plans for renewable future

As of August 2009, Scotland has approved 3GW of new renewable energy projects to add to the 3GW installed capacity. The Energy Consents and Deployment Unit, the department of the Scottish Government which approves large-scale renewables projects, says 34 renewable project applications are currently being processed, with 25 wind farms over 50MW and nine hydro projects over 1MW on the cards.



### Forest path for small-scale renewables

Forestry Commission Scotland is in discussions to install small-scale hydro devices to produce electricity in national woodlands. In addition to commercial interests, the Forestry Commission is welcoming approaches by community groups seeking to harness the power of water flowing in their local forests. Small-scale hydro developments already exist near Loch Awe, Loch Maree and at Glenskiagh, and it is believed that rivers on Forestry Commission land could provide the capacity to generate at least 50MW more electricity.



# I don't believe it! - renewables myths

**Cars running on watermelon juice and chip fat? Solar power... in Scotland? It can be hard to tell renewable fact from fiction, so here's our myth-busting guide.**

- **Renewables? They won't catch on!**

Renewable energy has been used for centuries – from waterwheels to windmills. The biggest example of renewable energy in action recently has been hydro-electricity, which brought jobs and power to the Highlands. Modern forms of renewable energy offer the same opportunities to strengthen the region's economy today.

- **Solar Power – with Scotland's weather?**

Surprisingly, our weather doesn't pose problems for the latest solar panels, which don't require direct sunlight to function. Cloud cover, however thick, doesn't leave the sky pitch black, so 'diffuse solar energy' can still break through. Properly installed solar panels can provide as much as half of a typical home's heating requirements through the year, rising to 100% during the summer.

- **Nuclear power is cheaper and cleaner than renewables.**

Nuclear power can create a lot of energy quickly, but the financial and environmental building and clean-up costs can be extremely high. A typical nuclear power plant can take 10 years to build, and lasts for 40 to 60 years. The cost of decommissioning the UK's nuclear power plants currently stands at over £73 billion, and is expected to rise.



- **Wind power simply isn't reliable**

We've got some of the strongest, most consistent winds in Europe. Shetland's Burradale wind farm holds the record for the most productive wind turbine in the world, harnessing 58% of its capacity in a year. However, the wind doesn't blow all the time and this is why using a range of technologies (wind, wave, tidal, bio energy, geothermal, solar) can dramatically increase predictability and reliability.



- **Marine energy - it's not a realistic prospect**

Marine energy development is behind other forms of renewables. That doesn't mean it won't play an important role in the future. Scotland's waters have the capacity to provide us with 7.5GW of tidal power and 14GW of wave energy – dwarfing the energy currently generated by every power plant in Scotland (10.3 GW). Investment and innovation are rapidly driving forward marine energy.

**And by the way you can run a car on both chip fat and watermelon juice!**



## Ambitious greenhouse targets position Scotland as world climate change leader

**The Scottish Parliament has announced the world's most ambitious targets for reducing greenhouse gases, following recommendations by the Intergovernmental Panel on Climate Change (IPCC) that all countries should reduce carbon emissions by 25-40% by 2020.**

Political parties in Holyrood voted unanimously to exceed this requirement, agreeing to reduce emissions by 42% from 1990 levels. Environmentalists welcomed the news, stating that Scotland was setting a new moral standard for the rest of the world.

On the other end of the scale, Japan has been widely criticised for choosing to reduce emissions by only 8%.

Elaine Hanton, joint head of energy at Highlands and Islands Enterprise, says: "This announcement is more positive news for our growing renewables industry. While these are tough targets, we have the renewable energy resources that will help us reduce our carbon emissions.

"The Highlands and Islands are at the forefront of Scotland's renewable energy sector, and we are already striving to meet the renewable electricity targets set by the Scottish Government and they, along with these new targets, will have massive economic and social implications for the region. The renewable sector in Scotland has the potential to create at least 16,000 jobs in the next ten years, with the Scottish Government report recently revealing that there are already 3,000 jobs in renewables north of the Border. So the economic benefits that the development of the renewable energy industry can bring are extremely significant.

"The development of renewable energy has been identified by Highlands and Islands Enterprise as key to the growth of the region's economy. We are committed to encouraging the growth and development of renewable energy technologies in order to meet the targets set by the Scottish Government."



## What if we don't cut our emissions?

**The world-leading Climate Change (Scotland) Bill has introduced targets to reduce emissions by at least 80% by 2050.**

Switch talks to Fergus MacNeill of Scottish Natural Heritage (SNH) about what will happen if we don't cut our emissions.



- **Changes to Our Natural Habitat**

Already the seas around Scotland have seen shifts in ranges of algal, plankton and fish numbers. As sea levels rise, saltmarsh and machair habitats could be lost.

- **Extended Seasons**

Growing seasons may increase by 20-80 days. Warming has caused earlier spring events such as leaf unfolding, bird migration and egg-laying. Caterpillars may emerge earlier than birds' eggs hatch, leading to a lack of food for some bird chicks.

- **Climate Change**

This could be the most serious threat to Scotland's natural heritage in the coming decades. As well as environmental consequences, climate change is likely to have major social and economic implications for people in Scotland and elsewhere.

Fergus MacNeill, of Scottish National Heritage says,

“There is scientific consensus the planet is warming and the degree of recent changes can be explained only by the effect of human activities.

We strongly support the need for major global reductions in greenhouse gas emissions to avoid a dangerous level of climate change – taken as a 2°C warming over pre-industrial levels. SNH recognises the importance of Scotland, as a developed nation, showing leadership in emissions reduction.”

Scottish Natural Heritage is the Government's advisor on all aspects of nature and landscape across Scotland. Its role is to help everyone understand, value and enjoy Scotland's nature now and in the future. For further information visit [www.snh.org.uk](http://www.snh.org.uk)

## Save energy - save money

As the credit crunch takes hold, we're all beginning to feel the pinch. But homeowners have a secret weapon to hit back: energy efficiency. Energy and Climate Change secretary Ed Miliband announced earlier this year that annual energy bills could rise by up to £250, so it's never been more important to make sure you're making the most of your home's energy.

Peter Rickard, of Energy Saving Scotland Advice Centre Highlands and Islands, says there are simple ways to cut back on your home's energy use. "Investing in energy-saving measures like insulation and draught-proofing could save a typical home as much as £1,000 every year. Using energy efficient light bulbs and covering pans when cooking are a great start. More long-term approaches can be taken to make your home energy efficient, but these depend on your budget."



One method of saving energy is insulation. A home which hasn't been insulated can lose half its heat through the walls, windows and roof. Fortunately, it's an easy task for a competent DIY enthusiast or professional to install. Insulated lofts pay for themselves in two years, and are effective for as long as 40. Installing cavity or solid wall insulation can save £100 to £400 per year in heating bills, if every suitable home in the UK had cavity wall insulation, almost four million tonnes of carbon emissions would be cut.

Investing in microgeneration technologies can reap big rewards, too. Solar panels, for example, can dramatically cut your heating bills, providing all the heating for a typical home during the summer and half through the rest of the year. The Energy Saving Trust website offers information on grants available to householders which can help with the cost of installing microgeneration technologies.

Elaine Hanton, joint head of energy at Highlands and Islands Enterprise (HIE), adds: "Energy efficiency is an important issue for money-conscious householders. HIE is committed to the growth of the renewable energy sector, and recognises the huge economic and community benefits it could bring. However, renewable energy generation alone is not enough – we need to cut our energy demands if we are to meet the carbon emission reduction and renewable energy targets."

**For further tips on saving energy, call the Energy Saving Trust on 0800 512 012, or visit [www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk).**



# The future of education is green

Schools in the UK spend on average £100m on electricity, £106m on water, and an alarming £150m on stationery every year. Eco-Schools is an initiative which aims to encourage schools to act responsibly and support sustainable energy in Scotland. A recognised Award Scheme, it promotes environmental awareness in a way that links closely into the new Curriculum for Excellence (CfE).

Kate Campbell, Manager of Eco-Schools Scotland, says: "It's important that children understand from a young age the importance of protecting the environment through the production of clean energy, and what will happen if we don't try to be more energy efficient or cut our emissions.

"The Eco-Schools initiative educates children about the important role renewable energy plays in developing a cleaner, more sustainable future. Eco-



Schools takes a hands-on approach to ensure children actively do the right thing for the planet, making the right environmental decisions which impact their future."

Highlands and Islands schools play a leading role in the scheme, with 319 registered schools out of 3,500 across Scotland. To apply for an award, the whole school must demonstrate a willingness to take action to make long-term, sustainable changes, with staff and pupils involved every step of the way.

The programme encourages schools to make environmental issues a central part of their ethos. Teachers can benefit from a Europe-wide network of support agencies and gain curriculum ideas for pupils.

Highlands and Islands Enterprise (HIE) has organised initiatives in the last year, such as the Big Green Challenge debating competition, and Continuous Professional Development sessions for primary teachers, to increase awareness and understanding of renewable energy in schools. Together with the Eco-Schools programme, children across the region are discovering the importance of renewable energy to our sustainable future.

If you are interested in finding out more about the Eco-Schools initiative visit [www.ecoschoolsscotland.org](http://www.ecoschoolsscotland.org). For further information on the HIE schools activity, email [info@hi-energy.org.uk](mailto:info@hi-energy.org.uk).

## First Scottish Renewables Festival reveals awareness and understanding of renewable energy in Highlands and Islands



**June saw the Scottish Renewables Festival, organised by Scottish Renewables together with Highlands and Islands Enterprise (HIE), celebrate the diversity of renewable energy. The two-day festival let the public explore wind farms, hydro power schemes and wood fuel power stations, showcasing their role in developing a sustainable future.**

Opening their doors were the world's most productive wind turbine at Burradale in Shetland, the Eragan Hydro in Oban and the European Marine Energy Centre in Orkney. In Thurso, a screening of climate change film *The Age of Stupid* received positive feedback: over a third said the film had significantly changed their views on climate change. One commented: "It has made me rethink the 'NIMBY' issues surrounding windfarms, and the urgency of rethinking the way forward."

HIE also organised educational activities at the Inverness Eastgate Shopping Centre. These included HIE's Science Technology, Engineering and Maths team discussing renewables-related study and career opportunities. A renewable energy educational toolkit was available for younger children. Re-usable shopping bags, containing the first issue of *Switch* magazine, were handed out. Shoppers gave their views on climate change and renewable energy: 85% were concerned about climate change and 86% worried about rising energy prices. The public was most aware of wind, solar and wave power, and 84% supporting further development of renewables.

Anna Allan, senior development manager at HIE, comments: "The festival proved a great success, showing the high levels of awareness and support of renewable energy development in the region. The festival provided an excellent platform to engage with families and communities face-to-face to increase awareness and understanding of renewables."



# A 'green collar' revolution

Renewable energy can step into the shoes of the oil and gas industry to provide for Scotland's energy needs. With a dynamic workforce and the capacity to be powered entirely by renewables in 20 years, the country is ready and able to take on the challenge.

But who's taking this forward to provide a viable solution for the future of our energy requirements?



**Barry Johnston (31) Director of Scotrenewables, from Orkney.**

Returning home to the battering wind and waves of Orkney after completing his degree in Offshore Engineering, Barry saw natural power with a new perspective.

"I realised that this raw energy could be engineered to bring benefit not only to Orkney, but Scotland as a whole. So I started a PhD in marine renewable energy at Herriot-Watt University's Orkney Campus which included working in Japan on renewable projects," says Barry. "When I returned, there was still a lack of renewables projects so I decided to do something about it by initially helping to champion the need to establish a test centre in Orkney specifically for marine renewables."

Since 2002 when Barry began Scotrenewables at the age of 23, the company has gone on to become a huge success. "We secured a £6.2 million deal last year to develop marine projects and £1.8 million investment from the Scottish Government in 2008. Significant company growth has created 19 jobs mainly for young graduates.

"I'm a firm believer that we need to use all of our natural resources to help reduce emissions but also to generate and sustain quality jobs, particularly in remote rural places."



**Dr Sian McGrath (36) Head of Commercial Development at Aquamarine Power, from the Outer Hebrides.**

During three years in the Indonesian rainforest as a Tropical Forest Policy Advisor, the seeds were sown for Sian's career in the Scottish renewables industry.

Sian returned to Edinburgh to pursue a career with Aquamarine Power. "My interest in environmental polices made renewable energy the perfect sector," she says. "I would love to take my passion home to the Outer Hebrides and work on a project there. There is a huge wave resource ready to be utilised which could provide local jobs and clean energy."

The highlight of Sian's career so far is the Oyster, the UK's first near shore wave energy converter. Oyster has just completed its first phase of deployment at the European Marine Energy Centre (EMEC), where it was secured on the Orkney sea bed.

"Scotland was famous for its North Sea oil, but soon it will be known for its Atlantic Ocean electricity. There were 5,000 welders at Nigg at one point building oil platforms. I'd like to see those welders return to build marine energy devices and kick-start a brand new manufacturing industry in Scotland."



**David Thomson (33) Director of Shetland Aerogenerators and Project Officer with Viking Energy, from Shetland.**

"Never mind the credit crunch, it is the energy crunch we should be worried about," David Thomson warns. "While we're not likely to run out, it won't be too long before fossil fuels start to become unaffordable for most people. Our quality of life will be seriously affected."

David's 'green collar career' started when he was 18, working part time in his family's business, Shetland Aerogenerators Ltd, which he is now director of. In a joint venture between Shetland Islands Council and Scottish and Southern Energy, Viking Energy has submitted plans for a 150-turbine wind farm on Shetland which has caused controversy, but David says that working round these issues is possible and renewable energy is the way forward.

"Large-scale projects such as this can provide genuine energy security. Viking Energy will generate £37 million for the local community, much of which will be used to support the services, facilities and infrastructure necessary to retain a sustainable population on an island 200 miles out into the North Sea."

# Scotland powers ahead with renewables schemes

The renewables debate has been at the top of the political agenda recently with more renewable energy projects approved and increased investment. Targets have also been announced by the Scottish Government underpinning its ongoing commitment to the sector.

Scotland has 25% of Europe's wind and tidal capacity, and the Highlands and Islands are well-placed to generate renewable energy. Thanks to dozens of exciting projects in the region, Holyrood's ambitious objectives are certainly within reach.

**By 2011, it is anticipated that 31% of our electricity will be generated from renewable energy, rising to a figure of 50% by 2020.** Estimates put Scotland's capacity to generate energy from renewables sources at nearly six times the capacity currently produced by all energy sources.

Much of our future energy capacity is likely to come from wind power. **Scotland has the potential to produce 36.5GW of onshore and offshore wind power.** Currently, we're tapping into only 1.5GW of that. However, Scotland is feeling the first winds of change.

In May, First Minister Alex Salmond switched on Whitelee, Europe's largest onshore wind farm by Glasgow. 140 turbines now actively feed electricity into the national grid - with plans to extend by 36 more turbines- enough to power a quarter of a million homes.

Generating electricity from the sea is still experimental, but the Siadar wave power scheme off the Isle of Lewis was recently given the governmental green light. An 'active breakwater' will harness waves and once fully operational, the plant is expected to generate enough electricity to power one-fifth of homes on Lewis and Harris.

Scotland - the Highlands and Islands in particular - has some excellent renewables resources, a skilled supply chain, ground-breaking projects and leading-edge research, development and deployment expertise, placing it in a strong position to be a global leader in this emerging industry.

# Getting to grips with the grid

Mega pylons; Beaulieu-Denny; transmission system; grid upgrades. These words will be familiar to most of us. Indeed, many will have heard the controversy the subject has attracted - particularly in the media in recent years. Posters emblazoned with 'say no to pylons' can be seen at various points of the A9. Unlike wind turbines, which have their fair share of fans and enemies, there are few who would argue that pylons - whatever their size - are majestic or pleasing to the eye. But what is it all about, and what has it to do with renewable energy and reducing our carbon emissions?

The electricity transmission and distribution system or "grid" was designed to transmit power from large, centralised, traditional power stations outwards to where it is needed. These fossil fuel and nuclear power stations are typically situated close to demand centres - areas of high population where most of the power will be used - or close to fuel sources for powering the station.

As we strive to reduce carbon emissions, there is an increasing need to generate electricity from renewables and therefore the role of the grid is changing. Some of the best locations for Scotland's new renewable power stations are in areas where the resources are highest; often regions of low population which are distant from demand centres. The grid is increasingly required to transmit power from outlying areas to demand centres - a complete reversal of its original function.

In order for the Highlands and Islands to contribute to carbon reduction targets and ensure a secure future energy supply, the grid must be adapted. Improvements in technology mean that in future, high capacity cables will be routed out to sea minimising visual impact. However, in order to support sub-sea cables transmitting large volumes of power, a number of upgrades to the onshore grid are required. These are mostly upgrades to existing routes but could include some entirely new routes. The planned Beaulieu to Denny line may be among the last few long-distance overhead line upgrades required to bolster the onshore grid which would pave the way for alternative cable routes moving towards 2020. The key is to make the best use of the onshore grid before moving to these alternatives.

**More information can be found at:**  
<http://www.scottishrenewables.com>  
<http://www.hi-energy.org.uk>



## Kids' section

### Renewables Word Search



- SOLAR
- BIOMASS
- WIND
- GEOTHERMAL
- HYDRO
- TIDAL
- RENEWABLES
- CLIMATE
- ENERGY
- GREEN
- CARBON
- GLOBAL
- WARMING
- EMISSIONS
- WATER
- SUN
- ENVIRONMENT

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H	V	C	N	X	N	R	M	I	L	O	P	Q	N	P
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