GCE A level

1204/01

GEOGRAPHY – G4
Sustainability

A.M. FRIDAY, 14 June 2013

1¾ hours

ADDITIONAL MATERIALS

In addition to this question paper, you will need a pink WJEC 20 page book, which has been specifically designed for this examination paper. No other style of answer book should be used. Should you run out of space, use a standard 4 page continuation book.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Answer **all** questions.

Write your answers in the separate answer book provided, following the instructions on the front of the answer book.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication used in your answers.

You are reminded that this paper is synoptic and so will assess your ability to draw on your understanding of the connections between the different aspects of the subject represented in the geography specification.

Even where not specifically asked for, you should support your answer with examples and/or case studies.

Answer **all** *questions.*

SECTION A

In this section you may use information from the **Resource Folder** *and your own research.*

0 1 For **one or more** countries, outline variations in patterns of food consumption. [10]
(approximately 13 minutes)

0 2 Explain why there are increasing demands for energy in **one or more** countries. [10]
(approximately 13 minutes)

0 3 Outline physical challenges to food production in **one or more** countries or regions. [10]
(approximately 13 minutes)

0 4 'In order to meet growing demands for energy, land use must switch from food crops to energy crops.'
How far do you agree with this statement? [25]
(approximately 33 minutes)

SECTION B

In this section you may use information from any of your studies for AS and A2 Geography as well as from the Resource Folder and your own research.

0 5 Describe ways in which the quality of the environment causes concerns in cities.
To what extent can sustainable solutions be found to meet these concerns? [25]
(approximately 33 minutes)

GCE A level

1204/01-A

GEOGRAPHY – G4
Sustainability

A.M. FRIDAY, 14 June 2013

Examination copy

To be given out at the start of the examination.

The pre-release copy must not be used.

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RESOURCE FOLDER

ADVICE TO CANDIDATES

In this synoptic exercise you will be assessed on your ability to **synthesise knowledge and understanding and skills** derived from your A level course.

You are reminded that assessment will take into account the quality of written communication used in your answers.

The main focus of the materials in this Resource Folder is related to the sustainability of food supplies and food consumption and energy in Vietnam. Wider issues in Vietnam that have implications for food supplies and energy are also examined. Some of these issues are also put into a global context.

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Contents

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BACKGROUND TO VIETNAM

Figure 1: Recent history of Vietnam

Vietnam (full official name Socialist Republic of Vietnam) is located in southeast Asia with many newly industrialised countries (NICs) as neighbours. Vietnam is a former French colony. France developed only the main cities of Saigon (Ho Chi Minh City) and Hanoi, but the majority of the country remained undeveloped. After independence there was civil war for many years. Throughout the civil war economic development was severely hindered with much of the infrastructure left by France destroyed. Modern Vietnam was established in 1976 and almost all of its economic development has occurred since then.

Although the government is communist, private enterprise has been encouraged since 1986. About 40% of GDP still comes from state-owned enterprises (SOEs), which concentrate on industries that will support future growth such as steel, chemical fertilisers and cement.

More recently, Vietnam's greatest asset has been cheap labour. This has attracted many overseas companies. Most do not build factories in Vietnam, but give contracts to Vietnamese manufacturers to produce goods for them. For example, Microsoft and Intel source new software from Vietnam.

Source: asiafoundation.org

Figure 2: Natural vegetation of Vietnam

93% of the land area of Vietnam was originally rainforest, with the remainder being well vegetated.

Today, 35% of Vietnam is still covered by natural rainforests. Agriculture covers 56% of the country, and much of this is devoted to plantations of tree crops. The areas of crop production are often mixed with natural rainforest areas. Little of the land is totally cleared, although the change from natural rainforest to cropland is accelerating.

Only 0.2% of the country is covered by urban areas although this figure is growing.

Source: earthtrends.wri.org

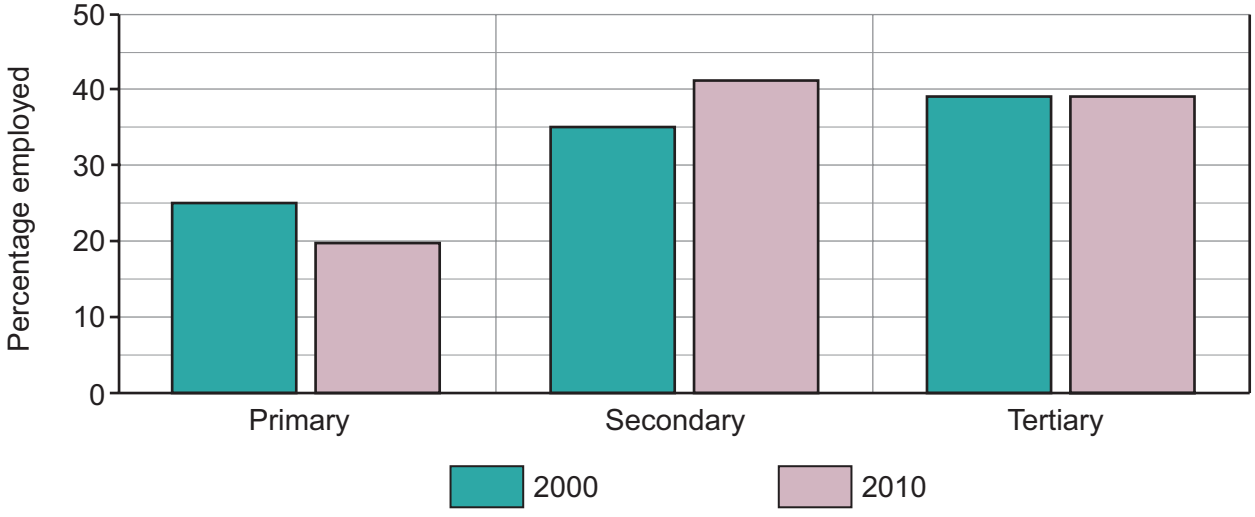
Figure 3: Selected indicators for France, Senegal and Vietnam (data available in 2012)

	France	Senegal	Vietnam
GDP/capita US$	35 156	1 871	3 359
GDP annual growth %	1·7	4·0	5·8
Average daily calorie intake	3 550	2 320	2 770
Average daily protein intake (grams)	113	59	72
Average energy use kgoe*/person/year	4 518·4	233·2	539·4
Total population millions	65·4	12·9	87·8
Natural increase per thousand	3·8	27·8	11·3
Life expectancy years	81	63	74
Malnourished, under 5 deaths/100 000	<1	14·5	20.2
Urban population %	76	50	26
Urbanisation rate % change/year	0.8	3.1	3.1
HDI (Rank)	0.884 (20)	0.459 (155)	0.593 (128)
Change in calorie intake 2000 – 2010 %	–2.5	+8.4	+9.9

* kgoe = kilograms oil equivalent

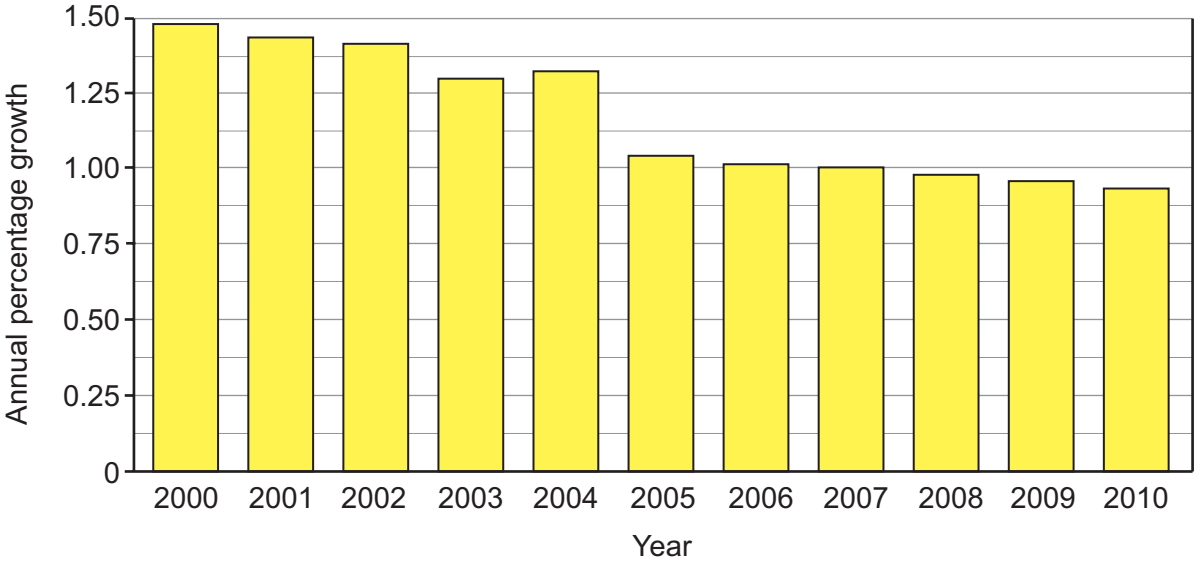
Sources: cia.gov and hdr.undp.org

Figure 4: Changing employment structure in Vietnam



Source: asiafoundation.org

Figure 5: Population growth rate change of Vietnam 2000 – 2010

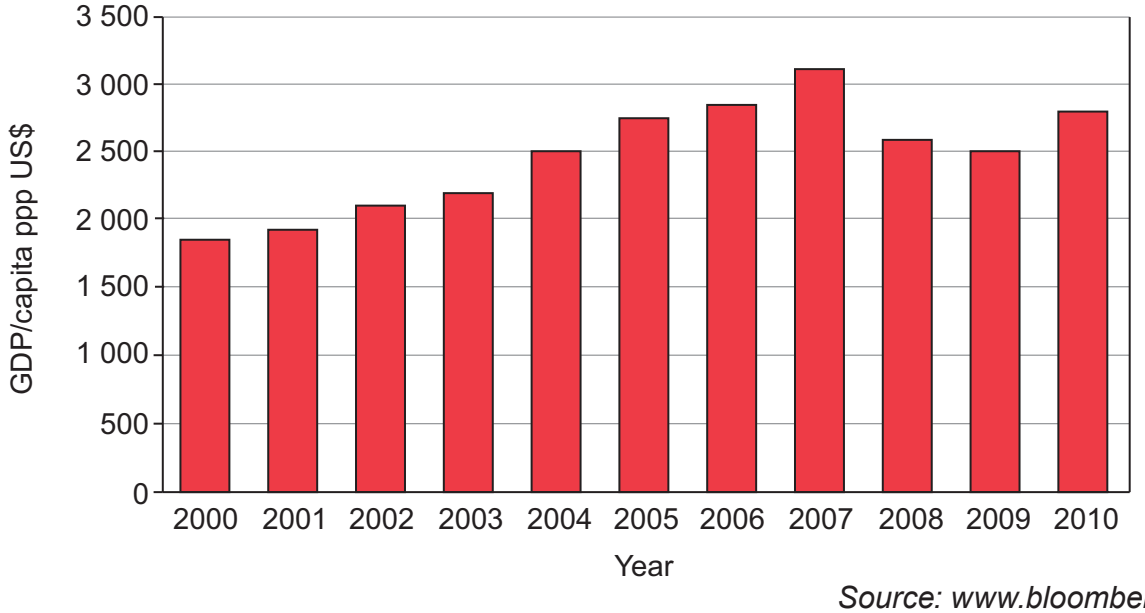


Source: www.gso.gov.vn

In almost all countries, as population grows, the demands for both food and energy increase. At the same time, more land is needed to house the increased population and there is a reduction in the amount of land available for growing food or growing biofuel crops.

Poor people, living mainly by subsistence agriculture, eat only a small range of staple foods. As countries develop, some people become more wealthy, and there is often a change in the foods eaten, and they can afford to buy more food. This gives them access to a greater range of foods. Calorie intake usually increases, and people often adopt a 'western' diet, abandoning traditional foodstuffs. There is also an increase in the consumption of foods that have been regarded as luxuries within the local culture. For example, eating shark fin soup is regarded as a status symbol in many countries in southeast Asia. As affluence increases, calorie-rich foods are consumed more.

Figure 6: Vietnam GDP/capita ppp* US$ 2000 – 2010

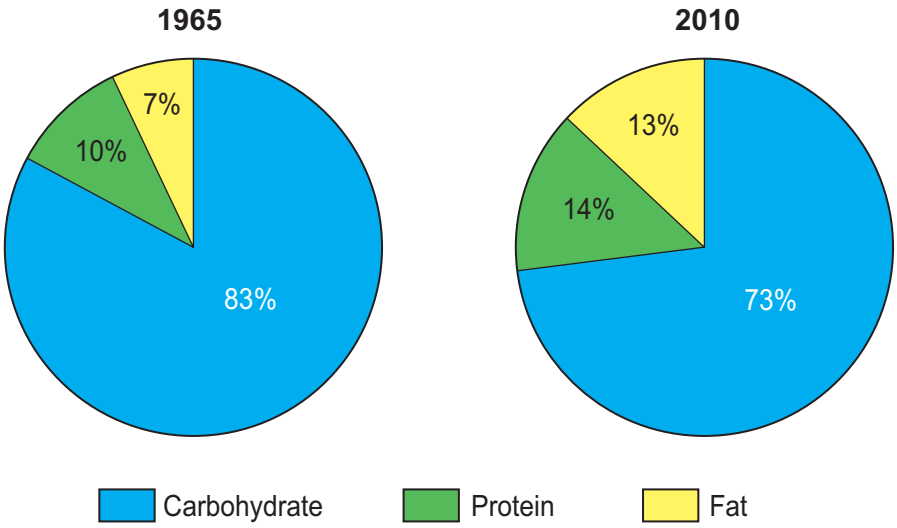


Source: www.bloomberg.com

*ppp = purchasing power parity

FOOD IN VIETNAM

Figure 7: The changing diet of Vietnam



Source: nutriweb.org

New research on food consumption 27 April 2011

A 10-year research project conducted by the National Nutrition Institute reveals what health experts say is a disturbing trend: the Vietnamese now eat more meat, fish and eggs than before. Consumption of food of animal origin has increased and the consumption of vegetables and seafoods has gone down considerably.

Although meat provides necessary animal proteins and micronutrients, too much meat consumption can lead to dangerous health problems such as cancers, loss of calcium, cardiovascular diseases and rheumatism. Such eating habits have also caused an increasing number of cases of diabetes and obesity.

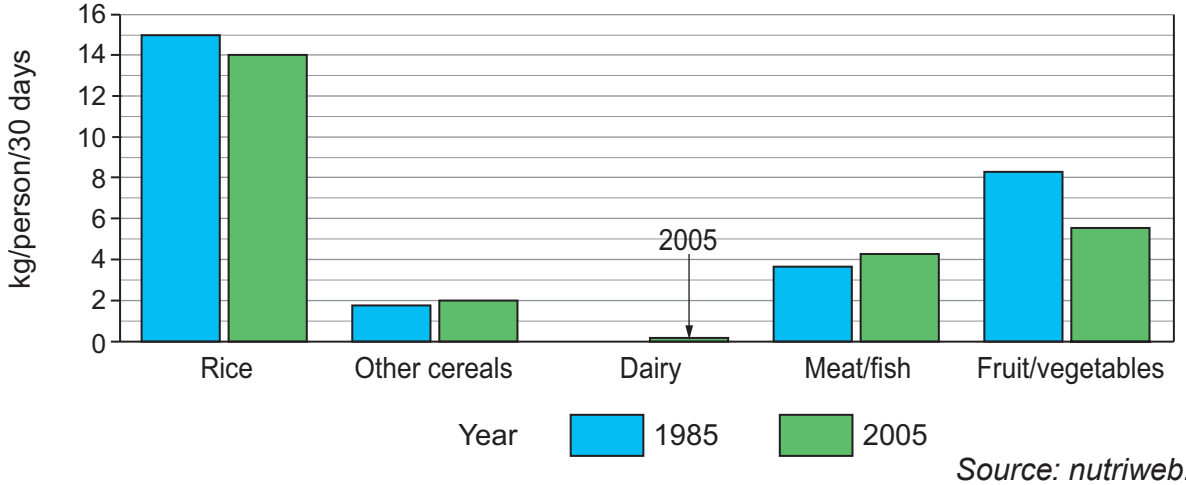
Source: www.dztimes.net

Traditional

Modern

Food in Vietnam

Figure 8: Vietnamese diet 1985 and 2005



Source: nutriweb.org

Turn over.

ENERGY IN VIETNAM

Figure 9: Energy in Vietnam

Biomass Most people in Vietnam still live in rural areas and obtain their energy needs from wood, dung and rice husks. These are classed as non-commercial biomass.

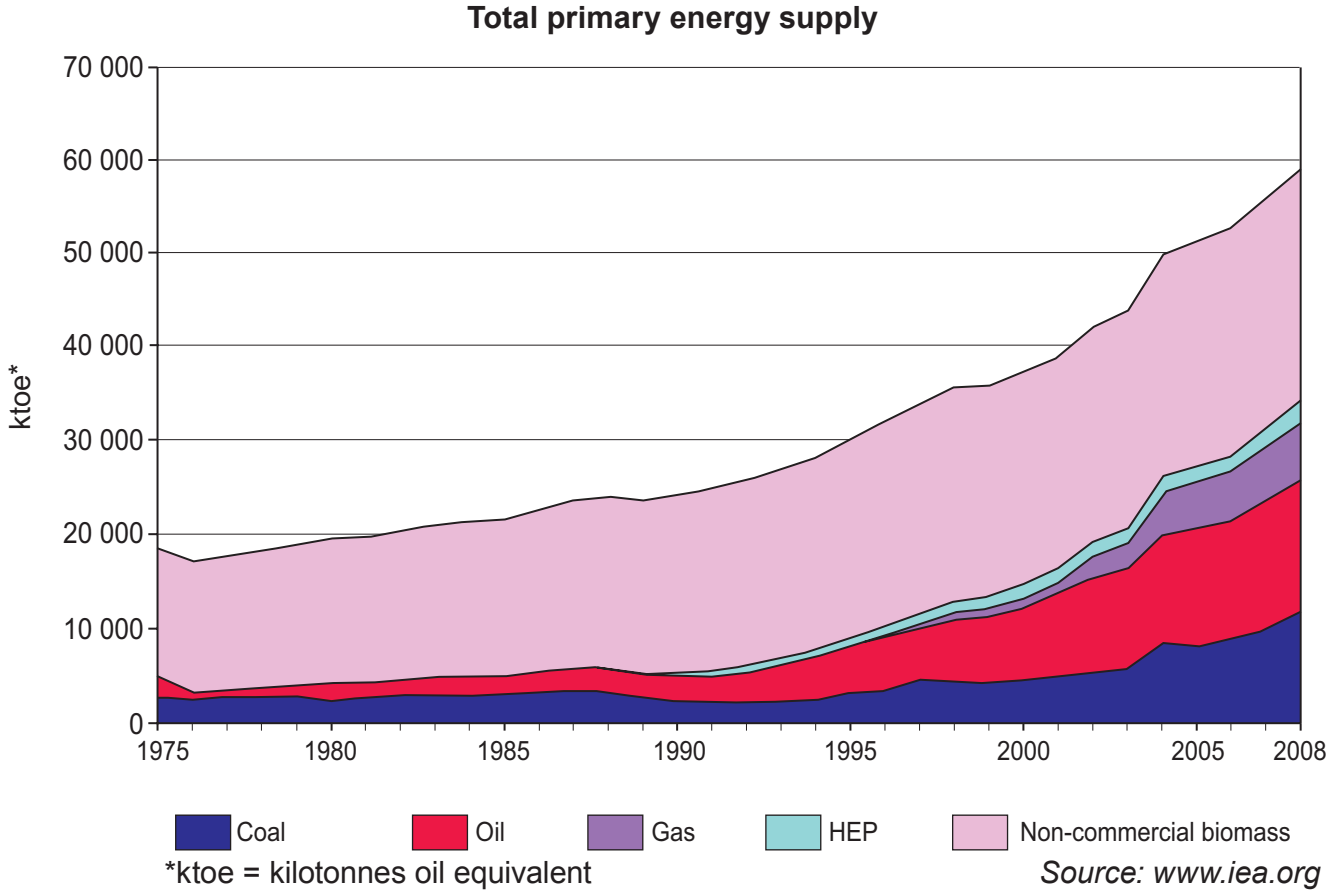
Gas Vietnam has several offshore gas fields but only two of the smaller ones, close to shore, have been exploited so far. All the gas produced is used within Vietnam, but when some of the larger gas fields are developed, Vietnam has the potential to export a significant amount of gas.

Oil There is at least one oil field with reserves of 600 million barrels or more, and exploration for other oil fields is taking place. Few of these reserves are directly available to Vietnam as the first oil refinery was only opened in 2009 and has not yet reached its full capacity. The majority of the developing crude oil production is exported to be refined in Japan, Singapore and South Korea. Vietnam now imports most of the refined petroleum products that it needs, however home production will become increasingly important. Oil is particularly important as Vietnam develops. It is needed to power transport, particularly petroleum and diesel for road transport. Much of the machinery in the rapidly-expanding manufacturing industry is also powered directly by oil products, especially diesel and fuel oils.

Coal Vietnam has an estimated 165 million tonnes of coal reserves. This is likely to increase as exploration for new reserves continues. Until 2003, all the coal that was mined was exported to Japan and China. Since 2003, Vietnam has been constructing eight coal-fired electricity power stations to be completed in 2012. Vietnam expects to mine about 10 million tonnes of coal per year and use it all within Vietnam.

HEP By 2003 there were many medium-sized HEP stations in Vietnam, which produced just over half of the electricity needed in the country. Five larger HEP plants are under construction. Once complete, HEP would continue to supply over half the electricity needed.

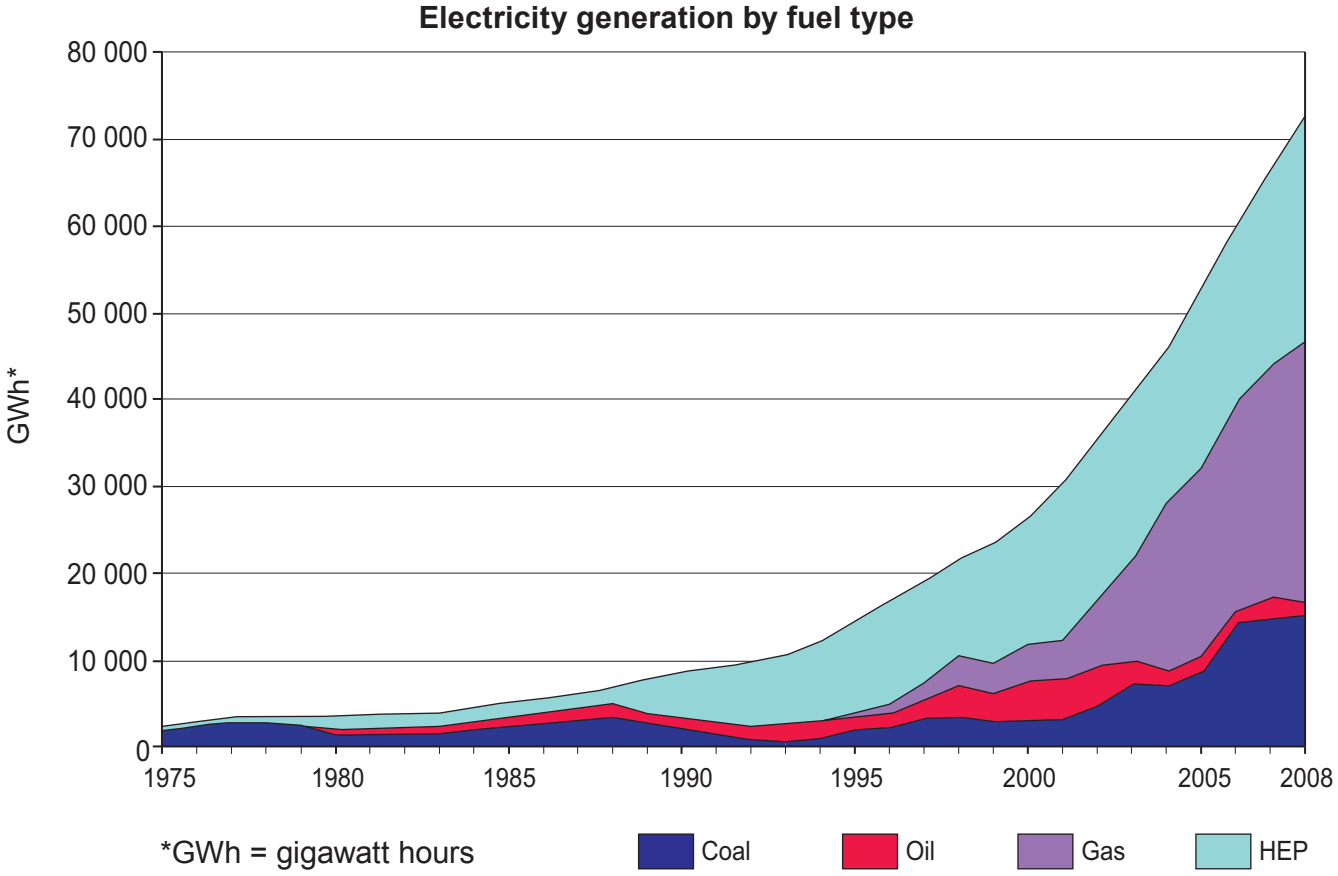
Source: www.eoearth.org



*ktoe = kilotonnes oil equivalent

Source: www.iea.org

Figure 10: Electricity in Vietnam



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Oil products are important to development in Vietnam, but of greater importance still is increasing electricity output.

Much of the new industry is manufacturing outsourced from other countries using machinery powered by electricity. Other important industries are microelectronics and software production both of which also depend on electricity.

As the population becomes more affluent, an increasing number of homes are connected to the electricity network, and the demand for domestic products which use electricity will increase.

Source: www.iea.org

HEP station under construction in Vietnam

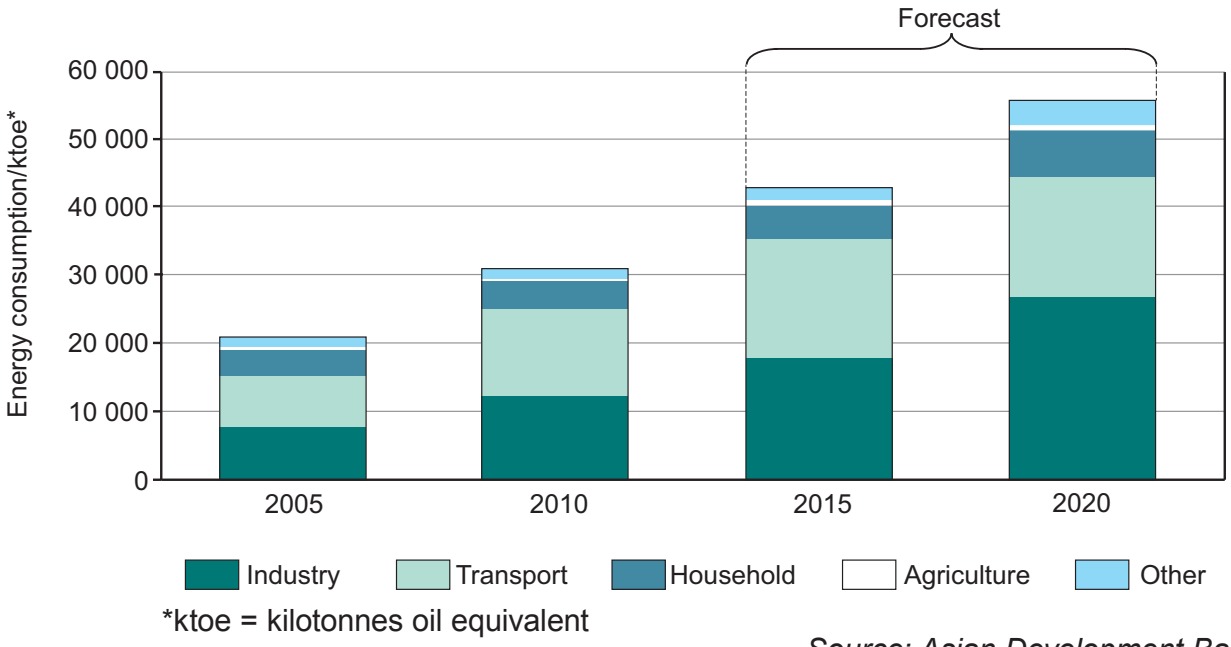
Source: www.lisemco2.com

Gas platform off the coast of Vietnam

Source: www.offshoreenergy.com

Turn over.

Figure 11: Energy consumption in Vietnam 2005 – 2020



*ktoe = kilotonnes oil equivalent

Source: Asian Development Bank

Figure 12: New sources of energy in Vietnam

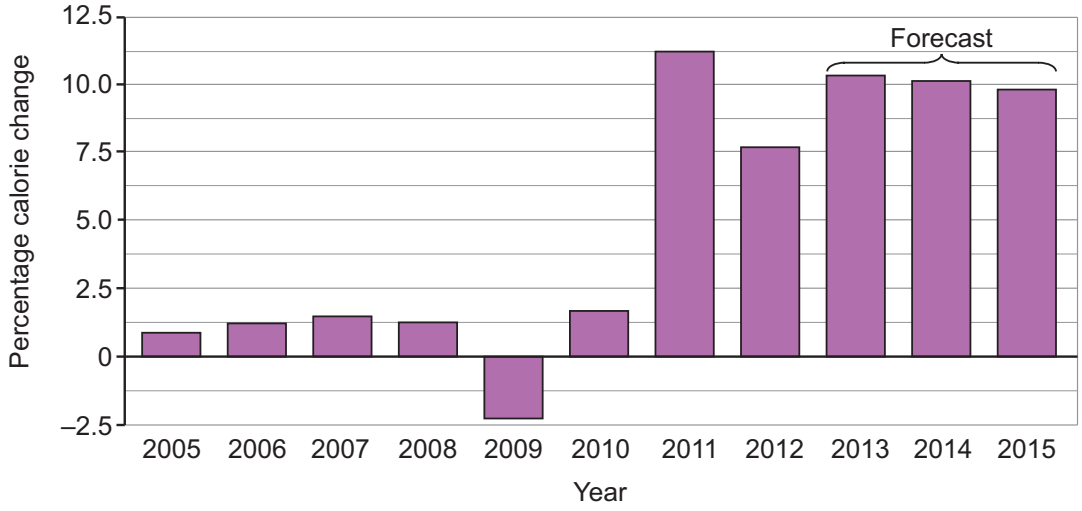
One promising source of energy to meet the growing needs of Vietnam is biofuels. In particular, Vietnam has several regions where Jatropha could be grown. Oil from the seeds of the Jatropha plant can be processed to produce biodiesel which is equal in quality to fossil fuel. Once the oil is extracted, the residue can be used as animal feed as it has a 30% protein content, and can also be used as a fertiliser. Jatropha is not considered a threat to food security because it can be grown on steep land which is not used for food production. By 2015, 150 000 tonnes of biodiesel could be produced, rising to over 1 million tonnes by 2020.

Region	Jatropha crop potential	
Northern Mountains	Moderate soil fertility Other crops unsuitable	Large-scale Jatropha suitable
Central North	Poor soil fertility No other competing crops	Large-scale Jatropha suitable
Central South	Poor soil fertility No other competing crops	Large-scale Jatropha suitable
Central Highlands	Fertile soils Other crops for food and commodities can grow well	Possible to develop Jatropha on a medium-scale
South East	Fertile soils Other crops for food and commodities can grow well	Some small-scale Jatropha possible

Source: adapted from Asian Development Bank

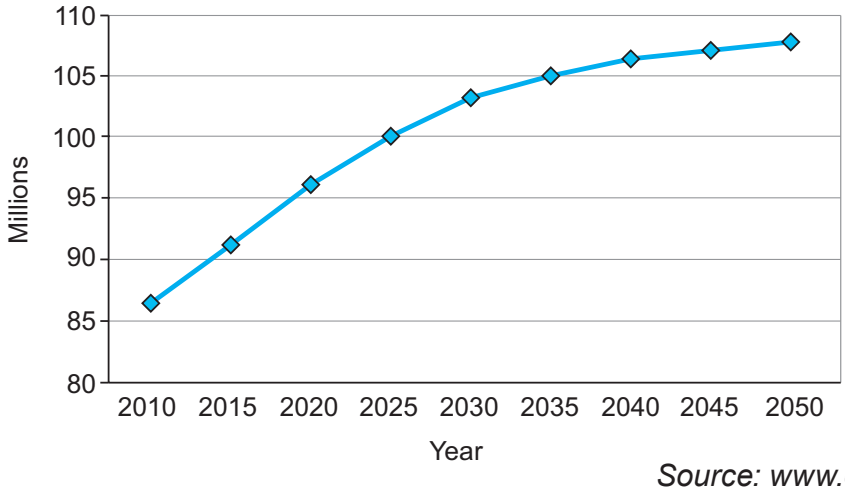
FUTURE OF FOOD SUPPLIES IN VIETNAM

Figure 13: Change in food consumption per capita from previous year in Vietnam



Source: adapted from www.gso.gov.vn

Figure 14: Projected population of Vietnam 2010 – 2050



Source: www.os-connect.com

Figure 15: Vietnam GM Crops to Be in "Mass Production" by 2015

Date Posted: 23 February 2009

Vietnam's biologists have succeeded in creating some genetically-modified (GM) crops. Hence, Vietnam is determined to put GM crops into mass production at the latest in 2015 for better national food security.

After the Government approved a key programme on biotechnological development to 2020, several GM projects have been launched in Vietnam.

So far, colleges and research institutes have been able to create some varieties of GM crops at laboratory level. These products will be piloted in net houses, greenhouses and fields.

Prioritised GM crops include rice, maize, cotton, soya bean, cassava, and potato, most of which are food staples in Vietnam. Except for rice, Vietnam has to import annually food in large quantities. Thus, it is essential for the country to increase the output of these crops.

GM crops can help to improve food productivity and farmers' incomes, conserve biodiversity, improve environment, ensure food security, and provide a good food source for farm animals.

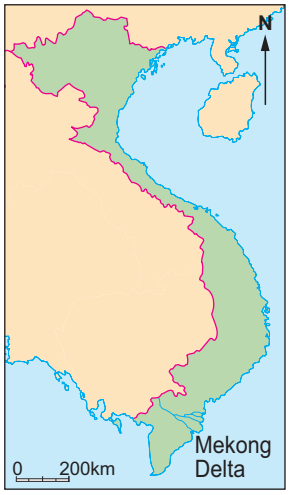
Source: www.seedtoday.com

Turn over.

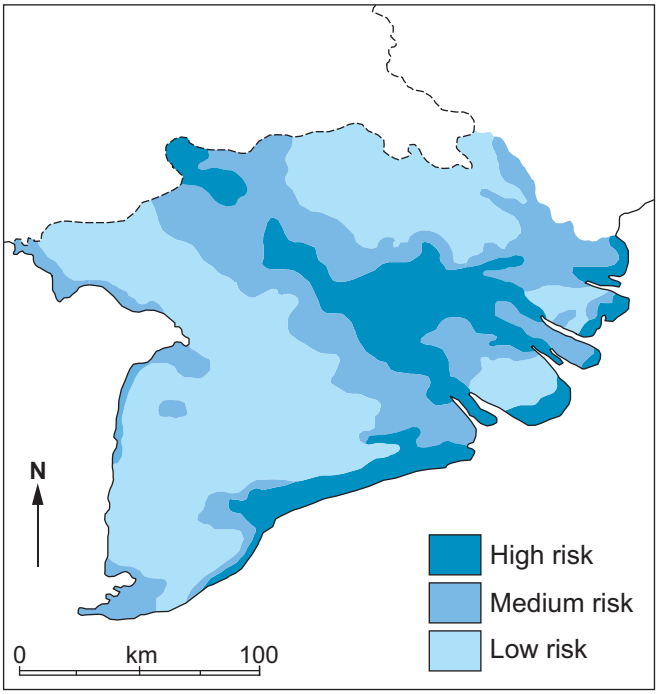
Figure 16: Threats to food production in parts of Vietnam

One of the most important food producing areas is the delta of the Mekong River. Any threats to these areas would seriously affect Vietnam's food security. Below and opposite are two of the major threats.

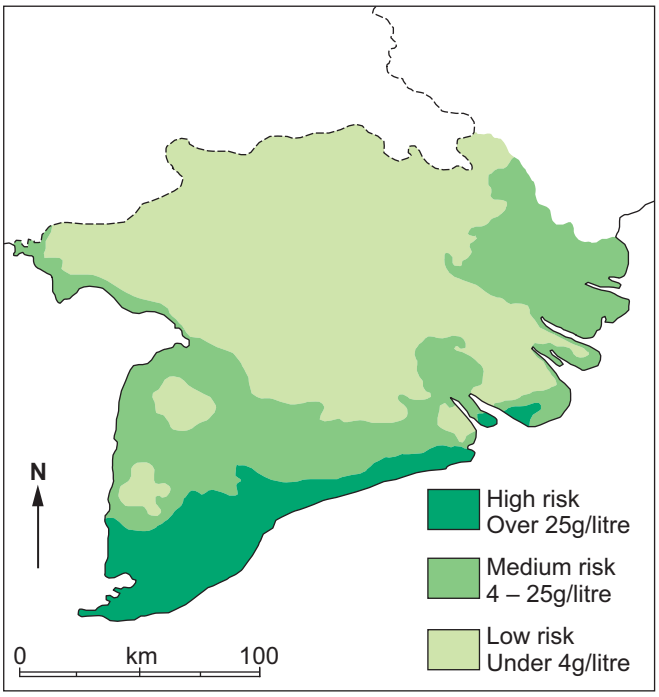
Flood risk in the Mekong Delta



The delta is very low-lying. Climate change may bring more frequent and more intense storms. This can increase the risk of flooding in the delta both from increased rainfall and from storm surges from the sea.



Threat of salt water creep in the Mekong Delta



Sea levels are gradually rising. This increases the likelihood that salt water can reach fields where crops are growing. This can either kill the crops or decrease their yield considerably. It is made worse where water is being extracted from aquifers. Salt water can replace the fresh water in aquifers if too much water is withdrawn.

Source: www.unescap.org

CONTRASTING OPINIONS ON GLOBAL FOOD AND ENERGY ISSUES

Figure 17: Biofuel crops v food crops

It is all very well energy companies offering money for crops to produce biodiesel, but you can't eat biodiesel. If all our food producing areas grow crops for biofuel, where will the food come from? Some people say 'Clear the natural forests and grow them there'. But we don't yet know all the species that live there, and what right have we got to wipe them out? We already know that an ecosystem with only a few species is not very stable. It would be madness to risk destroying our natural forests. There just isn't enough existing land to produce both food and biofuels. It would be wrong to produce biodiesel for rich people in developed countries if that means even less food for the starving poor.

If we are going to maintain a decent standard of living in the developed world, and offer the same opportunity to people in developing countries, we need energy. We can't keep using fossil fuels because global warming will put an end to life on earth. We need to develop renewables, and one of the most important is biofuels. We can make the equivalent of petrol, diesel and kerosene to use both for vehicles and making electricity. This is a really efficient way of trapping energy from the sun in a way we can use easily. We've hardly scratched the surface of their potential. We can clear forest areas and replace them with plants that will give us fuel. We will still have forest areas, only now they will have useful plants and trees growing in them. We would be foolish to turn our backs on biofuels.

Source: adapted from www.adb.org

Figure 18: GM crops v non-GM crops

Genetic modification is just speeding up selective breeding that was used in the past and has produced all the crops and farm animals we use today. If the world is serious about eradicating starvation and malnutrition, GM foods are essential. All the opposition is based on irrational, emotive propaganda that has no basis in truth. GM foods are identical to those found in nature and have nothing unnatural about them at all. In fact, they can be produced to contain more nutrients. They can withstand drought, pests and weeds and food can be produced in areas where it is impossible to produce it now. With climate change, some food producing areas will become dry. GM can produce crops that will still grow there.

We have no idea what health risks there may be with GM foods. Some crops are made to have resistance to pesticides. What if that gene got transmitted to a weed? How would we stop it spreading? We have been meddling with nature with nuclear power and look at the number of people suffering from the results of radiation now. We don't know what the dangers of GM are and innocent people will pay the price for that if things go wrong. What is more, if we let this happen, all the food production will be in the hands of a few multi-nationals who will be able to hold all the world governments to ransom. They care only for profits not people. To be healthy, we need wholesome organic foods that are no threat to health or wildlife and are fully in balance with nature.

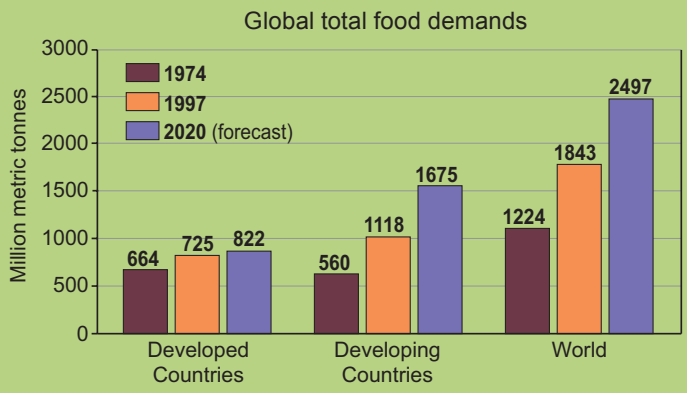
Source: adapted from www.adb.org

GLOBAL DEMANDS

Figure 19: Global food demands

As the population of the world continues to grow, the demand for food will also grow. Developing countries in Asia, because of their larger and more urbanised populations and rapid economic growth, will account for half of the increase in global demand for cereals, with China alone accounting for one quarter.

The world's appetite for meat will increase enormously. Worldwide, demand for meat is forecast to rise by more than 55% between 2000 and 2020, with most of the increase occurring in developing countries. China alone will account for more than 40% of this increase, compared with India's 4%.



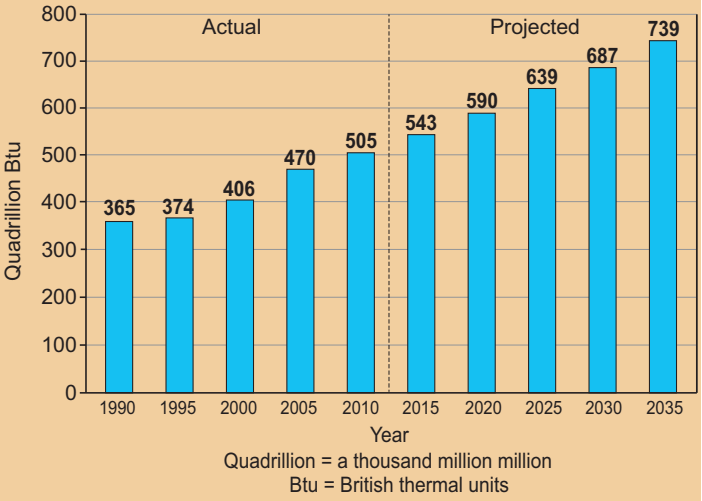
The main problem with food supply is that as demand increases, the price of food will rise. Most people in developed countries can afford to buy the food they need. People in most developing countries are increasing their wealth so can still buy food. People in the least developed countries just cannot afford higher prices and large numbers of poor people in those countries will be malnourished.

New land for agriculture is becoming increasingly scarce. Many food producing regions are experiencing a decline in the amount and reliability of rainfall. Output per hectare is still growing, but such growth is dependent on expensive fertilisers, irrigation and machinery, which are least affordable in the areas most vulnerable to food insecurity.

Source: International Food Policy Research Institute

Figure 20: Global energy demands

The demand for energy is expected to rise by 46% between 2010 and 2035. The greatest projected increase is in developing countries. The global recession of 2008/09 did slow the growth in demand, but developing countries in Asia are leading the world out of recession and are causing energy demand to grow again.



Two countries that were among the least affected by the global recession were China and India, and they continue to lead the world's economic and energy demand growth. Together they accounted for about 10% of the world's total energy consumption in 1990 and 20% in 2010. Strong economic growth in both countries is likely to continue, with their combined energy accounting for 30% of total world energy consumption in 2035. In contrast, the USA's share of world energy consumption is expected to fall from 21% in 2010 to about 16% in 2035.

The most rapidly growing area of demand is for electricity to support the massive servers belonging to organisations such as Apple, Google and Microsoft and other 'cloud' technology. Many people and businesses keep all their software and documents online rather than on their own computer. The rapid growth of Facebook and Twitter has created a massive demand for more servers. Many buildings in central London now contain servers for banking, insurance and the stock exchange. The servers need electricity to run and to be kept cool.

Source: www.eia.doe.gov

ENERGY IN FOOD PRODUCTION

Figure 21: Food energy accounting

An important way of examining foodstuffs is to find the ratio between the energy input needed to produce the food and the energy that is available from eating it.

In producing food, energy is needed for farm machinery, fertilisers and other chemicals, for processing the food, wrapping it and keeping it fresh, and transporting it to a supermarket. Almost all this energy, whether it be fuel for making or powering the machinery, for many agricultural chemicals and food wrapping is made from crude oil.

The energy available is the amount of calories a person gets from eating the food.

Examples

Slash and burn subsistence maize in Central America

Input	Output
human energy cutting natural vegetation using hoe to keep down weeds gathering/grinding in the crop	maize flour to eat as food

1 calorie : 129 calories

Pre-industrial revolution wheat in Europe

Input	Output
human energy horse food threshing and grinding crop cooking	wheat loaf as food

4 calories : 1 calorie

Present day wheat in Europe

Input	Output
manufacturing tractors, harvesters, lorries fuel for machines chemicals for fertilisers, pesticides and herbicides milling and baking packaging, transport and retailing	wheat loaf as food

90 calories : 1 calorie

Winter lettuce in Europe

Input	Output
greenhouse heating and lighting transport, retailing	lettuce for salad as food

2 000 calories : 1 calorie

Source: adapted from www.organicconsumers.org

Sources of information and copyright

Page 4 http://asiafoundation.org/resources/pdfs/VNEconomicDev.pdf
http://earthtrends.wri.org/pdf_library/country_profiles/for_cou_704.pdf

Page 5 http://www.cia.gov/library/publications/the-world-factbook/
http://asiafoundation.org

Page 6 http://gso.gov.vn/default_en.aspx?tabid=617&idmid=&itemID=11016
http://bloomberg.com/news/2011-03-29/vietnam-s-economic-growth-slows-to-5-43-on-rate-increase.html

Page 7 http://nutriweb.org.my/publications/mjn009_1/mjn9n1_art1.pdf
http://www.dztimes.net/post/social/vietnamese-are-overeating-meat-research.aspx

Page 8 http://eoearth.org/article/Energy_profile_of_Vietnam
http://iea.org/stats/pdf_graphs/VNTPES.pdf

Page 9 http://iea.org/stats/pdf_graphs/VNELEC.pdf
http://www.lisemco2.com/upload/images/en/Projets/thumb/Thuydiensonla-2.jpg
http://www.offshoreenergytoday.com/wp-content/uploads/2012/07/First-Oil-Flows-from-Second-Platform-on TGT-Field-Offshore-Vietnam.jpg

Page 10 http://en.openei.org/wiki/Vietnam-Status_and_Potential_for_the_Development_of_Biofuels_and_Rural_Renewable_Energy

Page 11 http://gso.gov.vn/default_en.aspx
http://www.os-connect.com/pop/pc/VNM/
http://www.seedtoday.com/info/ST_articles.html?ID=71400

Page 12-13 http://www.unescap.org/LDCCU/Meetings/HighLevel-RPD-food-fuel-crisis/Paper-Presentations/C2-FoodSecurity/Vietnam-FoodSecurity.pdf

Page 14-15 http://www.adb.org/Documents/Reports/Biofuels/biofuels-vie.pdf

Page 16-17 http://www.eia.gov/forecast/ieo/pdf/ieoreftab_1.pdf
International Food Policy Research Institute

Page 18 http://www.organicconsumers.org/corp/fossil-fuels.cfm

GCE A level

1204/01-B

GEOGRAPHY – G4
Sustainability

Pre-Release Material for examination on 14 June 2013.

To be opened on receipt.

A new copy of this Folder will be given out in the examination.

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RESOURCE FOLDER

INSTRUCTIONS TO CANDIDATES

A new copy of this Folder will be given out in the examination. **This copy must not be taken into the examination**.

Work through this Folder to make sure you understand all the resources. You may seek help from your teachers or any other sources in this context. You have to apply your critical understanding to an unfamiliar situation.

ADVICE TO CANDIDATES

The information in this Resource Folder is related to the sustainability of food supplies and food consumption and energy in Vietnam. Wider issues in Vietnam that have implications for food supplies and energy are also examined. Some of these issues are also put into a global context.

Guidelines for using the pre-release materials

The contents of the booklet should be studied carefully. The examples given will help in answering some of the questions on the question paper. To give a fuller answer, it is advisable to look at other material before the examination. This could be similar topics, related to information in other countries, or may be the same countries but in greater depth or on closely related topics. It would be particularly useful to note if other case studies seem similar in nature, or if they show contrasting perspectives to those from the material in this Resource Folder.

Some of the resource materials come from Geography textbooks, but others come from companies, pressure groups, research organisations, governments and private individuals. In some cases they are using information to promote their own interests rather than to represent an impartial view. It is worth considering if they are trying to support a particular interest group and persuade readers to agree with them. In finding other materials, it is worth bearing in mind that they might not be presented in an impartial and objective way.

Material in the Resource Folder may often be related to other themes found in G4, and to other units in Geography AS and A2. These links should be noted, as there will be opportunities to refer to such connections with other work in some of your answers. Being able to link together different parts of your Geography studies is important and will be rewarded in answers. Such linkages are sometimes referred to as ‘synopticity’.

Textbooks, journals, good quality newspapers and television and radio programmes are good sources of information. Probably the most accessible source of geographical information is the Internet, but it is also the one which may be most susceptible to bias and lack of impartiality. Many of the resources are extracted or adapted from sources on the Internet. These sources have the web addresses provided for copyright reasons. Many are only extracts or shortened versions of fuller documents and some may be inaccessible by the date of the release of this Resource Folder. Following these links for greater depth of reading and for more recent updates of material can be helpful but is not essential.

Each candidate will be provided with a copy of the Resource Folder, for use in the examination, at the same time as the question paper is issued at the beginning of the examination on the day set for the paper.

Copies of the Resource Folder with added notes, or notes from research carried out in the previous six weeks, may not be taken into the examination.

Contents

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BACKGROUND TO VIETNAM

Figure 1: Recent history of Vietnam

Vietnam (full official name Socialist Republic of Vietnam) is located in southeast Asia with many newly industrialised countries (NICs) as neighbours. Vietnam is a former French colony. France developed only the main cities of Saigon (Ho Chi Minh City) and Hanoi, but the majority of the country remained undeveloped. After independence there was civil war for many years. Throughout the civil war economic development was severely hindered with much of the infrastructure left by France destroyed. Modern Vietnam was established in 1976 and almost all of its economic development has occurred since then.

Although the government is communist, private enterprise has been encouraged since 1986. About 40% of GDP still comes from state-owned enterprises (SOEs), which concentrate on industries that will support future growth such as steel, chemical fertilisers and cement.

More recently, Vietnam's greatest asset has been cheap labour. This has attracted many overseas companies. Most do not build factories in Vietnam, but give contracts to Vietnamese manufacturers to produce goods for them. For example, Microsoft and Intel source new software from Vietnam.

Source: asiafoundation.org

Figure 2: Natural vegetation of Vietnam

93% of the land area of Vietnam was originally rainforest, with the remainder being well vegetated.

Today, 35% of Vietnam is still covered by natural rainforests. Agriculture covers 56% of the country, and much of this is devoted to plantations of tree crops. The areas of crop production are often mixed with natural rainforest areas. Little of the land is totally cleared, although the change from natural rainforest to cropland is accelerating.

Only 0.2% of the country is covered by urban areas although this figure is growing.

Source: earthtrends.wri.org

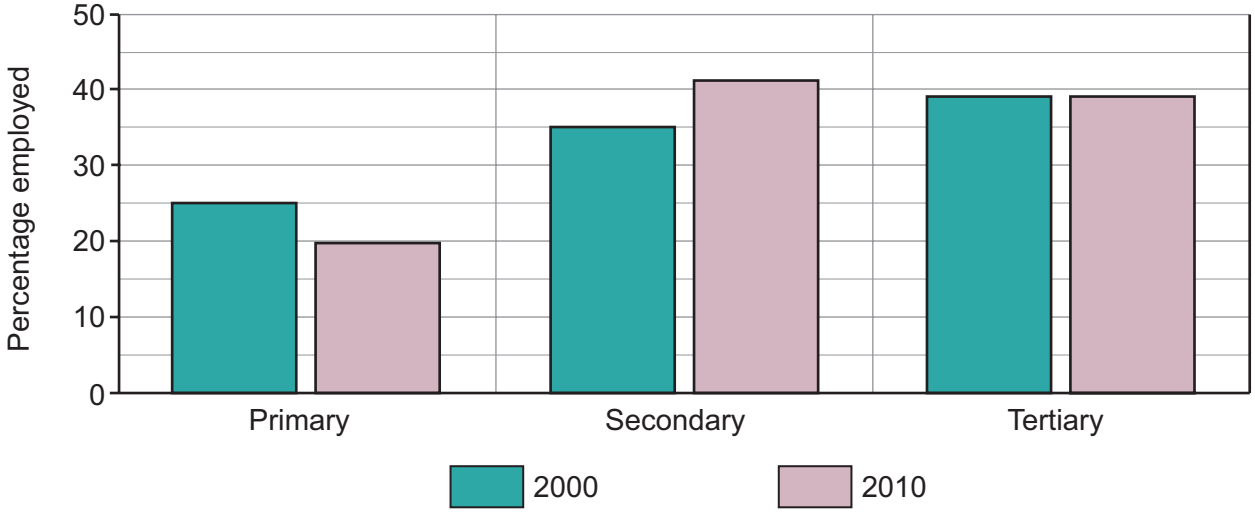
Figure 3: Selected indicators for France, Senegal and Vietnam (data available in 2012)

	France	Senegal	Vietnam
GDP/capita US$	35 156	1 871	3 359
GDP annual growth %	1·7	4·0	5·8
Average daily calorie intake	3 550	2 320	2 770
Average daily protein intake (grams)	113	59	72
Average energy use kgoe*/person/year	4 518·4	233·2	539·4
Total population millions	65·4	12·9	87·8
Natural increase per thousand	3·8	27·8	11·3
Life expectancy years	81	63	74
Malnourished, under 5 deaths/100 000	<1	14·5	20.2
Urban population %	76	50	26
Urbanisation rate % change/year	0.8	3.1	3.1
HDI (Rank)	0.884 (20)	0.459 (155)	0.593 (128)
Change in calorie intake 2000 – 2010 %	–2.5	+8.4	+9.9

* kgoe = kilograms oil equivalent

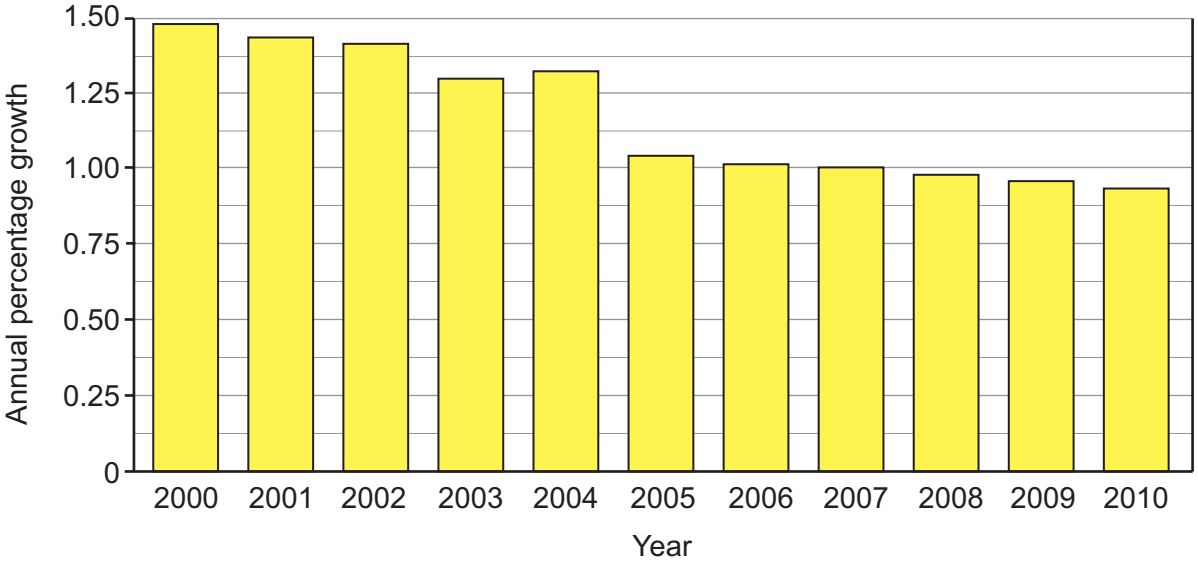
Sources: cia.gov and hdr.undp.org

Figure 4: Changing employment structure in Vietnam



Source: asiafoundation.org

Figure 5: Population growth rate change of Vietnam 2000 – 2010

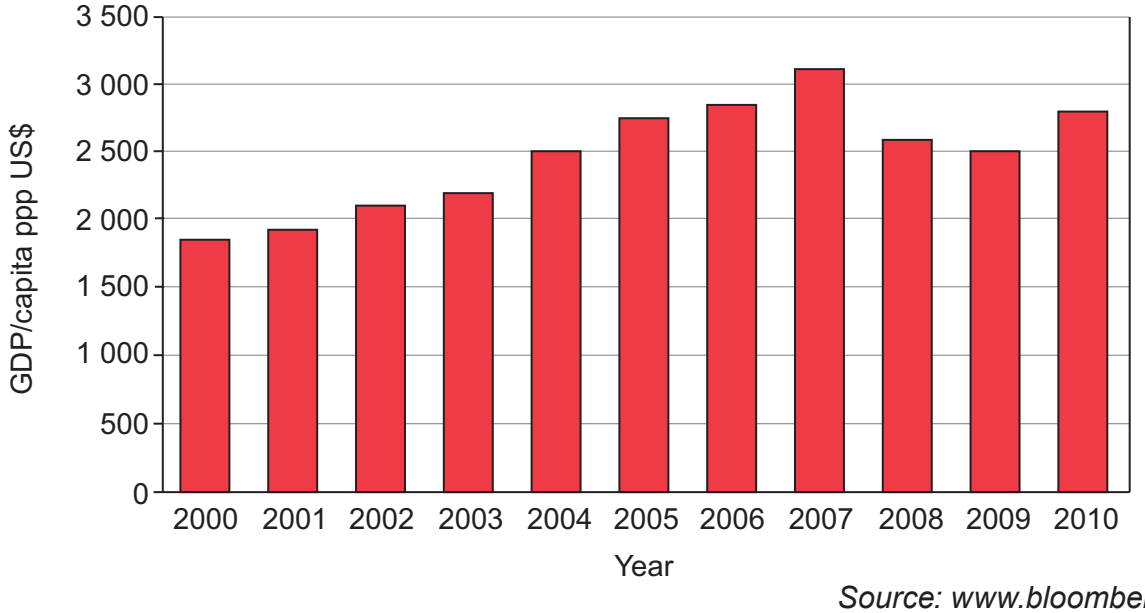


Source: www.gso.gov.vn

In almost all countries, as population grows, the demands for both food and energy increase. At the same time, more land is needed to house the increased population and there is a reduction in the amount of land available for growing food or growing biofuel crops.

Poor people, living mainly by subsistence agriculture, eat only a small range of staple foods. As countries develop, some people become more wealthy, and there is often a change in the foods eaten, and they can afford to buy more food. This gives them access to a greater range of foods. Calorie intake usually increases, and people often adopt a 'western' diet, abandoning traditional foodstuffs. There is also an increase in the consumption of foods that have been regarded as luxuries within the local culture. For example, eating shark fin soup is regarded as a status symbol in many countries in southeast Asia. As affluence increases, calorie-rich foods are consumed more.

Figure 6: Vietnam GDP/capita ppp* US$ 2000 – 2010

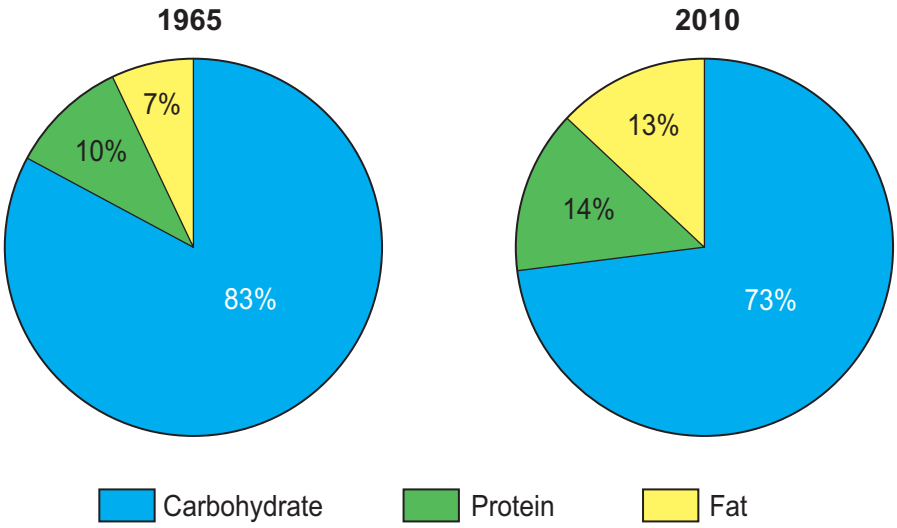


Source: www.bloomberg.com

*ppp = purchasing power parity

FOOD IN VIETNAM

Figure 7: The changing diet of Vietnam



Source: nutriweb.org

New research on food consumption 27 April 2011

A 10-year research project conducted by the National Nutrition Institute reveals what health experts say is a disturbing trend: the Vietnamese now eat more meat, fish and eggs than before. Consumption of food of animal origin has increased and the consumption of vegetables and seafoods has gone down considerably.

Although meat provides necessary animal proteins and micronutrients, too much meat consumption can lead to dangerous health problems such as cancers, loss of calcium, cardiovascular diseases and rheumatism. Such eating habits have also caused an increasing number of cases of diabetes and obesity.

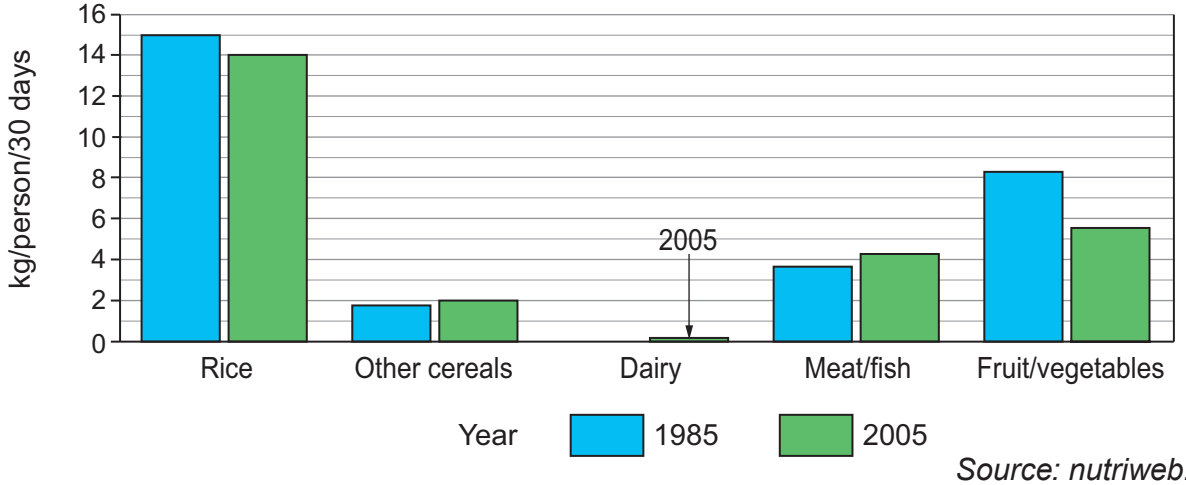
Source: www.dztimes.net

Traditional

Modern

Food in Vietnam

Figure 8: Vietnamese diet 1985 and 2005



Source: nutriweb.org

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ENERGY IN VIETNAM

Figure 9: Energy in Vietnam

Biomass Most people in Vietnam still live in rural areas and obtain their energy needs from wood, dung and rice husks. These are classed as non-commercial biomass.

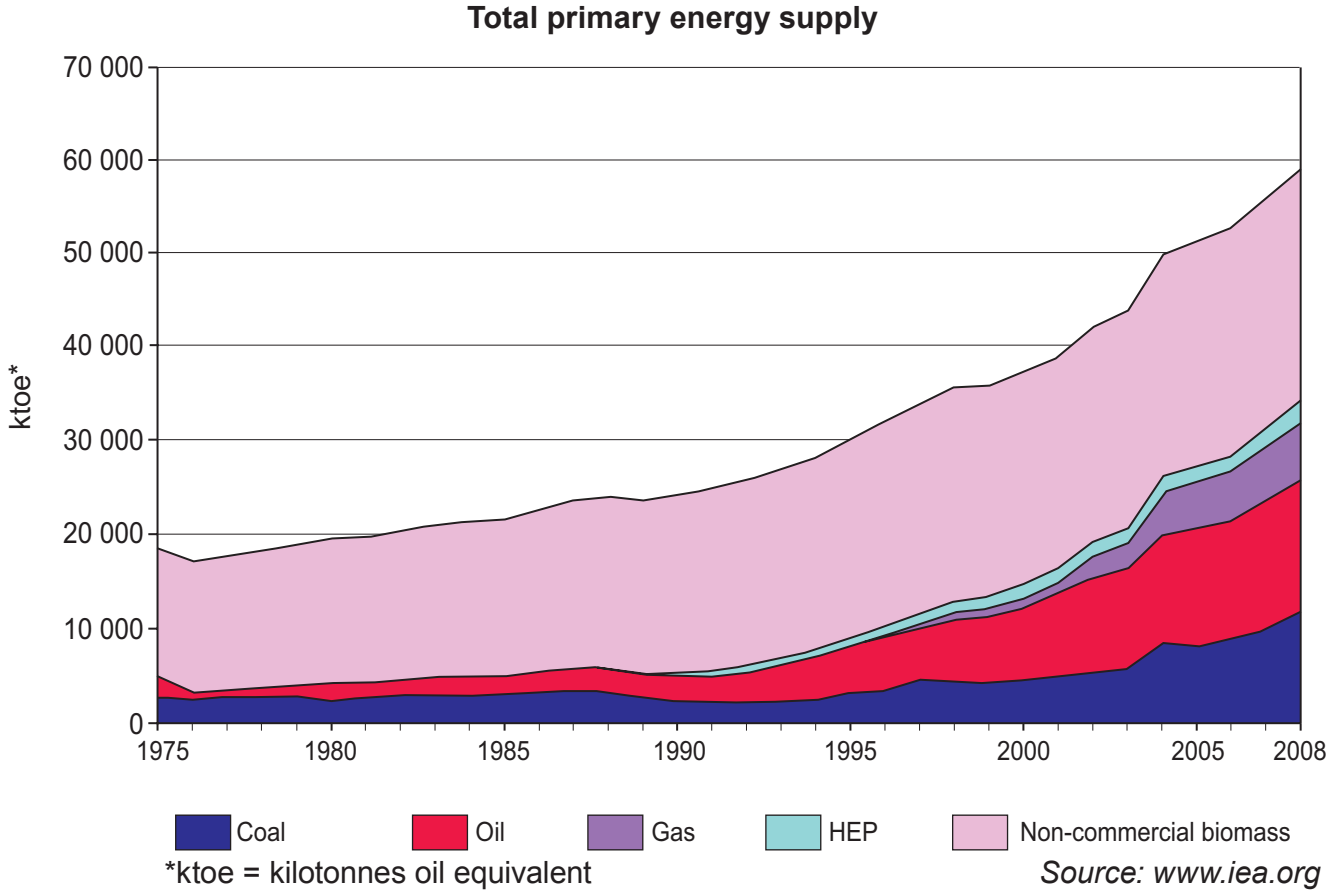
Gas Vietnam has several offshore gas fields but only two of the smaller ones, close to shore, have been exploited so far. All the gas produced is used within Vietnam, but when some of the larger gas fields are developed, Vietnam has the potential to export a significant amount of gas.

Oil There is at least one oil field with reserves of 600 million barrels or more, and exploration for other oil fields is taking place. Few of these reserves are directly available to Vietnam as the first oil refinery was only opened in 2009 and has not yet reached its full capacity. The majority of the developing crude oil production is exported to be refined in Japan, Singapore and South Korea. Vietnam now imports most of the refined petroleum products that it needs, however home production will become increasingly important. Oil is particularly important as Vietnam develops. It is needed to power transport, particularly petroleum and diesel for road transport. Much of the machinery in the rapidly-expanding manufacturing industry is also powered directly by oil products, especially diesel and fuel oils.

Coal Vietnam has an estimated 165 million tonnes of coal reserves. This is likely to increase as exploration for new reserves continues. Until 2003, all the coal that was mined was exported to Japan and China. Since 2003, Vietnam has been constructing eight coal-fired electricity power stations to be completed in 2012. Vietnam expects to mine about 10 million tonnes of coal per year and use it all within Vietnam.

HEP By 2003 there were many medium-sized HEP stations in Vietnam, which produced just over half of the electricity needed in the country. Five larger HEP plants are under construction. Once complete, HEP would continue to supply over half the electricity needed.

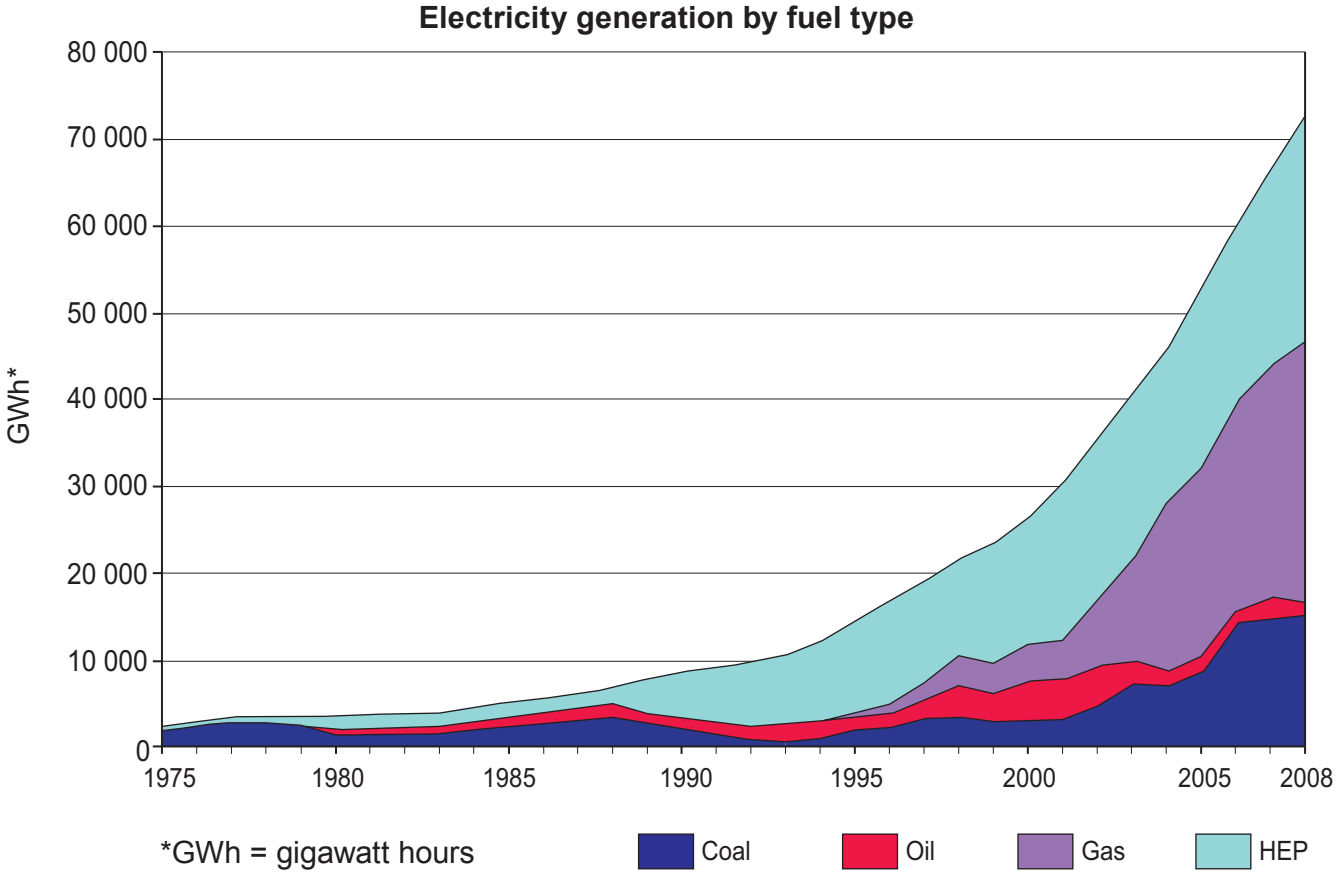
Source: www.eoearth.org



*ktoe = kilotonnes oil equivalent

Source: www.iea.org

Figure 10: Electricity in Vietnam



Oil products are important to development in Vietnam, but of greater importance still is increasing electricity output.

Much of the new industry is manufacturing outsourced from other countries using machinery powered by electricity. Other important industries are microelectronics and software production both of which also depend on electricity.

As the population becomes more affluent, an increasing number of homes are connected to the electricity network, and the demand for domestic products which use electricity will increase.

Source: www.iea.org

HEP station under construction in Vietnam

Source: www.lisemco2.com

Gas platform off the coast of Vietnam

Source: www.offshoreenergy.com

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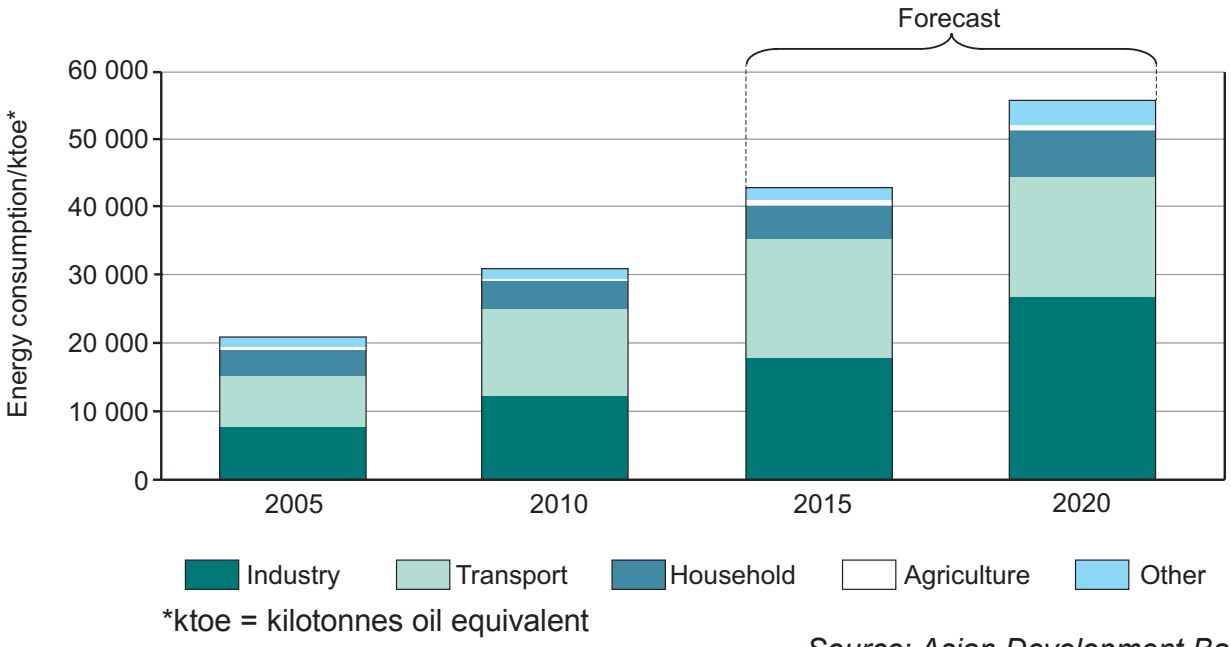
Figure 11: Energy consumption in Vietnam 2005 – 2020



*ktoe = kilotonnes oil equivalent

Source: Asian Development Bank

Figure 12: New sources of energy in Vietnam

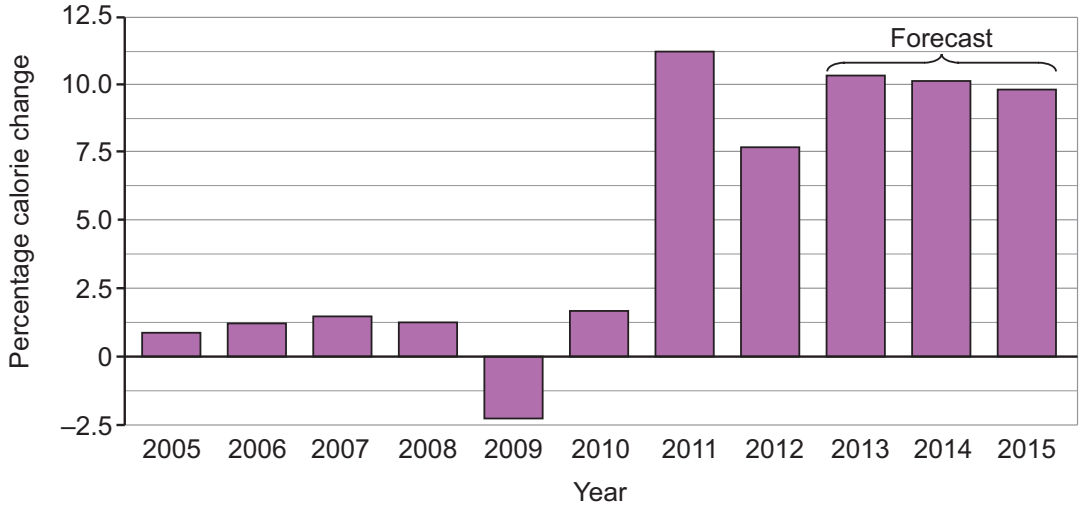
One promising source of energy to meet the growing needs of Vietnam is biofuels. In particular, Vietnam has several regions where Jatropha could be grown. Oil from the seeds of the Jatropha plant can be processed to produce biodiesel which is equal in quality to fossil fuel. Once the oil is extracted, the residue can be used as animal feed as it has a 30% protein content, and can also be used as a fertiliser. Jatropha is not considered a threat to food security because it can be grown on steep land which is not used for food production. By 2015, 150 000 tonnes of biodiesel could be produced, rising to over 1 million tonnes by 2020.

Region	Jatropha crop potential	
Northern Mountains	Moderate soil fertility Other crops unsuitable	Large-scale Jatropha suitable
Central North	Poor soil fertility No other competing crops	Large-scale Jatropha suitable
Central South	Poor soil fertility No other competing crops	Large-scale Jatropha suitable
Central Highlands	Fertile soils Other crops for food and commodities can grow well	Possible to develop Jatropha on a medium-scale
South East	Fertile soils Other crops for food and commodities can grow well	Some small-scale Jatropha possible

Source: adapted from Asian Development Bank

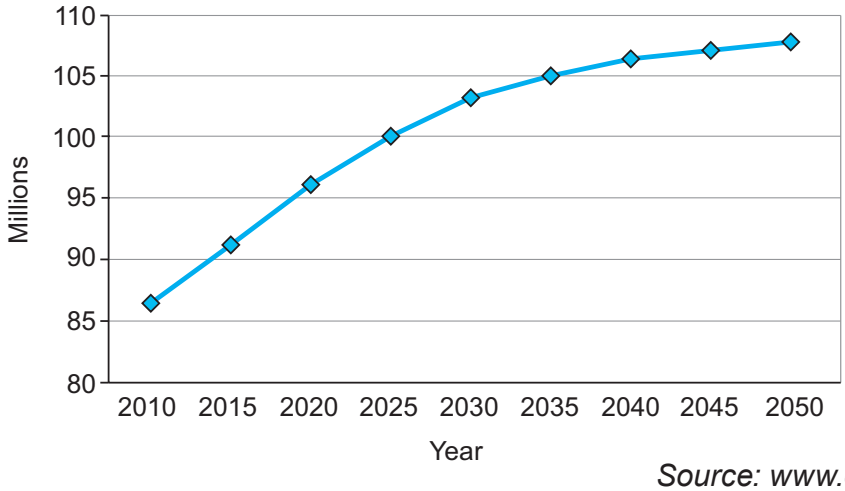
FUTURE OF FOOD SUPPLIES IN VIETNAM

Figure 13: Change in food consumption per capita from previous year in Vietnam



Source: adapted from www.gso.gov.vn

Figure 14: Projected population of Vietnam 2010 – 2050



Source: www.os-connect.com

Figure 15: Vietnam GM Crops to Be in "Mass Production" by 2015

Date Posted: 23 February 2009

Vietnam's biologists have succeeded in creating some genetically-modified (GM) crops. Hence, Vietnam is determined to put GM crops into mass production at the latest in 2015 for better national food security.

After the Government approved a key programme on biotechnological development to 2020, several GM projects have been launched in Vietnam.

So far, colleges and research institutes have been able to create some varieties of GM crops at laboratory level. These products will be piloted in net houses, greenhouses and fields.

Prioritised GM crops include rice, maize, cotton, soya bean, cassava, and potato, most of which are food staples in Vietnam. Except for rice, Vietnam has to import annually food in large quantities. Thus, it is essential for the country to increase the output of these crops.

GM crops can help to improve food productivity and farmers' incomes, conserve biodiversity, improve environment, ensure food security, and provide a good food source for farm animals.

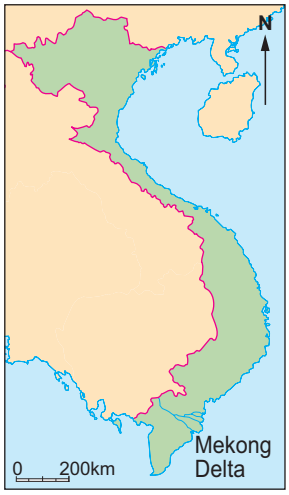
Source: www.seedtoday.com

Turn over.

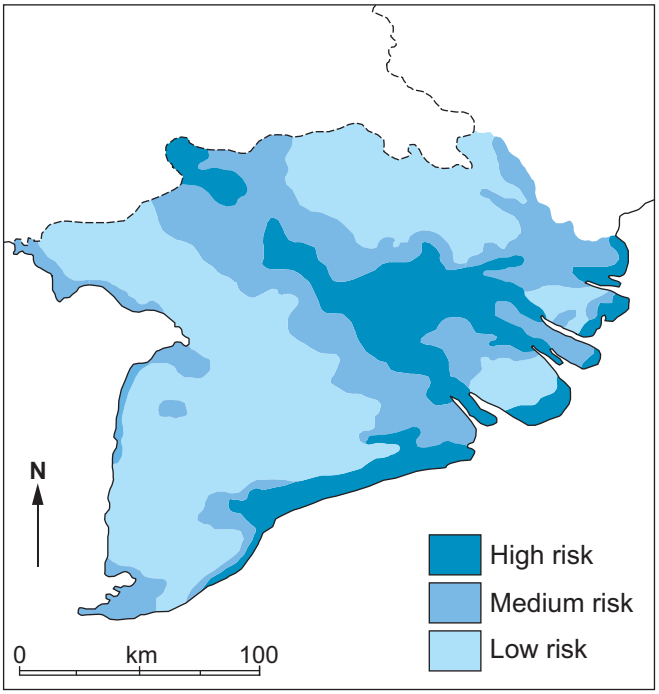
Figure 16: Threats to food production in parts of Vietnam

One of the most important food producing areas is the delta of the Mekong River. Any threats to these areas would seriously affect Vietnam's food security. Below and opposite are two of the major threats.

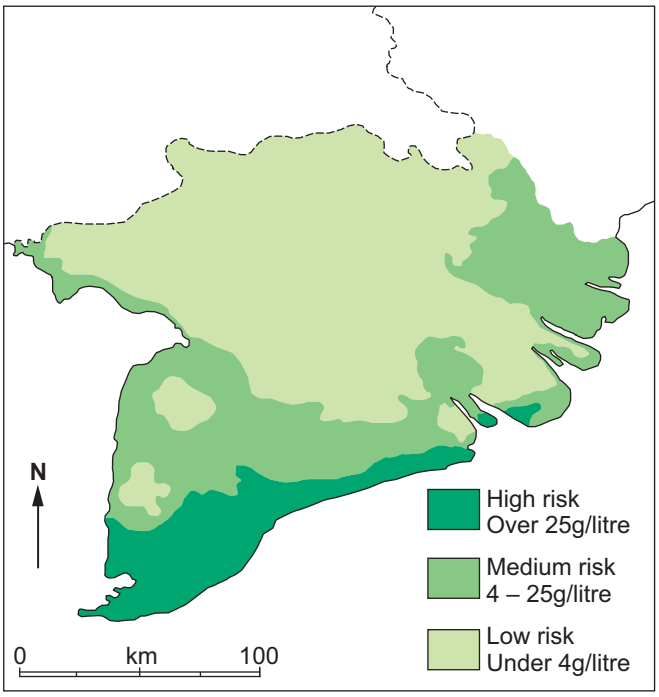
Flood risk in the Mekong Delta



The delta is very low-lying. Climate change may bring more frequent and more intense storms. This can increase the risk of flooding in the delta both from increased rainfall and from storm surges from the sea.



Threat of salt water creep in the Mekong Delta



Sea levels are gradually rising. This increases the likelihood that salt water can reach fields where crops are growing. This can either kill the crops or decrease their yield considerably. It is made worse where water is being extracted from aquifers. Salt water can replace the fresh water in aquifers if too much water is withdrawn.

Source: www.unescap.org

CONTRASTING OPINIONS ON GLOBAL FOOD AND ENERGY ISSUES

Figure 17: Biofuel crops v food crops

It is all very well energy companies offering money for crops to produce biodiesel, but you can't eat biodiesel. If all our food producing areas grow crops for biofuel, where will the food come from? Some people say 'Clear the natural forests and grow them there'. But we don't yet know all the species that live there, and what right have we got to wipe them out? We already know that an ecosystem with only a few species is not very stable. It would be madness to risk destroying our natural forests. There just isn't enough existing land to produce both food and biofuels. It would be wrong to produce biodiesel for rich people in developed countries if that means even less food for the starving poor.

If we are going to maintain a decent standard of living in the developed world, and offer the same opportunity to people in developing countries, we need energy. We can't keep using fossil fuels because global warming will put an end to life on earth. We need to develop renewables, and one of the most important is biofuels. We can make the equivalent of petrol, diesel and kerosene to use both for vehicles and making electricity. This is a really efficient way of trapping energy from the sun in a way we can use easily. We've hardly scratched the surface of their potential. We can clear forest areas and replace them with plants that will give us fuel. We will still have forest areas, only now they will have useful plants and trees growing in them. We would be foolish to turn our backs on biofuels.

Source: adapted from www.adb.org

Figure 18: GM crops v non-GM crops

Genetic modification is just speeding up selective breeding that was used in the past and has produced all the crops and farm animals we use today. If the world is serious about eradicating starvation and malnutrition, GM foods are essential. All the opposition is based on irrational, emotive propaganda that has no basis in truth. GM foods are identical to those found in nature and have nothing unnatural about them at all. In fact, they can be produced to contain more nutrients. They can withstand drought, pests and weeds and food can be produced in areas where it is impossible to produce it now. With climate change, some food producing areas will become dry. GM can produce crops that will still grow there.

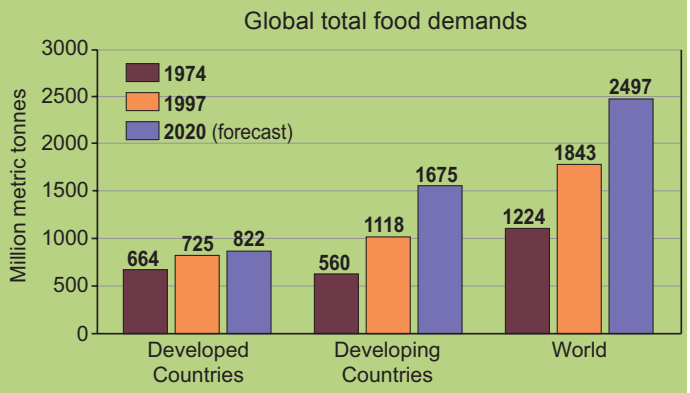
We have no idea what health risks there may be with GM foods. Some crops are made to have resistance to pesticides. What if that gene got transmitted to a weed? How would we stop it spreading? We have been meddling with nature with nuclear power and look at the number of people suffering from the results of radiation now. We don't know what the dangers of GM are and innocent people will pay the price for that if things go wrong. What is more, if we let this happen, all the food production will be in the hands of a few multi-nationals who will be able to hold all the world governments to ransom. They care only for profits not people. To be healthy, we need wholesome organic foods that are no threat to health or wildlife and are fully in balance with nature.

Source: adapted from www.adb.org

GLOBAL DEMANDS

Figure 19: Global food demands

As the population of the world continues to grow, the demand for food will also grow. Developing countries in Asia, because of their larger and more urbanised populations and rapid economic growth, will account for half of the increase in global demand for cereals, with China alone accounting for one quarter.



The world's appetite for meat will increase enormously. Worldwide, demand for meat is forecast to rise by more than 55% between 2000 and 2020, with most of the increase occurring in developing countries. China alone will account for more than 40% of this increase, compared with India's 4%.

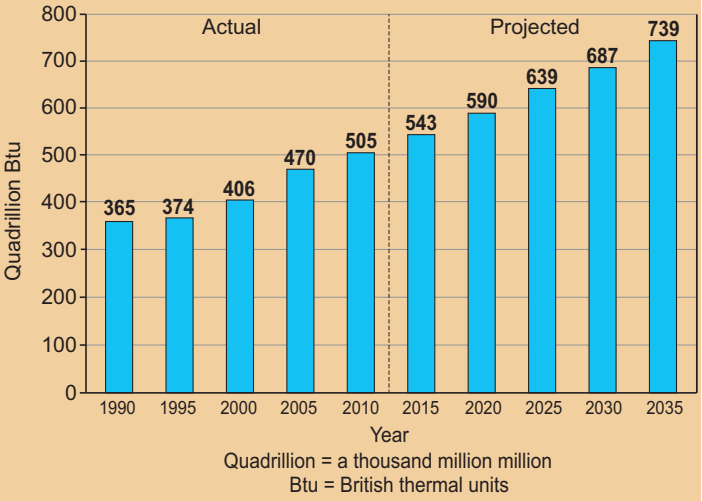
The main problem with food supply is that as demand increases, the price of food will rise. Most people in developed countries can afford to buy the food they need. People in most developing countries are increasing their wealth so can still buy food. People in the least developed countries just cannot afford higher prices and large numbers of poor people in those countries will be malnourished.

New land for agriculture is becoming increasingly scarce. Many food producing regions are experiencing a decline in the amount and reliability of rainfall. Output per hectare is still growing, but such growth is dependent on expensive fertilisers, irrigation and machinery, which are least affordable in the areas most vulnerable to food insecurity.

Source: International Food Policy Research Institute

Figure 20: Global energy demands

The demand for energy is expected to rise by 46% between 2010 and 2035. The greatest projected increase is in developing countries. The global recession of 2008/09 did slow the growth in demand, but developing countries in Asia are leading the world out of recession and are causing energy demand to grow again.



Two countries that were among the least affected by the global recession were China and India, and they continue to lead the world's economic and energy demand growth. Together they accounted for about 10% of the world's total energy consumption in 1990 and 20% in 2010. Strong economic growth in both countries is likely to continue, with their combined energy accounting for 30% of total world energy consumption in 2035. In contrast, the USA's share of world energy consumption is expected to fall from 21% in 2010 to about 16% in 2035.

The most rapidly growing area of demand is for electricity to support the massive servers belonging to organisations such as Apple, Google and Microsoft and other 'cloud' technology. Many people and businesses keep all their software and documents online rather than on their own computer. The rapid growth of Facebook and Twitter has created a massive demand for more servers. Many buildings in central London now contain servers for banking, insurance and the stock exchange. The servers need electricity to run and to be kept cool.

Source: www.eia.doe.gov

ENERGY IN FOOD PRODUCTION

Figure 21: Food energy accounting

An important way of examining foodstuffs is to find the ratio between the energy input needed to produce the food and the energy that is available from eating it.

In producing food, energy is needed for farm machinery, fertilisers and other chemicals, for processing the food, wrapping it and keeping it fresh, and transporting it to a supermarket. Almost all this energy, whether it be fuel for making or powering the machinery, for many agricultural chemicals and food wrapping is made from crude oil.

The energy available is the amount of calories a person gets from eating the food.

Examples

Slash and burn subsistence maize in Central America

Input	Output
human energy cutting natural vegetation using hoe to keep down weeds gathering/grinding in the crop	maize flour to eat as food

1 calorie : 129 calories

Pre-industrial revolution wheat in Europe

Input	Output
human energy horse food threshing and grinding crop cooking	wheat loaf as food

4 calories : 1 calorie

Present day wheat in Europe

Input	Output
manufacturing tractors, harvesters, lorries fuel for machines chemicals for fertilisers, pesticides and herbicides milling and baking packaging, transport and retailing	wheat loaf as food

90 calories : 1 calorie

Winter lettuce in Europe

Input	Output
greenhouse heating and lighting transport, retailing	lettuce for salad as food

2 000 calories : 1 calorie

Source: adapted from www.organicconsumers.org

Sources of information and copyright

Page 4 http://asiafoundation.org/resources/pdfs/VNEconomicDev.pdf
http://earthtrends.wri.org/pdf_library/country_profiles/for_cou_704.pdf

Page 5 http://www.cia.gov/library/publications/the-world-factbook/
http://asiafoundation.org

Page 6 http://gso.gov.vn/default_en.aspx?tabid=617&idmid=&itemID=11016
http://bloomberg.com/news/2011-03-29/vietnam-s-economic-growth-slows-to-5-43-on-rate-increase.html

Page 7 http://nutriweb.org.my/publications/mjn009_1/mjn9n1_art1.pdf
http://www.dztimes.net/post/social/vietnamese-are-overeating-meat-research.aspx

Page 8 http://eoearth.org/article/Energy_profile_of_Vietnam
http://iea.org/stats/pdf_graphs/VNTPES.pdf

Page 9 http://iea.org/stats/pdf_graphs/VNELEC.pdf
http://www.lisemco2.com/upload/images/en/Projets/thumb/Thuydiensonla-2.jpg
http://www.offshoreenergytoday.com/wp-content/uploads/2012/07/First-Oil-Flows-from-Second-Platform-on TGT-Field-Offshore-Vietnam.jpg

Page 10 http://en.openei.org/wiki/Vietnam-Status_and_Potential_for_the_Development_of_Biofuels_and_Rural_Renewable_Energy

Page 11 http://gso.gov.vn/default_en.aspx
http://www.os-connect.com/pop/pc/VNM/
http://www.seedtoday.com/info/ST_articles.html?ID=71400

Page 12-13 http://www.unescap.org/LDCCU/Meetings/HighLevel-RPD-food-fuel-crisis/Paper-Presentations/C2-FoodSecurity/Vietnam-FoodSecurity.pdf

Page 14-15 http://www.adb.org/Documents/Reports/Biofuels/biofuels-vie.pdf

Page 16 http://www.eia.gov/forecast/ieo/pdf/ieoreftab_1.pdf
International Food Policy Research Institute

Page 17 http://www.organicconsumers.org/corp/fossil-fuels.cfm

