

TEACHERS' NOTES

Introduction

Norway is Europe's most northerly country with many distinctive features which offer an excellent basis for teaching and learning opportunities in the Scottish geography curriculum. Norway also has close historical, economic and cultural links with Scotland.

The main body of this pack consists of twelve cards, six of which are in full colour and provide basic information in a lively and informative way. The other six are photocopiable pupil activities, designed to assist knowledge and understanding; develop skills of interpretation and evaluation and, most importantly, help to develop informed attitudes about the culture and way of life of other countries; the responsible development and exploitation of natural resources and the conservation and protection of the environment. The cards are supported by a case study of the Sima hydro-electric power station, six large photographs and a poster-size map of Norway.

Norway should be placed in context as a modern, industrialised country with strong links to the UK.

The resource lends itself best to supporting the 5–14 curriculum in Scotland in the attainment outcome 'Understanding People and Place' and, in particular, in stages P7–S2. This does not preclude possible applications in other areas of the curriculum which might range from Standard grade topics such as 'Trade and Aid' to aspects of the European Environmental Issues Short Course (e.g. Acid Rain). European Environmental Issues, of course, form an important part of the Intermediate level geography syllabus being proposed for the Higher Still curriculum framework.

Historical context

The area named Norway has been inhabited for thousands of years, but the Kingdom of Norway first came into being about AD 900. The Norwegian Vikings founded many settlements in Britain, France, Ireland, Iceland and Greenland, and reached North America 500 years before Columbus.

After a period of internal feuding and the Black Death (which wiped out almost two-thirds of Norway's population), the country came under Danish rule from 1380 until 1814. Thereafter, Norway was united with Sweden until the association was peacefully dissolved in 1905, when Norway became fully independent. Since 1905, Norway has gradually developed from a mainly farming and fishing society into a modern industrial nation.

During World War 2, when Norway was occupied by Germany, the King and Government sought refuge in Britain. From here, the Free Norwegian Armed Forces were established and subsequently played an active part in the Allied war effort. Norway's large merchant navy made a vital contribution to the provision of Allied supplies.

In the post-war years, Norway has been an active participant in international cooperation, including in the areas of defence, trade and protection of the environment, and has enjoyed particularly close ties with other West European countries and the USA.

Notes on the cards

Cards 1a/b/c/d – 'The way to the north'/Glaciers and fjords

Card 1a The first task will be to draw attention to Norway's location in relation to Britain. Pupils should particularly note Norway's latitudinal extent, which has a great bearing on aspects such as climate, vegetation, land use and, ultimately, the distribution of the population. Norway's southernmost tip is at a latitude just north of Aberdeen while its most northerly point at Nordkapp is 1750 km further north and well beyond the Arctic Circle.

Geologically, the mountains of Norway and Scotland are similar in origin and were formed during the Caledonian period of mountain-building 400–500 million years ago. The ancient nature of the rock has resulted in mountains which are merely the eroded stumps of the original mountain chain. As a result, rarely do the mountains in southern Norway exhibit the sharp jagged peaks which characterise the younger fold mountains elsewhere in Europe, such as those found in the Alps.

Relevance of *Look at Norway!* to Social Subjects: Understanding People and Place

ATTAINMENT TARGETS	Cards						Case study
	1	2	3	4	5	6	
Knowledge and understanding	•	•	•	•	•	•	•
Planning	•	•	•	•	•	•	•
Collecting evidence	•	•			•		
Recording and presenting	•	•	•	•	•	•	•
Interpreting and evaluating	•	•	•	•	•	•	•
Developing informed attitudes	•	•	•	•	•	•	•

KEY FEATURES

SS1 Aspects of the physical and built environment

Weather forecasting	•	•		•			
Climatic patterns	•	•	•	•			
Weathering and landforms	•			•	•		
Land formation	•						
Settlements	•		•	•			

SS2 Ways in which places have affected people and people have used and affected places

Extreme physical events	•	•	•	•			
Resource usage			•	•	•	•	•
Population	•		•	•	•	•	•
Boundaries and barriers	•		•	•			
Environmental issues			•	•	•	•	•
Landscapes	•		•	•			•

SS3 Locations, linkages and networks

Interdependence	•	•	•	•	•	•	•
Transport networks	•			•		•	
Global transport						•	

SS4 Making and using maps

Mental maps	•	•				•	•
Making maps	•						
Map skills	•			•			•
Specialist maps	•	•			•		
Sketch maps	•	•				•	

During the period of mountain-building the original sedimentary rocks were metamorphosed by the pressures brought about by crustal movement. This, along with some intrusion of material of volcanic origin, led to the limited formation of some mineral deposits, for example copper and titanium.

Card 1b Since the early phase of mountain-building, the principal influence on the landscape has been the work of ice. Over the past two million years there have been over 30 Ice Ages in Europe, with the last one ending about 10 000 years ago. The accumulation of snow and ice covered the whole of Norway, then spread over the North Sea to merge with the Scottish ice-cap. At its maximum extent, the ice in Britain reached as far south as North Yorkshire. Evidence for this movement exists in the presence of glacial erratics in North Yorkshire and elsewhere. These are rocks deposited by the melting ice at the end of the Ice Age which have been proved to be Norwegian in origin.

The glaciers associated with the Ice Age were responsible for the production of much of Norway's distinctive scenery, most notably the fjords of the south-west which remain the country's major tourist attraction. The fjords are over-deepened glacial valleys which became drowned following the rise in sea level after the Ice Age. Elsewhere, the melting of the ice left deposits of glacial moraine which provide some of the flattest and most fertile land in Norway, notably in the south-east. It should be noted that an ice cap and glaciers still remain on some of the higher mountains.

Card 1c begins with a simple exercise in atlas skills which can be used as an extension to the key feature of 'making and using maps' (SS4) and includes revision in calculating distance and direction. The next two exercises go some way to meeting the requirements of SS2 in examining the population density and distribution. This shows just how sparsely populated Norway is in relation to Britain. A choropleth map clearly indicates the uneven distribution with its heavy bias towards the south. Pupils should be able to link this distribution to the nature of the environment and may be asked to consider alternative methods of illustrating the relationship.

Card 1d can help to meet some of the requirements of SS1, and in particular the study of glaciation, either for the first time or as reinforcement of earlier work. One exercise looks at a river valley before and after glaciation with the requirement to add labels in the correct place. The other requires the drawing of a longitudinal section of Sognefjord using data from Card 1b. No great margin of accuracy is required here, but the task will provide some practice in the skill of graphicacy. It should also highlight the main features of a fjord, to compare with the sea lochs of western Scotland which were formed in the same way.

The same exercise can touch on some aspects of SS3 which look at Locations, Linkages and Networks. Consideration of the role of ferries, bridges and tunnels in Norway might lead to discussions about issues closer to home, such as the social and economic impact of geographical remoteness and controversies such as the Skye Bridge tolls, for example.

Cards 2a/b/c/d – A variable climate/Wetter west, drier east

These cards look at the climate of Norway and the factors which bear upon it. The most important of these are the effects of latitude and proximity to the sea. The main curricular link would be to SS1, 'Aspects of the Physical Environment', and some aspects of SS2, namely 'ways in which places have affected people'.

Reasons for the decline in temperature with increasing latitude, and seasonal effects leading to differing lengths of day and night, should already have been covered in the science attainment outcome 'Understanding Earth and Space'. However, it may be necessary to revisit these concepts before embarking on some of the exercises relating to Cards 2.

Card 2a Pupils should note that in Norway in January the fall in temperature is from west to east, with the result that in winter the temperatures in the eastern part of the country may be very low indeed. At the same time from north to south the sea remains ice-free all year to well beyond the Arctic Circle. Indeed, in some years the sea can be ice-free to as far north as Kirkenes near the Norwegian-Russian border.

The consequences of these temperatures for the economy of Norway are very important. For example, ice-free waters and ports allow fishing and shipping to take place in winter, including the export of Swedish iron ore from Narvik, which might otherwise have been impossible at such high latitudes.

Pupils should consider the effects of ocean currents (compare with western Scotland) and the differing natures of continental and maritime climates. The card also refers to the effects of increasing altitude on the average temperatures in an area.

Card 2b contains a map which looks at rainfall and its relationship to the relief of Norway.

Card 2c Variations in the duration of nights and days are also included here and pupils are required to complete a graph for Tromsø. Group discussion on the implications of prolonged hours of darkness might consider economic factors (e.g. lighting), social factors (e.g. travel to school or leisure pursuits), and even issues such as the phenomenon first recognised in North America, namely a form of depression known as 'cabin fever' brought about by long periods of confinement and inactivity as a result of the harsh weather or lack of daylight.

Card 2d The completion of climate graphs for Bergen and Oslo should allow comparison with west-east differences in Scotland for prevailing wind direction, relief and rain shadow effects. Note the increase in rain in the summer months in Oslo which might require reference to convectional or cyclonic rainfall.

Cards 3a/b/c/d – The forest ecosystem/The tundra ecosystem

Card 3a Forests cover a larger area of productive land than any other land use in Norway. Wood provides a valuable resource as the raw material for a pulp and paper industry which is a successful exporter of high-class products. A section headed 'Valuable trees' outlines how trees are used after they are felled.

Cards 2 illustrated some of the key features of SS2, notably 'ways in which places have affected people'. In Cards 3 the emphasis has changed to the complementary aspect of SS2, namely how 'people have used and affected places'.

The study of Norwegian forestry can provide a good basis for considering a whole range of important environmental issues. The first of these relates to resource management and the importance the Norwegians place on conservation. Uncontrolled clearance of forests in the latter part of the 19th century led to fears for their long-term future. Since then, a combination of incentives and legislation has led to an impressive recovery which has produced an annual tree growth that is nearly twice the rate of harvest.

In addition, Norwegians are a very outdoor people and activities such as walking, climbing, skiing (especially cross-country) and angling are very popular. Many Norwegians have second homes in the countryside. It is considered vital that the land is accessible for recreation. These issues strike a rich vein for discussion which can be compared and contrasted with similar concerns in Scotland, for example problems faced by communities in which there is a large number of second homes; issues of access and land ownership; problems of balancing access with that of over-usage, as in the Cairngorms.

A further issue of concern in Norway is the effects of acid rain. Norway has been at the forefront in Europe of enacting legislation to reduce air-borne pollution.

Card 3b To the north of the forest zone is the complex and fragile tundra ecosystem which has a surprisingly large range of flora and fauna. The tundra in Norway is also the home of the Sami people. Although most Sami are now fully integrated into mainstream Norwegian society, some have maintained elements of their original identity and culture, such as herding reindeer. However, here too conservation is vital. To prevent overgrazing in a very fragile environment, culling must be practised. It serves to control numbers and eliminates older and weaker animals.

Card 3c Two pie charts compare the land use of Norway with that of Britain and include a number of associated questions including how trees are adapted to survive the severe winters.

Card 3d Two exercises should enable pupils to appreciate the linkages between the climate, the vegetation, the fauna and of living things to each other, so meeting some of the requirement of key features SS3.

One of the exercises looks at the old and new lifestyles of the Sami people. Pupils might be asked to consider the effects on the tundra ecosystem of some of these changes. In addition, discussion might include the implications of improved communications (in their widest sense) and the danger to the tundra ecosystem which might arise from increased tourism in the area.

Cards 4a/b/c/d – The challenge of farming/ Fishing – a proud tradition

Card 4a The total agricultural area of Norway is only 1 million hectares, representing about 3% of the total land area. Widespread mountainous terrain, a short growing season, severe winters and long distances to markets combine to produce conditions for farming that are less than ideal. For the last few decades, the number of farms has been declining steadily. However, the amount of land under cultivation has remained fairly stable.

It should be pointed out that Norwegian agricultural policy is an integral part of regional policy, which is aimed at maintaining employment and settlement in rural districts. This can only be done with a variety of support schemes, most of which require direct financial subsidy. There is a strong tradition of family ownership of farms in Norway and farms are passed on through the generations, with the eldest child having the legal right of inheritance.

Pupils should note that most farmers also have other jobs and traditionally these have had a different seasonal focus. For example, farming was carried on in the summer and fishing and/or forestry in the winter.

Card 4b considers the historical importance of fishing and current fishing practices. In the fishing industry, there is also a long tradition of dual employment – farming in the summer and fishing in the winter. In recent years however, there has been a gradual shift to work on oil rigs as an alternative, with farmers spending alternate periods on the rig and the farm. Farm work is carried out by other members of the family in the farmer's absence.

As in other areas, Norway has tackled the problem of fish conservation with considerable vigour. Stocks of fish declined drastically in the 1960s and 1970s as the result of over-fishing brought about by a combination of factors such as improved technology (echo-sounders), larger ships, bigger and better nets, and fishing by other nations.

In 1977, Norway succeeded in establishing an exclusive 200-mile (320 km) economic zone off its coast. This, with strict limits imposed on the catching of many species in the 1980s, allowed stocks to recover to the extent that catches are now quite healthy. Continuing efforts are being made to ensure that catches are sustainable. Pupils may compare this with the situation in Britain.

The lengthy coastline (over 21 000 km, including fjords) is particularly well suited to fish farming, and this has been one of Norway's fastest-growing industries in recent years. Norway is now the world's leading producer of farmed (Atlantic) salmon. There are strict regulations governing the industry to ensure that production methods are environmentally friendly, to avoid disease and to secure stable markets.

Card 4c A series of exercises summarises the difficulties of farming in Norway. Ready comparison can be made with the crofting situation in the west Highlands and Islands (small-scale, part-time, subsidised, farming combined with forestry and fishing etc.).

Card 4d The statistics underline the importance of cod, especially in the vicinity of the Lofoten Islands and predominantly in the winter months. Here attention could be drawn to the importance of continental shelves, shallow water, plankton and sunlight. The final exercise looks at salmon farming and some of the related issues.

Cards 5a/b/c/d – Energy from oil and gas/Energy from water

Norway is rich in energy resources. The Norwegian continental shelf contains large amounts of crude oil and gas. In addition, the many mountains and waterfalls provide an ample source of hydro-electricity. The pupil cards on this topic are supported by a case study on the Sima hydro-electric power station.

Card 5a Oil and natural gas provide a large proportion of Norway's wealth. The major part of it is exported – the result of a small population and hydro-electric power available for home consumption.

Norway's production of crude oil now exceeds 3 million barrels per day and is expected to increase in the years to come. More than 90% of the oil from Norway's continental shelf is exported, making Norway the world's second largest oil exporter after Saudi Arabia.

Moreover, Norway's production of petroleum gas is increasing rapidly and will soon make Norway the fifth largest gas exporter in the world. The Troll gas field alone, with its massive platform rising 472 metres from the ocean floor off the coast of Bergen, will meet 25% of Europe's gas needs by 2010. Additional gas fields are known to exist further north in the Norwegian Sea. The present and future importance of exports can be gauged in part by the network of pipelines shown on the map in Figure A, and there is the likelihood of a further gas pipeline which will supply France.

Proven oil and gas reserves in the Norwegian sector amount to some 50–60% of Western Europe's total reserves. Pupils should be warned, however, that estimates of reserves are unreliable and are usually underestimated. Current estimates never allow for the discovery of new fields or for the development of new extraction technology.

Environmental considerations are an integral part of Norway's petroleum policy, and fuels which will increase carbon dioxide levels are heavily taxed. Discussions are now going on in Norway about the building of two gas-fired power stations at Kollsnes and Kårstø in western Norway. Electricity from these power stations is

intended for export. Gas-fired power stations pollute more than hydro-electric ones. Quite a few Norwegians are therefore opposed to gas-fired power stations. However, if electricity generated by gas were exported to Norway's Scandinavian neighbours, replacing that produced by their own even more polluting coal-fired plants, the total pollution levels in these countries would still be reduced.

Card 5b About 25–30% of Norway's 4000 river systems have been exploited for the production of hydro-electricity, and almost all of the country's electricity is supplied from this source. Norway has 550 generating plants in operation, including some 200 underground installations, 250 dams over 15 metres in height and more than 3500 kilometres of hydro-electric power tunnels. The card makes the link between the availability of plentiful energy and the development of heavy industry.

Pupils should appreciate the difference between power stations which use a large volume of water but have a short head and those with a large head of water but a small volume. The former are found mainly in the longer river systems of eastern Norway, whereas the latter have been built to use the short, steep rivers of the west, sometimes combining the flow of several rivers – as the case study example of Sima shows. A link is made between the location of large power stations and population density.

Environmental aspects of hydro-electric power stations are further explored in the case study.

Card 5c A series of exercises involves the drawing of graphs showing production figures and answering related questions. Pupils should already be familiar with various aspects of the geography of oil production, having presumably studied it in a Scottish context.

Comparison here might be made with the UK, which started to develop its oil and gas fields earlier than Norway. The UK's production of crude oil is today somewhat lower than Norway's. Its gas production is nearly double that of Norway, but Norway's estimated gas reserves are larger. It is likely that the bulk of oil and gas production will continue to be exported to other European countries.

Card 5d One exercise asks pupils to use their knowledge of the different regions to analyse the pattern of electricity production and consumption on a particular day. It also asks them to forecast the production and consumption of energy in the summer: smaller amounts of hydro-electricity would be produced, because less would be used, and water would be stored in reservoirs for times of lower rainfall.

Cards 6a/b/c/d – Industry and research/Trade and international relations

Card 6a explores the nature of Norwegian industry, which has been determined largely by four main factors: its raw materials; its small population, which precludes large-scale labour-intensive industries; the availability of hydro-electricity; and its long association with the sea.

The traditional manufacturing industries such as metal extraction and processing, fish processing and the pulp and paper industry are still important to Norway. However, much of Norwegian industry is now more diverse and advanced. High-technology products represent an important part of the country's economy. Norway develops and exports advanced offshore technology and is at the forefront of technological developments in areas within engineering and construction, energy generation, telecommunications and data processing, the manufacture of car components, the aerospace industry, the construction of high-speed ships and the production of timber and building materials. Furthermore, environmental technology is one of Norway's fastest-growing exports.

Card 6b continues the theme of an export-led economy by looking at Norway's trade, its shipping interests and its interdependence with other countries. The importance of the rich countries' contribution to foreign aid is highlighted. In this respect Norway is one of the world's greatest contributors.

Card 6c Pupils investigate the country's occupation structure and then go on to compare it with another developed country (United Kingdom) and a developing country (Nigeria).

Card 6d The completion of a map showing Norway's trading partners illustrates its close ties with the EU even though it has chosen not to become a full member. The final questions look at issues of development.

Cards CS/a/b/c/d/e/f – Case study: Sima power station

As an extension to Cards 5, a case study of the Sima hydro-electric power station provides additional information on how hydro-electricity is produced. It also highlights some of the issues related to renewable and non-renewable forms of energy. The in-depth nature of this information makes it particularly suitable for use as the basis of a pupil investigation or enquiry (perhaps Levels D and E) on topics including energy issues, land-use conflicts or general studies related to the conservation of the environment.

The Sima power station, which went into production in 1980, is the second largest in Norway. Although the annual rainfall is over 2000 mm, much of this falls in winter as snow and cannot be used until spring or summer when it melts. Demand for electricity, of course, is greatest in winter, when extra lighting and heating are required. To overcome these seasonal variations, a complex network of tunnels links several river basins, making more water available in periods of peak demand.

Card CS/c allows pupils to compare renewable and non-renewable sources of energy. It explores Norway's seasonal imports of electricity from other Scandinavian countries, notably Denmark, where it is produced in coal-burning stations. The Norwegian authorities are looking to reduce the net imports of electricity by encouraging better energy efficiency, promoting the use of bio-energy, and by improving and expanding the existing hydro-electricity system.

Discussions are being held about the building of two gas-fired stations at Kollsnes and Kårstø in western Norway. Electricity from these power stations would be intended for export.

Cards CS/d/e/f contain a series of questions based on the Sima information and a variety of tasks including labelling diagrams and interpreting graphs. Considerable emphasis is placed on comparing renewable and non-renewable energy issues. There are opportunities for group work to discuss the Government's decision to permit the building of the gas-fired stations, using arguments for and against the various options available. This could be extended in the form of a role play exercise or a mock debate.

Norway on the Internet

The following site contains information, in English, provided by the Norwegian Government:

<http://odin.dep.no/html/english/norway.html>

It contains a wealth of data, including:

- Introducing Norway for young people
<http://odin.dep.no/ud/publ/96/norway/>

- Facts and figures about Norway
<http://odin.dep.no/ud/publ/minifakta/index.htm>

Facts and figures are provided on a number of topics. Those most relevant to *Look at Norway!* are:

- Geography • Climate • Environment
- Demographic data, Health • Consumption, Living conditions, Wages • Foreign trade • Industries • Energy
- Transport and communications, Tourism

There are also links to other Internet sites with information about Norway. Go to <http://www.lookatnorway.org.uk>

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