

# **ENGINEERING A PROSPEROUS AND SUSTAINABLE NATION.**

Institution of  
**MECHANICAL  
ENGINEERS**

**A Vision for Engineering in Scotland**

**Improving the world through engineering**





“ ”

**STRENGTHENING  
AND EXPANDING OUR  
MANUFACTURING BASE  
STILL OFFERS THE  
MOST REALISTIC ROUTE  
TOWARD A BALANCED  
AND SUSTAINABLE  
ECONOMY.**

**SIR ALAN RUDGE**

# ENGINEERING A STRONG AND SUSTAINABLE FUTURE FOR SCOTLAND.



Once a world leader in manufacturing industries, Scotland has seen its economy transform over the last 30 years, as reliance has shifted from heavy industry to a growing services sector. As seen throughout the UK, the recent global financial crisis has provided an opportunity for the next government to re-generate the manufacturing sector and rebalance the economy.

In 2009 the number of engineering companies in Scotland grew by 4.7%, with over 315,000 employees and a combined turnover of £60.8 billion. Yet alongside signs of recovery, there are still significant challenges ahead for manufacturing and engineering companies across the country.

For Scotland to become a key player in international trade and industry, decisions must be taken now in order to establish Scottish manufacturing on the world stage. To do this, the Government must establish and promote a long term economic vision, with manufacturing at the centre of any plan. Developing a 50plus-year economic roadmap is central to this, with emphasis on communication, connectivity and collaboration so that Scotland can re-establish itself as a premier manufacturing and technology nation.

The development of renewable technologies heralds a significant opportunity for the Scottish manufacturing sector. Encouraging the growth of the renewables sector will offer the potential to

create thousands of jobs as Scotland aims to become a premier location for the manufacture and deployment of renewable energy technologies, estimated to be worth £300 million per annum to the economy.

#### **Advice, experience, prosperity**

The Institution of Mechanical Engineers has over 93,000 members, 10% of whom are in Scotland, working across all sectors of the economy. We can:

- Provide independent advice and analysis on where to prioritise education and training funding.
- Offer industrial and academic expertise to assist in the consultation, development and implementation of national engineering policy for all economic sectors.
- Facilitate dialogue between industry, academia, Westminster and Holyrood on key engineering issues.
- Create solutions and policy development to help transition Scotland to a low-carbon economy, while protecting the population and critical assets from climatic changes.

#### **A voice with conviction and value**

The Institution is a globally respected and valued voice of engineering. We are the second-largest and fastest-growing engineering institution in the UK. Our commitment is to provide impartial engineering perspectives on a wide range of topics, from an engineering response to climate change, education and critical skills, to energy production and distribution. If you have a question, we will have an answer.

**WHAT SHOULD OUR  
GOVERNMENT DO?  
FOR OUR ENVIRONMENT:  
PRESENT AND FUTURE.**



Current environmental legislation in Scotland is almost entirely based on climate change mitigation strategies; however this is only one part of the future solution. We need to act now to protect our citizens, villages, towns and critical assets by building resilience and adapting to future climate change. Controlled and timely action will, in the long term, save Scotland money, disruption to our economic growth and potential loss of life.

The environment is not an isolated concept and must be subject to the principles of sustainability. Just as in the past, considering economic impacts alone has led to environmental damage, we must now be careful that a focus purely on environmental issues does not lead to societal and economic harm.

Setting highly ambitious greenhouse gas (GHG) reduction targets for 2020 is commendable but requires a review of current accounting practice to ensure that targets are not simply achieved by 'offshoring' the GHG emissions problem. Much of Scotland's manufacturing capability has been lost abroad over the last 30 years, and we cannot continue to ignore the GHG emissions of products manufactured overseas and shipped to the UK.

#### **Government should:**

- Adopt a national roadmap for climate change. Spanning at least 100 years, the roadmap should include adaptation and appropriate geo-engineering approaches, such as air capture technology, in addition to mitigation strategies.
- Invest in strategic mitigation, adaptation and geo-engineering technologies as a major employment, infrastructure and economic driver for Scotland.
- Above all, ensure that all its activities, strategies and policies are genuinely sustainable, considering their full societal and economic impacts, not just the environmental ones.



**FAILURE TO COMBAT CLIMATE  
CHANGE WILL INCREASE  
POVERTY AND HARDSHIP.**

**BAN KI-MOON**

**WHAT SHOULD OUR  
GOVERNMENT DO?**

**ON ENERGY:  
TO POWER  
OUR NATION.**





Scotland's natural resource base for renewables is immense. However, much of this comprises intermittent wind, wave and tidal energy, requiring back-up from other energy sources. Without greater investment in energy-from-biomass and energy-from-waste this back-up supply will have to come from fossil fuels, which are largely imported and in diminishing supply. Research & development is also required into storage options for intermittent renewable energy, so that outputs can be stored at off-peak times to level out generation when conditions lead to reduced capacity.

Even if 20% of energy demand is met by renewable resources by 2020, 80% of demand will still be reliant on fossil and nuclear sources. Yet for Scotland to continue to prosper economically and for more people to avoid the fuel poverty trap, it is important to break our fossil habit, improve energy security and reduce our growing demand for energy.

The Institution has devised an Energy Hierarchy which offers a common-sense, cost-effective, sustainable energy policy, prioritising a reduction in energy use. The remaining energy demand is met by using the cleanest energy options possible.

For energy policy to be sustainable, it is essential that Scotland continues to support a broad portfolio of energy sources.

#### **Government should:**

- Adopt and promote our Energy Hierarchy, focusing on energy demand reduction and efficiency. We cannot simply continue to consume more and more energy with the finite resources available.
- Considerably increase funding for research, development, demonstration and deployment in renewable energy technologies and foster the manufacture of these technologies in Scotland. The benefit to Scotland will be in increased energy security and the potential of becoming a global leader in new energy technologies with significant employment and export prospects.
- Balance large-scale electricity generation with local smaller-scale distributed energy systems, especially where electricity and heat, produced increasingly from renewable sources, can be utilised for the local population.
- Ensure all new and existing thermal energy plants are designed as Combined Heat & Power or equipped with waste heat recovery systems to provide more sustainable heat supply to industry and buildings.

**WHAT SHOULD OUR  
GOVERNMENT DO?  
ON TRANSPORT:  
KEEPING SCOTLAND  
MOVING.**



It is vital to the Scottish economy that we are able to transport people and freight to their desired destinations quickly, efficiently, and with the least impact on the environment.

Connectivity with London and the rest of Europe is also vital in order to maintain commercial links and ensure Scotland's ability to be a player in international economic development. High-speed rail will have both environmental and economic benefits for Scotland, as well as keeping the transport system working properly and reducing the need for air travel.

An independent transport policy has allowed Scotland's rail network to improve remarkably since the devolution of all powers in 2006, with 23% of the network already electrified and Transport Scotland committed to installing electric power lines on more than 200 miles of rail track in the central belt by 2016.

Recent figures show that while overall carbon dioxide emissions have fallen 20% since 1990, emissions from the transport sector have in fact risen 7%. With road travel accounting for over 90% of transport emissions, widespread adoption of electric vehicles is fundamental to Scotland's ability to change.

Each year ports in Scotland handle over 100 million tonnes of freight. Initiatives such as the Freight Facilities Grant play a vital role in reducing reliance on Scottish roads every year. It is important to develop a policy framework that incentivises increased use of naturally low emissions modes for freight and passenger use, replacing less sustainable options and reducing pressure on our roads.

#### **Government should:**

- Puts pressure on Westminster to ensure that the new High-speed rail route is extended to Scotland at the earliest possible opportunity.
- Create a rail freight system that reduces road congestion and emissions from long-haul goods vehicles.
- Play a central role in ensuring consistent infrastructure strategies across Scotland.



**TRANSPORT PLAYS  
AN IMPORTANT ROLE  
IN THE ECONOMY.**

**SIR ROD EDDINGTON**

# WHAT SHOULD OUR GOVERNMENT DO? ON SKILLS AND EDUCATION: ENSURING OUR FUTURE ECONOMIC WEALTH AND SUCCESS.



The Scottish education system is highly regarded internationally at all levels. It is no surprise therefore that Scotland has a history of creativity and innovation in Science, Technology, Engineering and Mathematics (STEM).

Along with a supportive economic climate, a skilled workforce is essential to building long-term competitive advantage and sustainable growth. Investment in the future engineering workforce is an urgent need; reasons for this include:

- Meeting Scottish growth targets and fulfilling economic potential will depend on a significant increase in the number of engineers available;
- The need to respond to future challenges and opportunities (such as the effects of climate change);
- Investment in the whole education system, from primary to doctoral research has proven benefits for the individual as well as the economy;
- It takes up to ten years to educate and train a productive engineer or technician.

Fostering Scottish engineering talent should start from an early age – many children form a broad understanding of their future career paths during their primary school years. Good exposure to STEM gives children the opportunity to develop their innate interest in the world around them and to better understand it. This is enabling and widely beneficial, as STEM subjects form the basis for

the creativity, enterprise and research skills that underpin engineering success and that are sought after by all sectors of the economy.

#### **Government should:**

- Commit to a strong STEM focus in the classroom starting from an early age; children should be provided with a thought-provoking curriculum, encouraged to ask questions and to seek creative solutions (Curriculum for Excellence is an important way of addressing this);
- Work with industry to encourage the provision and uptake of apprenticeships and graduate training;
- Ensure that funding for undergraduate engineering degree courses enables Scottish universities to accept all suitably motivated and qualified applicants.
- Encourage and incentivise strategic relationships between business and academia, so that the STEM curriculum at all levels evolves to meet the changing needs of industry.

# A POSITION OF AUTHORITY A POSITION TO HELP.

Engineering is at the heart of all things we do as a nation. Its value and importance will ensure Scotland remains a highly innovative, highly skilled manufacturing nation. But to succeed, we need your voice and support for this valuable economic sector.

The Institution of Mechanical Engineers can offer you advice and guidance to ensure you are fully briefed on all areas of engineering: from energy, to the environment, to transport, to education, to the health and wellbeing of our population. If you need help or advice, we offer a number of impartial services:

## Advice and Assistance

With 93,000 professional engineers and technicians in the UK including over 10,000 in Scotland, we can provide you with help and advice on any engineering subject area. If you have a question, we have the answer.

For help or advice, contact the public affairs team on 020 7973 1293 or email [publicaffairs@imeche.org](mailto:publicaffairs@imeche.org)

## Policy Statements

The Institution produces a wide range of engineering policy statements, all readily downloadable, that are specifically designed for the public affairs environment. They contain concise background information on the chosen subject and practical engineering recommendations and solutions. [www.imeche.org/policy](http://www.imeche.org/policy)

Summaries of all our policy statements and key statistics can be accessed through our free iPhone app. [www.imeche.org/iphoneapp](http://www.imeche.org/iphoneapp)

## Policy and Report Development

The Institution produces reports on a wide range of engineering subjects of media and public interest. Our recent publications on climate change, population and manufacturing have all generated substantial publicity for UK engineering plc.

To discuss ways in which we can help you develop policy or engineering topic reports, contact Richard Campbell on 020 7304 6833 or email [r\\_campbell@imeche.org](mailto:r_campbell@imeche.org)





**Institution of  
Mechanical Engineers**

1 Birdcage Walk  
Westminster  
London SW1H 9JJ

T +44 (0)20 7973 1293  
F +44 (0)20 7222 8553

[publicaffairs@imeche.org](mailto:publicaffairs@imeche.org)  
[www.imeche.org](http://www.imeche.org)