

Topic 7: Climate change and energy production

Topic 1: Foundations of ESS

7.1: Energy choices and security and Topic 1.4: Sustainability



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The following information is drawn from an example Environmental Impact Assessment for energy generation in Nicaragua. More detailed versions can be found at <https://goo.gl/xhgusY> and an overview of the project here <https://goo.gl/yY7qfv>

Background.

In 1994 a plan was developed to increase the generation of geothermal produced electricity at the San Jacinto-Tizate plant through introduction of newer more efficient technology. This would increase energy production from 10 MW to 72 MW. The project would also produce funds through the Certified Carbon Emissions agreement within the Kyoto protocol.

The plant is in an area of tropical forest used by locals for construction material and fire wood. While the area is protected as there is considerable plant biodiversity, much of the area has been altered by human activity through slash and burn agriculture and deforestation. This has significantly impacted on the animal biodiversity of the area. While the population of the area is relatively small a lot of people have left the area in search of work with the main source of employment is in agriculture.

The project is also in a major water basin and surface drainage network as well as being in an area with seismic and volcanic activity.



7.1: ENERGY CHOICES AND SECURITY AND TOPIC 1.4: SUSTAINABILITY

Type of Impact	Project phase	Impact Level	Description
Physical and Chemical environment	Construction	Negative - High	Soil and rock plus waste construction material
			Changes in soil: Erosion of soil during construction because of removal of vegetation including trees and moving soil around during construction .
		Moderate	Noise: increased noise levels during construction because of use of heavy machinery
			Air quality. Increased emissions in area due to using heavy machinery
		Low - positive	Drainage - during early construction changes in drainage pattern but construction includes enhancing drainage in the area as part of the design
	Operation	Moderate	Mud and rocks produced in geothermal pools will require removal
			Brine water produced during electricity generation
		Contaminated water and area from leaks to machinery and electrical transformers	
	Low - positive	Geothermal generators produce less CO ₂ than other forms of electricity generation	
Ecological		Low - positive	Helps reduce reliance on wood in the local area for energy. Therefore helps reduce pressure on local tropical forest for fuel.
Socio economic	Production and operation	Positive	Around 700 people will be employed in the construction and then operational phases
			Access to water - project includes plans to make potable water available to local community as result of development.
		Low	Potential hazard from super heated water piping break
			Increased risk of electrocution because of development of electricity sub stations

Tasks: As a group (odd numbers)

Suggest how the impacts above would alter if the project had not been undertaken. What would remain similar what would change?

Identify how each negative impact of the project could be reduced (mitigation) during each phase. (Some impacts may not be able to be reduced)

From the information given and within the provided links produce a short (10 minute) presentation to evaluate the how EIAs can be used to test the feasibility of the project as a vehicle for sustainable development. Basically - Is the project good or bad? **Question is on the next page**

The following criteria are used to assess your presentation - These are adapted from the paper 2, Section B, Structured Essay criteria. Think of your presentation in terms of the criteria - what would a successful presentation look like using these criteria?

TOPIC 1.4: SUSTAINABILITY - EIA

Evaluate the use of an EIA when considering the advantages and disadvantages of different energy sources, in relation to sustainability.

Level	Level Descriptor
Knowledge and Understanding (Level 1)	<p>The presentation contains:</p> <ul style="list-style-type: none">• minimal evidence of knowledge and understanding of ESS issues or concepts• fragmented knowledge statements poorly linked to the context of the question• some appropriate use of ESS terminology• no examples where required, or examples with insufficient explanation/relevance• superficial analysis that amounts to no more than a list of facts/ideas• judgments/conclusions that are vague or not supported by evidence/argument.
Analysis (Level 2)	<p>The presentation contains:</p> <ul style="list-style-type: none">• some evidence of sound knowledge and understanding of ESS issues and concepts• knowledge statements effectively linked to the context of the question• largely appropriate use of ESS terminology• some use of relevant examples where required, but with limited explanation• clear analysis that shows a degree of balance• some clear judgments/conclusions, supported by limited evidence/arguments.
Evaluation and synthesis (Level 3)	<p>The presentation contains:</p> <ul style="list-style-type: none">• substantial evidence of sound knowledge and understanding of ESS issues and concepts• a wide breadth of knowledge statements effectively linked with each other, and to the context of the question• consistently appropriate and precise use of ESS terminology• effective use of pertinent, well-explained examples, where required, showing some originality• thorough, well-balanced, insightful analysis• explicit judgments/conclusions that are well-supported by evidence/arguments and that include some critical reflection.

Works Cited and Additional Resources

International Institute for Sustainable Development (2010) "EIA CASE STUDY: Energy – Nicaragua - IISD." Retrieved from: <http://www.iisd.org/learning/eia/wp-content/uploads/2016/05/Case-Study-Nicaragua-energy.pdf>

International Institute for Sustainable Development (2016) "Environmental Impact Assessment Training Manual." Retrieved from: <http://www.iisd.org/learning/eia/wp-content/uploads/2016/06/EIA-Manual.pdf>.

"San Jacinto-Tizate Geothermal Project." Power Technology, Power Technology, www.power-technology.com/projects/san-jacinto-tizate-geothermal-project-spain/.