Emerging Trends in GMS Power Sector Development:
- Private sector engagement
- Integration of Renewable Energy

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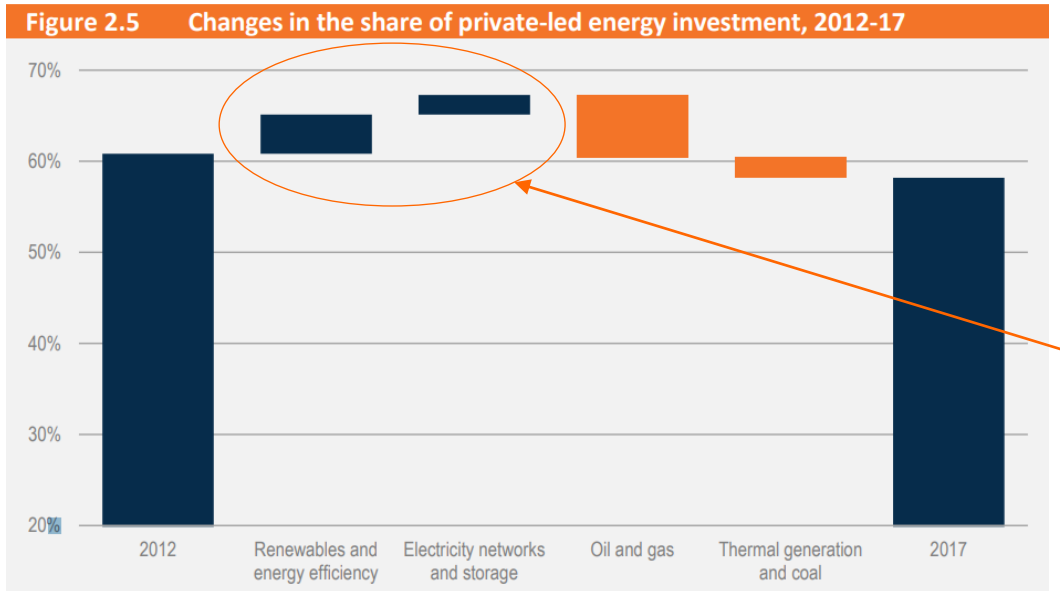
Emerging trends in GMS power sector development

Overview of key trends

- Increasing role/share/participation of private investors in power sector development
  - Key statistics
  - Trends in South-East Asia and the GMS
  - Factors influencing successful private sector participation
- Private sector participation in the power sector – regional and international experience
  - IPPs
  - Corporatisation of transmission and distribution
  - Other areas of private sector activity
- Increasing renewable energy (RE) penetration in the GMS – technical, commercial and regulatory issues
  - Planning for intermittency – national and interconnected systems
  - Electricity trading arrangements
- Regulation and planning for increased RE and interconnector trading
  - Including regulations themselves and organisation of regional regulatory bodies

Trends in global private sector energy investments

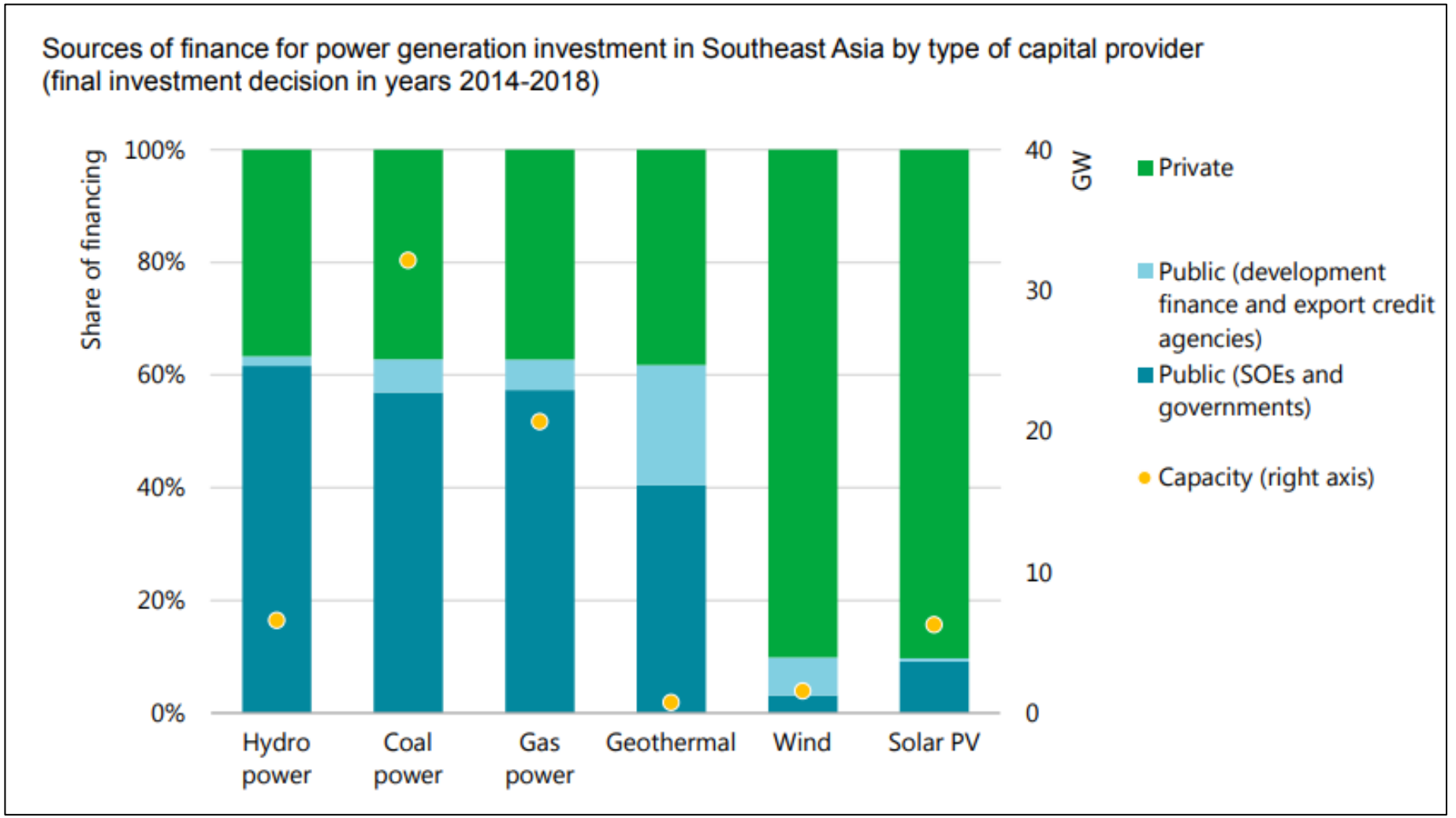
- "Nearly three-quarters of the USD 1.8 trillion of global energy investment is driven either by direct investing by state-owned enterprises or private-led investments **incentivised by policies**."
- "Governments are also increasingly shaping private investment decisions through **policies, regulations and standards**, particularly in capital intensive sectors, such as renewables and energy efficiency."
- "The share of private-led energy investment has declined in the past five years. **There is a rising share of investment in renewables, where private entities own nearly three-quarters of investments, energy efficiency, which is dominated by private spending, and private-led grid spending**. However, the share of energy investment from state-owned enterprises (SOEs) rose by more over the period."



Source: IEA "World Energy Investments 2018"

Note: private sector investments increasing in renewables/energy efficiency and electricity networks/storage

Private sector financing in South-East Asia by technology type

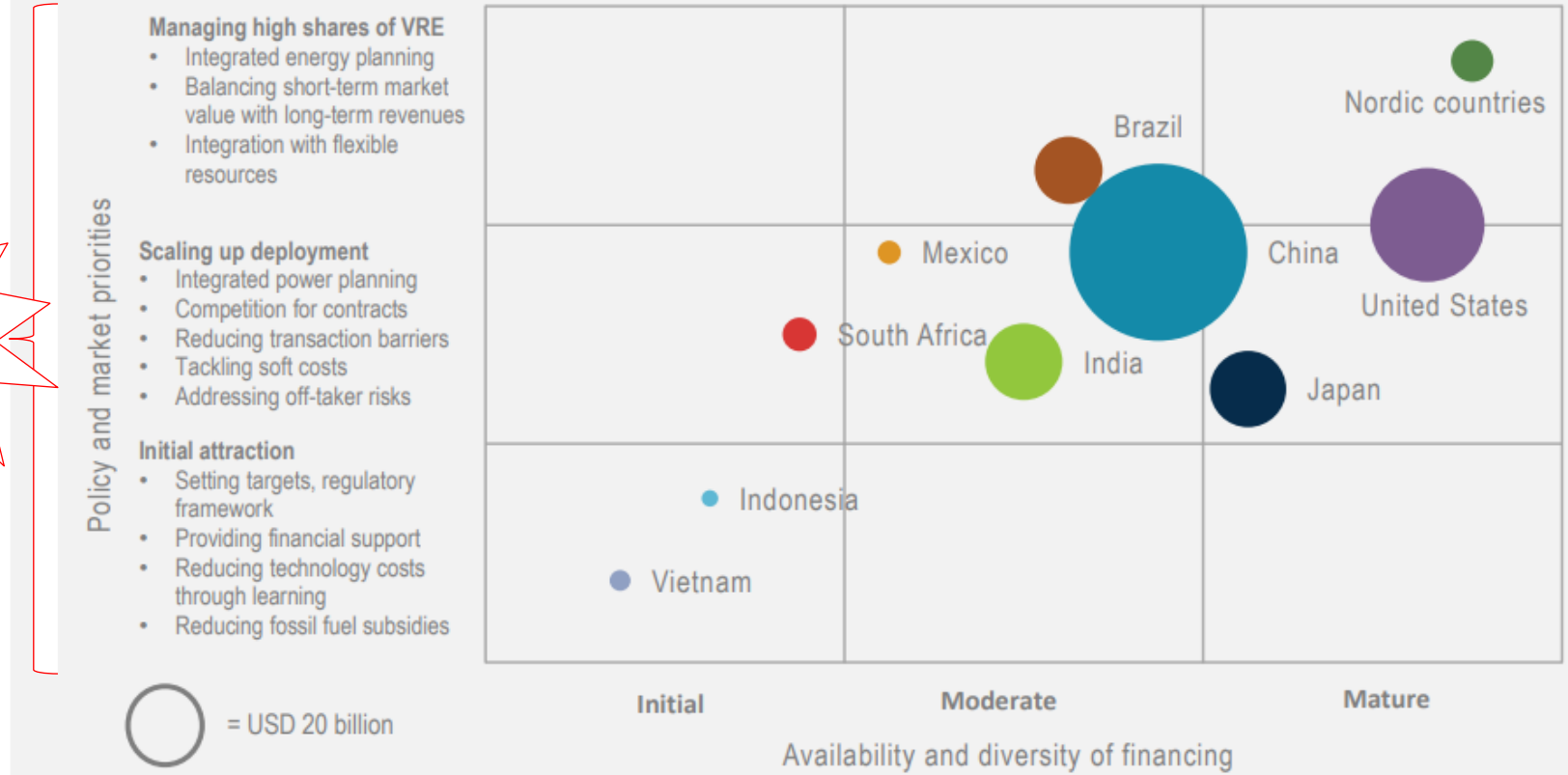


Source: IEA "Southeast Asia Energy Outlook 2019"

Enabling policies for private sector investments

Note priorities!

Figure 2.16 Stages of policy, market & financing for renewable investment, selected countries in 2017



Addressing policy and market priorities, in addition to robust and liquid financing markets, can help improve the bankability of renewable projects and improve the availability and diversity of financing.

Source: IEA "World Energy Investments 2018"

Perceived investment risk profiles

Reducing risks and improving policy and market approaches around four priority areas is critical to meet future power investment needs

Investment: current frameworks, key priorities and risks for power markets in Southeast Asia

Market	Main investment framework	Investment Priorities			
		Financial health of the system	Project bankability	Financing and cost of capital	Integrated approaches
Indonesia	State-owned single buyer with IPPs; utility-owned grid with retail regulation.	🔴	🔴	🟡	🔴
Malaysia	Regulated single buyers with IPPs; utility-owned grid with retail regulation.	🟢	🟡	🟢	🟢
Philippines	Wholesale market with IPPs; partial retail competition and grid unbundling.	🟡	🟡	🟡	🟡
Singapore	Wholesale market with IPPs; retail competition and grid unbundling.	🟢	🟢	🟢	🟢
Thailand	State-owned single buyer with IPPs; utility-owned grid with retail regulation.	🟡	🟡	🟢	🟡
Viet Nam	State-owned single buyer with IPPs; utility-owned grid with retail regulation.	🔴	🔴	🟡	🔴
Other (Cambodia, Lao PDR, Myanmar)	State-owned single buyer with IPPs; utility-owned grid with retail regulation.	🟡	🔴	🔴	🔴

🟢 Low risk/supportive factor for investment 🟡 Potential risk factor/barrier for investment 🔴 High potential risk factor/barrier for investment

Challenges to note…

Source: IEA "Southeast Asia Energy Outlook 2019"

Key points to note…

- Different risk profiles across SE Asian countries, including the GMS
- Main requirements for creating a positive investor climate:
  - Increased financial sustainability of the power utilities as creditworthy purchaser of power
  - Improved bankability of power projects, including well-designed contracts and adequate tariffs
  - Improved availability of financing from diverse sources and reduced costs of capital
  - Integrated approaches for enabling investment:
    - Establish the planning process
    - Policies to support private investment in renewables, transmission and demand side activities (e.g. energy efficiency)
    - Business models that are attractive to investors
    - Regulatory regimes that are stable and transparent

Status of private sector participation in the GMS electricity sector – to be discussed…

Table 10: Summary of the Status of Power System Planning

	Status and Process	Cross-Border Interconnections	Private Participation
Cambodia	Previous Power Development Master Plan established in 2006. A systematic approach for demand forecasting and energy system analysis is being applied to update the master plan.	Cambodia imports power from Viet Nam and Thailand.	This is significant both for large-scale and small-scale generation.
Lao PDR	A list of projects in construction and at various stages of planning is available, but there is no indication of systematic planning underlying the selection of projects.	Many cross-border connections are planned mainly for the export of power to Thailand and Viet Nam.	Very strong in generation and potentially will enter transmission. Mainly investors with an interest in importing power.
Myanmar	National Electricity Master Plan study completed. A schedule of intended projects is available.	Links to the PRC exist. Very large new interconnections were proposed earlier, but those to Thailand seem to be in abeyance and those to the PRC have not progressed.	Many private finance projects were proposed by investors with an interest in importing power; their present status is uncertain. BOTs permitted under new legislation.
PRC (Guangxi and Yunnan)	No power system expansion plan is publicly available.	Some links with Myanmar; others are foreseen but uncertain. An HVDC connection with Thailand has been delayed. There are several small links to Viet Nam.	Some private participation in IPPs, mostly domestic and in large part from corporatized subsidiaries of the SOEs.
Thailand	A detailed and regularly updated power system expansion plan is easily available.	There are strong connections with the Lao PDR and several planned cross-border connections with Cambodia. Connection plans with the PRC have lapsed, and are under consideration with Myanmar.	IPPs are a significant part of the expansion plan owned by local investors.
Viet Nam	A PDP is prepared, regularly updated, and a summary is published as a decree.	There are several lines to the PRC; greater connectivity to Cambodia is likely.	Private finance was successful in the early 2000s but dried up since then. Reforms have been made.

BOT = build-operate-transfer, HVDC = high-voltage direct current, IPP = independent power producer, Lao PDR = Lao People's Democratic Republic, PDP = power development plan, PPP = public–private partnership, PRC = People's Republic of China, SOE = state-owned enterprise.
Source: ADB compilation.

Source: ADB "Greater Mekong Subregion – Energy Sector Assessment, Strategy and Road Map"

Notes from Country Discussions

- **Cambodia:** a recent successful PPP programme for a large scale solar power plant, with financial support by ADB.
- **PRC:** The private sector has been very active in the renewables sector, particularly in the distributed generation sector, however some of the largest solar and wind farms have also been privately developed, some of which have then been sold to state-owned power corporations.
  - Feed-in tariffs and feed-in premiums have already been utilised, and now green certificates are being introduced. It is intended that there will be no subsidies for renewables from next year, and they will then compete directly with other forms of generation.
  - The 2030 target to meet climate change objectives is for PRC to have 20% renewable penetration, which means that the amount of hydro, wind and solar should be doubled over the next 10 years.
- **Lao PDR** has been promoting private sector development over the last two decades - the Electricity Law and Investment Promotion Law encourage IPPs and the aim is to plan for a target quantity of generation without being prescriptive about which projects should be developed.
  - The Ministry of Energy & Mines encourages PPAs to entered into with off-takers, and also has a planning committee to discuss the way that projects will be developed.
  - Planning is now more systematic than the ADB study quoted earlier suggested.
  - The private sector has a potential contribution to make in cross-border trading, and EDL-T as a privately owned transmission company is getting established and defining its role.

Notes from Country Discussions

- **Myanmar:** recently there has been reported active participation of private developers/investors in the renewable energies, particularly solar power. The Ministry of Electricity and Energy called for a tender of more than 1,000 MW solar projects and selected 29 developers to develop solar power projects of the size around 30 MW. During 2018 – 2019 MOEE issued tenders for LNG to power. Private developers won some of those tenders.
- **Thailand:** Government policy on power development encourages domestic IPPs, and purchases from IPPs in Lao PDR and other countries. Under the regulatory framework, ERC takes care of IPP issues. There is also a subcommittee looking at power purchase from neighbouring countries and interconnections.
  - The private sector is involved in IPP development and signs PPAs, particularly at the distribution level.
  - Planning processes are being developed to encourage a more structured way of encouraging IPP participation.
  - Key challenge: knowing how much RE is installed at the distribution level, creating technical problems.
- **Viet Nam:** Participation of private investors has been established over many years – hydro, coal and GT generation has been privately funded over this time. ~6000MW of solar farms have been developed over the last 2 years – nearly 100% of the total development.
  - Key feature: incentives to investors. Feed-in tariffs, also land and tax incentives – many policies working together to encourage private sector investors.
  - Key challenge: There are technical problems for the transmission system to absorb high quantities of solar, with congestion arising both at distribution and transmission levels (110kV and 220kV particularly).

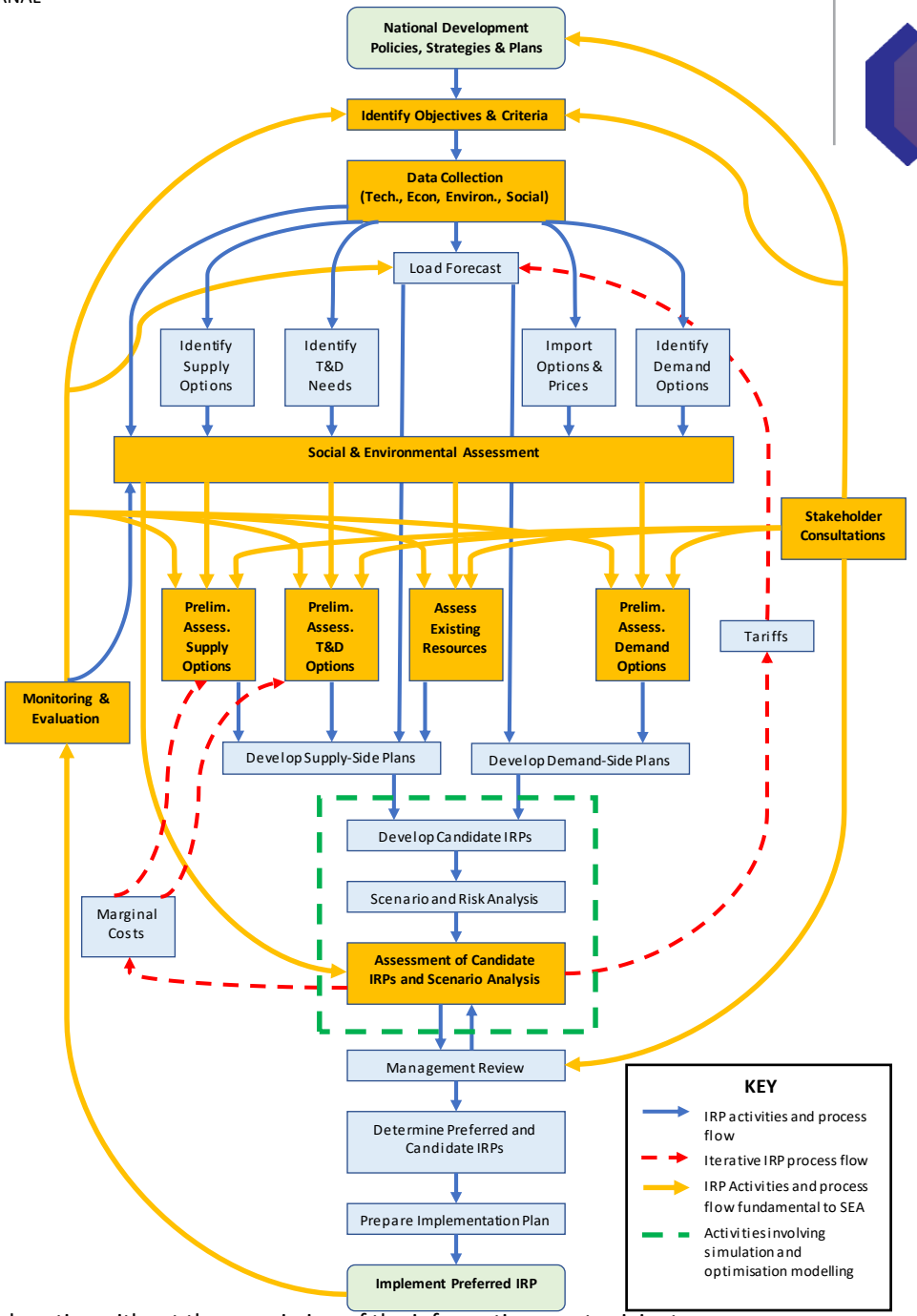
Increasing Renewable Energy penetration in the GMS

Technical, commercial and regulatory issues

Technical requirements

Key technical priorities

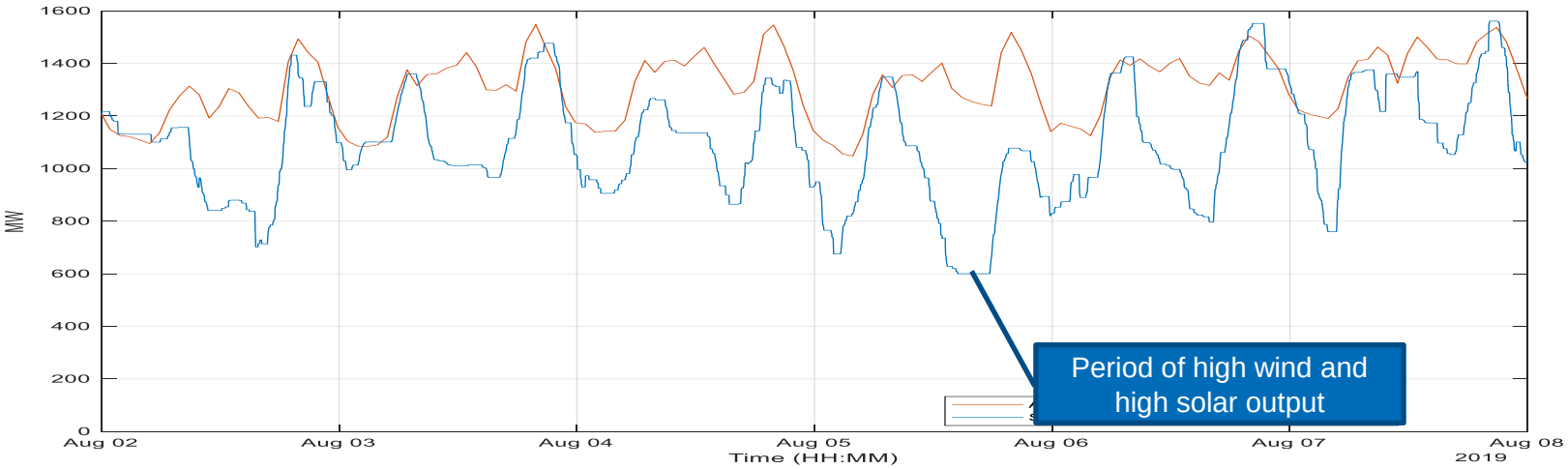
- Planning process that correctly identifies the role that renewable generation can play at a **regional** level
  - Integrated Resource Planning that looks in detail at RE and interconnection alongside conventional generation expansion and demand side options
  - Scenario-based planning that incorporates social and environmental concerns at the heart of the process, and values externalities appropriately (Strategic Environmental Assessment – ADB TA9003)
  - Full consideration of power network resilience in the planning process
- **Power system analysis studies** that consider steady-state and dynamic performance of networks with increased RE penetration
  - Fault ride-through requirements
  - Reserves
  - Inertia
  - Limitations of existing plant performance
  - Use of interconnectors to provide balancing services



Simulation of balancing of Variable Renewable Energy with conventional generation

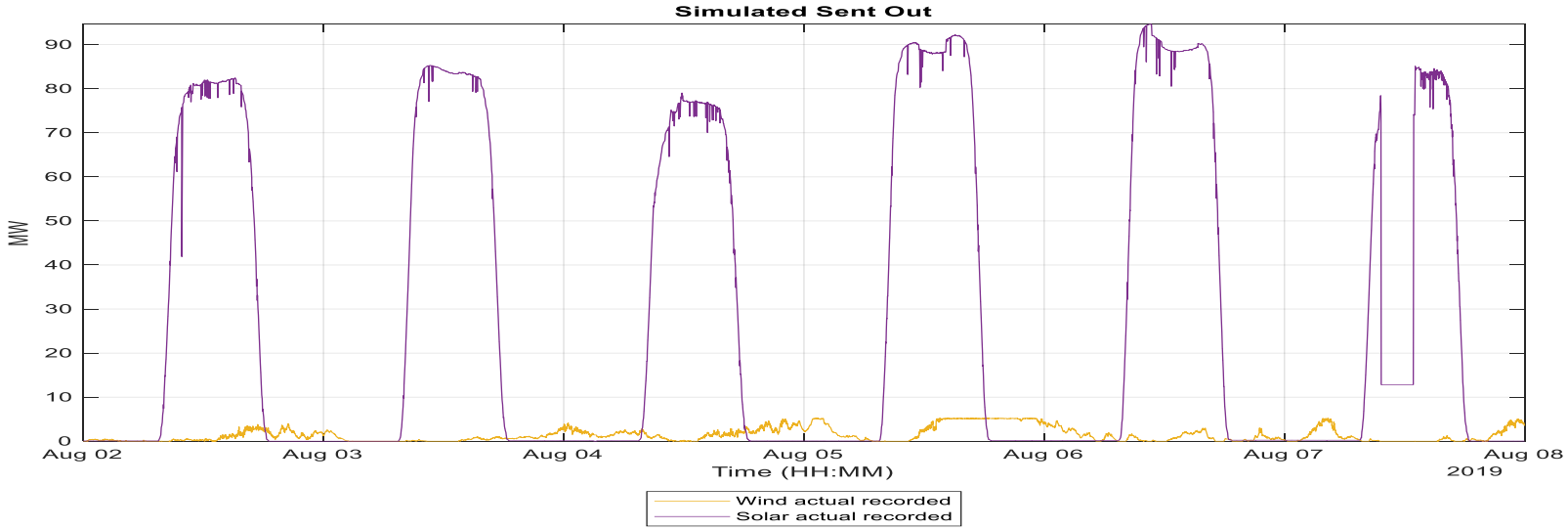
Normal conventional generation dispatch

Simulated conventional generation dispatch



Solar recorded output

Wind recorded output



Importance of regulations, regional and national grid codes – links with WGPO

- Experience in other regions (e.g. Europe, Southern and Eastern Africa) suggests that there should be a regional planning code or regional planning regulations to harmonise technical standards.
- The Regional Energy Regulatory Authority in Southern Africa has proposed a Regional Grid Code and is currently progressing the process of drafting the code.
- WGPO is already well advanced with its work on the GMS Regional Grid Code, though planning was an area of discussion.
- Key planning issues related to RE that need to be addressed:
  - Operating reserves in planning criteria should include RE uncertainty/intermittency
  - Sufficient inertia determination to ensure there is sufficient inertia to maintain frequency control
  - Accredited capacity criteria for RE
- Key Operating issues to RE that are typically not addressed in traditional Grid Codes:
  - Dynamic reserves
  - Inertia monitoring
  - Forecasting RE
- Important to discuss with the WGPO the specific issues relating to planning and technical standards for RE IPPs that need inclusion in the GMS Regional Grid Code

Commercial arrangements

Evolution of electricity trading arrangements

- GMS has strong experience with IPPs, especially hydro, trading under long term PPAs
  - Bilateral contracts with integrated energy and wheeling charges
- Key issue: what trading arrangements are required to promote Renewable IPPs regionally?

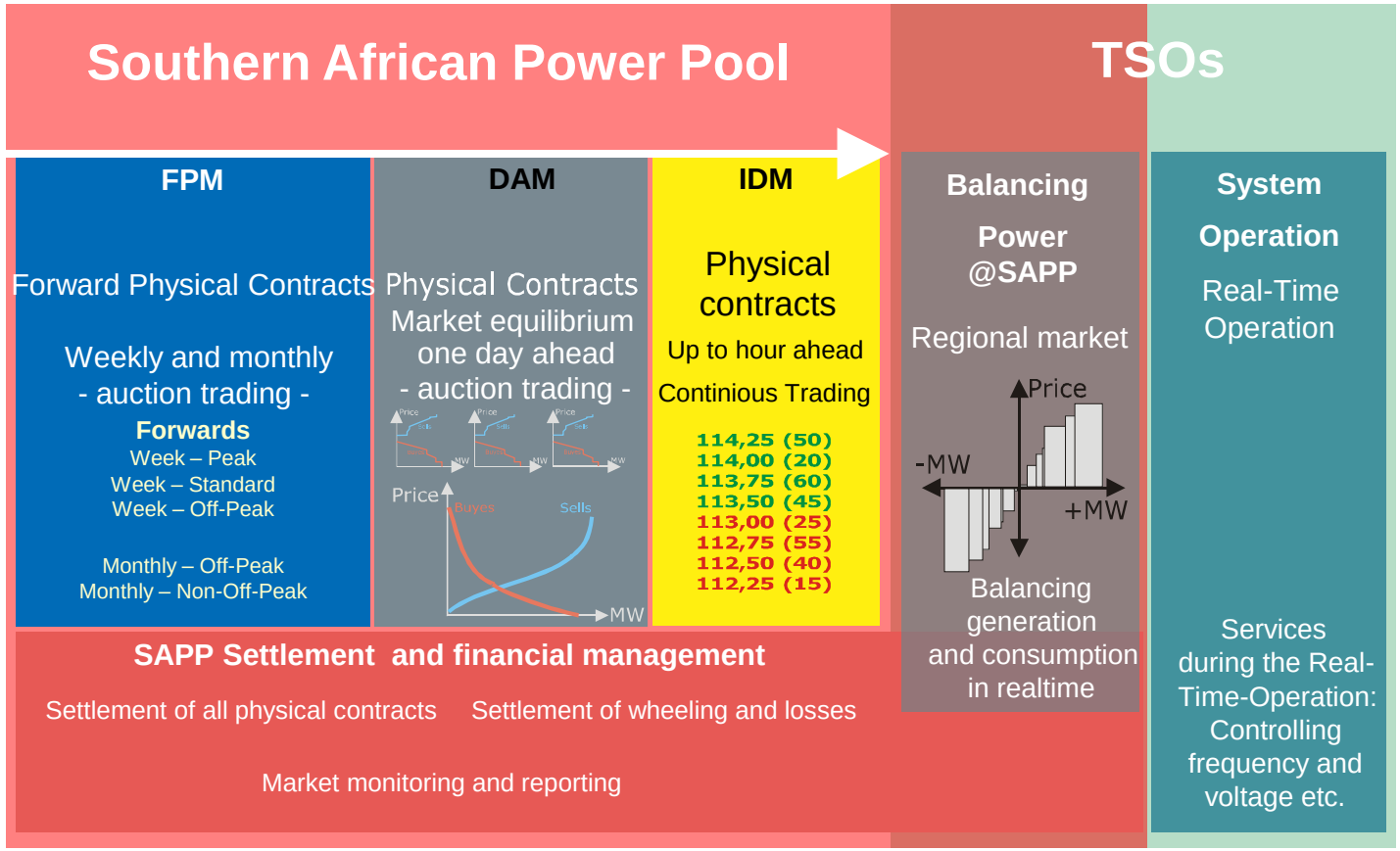
Examples – Southern Africa and Europe

Within SAPP, several bilateral contracts are still being traded between the countries. In addition, four different organised markets have been made available for SAPP members:

- the Forward Physical Market – Monthly,
- the Forward Physical Market – Weekly,
- the Day-ahead Market, and
- the Intra-day market.

The European Target Model includes an Intra-Day Market which enables the RE producers to trade and adjust their final balance before having imbalance settlement occurs. There are few options on how the markets can be utilised and developed best to accommodate the intermittent RES, as the leading practices from European markets have shown

Example: Southern African Power Pool Market Framework



Source: Nord Pool Consulting

Key features of successful trading environments to facilitate RE

- ***Access to a variety of market platforms*** to allow RE to be traded in short timeframes when forecasts of RE output are available
- ***Region-wide Balancing Market or Balancing Mechanism*** region-wide to allow market-based solution to find the most economical solution close to real-time
- ***Access to markets*** for RE owners and flexibility providers. If access to physical markets are limited to the vertical integrated utilities then IPPs will have limited interest.
- ***Clear regulations*** covering third-party access to networks, wheeling charges, responsibilities for losses, as well as technical connection standards
- ***Defined/stable market rules*** with robust settlement arrangements and appropriate guarantees in the event of non-payment to protect small IPPs
- ***Robust market surveillance arrangements*** to ensure a level playing field

Regulatory issues

Regulatory issues and objectives

- **Key objective for consideration**:
  - To enhance a **sustainable regional energy market** in the GMS region, which is **conducive to investment** and **promoting sustainable development**.

- **Key outcomes we might consider**:
  - Developing a **framework for regulatory oversight** of the regional energy market, that can be adopted by regional and national regulatory bodies and will promote investments and power trading in the region;
  - Achieving an **appropriate balance between national and regional regulatory bodies**;
  - Identifying **capacity building requirements for national and regional regulatory institutions** to proactively influence power trading and developments in the energy sector.

Example: Development of a Framework for Regulatory Oversight of the Regional Energy Market in Eastern Africa, Southern African and the Indian Ocean

The objectives of the work:

a. to clarify the roles of **regional energy regulators** and/or associations and their **member regulators**, and to establish **appropriate regulatory instruments and market monitoring & surveillance programs** for the regional energy market;

b. to incentivise investments in regional transmission and generation infrastructure through development of **appropriate pricing methodologies** that promote competition and market integration; and

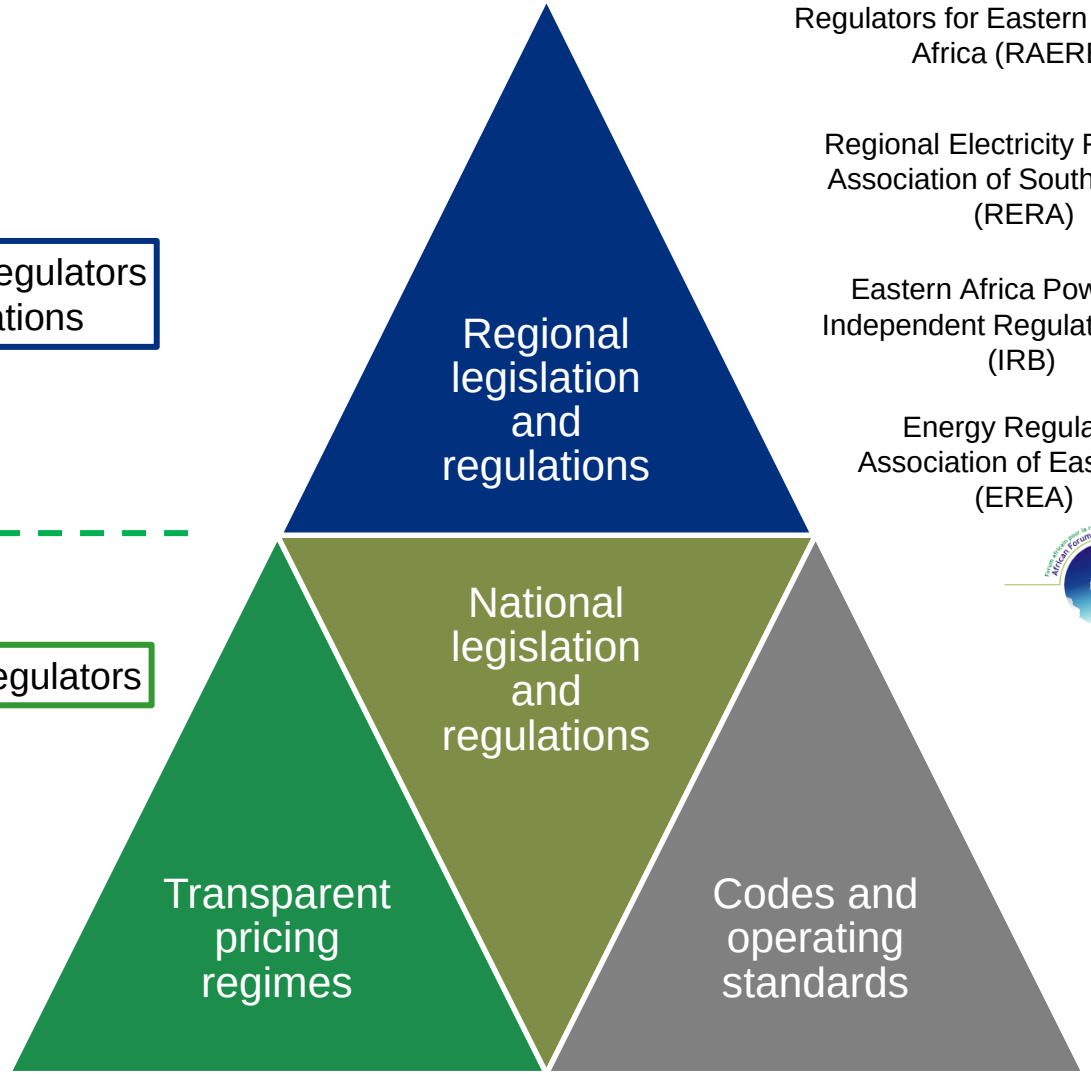
c. to **promote open access to the regional transmission network** through development of harmonized interconnections codes and operations regimes.

d. to design a responsive **training programme** for strengthening the capacity of national and regional regulatory institutions to proactively influence power trading and developments in the energy sector

Framework for Regulatory Oversight – what do we mean?

Regional energy regulators and/or associations

National energy regulators



Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA)

Regional Electricity Regulators Association of Southern Africa (RERA)

Eastern Africa Power Pool Independent Regulatory Board (IRB)

Energy Regulators Association of East Africa (EREA)

AFUR
African Forum for Utility Regulators

Priority regulations for harmonisation

Licensing

- guidelines
- regulations
- standard licence conditions

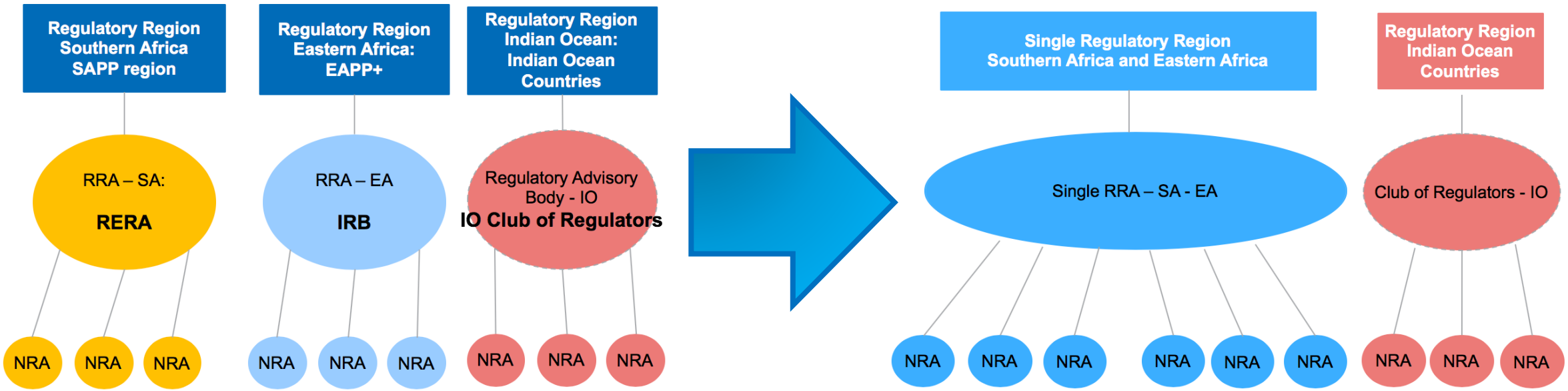
Network Regulations

- Transmission connection/use of system agreements
- Network tariffs
- Regional Grid Code and associated technical standards

Market Regulations

- Market Access
- Template Power Purchase Agreements
- Market Surveillance/Dispute Resolution

Regional regulatory institutional structure EA-SA-IO: possible example of a Long-term Vision



Possible application in the GMS

- Key issue: the difference between a “Regulatory Authority” and a “Regulatory Association”?
  - Southern Africa is moving towards a regional Regulatory Authority
  - The Indian Ocean island countries have an informal advisory body – more like an Association
- What structure might be appropriate in the GMS going forward?
- How to ensure best practice in electricity market regulation is shared amongst National Regulatory Authorities?
  - SA-EA-IO considering a “Centre of Excellence” or regional School of Regulation

Notes from Country Discussions

- **PRC:** In South China there are transparent market rules and the National Development and Reform Commission policies support renewables, as well as nuclear, for private and government investment.
  - There have been technical challenges: intermittency for large renewable installations causes challenges in PRC just as in Europe
  - Now policies encourage utilities to provide Ancillary Services – this includes flexible capacity in coal-fired plants
  - China State Grid has reduced curtailment to 3-4%. Also curtailment reduced on regional systems.
  - Central, East and Southern systems tend not to encounter these problems – UHVDC makes a major contribution technically, although it is still possible to find commercial/policy differences between regions that create challenges.
  - To give an indication of the opportunities for power sector investment, NEA publishes 5 year plans – these highlight major project sizes, but do not define projects in detail.
- **Lao PDR:** started with IPP hydro power development over many years, trying to build power plants to sell electricity to neighbouring countries with large economies – hydro power totalling 10GW plus 2GW of coal, much of which is linked to other countries through dedicated transmission.
  - The main issue concerns how to secure **firm energy** – considering thermal projects and the need to strengthen system to system interconnection operationally.
  - Conflicting objectives that can cause problems for planning, including understanding the different prices in target markets. How can we support the region, taking account of the ability of each country to support the others? E.g. the example of the Southern African Power Pool.

International Experience in private RE development - including experience with standardised PPAs

Incentives for RE development: example of Europe
High level principles

- Financial support for renewables should be limited to what is necessary and should aim to make renewables competitive in the market
- Support schemes should be flexible and respond to falling production costs. As technologies mature, schemes should be gradually removed. For instance, feed in tariffs should be replaced by feed in premiums and other support instruments that incentivise producers to respond to market developments
- Unannounced or retroactive changes to support schemes should be avoided as they undermine investor confidence and prevent future investment
- EU countries should take advantage of the renewable energy potential in other countries via cooperation mechanisms. This would keep costs low for consumers and boost investor confidence.

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Regulatory risks – key considerations

- Long term legal commitments on the timing and phasing out of support
- Devising a support scheme that is flexible enough to account for changes in the development of costs and technologies.
- Announcement of automatic reductions in support depending on specified cap and/or lower technology costs
- Planned review periods and no unannounced interim changes
- Clear commitments to avoid changes that alter the return on investments already made and undermine investors' legitimate expectations
- Wide and public consultation on scheme design (e.g. 4-6 weeks for routine changes)
- Stable scheme financing linked to consumption and off-budget financing to avoid fiscal impacts and uncertainty
- Keep costs transparent and separate from other system costs

Market integration

Different instruments can be used to support renewables production in the EU. The most commonly used ones are:

- feed-in tariffs,
- feed-in premiums,
- quota obligations,
- tax exemptions,
- tenders, and
- investment aid (can be partially financed from structural and cohesion funds).

The trend in EU has been to encourage more market exposure to be imposed on renewables producers.

Incentives for RE development: example of South Africa

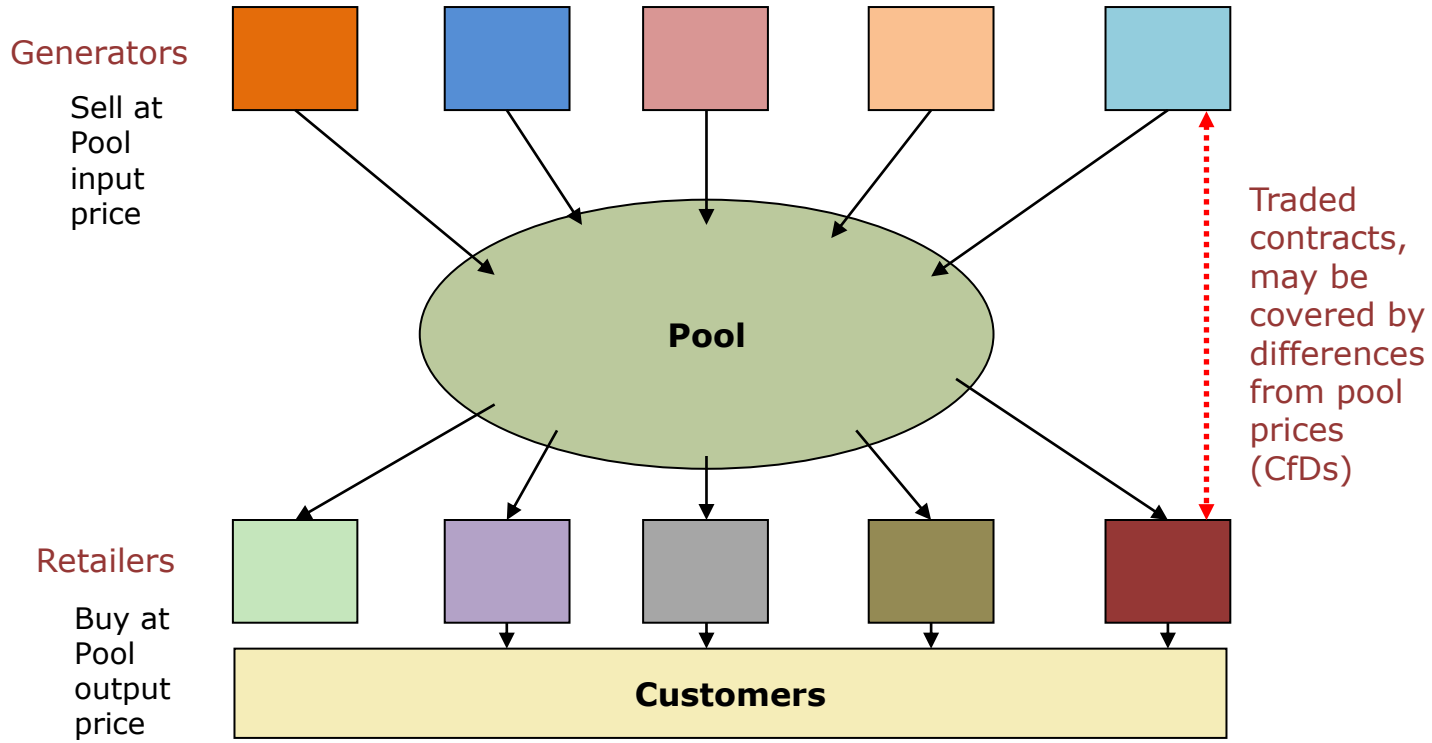
- The IRP 2019 makes provision for additional capacity across a range of technologies, including:
  - 6,000 MW of solar photovoltaic (PV) generated electricity
  - 14,400 MW of wind-generated electricity (current annual build limits on solar PV and wind have been retained – but no new concentrated solar PV beyond the 300 MW committed for 2019)
  - 5,000 MW of battery storage to be commissioned by 2030
- IRP 2019 provides for uncapped procurement of Distributed Generation up to and including 2022, and thereafter, procurement would be capped at 500MW a year up to 2030.
- Transmission grid access is managed by Eskom. Selling electricity by municipalities constitutes a significant source of their income, resulting in some reluctance to permit third-party access to the distribution grid for trading purposes.
- Generators under 1MW do not need a generation licence but need to register with NERSA. Draft regulations for Small Scale Embedded Generators were consulted on in 2008 but are understood still to be in draft form.
- South Africa has successfully implemented four rounds of independent power procurement through its renewable energy independent power producer procurement programme (REIPPPP).
- Twenty- seven new PPAs (REIPPPP round 3.5 and 4) were signed in April 2018, and financial close in respect of rounds 4 and 4.5 was reached in July 2018.
- Given substantial uncertainty regarding the future structure of Eskom and the industry, as well as a declining economy, the pace and timing of future rounds of renewable energy procurement is currently unclear.

Key learning from international examples

- Focus on key principles and the creation of a large and freely competitive tendering process
- Try to look for regional solutions and develop common frameworks, to boost economic development
- Address national priorities, e.g. decarbonisation policies
- Take account of the market maturity in each situation

UK Experience with CfDs

- UK electricity market was restructured in 1990
  - Electricity Pool of England & Wales – a gross Pool with comprehensive Pooling & Settlement Rules
  - Financial instruments were quickly created to give assurance of a fixed price against a volatile pool price: “Contracts for Differences”
  - However, template contracts were not widely adopted – they were negotiated bilaterally with significant input from lawyers



UK Renewables CfDs

- Introduced in 2014 as part of the Electricity Market Reform process, the Contracts for Difference (CfD) scheme is now the government's main mechanism for supporting low-carbon electricity generation.
- Aim is to that CfDs incentivise investment in renewable energy by providing developers of projects with high upfront costs and long lifetimes with direct protection from volatile wholesale prices
- They also protect consumers from paying increased support costs when electricity prices are high.
- Renewable generators that meet the eligibility requirements can apply for a CfD by submitting what is a form of 'sealed bid'. There have been 3 auctions, or allocation rounds, to date, which have seen a range of different renewable technologies competing directly against each other for a contract.
- Successful developers of renewable projects enter into a private law contract with the Low Carbon Contracts Company (LCCC), a government-owned company.
- Developers are paid a flat (indexed) rate for the electricity they produce over a 15-year period
  - the rate is calculated as the difference between the 'strike price' (a price for electricity reflecting the cost of investing in a particular low carbon technology) and the 'reference price' (a measure of the average market price for electricity in the GB market).
- National Grid ESO RUNS the CfD allocation process.
- Ofgem is responsible for hearing certain appeals.

UK Renewable CfDs: Two part structure

- Standard terms and conditions – a 500 page document
- CfD Agreement template:

- 1. Definitions and Interpretation
- 2. Agreement
- 3. Term
- 4. Generation Technology Type
- 5. Conditions Precedent and Milestone
- 6. Accrual of Payments prior to State Aid approval
- 7. Installed Capacity Estimate and Required Installed Capacity
- 8. Changes in Law
- 9. Payment Calculations: Strike Price
- 10. Balancing System (BSUoS/RCRC) and TLM(D)
- 11. Curtailment
- 12. Notices
- 13. Agent for Service of Process
- Annex 1 (Description of the Facility)
- Annex 2 (Modification Agreement)
- Annex 3 (Facility Generation Type)
- Annex 4 (Fuelling Criteria)
- Annex 5 (Project Commitments)
- Annex 6 (Conditional Start Date Notice)

International experience with template PPAs – Sub-Saharan Africa

- In the SADC region inter utility PPAs are largely of the same format and contain similar phraseology under similar headings/terms in the PPA
  - Some customisations (technology based, tariffs)
- In Zambia, the KfW GETFiT RE projects use a standard template for each technology (600MW of varying sizes)
  - Competitive procurement process
  - Template agreed between KfW and ZESCO
  - Solar and Hydro
  - Templates are being borrowed by other entities (GreenCO)
- The South African Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) uses standard PPA for each technology
  - Initially a competitive capacity procurement process with capped tariffs per technology
  - Now a competitive capacity procurement process with competitive tariffs per technology
- Namibia and Zimbabwe moving to competitive procurement (standard PPAs)
- The East African Power Pool has developed a standard PPA for short term trade
  - It is reduced to a form to be signed at short notice by parties

New business models in electricity trading from renewable IPPs

- Creditworthy intermediary off taker business model
  - New entity Interposed between IPPs and off takers (off takers = utilities and LPUs)
  - Intermediary signs PPA with IPP and multiple PSAs with off takers (portfolio arrangement)
  - Intermediary becomes member of Power Pool and participates in regional market platforms
  - Capitalisation through shareholding by DFIs, MDBs, Governments, Equity Investors
  - Buffer capital guarantee gives better comfort to lenders and investors hence reduced cost of capital and project tariff
  - Better risk management and relieves government support on projects (except where step in is required)
  - Leads to increased private sector investment, improved security of supply and more efficient market
  - Can provide other services
    - Intermediary trader
    - Aggregator for small projects
    - Can invest in storage facilities and provide ancillary services

Statutory, Regulatory, Structural Considerations

- Stakeholder awareness of model benefits is critical for buy-in
- Most countries don’t provide for non-infrastructure market participants
  - Review of statutes may be necessary (Electricity Act, Regulation Act)
- Regulations need review to permit licencing
- Grid codes need to recognise non-infrastructure owning entities
- Agreements with service providers are required
  - Network service charging and capacity allocation methodologies
  - System operation agreements
  - Off take and supply agreements
  - Membership in power pool for market access
- Market re-arrangement may be necessary
  - Market transformation to multi-buyer model
  - Neutral system and market operators
  - Open access presents opportunities to access customers

Example in Southern Africa

- **Africa GreenCo**
  - Establishing in Zambia
    - Strong Government support
    - Statutes and regulations have been changed to permit participation and licencing
    - Investors reaching financial close
    - Setting up trading platforms, systems and procedures
    - Licencing process in progress
    - SAPP membership process initiated
    - Overwhelming support from IPPs
    - Negotiations with national utility in advanced stages
  - Establishing in Namibia
    - Regulator very supportive
    - Market already transformed to multi-buyer model
    - Network charges already disaggregated
    - Neutral system/market operator established
    - Strong support from IPPs

Key Features in Intermediary PPAs

- PPA between Intermediary and IPP
  - Contractual capacity
  - Capacity declaration procedures
  - Out of balance energy management
  - Deemed supply clauses
  - Payment for energy
  - Payment default cover (guarantees – provided through buffer capital and/or alternative sales offset through the portfolio of GreenCo clients)
  - Step in/out arrangements
- PSA between Intermediary and Off taker
  - Contractual capacity
  - Capacity declaration procedures
  - Out of balance energy management (linked with the System Operations Agreement)
  - Deemed supply clauses
  - Wheeling arrangements (including *within* countries)
  - Cover for losses
  - Diversion of power under payment default
  - Liability for defaulted power supply
  - TSO services (System Operations costs)

Notes from Country Discussions

- **PRC:** For large hydropower plants CSG uses an annual PPA – this is because of uncertainty on the hydro output. Two part contract for energy:
  - the first part is a fixed amount with a fixed price; the second part varies according to how much can be generated based on an hourly market price (or monthly/spot market).
  - Financing for hydro companies can be based on long term average generation and approved prices for large hydro (the government produces a long term approved price). This helps to offset the uncertainty introduced by an annual contract. Government policy and the template PPAs therefore are therefore integrated.
- **Lao PDR:** has a template BOT and PPA agreement designed by the World Bank that has been used for >50 projects. These are now widely used for new projects. There are also templates for solar projects – these dominate in the southern parts of Lao PDR. The same template is used for all types/sizes of plants, but specific terms can be modified. Different agreements exist for exporting plants and national projects.
- **Myanmar:** There is not a lot of difference between the new PPAs that are being utilised today and those that were drafted as templates by the IFC.
- **Thailand:** ERC defines the renewable purchasing policy. This includes defining a standard PPA for SPPs, and about 200 projects are using the standard PPA terms. In addition, in Thailand there are many very small producers – VSPPs – which are mainly renewable projects. The VSPPs have standard PPAs with simpler terms than those for the SPPs.
- **Viet Nam** has many kinds of standard PPA in use, for technologies such as small hydro, wind farms, solar farms, coal and gas-fired plants. These have been used for the past 10 years. The standard PPA for solar farms was set up 3-4 years ago and not been modified much since.

Conclusions and next steps

Conclusions and possible next steps for WGRI work

- It was noted that the WGRI, WGPO and RPTCC have discussed many issues, but the challenge is how to move forward practically.
- The Chair commented that RE development needs to be clearly linked with increased interconnection in the GMS region to ensure that intermittency can be managed and the benefits of regional system balancing can be achieved. The role of the WGRI is key in enabling these interconnections to be achieved.
- It was noted that future topics for discussion could include BOT/IPP/PPA models and templates for developing renewable energy regionally, including learning from the experiences of all the countries to date and international experience. This could include identifying best practice in renewable IPP planning and procurement procedures.
- Proposals for consideration by the RPTCC:
  - **the WGRI could research international and regional best practice in the development of BOT, IPP and PPA models and associated template agreements with a view to creating a set of template documents for reference by RPTCC members**
  - **the WGRI could investigate the way that national and regional market designs can support RE integration and make recommendations for regional market development**
  - **the WGRI, in consultation with the WGPO, could recommend the processes and procedures needed to conduct technical evaluations of the impact of RE integration and the implications for future interconnection in the GMS region**
- All of the above to be discussed in a specific WGRI workshop and brought to the next RPTCC

Thank you for your participation!

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