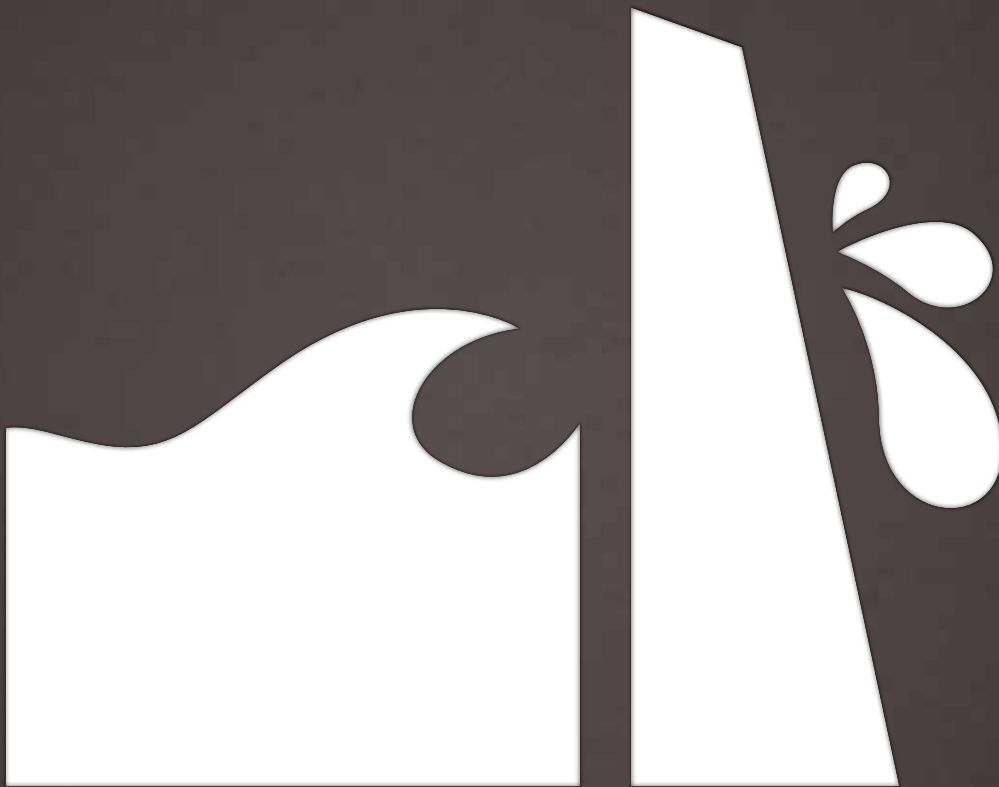


Energy Governance Case Study #04  
March 2011



# SETTLING THE SCORE:

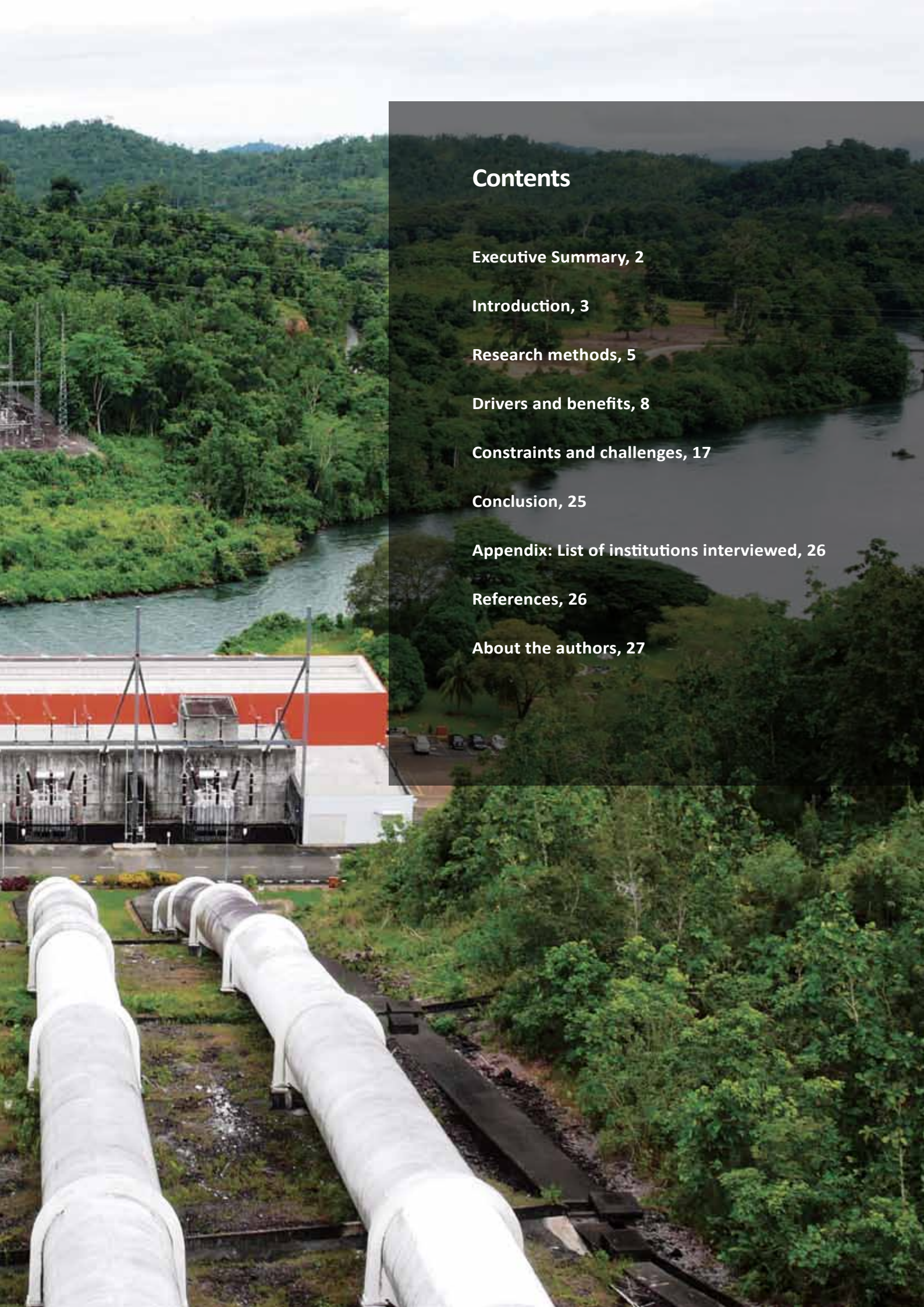
THE IMPLICATIONS OF THE SARAWAK CORRIDOR OF RENEWABLE  
ENERGY (SCORE) IN MALAYSIA

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L.C. Bulan









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## Executive Summary

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This report investigates the drivers and challenges associated with the Sarawak Corridor of Renewable Energy in Malaysia, or SCORE, on the island of Borneo. SCORE constitutes a multi-hundred billion dollar infrastructure development plan in Sarawak, one aiming to achieve US\$105 billion of investment and to build 20,000 MW of hydroelectric dams along a 320 kilometer corridor crisscrossing 70,000 square kilometers. Based largely on primary data collected through site visits, original field research in Sarawak and more than seventy research interviews, the report identifies the genesis of SCORE, its expected benefits and challenges with implementation encountered to date. The report begins by describing its research methods and then summarizes four sets of anticipated benefits discussed by respondents associated with SCORE: industrialization, energy security, equitable development and spillover effects. It then dives into a longer discussion of the technical, economic, political, legal and regulatory, social and environmental challenges facing the project summarized in Table 1. Technical challenges range from lack of supporting infrastructure to dam excavation and construction. Economic challenges include cost overruns, financing difficulties and uncertainty concerning power purchase agreements for hydroelectricity. Political challenges involve hubris, claims of corruption and low political literacy. Legal and regulatory challenges encompass oppressive legal statutes, lack of a national energy policy and lawsuits. Social challenges range from boom and bust towns to community relocation and resettlement. Environmental challenges include deforestation, greenhouse gas emissions and downstream impacts from aluminum smelting and heavy manufacturing.

SCORE reminds us of the interconnected nature of the challenges facing big infrastructure and development projects. It demonstrates that some large-scale energy infrastructure projects being promoted on the grounds of economic development can bring substantial costs. SCORE also brings to the fore the decades-old dilemma facing policymakers worldwide –should energy be viewed primarily as the means to achieve development? The massive expansions in energy capacity planned under SCORE assumes that GDP growth and per capita energy consumption must go hand in hand and that the trickle-down benefits from industrialization and rapid economic growth can solve poverty. Yet the evidence presented in the report implies that that energy production, when conceived of and implemented in the manner that is being promoted under SCORE, may ultimately achieve a bigger economy only at the expense of the communities it is supposed to serve.



Table E1: Summary of challenges facing the Sarawak Corridor of Renewable Energy (SCORE)

Category	Explanation
Technical	Sedimentation, rainfall and hydrology
	Lack of supporting infrastructure
	Dam excavation and construction
	Coordination of contractors and human resources
Economic	Cost overruns
	Financing
	Power purchase agreements
	Little economic improvement to community welfare
Political	Cancellation of undersea cable
	Hubris
	Corruption and nepotism
	Low political literacy and representation
Legal & Regulatory	Oppressive legal statutes and land codes
	Lack of a national energy policy
	Lawsuits
	Regulatory commitment to fossil fuels
Social	Community relocation and resettlement
	Boom and bust towns
	Community livelihood
	Unfair compensation
Environmental	Deforestation and flooding
	Greenhouse emissions
	Changes to water quality and river flow
	Downstream impacts from industries

## Introduction

Sarawak is one of the two states that make up East Malaysia on the tropical island of Borneo. It is by far the largest state in the country with more than 120,000 square kilometers and it is known for its rich natural heritage with more than 8,000 unique types of flora and 20,000 species of fauna, including the world's largest butterfly, the biggest flower and the most extensive cave system. Because of its tropical climate, the state also has plentiful natural resources. Its economy is therefore driven by logging, palm oil production, liquefied natural gas, rubber plantations and pepper production. Yet as Table 1 depicts, its existing electricity capacity is heavily fossil-fuel dominated.

Table 1: Existing power plant capacity in Sarawak, August 2010

Name	Installed capacity (MW)	Fuel type
Biawak Power Station	114	Diesel and Natural Gas
Batang Ai Hydroelectric Power Station	108	Hydroelectric
Bintulu Power Station	510	Natural Gas
Distributed Generation (various locations)	4	Diesel and Oil
Miri Power Station	99	Natural Gas
Mukah Coal Power Station	270	Coal
Sejingkat Coal Power Station	210	Coal
<b>Total</b>	<b>1,315</b>	

To move away from fossil fuels and promote more rapid economic development, state planners have proposed the Sarawak Corridor of Renewable Energy (SCORE). SCORE would involve building at least 12 hydroelectric dams constituting 20,000 megawatts (MW) of installed capacity connected to industrial facilities along the coast. It would stretch some 320 kilometers from Tanjung Manis to Samalaju, covering an area of 70,709 square kilometers, more than half the size of the state. SCORE is the center piece of the Sarawak state's

plans for economic growth and development. The SCORE Master Plan targets a staggering RM\$334 billion (US\$105 billion) worth of investment by 2030 and is currently managed by the Regional Corridor Development Authority, RECODA, an implementing agency created to promote its development, find investors and service clients. The development corridor's primary aim is to grow the Sarawak economy by a factor of five, increase the number of jobs in the state by a factor of 2.5, ballooning from 900,000 in 2006 to 2.5 million, and to double the population to 4.6 million by 2030.<sup>1</sup>

The SCORE master plan articulates a five-pronged, sequential strategy of energy development. First, it aims to attract investments from ten key industries to take advantage of surplus hydroelectric capacity. Sarawak currently has 1,300 MW of installed capacity but will soon have the 2,400 MW Bakun Dam and 944 MW Murum dam coming online. The targeted ten industries are:

- Oil and Petrochemicals (refineries, chemical manufacturing, oil tank farms and marine bunkers);
- Aluminum (with planners aiming for 25 million tons of production capacity by 2030 oriented towards exports for Asian markets);
- Steel (steel mills);
- Glass;
- Tourism (better roads and infrastructure, the development of new attractions and service providers, particularly those promoting eco-tourism);
- Palm Oil (plantations, crushing, refining);
- Timber (including paper, pulp and furniture);
- Livestock (mostly industrial broiler farms and slaughter houses);
- Aquaculture (including lake-based, river-based and coastal); and
- Marine Engineering (predominately ship building and repair, drydocks and and construction for offshore oil and gas facilities).

Second, SCORE hopes to create a network of transportation and communication nodes between the industries, via roads and telecommunication infrastructure. Third, planners want to expand those industries as more of the hydroelectric dams come online, offering comparatively cheap electricity. Some of this, as much as 3,000 MW to 4,000 MW, can be exported to Peninsular Malaysia via undersea cable, plugged in to the Trans-ASEAN grid, or interconnected to Brunei and Kalimantan, Indonesia, through a "regional energy exchange." Fourth, SCORE seeks to accelerate human capital and skill develop-

ment, tapping the knowledge of an expatriate workforce. Fifth, it aims to develop tourism, especially within the lakes of the dams and along the beaches of the corridor.

Geographically, industrial development would be concentrated in three major centers. Mukah would become a central administrative area and center for training and education. Tanjung Manis would become a regional food processing center, specifically a hub for *halal* foods, a major port city and source for palm oil and timber. Similajau would host heavy industries and port facilities. 70 percent of financing for SCORE is to come from the private sector (private investors and global private equity funds) with 10 percent from government linked companies and 20 percent from a mix of federal and state funds.<sup>2</sup>

At the heart of SCORE, naturally, is the need for energy, which some have even called the “backbone” and “center-piece” of the scheme. As one of the experts we spoke with noted, “hydroelectric dams are the foundation for SCORE, without them no one is interested.” The plan, at least as of early 2011, is to build 9,379 MW of hydroelectric and coal-fired capacity by 2030, necessitating about RM\$44.4 billion, or US\$14 billion, of direct investment depicted in Table 2. The most important of these are Batang Ai, which is already operational, as well as Bakun and Murum, which are under construction. The Batang Ai Hydroelectric Power Station was built in the early 1980s 260 kilometers southeast of Kuching, the capital. It is a concrete face, rock-filled dam with three saddle dams and consists of four 27 MW Toshiba Francis Turbines that send their electricity directly into the state grid. The Bakun Hydroelectric Project, situated on the Balui River, is almost near completion and sits near the Rajang River about 60 kilometers west of Belaga. It is the tallest concrete face, rock-filled dam in the world and will consist of 2,400 MW of installed capacity and 1,800 MW of firm capacity. Murum, set to be completed by 2013, is to be a 944 MW rock concrete face gravity dam. By 2037, as many as 51 dams could be constructed and the first 12 dams will involve a 600 percent increase in Sarawak’s electricity generation. Electricity from Bakun and Murum will feed at least two aluminum smelters, one a US\$1 billion, 330,000 ton/year facility owned by the State Grid Corporation of China, GiiG Holdings and the Aluminum Corporation of China that will need 600 MW; another a US\$2 billion, 550,000 ton/year facility operated by Rio Tinto and Cahya Mata Sarawak Berhad that will need 1,200 MW of power.

The importance of investigating the costs and benefits of SCORE is twofold. SCORE is part and parcel of a key development strategy for Malaysia. It is prized as being a component of both the Ninth Malaysia Plan (2006 to 2010) and the Tenth Malaysia Plan (2011 to 2015), the main planning doc-

uments that guide national development policy, as well as the National Mission and the Third Industrial Master Plan.<sup>3</sup> Interview respondents that we spoke to mentioned that “Prime Ministers themselves travel overseas to try and raise investments for development corridor projects like SCORE, they are a key part of Malaysia’s development agenda” and that “SCORE is integral to Malaysia’s intent to move from a middle-income economy to a high-income economy.” The State Secretary of Sarawak, Amar Wilson Bayadandot, has publicly stated that “SCORE is the biggest and most important development plan that has ever been undertaken by the Sarawak Government.”<sup>4</sup> Investigating the drivers behind SCORE, the benefits it is hopes to bring and the challenges it encounters are thus essential towards better understanding the diverse pressures and interests related to Malaysian energy policy and planning.

Moreover, for scholars and planners in other countries, development projects like SCORE are becoming what one interview participant called “an increasingly common part of the energy landscape as planners seek to build energy systems and meet development goals at the same time.” Our field research revealed that to date planners within Southeast Asia, such as Brunei, Cambodia, Indonesia, Laos and Thailand, have visited Sarawak to learn about the applicability of SCORE to their own countries, as well as planners outside the region from Bahrain and India. Another respondent indicated that:

- ➔ If it materializes, SCORE can be replicated in other countries around the world, a useful model wherever development is needed, whether it be along the Mekong Delta and in the rivers of Myanmar to the Amazon Basin or Africa.

Tracing the complexities of such large-scale energy projects is therefore necessary to learn if their benefits outweigh their costs as well as if they should be replicated or scaled up in other countries and regions.

## Research methods

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To explore the drivers, benefits and barriers to SCORE, the study relied first on original data collected through research interviews along with site visits and field research, supplemented with a review of the academic and policy literature.

The authors conducted 85 semi-structured, open-ended, grounded interviews with participants from 37 institutions involved with SCORE over the course of March 2010 to July 2010. Those interviewed were selected to ensure a representative sample of stakeholders including:

Table 2: Hydroelectric and Coal-fired facilities to be part of SCORE

Project	Rated capacity (MW)	Cost (million RM)	Type	Reservoir area (hectares)	Catchment area (hectares)	Date of commencement of construction	Date operational	Construction time (months)
Batang Ai	108	1,278	Reservoir, Convex Concrete Face Rock Filled	9,000	120,000	1981	1985	52
Bakun	2,400	15,325	Reservoir, Straight Concrete Face Rock Filled	69,640	1,500,000	1994	2011	132
Murum	944	3,500	Reservoir	24,500	275,000	2008	2013	60
Belaga	230	800	Reservoir			2014		
Pelagus	411	1,400	Reservoir			2015		
Baram	1,212	5,000	Reservoir			2015		
Limbang 1	45	400	Run of River			2018		
Limbang 2	200	900	Reservoir			2018		
Baleh	1,400	8,000	Reservoir			2019		
<u>Balingian</u>	<u>900</u>	<u>3,000</u>	<u>Coal-fired</u>	–	–	2019		
<u>Merit</u>	<u>600</u>	<u>2,000</u>	<u>Coal-fired</u>	–	–	2022		
Punan Bah	130	390	Run of River			After 2022		
Lawas	105	315	Reservoir			After 2022		
Limbang 3	50	150	Reservoir			After 2022		
Linau	290	870	Reservoir			After 2022		
Tutoh	160	480	Reservoir			After 2022		
Belapeh	140	420	Reservoir			After 2022		
Ulu Ai	54	162	Reservoir			After 2022		
<b>Total</b>	<b>9,379</b>	<b>44,390</b>						

Source: Research interviews. Coal-fired power plants are underlined. All construction dates and cost estimates beyond 2010 are Projected/Estimated. Construction is presumed to have begun the moment diversion work commences. Cost for Bakun dam taken from the mean presented by respondents, construction is estimated to finish in February 2011. All figures have been updated to \$2009.



- Engineering and construction firms such as Alstom Hydro, Sarawak Hidro and Snowy Mountains Engineering Corporation;
- Government ministries at the federal level, including the Board of the National Economic Advisory Council, Economic Planning Unit at the Prime Minister’s Department, the Public Private Partnership Unit at the Prime Minister’s Department, the Ministry of Energy, Green Technology and Water and the Ministry of Natural Resources and the Environment;
- Regulatory agencies at the state level, including the State Planning Unit of the Sarawak State Government, Sarawak Rivers Board, Natural Resources and Environment Board Sarawak and the Regional Corridor Development Authority;
- Energy companies and electric utilities, including Petronas, Sime Darby, Tenaga Nasional Berhad, Sarawak Energy Berhad and Syarikat Sesco Berhad (formerly the Sarawak Electricity Supply Corporation);
- Human rights organizations including the Bar Council of Malaysia, Human Rights Commission of Malaysia (SUHAKAM) and Suara Rakyat Malaysia (SUARAM); and
- Research institutes and civil society organizations, including the Centre for Environment, Technology and Development Malaysia, Friends of the Earth, International Rivers Network, Universiti Malaysia Sarawak and World Wildlife Fund International.

Although the authors would normally reference these interviews explicitly, we have declined to do so for this report, due to the request of participants, ethical guidelines at the authors’ university and the sensitive nature of SCORE in Malaysia. (Some opponents of SCORE have allegedly been beaten or threatened with violence, making us extremely sensitive about the identity of our participants). Figures 1–3 show the research team visiting various hydroelectric dams in Sarawak.

What we are willing to reveal is a list of the institutions interviewed, provided in the Appendix, as well as details of the interview process. Interviews lasted between thirty and

Figure 1: Dr. Sovacool inspects the inside of the 108 MW Batang Ai Hydroelectric Station powerhouse in Sri Aman, Sarawak



Figure 2: Dr. Sovacool views the powerhouse, spillway and transformer at the nearly-completed 2,400 MW Bakun Hydroelectric Dam



ninety minutes and participants were asked four questions: “What are the primary drivers behind SCORE?;” “Whom will be its key beneficiaries?;” “What are some of the challenges facing the projects?;” and “What general lessons for public policy and energy policy can we take away from SCORE?” Participants were not prompted for responses and were permitted to answer as long (or as detailed) as they wished. The authors selected open-ended, semi-structured and grounded interviews so that they could develop additional lines of inquiry as the interview progressed. The research was “grounded” in the sense that we commenced our project without any preformed hypotheses [2].

To get the perspective of those involved with building and operating parts of SCORE infrastructure, mainly hydroelectric dams, the authors conducted site visits of one operating dam, Batang Ai, as well as two under construction, Bakun and Murum, depicted in Figures 4–6. To get input directly from the communities affected by SCORE, the authors spoke with community leaders, tribal elders and ordinary villagers from longhouses in Asap, Bakun, Upper Bakun, Danang Murum and Lubok Antu, including Uma Badeng, Long Lawen, Long Wat, Nepi Pasir, Rumah Kelap and Uma Daro.

These villages included settlements of the Bukitan, Iban, Kayan, Kenyah and Penan tribes. We had the advantage of having simultaneous translation into local tribal languages and dialects as well as the national Malaysian language, or *Bahasa Melayu*, for the entirety of our visits.

## Drivers and benefits

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This section investigates the drivers and anticipated benefits from SCORE. As one respondent put it:

- ➔ If we do it right, the benefits from SCORE will include more jobs and human resources, increased GDP and income for the state and more developed infrastructure such as ports, airports and roads. SCORE can help open up the interior of Sarawak so that we can expand electrification, water, health-care, education and growth nodes into the hinterlands. SCORE will enable Sarawak to forge connections with overseas businesses and investors and also improve energy security for Malaysia.



Figure 3: The research team overlooks the under-construction concrete face of the 944 MW Murum Dam in Sarawak



Most respondents broke these benefits down into four categories: investment and industrialization for Sarawak, improved energy security for Sarawak and Malaysia, more equitable development between Malaysian states and within Sarawak and spillover economic benefits such as enhanced knowledge, jobs and competitiveness.

The most direct expected benefit from SCORE is *industrialization* and *foreign investment*. One participant summed it up by noting that:

- SCORE is about establishing manufacturing, agriculture and a services sector in Sarawak. Basically, we're talking about value creation, raw materials for industries and converting existing resources into cheap energy, which is then turned into usable and exportable commodities.

Another remarked that:

- As a planner, when I think about Sarawak, I see rivers full of untapped potential and I want to sell them for full maximum economic benefit. I want to convert a practically useless resource, flow-

ing water, into one that produces revenue, taxes and jobs. Only a few thousand people need to be relocated, compared to bringing in hundreds of millions of dollars and I can even resettle them and give them a better life. Everybody wins.

Chief Minister of Sarawak, Pehin Sri Haji Abdul Taib Mahmud, stated it succinctly by noting that:

- SCORE will act as the catalyst for growth and development of the Central Region ... and intensify the development of infrastructure, utilities and social amenities and generally contribute towards greater growth and development.

The SCORE master plan states the goal of investment and industrialization quite clearly when it says that if successful Sarawak will become an "advanced industrialized state" making it Malaysia's "primary economic powerhouse." As one participant elaborated, "industrialization is a necessity from our point of view, we are basically a natural resources and agriculturally-based economy, we need to go up the value chain in terms of industry and services, drawing in more people and industry so that we can build urban centers." SCORE thus pri-



Figure 4: The 108 MW Batang Ai Hydroelectric Facility near Sri Aman in Sarawak, July 2010



oritizes “true, sequential, cluster based development” where “nodes expand outward from industrial areas to rural ones.”

The primary thrust behind such industrialization is overseas investors and the private sector. As one participant commented, “the biggest benefit of SCORE will truly be its ability to attract foreign direct investment. Already aluminum companies, the steel industry and glass makers have expressed interest in bringing their facilities here to Sarawak.” A closely related benefit is more stable foreign direct investment flows and real GDP growth; as Figure 7 shows, growth has been highly sporadic for Sarawak and dependent on global commodity prices dropping from 7.4 percent in 2000 to 0.3 percent in 2001, rising to 7.6 percent by 2003 again only to drop to 2 percent by 2009.

The drive towards industrialization is not being steered by the Malaysians and those in Sarawak alone, but also those that want to export technology or labor there. One participant noted that “two international drivers behind SCORE at the moment are the Chinese and the Indonesians, the Chinese because they are always looking for offshore ways of providing processed aluminum and can sell their expertise in building hydroelectric dams, the Indonesians because they see a

great opportunity for wage employment.” Thus, in one sense, SCORE is about integrating Sarawak into the global economic system. As one participant stated, “basically SCORE would serve the world, it would become a part of the global supply chain, plugging Sarawak into the global economy.”

A second stated benefit would be *improved energy security* through diversification of the electricity sector, improved reliability, satisfying energy demand in Peninsular Malaysia and meeting renewable energy and climate change targets. The most direct of these is diversification. The Malaysian electricity sector is “heavily dominated by natural gas, oil and coal,” and Sarawak is almost “completely dependent on fossil fuels for the moment.” The Sarawak economy is deeply based on liquefied natural gas (accounting for 44.7 percent of exports) and crude oil and oil products (accounting for 31.1 percent). There is a growing appreciation, however, that these fossil fuels will not last forever and that:

- ➔ Under the current administration, energy security and diversifying the electricity sector away from fossil fuels is very important. We need a portfolio of different options and SCORE will definitely improve energy security by getting us off oil, gas and coal. If

Figure 5: The 2,400 MW Bakun Dam (near completion), July 2010



successful, SCORE will grow hydroelectric capacity in Sarawak from 108 MW, or a 9.7 percent share in 2006, to 20,000 MW, or to a 71.4 percent share.

Another participant noted that:

→ We know sooner or later that oil and gas will deplete and that we need to look and diversify to other sources of economic growth. We have to develop something and those of us in Sarawak have learned from countries like Angola and Nigeria where oil production peaked in the 1970s, or Texas, where it peaked even before then. We need to be looking beyond oil and gas and SCORE is part of that quest.

Part of the energy security benefit is reliability, not only diversifying, but diversifying to more reliable technology. One participant noted that:

→ Hydroelectric power stations are more reliable and efficient than fossil fueled ones. It takes only 30 to 50 people to run a typical dam and with automation, you can get nice economies of scale. Murum is 900 MW, that's almost ten times as big

as Batang Ai, but it will require only 100 workers. That's three times the workers to get ten times the power and the capacity factor of hydro is much higher than fossil fueled stations. Thermal stations are lucky to get above 90 percent, whereas Batang Ai operates at 98 percent.

Another expected benefit is meeting shortfalls in demand, even in Peninsular Malaysia. Malaysians, simply put, are using more per capita electricity due to urbanization, increasing income and the emergence of a middle class with more affluent and consumerist tendencies. More Malaysians own detached housing, automobiles and appliances such as electric fans (98.5 percent), color televisions (93 percent), washing machines (85.6 percent), refrigerators (77.4 percent), computers (28.9 percent) and air conditioners (14.4 percent) compared to only two decades ago.<sup>5</sup> Yet 70 percent of Malaysia's 123 Terawatt-hours (TWh) of electricity potential lies in Sarawak. SCORE, one participant noted, "is therefore critical in satisfying shortfalls in Malaysian energy demand, getting some of that massive potential to where it needs to go." Another remarked that "even though the undersea cable from Bakun has been postponed, I am certain we will eventually commence its development in order to link the electricity



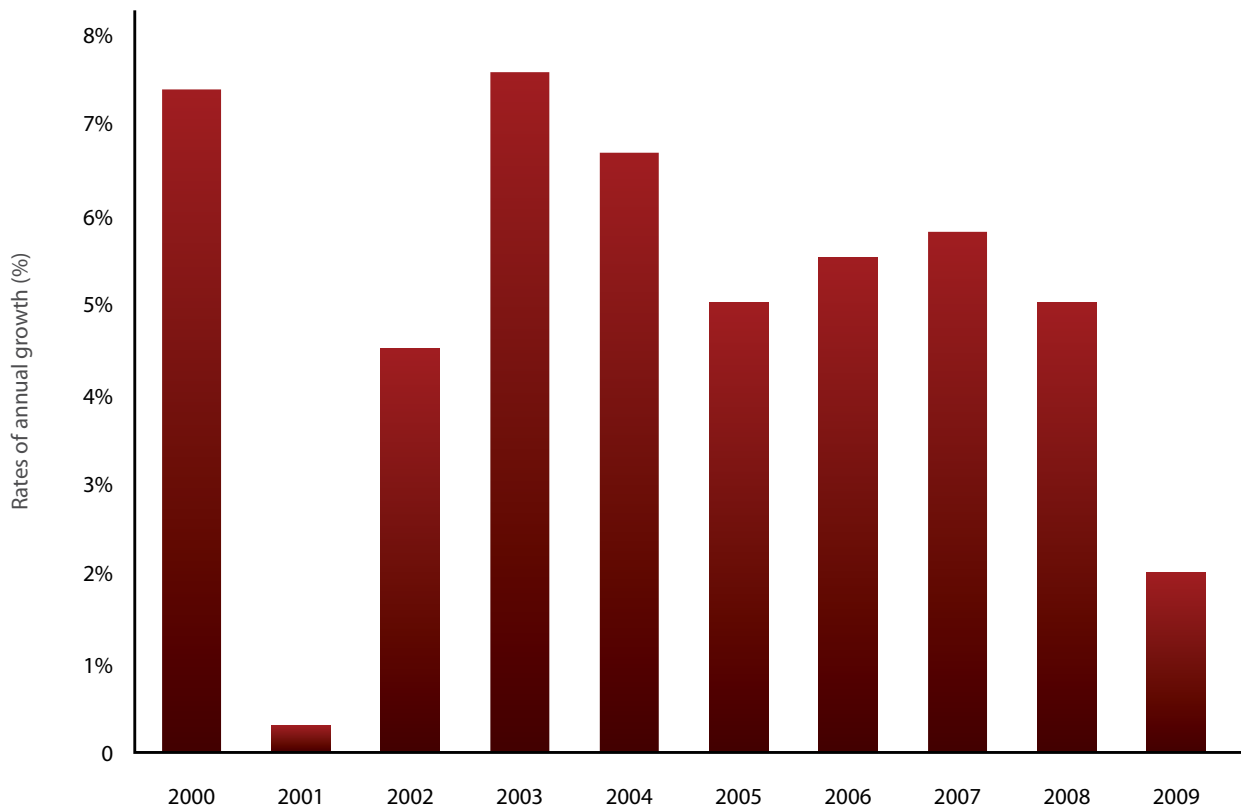


Figure 6: The rock concrete face and powerhouse (located seven kilometers away) of the 944 MW Murum Dam (under construction), July 2010





Figure 7: Real gross domestic product growth rates in Sarawak, 2000 to 2009



coming from SCORE with the Peninsular.” This could be why “Malaysia’s official energy plans projected outward to 2030, we expect 5,000 to 7,000 MW of hydroelectricity to be exported from Sarawak to Peninsular Malaysia.”

A final energy security related benefit is minimizing the environmental impacts of energy production and meeting goals for renewable energy and climate change.<sup>6</sup> Under Malaysia’s “Fifth Fuel Policy” 5 percent of electricity supply is supposed to come from renewables by 2010. SCORE, said one participant, “enables us to say that Malaysia is becoming more renewable,” with one even going so far as to say “SCORE is proof that we’re going all out to promote renewable energy and with projects like SCORE Malaysia could one day be seen like New Zealand, almost completely renewable.” When announcing Malaysia’s Green Technology Policy recently, Prime Minister Dato’ Sri Mohd. Najib Abdul Razak said, “Renewable energy sources such as solar, wind, mini-hydro, biomass, biogas and geothermal are expected to grow by 116 times in uptake between now to 2030 when the new roadmap which features the Feed-in Tariff mechanism for renewable energy takes off under the 10th Malaysia Plan.”<sup>7</sup>

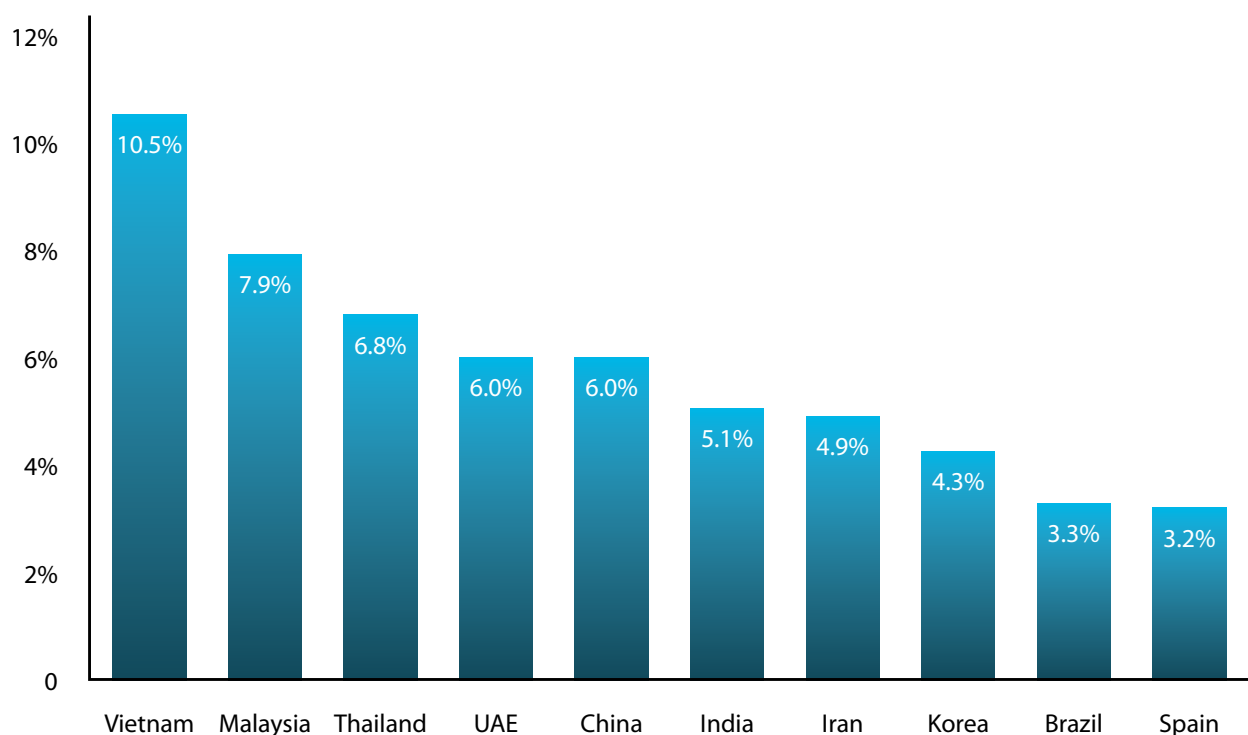
Malaysia is also committed to cutting down greenhouse gas intensity by 40 percent between 2005 and 2020.<sup>8</sup> The

commitment stems largely from the fact that Malaysia is the second fastest growing emitter of greenhouse gases in the world with an annual increase of 7.9 percent per year, *excluding* changes in land use, numbers presented in Figure 8. Put into future context, emissions in a business as usual scenario would grow 74 percent from 2005 to 2020<sup>9</sup>. Interestingly, if the undersea cable from SCORE is completed such an electricity interconnection could be the second cheapest carbon abatement option for the entire electricity sector and eighth cheapest option for all of Malaysia, numbers depicted in Figure 9. (SCORE is classified as the category “Transmission Link from Bakun”).

A third purported benefit would be more *inclusive development* between Malaysian states and within Sarawak. While Sarawak is the largest of Malaysia’s thirteen states and home to 40 percent of the country’s land area, its GDP per capita lags behind the national average and is often considered one of Malaysia’s “least developed” states, despite its natural resources. Some of the country’s most severe pockets of deprivation exist in Sarawak<sup>10</sup>. As one respondent elaborated:

➔ The Ninth Malaysia Plan (from 2006 to 2010) had the primary task of reducing the regional imbalance between states within Malaysia through a

Figure 8: Average annual growth rates in carbon dioxide emissions for the top ten countries, 1990 to 2006 (%)



new approach known as corridor development. Sarawak is one of the least developed states and a gap is widening between states with Selangor, Kuala Lumpur and Penang getting wealthier. It is not a healthy situation and creates a lot of uneasiness and tension. SCORE represents the type of focused development effort that is needed for equalizing these disparities.

Another remarked that “Sarawak is behind in terms of development, we need to move ourselves to become a high income state. Malaysia as a whole is moving towards that, Sarawak needs to follow the main Malaysian policy.” Yet another commented that:

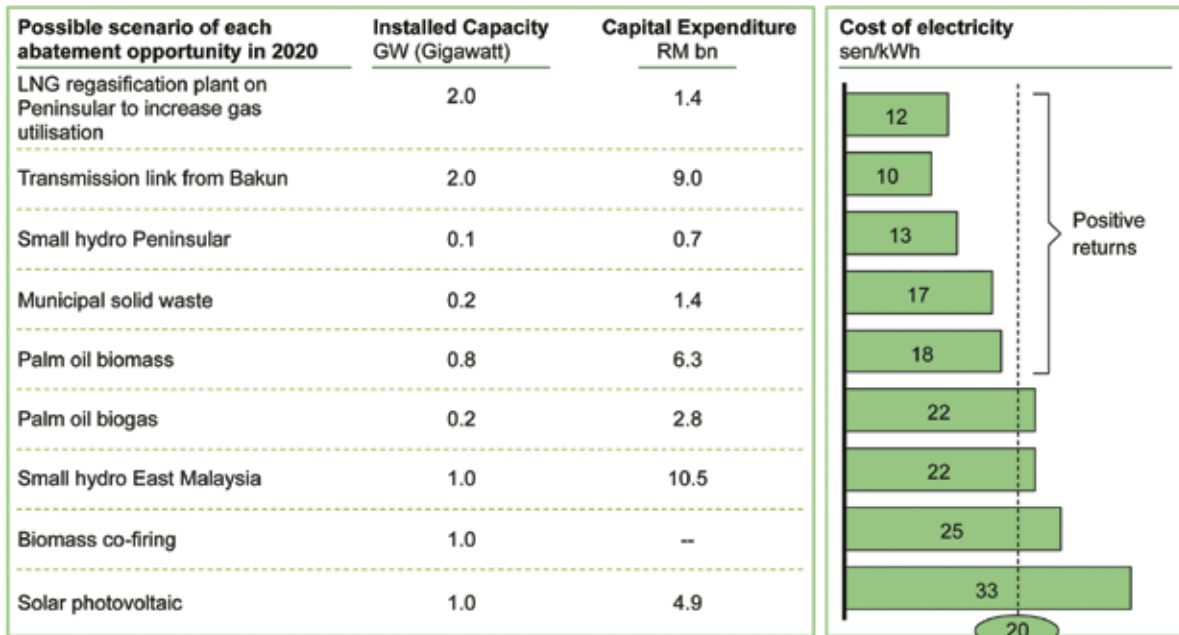
- ➔ Sarawak is one of the lowest rungs in development with other states and we want dearly to be on par with them. The state of Sarawak is quite hobbled, our infrastructure is not there, be it water, be it roads, or electricity or telecommunications, this is the major focus of development. We need to catch up, in line with Vision 2020.

These views highlight the technical and financial challenges facing policymakers in expanding access to basic healthcare, education and amenities for hard to reach populations in the interiors of Sarawak. Moving away from the state-centric model of development that has dominated Malaysia’s political economy throughout its post-Independent period,

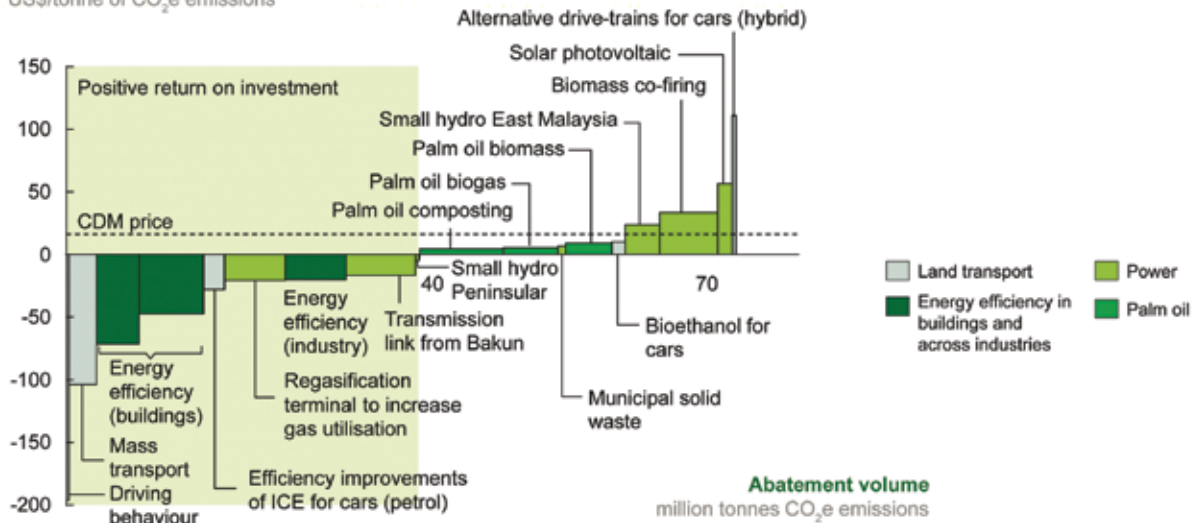
the logic behind the development corridors is to rely on the private sector and public-private partnerships to modernize rural areas. Such sentiments are apparent in official planning documents, with Prime Minister Tun Abdullah Haji Ahmad Badawi stating that “if Sarawak’s natural strengths and assets are fully optimized and given the opportunity to flourish ... overall competitiveness will be strengthened and prosperity will be better distributed”.<sup>11</sup> The strategy to entice foreign investment into SCORE has already shown some results with officials announcing an alleged RM87.6 billion in the form of actual investments to Bakun and Murum dam, as well as agreements for aluminum smelting and pledges to invest in Mukah, Tanjung Manis and Similajau. This compares to only RM60 billion for Iskandar Malaysia, RM40 billion for the Northern Corridor Economic Region, RM32 billion for the Sabah Development Corridor and RM28 billion for the East Coast Economic Region. As one respondent iterated, “SCORE is clearly the best performing of all of the development corridors in Malaysia.”

The equity benefit is not just about leveling the playing field between states, but also within the Sarawak. Sarawak is home to many members of Malaysia’s indigenous peoples, referred to as *Orang Asli* in Peninsular Malaysia and *Orang Asal* in Sarawak and Sabah or “original people”, which together with the Malays form the broader category of Bumiputera or “sons of the soil.”<sup>12</sup> Yet growing disparities between and within ethnic groups as well as urban and rural areas is a policy concern.

Figure 9: Cheapest options for carbon abatement in Malaysia



Cost of abatement in 2020  
US\$/tonne of CO<sub>2</sub>e emissions



Since the 1990s, income growth has disproportionately benefited the top 20 percent income earners. The hardcore poverty rate among the *Orang Asli* of Peninsular Malaysia is 25 times higher than the national average of 1.4 percent.<sup>13</sup> Such statistics were confirmed by our interviews, where we talked to one academic who completed a study in which a survey of 5,000 people found that more than 60 percent lived below the poverty line. As one respondent noted:

→ Until today, the government in Sarawak refuses to discuss poverty as an issue, they will not release information and data on poverty rates out of fear it

will reveal their ineptitude. Though they say there is no poverty, in fact it is quite stark and widespread.

SCORE, some respondents indicated, can help reduce this poverty in a variety of ways. Some talked about how “concentrated settlement,” undertaken to remove and relocate communities away from dam sites, could “reduce the cost of infrastructure and communication.” Another remarked that “the relocation strategy makes sense if you actually want to group and consolidate dispersed rural population, cluster these people together around a center so you can give them health care, education and energy services.” Still another explained that:



→ How do we provide modern amenities to dispersed villages? It could cost us RM1 billion to build a single road to connect one remote village. By the time the road is completed, the money spent, the village could be empty and everyone could have left for town. It makes no sense to build services in every community, roads to every community, we need to centralize the people, not decentralize and expand the roads and services.

The following statements made by government officials and planners are illustrative of the appeal SCORE holds to them for poverty alleviation. As one remarked:

→ The indigenous people I have spoken to want to be part of modern society. Sarawak has a large population of young Penan or Kenyah that no longer care about the preservation of culture or their traditional way of life. They want gadgets, cars, nice clothes and need to learn to survive in the modern economy. They are not interested in picking some fruit in the forest, collecting bananas, hunting pigs. They instead all want to drink beer, get their internet, watch their DVDs, get involved in life. SCORE is the way they can achieve that.

Another commented that:

→ In a way the development that SCORE promotes is like disturbing a hornets' nest, for it shakes people out of their old system. If you are living in the jungle and have to spend two hours going to school each way, you are not making good economic use of your time, not going to escape poverty. You are economically inefficient, not good enough to participate in the modern economy, maybe even unable to lay bricks or drive trucks. What to do with these people? Take them out of the jungle, don't just give them cash, but train them, embed in them a sense of modernity. Fix them into a community, educate them about the cash economy, investment, savings. Teach them things like contract farming, agricultural processing, other semi-skilled jobs. If I could I would send a helicopter to rescue them all from the jungle, but a far better solution is SCORE.

These comments echo formal statements issued by senior government officials. Chief Minister of Sarawak Taib Mahmud once remarked that "the Penan should not be left to roam the jungles like the Orang Utans"<sup>14</sup> and former Prime Minister Mahathir Mohammad once remarked that indigenous peoples should not be permitted to "live on maggots and monkeys in their miserable huts, subject to all kinds of diseases". As he went on to say:

→ We do not intend to turn the Penan into 'human zoological specimens' to be gawked at by tourists and studied by anthropologists while the rest of the world passes them by ... It is our policy to eventually bring all jungle dwellers into the mainstream of the nation's. There is nothing romantic about these helpless, half-starved and disease-ridden people and we will make no apologies for endeavoring to uplift their living conditions.<sup>16</sup>

Though some of the villagers and community leaders we spoke with were critical of SCORE — see the comments presented below in the subsection on social challenges — others were favorable. One tribal leader told us that:

→ Of course relocation offered by SCORE is attractive. I can get a permanent longhouse big enough for 300 families for my community with concrete at the bottom, free electricity, free water, two schools, including a secondary school and clinic, and I can live near a river and a highway.

Another member of the Penan that will be displaced by the Murum Dam, stated that:

→ Resettlement will get us closer to schools, here you can look around and see children not in school, parents around because they are not employed. Most of us drop out after primary school. We started here with 52 families and are now down to 30, we have lost those because they went to Asap. There is electricity there, clean water, road access, clinics, sanitation and a school. We need those and it's what SCORE can provide. It's our future.

Figure 10 depicts one of these longhouses.

Yet another resident of the Asap resettlement community, home to those displaced by the Bakun dam, remarked that:

→ Things are not bad here ... Life here is not as difficult as in the forest. We have jobs, can go to school, can go to clinic. The government is not bad—it is trying to help.

Another resettled resident argued that:

→ Life before is different from life now, maybe even a little bit better. In some ways we are living better, we were all subsistence farmers before, we now have enough money to send some of our children to school, got fair compensation for our flooded land. Our longhouse even has a maid for the chief and it is made of concrete rather than wood. Most homes have at least one car, one

Figure 10: An electrified longhouse complete with road and access to schools and clinics in Sungai Asap, Sarawak



motorcycle, a television, 24 hour electricity for every room, electric fans and kitchen appliances.

Lastly, participants indicated SCORE could offer ample *economic spillover benefits*. One noted that “the spillover impact from SCORE is very important, it could serve as a magnet for building skills and bring affiliated infrastructure like roads and telecommunications networks.” Another thought that the “multiplier effects and downstream industries established will be good for Sarawak” and that “the area around the dams themselves could become tourist attractions, where people could fish, swim, or jet ski.” One senior government official commented that “SCORE will bring community centers, skills development centers, schools, hospitals and transport corridors.” Another explained that:

- SCORE seems to operate on the Batang Ai model of development: industrialization and hydro-electric construction first, then indirect benefits such as aquaculture and tourism. The Batang Ai reservoir, for example, is now home to a Hilton Resort and a vibrant aquaculture industry which produces 300 million tons of fish each year from 2,810 cages of red tilapia and patin. The Batang Ai Longhouse resort also receives about 21,000 annual visitors. We hope to do the same thing with the lakes created by the Bakun and Murum dams and possibly even the others.

Figure 11 shows a panoramic view from the Hilton Batang Ai Longhouse.

## Constraints and challenges

Participants divided the challenges and constraints facing SCORE into technical, economic, political, legal and regulatory, social and environmental dimensions. Table ES1 offers an overview of these challenges, while the rest of this section discusses each in turn. By “challenges” we mean both those that had to be overcome already, such as construction and excavation for some of the dams such as Bakun and Murum, and those that remain, such as negotiating power purchase agreements and dealing with future community relocation and resettlement. In laying out the challenges in this manner, the authors did not presume that they exist in obvious, easily distinguishable categories. They are loose, interconnected and jumble together and we separate them into distinct categories only so that they can be more easily identified.

### Technical Challenges

Respondents discussed four types of technical challenges related to sedimentation and hydrology, lack of supporting infrastructure, dam construction and coordination of contractors, and human resources.

*Sedimentation and hydrological difficulties* include both projecting where dams for SCORE should go and then operating them safely and affordably once they are built. Logging, erosion and unsustainable agricultural practices have contributed to unusually high amounts of suspended sediment, silt, clay and gravel in the water, properties that



Figure 11: The view from the Hilton Batang Ai Longhouse sitting on the reservoir of the Batang Ai Hydroelectric Dam



create muddier waters that are harder on dams. Figure 12 shows the murkiness of the Kapit River, downstream of Bakun. As one respondent noted:

- The turbidity and the murkiness of Sarawakian rivers suggests that operators will be lucky to get 30 to 40 years out of dams there. Those properties make Sarawak not ideally suited for large-scale hydroelectric facilities. There is also too much flooding, too much silt in the water.

Another commented that “climate change could complicate efforts to build SCORE since it could change precipitation and evaporation patterns, throwing the initial hydrological estimates of energy potential way off.”

Participants also mentioned *lack of supporting infrastructure* as a barrier. One remarked that:

- Sarawak is not an attractive place for investments. It is not fully developed, lacking even basic infrastructure such as highways to carry raw materials or extensive reliable electricity networks. Everything has to be built from scratch, which adds to the cost of doing any sort of big project.

Another stated that “doing big dams may make sense in China or Peninsular Malaysia, where they need large amounts of energy or are connected to national grids, but Sarawak is isolated, its power grid is not even connected to Sabah, the next state, for political and geographic reasons.” One participant questioned whether Sarawak had enough competitive advantage, given these deficiencies, to go ahead with something like SCORE. One argued that:

- I would expect a project like SCORE to work in an industrializing free trade zone that already has ports, uninterrupted electricity supply, highways, roads and telecommunications networks. But Sarawak does not have the infrastructure, what can they offer? Only land and cheap electricity and these are hardly rare commodities. Most developing countries can offer them.

Even the electricity grid in Sarawak was mentioned as a barrier, with “RM1.8 billion in transmission upgrades needed” and “only a spaghetti line transmission network existing now in Sarawak, 25 years old, reaching its useful life, a single string going from Samalaju to Kuching that will need to be ramped up if we are ever to develop SCORE.”

*Constructing and excavating* the dam sites was mentioned as a challenge. One respondent argued that:

- The infrastructure and logistics issues with SCORE are immense. Each dam will need river diversion, tunneling and channeling, access to the dam to transport machines and turbines and highly trained engineers and construction workers to build spillways, powerhouses, transformers, turbines and the dam face.

Another put things in perspective when talking about Bakun:

- For a project like Bakun we are talking about heaps of construction. We had to erect a coffer dam as well as the dam’s concrete face. We had to clear the reservoir area and also build the

Figure 12: Logging and changes in land use have increased sedimentation and turbidity of the Kapit River



powerhouse, a quarry, offices for headquarters and subcontractors. We constructed a canteen, two restaurants, a hotel and a clinic as well as a switchyard, transformer, concrete factory, spillway, tunnels, roads and housing for workers.

Given that each dam site is unique and also that all of the proposed dams are in rural areas far from urban centers, these construction and excavation challenges will likely occur for each phase of SCORE.

Respondents also identified *coordination of contractors* and *human resources* as obstacles. One noted that “skilled manpower, capital and technology” are “the key challenges in the near term,” and that “Sarawak does not have a rich enough labor base, banking, financial facilities, technology firms, or engineers.” Another commented that “Sarawak simply does not have the skill set for something like SCORE” and that “quantum leaps in skills and manpower training” would be needed. Coordination of workers and contractors were also referenced as “formidable” and perhaps “inescapable” challenges. About five to seven thousand workers, many of them from China, Bangladesh, Philippines and Indonesia, had to be imported for Bakun alone and one respondent argued that “there’s no way Sarawak has enough manpower to do more than just Bakun, Murum and maybe Baram.” Another warned “not to be fooled by any laundry list of everything potentially desirable under SCORE in the master plan, the plan must be

juxtaposed against reality and the reality is the coordination and managerial challenges with SCORE are massive.” Others critically (and often candidly) referred to SCORE as “half baked,” “nothing more than a marketing brochure,” “an illusion,” and “a question mark.”

### Economic challenges

Respondents discussed four types of economic challenges to SCORE: cost overruns, financing, power purchase agreements and little economic improvement to community welfare.

*Cost overruns* were referenced as a major challenges since some parts of SCORE, notably Bakun (and possibly Murum), are already more expensive than planned. One respondent argued that “by some estimates the cost overruns associated with Bakun were a staggering 600 percent—that dam was supposed to cost RM2.5 billion but cost six times more due to delays, rising interest rates, strikes and problems with excavation.” Another remarked that “the entire bidding process placed too much risk on the contractors and subcontractors. If we had to price all of the risks that we were being asked to take, we would never have gotten the contract and won the tender.” Another reason for the ballooning costs was related to how the project was financed, with borrowings from EPF and KWAP which meant that interest payments rose as the project delayed. Sime Darby suffered RM1.7 billion of cost overruns for BHP, an amount almost the same size as the en-



tire RM1.8 billion contract, making others “wary of becoming involved in other aspects of SCORE.”

*Financing* also promises to remain a challenge, with “a big obstacle relating to where the money will come from to meet the SCORE master plan.” As one respondent noted:

- I am a bit skeptical SCORE will actually happen. It is mind boggling to do so many dams in an area without high electricity demand; I do not think financing it will be easy. It will be a huge challenge to get financing from the private sector and lining up the necessary industry players to make SCORE a reality.

Part of this reluctance to finance appears connected to the perceived unattractiveness of hydroelectric dams compared to other renewable energy resources. As one respondent stated:

- Investors are not betting on large-scale hydro. The guiding principle for renewable energy in Malaysia is to commercialize that next generation of technologies, people are not wasting time with old school hydroelectricity.

Setting the *power purchase agreements* from the dams in SCORE could also be difficult with many businesses “wanting the electricity for close to free.” One participant elaborated:

- SCORE is a risky strategy, one that is very strange, trying to produce cheap energy first to attract businesses rather than having businesses already here that need energy and want to grow. The SCORE strategy is not focused and will not work on small and medium size enterprises; what it needs is energy guzzlers, things like manganese and aluminum. Sarawak is the only state in the world to my knowledge that uses this type of strategy.

Others remarked how “Sarawak is competing with everyone to draw in industry and the smelters and companies have all of the negotiating power,” meaning that “it’s going to be very difficult for them to set a power purchase agreement that will bring positive returns on investment on these big dams.”

A final economic challenge relates to *community welfare*. As one respondent put it succinctly, “SCORE is not really intended to electrify people or the rural poor in Sarawak, it is for industry only.” Another commented that “SCORE is supposed to be a growth engine for industry, it won’t help the poor, it has no real jobs for them and no skills adoption. The amount of jobs created for locals will be practically zero.” Others stated that SCORE will have “no positive effect on poverty alleviation” and that “it is not really concerned with benefiting communities, it’s more concerned with building infra-

structure,” with one going so far as to call the project “lousy” and “not doing the country any good.” Still others remarked that SCORE “won’t even offer local jobs, most will be filled by immigrants and we’re not talking about a large number of them, at most 200 for a single smelter,” and that “SCORE is about cheap electricity, royalties and revenue, but there is no broader social benefit.”

### Political challenges

Some respondents noted how the political environment creates four barriers for SCORE including the cancellation of the undersea cable, hubris, corruption and nepotism and low political literacy and representation.

The decision by federal planners to *cancel the undersea cable* directly affects the profitability of the entire corridor. Respondents expressed contradictory stances on why the cable was cancelled. One said that it was because it was “ridiculously expensive” and “the national government didn’t want to waste money on it when they could build other power stations in Peninsular Malaysia cheaper and quicker.” Another suggested that the decision was that of the state government, not the national one and involved “Sarawakians wanting to keep all of the electricity for themselves, not giving it away or exporting it.” Regardless of the cause, however, the cancellation does seemingly hurt the viability of SCORE. “Instead of selling higher priced electricity to the electricity markets in Peninsular Malaysia,” noted one respondent, “operators are now stuck with trying to negotiate with a limited number of companies in Sarawak.” One participant argued that “the decision to cancel the undersea cable, which is political, ... basically a nail in the coffin for any positive returns on investment for the foreseeable future.”

*Hubris* also serves as an interesting political challenge. Many planners in both Sarawak and Malaysia have come to see science and technology as emblematic of a new Malaysian cultural identity. This new Malay, or *Melayu Baru*, became a political ideology championed by the ruling party in the 1990s and promoted reliance on technological transformation and modernity to “emancipate the Malays from the shackles of feudalism, servitude, blind religious faith and moral degradation”<sup>17</sup>. Malaysia was also in a sense competing with its Arab neighbors Dubai and United Arab Emirates, which they perceived as highly stable, wealthy and technologically developed.<sup>18</sup> To promote technological transformation that would enable Malaysia to “catch up,” Prime Minister Mahathir embarked upon Vision 2020 to create a highly technical, sophisticated, high energy economy. Part of Vision 2020 involved ambitious capital-intensive megaprojects as a way of overcoming colonialism and decades of “feeling small.” Malaysia has now entered a postcolonial phase where they want to imitate Western consumption and technology but on a grand-

er, more ambitious scale, with “bigger, taller and bolder” technology. Thus a slew of government sponsored projects related to automobile manufacturing, steel and cement making and the construction of iconic projects such as the Kuala Lumpur International Airport, Petronas Towers, Putrajaya, Formula One Circuit and the Multimedia Super Corridor.<sup>19</sup>

Big dams, such as Bakun and Murum, fit in centrally with this vision. In its initial design Bakun Dam and its undersea cable would have been the biggest rock-filled concrete face dam in the world connected to the longest cable. Because it came to be associated with progress, however, contractors and even politicians are reluctant to point out real difficulties.<sup>20</sup> Or, as one respondent noted, “Malaysians want to show the world they can build the Petronas Towers or Bakun Dam and when things go wrong, they are swept under the carpet, it does not bode well for political accountability.” Another mused that “the arrogance and ambitions behind them may not match the skill Malaysia needs in getting them built.” Yet another joked that “SCORE fits with the Malaysian style of development where we go big in the planning stage and fail on implementation.” The problem with such hubris, however, is that “it means we have no idea how to transform these bold ideas into actual, sound projects,” and that “big projects like SCORE could wipe Malaysia off the map with incompetence and fading away into irrelevance.”

A third political challenge and probably one more detrimental, is *corruption*. One respondent argued that “SCORE is simply about the political elite in Sarawak lining their pockets,” another that “the thinking behind SCORE is the bigger the projects, the biggest the cuts and bribes you can get.” The Sarawak police have been accused of “sanctioning violence” against those that have tried to oppose the project. One participant emotively argued that:

→ I and members of my community have tried to oppose the Bakun Dam and also other government linked companies from logging or building palm oil plantations on our land. But company officials have done things like hire thugs to put our village leaders into a burlap sack and drag them behind a car, or beat them half to death. We don’t oppose the government or the companies linked to it here anymore.

This corruption, perceived or real, makes communities reluctant to negotiate with the government over social issues related to SCORE such as relocation or employment. One respondent admitted that the state government “has a real credibility and legitimacy issue in the eyes of the international community, which can complicate everything from signing contracts and setting electricity tariffs to reaching out to communities and indigenous people.”

A fourth, and connected challenge, involves low political literacy and representation. As one respondent surmised, “people are used to discontent and corruption in Sarawak, it has become normalized.” Another argued that the local groups that would most likely suffer from SCORE have been “brainwashed” and “content to receive a few crumbs from the table.” As this person continued:

→ The tragedy here is that the indigenous communities are all compromised, not are not willing to stand up for their rights, let alone able. They can be bought off very easily, some with only a few hundred dollars. Political awareness is extremely weak; they are easily strong-armed into shutting up.

Another argued that “the ethnic clans have problems negotiating with each other and the government, each clan wants different things, we don’t trust each other, we can agree on nothing, which makes us easy to conquer by a unified government.”

### Legal & regulatory challenges

Participants articulated legal and regulatory challenges such as oppressive legal statutes, lack of a national energy policy, lawsuits and a regulatory commitment to fossil fuels.

In terms of *oppressive legal statutes* and *land codes*, much of the property needed for SCORE sits on native customary land. The indigenous communities that have occupied the territories in the interior of Sarawak for generations have had it steadily taken from them (and in Malaysia as a whole). Figure 13, for example, shows a notice given to one Penan community forced to leave their home. As one respondent went on to explain:

→ There are really five ways in which the state government in Sarawak uses the law and land codes to oppress indigenous rights and push through projects like SCORE. The first is by setting unfair standards for indigenous land tenure. They won’t recognize community maps or ancestral claims so that they can claim the land belongs to the state. The second is by foreclosing access to foraging ground by encroaching on where indigenous communities live. The third is by failing to give indigenous peoples identity cards so that they cannot vote. The fourth is by giving unfair compensation for relocation and resettlement, sometimes just a couple of pigs for relocating an entire village, or giving people ‘land’ but of a lesser quality than the type of land lost, i.e. not as good, in swampy areas, infertile, or with limited or difficult access to plots. The fifth is by making it criminal to oppose projects, by jailing protestors and op-



ponents of the state. This can be easily achieved by placing police in certain villages, or by creating ongoing threats. The sad thing is that, Bakun Dam included, I cannot think of a single energy project in Sarawak, that has not committed these types of impacts or grievances.

As another put it, “the state government in Sarawak has too much power, the law is tilted too heavily in its favor, they can get away with almost anything.”

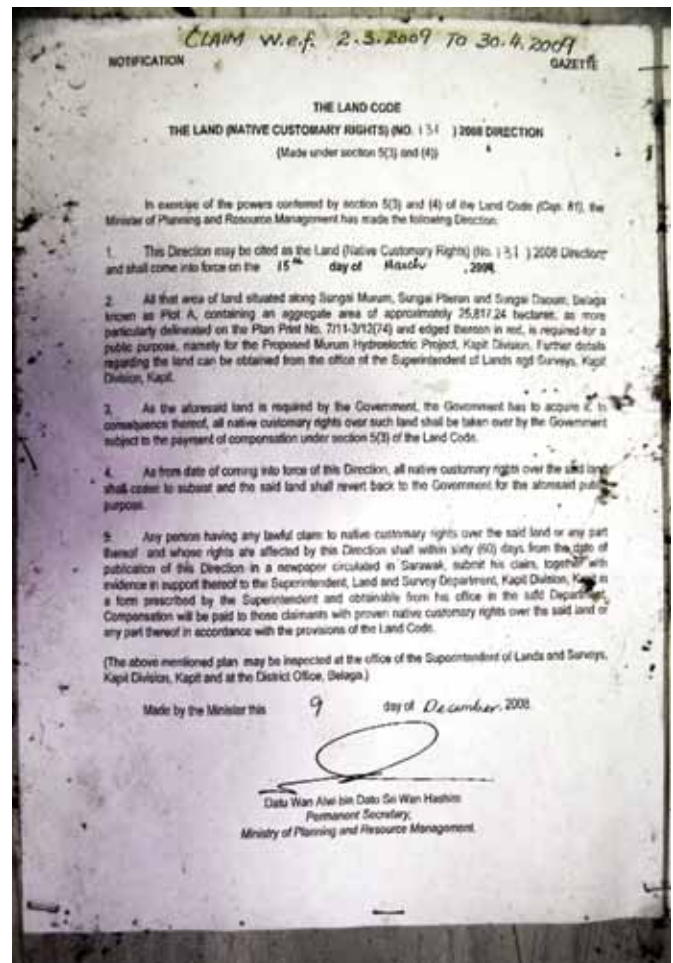
The *lack of a national energy policy* complicates efforts to promote SCORE and fragments those involved in it. As one respondent put it:

→ Sabah and Sarawak operate as different emirates when it comes to energy decisions, they are exempt from national legislation or jurisdiction, making energy policy inherently fragmented. Unlike other Malaysian states, energy policymaking power is exclusively within the domain of Sarawak. The national government has no influence there.

A third regulatory challenge involves *lawsuits* over environmental impact assessments and community relocation. As one respondent critiqued, “if planners in Sarawak produce an EIA they don’t like, they will just close their eyes and ignore it.” Another commented that “Public comments on the EIAs in Sarawak are completely voluntary, up to the project developers. Criticisms are accepted when convenient and ignored when not.” Another element of this challenge includes enforcing EIAs that do exist. “Compliance with EIAs on the ground can be a tricky thing,” noted one participant, “the books can say one thing but the poor local workers on the ground paid on a piecemeal basis may have little understanding and knowledge doing their job to feed their family and no capacity at all to comply with environmental statutes.” Another mentioned that “Sarawak is certainly behind in terms of getting state-of-the-art or even adequate EIAs done. They have to be pushed to do them and in the case of SCORE have to be directed from senior ministers for them to happen.” This may explain why a respondent argued that “scores of lawsuits have been filed against Bakun, the first big leg of SCORE.”

As a positive sign, two of the state planners we spoke with seem to recognize this, with one saying that “future EIAs will be better, rest assured that the next group of people affected by other dams will have better deals, we are learning, we have made mistakes, but we will learn from them,” and another remarking that “we will get better at environmental compliance ... we are also intending to comply with the Equator Principles and the United Nations Declaration on the Rights of Indigenous People for all future projects, for both developers and consultants.” One contractor told us that “we

Figure 13: Notice given to the Penan of Long Wat to vacate their land for the Murum Hydroelectric Project



are not trying to fumble the future environmental and social impact assessments, we are working with consultants and my hope is that future EIAs will be the best done to date.”

A final regulatory challenge involved regulatory *commitment to fossil fuels*. Sarawak is home to 550 million tons of coal in Mukah-Balingian and another 445 million tons in Merit-Pila.<sup>21</sup> Respondents commented that “if the dams take too long to build, or if there are any unexpected delays, we have no problem firing up new coal plants in the interim,” and that “in Malaysia subsidies are heavily tilted towards fossil fuels, making projects like Bakun [and SCORE] less competitive.” Another one explained that:

→ Because of the way regulations and subsidies are designed we are not looking to invest in large dams in Malaysia. We have a variety of alternatives to consider that are much more lucrative and certain, from palm oil plantations to natural gas combined cycle power plants, to wood pellets, palm kernel shells, palm oil effluent, empty fruit bunches, agricultural residues, logging and timber. We can make money quickly on these options, so why take the risk with a capital intensive dam?

## Social challenges

The social challenges mentioned by respondents included community relocation, boom and bust towns, threats to livelihood and unfair compensation.

*Community relocation and resettlement* was discussed as a “severe” barrier. Bakun dam by itself necessitated forcibly moving about 10,000 people from the 70,000 hectare reservoir and catchment area to a 4,000 hectare sponsored resettlement site at Sungai Asap. Yet resettled life in Asap required a fundamental shift in the way of life of these communities and has threatened the maintenance of traditional knowledge systems. As one resettled villager lamented:

→ Before we had to resettle here in Asap, our main source of protein used to be wild boar and fresh fish. Here there is no fish. The Asap River is too small and the Koyan river is too far. Wild boar is extinct in these parts as there is no more forest. It was cool there, but it is hot here. There we could sleep without fans, here we need a fan or air conditioning. We had land for farming there, here we have to travel one hour walking to get to our farmland. There we could use the river for transport, here we have to walk or take the car. There we did not need fertilizer or pesticides, here the land is so harsh that we do. There we used to eat hornbill for *burung kenyalang* and what the forest provided, here we have to buy vegetables at the market, we are no longer subsistent. We don’t even have the title to this land, meaning if the government wishes to move us again, we have no choice but to go.

Our site visits also revealed that relocation and resettlement in Asap has adversely impacted community resilience and cohesion. One participant reported that since the scheme started in 1998, more than 3,000 people have migrated out of the area “because they cannot take it anymore” to towns such as Bintulu, Sibul, Miri and Kuching. In Long Lawen, a displaced community from Bakun, the numbers living there have dropped from 2,400 people to 60 relocated families and 400 people that have now whittled down to 100. At one community we visited, for example, we had trouble sleeping at night due to coughing from a tuberculosis epidemic, malaria-carrying mosquitoes buzzing around our beds, and the smell of urine, since the longhouse lacked basic sanitation and people relieved themselves through the wooden floorboards. Another villager said that the difficulties that they faced in planting crops such as cocoa and pepper had become a source of tension within the community.

*Boom and bust cycles* of economic activity and *inflation* are also prominent social concerns. The thousands of construction workers — a peak of 7,000 and about 3,000 on average during other times — for Bakun created a high demand for fuel, food, clothing and other goods, driving prices up and causing shortages in some villages. Marital problems and “increased immorality” occurred with public displays of intoxication, fighting and prostitution. It has also been documented that “rampant pimping activities” have been observed with “Chinese, Filipino and Malaysian women” with a “make-shift brothel situated about one kilometer from the dam site.”<sup>22</sup>

*Downstream community livelihood* could also be threatened by SCORE. About ten thousand people downstream from Bakun will have their fishing and agricultural activities disrupted for nine to twelve months as the reservoir impounds water, about six thousand similarly will be affected by Murum. Rivers in Sarawak, unlike other Malaysian states, are incredibly important to transport and community livelihood given the lack of rail and limited road networks there and the great distances between villages. Rivers serve as “superhighways” from coastal areas into the interior and the longest one, Sungai Rajang, is the one SCORE intends to tap. The problem is that 600,000 people, or one quarter of the population of Sarawak, rely on rivers exclusively for transportation, fishing, drinking water and agriculture.<sup>23</sup> One participant worried that people will have to travel “relatively long” distances to collect water from sources other than the river; Kapit, Song and Sibul will experience shortages of drinking water; and 16 longhouses along the river will lack domestic water for washing, bathing and cooking. Figure 14 shows a girl already having to walk significant distances to collect drinking water near Murum.

A final thematic social challenge relates to *unfair compensation* for those affected by the dams. One respondent called the compensation given for Bakun and SCORE “very poor” and “considered unfair,” making it “very hard for affected communities to survive.” Such loss of land, noted one respondent, is “very difficult to measure and fix with economic measures like money, it is hard to compensate someone for a home that has been passed down for generations, land where our ancestors are buried, or a Durian tree tended and cared for by generations of family members.”

## Environmental challenges

Respondents mentioned environmental challenges related to deforestation and flooding, greenhouse gas emissions, changes to water quality and river flow and downstream industrialization.

*Deforestation* and *flooding* were continually referenced as significant environmental impacts from SCORE. One study has already warned that:



→ The impact on Sarawak’s environment and indigenous communities [from SCORE] will be devastating, involving massive flooding of pristine forested areas, displacement of thousands of indigenous people, fragmentation of forests affecting endangered and endemic plants and wildlife and extensive damage to rich biodiversity in river headwaters.<sup>24</sup>

Bakun dam, with a catchment area of 1.5 million hectares and a reservoir area of about 70,000 hectares, will destroy 50 million cubic meters of biomass home to six rare and endangered fish species, 32 protected bird species, six protected mammals and more than 1,600 protected plants including, Herons, eagles, woodpeckers, Silvered Leaf Monkeys, Bornean Gibbons, Langurs and Flying Squirrels. Murum dam, with a reservoir area of 24,500 hectares and catchment area of 275,000 hectares, will release 3.48 million tons of carbon, displace 755 people and threaten 300 rare and endangered species. Other proposed dams could affect water quality and availability throughout the Mulu National Park, home to the world’s largest cave and a UNESCO World Heritage Site.<sup>25</sup>

Since Borneo is a tropical environment, the dams behind SCORE would also emit substantial amounts of *greenhouse gases*. Decomposition and methane emissions from rotting vegetation is one primary source, as well as greenhouse gases released through diffusion as water is degassed through the turbines and spillways. One respondent noted that:

→ SCORE could have quite massive biodiversity and climate impacts. The methane generated from rotting vegetation could be equivalent to all of the emissions from Malaysia’s coal fired emissions alone. We’re talking about substantial climate change impacts.

Another explained that “being a developing country, climate change and sustainability is a low priority in Malaysia, it is seen as more important to develop infrastructure, clean or not and deal with the consequences later.”

The series of dams from SCORE could also negatively affect *hydrology, water quality and river flow*. Because they act as physical barriers within a river, dams change the concentration of dissolved oxygen, nutrient loads and suspended sediments in riparian and riverine ecosystems. Respondents mentioned that some of the water-related impacts from SCORE would include:

- Serious deterioration of water quality in reservoirs and downstream areas;
- Significant adverse impacts on water levels and salt water intrusion downstream;

Figure 14: A Penan girl walks to collect water from the Murum River near Long Wat after school



- A substantial risk of the introduction and spread of waterborne diseases; and
- A remote but tangible risk of catastrophic downstream flooding due to dam failures.

An independent study from the United Nations Development Program warned that SCORE, if fully developed, could damage water quality and water levels, produce industrialization and population growth that will contaminate water and stress water supplies, and result in other adverse environmental impacts such as sedimentation and siltation.<sup>26</sup>

Not to be dismissed are the *downstream impacts from industrialization*. After all, the electricity provided by SCORE will have to go to something and the industries planners have been courting are some of the “dirtiest” forms of industry. As this respondent continued:

→ So far the investment responses for SCORE have not been fantastic. So now the planners are starting to close their eyes to environmental degradation. They don’t care who they attract, it could be a plant that leeches heavy metals directly into the environment, as long as they can get someone to use all of this energy.



Another clarified that “SCORE is not really about energy, [it is] more about promoting industrialization and attracting investment in heavy industries” and that “Sarawak is not interested in light processing industries. They are interested in big industrial users. It doesn’t matter which industry, as long as they are big enough to use the energy”. A participant suggested that the types of investors that would be attracted to SCORE would be “maybe the Chinese, or multinationals, who want to milk the environment and are looking for cheap electricity and shoddy environmental standards.” One respondent went so far as to claim that “there’s really not much about SCORE that is renewable. I suspect they put the term ‘renewable’ in the title only so they didn’t have to call it SCOE. For in this particular case we’re not talking about renewable energy that enables low carbon growth, instead its hydroelectricity that enables carbon-intensive and energy guzzling growth.”

## Conclusion

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In one way trying to draw lessons from SCORE is problematic because of its context. As one respondent bluntly stated, “there are no lessons for other countries because we’re not doing SCORE for other countries, we’re doing it for ourselves, for Sarawak.” While we are appreciative of the uniqueness of SCORE, we still present three general conclusions.

First, SCORE reminds us of the interconnected nature of the challenges facing big infrastructure and development projects. One respondent commented that:

→ People forget that there is a price to pay for development, it never occurs in a vacuum or without consequences. Our role as policymakers and regulators here in Sarawak is not to say no to any development project, just to minimize the impacts from the development projects that occur.

No doubt many Malaysian planners mean well, but in the case of SCORE, the price of that development could be significant with flawed environmental impact assessments, questionable procurement procedures, highly criticized relocation of indigenous communities, cost overruns and delays and difficulties finding investors and financiers. Bakun Dam, the so-called backbone of SCORE, was 600 per cent over cost by some projections and saw the government awarded contractor, Sime Darby, saddled with RM1.7 billion of debt. As one respondent remarked, “while projects under SCORE are well underway, with two of its dams almost complete, yet no customers for the uptake of the increased capacity decided, the project is a bit odd. For it is taking

what is special to Sarawak, its biodiversity and cultural heritage and destroying and converting it into electricity, a commodity available in almost every country on the planet.” Our study has shown how planners and scholars need a holistic understanding of all of the obstacles facing SCORE if they are to truly understand the difficulties with implementing large infrastructure projects. It also suggests that SCORE may never occur in its entirety, given the tenacity of the challenges that remain. Perhaps a more realistic assessment would be that piecemeal components (such as a few dams) would be installed incrementally over several decades.

Second, and connected, is that some large-scale energy infrastructure projects can bring costs that outweigh benefits. The possible benefits of SCORE—industrialization, improved energy security, inclusive development, positive spillover effects—are real, but they could very well be outweighed by the project’s negative consequences. In particular, it appears that the social and environmental costs, such as the loss of precious virgin rainforests and exacerbation of inequality, were not anticipated or fully appreciated by decision makers when the project was sanctioned. SCORE painfully illustrates how centralized energy megaprojects, while ostensibly championed for reasons of economies of scale and the ability to bring about transformational change in the shortest period of time, often fail to address broader development goals such as fighting energy poverty and improving the livelihoods of the populations affected by these projects. As a result of their immense political, capital and human resource challenges, SCORE and projects like it can lead to powerful coalitions of interest that once formed, become extremely difficult to dismantle. Their sheer size and influence suggests that megaprojects should remain a salient area of inquiry for years to come.

Finally, SCORE brings to the fore the decades-old dilemma facing policymakers worldwide – should energy be viewed primarily as the means to achieve industrial, social, and economic development? The massive expansions in energy capacity planned under SCORE reveal a model of development increasingly constrained. This model assumes that GDP growth and per capita energy consumption must go hand in hand and that the trickle-down benefits from industrialization and rapid economic growth can solve poverty. Yet the evidence collected in our study has shown that energy production, when conceived of and implemented in the manner that is being promoted under SCORE, can sometimes achieve a bigger economy at the expense of the communities it is supposed to serve.



## Appendix: List of institutions interviewed

- Alstom Hydro
- Bar Council of Malaysia
- Borneo Resources Institute Malaysia
- Centre for Environment, Technology and Development Malaysia
- Centre for Orang Asli Concerns Malaysia
- Economic Planning Unit, Prime Minister's Department
- Friends of the Earth
- Global Environment Facility
- Human Rights Commission of Malaysia (SUHAKAM)
- Institute of Strategic & International Studies Malaysia
- International Rivers Network
- Ministry of Energy, Green Technology and Water
- Ministry of Natural Resources and the Environment
- Ministry of Tourism
- National Economic Advisory Council, Malaysia
- Natural Resources and Environment Board Sarawak
- OSK Research
- Partners of Community Organizations
- Petronas
- Public Private Partnership Unit, Prime Minister's Department
- Regional Corridor Development Authority (RECODA)
- Sarawak Energy Berhad
- Sarawak Hidro Sdn Bhd
- Sarawak Iban Dayak Association
- Sarawak Rivers Board
- Sarawak State Government
- Sime Darby
- Snowy Mountains Engineering Corporation
- State Planning Unit, Sarawak State Government
- Suara Rakyat Malaysia (SUARAM)
- Syarikat SESCO Berhad (Sarawak Electricity Supply Corporation)
- Tenaga Nasional Berhad
- The Borneo Project
- Third World Network
- United Nations Development Program Malaysia
- Universiti Malaysia Sarawak
- World Wildlife Fund International

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