LEDS
GLOBAL PARTNERSHIP

Webinar series: Innovative tools for advancing low emission and climate resilient energy planning in Asia

Session 1: Long-range Energy Alternatives Planning (LEAP) System, Applications in Vietnam and Indonesia
March 29, 2016

Organized by the Asia LEDS Partnership

and LEDS Global Partnership's Energy Working Group

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Agenda

- Welcome and introductory remarks

- Overview of the Asia LEDS Partnership and LEDS GP Energy Working Group
  - **Sandra Khananusit, *Asia LEDS Partnership***
  - **Alexander Ochs, *Energy Working Group***

- Presentations – Panelists:
  - **Charles Heaps, *Stockholm Environment Institute***
  - **Nguyen Minh Bao, *Institute of Energy, Vietnam***
  - **Saifuddin Suaib, *USAID Indonesia Clean Energy Development Program***

- Questions and answers

- Short Survey

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The Asia LEDS Partnership and LEDS GP Energy Working Group

Sandra Khananusit, Asia LEDS Partnership Secretariat

Alexander Ochs, Co-Chair, LED GP Energy Working Group

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LEDS Global Partnership

An international initiative aiming to harness the collective knowledge and resources of governments, donors, international organizations, and practitioners in scaling up and strengthening implementation of climate-resilient low emission development around the world.

Catalyzes action and collaboration across more than 160 countries, plus international donor and technical organizations.

Operates through "regional platforms" (delivery) and "technical working groups" (expertise).

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This webinar series

Innovative tools for advancing low emission and climate resilient energy planning in Asia

- March: SEI's LEAP: Applications in Vietnam and Indonesia
- April: NREL's Geo-spatial Toolkit: Application in Vietnam
- May: IUCN's Gender Equality for Climate Change Opportunities Methodology: Application in Sri Lanka

A collaboration between the Asia LEDS Partnership

and LEDS Energy Working Group

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ALP 2016 priorities

- Support capacity building for low emission energy planning and implementation

- Link the finance and LEDS communities to strengthen know-how of policymakers on investment mobilization

- Facilitate regional learning through peer exchange and new knowledge product development and dissemination

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ALP 2016 activities: Highlights

Webinars and training:

- Innovative tools for advancing low emission and climate resilient energy planning

- Online training program on low emission energy planning and implementation (with planned in-person training at events)

Events:

- Regional workshop on "Mechanisms that catalyze finance for grid-connected clean energy in Asia" (June in Hanoi)

- Asia LEDS Forum 2016 on "Mobilizing finance for implementing INDCs" (June in Hanoi)

Case studies, blogs, articles, and more!

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Energy Working Group (EWG)

The LEDS EWG promotes low emission and climate resilient development in the energy sector through:

- Learning, information exchange, communication of best practices

- Advisory services & technical assistance

- Enhanced opportunities for coordination and collaboration

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EWG 2016 activities: Highlights

Webinars:

- Innovative tools for advancing low emission and climate resilient energy planning
- Low emission climate resilient energy strategies

Energy training:

- Asia LEDS Partnership regional workshop
- Africa LEDS Partnership regional workshop

LEDS sustainable energy & development world atlas

Energy LEDS community of practice

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LEDS Energy Toolkit

- Reference guide for well-established LEDS planning tools & methodologies

- Focus on tools available at low or no cost

- 2015 version: 18 tools

- Will be updated and extended

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Energy Toolkit

*Leading Instruments & Methodologies
for Low-Emissions Development Planning
in the Energy Sector*

Version 1.0, May 2015

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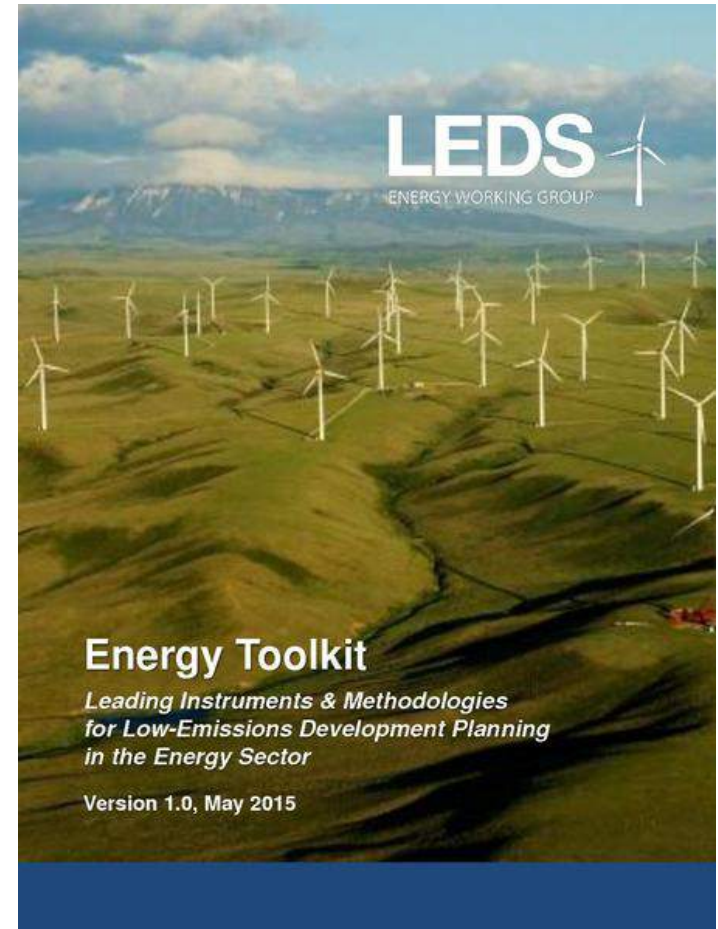
Long-range Energy Alternatives Planning System (LEAP)

Typical Clients
- Energy Ministries
- Environmental Ministries
- Utilities & Planning Agencies
- Universities
- NGOs
- Consulting Companies
- International agencies

Associated Costs
- Free to Governments, NGOs and Academia in Developing Countries.

Contact Information:
Charles Heaps, LEAP Developer (leap@sei-international.org)

Current & Past Users
Thousands of users in over 190 countries including The World Bank, UNDP, UNEP, IEEJ, APERC, Petrobras, Ramboll, GGGI, Bellona Foundation, etc.

More Information
www.energycommunity.org

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SEI

LEAP

Long-range Energy Alternatives Planning System (LEAP)

What is it?

A widely-used software tool for energy policy analysis and climate change mitigation assessment developed at the Stockholm Environment Institute.

Key Goals

LEAP is intended to bring the policy insights of sophisticated scenario-based energy and environmental planning to a much wider audience than the previous generation of energy models by placing powerful data management, sophisticated calculations and flexible and user-friendly reporting tools within a single accessible decision support software tool that is made available for free to target users in developing countries.

SEI

LEAP

Long-range Energy Alternatives Planning System (LEAP)

Data Inputs

A key feature of LEAP is its low initial data requirements. LEAP provides a choice of methods that let's users start out with readily available energy and economic statistics and default IPCC emission factors, and then gradually progress to more sophisticated methods once better data becomes available and more expertise has been gained.

Outcomes

LEAP allows you to create and evaluate long-range scenarios . It is notable for its powerful and flexible reporting and its outputs include :

- Primary and final energy requirements by sector
- GHG emissions and emissions of local air pollutants and short-lived climate pollutants
- Capital costs ,operating costs, fuel costs and externality costs presented in an easy-to interpret summary of the costs and benefits comparison of scenarios/
- Indicators of energy security including import dependence and diversity of supply.

Long-range Energy Alternatives Planning System (LEAP) System

Dr. Charlie Heaps

Stockholm Environment Institute (SEI)

A Tool for Energy Planning and GHG Mitigation Assessment

Charlie Heaps

LEAP Developer

SEI-U.S. Center

LEAP:
www.energycommunity.org

SEI:
www.sei-international.org

SEI: What We Do

- Develop and distribute LEAP

- Training & capacity building:

- Building a web-based community of LEAP users: Now with > 29,000 members in > 190 countries www.energycommunity.org

- Support to LEAP users worldwide.

- Develop our own scenario analyses.

LEAP TRAINING FOR VISAYAS ENERGY PLANNING
FEBRUARY 9-11, 2015 CEBU CITY, PH

SEI STOCKHOLM ENVIRONMENT INSTITUTE

Long-range Energy Alternatives Planning System: 1982-Present

- Easy-to-use, graphical, scenario-based modeling software for energy planning and GHG mitigation assessment.
- Broad scope, low initial data requirements, flexible data structures.
- A decision support tool for creating models of different energy systems.
- Flexibly supports multiple methodologies including econometric, optimization and simulation models, etc.
- Widely-used for energy planning, national communications, low emission development strategies (LEDS), and national action planning on SLCPs.
- Useful at different scales: cities, states, countries, regions, globally.
- Long-range perspective, annual time step with seasonal/time-of-day details.

- Links to SEI's "WEAP" model for energy-water "nexus" studies.
- API allows links to MS-Office and other modeling tools (e.g. for Monte Carlo risk assessments and the new Short-Lived Climate Pollutant Impact Benefit Calculator).
- Free for students worldwide and for NGOs, Governments and Academia in Developing Countries.
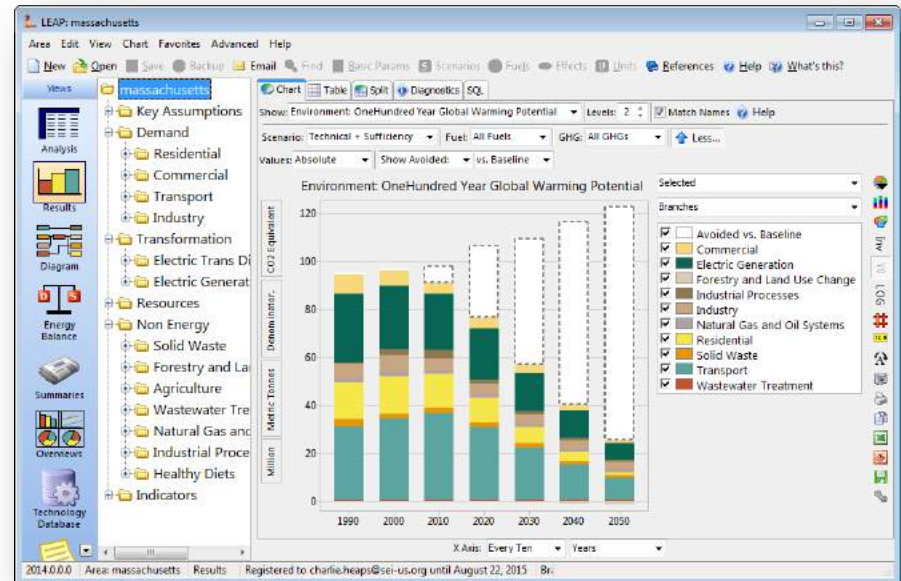
LEAP Structure

Recent LEAP Activities
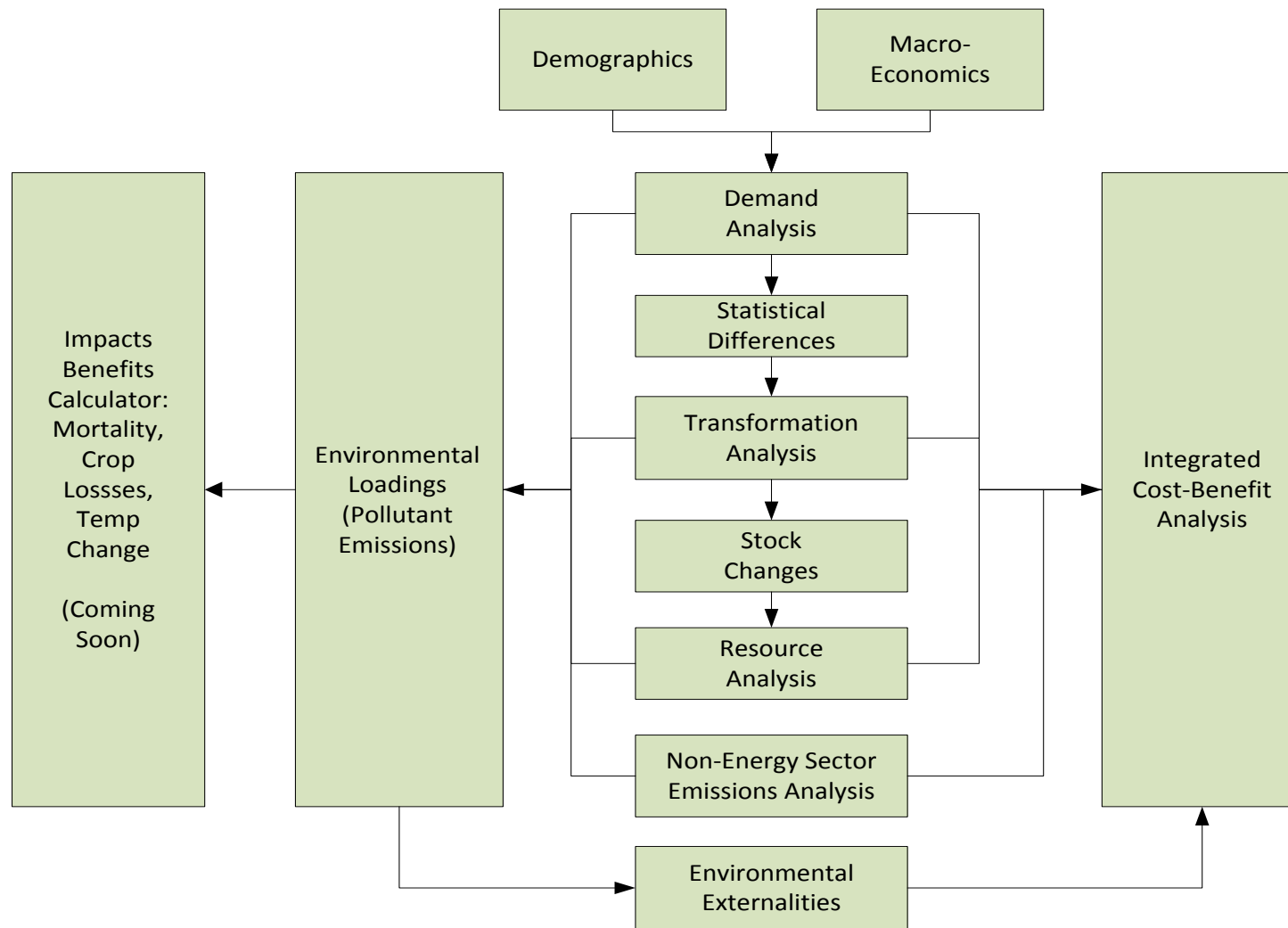
31 countries used LEAP to help formulate their INDCs
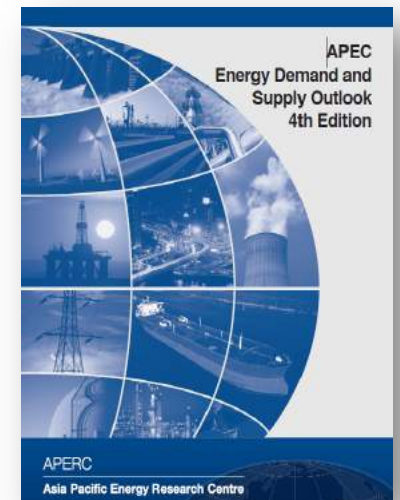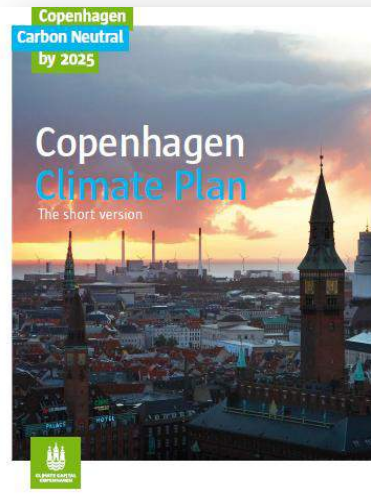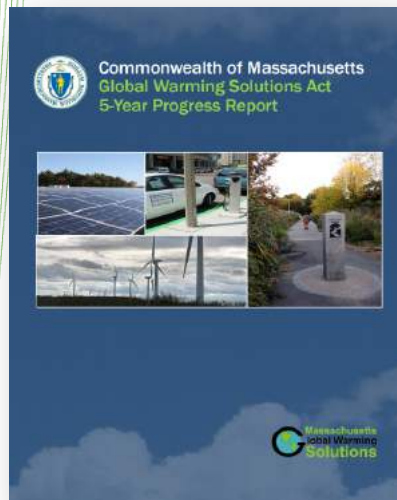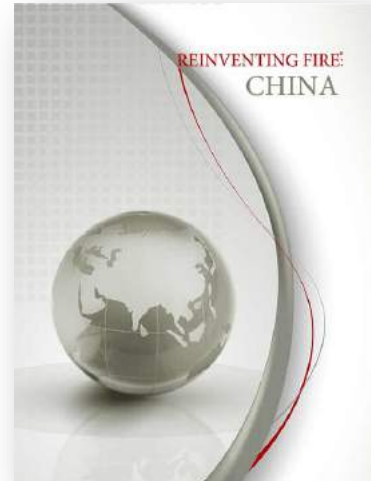
LEAP: What's Coming Soon

- LEAP 2016
- New Capabilities for modeling energy storage: vital for modeling deep integration of variable renewables
- Public Release of the LEAP SLCP Integrated Benefits Calculator
- Improved energy-water "nexus" modeling
- Revamp of LEAP Web Site
- Secure & responsive for any device (phones, tablets, PCs)
- Promoting deeper & richer community interaction
- New data sharing and searching capabilities
- New Cloud-based Technology Database
- Free and open source
- Links to LEAP and other popular models
- Replaces old Technology Database in LEAP (TED)

Open Source, Cloud-based Environmental Technology Database
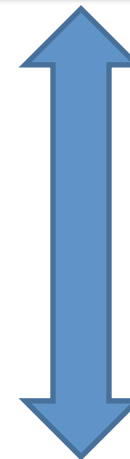## (In early development)
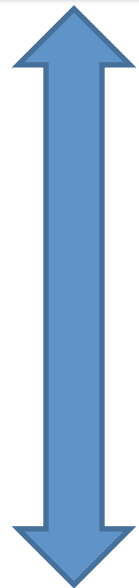
Administrators moderate posted data (minimum requirement is that data are referenced).

Users can search data, submit data (no need to use models), rate data (e.g. star ratings) and review data (like Amazon).

Submit and retrieve energy and emissions data via Internet using standard APIs

Web Interface

| LEAP | MESSAGE | MARKAL |
| RETScreen | WASP | EFFECT |

etc

www.energycommunity.org

25-36 months ago:	3818

Germany 537
Portugal 528
South Africa 489
Italy 441
Malaysia 421
Ireland 407
Canada 404
Argentina 398
Vietnam 388
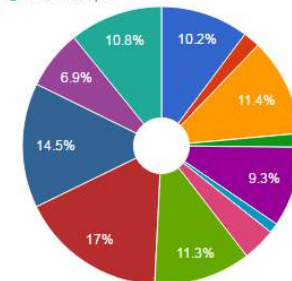Philippines 382

Members by Country

LEAP Downloads

In last day	12
In last week	54
In last month	347
In last 12 month:	4457
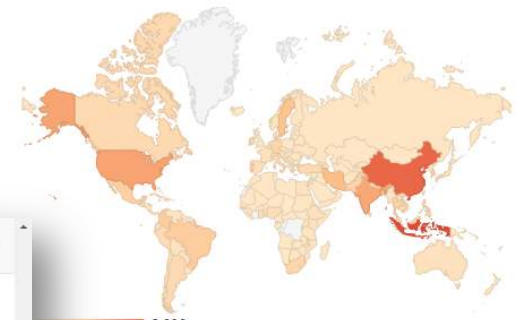
2,636

Membership by Region

● Africa ● Cent. America & Carib... ● Eastern Asia
● Eastern Europe ● North America ● Oceania
● Other Asia ● South America ● South-Eastern...
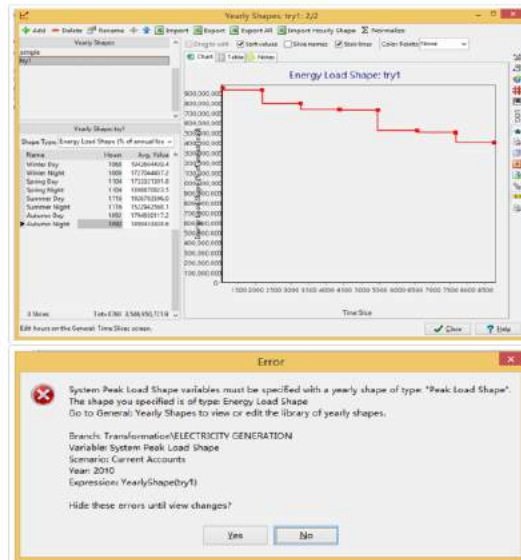● Southern Asia ● Southern Europe
● Western Europe

10.8% 10.2%
6.9% 11.4%
14.5% 9.3%
17% 11.3%

waiting for your kind answer.

Energy Load Shape: try1

Error

System Peak Load Shape variables must be specified with a yearly shape of type: "Peak Load Shape".
The shape you specified is of type: Energy Load Shape
Go to General: Yearly Shapes to view or edit the library of yearly shapes.

Branch: Transformation\ELECTRICITY GENERATION
Variable: System Peak Load Shape
Scenario: Current Accounts
Year: 2010
Expression: YearlyShape(try1)

Hide these errors until view changes?

Yes   No

Taylor Binnington 3/25/2016

⟋ Send Again   ✎ Edit   🗑 Delete   Reply   ⬆ Promote   👍 Like   15 Views   1 Like

Hi Jin,

Both the Energy Load Shape and the Peak Load Shape options for inputting load curve data require that you enter values which are "percentages" of annual energy or peak load, respectively. Each of the numbers you have entered is clearly larger than 100%, which is causing an error to appear.

Please review these two help files:

http://www.energycommunity.org/WebHelpPro/Transformation/System_Peak_Load_Shape.htm

Membership by Type

016, Language: English, Citing LEAP

For more information:

 Download from the LEAP web site:
www.energycommunity.org

 Join us on Facebook:
facebook.com/groups/LEAPSoftware

Application of LEAP to support development of Viet Nam's INDC

Mr. Nguyen Minh Bao

Institute of Energy, Ministry of Industry and Trade, Vietnam

Introduction

- In order to prepare GHG reduction commitments for the 21st United Nations Framework Convention on Climate Change Conference in Paris in 2015, all Parties are required to devise their Intended Nationally Determined Contributions (INDCs).

- Viet Nam has prepared the INDC to determine possible mitigation targets as well as contributions to global efforts. Viet Nam's INDC was implemented at the national level in relevant sectors, including the energy sector, agriculture, LULUCF and waste.

- LEAP was selected to determine the possible GHG emission reduction potential in energy sector and it's contribution for INDC of Viet Nam.

Why LEAP was selected?

Currently, there are many types of models such as optimization models (e.g. MARKAL), simulation models (e.g. ENPEP) and accounting frameworks (e.g. LEAP). These models were accepted for Mitigation Analysis in the UNFCCC context.

We selected LEAP for INDC preparation in Viet Nam, because:

- LEAP was primarily designed for integrated energy and GHG mitigation analysis

- LEAP was thoroughly tested and generally found to be credible

- LEAP has been widely applied in more than 190 countries worldwide and many countries have also chosen to use LEAP as part of their commitment to report to the UNFCCC

- Unlike ENPEP and MARKAL, LEAP does not require a great number of data and can be used with low initial data requirements

Why LEAP was selected? (cont.)

- LEAP is accounting framework based on relatively simple physical energy and environmental accounting principles that can be easily verified, making the system highly transparent

- Unlike a complex tool such as ENPEP or MARKAL, LEAP is a simple tool that makes easy for users to develop different policy scenarios and select the best solutions based on cost-benefits analysis

- LEAP is flexible and can be used to create models of different energy systems based on data available, ranging from bottom-up, end-use techniques to top-down approaches

- LEAP can be used with low level of data requirement

- LEAP is free of charge for developing countries

- We have considerable experience on using LEAP

How LEAP was used for INDC in Viet Nam?

Objective: to determine the possible GHG reduction potential based on cost-benefit calculation and selection of prioritized mitigation technologies for energy sector in the period of 2020-2030.

Approaches:

- Identify existing policies, national priorities and possible GHG mitigation technologies

- Selection of methodology

- Develop Baseline Scenario

- Develop GHG Mitigation Scenarios

- Select prioritized mitigation technologies based on economic benefits and GHG reduction costs.

- Propose the possible mitigation contribution of energy sector for the period 2020-2030.

How LEAP was used for INDC in Viet Nam?

Methodology: The bottom-up method is used for this study.

- Advantages:
    - Use detailed data on fuels, technologies and policies
    - Assess costs/benefits of individual technologies and policies
    - Easily verified and highly transparent
- Constraints: Data limitation
- Solutions:
    - Propose the list of possible mitigation technologies
    - Select the technologies with available input-data based on the previous studies

How LEAP was used for INDC in Viet Nam?

Develop Baseline/BAU Scenario: The BAU scenario was developed based on assumptions, including:

- Changes in overall economic output – GDP growth

- Changes in population

- Changes in technologies

- Lack of additional policies in response to climate change

Develop GHG Mitigation Scenarios: Mitigation scenarios were designed based on the potentials of RE sources and EE technologies under the assumption that additional action plans or policies are developed. Steps to develop GHG mitigation scenarios:

- Set up the options/list of mitigation technologies (EE, RE, fuel substitutions)

- Create the framework of energy system

- Calculate costs, benefits and GHG mitigation potential

Contribution of Energy Sector to INDC

What are possible GHG mitigation technologies?

The prioritized mitigation technologies were categorized as voluntary/ unconditional and conditional contributions:

- Unconditional contributions: implemented in Viet Nam using domestic resources

- Conditional contributions: implemented with additional international funding, technology transfer and capacity building

	Criteria
Unconditional	- Low abatement costs - Already implemented in Viet Nam - Aligned with sectoral plans for the 2020-2030 period
Conditional	- Higher abatement costs - New technologies - Currently implemented in developed countries

Contribution of Energy Sector to INDC

How were LEAP results adopted and applied for INDC?

- Contribution of policy makers and managers, representative from Ministries and branches and other related agencies was set up from the beginning of study project

- A series of meetings was organized with the participation of technical experts, policy makers and managers to check and fully evaluate on the aspects of data-input, assumptions and output-results

- Draft report was sent to energy experts both international and national levels to get comments

- Final draft report was submitted to the Ministries and branches to get comments

- Final report was submitted to Prime Minister to get approval.

Challenges and Solutions

Input-data: There still is inconsistency on data and information from the different sources.

✓ *Solution:* Analysis and selection of suitable data based on other sources with the following priority ranking:

- Published data from National Statistic Yearbooks
- Officially published documents from ministries
- Published research results from institutes
- Organized group meetings to analyse and select suitable data

Inconsistency on data in base year through end-uses approach: There is inconsistency between energy consumption by end-uses that was broken down for end-uses approach and original base year data on energy consumption by fuels.

✓ *Solution:* Create more the other-uses to put the remains of energy consumption for each sector in base year.

Conclusions and Recommendations

Conclusions:

- LEAP is very flexible model regarding data requirement
- LEAP is a suitable model for GHG mitigation analysis in developing countries due to data limitation
- LEAP is a good choice for assessment and selection of GHG mitigation technologies in energy sector because of their simple verification and high transparency
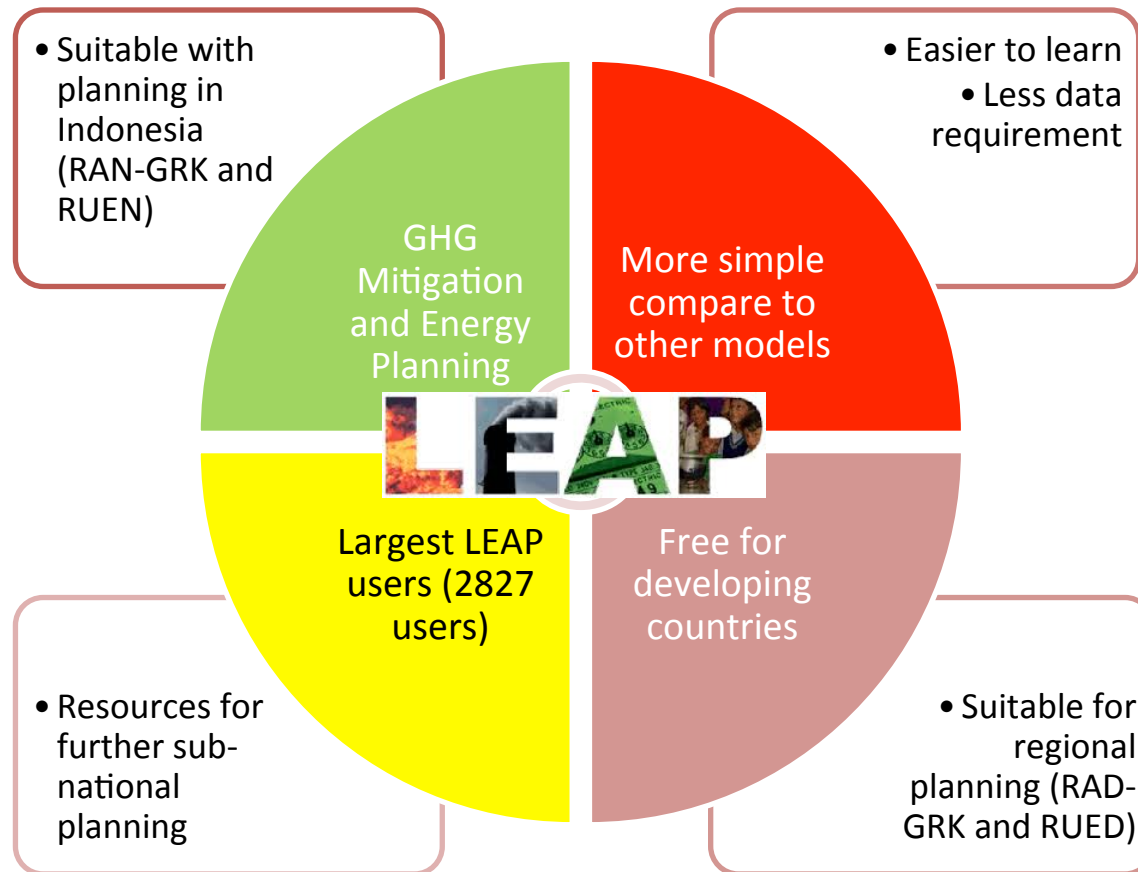
Recommendations:

- LEAP is just a tool, the users should have background and good knowledge on the related works that require LEAP to support
- The beginners at LEAP model should be practiced with simple calculations
- Learning by practice is the best way to get experience on using LEAP.

Why LEAP?

- Suitable with planning in Indonesia (RAN-GRK and RUEN)

GHG Mitigation and Energy Planning

- Easier to learn
- Less data requirement

More simple compare to other models

- Resources for further sub-national planning

Largest LEAP users (2827 users)

Free for developing countries

- Suitable for regional planning (RAD-GRK and RUED)

Activity 1: Developing GHG Emission Baseline for 34 Provinces in Indonesia

- PresReg 61/2011 mandate → review the existing sub-national GHG mitigation planning → review the baseline

- Coordinated by RAN GRK Secretariat (National Planning Agency) – USAID ICED developed starter kit (database and LEAP structure) for the energy sector calculation

- LEAP training was conducted in three regions: West (Sumatera and Java), Central (Kalimantan, Sulawesi and Bali), East (Nusa Tenggara, Maluku and Papua)

- Trainers were mainly MEMR and USAID ICED.

Activity 1: Developing GHG Emission Baseline for 34 Provinces in Indonesia

West Region (Belitung)

Central Region (Solo)

East Region (Makassar)

How does the activity inform policy?

- The BAU emission resulted from this training, will be the basis for updating each province's GHG mitigation plan (RAD-GRK)

- At the national level, the multi-region LEAP allows the national stakeholders to monitor the level of projected emissions in each province

- The sub-national LEAP model could be the province's starter kit to further develop their sub-national energy planning.

Activity 2: LEAP for National Energy Planning

- Derivative of the National Energy Policy

- LEAP is selected as the tool to model the National Energy Policy targets

- Participatory process adoption during the process

- Planning Bureau and the National Energy Council lead the modeling and drafting process

	2025	2050
NRE Mix	23%	31%
Energy Supply	> 400 MTOE	> 1.000 MTOE
Electricity	> 115 GW	> 430 GW
Energy Elasticity	< 1	< 1
Electricity/capita	2.500 kWh	7.000 kWh

How does the activity inform the policy

- LEAP result is the basis to draft the narrative of Indonesia's Energy Planning.

- It is also used as the tool to present the National Energy Planning to various energy stakeholders

Challenges

Activity 1: Sub-national GHG Mitigation Plan

- Provincial data is the main issue, thus the national government developed the starter kit for the local government
- Continuous government staff rotation
- Very short time-frame

Activity 2: National Energy Planning

- Some activity data is not available at the national level
- Various stakeholders with (sometimes) conflicting interests
- Political process

Overview of LEAP in Indonesia

- It has been used at national and sub-national level (inputs for national and sub-national policies).

- LEAP application in Indonesia still focuses on supply-demand and emission projection → Optimization feature has not been applied

- Not many attempt to use LEAP-WEAP applications yet.

Recommendation:

- Future LEAP training in Southeast Asia (if any) should cover optimization exercise and LEAP-WEAP applications.

- Possible LEAP combination with other models, for instance: for rural electrification purpose (just idea)

Q & A session

Thank you for participating - please join the LEDS GP!

Further reading, recordings of webinars, etc.:

http://www.asialeds.org/

http://ledsgp.org/working-groups/energy/

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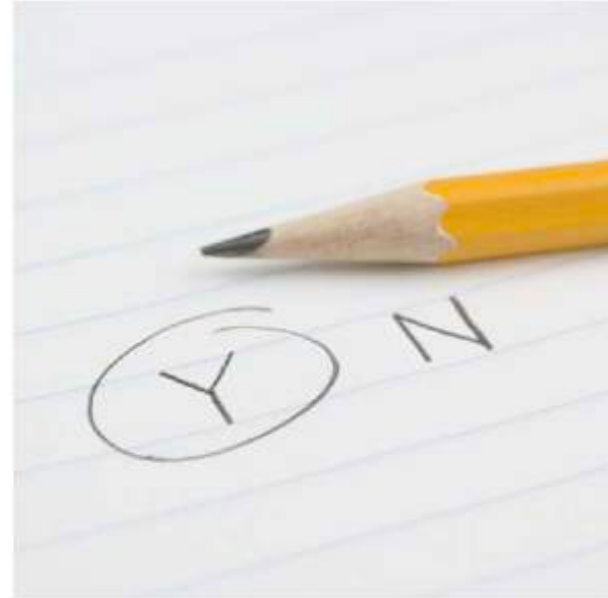
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Survey

- **How did we do?**
- **Your feedback is important!**