ACEF 2021 Side Event Workshop

Integrated resource planning in the Mekong subregion: Innovations in Lao PDR

16 June 2021

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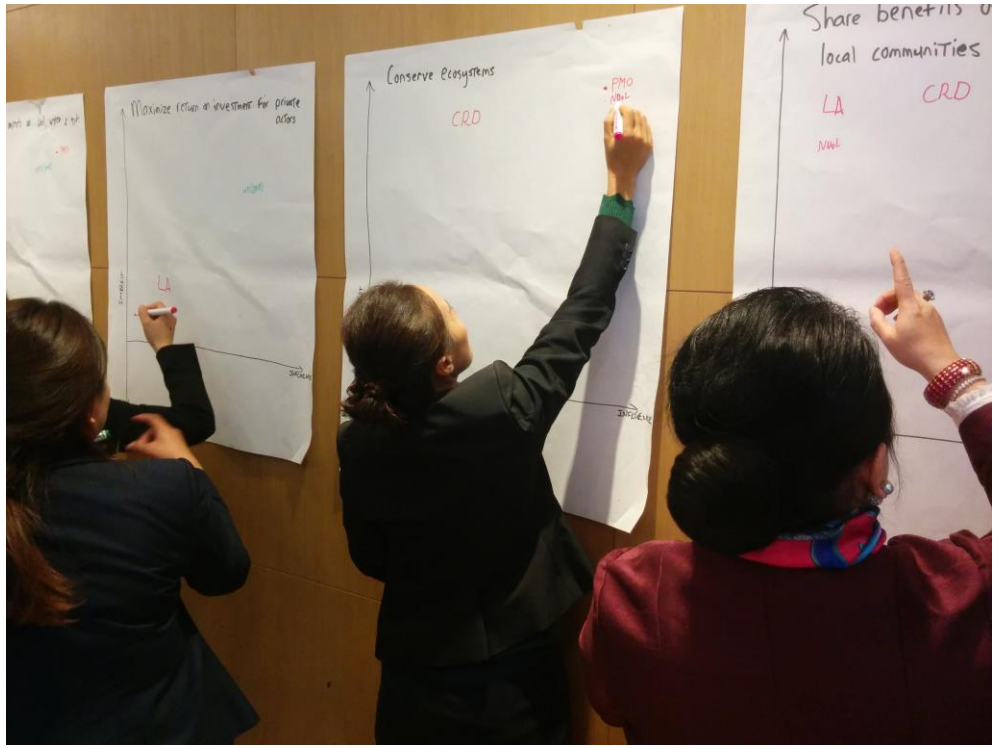
A region in flux

Intersecting challenges for power planning

- Economic growth
- Regional integration
- Technological change
- Decarbonization
- Environmental degradation and protection
- Sustainable development goals

An evolution in planning is needed

- Broader objectives
  - Not just cost: environmental and social goals
  - Economic effects
  - Cumulative impacts
- Additional planning options
  - Variable renewable power
  - Small-scale and distributed generation
  - Storage
  - Energy efficiency/demand-side management
  - Interconnections and trading
- More inclusive stakeholder participation

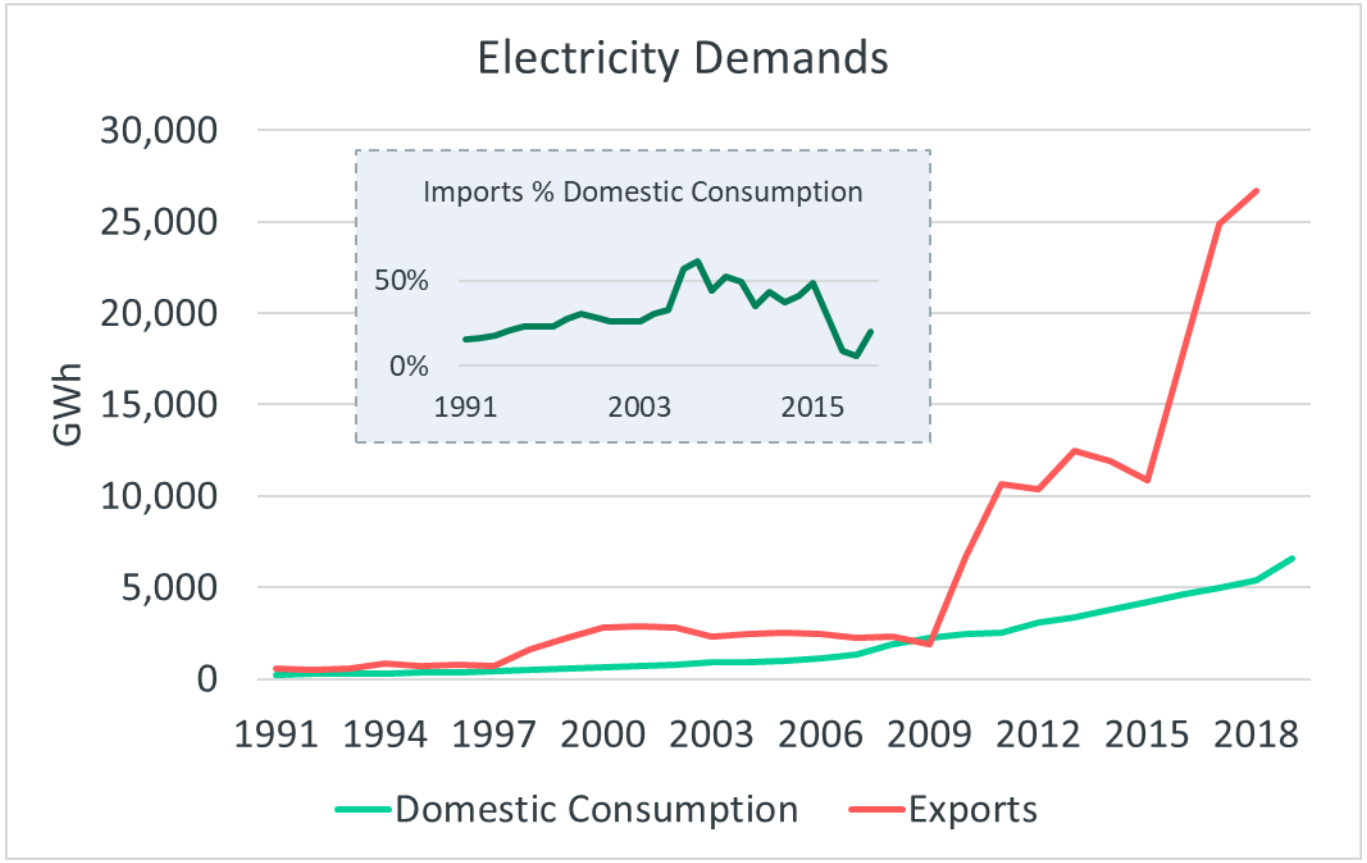


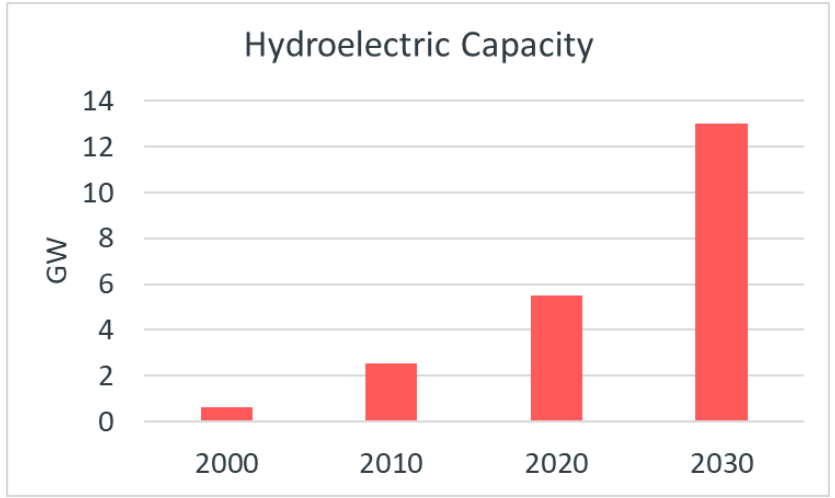
(ADB, 2020)

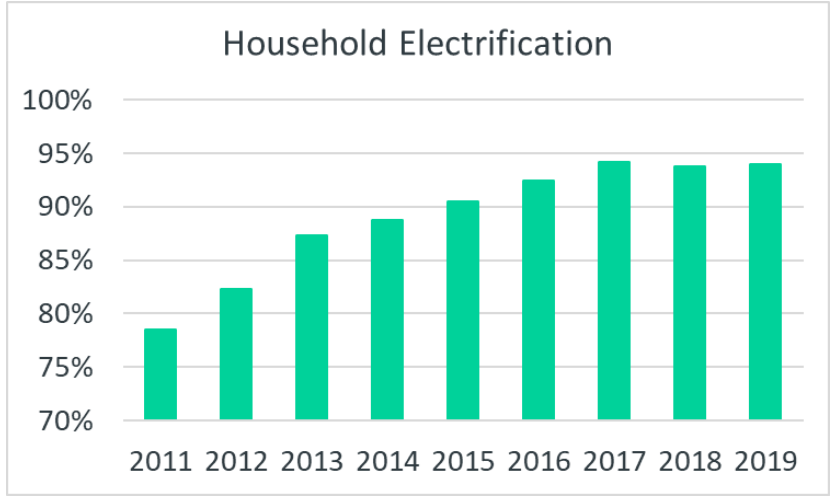
Uneven progress across the region

Integrated resource and resilience planning in Lao PDR

National context



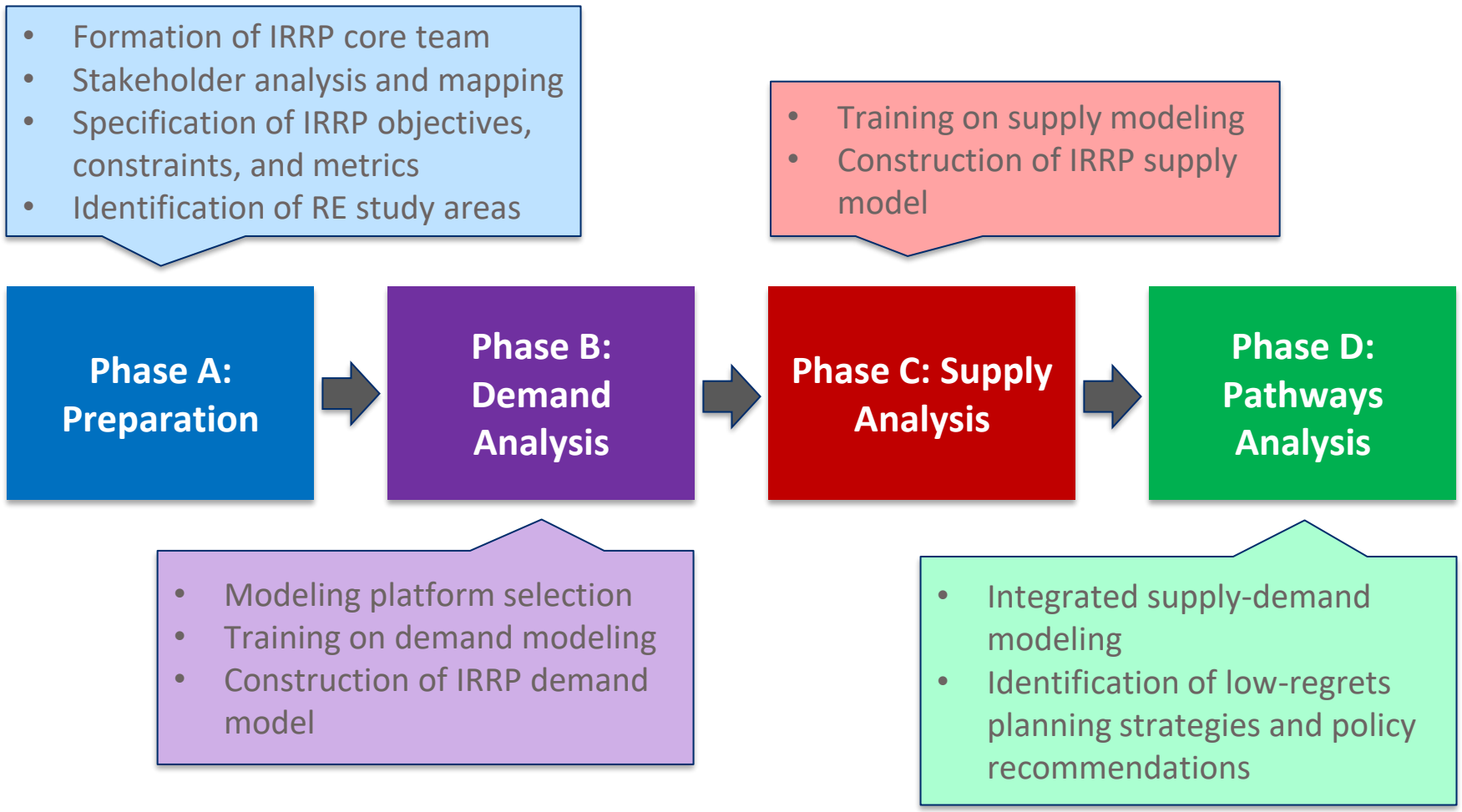




IRRP concept

- Wide range of objectives for power planning
  - Air quality
  - Climate change mitigation
  - Electricity affordability
  - Energy independence
  - Energy security
  - Export revenues
  - Protection of aquatic ecosystems
  - Reduced relocation of citizens
  - System reliability
- Systematic exploration of future uncertainties
- Long-term focus: to 2055
- Focused development of renewables: renewable energy zones
- Integration of national and export PDPs
- Capacity-building program

Approach


• Formation of IRRP core team
• Stakeholder analysis and mapping
• Specification of IRRP objectives, constraints, and metrics
• Identification of RE study areas
• Training on supply modeling
• Construction of IRRP supply model
Phase A: Preparation
Phase B: Demand Analysis
Phase C: Supply Analysis
Phase D: Pathways Analysis
• Modeling platform selection
• Training on demand modeling
• Construction of IRRP demand model
• Integrated supply-demand modeling
• Identification of low-regrets planning strategies and policy recommendations

Modeling platform

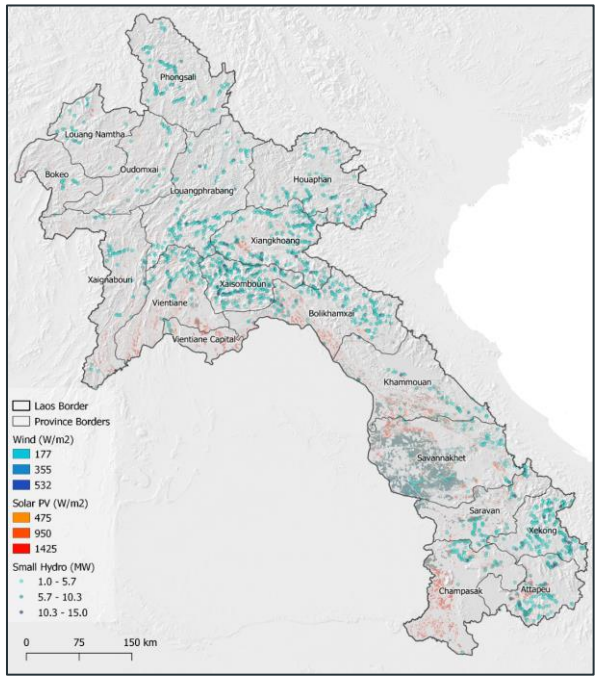
LEAP and NEMO: a toolkit for integrated energy system modeling

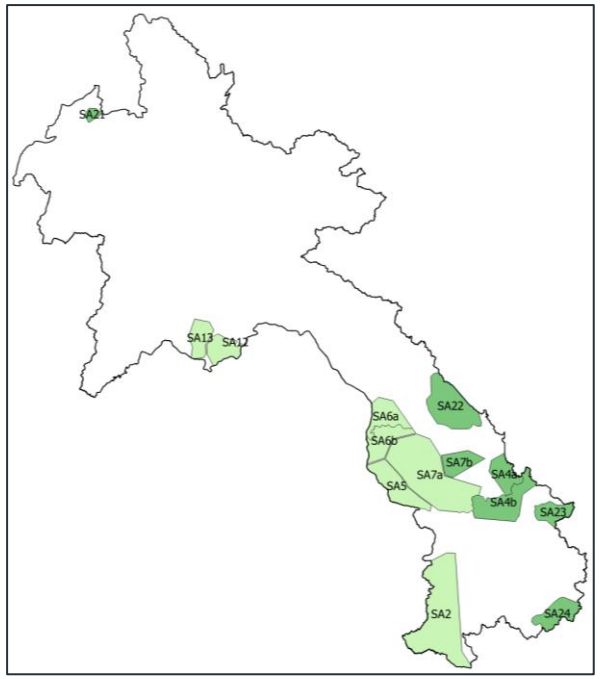
- LEAP
  - Graphical user interface
  - Model construction and inputs database
  - Demand modelling
  - Results visualization
  - Model documentation
- NEMO
  - Mixed-integer optimization modelling of capacity expansion, dispatch, and power flow
  - Generation, storage, transmission, and demand-side measures
  - High performance, open source

Find more information and download at: https://leap.sei.org/

Renewable energy zones

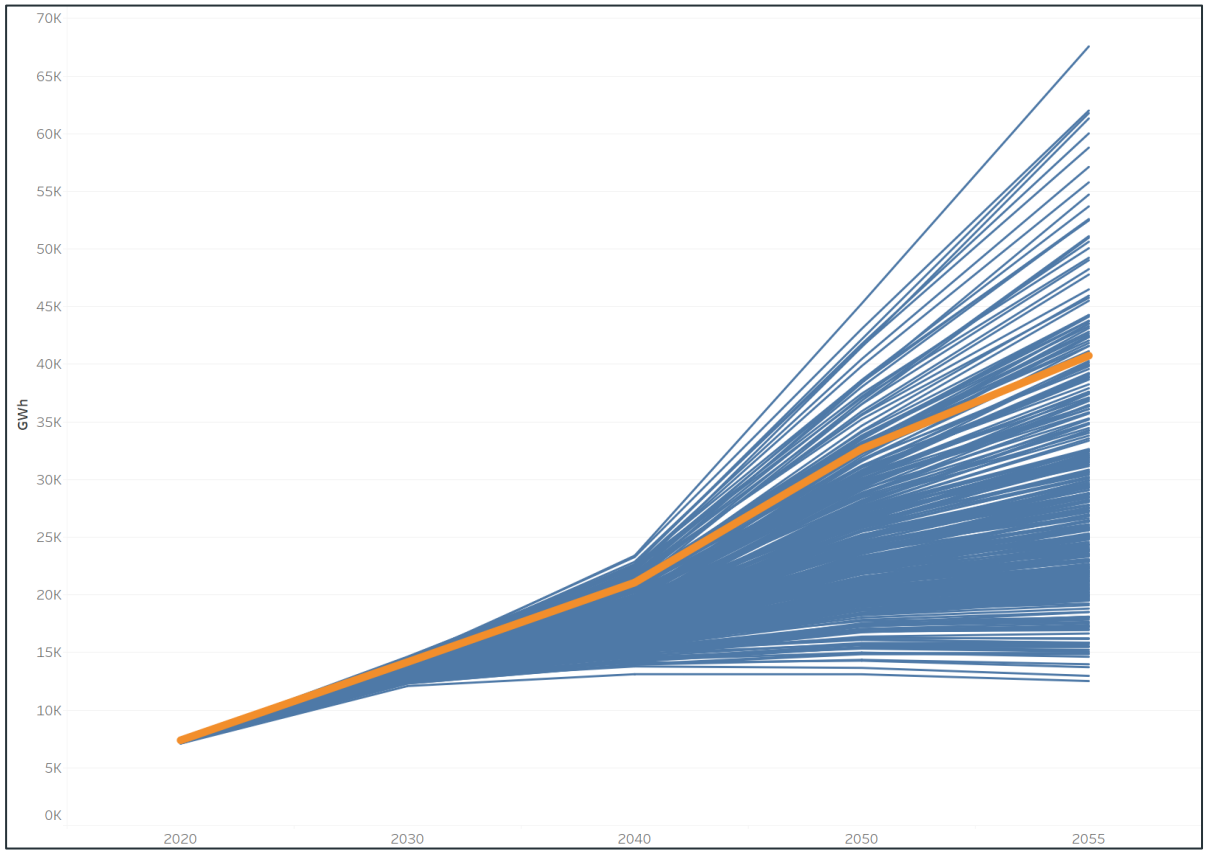
- GIS analysis to identify most promising areas for RE development
  - Resource quality
  - Proximity to population, roads, protected areas, unexploded ordnance
  - Land cover and use
  - Topography
  - Costs
- Assessment of developer interest
- Highest-priority areas included as supply options in modeling





Identifying low-regrets strategies

- Large scenario ensemble analysis: hundreds of futures simulated
- Interactive exploration of results and assessment of trade-offs
- Identification of robust planning decisions



IRRP outputs

- Location-specific targets for deploying generation, storage, and efficiency
- Recommendations for REZ development
- Key climate change resilience actions
- Priorities for monitoring and adapting plan