Big Problems - Exciting Solutions

The challenges facing the world are many, and there is no single solution, no 'silver bullet'. But there are increasing numbers and a huge variety of technological, practical and individual solutions which CAN address all of our current problems. Below is a selection, but there are many more. Many of these have been around for many years, but were not economically profitable or technically viable. By increasing the demand for such innovative solutions – as the problems become more extreme and the need for solutions more obvious – these factors will change and these solutions will become more available. Some are useful in Northern Ireland, some in Madagascar, some generally for the world and some for other parts of the world. Ideas are arranged generally around the Eco-Schools topics, but many will address several topic areas.

Have you got other ideas on what could be done? Try searching on the internet, maybe someone else has already thought of it; or you develop and patent it!

The Big Ten

There are some major things that will contribute to solving many of the current problems facing the world. They do require global action to be truly effective, but the good news is that we can each play our part in addressing these issues.

1. **Decarbonize energy production.** Move away from use of any fossil fuel for energy production and instead use renewables.
2. **Stop destruction of natural habitats** to maintain biodiversity and store carbon and water. Prioritise habitats with crucial roles in delivering a range of ecosystem services, such as mangroves, coral reefs and forests.
3. **Conserve water.** Recognise that aquifers are being depleted and ensure that rainwater is captured for use. Don't waste water—in NI it's the biggest user of electricity!
4. **Reduce waste—especially food waste.** We waste almost half of all the food grown—reducing that will reduce the amount of land we need to use to grow food with massive impacts on carbon emissions from agriculture.
5. **Reduce consumption of animals.** By shifting to more vegetable based diets we can decrease the land needed to grow food, decrease carbon emissions, and provide healthy diets for more of the world's people. Shift to alternative protein sources—vegetable protein, mycoprotein (quorn), artificial meats, insects, etc. Keep meat for special occasions and insist that it is reared ethically and sustainably.
6. **Promote the circular economy** to reduce waste of all natural resources as well as energy.
7. **Shift away from plastics** whenever possible, and dispose of properly when used.
8. **Community level action. T**hink global, act local; put big ideas into practice locally. Help people in other countries to implement practical, appropriate solutions to their problems.
9. **Empower women and girls.** Give women and girls power over their lives and their communities.
10. **Educate the children.** An educated and empowered population will bring about the needed changes.

Energy

Providing low cost safe ‘bottle lamps’ saves people from burns and provides cheap light to areas without central electricity supplies. They can channel sunlight into dark rooms during the day and magnify lights at night.

New paint conducts electricity, replacing wiring and increasing flexibility for many uses.

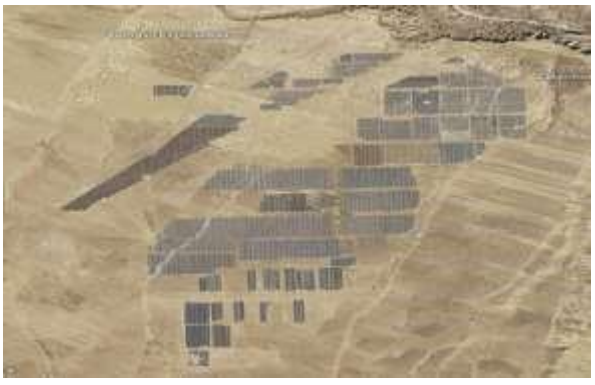
Solar charged LEDs can provide light for reading in homes, lengthen school days and help reduce the use of charcoal and wood to provide light and reduce pollution.

New techniques can generate electric power from plants.

Solar energy has become much more efficient and is cheaper than fossil fuels in more than 30 countries. Many countries, including India and China, are switching energy production from polluting, carbon intensive coal to renewable solutions. New technologies are constantly emerging and becoming economically viable at every level, from individual panels powering lights and energy for homes to huge ‘farms’ providing energy to cities. European energy companies pledge no new coal plants after 2020.

China produces more solar energy than any other country. Production more than doubled in 2016.

Aquion Energy salt water batteries bring a whole new type of battery to the market offering a safe, clean, non-hazardous, no hassle, recyclable solution. These products are clean salt water batteries that outperform and outlast traditional battery chemistries. AHI batteries contains no heavy metals or toxic chemicals, they are also non-flammable and non-explosive making them the safest batteries in the world.

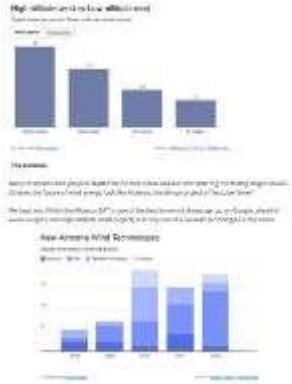


Energy

Germany, The Netherlands and Denmark are building a 2 sq mile island in the North Sea to service 7,000 wind turbines and provide power for 80 million Europeans.

Capturing high altitude wind energy via kites and planes is becoming feasible; wind is abundant and constant and the cost of harvesting it is going down. The first Kite-powered wind farm will begin construction in the UK in 2017.

One of the biggest problems with renewable energy is its unpredictability and irregularity. New battery technology is required to allow storage for times when power is not being generated. Batteries are now allowing solar projects to provide power at night in Hawaii.



A blooming 'sunflower' of solar panels follows the sun to generate more energy.

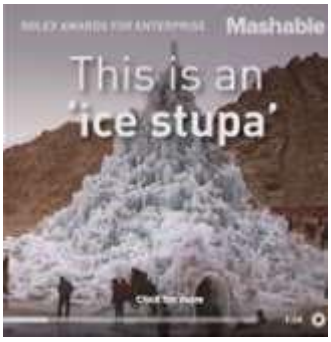
Glass tiles can provide solar energy at the same or less cost as conventional tiles.

Tidal power is becoming economically and practically viable.

Roll out arrays of solar panels can be rapidly deployed in disaster areas.

Micro wind turbines are light and can recharge batteries or small electronic equipment.

Water



A new way to harvest water when abundant by making giant pyramids of ice could provide water for months after the rainy season ends in some cold climates as the ice melts slowly to release clean water.

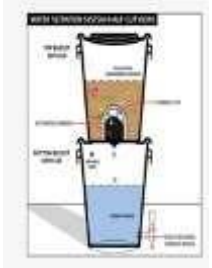
Rainwater harvesting – multiple ways to capture rainwater for later use rather than allowing it all to run off, often causing flooding.

Filters that can turn seawater into drinking water, and solar powered devices can pull water from desert air.

Wind powered turbines can pull drinkable water from the atmosphere, even in dry areas.

New filters can be used for individual or community water cleaning from any water source, remove bacteria and sterilizes water, absorbing chlorine, foul taste and odours and organic chemicals.

The Drinkable Book™, the first-ever manual that provides safe water, sanitation and hygiene education and serves as a tool to kill deadly waterborne diseases by providing the reader with an opportunity to create clean, drinkable water from each page.



Litter

Waste

Plastics are a major problem for marine life,
causing deaths of all types of sea dwelling animals
from seabirds to turtles to whales, as well as sharks and other fish. Everything from microbeads to plastic straws are killing these animals, and building up in enormous concentrations in some areas. It is estimated that up to 13 million tonnes of plastics enter the world's oceans every year; much of it comes from the land and consists of 'single use' plastics such as containers, straws and films. Much of this comes from just 10 rivers, predominantly in Asia. Asian countries China, Thailand, Indonesia and the Philippines have pledged to keep plastics from entering the seas.

Ocean currents sweep plastics and other floating garbage into 5 large 'gyres' in the oceans – even in the gyres the garbage isn't that dense, but there is so much that techniques are being developed to 'harvest' it. Over 5 trillion pieces of garbage litter the oceans.

Algal buildup in lakes and the seas is unsightly, toxic to fish and other life and makes water unusable for people without significant cleanup costs. Some of these 'algal blooms' are due to natural causes, but many are caused by runoff of fertilizers and sewage. New technologies are harvesting these algae and turning them into shoes and other products normally made from plastics – and they won't contribute to climate change from oil or plastic buildup in waste.

Waxworms can consume plastics quickly, a partial solution to the plastics pollution problems.

Plastics made from plant materials can help to solve the massive problem that plastics cause in our oceans., degrading rather than building up in animals' stomachs or tightening around their bodies.

Plastics can be recycled to provide low cost building materials.

Edible cutlery has been invented to avoid plastics in 'single use' instances. Made usually of millet, the cutlery can be used then eaten and can be made in many different shapes and sizes.

Healthy Living

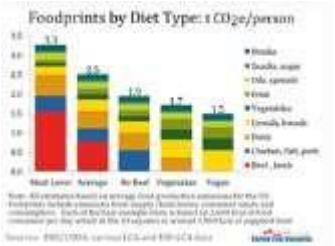
Bioelectronics, small electronic implants, are nearing practicality – hopefully within 10 years - to help manage chronic conditions such as diabetes and hypertension.

There is growing understanding of the amount of sugar in various products, and why this is dangerous to health.

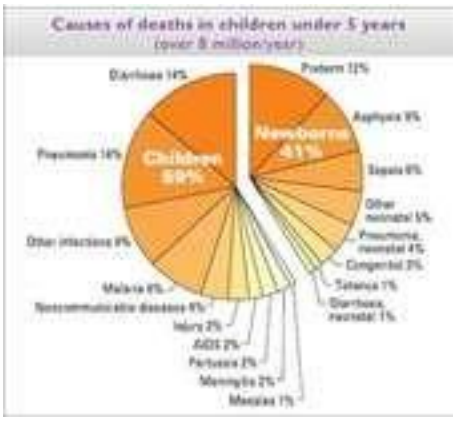
Diseases like elephantiasis, caused by a worm and causing misery to millions in tropical countries, can be prevented with simple pills, and using women to distribute the pills helps overcome resistance to taking the medicine.

Eating meat has a very large carbon footprint –from removing natural vegetation to provide grazing to growing grain to feed the animals. 18% of global emissions result from livestock, and our food systems count for up to a quarter of all human emissions (12% from agricultural production, 9% from farming induced deforestation and 3% from refrigeration and transport). Cutting your meat consumption has big health benefits as well. The growing population, coupled by increased prosperity, is rapidly increasing the demand for meat around the world.

A healthy diet is an essential part of a healthy lifestyle, combined with physical activity it will maintain a healthy weight, reduce risks of chronic diseases such as heart disease and cancer and promote your overall wellbeing. A diet rich in fruits and vegetables, minimising refined sugars and fats gives you the best possible chance of a long and healthy life.



In Northern Ireland death of children under 5 years is higher than elsewhere in the UK, and are related to poverty, obesity, accidents and low levels of breastfeeding. In the developing world diseases are much more common as causes of death.



Transport

Modern electric and maglev trains are non-polluting, comfortable and very fast – up to more than 40 miles per hour- but do require supporting infrastructure.

Trams, busses and trolleybuses and other mass transit systems can be highly effective, non-polluting and cost effective, but generally require large populations moving in predictable directions to be financially viable. Most cities are now opting for 'freely moving' vehicles not constrained by tracks or wires.

Electric cars are becoming increasingly affordable and common; the network of charging points is improving and encouraging use. Range is now up to 300 miles for some models. Hydrogen fuel cell cars are also becoming viable, though will require major infrastructure for full usefulness.

'Driverless' cars are fast becoming practical and are likely to revolutionize how we travel. By reducing accidents, pollution and time lost due to congestion the cars may also totally change the way cities 'work' and the attitudes to car ownership. Single occupancy pods, rentals like city centre bicycles, modular 'chains' for long distance travel, the possibilities are immense.

Rentable cycles are available in many cities, including Belfast, providing transport around the city without the need for cars. Coupled with electric cars or trams and an increased emphasis on walking, can a car-free city be far behind?

High tech rickshaws can offer another opportunity for helping to declutter cities while maintaining access for all and movement of goods and people.

Improving the safety and image of walking will have major impacts on health and wellbeing as well as cutting down on congestion and pollution in cities.

India has pledged to have every single car electric by 2030; could Belfast not aim for a 'carbon free' city centre by that date using a combination of these technologies?

Biodiversity

Focussing on single types of animals, from seahorses to birds, can bring the complexities of ecosystems and their need for conservation to public and political minds. Programmes around the world work with local people to demonstrate how biodiversity conservation improves their lives and livelihoods.

Bees and other insects pollinate £ billions of crops each year – around three quarters of what we eat - around the world, but are being threatened by numerous diseases, parasites and pesticides. Identifying the causes of these deaths, of individuals and entire colonies, is a top priority globally; pesticides and fungicides are strongly implicated. Research is proceeding to identify the causes and provide solutions before these vital pollinators decrease even more; 10 million beehives, worth $2 billion, have been lost in the US in the last 6 years. B&Q has pledged to stop selling plants grown with pesticides that are harmful to bees.

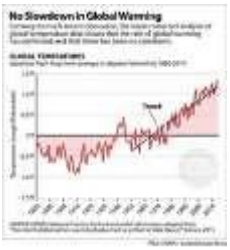
Intensive conservation efforts mean that some species are coming back from the brink of extinction.

Ten years after the discovery of a new species of palm in Madagascar scientists have found an additional population of it and are working with local people to protect it. The 'Suicide Palm', *Tahina spectabilis*, dies after flowering, a lifestyle very unusual in palm trees. A new school and well have been provided the local village from proceeds of the sale of the tree's seeds.

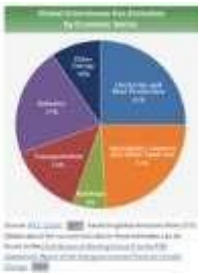
Planting trees in soils that have been degraded is a challenge, but a new watering system gives young trees the start they need to produce new forests in degraded land. Over 2 billion ha, the size of china and America, is degraded and tens of thousands of trees have successfully been planted in these fully biodegradable pods in more than 25 countries. Using local labour helps with livelihoods as well as improving the living conditions of people living in denuded areas.

A tiny butterfly was thought to have died out more than 15 years ago, but has been rediscovered in Co. Fermanagh.

Climate Change

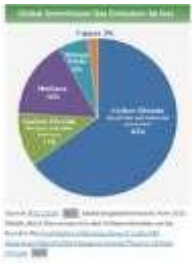


The concentration of carbon dioxide in 2016 reached 400 ppm, the highest in 3 million years; 2016 was the warmest year on record.



Deforestation is the cause of 11% of all GHG emitted by people, comparable to all car and truck emissions.

The Amazon rainforest is a massive store for carbon, and just 1% of the tree species sequester 50% of the regions carbon. But if the forest were to continue to be destroyed, this could turn into a massive 'carbon source', releasing huge amounts of stored carbon into the atmosphere.



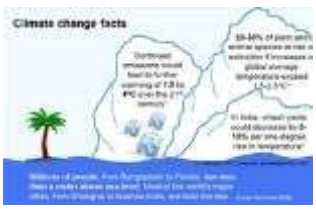
800 million people, 11% of the global population, are currently vulnerable to climate change impacts including droughts, floods, extreme weather events, heat waves and sea level rise.

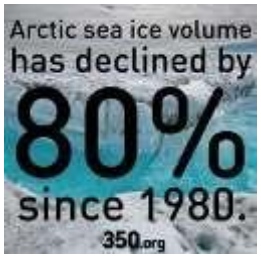
Coastal ecosystems, especially mangroves, are vital as they store up to 5 times as much carbon per hectare as tropical rainforest, but nearly 1 million ha are lost each year. Not only does this have massive climate impacts, it removes a buffer from extreme weather for coastal communities and a vital nursery for thousands of marine species, many of them economically important.

Saving ecosystems is more cost-effective than most human interventions to stop climate change. Tropical forests alone provide up to 30% of the solution towards climate change. However, such solutions only receive 2% of climate change funding.

194 nations signed up to the Paris Agreement to limit carbon emissions and attendant warming. Despite the USA reluctance to support its commitment, other countries are strong in their support for the agreement and providing the funding necessary for its implementation. The cost of adaptation is estimated at US$ 140 billion per year, less than 0.1% of global GDP.

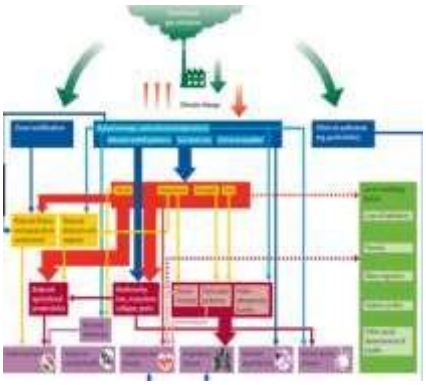
Most of the warming is increasing the temperature of the oceans. Impacts are exceptionally severe in the poles, with massive melting of icecaps taking place every year and the average temperature in the arctic setting new high levels each year.





Global Perspective

The impacts of climate change are overwhelmingly more significant for the poor and those living in the developing world. Solutions to global poverty require consideration of the impacts of climate change, direct and indirect, on those who suffer from climate change impacts such as drought, floods, sea level rise and extreme weather.

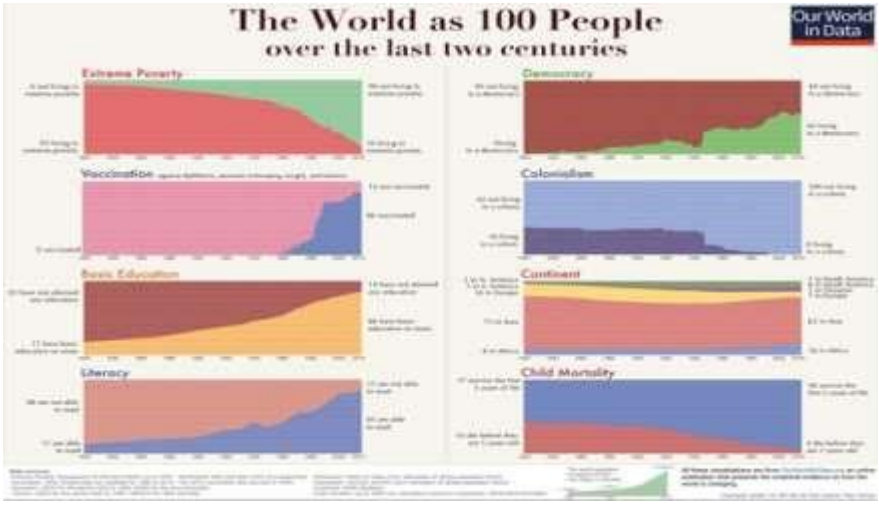


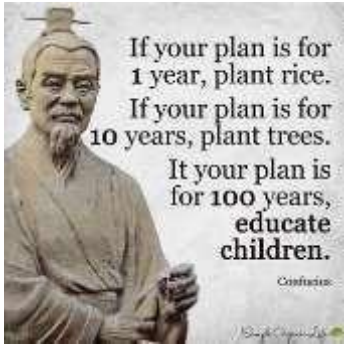
Many doctors in India deliver baby girls for free to stop abortions of female foetuses because of a preference for boys.

Surgeons help restore health and sight to millions of people, often based on high tech ships visiting areas with no access to normal hospitals. Called Mercy Ships, they have been operating since 1978 and performed more than 67,000 operations, including cleft lip repair, cataract removal, facial reconstruction and orthopaedic procedures.

Natural disasters and extreme weather events push 26 m people each year into poverty says the World Bank, at a cost of £416 bn per year, and this cost is increasing and made worse by climate change impacts. Building resistance to climate impacts is a moral imperative, and making countries more resilient and improving early warning could bring benefits of $100 bn per year.

It is important to understand the degree of differences between countries and within countries between those who are well off and those living in poverty. Addressing these contrasts is essential if global problems are to be solved. There have been many changes and advances in the last two centuries, but much inequality and inequity remains. Delivering the Sustainable Development Goals is a powerful way to address this.





Outdoor Learning

School grounds are rich in heritage and can be a source of inspiration for learning about changes in society, why and how these have happened and their impact on the environment. Much of the formal curriculum can be taught outside and indeed some aspects of learning can only be taught outside. However, many other elements of the curriculum benefit from the use of the outdoor environment.

School grounds can be designed and used as a setting for lessons – using the outdoors to teach small groups or a whole class.

Pupils can learn about the outdoors through books, videos and the internet. However, children will learn much more if they can actually experience the things they are learning about. They will remember the minibeasts they are discovering if they get to handle them rather than just see the pictures. They will understand how the sun moves around the sky creating different shadows at different times of year and day if they see it happen in their own school grounds.

School grounds can often be limited to asphalt and playing fields, but there are few schools where more cannot be made of even limited areas. Sites can be developed for growing food, for wildlife areas such as woodlands, meadows or ponds, or even the most limited school grounds can provide space for bird feeders and mini-beast homes.

Taking trips into the environment can be extremely valuable in making lessons relevant and memorable. Parks, country parks, nature reserves and forests all provide great learning opportunities.