Krabi at the Crossroads

Dirty Coal VS. Clean Renewable Energy

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ACRONYMS

AICHR	ASEAN Intergovernmental Commission on Human Rights
ASEAN	Association of Southeast Asian Nations
DEDE	Department of Alternative Energy Development and Efficiency (in the Ministry of Energy of Thailand)
DWT	Dead Weight Ton (Coal Carrier)
EGAT	Electricity Generating Authority of Thailand
EHIA	Environment Health Impact Assessment
EIA	Environment Impact Assessment
FIT	Feed-in Tariff
GHG	Greenhouse Gas
GWh	Gigawatt Hour (equal to one billion watt hours)
HRES	Hybrid Renewable Energy System
LED lamp	light-emitting diode product, which is assembled into a lamp or light bulb
MW	Megawatt (equal to one million watts)
NOx	General oxides of nitrogen (such as nitric oxide or NO, nitrogen dioxide or NO2, N2O2, etc.)
ONEP	Office of Natural Resources and Environmental Policy and Planning of Thailand
RAMSAR	Ramsar Convention, also known as "the Convention on Wetlands of International Importance, especially as Waterfowl Habitat," adopted by participating nations at a meeting in Ramsar, Iran
RE	Renewable Energy
REC	Renewable Energy Cluster
SEA	Strategic Environmental Assessment (promoted by ONEP)
Solar PV	Solar Photovoltaics
SOx	General oxides of sulfur (including Lower sulfur oxides such as SnO, S7O2 and S6O2; Sulfur monoxide or SO; Sulfur dioxide or SO2; Sulfur trioxide or SO3; Higher sulfur oxides such as SO3 and SO4 and polymeric condensates of them; Disulfur monoxide or S2O; and Disulfur dioxide or S2O2)
SPP	Small Power Producer
THB	Thai Baht
UNFCCC	United Nations Framework Convention on Climate Change
VSPP	Very Small Power Producer

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Preface

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Thailand is at the crossroads. With the political changes and turmoil affecting the country, we are now asking what energy future Thailand's new governments will promote? Will the country go green, or stay on the dirty old path of fossil fuels?

This question matters because we are in a silent epidemic. Coal has been quietly killing us and making us sick. Coal related pollutants may be among the leading causes of heart disease, cancer, respiratory diseases, and stroke in Thailand as they are in the world – all these illnesses have coal-related pollutants as a contributing factor. In the USA, coal is in the top ten leading causes of respiratory disease, and seemingly in China, even higher. How is that possible? The answer is that toxic heavy metals, SOx, NOx, and more, escape from chimneys of coal-fired power plants and filterdown. These pollutants rain down everywhere, affecting people in a clear case of toxic trespass. Like every other entity on earth, coal-fired power plants should pay if they destroy something, or sicken or kill someone - not get away scot free for murder and expand their reach. And yet getting away with murder is exactly what they have done in Krabi and in Thailand generally.

Thailand has claimed to be a leader in the clean energy realm. Indeed, the country has made great strides in developing a feed in tariff and expanding solar, wind, and other renewable energies. However, these positive changes conceal a dirty truth: Thailand is still addicted to coal. Far from quitting its filthy coal habit, the Thai authorities have promoted new coal-fired power plants in Krabi, Map Tha Put, Nakhon Sri Thamarat, Chacheongsao, Trang, Chumphon, and Mae Moh, to add on to the existing coal-fired power plants. Indeed, there appear to be even more coal-fired power plant projects, beyond the ones listed above. The country's leaders, especially officials at the Electricity Generating Authority of Thailand (EGAT), continue to embrace lies about clean coal. Thailand is even exporting its dirty energy problems abroad: EGAT has pressured Burmese authorities to go ahead with a new $3.2 million, 1800 MW power plant project in Myanmar's planned Dawei industrial estate zone with a power transmission network connecting to Thailand's power grid, despite tremendous local resistance.

It is time to quit coal, turn the page on coal plans for the nation and for Krabi specifically, and debunk the wishful thinking that has led us to a love affair with the fantasy of "clean coal." Thailand urgently requires a full government investigation into how much coal costs the country. We must open up rules for public debate and review, promulgate regulations around coal ash, and guarantee stronger disclosure rules for toxic heavy metals. Thailand needs public health decisions that protect human health. Government officials should step up to the plate to vigorously monitor and enforce the law. We ought to be in a war on coal, not a war on health.

The time has come to end denialism, leave fantasy behind, look at data, and make decisions based on realities. The environment is the human rights challenge of our generation. Thailand's decision-makers stand at a historic crossroads. Can our leaders protect Krabi's fisheries, agriculture, and health, instead of coal companies' bottom lines? Greenpeace believes that Thailand's leaders can indeed reorient the country on to a more sustainable path, and ensure that Thailand becomes a real global leader in renewable energy and green growth.

Von Hernandez,
Executive Director of Greenpeace Southeast Asia

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Introduction

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A few minutes drive from town of Krabi, one of Thailand's most famous tourist destinations, a former coal mine remains side by side with a decommissioned coal-fired power plant, which poisoned the surrounding areas for over 3 decades. Around the mine and plant locals speak freely about the legacy of coal in the polluted waterways, devastated fisheries, damaged farms, and unusually high concentrations of illnesses including upper respiratory tract infections.

Now the government plans to build a new 870 MW plant on the same site – over 8 times bigger than the old one. This report explains how, after an inadequate Environment Health Impact Assessment (EHIA) process, the government and EGAT are moving forward with their dirty plan is to expand coal in Krabi in spite of the area being renowned as a global marine biodiversity hotspot, and a RAMSAR site. The new proposed Krabi coal-fired plant and coal seaport would damage or destroy Krabi's marine life and unique wetlands, and hurt local tourism as well as the local economy.

Krabi is a center of marine bioversity in the region, but it also provides vital livelihoods and revenue. Krabi province is home to hundreds of thousands of people whose livelihoods rely directly on a thriving fishing industry as well tourism, largely from the area's world famous beaches. The estimated annual use value of the Ramsar site in Krabi River Estuary is $9.7 million for recreation and tourism alone (this is only one part of the Krabi Estuary and in any case does not even factor in the value of fishing and fishing related activities for the economy). The meager benefits from the proposed coal power plant would in no way compensate for the loss of $9.7 million per year.

There is no need for the authorities to choose a dirty, antiquated energy solution that will pollute the community and our planet. Rather than pumping 2 billion USD into the proposed Krabi coal plant, the money can go into a renewable energy revolution for Krabi. The best choice for Krabi now is a decentralized hybrid renewable energy system. Krabi's decision makers and local authorities must

1. Create a smart grid;
2. Develop clusters of decentralized, renewable, hybrid, off-grid, micro grids in Krabi;
3. Encourage and legislate for energy efficiency in Krabi; and
4. Roll out financial and non-financial incentives to promote renewable energy in Krabi.

Renewable energy is a good financial investment for Krabi. It will bring jobs, money, and energy for the region. Krabi can choose a clean energy future, and become a showcase for Thailand's renewable energy leadership.

The government and EGAT's plan to expand coal in Krabi

3

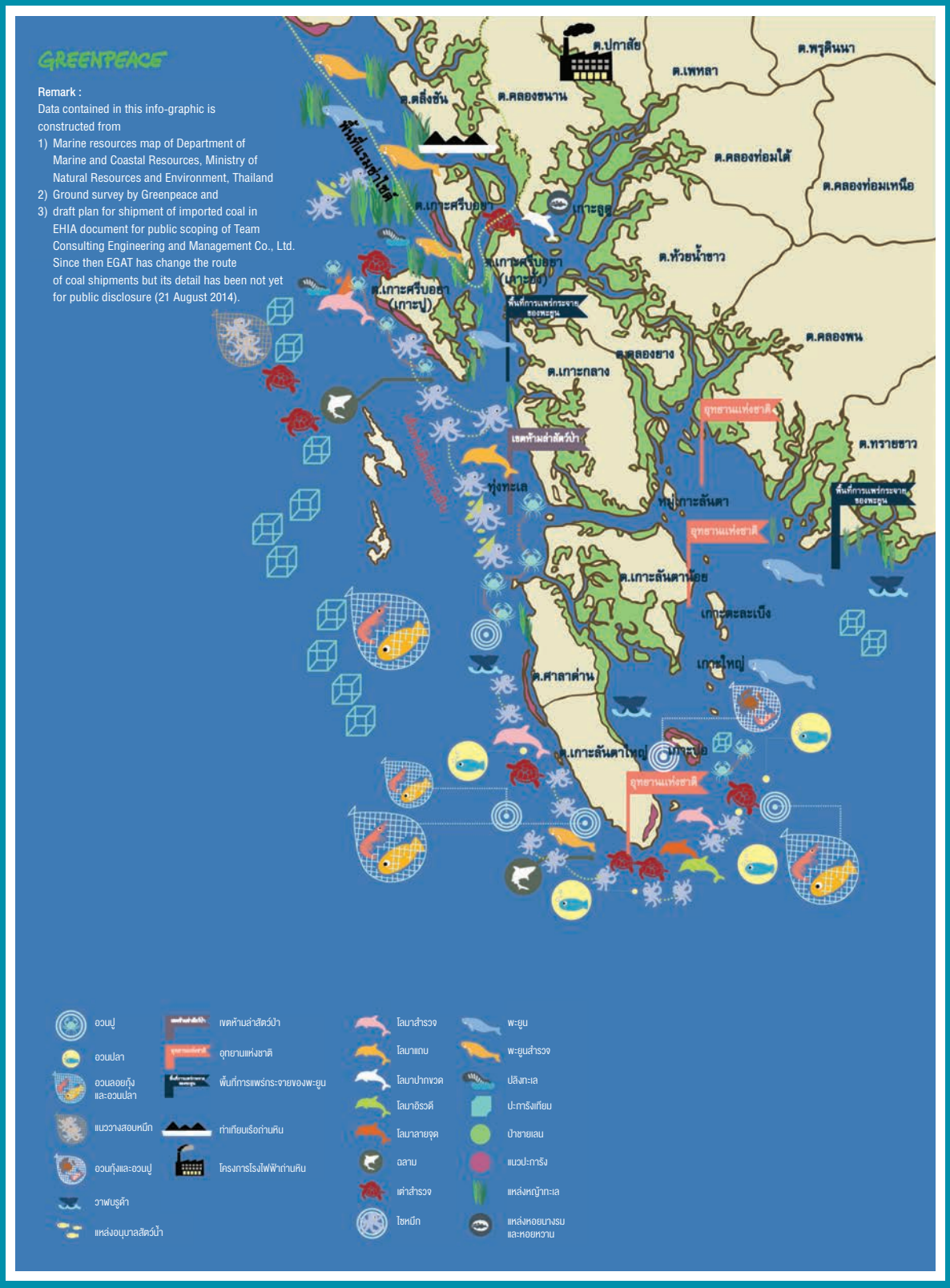
Under Thailand's Power Development Plan[1] construction for a new 870 MW installed capacity coal-fired power plant at Krabi, currently the subject of environmental and health impact assessment process (EHIA), would begin in 2015, and the plant would start supplying electricity in 2019.

The new coal plant is proposed at the location of an existing thermal power plant owned by Electricity Authority of Thailand (EGAT) in Tambol Pakasai, Nuea Khlong district of Krabi province, Thailand. Originally a small, 60 MW coal-fired power plant comprised of three 20 MW generating units, the Krabi facility burned coal and poisoned its neighboring environment for 31 years, from 1964 until 30 September 1995. From 1995 till now, the converted power plant has been housing a 340 MW generating unit combining gas and oil.[2] The proposal to reconvert the plant to go back to burning coal – but on a much larger scale – has become one of the key battlegrounds of Thailand's future energy choices.

Aside from the proposed Krabi coal plant, a coal seaport project will be built in the Krabi Estuary, which has been categorized as one of the "Wetlands of International Importance" under the Ramsar Convention. According to EGAT's plan, at least 2.3 million tonnes of coal would be imported from Indonesia, Australia, South Africa, or elsewhere every year to power the plant. Shipment of imported coal to the planned Krabi coal plant would require transshipment at sea. A 50,000-100,000 Dead Weight Ton (DWT) Coal Carrier would have to anchor at sea 79 kilometers from the location of proposed coal plant, and then unload coal into a smaller coal barge (although because of constant opposition form local communities and businesses, a new proposal was made for a smaller vessel). It would need a huge inland wharf to accommodate two coal barges to come along side at the same time to unload coal to the coal yard. The proposed coal trans-shipment would add to current dredging, dumping and shipping that could turn local fishing grounds, sea grass beds, and mangroves into a coal superhighway.

1 The Royal Thai Government's Power Development Plan (PDP 2010 Revised 3), prepared periodically by the state-owned Electricity Generating Authority of Thailand (EGAT), is the master investment plan for power system development. It determines what kind and what quantity of power plant get built, where and when. The PDP has wide-reaching implications, shaping not just the future of Thailand's Electricity sector and tis social and environmental landscape, but also that of Thailand's neighboring countries (Chuenchom Sangarasri Greacen and Chris Creacen, Proposed Power Development Plan (PDP) 2012 and a Framework for Improving Accountability and Performance of Power Sector Planning, April 2012.)

2 Electricity Generating Authority of Thailand (EGAT) website, "Krabi Power Plant," available at http://www.egat.co.th/en/index.php?option=com_content&view=article&id=38&Itemid=117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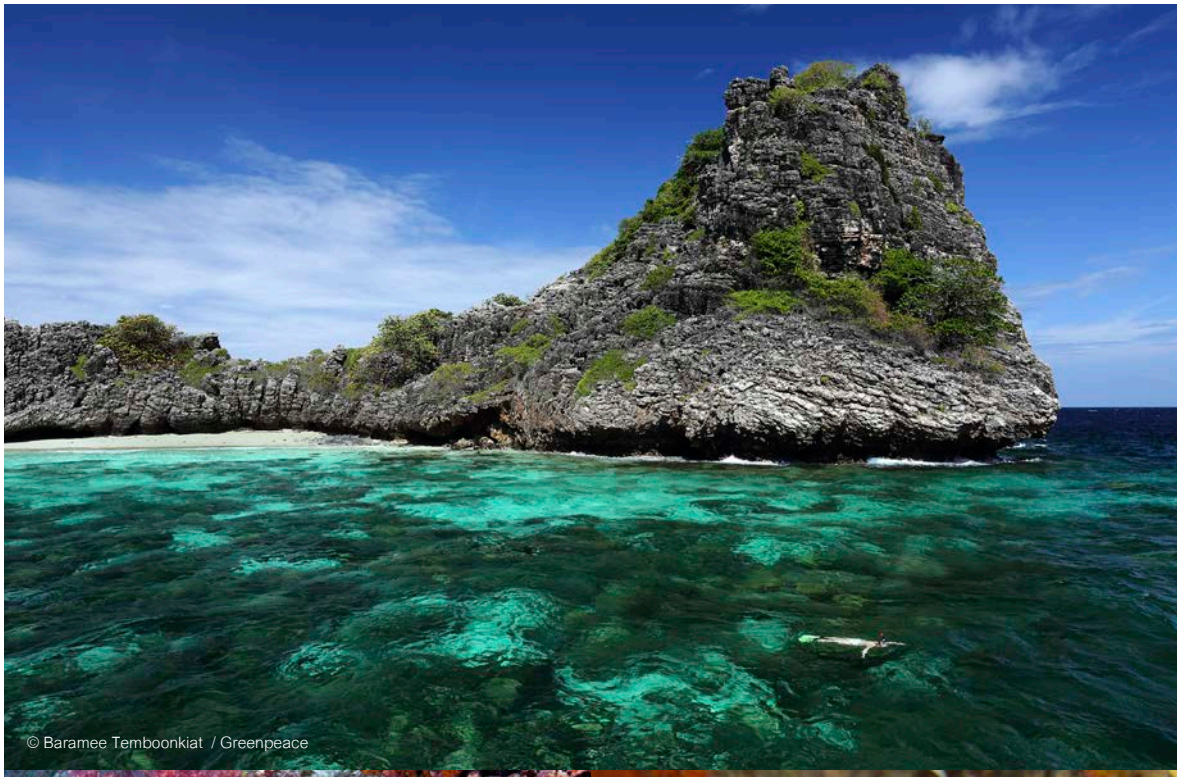
Remark :
Data contained in this info-graphic is constructed from
1) Marine resources map of Department of Marine and Coastal Resources, Ministry of Natural Resources and Environment, Thailand
2) Ground survey by Greenpeace and
3) draft plan for shipment of imported coal in EHIA document for public scoping of Team Consulting Engineering and Management Co., Ltd. Since then EGAT has change the route of coal shipments but its detail has been not yet for public disclosure (21 August 2014).
ต.ปกาสัย
ต.พรุดินนา
ต.เพหลา
ต.ตลิ่งชัน
ต.คลองขนาน
ต.คลองท่อมใต้
ต.คลองท่อมเหนือ
ต.เกาะศรีบอยา
เกาะลูด
ต.ห้วยน้ำขาว
ต.เกาะศรีบอยา (เกาะปู)
ต.คลองพน
ต.คลองยาง
ต.เกาะกลาง
ต.ทรายขาว
ทุ่งทะเล
ทุ่งเกาะลันตา
ต.เกาะลันตาน้อย
เกาะตะละเบ็ง
เกาะใหญ่
ต.ศาลาด่าน
ต.เกาะลันตาใหญ่
อวนปู
อวนปลา
อวนลอยกุ้งและอวนปลา
แนววางสอบหมึก
อวนกุ้งและอวนปู
วาฬบรูด้า
แหล่งอนุบาลสัตว์น้ำ
เขตห้ามล่าสัตว์ป่า
อุทยานแห่งชาติ
พื้นที่การแพร่กระจายของพะยูน
ท่าเทียบเรือถ่านหิน
โครงการโรงไฟฟ้าถ่านหิน
โลมาสำรวจ
โลมาแถบ
โลมาปากขวด
โลมาอิรวดี
โลมาลายจุด
ฉลาม
เต่าสำรวจ
โซหมึก
พะยูน
พะยูนสำรวจ
ปลิงทะเล
ปะการังเทียม
ป่าชายเลน
แนวปะการัง
แหล่งหญ้าทะเล
แหล่งหอยนางรมและหอยหวาน

Krabi is renowned as a global marine biodiversity hotspot, a wetland of international importance, and a historical site

4

Krabi, which means “sword” in Thai, is located on the Andaman seacoast and is noted for its outstanding natural beauty and solitary limestone peaks, both on the land and in the sea. Rock climbers from all over the world travel to Ton Sai and Railay Beach. Of the 154 islands in the province, Ko Phi Phi Leh is the most famous, since it was used in the movie The Beach.[3]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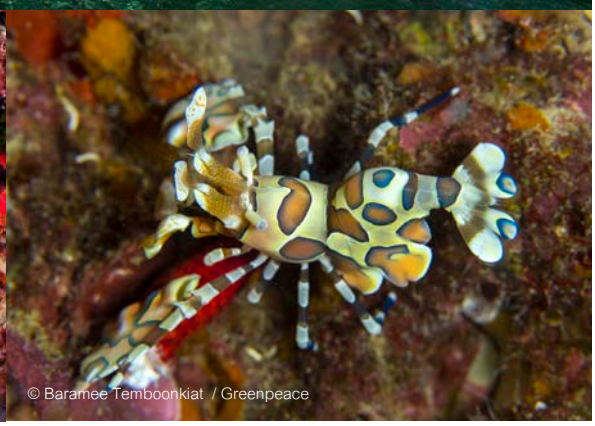
© Baramee Temboonkiat / Greenpeace

3 See http://www.1worldcommunication.org/boycottthebeach.htm

Beyond its beauty, Krabi's ecosystem merits protection as a global marine biodiversity hotspot, with over 200 species of fish and 80 species of coral catalogued, including Diploastrea Heliopora hard corals and soft corals, sea fans, sea whips, leather corals, Tubeastrea barrel corals, sponges, gorgonian seafans, range of shrimps such as mantis shrimps, crabs, barracuda, squid, leopard sharks, snappers, grouper, seahorses, nudibranchs, scorpionfishes, black-tip reef shark, lobsters, stingrays, large porites species, brittlestars, fusiliers, sea snakes, red saddleback anemonefish, other anemonefishes, and more.[4] The region boasts two beautiful National Parks (Khao Phanom Bencha National Park and Than Bok Koranee Marine National Park) as well as a Wildlife Sanctuary (Khlong Phraya Wildlife Reserve).[5]

In 2001 the estuary of the Krabi river was listed as a wetland of international importance among the dozen Ramsar sites in Thailand, under the Ramsar Convention.[6] The Krabi River estuary covers an area of 21,300 hectares that comprise mudflats, sandy beaches and canals in front of Krabi Town, as well as mangrove forests, and extensive seagrass beds in Koh Sri Boya. Indeed, the Krabi coal plant is slated to be built inside Thailand's largest seagrass ecosystem. The estuary is formed where a complex of several rivers discharge into southern Thailand's Phang-Nga Bay, and is dominated by more than of over 8,300 hectares of mangrove forest,[7] and approximately 5,000 hectares of seagrass[8]. At low tides, around 1,200 hectares of tidal mudflats are revealed. The Krabi River estuary's mangrove forests, sea-grass beds and coral reefs provide important sources of food for fish, spawning grounds, and nurseries.[9]

The Ramsar site is close to the location of the power plant, and a canal runs behind the plant, which winds through the mangroves towards the sea.

In addition to the many living organisms requiring our protection, fragile relics of history have been preserved in Krabi, which also make the place unique. Limestone hills in Krabi contain prehistoric rock-painting depicting humans, animals, and geometrical shapes in the cave. Lang Rong Rien cave in Krabi contains one of the oldest traces of human occupation in South-East Asia.[10] The natural landscape of Krabi includes a "Shell Cemetery" which was once a large freshwater swamp, the habitat of diverse mollusks of about 2 centimeters in size, it features a slab formed from a huge number of embedded various types of mollusks which can be dated to approximately 40 million years ago.

4 http://www.divetheworldthailand.com/thailand-scuba-diving-dive-sites-krabi.php

5 ProForest, "An assessment of potential HighConservation Values in Northern KrabiProvince, Thailand," Final report, February 2009 (This publication was commissioned and supported by theGerman Technical Cooperation organization, DeutscheGesellschaft für Technische Zusammenarbeit (GTZ) GmbH). Available at http://www.hcvnetwork.org/resources/assessments/Thailand%20Krabi%20HCV%20assessment%20-%20Final%20v1.1.pdf

6 The Ramsar Convention on Wetlands official website, "Ramsar List of Wetlands of International Importance; The Annotated Ramsar List: Thailand," 03 July 2013. Available at http://www.ramsar.org/cda/en/ramsar-pubs-notes-annotated-ramsar-16158/main/ramsar/1-30-168%5E16158_4000_0__ (The webpage notes: "Krabi Estuary. 05/07/01; Krabi Province; 21,299 ha; 07°58'N 098°55'E. National Reserve Forest. An area of sand beach, mangroves, and mudflats, with some steep wooded cliffs and intertidal mudflats extending up to 2 kilometers offshore at low tide. A complex of rivers open to the sea within the site, and extensive seagrass beds are present at Sriboya Island. Some 221 bird species are found in the mangrove areas, and the mudflats form one of the most important areas in southern Thailand for migratory birds. Water quality has suffered from nearby community enlargement and the rapid growth of tourism from nearby Krabi city, and increased aquaculture may bring cause for concern. Most mangrove areas are presently forest concession but will convert to conservation purposes by the end of 2001. Ramsar site no. 1100. Most recent RIS information: 2001.")

7 Royal Thai Government, Office of Environmental and Natural Resource Policy and Planning (ONEP), "Biodiversity of the Ramsar Site in the Krabi Estuary," September 2006

8 Royal Thai Government, Department of Marine and Coastal Resources official website, "Central Database System and Data Standard for Marine and Coastal Resources." Available at http://marinegiscenter.dmcr.go.th/km/seagrass_doc07/#.U7YdYY2Sycw

9 Janekarnkij, P., 2010. "Assessing the Value of Krabi River Estuary Ramsar Site: Conservation and Development." ARE Working Paper No. 2553/4. Department of Agricultural and Resource Economics, Faculty of Economics, Kasetsart University, Bangkok. Available at http://ideas.repec.org/p/kau/wpaper/201004.html. (According to this study, in 2010, the estimated annual use value of the site was $9.7 million for recreation and tourism. The economic value of mangrove forest was $758/ha. The net present value of mangrove forest was $73.1 million based on 7% discount rate and 15 year timeline. The result imply that a development project that causes the same rate of mangrove destruction must generate a least an income of $2.3 million per year to be considered as an economically feasible project),

10 In Lang Rong Rien cave of Krabi province in 1986 archaeologists found 40,000-year-old human artifacts - stone tools, pottery and bones.

A coal-fired plant and coal seaport: bad for tourism and bad for the economy

5

The combination of Krabi's breathtaking beauty, biodiversity, Ramsar status, and unique history have all helped make it one of Thailand's premier tourist destinations. "Around 2.3 million tourists visit Krabi annually."[11] Unsurprisingly, as a result, Krabi Province's economy relies primarily on agriculture and tourism. In 2008 the World Wildlife Fund reported that "in spite of the December 2004 tsunami, tourism income has recovered and almost doubled since 2002."[12]

Indeed, Krabi's businesses have spoken out strongly to protect tourism - and their jobs, revenues, and wealth - from the damage that a coal plant could do in the area. In a "Statement of the Parties of Private Sector in Krabi on Energy Solutions toward Krabi Vision 2020 - Krabi Goes Green," local businesses concurred,

Thailand's tourism has long been playing a significant role as income generating sector. Thailand tourism revenue has been the world's top five with 8.31 trillion THB (PATA, 2013). Tourism as an industry in Thailand has been contributing to stabilize domestic economy as it is a labor-intensive service sector accounting for 13% of GDP. Livelihoods of at least 1.2 million people directly depend on tourism industry for example tourism in Phuket is account for 50% of its economy (SCB Research Center)... Tourism industry is of the utmost importance for Krabi province. It generated 48,270.57 million THB (Ministry of Tourism and Sport, 2012) Even though agriculture is the main economy in Krabi, according to the Revenue Department, the biggest income comes from tourism. Moreover, Koh Phi Phi and Koh Lanta of Krabi are the top two and three beach destinations in Asia in 2012 respectively (Trip Advisor/ Travelers' choice 2012 "Beach Destination in Asia).

Given our conceptual framework and vision, the private sector in Krabi has agreed with local government to determine the development strategy for the province such as "become a high quality world class marine tourism based on the strength of agriculture and community (Strategic Development for Provinces along Andaman Seacoast 2558-2562)", "A high quality tourism destination internationally, the center of sustainable agriculture, and livable city (Krabi Vision 2020)", and Q-City (Krabi Municipality). Under the National Tourism Development Plan 2555-2559 it is mentioned that Green Tourism must be incorporated, as Thailand has been a party to UNFCCC and the Kyoto Protocol. Most importantly, "the Declaration of Sustainable Tourism Development of Krabi" aims to conserve and recover natural resources and the environment and implement tourism activities, contributing to strengthening a world-class tourist city. All stakeholders should refrain from conducting any activities that cause toxic pollution and natural resource/environmental degradation.

11 Wanwisa Ngamsangchaikit, "PM to support Krabi tourism," TTR Weekly, 18 September 2012. Available at http://www.ttrweekly.com/site/2012/09/pm-to-support-krabi-tourism/

12 World Wildlife Fund, "Assessing the Implications of Climate Change at the Provincial Level: Krabi, Thailand", 2008. Available at http://awsassets.panda.org/downloads/krabi_factsheet_eng_1.pdf

A coal-fired plant and coal seaport:
bad for tourism and bad for the economy

The Parties of the Private Sector in Krabi announce that we are not supporting the use of raw materials for power generation that cause toxic contamination or lead to the alteration of the natural environment, for example coal-fired power plants and nuclear power plants. We support the use of clean renewable energy for sustainable economic development of Krabi…We, the Private Sector in Krabi, propose that the military government develop mechanisms to encourage and promote clean renewable energy as follows:

- *Tax exemption to import machineries for electricity production from wind and solar PV for example*
- *Incentivize real estate and other business sector to install renewable energy system.*
- *Use economic measure to motivate people and business to switch to LED lighting.*
- *At least 1 year Company income Tax exemption for Solar PV and Wind Installation*
- *Soft loan for business that switching to renewable energy production*
- *Promote low energy building*
- *Extend quota limit for feed-in Tariff and improve electricity grid system to facilitate electricity production from renewable energy.*
- *Support research on clean renewable energy development and setting time bound target for its deployment*
- *Stop power development plan (PDP) that relay on dirty coal and dangerous nuclear.*[13]

13 Statement of the Parties of Private Sector in Krabi on Energy Solutions toward Krabi Vision 2020 - Krabi Goes Green." 18 June 2014. Available at http://www.prachachat.net/news_detail.php?newsid=1404281354 and http://thailandcoalnetwork.org/2014/06/20

The important point to emphasize here, is that even the business sector has stood up to denounce a coal-fired power plant in Krabi, and to embrace renewable energy as an alternative. Protecting the elements that make Krabi's tourism industry lucrative (beauty, biodiversity) is key to the economic survival of the province.

Setting up a coal-fired power plant to belch out toxic heavy metals flies in the face of efforts to strengthen sustainable tourism, ecotourism, and tourism more broadly, which keep Krabi's economy afloat.

To the extent that a specific study has been conducted, regarding the value of the RAMSAR site in particular, which could be threatened by the coal plant, we know that the local economy stands to lose millions of dollars for that site alone (the potentially affected area is larger than the RAMSAR site).

"Krabi River Estuary, a Ramsar site located in southern Thailand, is dominated by two major natural vegetation assemblages, i.e. mangrove forests and seagrass beds. According to the cluster development strategy, the cabinet has approved in principle to develop Krabi as the global marine tourism center and economic gateway of Asia. This study aimed to assess the economic value of the site, using market price and benefit transfer. The impact on economic activities with the 5% annual decline of mangrove forests was evaluated. **The estimated annual use value of the site was $9.7 million for recreation and tourism. The economic value of mangrove forests was $758/ha.** The net present value of mangrove forests was $73.1 million based on 7% discount rate and 15-year timeline. An approximate impact of mangrove change follows the study of Ruitenbeek (1992). It was assumed that the impact on local direct resource extraction and loss in biodiversity would occur at the year after the depletion of the forest. The impact on the productivity of local fishery would occur in the fifth year and on tourism in the tenth year. Thus, **value loss of mangrove at the annual rate of 5% in the net present term became $21.0 million or $2.3 million per year.** The results imply that a development project that causes the same rate of mangrove destruction must generate a least an income of $2.3 million per year to be considered as an economically feasible project."[14]

Moreover, to the extent that not all residents have shared in Krabi's tourism boom, they are dependent on agriculture and fishing, harvesting shellfish from Krabi's canals and coastal waters, and family-scale aquaculture - all of which require clean air and water rather than toxic heavy metals and emissions.

14 Janekarnkij, P., 2010. "Assessing the Value of Krabi River Estuary Ramsar Site: Conservation and Development." ARE Working Paper No. 2553/4. Department of Agricultural and Resource Economics, Faculty of Economics, Kasetsart University, Bangkok.

The Project's Environment Health Impact Assessment (EHIA) was inadequate

6

The Environment Health Impact Assessment (EHIA) process is a crucial one for any power plant. The EHIA for the proposed Krabi coal plant and its coal seaport has been deeply flawed - contravening the spirit and letter of Thailand's EHIA law and policy. This section of the report explores how, and why.


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In 2007, the Constitution of the Kingdom of Thailand, Section 67, paragraph 2, stated that "Any project or activity which many seriously affect the community with respect to the quality of the environment, natural resources and health shall not be permitted, unless, prior to the operation thereof, its impacts on the quality of the environment and on public health have been studied and assessed and a public hearing process has been conducted for consulting the public as well as interested persons and there have been obtained opinion of an independent organization, consisting of representatives from private organizations in the field of the environment and health and from higher education institutions providing studies in the field of the environment, natural resources or health." Because the EHIA was established by the 2007 Constitution as being in the category of Community Rights, public participation must be a core principle for any EHIA.[15]

Together with Constitution, the 2007 National Health Act further protects the right of individuals or groups to request an assessment and participate in the assessment of health impacts, resulting from a public policy. Moreover, the National Health Act of 2007 defines the term of "health" as "a state of well-being.[16] As a result of this 2007 Act, the Health Impact Assessment requirement was added into the existing EIA process, under the core concept of community rights and public participation. Thailand's Office of Natural Resources and Environmental Policy and Planning (ONEP), the legal body responsible for consideration and recommendations to permitting agencies or cabinet, launched Environment and Health Impact Assessments (EHIAs) in 2009.

According to new ministerial regulations under the Ministry of Natural Resources and Environment, new coal plant proposals with capacity for more than 100 MW are considered to have possible serious social, environmental, and health impacts on host communities.[17] They thus require a full EHIA, including public hearings, which much be taken into consideration.

15 On 22 May 2014, the Royal Thai Armed Forces, led by General Prayuth Chan-ocha, Commander of the Royal Thai Army (RTA), launched a coup d'état against the caretaker government of Thailand, following six months of political crisis. The military established a junta called National Council for Peace and Order (NCPO) to govern the nation. After dissolving the government and the Senate, the NCPO vested the executive and legislative powers in its leader and ordered the judicial branch to operate under its directives. In addition, it repealed the 2007 constitution, declared martial law and curfew nationwide, banned political gatherings, arrested and detained politicians and anti-coup activists, imposed Internet censorship and took control of the media.

16 ONEP set up the guidelines regarding environment and health determinants that should be done in any study. Many study teams use these determinants as a maximum. They fail to go any further, and do not give adequate attention to making their core content comprehensive. "Health" must be defined as the state in which a human being is experiencing physical, mental, spiritual and social wellbeing, all of which are holistic and in balance. A Public Scoping must allow all stakeholders to express their concern regarding impacts to their life and community. The case of a 600 Megawatt coal-based thermal power plant project in Chachoengsao province is an example of a flawed EHIA, where the core content of the study was not comprehensive. The EHIA report did not include the power plant's impact on widespread organic farming nearby, and the fact that organic mushroom and mango farming, which create jobs and generate income for the community, would be vulnerable.

17 11 types of project that could seriously harm communities, must undertake EHIAs (including lead mines, zinc mines or other metal mines that used cyanide or mercury or lead nitrate or arsenopyrite in production processes).

According to national guidelines, there are 6 steps for an EHIA, all of which allow for more participation of stakeholders and parties than in earlier EIA procedures:

- Screening,
- Public Scoping (in which the study team or consultant company must allow the public to express concerns on potential impacts),
- Assessing or appraisal,
- Public Review,
- Decision making, and
- Monitoring.

EGAT hired the consulting firm "Air Save Co. Ltd." In 2012 to conduct an EHIA Study for power plant and coal seaport project, including facilitating public hearings with all stakeholders. The company aimed to finalize and pass the EHIA report to The Office of Natural Resource and Environment Policy and Planning (ONEP) for approval by July 2013.

In the case of Krabi, the Public Scoping has been deeply flawed and much criticized. Excluded in the scoping were a health impacts assessment; an evaluation of the economic value of Krabi River Estuary and marine biodiversity in the region; and an evaluation of the effects of the project on people's livelihood and local tourism. Thus, the output of the public scoping did not reflect the real situation, nor did it address the environmental, health, and livelihood concerns of potentially affected communities."[18] The Krabi EHIA examines only a 5 kilometers radius from the project, as the area of study. In fact, there are many people who live over 5 kilometers from the project, who will also be affected.[19] Particularly when a power plant or other industrial project is situated along a waterbody, especially one close to the sea, any EHIA study team should include all the communities along the river, rather than limiting the scope of their inquiry to a radius of 5 kilometers.

Moreover, public participation and access to adequate information lie at the core of the ONEP guidelines for the EHIA process. However, the consulting firms hired for the proposed Krabi power plant "merely held the scoping as a technical compliance and disregarded the substantive requirements to ensure that the free, prior and informed consent of the affected communities for the project is solicited."[20] Public hearings for the proposed coal plant project insufficiently incorporated consultations with stakeholders such as local residents. The public hearings as they were carried out thus far, were ineffective, having failed to resolve disputes between local communities and proponents of the controversial project. Allegations that EGAT "is trying to develop a plan for a coal-fired power plant in Krabi that allows representatives of the local community to join in the designing and studying phases"[21] are false.

18 "Open Letter to the ASEAN Intergovernmental Commission on Human Rights," April 2014. This letter was signed by a coalition of groups, including: We Love Lanta Group; Save Prakasai Group; Lanta Island Tourism Association; Hotel Association of Koh Lanta; Andaman Foundation; Center of Ecological Building Awareness; Greenpeace Southeast Asia; Association of Thailand's Small-Scale Fisherfolks Federation; NGO-Coordination Southern Region; Food Security Network-Southern Region; Protect Trang Group; Save Andaman Network; Prakasai Environmental Conservation Network; Public Health Volunteer of Krabi; Krabi Fisherfolks Network; Andaman Organization for Participatory Restoration of Nature Resources; Phang-Nga Fisherfolks of Andaman Network; Mae-Moh Anti-Coal Movement; Khao Hin Sorn Anti-Coal Movement; Healthy Public Policy Foundation; Thailand Coal Network; Southeast Asia Coal Network. The letter is available in the report, in the Annexes section.

19 Such a failing is not uncommon in Thailand. For example, the EHIA report for Chevron Thailand Exploration and Production Co. Ltd., which plans a port and facilities to support petroleum exploration in the Gulf of Thailand, stated that only 9 households would affected by the project, using a 5 kilometers radius for the study. However, information from the Community Health Impact Assessment (CHIA) done by the local communities, revealed that more than 2,000 fishermen living along Tha Sala Bay would be affected by the project and were not included in the study.

20 "Open Letter to the ASEAN Intergovernmental Commission on Human Rights," April 2014.

21 "EGAT's Krabi coal-fired power plan gets local people involved - Plant designed with input from residents," http://www.linkedin.com/groups/EGATs-Krabi-coalfired-power-plan-4174397.S.131633497 or http://www.thailand-construction.com/news/903--construction-news/1317-egats-krabi-coal-fired-power-plan-gets-local-people-involved.html

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On the contrary, the representatives of the local community have been repeatedly silenced, ignored, and marginalized. Statements by Soonchai Kumnoonsate, the deputy governor for power plant development, that this plant "will be Thailand's first power plant developed and designed jointly with local people" are egregiously misleading.[22] The truth is that the Krabi EHIA disproportionately interviewed and gave a voice to stakeholders who benefit from the project, rather than those potentially harmed (such as employees or local authorities). Unfortunately, this is not uncommon in Thailand[23] – but it is illegal. Last but not least, with respect to flawed public participation, information relevant to the project is often inaccessible to local residents.

Because of flaws in Air Save Co., Ltd.'s work and intractable problems highlighted in their EHIA, in early 2014, EGAT hired another consulting firm "TEAM Group" to conduct an EHIA process for the new coal seaport project at Tambol Klong Rua which is located inside Ramsar site area of Krabi Estuary (separate from the coal power plant). The first public scoping turned out to be violent. Local villagers opposing the project documented cases of bullying, intimidation, threats and harassment utilized by private consulting firms and state authorities during the public scoping for the project. The project site was guarded by 50 armed security officers. Some of them caused harm to community members who raised concerns in the scoping. In the subsequent public scoping report, a number of participants listed were not, in fact, from the affected communities - and could not be considered stakeholders. The listing of these participants was suspect, and should be reviewed by a neutral, outside investigative body. Local villagers and civil society networks have submitted a complaint to the National Human Rights Commission[24] as well as an open letter to the ASEAN Intergovernmental Commission on Human Rights (AICHR). In their April 2014 Open Letter to the AICHR, local stakeholders complained about human rights violations in the course of an environmental and health impact assessment process of the 870 mw coal-fired power plant and coal seaport project in Krabi Province. The letter requested that the AICHR a) initiate a consultation and subsequently issue an opinion on the environmental rights of ASEAN peoples; and b) set the standards of the exercise of environmental rights in accord to the 'Access to Remedy' principles of the United Nations framework on business and human rights so that where people are harmed by business activities, there should be both adequate accountability and effective redress, judicial and non-judicial, in ASEAN countries.

22 Ibid.

23 There are many cases where the public participation in the public scoping stage was set up by the project owner. For example, in the public scoping for a gold mining project for Thungkam Co., Ltd., 2,000 security officers (police and soldiers) guarded the entrance and did not allow protesting villagers impacted by gold mining to enter the public scoping. Subsequently, when villagers checked the public scoping report for accuracy, they found that list of people who participated in the public scoping did not include many real stakeholder affected by the project.

24 "Krabi wrestles with coal-fired power plant blues," (Bangkok Post Website) 04 April 2014. Available at http://www.nhrc.or.th/2012/wb/en/news_detail.php?nid=2722&parent_id=1&type=hilight

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The challenge Thailand faces now, is to improve existing EHIA processes to make a more meaningful Public Scoping part of all EHIAs – including this one. Krabi's flawed EHIA can still be improved even at this late date, and must live up to standards enunciated in a national movement to reform EHIAs. Some recent top-down processes to promote improvements in Thailand, give reasons for hope for Krabi. The top-down processes, focused on the structural improvement, include the 5th National Health Assembly held 18-20 December 2012. Thailand's National Health Assembly adopted the agenda "Reforms of EIA and EHIA" which propose to revise laws such as the National Act for the Promotion and Conservation of Environment Quality 1992, in order to reform the structure and system of environmental and health analysis. ONEP also promoted the idea of SEA (Strategic Environmental Assessment) at the policy level and created new guidelines for the EHIA process.

Bottom-up processes to improve EHIAs are also taking place in Krabi, like those that have happened in many parts of Thailand, which recognize EHIA as a participatory learning process with community learning and empowerment. Many training courses by government offices and independent bodies to increase community and individual capacities have borne fruit. Today, Community Health Impact Assessments have been implemented at many levels in many communities affected by industries (using the same procedures as an EHIA), with information going to decision making authorities.[25]

25 Royal Thai Government, Office of Environmental and Natural Resource Policy and Planning (ONEP), 2012, "Environmental Impact Assessment in Thailand," Available at http://en.nationalhealth.or.th/node/189
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http://www.thia.in.th

Past hidden costs of coal for Krabi residents

7

Greenpeace has interviewed residents near the power plant about some of the different hidden costs of coal that the Krabi community was shouldering for decades: health impacts, fisheries impacts, and agricultural impacts. All of these have impoverished and weakened the community. Rather than inflicting new suffering on these innocent men, women, and children by forcing them to accept a new power plant against their will, EGAT should rather be compensating them for wrongful death, medical costs, and lost revenue due to the poisoning of their fields and waterways.

Five former employees at the Krabi coal-fired power plant and coal mine, each interviewed separately, all allege coal ash was dumped directly, mixed with water, into the Prakasai canal behind the plant, for 3 decades. (They also believe no coal ash was ever dredged up and shipped off site). The former employees who spoke with Greenpeace allege that the coal ash was “spun around” with water in some sort of giant container; then pumped straight out in a pipe, out to the canal. This could mean that the coal ash was dumped into a high energy system and dispersed quickly, with a subsequent significant modification of the sediment into a concrete-like material. Alternatively, the ash could have been transported as a slurry and sent to an ash lagoon, with waters from that lagoon discharged in the nearby canal as the effluent post settlement of the ash.

All local fishermen interviewed by Greenpeace made similar allegations about dumping into the canal; and stated that the water was dirty and smelly when dumped into the canal by the coal-fired power plant. Fishermen also say there was considerable thermal pollution. Fishermen allege that many mangroves around the dump site/canal died. Fishermen told Greenpeace that fish in the immediate vicinity of the dump site in the canal all died, and that few fish survived even kilometers downstream. Fishermen alleged that after the power plant was decommissioned, fish have been slow to bounce back - and say the catch is still radically different, and better, in other neighboring canals and areas where they fish. Fishermen similarly explained that shellfish around the dump site and canal mostly died, and those that survived were filled with a fine black substance.

Testimonies

8

For too long, coal's victims have been silent while coal companies and proponents hijacked the media and dominated the airwaves. With access to radio, television, papers, and government officials, coal companies are able to distort and hide the truth.

The people of Krabi deserve better than concealment and propaganda. We must give voice to the voiceless and finally listen to what they have to say about the true cost of coal in their lives. What follows are anonymous testimonies from affected individuals in the community near Krabi's old coal-fired power plant and mine.


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(Greenpeace has withheld their name for their own protection).


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"I lived all my life in Krabi, near the power plant. Today I do some agriculture and fishes, both aquaculture in the canal near his house, and along the coastline. I have been fishing since I can remember, in my father's time. In 2507 [2507 Buddhist era is 1964 AD] I remember the first power plant starting generating with 60 MW. At first, I saw it. You could see with your own eyes, the black smoke from the plant.

Me and my family usually fished in a canal named Bang Peung – not in Prakasai – so at first I didn't go near the place where the coal ash came out and the hot water pipes, for a while. But then one day, I went to Prakasai canal with my teacher and we saw the pipe.

Also, after school, I fished in mouth of Prakasai, where the canal meets the sea but not near the pipes. There were fishermen higher up in Prakasai already, who might have been angry if I tried to muscle in and steal their fish or share with them. According to the villagers, there wasn't much fish left up there anyway. The fish moved down. The local fish men moved down too. So: Why bother going there? There'd be no fish. I tried it a couple of times and caught nothing. Over the years, every time I'd get really curious, I'd go. More than a hundred times all in all. But it was true what the Prakasai fishermen told me: that the fish moved. That there was no point.

Anyway, I saw the wastewater dumping. There were 2 pipes releasing water. Water gates or filters too. The water from there, it was brown, hot, even steaming. On the upper side near the pipe, 200 meters up, I saw the coal ash water flowing. Where I tried to catch fish, you couldn't see the waterfall coming over the dam because it was kind of hidden by mangroves. But the water was coming from the plant through the mangrove area. The color near that pipe was like eggshells. It was flowing, rushing, with lots of bubbles like when you clean your clothes. A lot. Constantly. And for about 2 kilometers there was no fish, or maybe just a few tiny fish.

At first I didn't know why the fish were gone. Only now I know it was the power plant. At first I thought the Prakasai people already fished all the fish. I was a young teenager. The local Prakasai people thought the same at first. But now we know better, also because the fish came back after the plant was decommissioned. Now you can fish in that canal. The fish came back gradually. All the way up now. Same size as before. Same species. But less than before. About 60 or 70% of what it was before. Even, the Prakasai people can do aquaculture in the canal, but lower down, not up near the plant.

During the power plant time, some species of fish had black spots on their scales. Also, we used to have a lot a special shell we call "Hoiwan" in the Prakasai canal [Somewhat like a scallop]. I'd catch those shells, and others, and when you boil it to cook it the water would turn black and the inside was black. No fishermen could fish any shells and sell them. The fishermen had to look for shells elsewhere. Still today it's a problem. Still black now, but less than before, when the power plant was generating.

The mangrove died around the power plant area. Until now it's still dead. There was erosion after the mangroves died, from riverbanks, and streams are shallower now. Some banks on edge of power plant look like cement; don't look like earth. Mangroves are dead or affected for about 2 kilometers."


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"I've always been fishing. I often fished in and around the Prakasai canal - nearly every day - since I came here. 30 years. During the power plant time, the Prakasai canal wasn't good. It was rare to catch fish there. Now, it's gradually increased. During the power plant time I fished in Prakasai canal but caught few fish. The Prakasai canal had less fish than other canals. The fish moved.

So mostly I just fished at the mouth where the Prakasai canal meets the sea. 5-6 km. from the power plant, there was still almost no fish. Only 9-10 kilometers away you could find fish. The mouth was ok. Similar to others, although sometimes less than the mouths of other canals. The Prakasai canal is really different from other canals. When the power plant was decommissioned it gradually got better.

The first year after the power plant was decommissioned: you could only get 4 to 5 fish there. The second year was better: 1-2 kg. 2539: 2 or 3 kg. [2539 Buddhist era is 1996 AD] 2541: 2-5 kg. [2541 Buddhist era is 1998 AD] It's been gradually increasing. Last year, you could get 3-5 kg. This year is really better. I get 6-7 kg. each time I go.

It's not the same for everyone, but I get that because I use a big net. For big fish. If you use a small net you can get 10 kg. For crab now it's not bad, maybe around 8-15 kg.

During the power plant time I saw the pipes with contaminated water coming out. Hot water. The first pipe was Very hot. I used to walk in the mangrove because I had to in order to catch fish. But it was too hot and so I stopped and went to another area. It was steaming. The second pipe was not as hot, but it was turbid; white mixed with brown color. The water from both pipes was dirty. Definitely not pure enough to drink! No. It was scary even to wash your skin in it. No one would be brave enough to try drinking it.

Above the 2 pipes I also saw the wastewater flow. It flowed night and day. I didn't know what it was exactly. Turbid. Whitish brown. Smelled funny. If you got close your nose might hurt. The water was flooding out strong. I didn't go in there. I don't know if the wastewater was coal ash or not, but the local people told me it was coal ash water. I went to the mangrove area and caught crabs. The crabs were no good though. There was green gunk inside. And black. If you boil them in water the water turns black. I stopped there for a while.

The power plant wasn't good for fishermen. The power plant killed fish. Even today Prakasai has less than other canals. If another canal gives you 10 kg., Prakasai gives you 3 kg. It's a third as good as the rest.

The mangrove died and it's still dead up to now. Even as far as 3 kilometers downstream some parts are affected, in patches. Along the power plant there's much less mangroves. Oh god it really died. Even 10 kilometers away from the canal, places are still affected. And up close it's not just along the riverbanks, but inside too.

If we have a new power plant the fishing will be very affected of course. The fishermen will have to go far away. The important thing is to fight together. We need a lot of hands to support each other against this company because it's big. If I could see the director I would tell him, if the director came in front of me, I would say, "don't build the new coal power plant because it'll impact us." My house will suffer because we are close. But it's not just for me. I'm old now. But for children, the next generation. For all the fishermen."

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"I was a fisherman since I was a child, and did farming too, and sometimes I was a general employee. Mostly I fished in Prakasai canal and Sapan Chang [Chang bridge], which is downstream of Prakasai.

Before, Prakasai had many fish and natural resources. But over 30 years of power plant, the fish decreased. Especially shells became black and you couldn't eat them. Inside the shells' stomachs it was black. If you boiled the shells, the water turned black. When you cut the shell open, you see the stomach has soft black sand inside. The area near the power plant now has a lot more shells than previously but you still can't eat them. Still black today. There's ash still. Though less than before.

Shells used to be so plentiful that you could jump out and find anywhere but now there are still very few.

Before the power plant, the shells were never black and you could eat them, no problem. Mangroves also have ash left on the ground in there. Also fish decreased when the power plant started. Fish catch was reduced by about 70% at least. Only about 30% was left.

The decrease area started at the power plant and went 5-6 kilometers downstream on the canal.

Right near the power plant there were almost no fish, for about 2 kilometers. At kilometers 1-2 almost nothing. At kilometers 3-4 we had a few. At kilometers 5-6 it was better. And even after that there was an impact. (After 10 kilometers it's the sea).

In the first 1-10 kilometers:
• Before the power plant, you could get 40 kg. I used to catch so much that I couldn't carry it back home.
• After the power plant, only 1-5 kg.

It stayed bad and never got better till the power plant was decommissioned.

Since it was decommissioned, I can get around 3-10 kg. But the fish aren't back like in previous times. It's not same quantity. Now I catch no more than 10 kg, max. We still have water coming from power plant even thought it's not coal any more."


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"I was born in Nakhon Sri Thammarat province, and came here when I was 7 years old. I've been fishing my whole life. I'd fish in the Prakasai canal and a connected canal.

I could catch 50-60 kg. before the power plant. After, during the power plant time, it went down to 2-3 kg., or 4-5 kg. if you're very lucky. Sometimes 0 or 1 kg. only.

After the power plant was decommissioned it came back up, with fish gradually increasing. It went to 5 kg., even 8 kg. This year I get nearly 10 kg. pretty much every time I went there. Shells are coming back. A lot.

My old house was next to the Prakasai canal. Right across the canal. Behind the power plant. I went a lot to Prakasai canal. I saw the pipes from Prakasai sucking in and dumping out in Bangma canal. There was oily water. Sometimes a black color. Some water was very hot. I walked up to catch crabs and I could feel how hot it was. It was steaming next to that pipe. For 1 kilometers downstream it was still pretty hot. It had bubbles too. It wasn't white at all. Brown and turbid. With a really bad smell.

Shells decreased and they turned black inside, with black, fine, dusty sand. It was not big sand. Shells have come back now. Gradually. They're still black but not as bad as before. Some people eat them now.

Mangrove patches died up to 3 kilometers downstream, and even further.

The power plant impacted the fishermen of course, because we couldn't catch enough like before.

If there's a new power plant it may become zero – with no fish at all. Catching fish will end! and crabs and shells.

Did the power plant compensate me for harms? No. The company never compensated me for fish decreasing. No one was compensated for that. Since the beginning. The local fishermen in never got a single baht from EGAT in compensation. All of us are friends and talk, so I know.

Yes there were fish further away. Downstream. But it was more effort time and money. You need more fuel. It was 2 liters before the power plant but 6-7 liters after. So 200-300 THB after the power plant started. Need 1 more hour each direction, which is 2 extra hours every day to get the same amount of fish.

My income decreased. Nearly 100,000 THB before the power plant. It decreased to 50,000 THB, after the power plant came. Some months even less: 10,000 THB. (It's 20,000 THB now that the power plant was decommissioned.) I had to become a general employee and do things like cut trees. My life was much harder than before. I felt angry, sad, bad, frustrated, anxious and worried about the future especially my four children's future.

My message for the power plant company is: No coal.

EGAT would never be able to pay all the damages because it's not just me, but many other people who suffered. Too much money. They won't pay. But in my heart I would like EGAT to pay it.

10 years ago my net was damaged with an oil leak and EGAT promised to pay for the ruined net but it never paid until now. Or other fishermen either."

© Luke Duggleby / Greenpeace

"I was born here, and lived here all his life.

It depends on the weather: 8 months a year the wind blows the pollution here over our community, so we were affected by this. It affected fish, shrimp, and shells. One impact is that some had shells but there was hardly any little body inside. And if some survive they are black inside. Inside the shells, it's black sand. Koh Moh nearby was also famous for shells, just like us at Prakasai – but ours are bad now and theirs are still ok. Before the power plant there was no problem. You could eat them.

You also had the port and the transport area, and there were problems with shells under those too. Thousands of tons of vessels came to the seaport behind the power plant and it impacted the shells and fish. Big coal boats. Shipping equipment. The biggest boat was over 100 meters long. They impacted the bottom of the channel.

The digging from the coalmine and tailings and wastewater from the mine also made a difference, [with] the coal ash. The fish decreased in that canal.

When I was 10 years old, I saw the coalmine pumping dirty water into the sea.

Next to the coalmine and power plant on the Prakasai there was a decrease in fish catch. 5-6 kilometers from the mine there was a significant impact but 10 kilometers away it was better. Before the mine and power plant you could maybe get 30 kg. But during that time, 4-5 kg. only.

The people around the power plant had three jobs. Most fishermen also do agriculture. And when the fish decreased they could feed family but not sell any more, so they had problems. They tried planting rubber and palm oil to get more money. [They couldn't go further to catch fish elsewhere because] small boats like the old local boats are different from the boats that can go far. With a machine, they can go 10 kilometers away, but that is more expensive and difficult; you have to buy more fuel.

Yes the money decreased. When the power plant came. Previously I could save money but after the power plant I could only feed his family. And I had to grow rubber and palm to make ends meet. I'd get 50,000 THB per year on average, from fishing, before the power plant. I got other money, as I was very busy and wasn't only fishing all the time, but doing agricultural work too. After the power plant, I got about 20,000 THB per year from fishing.

How can I not be angry? I felt sad. I felt depressed, I felt bad. This was such a bad thing that happened to me. The new power plant is bad and I'm going to fight it. We need electricity in Thailand. We devote ourselves, we suffer all the coal impacts here, and people far away get the benefits. This makes me upset.

Stop the project. The community will suffer impacts for a long time. It's about the future."


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"I am a real fisherman. I have no land, no farm, no agriculture. The sea is my land. I've been fishing since I was young. After I finished school. Since 17 years old. I've been fishing 45 years! If I don't have this job I will lose everything.

I fish in Laemkruad especially. I fish out to Laem hin. Koh Phiphi. Jongpao. And Krong rek. And in front of Prakasai.

Out at sea, there's not a huge difference between them but the one thing making it difficult is the temperature and wind and weather. At Koh Pipi you can get 10 kg. In front of Prakasai 4-5 kg. It's been less fish in Prakasai for a while; not just his year. Laemkruad, you get about 2 kg. more than Prakasai. Laemhin, you get 1 or 1 ½ kg. more than Laemkruad. It gets better as you go further away from Prakasai.

You have to go 1 hour away in your boat, away, to get free from the impacts of Prakasai. (Someone in a small fishing boat died en route to Koh Pipi because it's far and it can be dangerous for small boats.)

The big impact is inside the canal. And it's not much better since the power plant was decommissioned. Just a small improvement.

When it's raining everything's coming out of Prakasai canal, washing out.

I am worried about the new coal plant project, especially about the many huge boats coming through to the plant and ruining everything.

It's not just fish. There are a lot of people around here who have cancer."

[Several fishermen told Greenpeace that their doctors diagnosed them with mercury poisoning. They described their symptoms as: confusion; lethargy; dizziness; faintness; headaches; numbness; tremors; weakness; inability to move limbs properly.]

> “Health: yes there was an impact of course. Wind blew the pollution around. The contaminated water made my skin itchy. I had patches of red skin after the power plant. Recently my leg and hand can’t move and feel numb. Like other fisherman that have it too. And the doctor said I have a problem in my nervous system. I feel a bit better after being in the hospital but now my other arm started. I drop things because my hand doesn’t work right any more.”

> “I was born in a different province, and moved here when was 17, in 2500. [2500 Buddhist era is 1957 AD]
>
> At first I wasn’t sick. Then I started coughing.
>
> In 2545 [2545 Buddhist era is 2002 AD] I got seriously sick. The Doctor said I had cancer of the uterus. I went to the hospital for an operation – first I went to the hospital in Krabi but then I transferred to another hospital.
>
> A neighbor passed away from lung cancer, she was 50 years old, more or less.
> Across the street, the same. She was about 60.
>
> Many women around here pass away from lung cancer. They never smoked. Over 30 people in this village, which I know of, died of cancer in past 20 years.”

> “Bad for fish, and plants, and also humans. Fishermen had skin problems. Other things too. Two months ago I couldn’t walk and the doctor said that I had toxic contamination and my bones were bad. They did X-rays. My joints are ruined. I have kidney problems. My blood circulation decreased. The doctor said it’s maybe because of toxic waste contamination for a long time. I had to stay in 3 hospitals for over 1 month. I had injections of something 70 times I think – 40 nights. I still can’t walk well. I am taking pills now: omeprazole. Clindamycin hydrochloride. Naproxen sodium.”

In conclusion, it appears likely that large quantities of power plant related effluents were discharged into the canal over a protracted period of time. These effluents may have contained large amounts of coal ash, and water contaminated with coal ash, and water contaminated from coal mine dust. It is possible that such dumping took place over the span of 3 decades. The exact timing and nature of dumping must be addressed by EGAT officials, and by disclosure of their documentation regarding the plant's management. Given the multiple, independent corroborating interviews confirm this, it is certain that many fish died after the coal-fired power plant began operating, as well as many plants such as seagrass and mangroves.

The possibility that EGAT knowingly, purposefully dumped all its coal ash into the canal behind the Krabi power plant for three decades, alongside waste from its coal mine (and that this caused tremendous damage to the mangroves, the biota living there including fish and shellfish, the fishermen's livelihoods, and local health), is a real one. Moreover, it is possible that pollution is still accumulated in the mud and bottom sediment of the canal, creating a historical record of pollution.

There is every reason to suspect that water and fish adjacent to the former discharge area are still contaminated with heavy metals and polychlorinated biphenyls, which were used and still may be used in heavy transformers and capacitors from which they may have leaked. At this stage, rather than pushing for a new coal-fired power plant, EGAT owes the community real answers based on independently verifiable testing.

Ultimately, coal is the world's dirtiest fossil fuel. Air pollution from coal combustion contains methane, sulfur dioxide and nitrogen oxide, as well as chemicals such as arsenic and mercury which can disrupt human mental and physical development and which contaminates soil and water supplies. The result is destroyed livelihoods, reduced crop yields and fish catches, and serious impacts on human health. Burning coal also accelerates global climate change which is now affecting Thailand with impacts such as extreme weather events, droughts, and floods. Coal is a curse for communities living in the shadow of coal-fired power plants. Coal emissions, coal ash and coal dust are toxic and choke healthy ecosystems.

Clean Coal is a hoax

The answer has to be renewable energy, not "clean coal." Clean Coal is a hoax, an oxymoron, like jumbo shrimp or friendly fire. In a nutshell, it is called clean because pollution control devices get more efficient and toxicants get more concentrated in scrubbers rather than going directly in the air. Sadly though, the cleaner the air, the worse the coal ash from scrubbers. Toxicants in scrubbers simply wind up in our water in the end. It's just Basic Science: the law of conservation of mass. If you have an atom of mercury it's not going to vanish. It will stay there. The only question is where it will go. Burning 1 billion tons of coal generates about 100 million tons of coal ash. That coal ash, and all the toxicants in it, cannot vanish.

Why spend 2 billion USD on coal and not on renewable energy?

9

The reported exorbitant bill for EGAT's proposed new coal plant, a purpose built seaport capable of enabling coal shipments, and a conveyor belt: THB 60 billion.[26] This approximately 2 billion USD would therefore not be spent on developing wind and solar.

To give a sense of what the 2 billion USD could be spent on in terms of renewable energy: A utility scale wind turbine in 2012 cost between $1.3 million to $2.2 million per MW of nameplate capacity installed. The 420 MW Macarthur wind farm in Australia cost 1 billion USD to build.[27] The Sharp Corporation and Thai power producer NED are building a 73 MW solar-cell power plant, in Lopburi province 150 kilometers north of Bangkok, for a total project cost of 250 million US dollars.[28] With 2 billion dollars, a hybrid solar-wind farm could be installed at Krabi, generating hundreds of MWh on average per year.

The best sites for wind power in the Krabi area are less than a 2 hours drive away, on top of the Nakon Sri Thammarat mountain range (famous for the Kao Luong peak) ranging all the way from Malaysia to Surat Thani.

The annual average windspeed in that mountain range is over 7m/s, which is the threshold needed to make wind farms most lucrative. Indeed, across from Krabi on the other side of the Kao Luong mountain range, where the annual average windspeed is under 7m/s, there are already several wind farms that are operational and financially viable. Across Northern Europe, the established feed-in tariff of 7 to 8 €cents per kWh ensures economic operation of onshore wind farms in areas above 5.5m/s.

26 Watcharapong Thongrung, "EGAT plans first coal-fired power plant in South," The Nation, 11 August 2012.
Available at http://www.nationmultimedia.com/business/EGAT-plans-first-coal-fired-power-plant-in-South-30188114.html;
see also One Stop Krabi, "Public hearings on Krabi power plant," 13 August 2012.
Available at http://www.1stopkrabi.com/travel_news/2012/08/Public-hearings-on-Krabi-power-plant;
Bangkok Post, "Egat plans new B60bn transmission line to South," 09 July 2013.
Available at http://www.bangkokpost.com/lite/topstories/359061/egat-plans-b60-billion-high-voltage-power-line-to-supply-the-south;
Cesar Tordesillas, "Thailand's electricity authority to build coal-fired power plant in South; The Electricity Generating Authority of Thailand will build an 800 MW coal-fired power plant worth initially THB 60 billion in Krabi," Asian Power, 11 August 2012.
Available at http://asian-power.com/project/news/thailands-electricity-authority-build-coal-fired-power-plant-in-south;
Bangkok Post, "Egat to hear public on Krabi plant," 11 August 2012. Available at http://www.bangkokpost.com/print/307140/

27 Regarding costs for a few Australian wind farms:
- The 140.7 MW Capital Wind Farm with 67 turbines cost $370 million (USD).
- AGL's Hallett 4 Wind Farm, at 132MW with 63 turbines, cost $314 million (USD) to build.
- Portland wind farm at 195 MW, was projected to cost $310 million (USD)

Further afield, for costs of some offshore wind farms:
- London Array at 1000 MW was projected to cost £1.8 billion
- Greater Gabbard at 504 MW was projected to cost £650 million
- Horns Rev 2 in Denmark at 209 MW was projected to cost €448 million
- Rødsand I ; with 72 turbines at 166 MW was projected to cost €600 million

28 See e.g. Becky Stuart, "One of world's largest solar power plants to be built in Thailand," PV Magazine, 01 July 2010.
Available at http://www.pv-magazine.com/news/details/beitrag/one-of-worlds-largest-solar-power-plants-to-be-built-in-thailand_100000327/#ixzz2fo4aaaba;
See also Natural Energy Development Co., Ltd, "Solar Provider Pouring Enthusiasm, Expertise into Asia's Biggest Project," Company interview, September 2010.
Available at http://www.boi.go.th/tir/issue/201009_20_9/107.htm

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Krabi can be a 100% renewable energy province

10

Krabi needs energy – sustainable, clean energy! Renewable energy is the solution to the region's energy needs. The potential for renewable energy is huge. There is no true energy shortage.

All we need to do is use existing technologies to harness energy effectively and efficiently. Renewable energy and energy efficiency measures are ready, viable, and competitive. Wind, solar and other renewable energy technologies have experienced double digit market growth for the past decade. Climate change is real, and so is the renewable energy sector. Sustainable, decentralised energy systems produce fewer carbon emissions, cost less, depend less on imported fuel, create more jobs, empower local communities, and are more secure and more efficient.

Some communities in the remote area of Krabi still remain without adequate access to electricity. Greenpeace recognizes that this is a real challenge, which needs addressing. We understand that businesses are also harmed by blackouts and brownouts due to a weak, fragile or insufficient grid and the necessity of buying expensive diesel back-up systems. But, we don't need coal to fix the problem.

Greenpeace endorses a better alternative. We believe all interests would be served by developing a hybrid renewable energy system for Krabi, instead of the proposed coal plant – a mix of solar pv, wind, biogas, and biomass from agricultural waste coupled with energy efficiency and energy management. Such a renewable energy-based solution can provide for local energy needs, will not harm local health, fisheries, or agriculture, and is moreover popular with local community members. It is financially viable and technologically feasible. Moreover, a hybrid renewable energy system (HRES) would enhance Thailand's efforts to move towards a clean energy future, whereas the proposed new coal-fired power plant would undermine Thailand's domestic and international commitments to fight global warming, generating millions of tons of GHG emissions as well as toxic coal ash yearly.

Greenpeace urges the government of Thailand to fast-track a feasibility study and plan of action for development of a 100 % hybrid renewable energy system for Krabi province.

Thailand should live up to its leadership role for renewables in Southeast Asia

11

Thailand has been a leader in the past with the Small Power Producer (SPP) and Very Small Power Producer (VSPP) programme. It can remain a leader as we move into the future. In particular, Krabi can become a pioneer for best practices within the renewable energy industry in Thailand.

"Thailand was among the first countries in Asia to introduce incentive policies for the generation of electricity from renewable energy (RE) sources, leading to rapid growth, particularly in solar power. Programmes for small and very small power producers created predictable conditions for RE investors to sell electricity to the grid. The 'Adder', a feed-in-premium, guarantees higher rates for RE, making the investments profitable. Thailand also regularly updates technical regulations, provides preferential financing, and invests in research and training. Civil society involvement strengthened and improved RE policies. In Thailand, outside expertise and links to international networks brought by civil society experts were crucial for the design and approval of the incentive measures. The Thai government is now adapting its policies to take account of recent technological progress and market growth. It is considering a sophisticated feed-in tariff to better control costs, while continuing to offer an enabling environment for RE investments."[29]

Rather than embrace coal, the national Thai and local Krabi authorities should build on Thailand's past successes and keep going green. This means living up to the 11th National Economic and Social Development Plan, a 5-year framework guiding government policy that aims to shift "toward a low-carbon society;" and also living up to the 2011 10-year Alternative Energy Development Plan (2012–2021) which has a goal of 25% RE in total energy consumption. The Thai Solar PV Roadmap Initiative (TSRI) also lays out positive ambitions.[30] Moreover, the 20-year Energy Efficiency Development Plan (2011-2030) that includes transportation, electricity, and heat, has set the goal of 25% reduction of the Energy Intensity of the country within 2030, compared to 2010.[31] These plans all lay out excellent goals for renewable energy and energy efficiency. In Krabi, we must move from paper to reality and make these promises count on the ground.

29 Climate and Development Knowledge Network, "Inside Story: Pioneering renewable energy options: Thailand takes up the challenge." Available at http://cdkn.org/2013/05/inside-story-pioneering-renewable-energy-options-thailand-takes-up-the-challenge/

30 The Solar PV Roadmap Initiative official webpage. Available at www.thaisolarpvroadmap.org/wordpress/?page_id=1189

31 Royal Thai Government, Ministry of Energy, "Thailand 20-Year Energy Efficiency Development Plan (2011-2030)". Available at http://www.eppo.go.th/encon/ee-20yrs/EEDP_Eng.pdf

The best choice for Krabi: a decentralized hybrid renewable energy system

12

Greenpeace endorses a better alternative to EGAT's dirty coal proposal. We need an integrated solution to be implemented across the region to address rising energy demand, realized through a decentralized system, supplemented by a rural and community-based development approach. It's a win-win solution for the climate, local job creation, empowerment of communities, helping people facing energy poverty, and giving Thai businesses a chance to grow.

We believe all interests would be served by developing a hybrid renewable energy system for Krabi, instead of the proposed coal plant. Such a renewable energy-based solution can provide for local energy needs, will not harm local health, fisheries, or agriculture, and is moreover popular with local community members. It is financially viable and technologically feasible. Moreover, a renewable energy system or renewable energy cluster (REC) would enhance Thailand's efforts to move towards a clean energy future, whereas the proposed new coal-fired power plant would undermine Thailand's domestic and international commitments to fight global warming, generating tons of GHG emissions as well as toxic coal ash yearly.

Greenpeace urges the government to Thailand to fast-track a feasibility study and plan of a renewable energy cluster for the Krabi region. The cluster would combine different renewable energy technologies such as bio energy (which used agricultural and fishery waste as well as organic waste from within the region), onshore wind, solar photovoltaics and – later on – offshore wind and integrates them into the power grid. Renewable Energy Clusters are increasingly popular as renewable energy technology advances[32] and the combined use of different renewable energies guarantees increased system efficiencies in addition to greater balance and predictability in energy supplies. For instance, when solar systems are at their least effective, in the rainy system, wind turbines often operate at peak efficiency.

This system can only be successful with the participation of all from the government actors and policy makers who need to support this program, to corporations who will provide investments, along with civil society actors who will act as catalysts working alongside communities.

32 Some examples include Enel; Termosolar; Apple; Zhangbei; Catalina; Grand Ridge; Gorona.

A decentralised energy future

EXISTING TECHNOLOGIES, APPLIED IN A DECENTRALISED WAY AND COMBINED WITH EFFICIENCY MEASURES AND ZERO EMISSION DEVELOPMENTS, CAN DELIVER LOW CARBON COMMUNITIES AS ILLUSTRATED HERE. POWER IS GENERATED USING EFFICIENT COGENERATION TECHNOLOGIES PRODUCING BOTH HEAT (AND SOMETIMES COOLING) PLUS ELECTRICITY, DISTRIBUTED VIA LOCAL NETWORKS. THIS SUPPLEMENTS THE ENERGY PRODUCED FROM BUILDING INTEGRATED GENERATION. ENERGY SOLUTIONS COME FROM LOCAL OPPORTUNITIES AT BOTH A SMALL AND COMMUNITY SCALE. THE TOWN SHOWN HERE MAKES USE OF - AMONG OTHERS - WIND, BIOMASS AND HYDRO RESOURCES. NATURAL GAS, WHERE NEEDED, CAN BE DEPLOYED IN A HIGHLY EFFICIENT MANNER.

1. PHOTOVOLTAIC, SOLAR FAÇADES WILL BE A DECORATIVE ELEMENT ON OFFICE AND APARTMENT BUILDINGS. PHOTOVOLTAIC SYSTEMS WILL BECOME MORE COMPETITIVE AND IMPROVED DESIGN WILL ENABLE ARCHITECTS TO USE THEM MORE WIDELY.

2. RENOVATION CAN CUT ENERGY CONSUMPTION OF OLD BUILDING BY AS MUCH AS 80% - WITH IMPROVED HEAT INSULATION, INSULATED WINDOWS AND MODERN VENTILATION SYSTEMS.

3. SOLAR THERMAL COLLECTORS PRODUCE HOT WATER FOR BOTH THEIR OWN AND NEIGHBOURING BUILDINGS.

4. EFFICIENT THERMAL POWER CLIP (CHP) STATIONS WILL COME IN A VARIETY OF SIZE - FITTING THE CELLAR OF A DETACHED HOURSE OR SUPPLYING WHOLE BUILDING COMPLEXES OR APARTMENT BLOCKS WITH POWER AND WARMTH WITHOUT LOSSES IN TRANMISSION.

5. CLEAN ELECTRICITY FOR THE CITIES WILL ALSO COME FROM FARTHER AFIELD. OFFSHORE WIND PARKS AND SOLAR POWER STATIONS IN DESERTS HAVE ENORMOUS POTENTIAL.

definitions and technical terms

• **The electricity 'grid'** is the collective name for all the cables, transformers and infrastructure that transport electricity from power plants to the end users.

• **Micro grids supply local power needs.** Monitoring and control infrastructure are embedded inside distribution networks and use local energy generation resources. An example microgrid would be a combination of solar panels, micro turbines, fuel cells, energy efficiency and information/communication technology to manage the load, for example on an island or small rural town.

• **Smart grids balance demand out over a region.** A 'smart' electricity grid connects decentralised renewable energy sources and cogeneration and distributes power highly efficiently. Advanced types of control and management technologies for the electricity grid can also make it run more efficiently overall. For example, smart electricity meters show real-time use and costs, allowing big energy users to switch off or down on a signal from the grid operator, and avoid high power prices.

• **Super grids transport large energy loads between regions.** This refers to interconnection - typically based on HVDC technology - between countries or areas with large supply and large demand. An example would be the interconnection of all the large renewable based power plants in the North Sea or a connection between Southern Europe and Africa where renewable energy could be exported to bigger cities and towns, from places with large locally available resources.

• **Baseload** is the concept that there must be a minimum, uninterruptible supply of power to the grid at all times, traditionally provided by coal or nuclear power. The Energy [R]evolution challenges this, and instead relies on a variety of 'flexible' energy sources combined over a large area to meet demand. Currently, 'baseload' is part of the business model for nuclear and coal power plants, where the operator can produce electricity around the clock whether or not it is actually needed.

• **Constrained power** refers to when there is a local oversupply of free wind and solar power which has to be shut down, either because it cannot be transferred to other locations (bottlenecks) or because it is competing with inflexible nuclear or coal power that has been given priority access to the grid. Constrained power is also available for storage once the technology is available.

• **Variable power** is electricity produced by wind or solar power depending on the weather. Some technologies can make variable power dispatchable, e.g. by adding heat storage to concentrated solar power.

• **Dispatchable** is a type of power that can be stored and 'dispatched' when needed to areas of high demand, e.g. gas- fired power plants or hydro power plants.

• **Interconnector** is a transmission line that connects different parts of the electricity grid. Load curve is the typical pattern of electricity through the day, which has a predictable peak and trough that can be anticipated from outside temperatures and historical data.

• **Node** is a point of connection in the electricity grid between regions or countries, where there can be local supply feeding into the grid as well.

A Study by the Healthy Public Policy Foundation used a "Participatory Renewable Energy Development Planning" – a bottom-up approach developed by independent renewable energy experts[33] to support local communities and all stakeholders in 14 provinces in Southern Thailand in order to develop their own renewable energy scenario. According to this study, using a renewable energy development planning model, the renewable energy potential of Krabi[34] has been taking into consideration and the target of renewable energy developments for Krabi in 2027 is carefully proposed as a 'demo' in order to demonstrate the possibility and stimulate further deliberation among all stakeholders in Krabi on their own renewable energy future.:

MW	Biomass	Wind	Solar PV	Biogas	Micro-hydro
Potential	1,981	68	18,705	30	3
2027 Target	813	55	95	30	3

The RE target identified in the table above will replace the planned coal capacity of 870 MW entirely and will run on locally available fuel (bio mass) respectively without fuel. The money spend for operation and maintenance for the Renewable energy cluster will remain within the community while the investment in coal (=fuel) will go outside Thailand and therefore will not contribute to the local economy.

The study also mapped out Electricity Demand Projections for Krabi:

- In 2012 peak demand of electricity for Krabi was 101 MW[35] and in 2011 electricity produced from renewable energy sources (biomass, biogas, and solar PV) was 398 GWh account for 70 MW using plant factor for biomass (70%) and biogas (50%).[36] About 39 MW from renewable energy are connected to the grid and the other 24 MW is planned to be connected to the grid in the near future.[37]
- If electricity demand increases 5% per year, which is the average growth between 2004 – 2012, the demand will be about 210 MW by 2027.
- Taking into account energy efficiency target on electricity set by Thailand 20-Year Energy Efficiency Development Plan (2011 - 2030)[38] at 29%, Krabi province will help save at least 61 MW by 2027; and thus, electricity demand would be at 149 MW by 2027.

33 Available at http://southdevplan.com/app/#/about
34 Sources for biomass and solar information were derived from the Thailand Energy Situation report 2011, of the Department of Alternative Energy Development and Efficiency (hereinafter DEDE), in the Ministry of Energy, Royal Thai Government; as well as from the wind and micro-hydro from research done by Pattalung Campus of Thaksin University, 2011. For biogas, all calculations were done by the Healthy Public Policy Foundation.
35 DEDE, "Energy in Thailand: Facts and Figures 2013," 2013.
Available at http://www.dede.go.th/dede/index.php?option=com_content&view=article&id=1841&Itemid=318
36 Research on mechanisms for renewable energy development in Southern Thailand was conducted by the Pattalung Campus of Thaksin University, 2011.
37 Status of renewable energy deployment from SPP&VSPP, was derived from the database of the Energy Regulatory Commission of Thailand (ERC) on 27 April 2014. See, e.g. http://www.erc.or.th/ERCSPP/default.aspx?x=0&muid=23&prid=41
38 Institute for Industrial Productivity, Industrial Efficiency Policy Database, "TH-3:Thailand 20-Year Energy Efficiency Development Plan (2011 - 2030) (EEDP)."
Available at http://iepd.iipnetwork.org/policy/thailand-20-year-energy-efficiency-development-plan-2011-2030-eedp

	2014	2017	2022	2027
Power Demand without Energy Efficiency and demand increase of 5% per year	110			149
EE target for Krabi	6	15	34	61
Power Demand Development with EE measures	110			88 (=149 - 61)

From the study's calculation, 100% RE for Krabi province is achievable within the next two years. By 2027 this renewable development plan will contribute to GDP growth mainly in the province by around 10,900 million THB/year (about 335.7 million USD), creating 15,500 green jobs, saving 2,700 million THB/year on imported fuel costs (about 83 million USD), and increasing renewable energy investment up to 15,300 million THB/year (about 471 million USD).

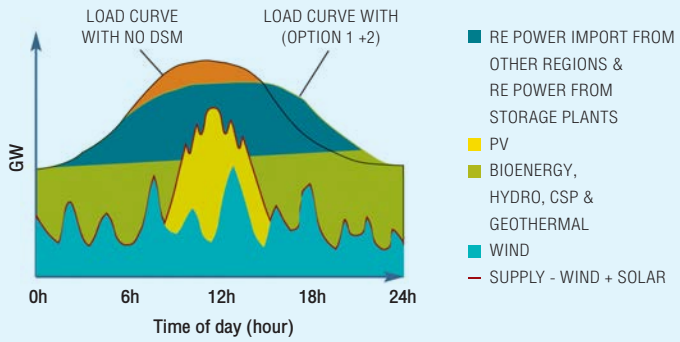
When comparing the RE outcome to the outcome which involves EGAT's proposed Krabi coal plant, we see that the shift could lead to reducing GHG by 3,280,000 ton/year and Sulfur Dioxide emissions by 122,000 ton/year by 2027.

Priorities and issues for Krabi's decision makers and local authorities

13

1) Create a smart grid

Reduce grid loads and energy losses in distribution with a smart interactive grid. Clever technologies can track and manage energy use patterns, provide flexible power that follows demand through the day, use better storage options and group customers together to form 'virtual batteries'. The overall concept of a smart grid is one that balances fluctuations in energy demand and supply to share out power effectively among users. New measures to manage demand, forecasting the weather for storage needs, plus advanced communication and control technologies will help deliver electricity effectively. A smart grid has power supplied from a diverse range of sources and places and it relies on the collection and analysis of a lot of data. Smart grids require software, hardware and data networks capable of delivering data quickly, and responding to the information that they contain. Several important ICT players are racing to smarten up energy grids across the globe and hundreds of companies could be involved with smart grids. There are numerous IT companies offering products and services to manage and monitor energy. These include IBM, Fujitsu, Google, Microsoft and Cisco. These and other giants of the telecommunications and technology sector have the power to make the grid smarter, and to move us faster towards a clean energy future. Greenpeace has produced reports on this[39] and can provide advice on such technologies.



The solution: an optimised system with over 90% renewable energy supply

- A fully optimised grid, whare 100 percent renewables operate with storage, transmission of electricity to other regions, demand management and curtailment only when required.
- Demand-side Management (DSM) effectively moves the highest peak and "flattens out" the curve of electricity use over a day.

39 Greenpeace, "powE[R] 2030: A European Grid for 3/4 Renewable Electricity by 2030," 2014. Available at http://www.greenpeace.de/files/publications/201402-power-grid-report.pdf

Smart grids

The task of integrating renewable energy technologies into existing power systems is similar in all power systems around the world, whether they are large centralized networks or island systems. The main aim of power system operation is to balance electricity consumption and generation.

Thorough forward planning is needed to ensure that the available production can match demand at all times. In addition to balancing supply and demand, the power system must also be able to:

- Fulfil defined power quality standards - voltage/ frequency - which may require additional technical equipment, and
- Survive extreme situations such as sudden interruptions of supply, for example from a fault at a generation unit or a breakdown in the transmission system.

Integrating renewable energy by using a smart grid, means moving away from the concept of baseload power towards a mix of flexible and dispatchable renewable power plants. In a smart grid a portfolio of flexible energy providers can follow the load during both day and night (for example, solar plus gas, geothermal, wind and demand management) without blackouts.

What is a smart grid?

Until now renewable power technology development has put most effort into adjusting its technical performance to the needs of the existing network, mainly by complying with grid codes, which cover such issues as voltage frequency and reactive power. However, the time has come for the power systems themselves to better adjust to the needs of variable generation. This means that they must become flexible enough to follow the fluctuations of variable renewable power, for example by adjusting demand via demand-side management and/or deploying storage systems.

The future power system will consist of tens of thousands of generation units such as solar panels, wind turbines and other renewable generation, partly distributed in the distribution network, partly concentrated in large power plants such as offshore wind parks. The power system planning will become more complex due to the larger number of generation assets and the significant share of variable power generation causing constantly changing power flows.

Smart grid technology will be needed to support power system planning. This will operate by actively supporting day-ahead forecasts and system balancing, providing real-time information about the status of the network and the generation units, in combination with weather forecasts. It will also play a significant role in making sure systems can meet the peak demand and make better use of distribution and transmission assets, there by keeping the need for network extensions to the absolute minimum.

To develop a power system based almost entirely on renewable energy sources requires a completely new power system architecture, which will need substantial amounts of further work to fully emerge.[40] Figure X.1 shows a simplified graphic representation of the key elements in future renewable-based power systems using smart grid technology.

A range of options are available to enable the large-scale integration of variable renewable energy resources into the power supply system. Some features of smart grids could be:

40 Ecogrid, "Phase 1 Summary report,"
Available at: http://www.energinet.dk/NR/rdonlyres/8B1A4A06-CBA3-41DA-9402-B56C2C288FB0/0/EcoGriddk_phase1_summaryreport.pdf

Managing level and timing of demand for electricity

Changes to pricing schemes can give consumers financial incentives to reduce or shut off their supply at periods of peak consumption, as system that is already used for some large industrial customers. A Norwegian power supplier even involves private household customers by sending them a text message with a signal to shut down. Each household can decide in advance whether or not they want to participate. In Germany, experiments are being conducted with time flexible tariffs so that washing machines operate at night and refrigerators turn off temporarily during periods of high demand.

Advances in communications technology

In Italy, for example, 30 million 'smart meters' have been installed to allow remote meter reading and control of consumer and service information. Many household electrical products or systems, such as refrigerators, dishwashers, washing machines, storage heaters, water pumps and air conditioning, can be managed either by temporary shut-off or by rescheduling their time of operation, thus freeing up electricity load for other uses and dovetailing it with variations in renewable supply.

Creating Virtual Power Plants (VPP)

Virtual power plants interconnect a range of real power plants (for example solar, wind and hydro) as well as storage options distributed in the power system using information technology. A real life example of a VPP is the Combined Renewable Energy Power Plant developed by three German companies.[41] This system interconnects and controls 11 wind power plants, 20 solar power plants, four CHP plants based on biomass and a pumped storage unit, all geographically spread around Germany. The VPP monitors (and anticipates through weather forecasts) when the wind turbines and solar modules will be generating electricity. Biogas and pumped storage units are used to make up the difference, either delivering electricity as needed in order to balance short term fluctuations or temporarily storing it.[42] Together the combination ensures sufficient electricity supply to cover demand.

Electricity storage options

Pumped storage is the most established technology for storing energy from a type of hydroelectric power station. Water is pumped from a lower elevation reservoir to a higher elevation during times of low cost, off-peak electricity. During periods of high electrical demand, the stored water is released through turbines. Taking into account evaporation losses from the exposed water surface and conversion losses, roughly 70 to 85% of the electrical energy used to pump the water into the elevated reservoir can be regained when it is released. Pumped storage plants can also respond to changes in the power system load demand within seconds. Pumped storage has been successfully used for many decades all over the world. In 2007 the European Union had 38 GW of pumped storage capacity, representing 5% of total electrical capacity.

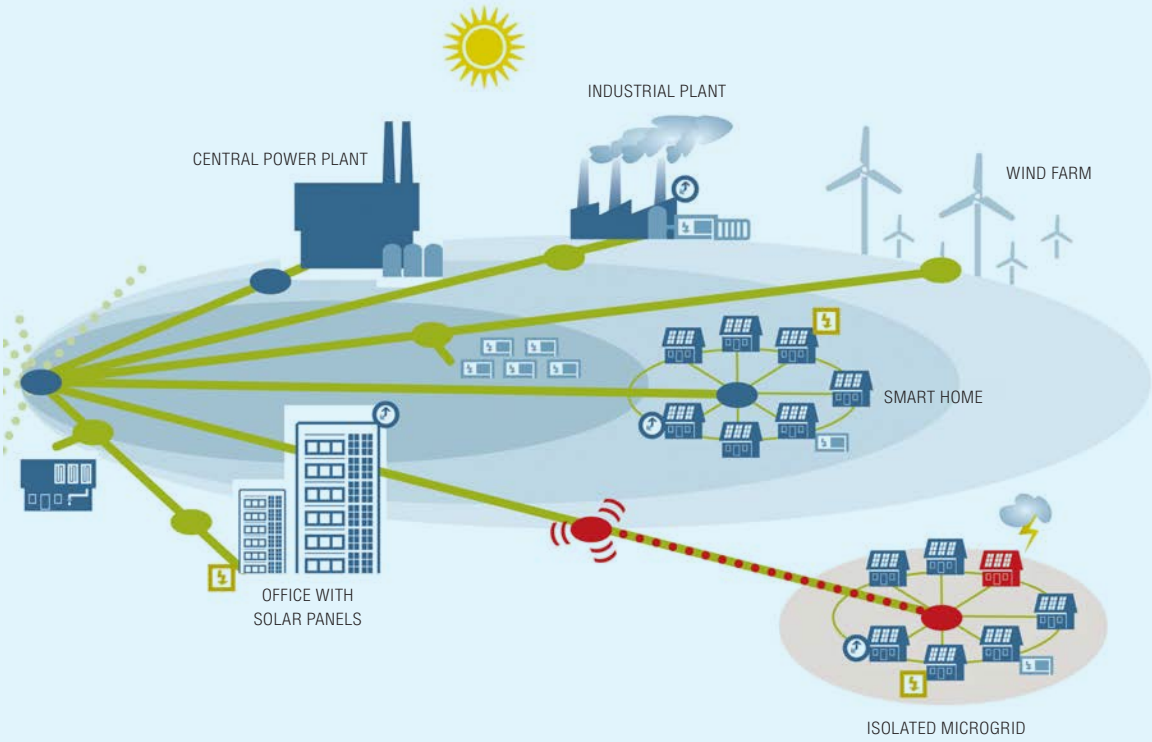
2) Develop clusters of decentralized, renewable, hybrid, off-grid, micro grids in Krabi

- Build up decentralised clusters of renewable micro grids / off-grid energy systems, where power and heat are produced close to the point of final use.
- Combine solar, wind, offshore wind, mini and micro-hydro, and biomass, wherever appropriate and available.
- Embrace solar thermal technologies: Solar collectors depend on direct solar irradiation. In very sunny regions even very simple collectors can provide hot water to households at very low cost. In Europe, solar thermal systems for hot water and/or heating can provide hot water even during the winter for households at around 400 €/m2 installation costs.

41 Kombikraftwerk, "The Combined Power Plant," 09 October 2007. Available at http://www.kombikraftwerk.de/index.php?id=27
42 Solar Server Solarmagazine, "The Combined Power Plant: the first stage in providing 100 % power from renewable energy," 16 April 2008. Available at http://www.solarserver.de/solarmagazin/anlagejanuar2008_e.html

The smart-grid vision for the energy [r]evolution

A VISION FOR THE FUTURE - A NETWORK OF INTEGRATED MICROGRIDS THAT CAN MONITOR AND HEAL ITSELF.



PROCESSORS
EXECUTE SPECIAL PROTECTION SCHEMES IN MICROSECONDS

SMART APPLIANCES
CAN SHUT OFF IN RESPONSE TO FREQUENCY FLUCTUATIONS

GENERATORS
ENERGY FROM SMALL GENERATORS AND SOLAR PANELS CAN REDUCE OVERALL DEMAND ON THE GRID

DISTURBANCE IN THE GRID

SENSORS (ON 'STANBY')
DETECT FLUCTUATIONS AND DISTURBANCES, AND CAN SIGNAL FOR AREAS TO BE ISOLATED

DEMAND MANAGEMENT
USED CAN BE SHIFTED TO OFF-PEAK TIMES TO SAFE MONEY

STORAGE
ENERGY GENERATED AT OFF-PEAK TIMES COULD BE STORED IN BATTERIES FOR LATER USE

SENSORS ('ACTIVATED')
DETECT FLUCTUATIONS AND DISTURBANCES, AND CAN SIGNAL FOR AREAS TO BE ISOLATED

3) Encourage and legislate for energy efficiency in Krabi

- Curb energy demand by promoting efficiency measures in the industry and service sectors, in particular by introducing highly efficient electronic devices using the best available technology in all demand sectors. Set a 3 year time window to implement strict efficiency standards for all energy consuming appliances and equipment.
- Reducing energy demand for heating and cooling in buildings through efficiency gains, with energy-related renovation of the existing stock of residential buildings, the introduction of low energy standards and "passive climatisation" for new buildings, as well as highly efficient air conditioning systems.

4) Roll out financial and non-financial incentives to promote renewable energy in Krabi

- Continue to guarantee priority access to the grid for renewable power generators
- Ensure that all relevant actors in Krabi are efficiently implementing Thailand's Adder model of feed-in premium, which was created in 2007, and that they are aware of the Adder model.
- Consider moving from a feed-in premium to a feed-in tariff[43] (FIT) that could "guarantee a total rate paid to VSPPs and SPPs, independent of volatile conventional power price" and that "could provide a pre-determined schedule for reductions in the FIT rate."[44]
- Grant temporary tax exemptions and ensure all potential renewable energy investors are aware that through the Board of Investments, eligible renewable energy projects can receive a corporate income tax break for up to eight years and are exempt from import duties on equipment.
- Publicize the fact that Thailand has a revolving fund (funded through a tax on petroleum products sold in Thailand), which "provides financing to local banks so that they can pass on low-interest loans with a maximum interest rate of 4% to renewable energy projects." Ensure that this programme is working in Krabi, with local banks and renewable energy investors.

43 World Resources Institute, "A Shared Vision for Thailand's Solar Energy Development," by Sarah Martin Sarah Martin and Davida Wood. 22 January 2014. Available at http://www.wri.org/blog/2014/01/shared-vision-thailands-solar-energy-development. (The article points out, "Experts criticize the country's FIT program and the government's weak regulatory framework for being inadequate at responding to changing market conditions, such as declining prices of solar PV modules. Others criticize the program for failing to consider potential impacts on consumers by expecting them to cover the additional payments. But there are signs of hope that Thailand's solar power development is poised for a turnaround. The National Energy Policy Commission approved new solar policy plans this past year, including updated FIT rates that encourage local production by reserving 800 MW for community-owned projects. And thanks in part to a new WRI tool, a multi-stakeholder group has emerged to ensure that Thailand's solar power development proceeds in a way that is both inclusive and effective.")

44 Climate Development Knowledge Network, "Inside Story:: Pioneering renewable energy options: Thailand takes up the challenge," 17 May 2013. Available at http://cdkn.org/2013/05/inside-story-pioneering-renewable-energy-options-thailand-takes-up-the-challenge/

- Ensure that the government fund providing equity investment or venture capital of up to 50 million THB (US$1.7 million) for smaller renewable energy projects, is publicized and accessed by appropriate actors.
- Make publicly available the Ministry of Energy Department of Alternative Energy Development and Efficiency (DEDE) Renewable energy maps/solar radiation maps/solar radiation database/data from the solar radiation monitoring station[45] ; Information from DEDE demonstration sites; and the DEDE One-Stop Service to provide renewable energy potential information.[46]
- Revive the DEDE "Energy Soft Loan" with revolving funds for Renewable energy and energy conservation; and publicize the ESCO Venture Capital Fund as well as DEDE investment grants.[47]
- Ensure effectiveness of non-financial support mechanisms including
    - standard power purchase agreements,
    - preferential arrangements for small generators and
    - information support.

  to aid small and independent power producers to enter the market more easily and reduce barriers
- Establish net metering[48] : Net metering is shorthand for getting paid the same price for each unit of electricity generated by a solar electric system and exported to the grid during daylight as the electricity company charges for each unit of its electricity that is imported from the grid when it is dark. This is equivalent to allowing a solar household's normal electricity meter to run backwards when solar power goes out from the house to the grid, although in practice it may be done by installing a second meter to measure electricity exports. Why does net metering matter for solar power? When you put solar electric panels on your home you become a miniature power station. Solar homeowners should be rewarded for producing clean electricity that doesn't damage the climate but most utilities pay a miserly amount, or nothing at all, for each unit of solar electricity they buy from solar homes while charging high rates for the electricity that they sell them from the grid. Net metering means solar electric homes get a fair deal for their solar power. In the UK, a power company TXU Europe, whose retail arm is Eastern Energy, has developed a break-through net metering deal for households with solar electric systems.

45 Nipon Ketjoy Dr.-Ing. (Renewable Energy Technology) Deputy Director for Research Affairs, Head of Photovoltaic System & Standard Testing Research Division, School of Renewable Energy Technology, Naresuan University, Thailand, "The solar power market development in Thailand: 20 year of grid connected PV systems: Lessons learnt from Germany why quality matters," Presentation, June 5, 2012. Available at http://www.thai-german-cooperation.info/download/renewable_2012_06_05_01_pvdev.pdf

46 Kulwaree Buranasajjawaraporn (Director, Innovation Group, Bureau of Solar Energy Development, Department of Alternative Energy Development and Efficiency, Ministry of Energy), Presentation "Thailand Solar Energy Overview" in the Seminar: " Italian Technologies on Renewal Energy," Sofitel Hotel, 21-22, March 2012. [hereinafter Kulwaree Buranasajjawaraporn "Thailand Solar Energy Overview"]
Available at http://aretusa.ice.it/SchemaSite/images/UserImageDir/177/EN/Presentations/Thailand%20Solar%20Energy%20Overview%20.pdf

47 Ibid. See also Mr. Sumrit Haema, Executive Director, Bureau of Energy Research, Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy, Thailand, "Renewable Energy in Thailand." Stakeholder Workshop on Renewable Energy and Experience Sharing 15 August 2012. The Sukosol Hotel, Bangkok. Available at http://eeas.europa.eu/delegations/thailand/documents/thailande_eu_coop/energy_efficiency/thailand_re_pol_and_challenges_en.pdf

48 Greenpeace, "SolarNet and Net MeteringQuestions and Answers,"
Available at http://www.greenpeace.org.uk/files/pdfs/migrated/MultimediaFiles/Live/FullReport/1508.pdf

Renewable energy is a good financial investment for Krabi 14

Being a renewable energy leader doesn't mean losing money. Renewable energy is good for the planet and good for pocketbooks: with short construction periods, low operational complexity, predictable cash flows, recurring income, and more. The Thai government itself calculates that its Alternative Energy Development Plan would save over US$19 billion in energy imports per year, and stimulate approximately US$15 billion in private investment, as well as generating at least 40,000 new jobs, and rural income and employment – and "US$1.5 billion were invested in the Thai renewable energy sector in 2011" alone.[49]

Return characteristics of renewable energies

source: SWISS RE PRIVATE EQUITY PARTNERS

Many government officials and coal lobbyists have argued that we require coal for a strong economy and job creation. That we need a coal-fired power plant in Krabi, for our electricity supply. It's not true. First, quitting coal won't kill jobs. The renewable energy industry is very labor intensive, especially relative to coal. Moving from coal to renewable energy will create employment for Thailand, not reduce it. Second, coal harms agriculture and fisheries – both labor-intensive sectors, with significant benefits for production and for employment. Third, importing foreign coal sends valuable wealth abroad whereas renewable energy has high domestic content. Ultimately, coal bears millions in hidden costs, which the industry has tried hard to conceal.

49 Climate Development Knowledge Network, "Inside Story:: Pioneering renewable energy options: Thailand takes up the challenge," 17 May 2013. Available at http://cdkn.org/2013/05/inside-story-pioneering-renewable-energy-options-thailand-takes-up-the-challenge/

Photovoltaics (PV) cost assumptions

INCLUDING ADDITIONAL COSTS FOR GRID INTEGRATION OF UP TO 25% OF PV INVESTMENT

SCENARIO	2009	2015	2020	2030	2040	2050
Energy [R]evolution						
Investments costs (US$/kWp)	3,000	2,300	1,650	1,280	1,040	1,060
Operation and maintenance costs US$/(kW/a)	43	38	21	15	14	15

Concentrating solar power (CSP) cost assumptions

INCLUDING COSTS FOR HEAT STORAGE AND ADDITIONAL SOLAR FIELDS

SCENARIO	2009	2015	2020	2030	2040	2050
Energy [R]evolution						
Investments costs (US$/kWp)	9,300	8,100	6,600	5,750	5,300	4,800
Operation and maintenance costs US$/(kW/a)	420	330	265	229	211	193

Wind power cost assumptions

INCLUDING ADDITIONAL COSTS FOR GRID INTEGRATION OF UP TO 25% OF INVESTMENT

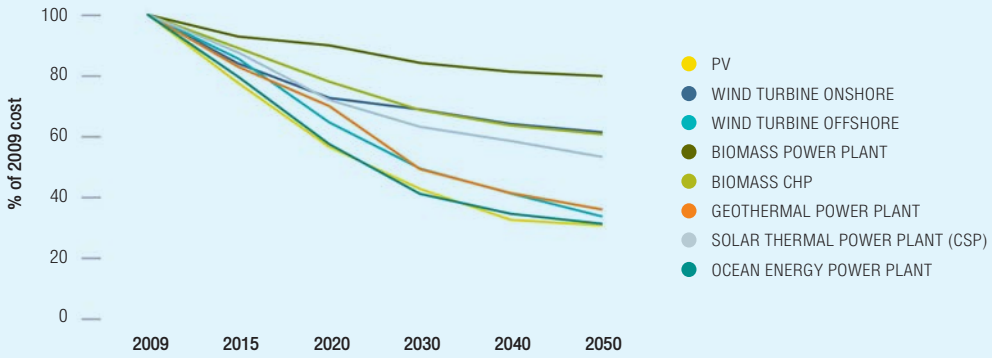
SCENARIO	2009	2015	2020	2030	2040	2050
Energy [R]evolution						
Wind Turbine offshore						
Investments costs (US$/kWp)	6,000	5,100	3,800	3,000	2,700	2,350
Operation and maintenance costs US$/(kW/a)	230	205	161	131	124	107
Wind Turbine onshore						
Investments costs (US$/kWp)	1,800	1,500	1,290	1,280	1,300	1,350
Operation and maintenance costs US$/(kW/a)	64	55	55	56	59	61

Biomass cost assumptions

SCENARIO	2009	2015	2020	2030	2040	2050
Energy [R]evolution						
Biomass power plant						
Investments costs (US$/kWp)	3,350	3,100	3,000	2,800	2,700	2,650
Operation and maintenance costs US$/(kW/a)	201	185	175	169	162	166
Biomass CHP						
Investments costs (US$/kWp)	5,700	5,050	4,400	3,850	3,550	3,380
Operation and maintenance costs US$/(kW/a)	397	354	310	270	250	237

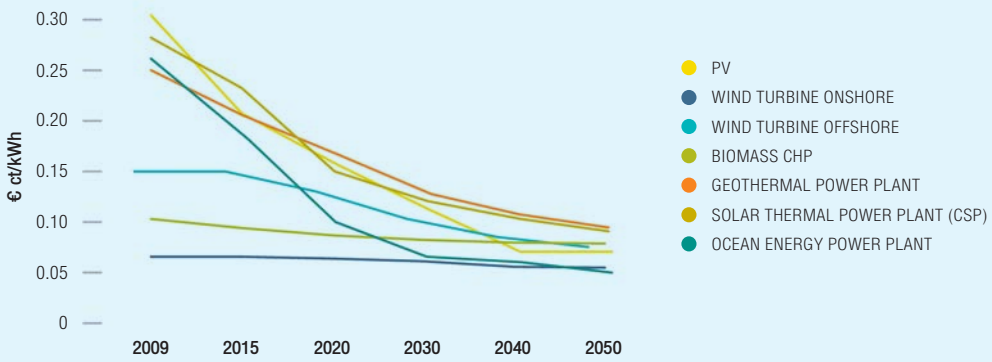
Future development of investment costs for renewable energy technologies

(NORMALISED TO 2010 COST LEVELS)



Expected development of electricity generation costs from fossil fuel and renewable options

(EXAMPLE FOR OECD EUROPE)



Greenpeace Recommendations

15

- EGAT and the Thai government should immediately stop pursuing the ill-advised and destructive coal power project at Krabi, to preserve Thailand's fragile wetlands and the rich marine environment on which millions of Thais depend. A dirty coal plant has no place in Krabi.
- The government should fully implement its energy efficiency development plan (2011-2030) and alternative energy development plan (2012-2021). These in turn should be supported by well-designed mechanisms like the renewable energy law.
- The Thai government should focus its efforts on developing clean and safe renewable energy in Krabi province. In Krabi, the local government and EGAT can follow 5 practical steps right now to bring renewable energy to all:

Assess renewable resources: Assess the potential for biomass, mini and micro hydro, wind, and solar power. Krabi's local authorities can already refer to existing assessments, which lowers costs. Academics, companies, and NGOs have already done multiple such studies, and the Ministry of Energy Department of Alternative Energy Development and Efficiency (DEDE) has developed a solar map of Thai potential already, using satellite images and ground station measurement in 38 stations.[50]

Calculate demand projections: Assess the level of electrical demand that will need to be serviced, especially peak demand and daily load profiles. As the proposed bottom-up electrification approach starts on a per village basis, a set of village demand profiles is generated based on hypothetical household demand profiles. The village demand profiles also contain assumptions about non-household loads such as a school, health stations or public lighting.

Define optimal generation mix: Design a system which can serve the demand using the resources available in the most economic manner, with standard components that are modular so that it can be replicated easily for expansion across the entire state. This can be determined using production simulation software such as HOMER42, which calculates the optimal generation capacities based on a number of inputs about the installation and operation costs of different types of generation technologies.

Design the network: Ensure that such a supply system can be distributed through a physical network without breaching safe operating limits, and that the quality of the delivered electricity is adequate for its use. Model the physical system using power system simulation software such as PowerFactory. In this way the behaviour of the electrical system under different operating conditions can be tested, for example in steady-state power flow calculations.

Consider control systems: Develop a suitable strategy for switching between grid-connected and island modes. Depending on the quality of service required by the loads in the microgrid, the regulations stipulated in the grid code for operation practices, and number of grid support features desired, several different designs could be developed. Design simplicity and cost efficiency is key.

50 Kulwaree Buranasajjawaraporn, "Thailand Solar Energy Overview."
Available at http://aretusa.ice.it/SchemaSite/images/UserImageDir/177/EN/Presentations/Thailand%20Solar%20Energy%20Overview%20.pdf

How does the current renewable energy market work in practice?

STEP	WHAT WILL BE DONE?	WHO?	NEEDED INFORMATION/ POLICY AND/OR INVESTMENT FRAMEWORK
Step 1 Site Identification	Identify the best locations for generators (e.g. wind turbines) and pay special attention to technical and commercial data, conservation issues and any concerns that local communities may have	P	Resource analysis to identify possible sites Policy stability in order to make sure that the policy is still in place once Step 10 has been reached. Without a certainty that the renewable electricity produced can be fed entirely into the grid to a reliable tariff, the entire process will not start.
Step 2 Securing land under civil law	Secure suitable locations through purchase and lease agreements with land owners.	P	Transporting planning, efficient authorisation and permitting.
Step 3 Determining site specific potential	Site specific resource analysis (e.g. wind measurement on hub height) from independent experts. This will NOT be done by the project developer as (wind) data from independent experts is a requirement for risk assessments by investors.	P + M	Transporting planning, efficient authorisation and permitting.
Step 4 Technical planning/ micrositing	Specialists develop the optimum configuration or sites for the technology taking a wide range of parameters into consideration in order to achieve the best performance.	P	Transporting planning, efficient authorisation and permitting.
Step 5 Permit process	Organise all necessary surveys, put together the required documentation and follow the whole permit process.	P	Transparent planning, efficient authorisation and permitting.
Step 6 Grid connection planning	Electrical engineers work with grid operators to develop the optimum grid connection concept.	P + U	Priority access to the grid. Certainty that the entire amount of electricity produced can be feed into the grid.
Step 7 Financing	Once the entire project design is ready and the estimated annual output (In kWh/a) has been calculated, all permits are processed and the total finance concept (Incl. total investment and profit estimation) has been developed, the project developer will contact financial institution to either apply for a loan and/or sell the entire project.	P + I	Long term power purchase contract. Prior and mandatory access to the grid. Site specific analysis (possible annual output).
Step 8 Construction	Civil engineers organise the entire construction phase. This can be done by the project developer or another. EPC (Engineering, procurement & construction) company – with the financial support from the investor.	P + I	Signed contracts with grid operator. Sign contract with investors.
Step 9 Start of operation	Electrical engineers make sure that the power plant will be connected to the power grid.	P + U	Prior access to the grid (to avoid curtailment).
Step 10 Business and operations management	Optimum technical and commercial operation of power plants/farms throughout their entire operating life – for the owner (e.g. a bank)	P + U + I	Good technology & knowledge (A cost-saving approach and "copy + paste engineering" will be more expensive in the long-term).

P = Project developer, M = Meteorological Experts, I = Investor, U = Utility

ANNEX 1

16

April 2014

Open Letter to the ASEAN Intergovernmental Commission on Human Rights (AICHR)

(Re: Human rights violations in the course of environmental and health impact assessment process of the 870 mw coal-fired power plant and coal seaport project in Krabi Province, Thailand)

The undersigned humbly submits this letter to Chairman H.E. U Kyaw Tint Swe and the AICHR as the Commission gathers inputs from stakeholders in drafting its contributions to the ASEAN economic integration and in reviewing its terms of reference for consideration of ASEAN Foreign Ministers. With the subject Krabi project as a case in point, we would like to bring to the attention of the AICHR cases of environmental rights violation which are likely to become rampant in many parts of the region as coal continues to dominate the energy mix of the region and fuel the economic integration. We ask the AICHR to a) initiate a consultation and subsequently issue an opinion on the environmental rights of ASEAN peoples; and b) set the standards of the exercise of environmental rights in accord to the 'Access to Remedy' principles of the United Nations framework on business and human rights so that where people are harmed by business activities, there should be both adequate accountability and effective redress, judicial and non-judicial, in ASEAN countries.

On behalf of the local communities in Krabi province, we in the civil society working on social issues and for environmental justice in Thailand, express our deep concern on the adverse and irreversible impacts of the 870 MW Coal-Fired Power Plant and Coal Seaport Project to be constructed in 2015 at Tambol Pakasai, Nhua Khlong district. This project will be built inside Thailand's second largest seagrass ecosystem, part of the Krabi Estuary categorised as Wetlands of International Importance under the Ramsar Convention.

Per initial assessment, at least 2.3 million tonnes of coal would be imported from Indonesia, Australia and/or South Africa every year. Shipment of imported coal to the planned Krabi coal plant would require trans-shipment at sea. A 50,000-100,000 DWT Coal Carrier would have to anchor at sea 66 kilometer far from the location of proposed coal plant, and then unload coal into a smaller coal barge. It would need a huge inland wharf to accommodate two coal barges to unload coal to the coal yard. This coal trans-shipment would add to current dredging, dumping and shipping that will turn our fishing grounds, sea grass beds and mangroves into a coal superhighway.

We are also deeply concerned about how the government's Environmental and Health Impact Assessment (EHIA) process for the Krabi project is being conducted. We have documented cases of bullying, intimidation, threats and harassment utilized by private consulting firms and state authorities during the public scoping for the project. The project site is guarded by 50 armed security officers. Some of them caused harm to community members who raised concerns in the scoping. In the subsequent public scoping report, a number of listed participants are not from the affected communities or cannot be considered stakeholders.

Information relevant to the project is also inaccessible.

The Constitution of the Kingdom of Thailand 2007, Section 67, paragraph 2 issues that "Any project or activity which may seriously affect the community with respect to the quality of the environment, natural resources and health shall not be permitted, unless, prior to the operation thereof, its impacts on the quality of the environment and on public health have been studied and assessed and a public hearing process has been conducted for consulting the public as well as interested persons and there have been obtained opinion of an independent organization, consisting of representatives from private organizations in the field of the environment and health and from higher education institutions providing studies in the field of the environment, natural resources or health".

Moreover, public participation and access to adequate information are at the core of the guidelines for the EHIA process issued by the Office of Natural Resources and Environmental Policy and Planning (ONEP). However, the consulting firms merely held the scoping as a technical compliance and disregarded the substantive requirements to ensure that the free, prior and informed consent of the affected communities for the project is solicited. Likewise excluded in the scoping are health impacts assessment; and evaluation of the economic value of Krabi River Estuary and marine biodiversity in the region as well as of the effects of the project on people's livelihood and local tourism.

In sum, the output of the public scoping does not reflect the real situation and does not address the environmental, health and livelihood concerns of the communities.

We understand that the Krabi situation is common in many parts of the ASEAN region where coal power plants are being put up, expanded or operated. The situation is expected to worsen as coal continues to dominate the energy mix of the region and fuel the economic integration.

With the Krabi project as a case in point, we ask the AICHR to a) initiate a consultation and subsequently issue an opinion on the environmental rights of ASEAN peoples; and b) set the standards of the exercise of environmental rights in accord to the 'Access to Remedy' principles of the United Nations framework on business and human rights so that where people are harmed by business activities, there should be both adequate accountability and effective redress, judicial and non-judicial, in ASEAN countries.

We also invite fellow ASEAN citizens, communities and groups to bring similar cases and reports to the AICHR to amplify the case and demand for the protection of the environmental rights of the people in light of ASEAN economic integration.

Sincerely,

- We Love Lanta Group
- Save Prakasai Group
- Lanta Island Tourism Association
- Hotel Association of Koh Lanta
- Andaman Foundation
- Center of Ecological Building Awareness
- Greenpeace Southeast Asia
- Association of Thailand's Small-Scale Fisherfolks Federation
- NGO-Coordination Southern Region
- Food Security Network-Southern Region
- Protect Trang Group
- Save Andaman Network
- Prakasai Environmental Conservation Network
- Public Health Volunteer of Krabi
- Krabi Fisherfolks Network
- Andaman Organization for Participatory Restoration of Nature Resources
- Phang-Nga Fisherfolks of Andaman Network
- Mae-Moh Anti-Coal Movement
- Khao Hin Sorn Anti-Coal Movement
- Healthy Public Policy Foundation
- Thailand Coal Network
- Southeast Asia Coal Network

ANNEX 2

17

Statement of the Parties of Private Sector in Krabi on Energy Solutions toward Krabi Vision 2020 - Krabi Goes Green

Thailand's tourism has long been playing a significant role as income generating sector. Thailand tourism revenue has been the world's top five with 8.31 trillion THB (PATA, 2013). Tourism industry in Thailand has been contributing to stabilize domestic economy as it is labor-intensive service sector accounting for 13% of GDP. Livelihood of at least 1.2 million people are directly depending on tourism industry for example tourism in Phuket is account for 50% of its economy (SCB Research Center). Taking Thailand competitiveness into consideration, there are only key sectors, agriculture and tourism Thailand is able to take advantage in a big way.

Tourism industry is of the most important for Krabi province. It generated 48,270.57 million THB (Ministry of Tourism and Sport, BE 2012) Even though agriculture is the main economy in Krabi, according to the Revenue Department, however the biggest income comes from tourism. Moreover, Koh PiPi and Koh Lanta of Krabi are top two and three beach destinations in Asia in 2012 respectively (Trip Advisor / Travelers' choice 2012 "Beach Destination in Asia). Given the conceptual framework and vision that private sector in Krabi has agreed with local government to determine the development strategy for the province such as "become a high quality world class marine tourism based on the strength of agriculture and community (Strategic Development for Provinces along Andaman Seacost BE 2558-2562)", "A high quality tourism destination internationally, the center of sustainable agriculture, and livable city (Krabi Vision 2020)", and Q-City (Krabi Municipality), under the National Tourism Development Plan BE 2555-2559 it is mentioned that Green Tourism need to be incorporated as Thailand has been the parties of UNFCCC and Kyoto Protocol, and most importantly according to "the Declaration of Sustainable Tourism Development of Krabi" that aims to conserving and recovering natural resource and the environment and implement tourism activities that contributing to strengthening world-class tourism city and all stakeholders should not conduct any activities that cause toxic pollution and natural resource/environmental degradation.

The Parties of Private Sector in Krabi announced that we are supporting the use of raw materials for power generation that cause toxic contamination or lead to the alteration of natural environment for example coal-fired power plant and nuclear power plant. We support the use of clean renewable energy for sustainable economic development of Krabi as the following ;

1. Clean renewable energy should come from the utilization of agricultural materials locally produced such as oil-palm (Note that oil plan plantation in Krabi are mostly belong small-holder) and agriculture by-products biogas from waste water treatment process from palm oil refinery, wood pallet from rubbers and other plants\
2. Clean renewable resources from Solar PV, Wind and tidal wave

We, the parties of Private Sector in Krabi proposed the military goernment to have a mechanism to encourage and promote clean renewable energy as follows ;

- Tax exemption to import machineries for electricity production from wind and solar PV for example
- Incentivise real estate and other business sector to install renewable energy system.
- Use economic measure to motivate people and business to switch to LED lighting.
- At least 1 year Company income Tax exemption for Solar PV and Wind Installtion

Soft loan for business that switching to renewable energy production

- Promote low energy building
- Extend quota limit for feed-in Tariff and improve electrictiy grid system to facilitate electricity production from renewable energy.
- Support research on clean renewable energy development and setting time bound target for its deployment
- Stop power development plan (PDP) that relay on dirty coal and dangerous nuclear.

18 June 1967

Covered in http://www.prachachat.net/news_detail.php?newsid=1404281354
and uploaded on Thailand Coal Network at http://thailandcoalnetwork.org/2014/06/20/