



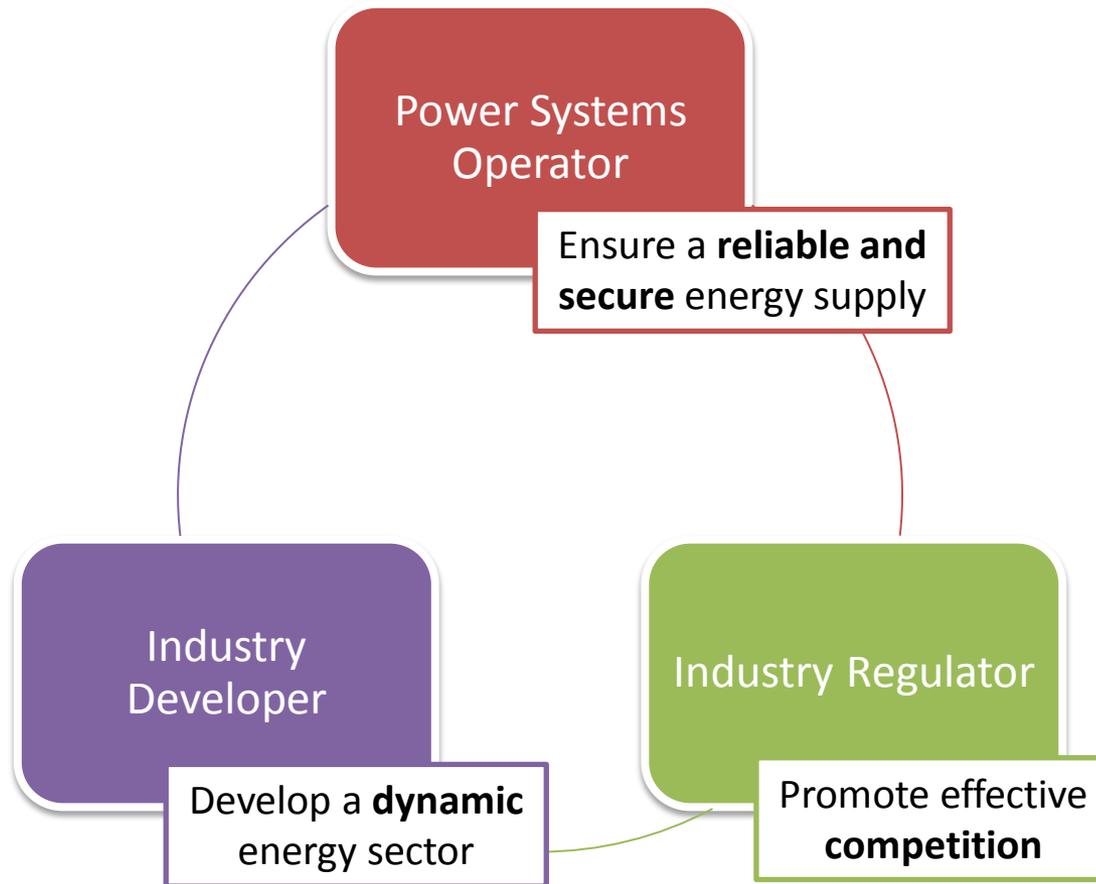
Regulation of Power Sector in Singapore - Development and Current Practices

9th Capacity Building Program for
Officers of Electricity Regulatory Commissions

Presenter: Rachel Su, Deputy Director
(Market Development and Surveillance Department)

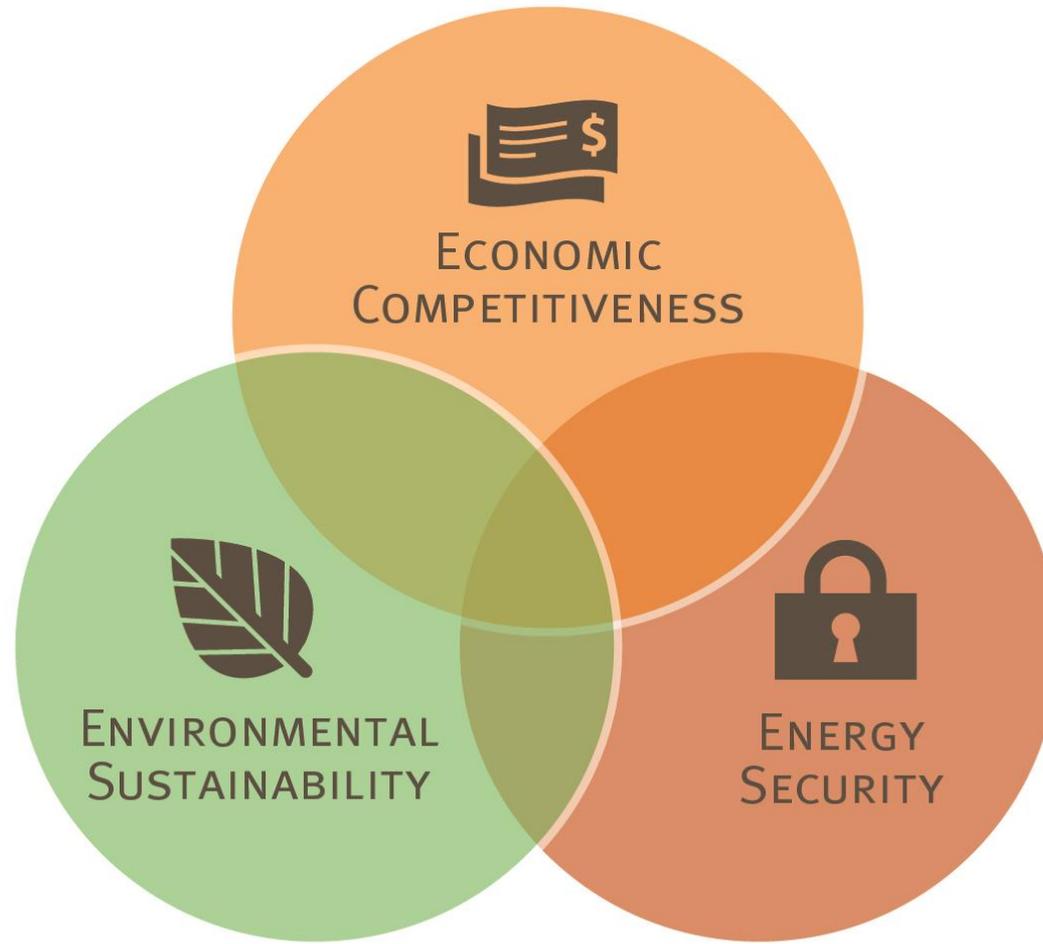
24 Nov 2015

Energy Market Authority (EMA) is the lead agency for energy matters in Singapore

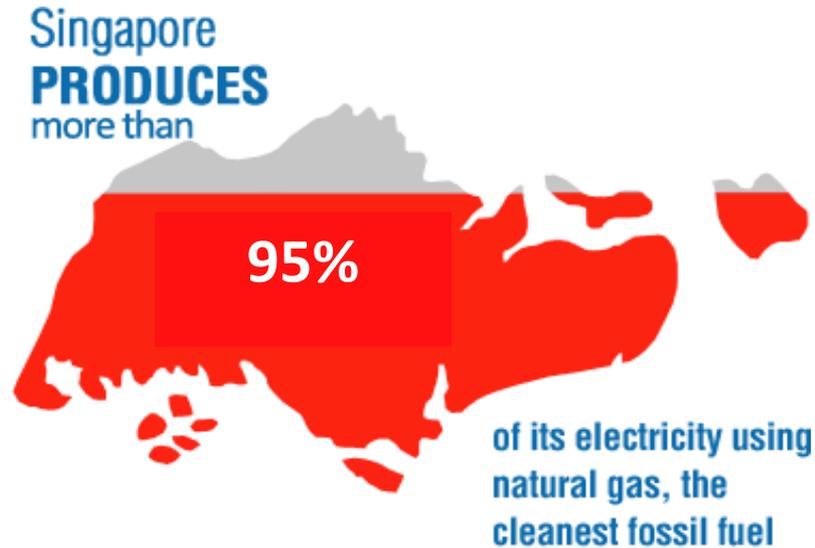


SINGAPORE'S ENERGY LANDSCAPE

Balancing Singapore's energy challenges



Singapore's energy landscape

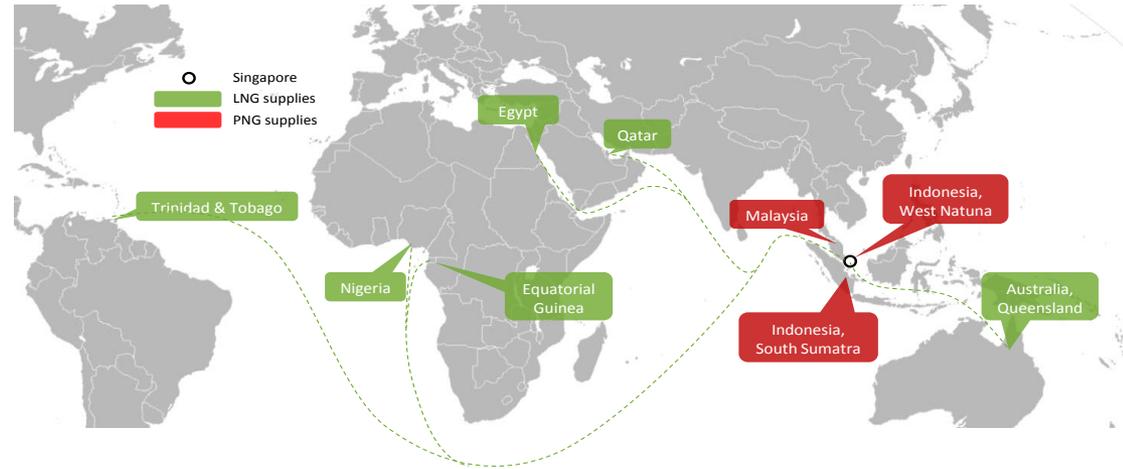


- Natural gas is the **dominant fuel source for power generation in Singapore** and is used in several industry applications.
- Beyond natural gas, Singapore is also exploring **alternative energy options to diversify our energy mix.**

Decision to import LNG to meet our strategic objectives of energy security and price competitiveness

1

Flexibility to **import from multiple sources** and access **competitively priced gas from global markets**



Reference: <http://thediplomat.com/2013/09/singapore-emerges-as-lng-trading-hub/>

2

Enhances competition in the electricity market

3

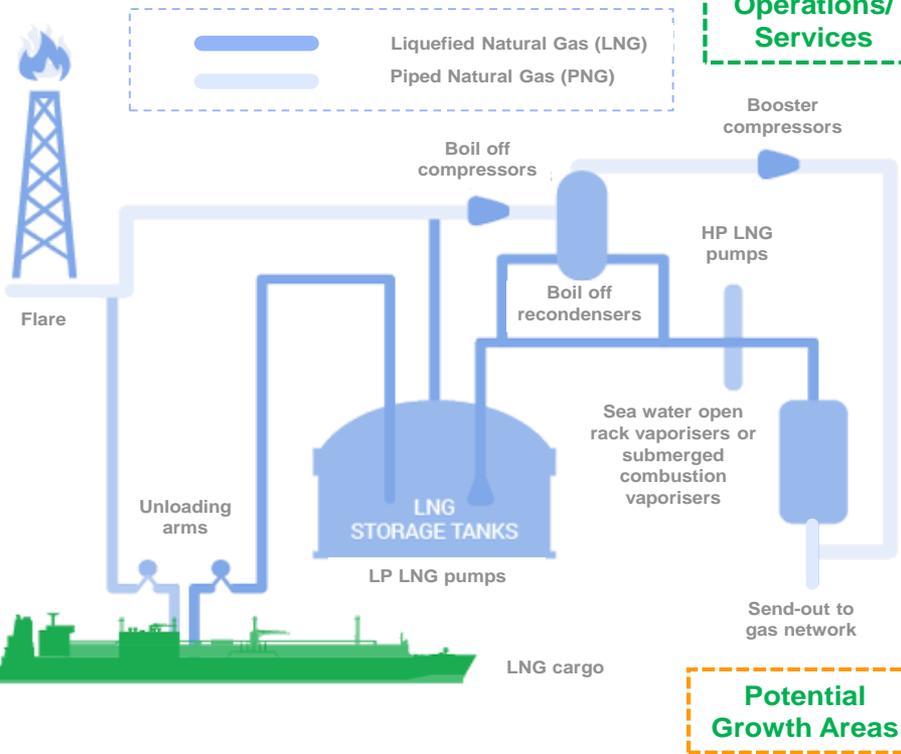
Places Singapore in a favourable position to be the natural gas hub for Asia and support growth of LNG ancillary services in Singapore

4

Environmentally Cleaner Fuel due to its lower carbon intensity compared with other fossil fuels

Singapore's 1st LNG terminal was commissioned in May 2013

LNG Receiving / Regasification Terminal



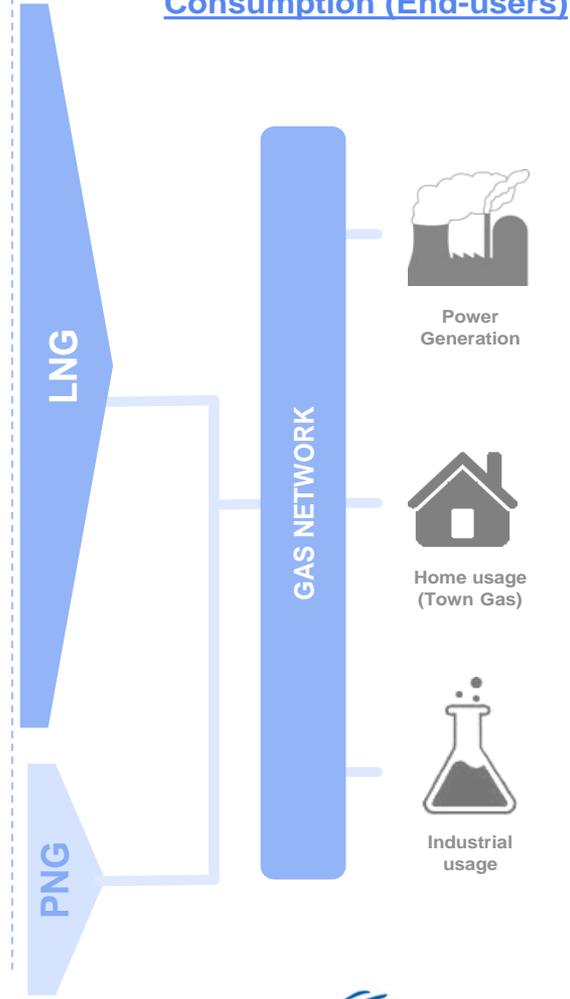
Main Operations

- Receiving
- Reloading
- Regasification
- Boil-off Gas (BOG) recovery
- Auxiliary systems
- Control and safety systems

Ancillary Services

- Vessel cooldown
- Storage and send-out
- Storage and reload (e.g. Break bulk)
- Cold Energy Utilisation Services
- LNG Bunkering

Consumption (End-users)



Building ahead of demand to widen our strategic options

- **Continued expansion of our existing terminal** to enhance our energy security and allows buyers to access spot cargoes when the price is right.
- **Forward looking terminal design to allow for the development of ancillary services** such as break-bulk, LNG bunkering and cold energy integration.



Solar PV offers greatest deployment potential for Singapore

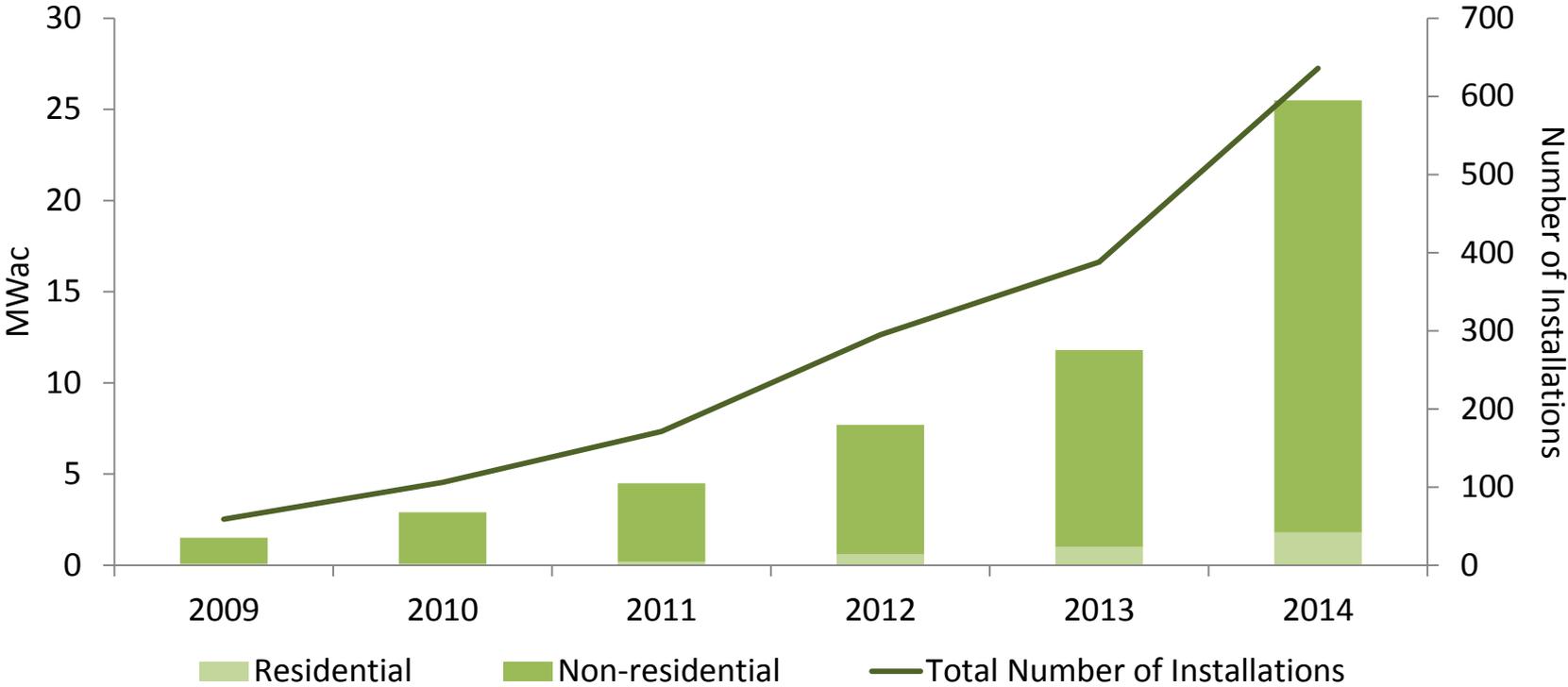
- Due to our physical constraints, Singapore has **limited renewable energy options** –

Renewable Energy	Our Constraints
Hydro	Singapore's terrain is relatively flat
Tidal	Tidal range in Singapore is generally low and our waters are relatively calm
Wind	Singapore has low average wind speeds

- Nonetheless, Singapore is located in the tropical sunbelt with good irradiance. Amongst the renewable energy options, **solar energy offers the greatest deployment potential.**

Steady growth in solar PV deployment in Singapore

Total Installed Capacity of Solar PV Systems (MWac)



Singapore's efforts to maximise solar PV deployment

Solar energy will benefit Singapore when it becomes commercially viable

- Environmental Sustainability
- Energy Security
- Price Competitiveness

Challenges that need to be addressed

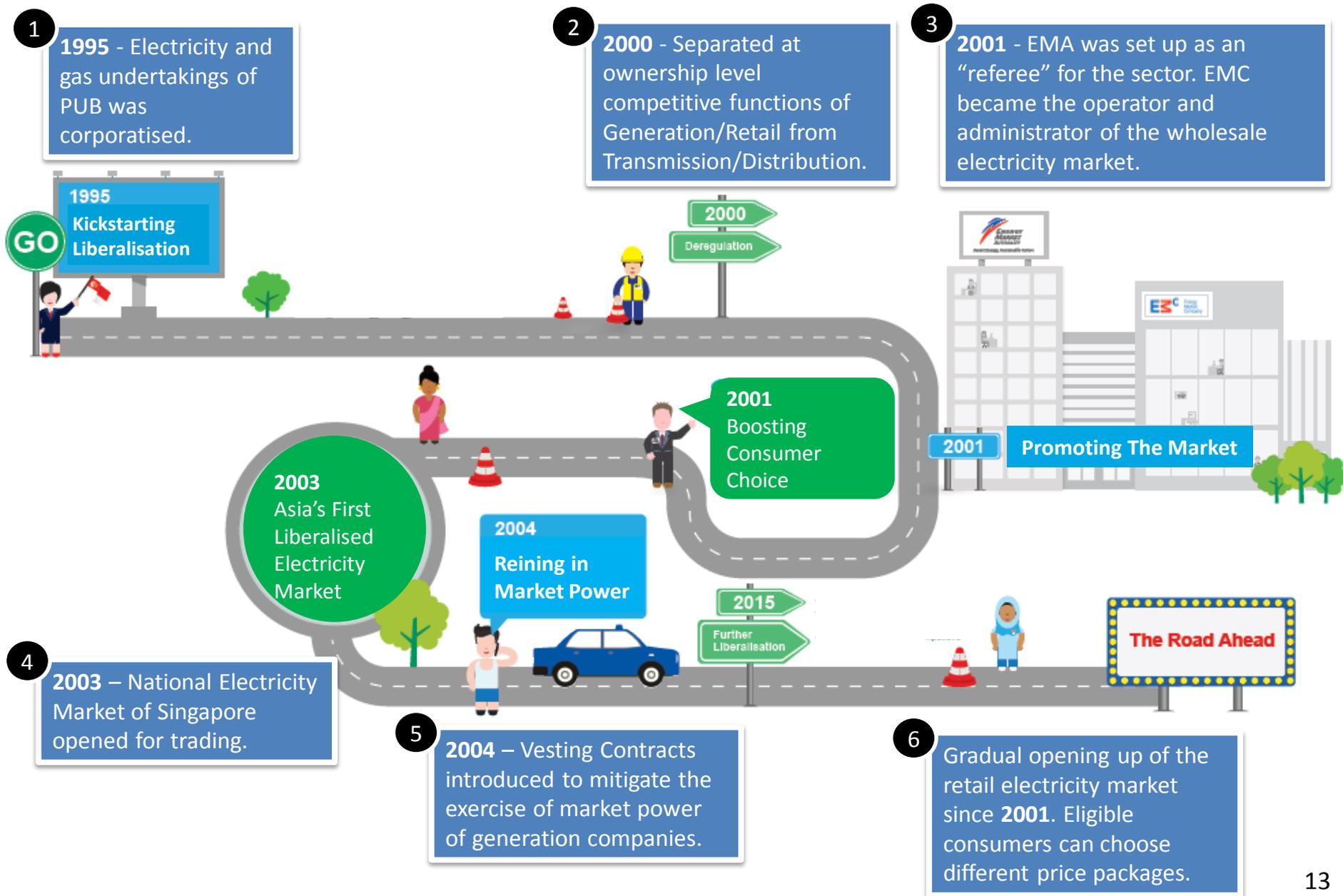
- Intermittent in nature and fluctuates due to changes in weather conditions, cloud cover and shadows
- Require back up from conventional power sources to ensure system stability

Singapore's efforts to maximise solar deployment

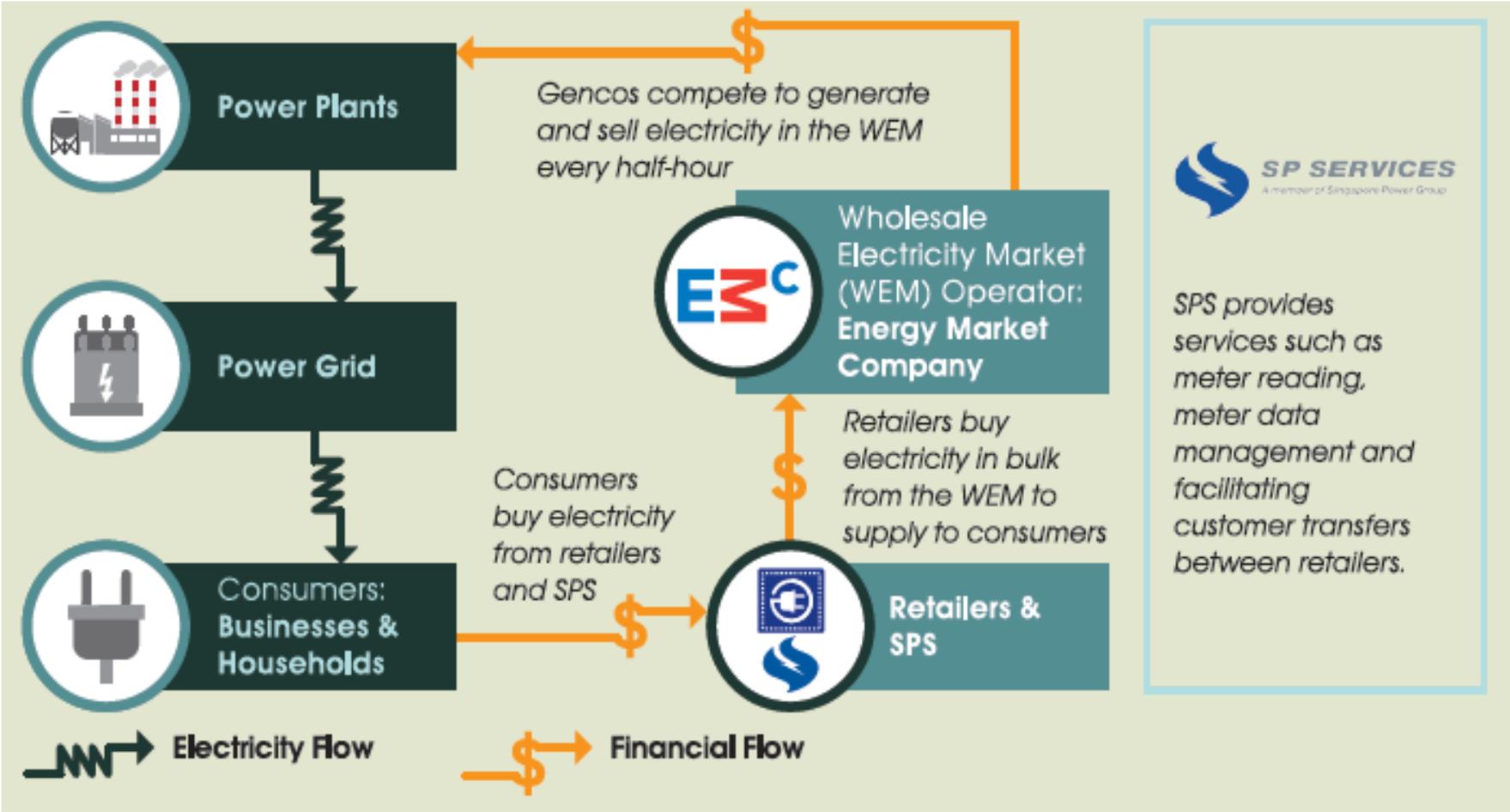
- Streamline deployment process
- Simplify payment procedures
- Build internal capabilities (e.g. solar forecasting)
- Ensure that the power system is able to manage intermittency

SINGAPORE'S ELECTRICITY MARKET DESIGN AND REGULATORY FRAMEWORK

Singapore's market liberalisation journey

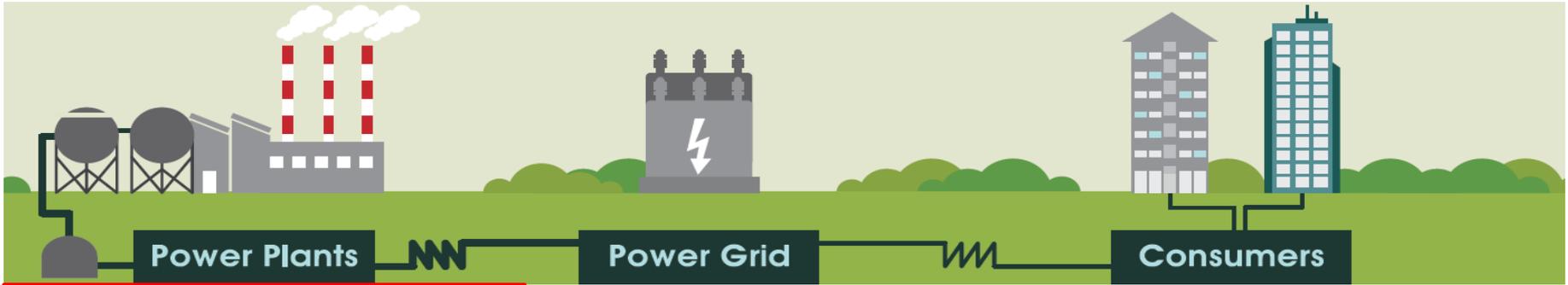


Singapore's electricity market design



Market clearing mechanism



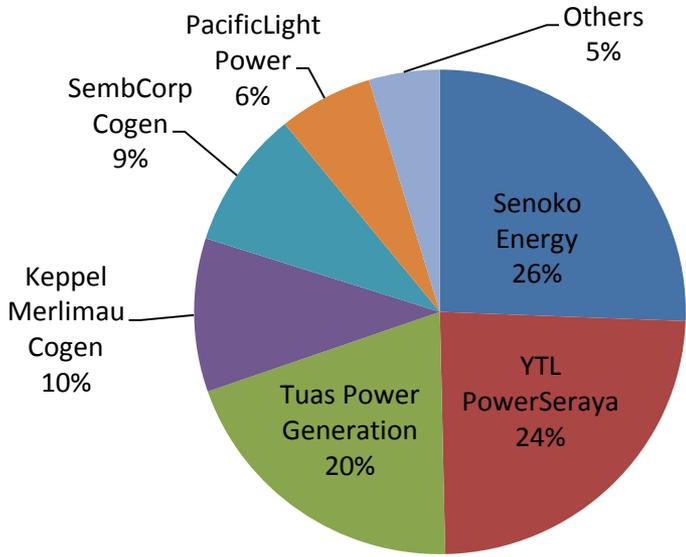


6 major generators & other small generators

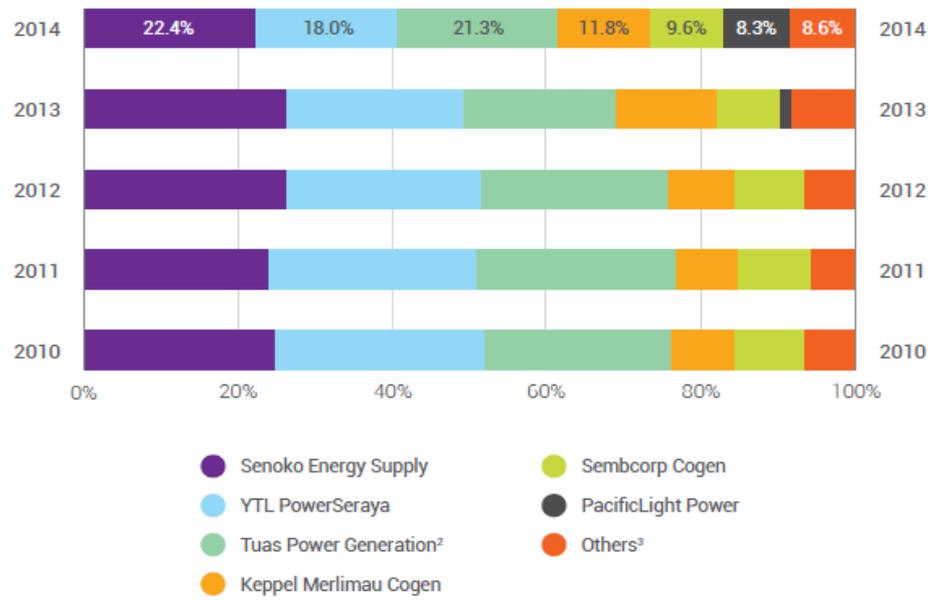
1 grid operator

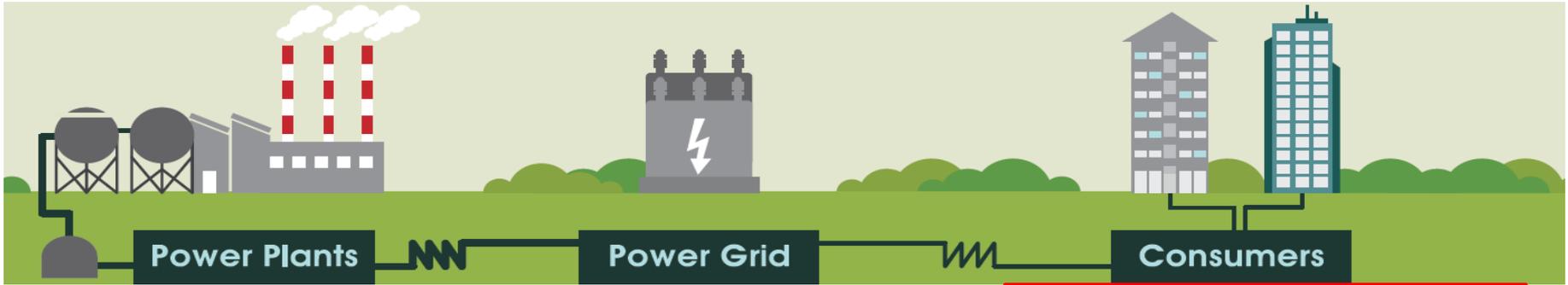
14 electricity & SP retailers & Services

Licensed Generation Capacity, Q1 2015



Market Share for Electricity Generation



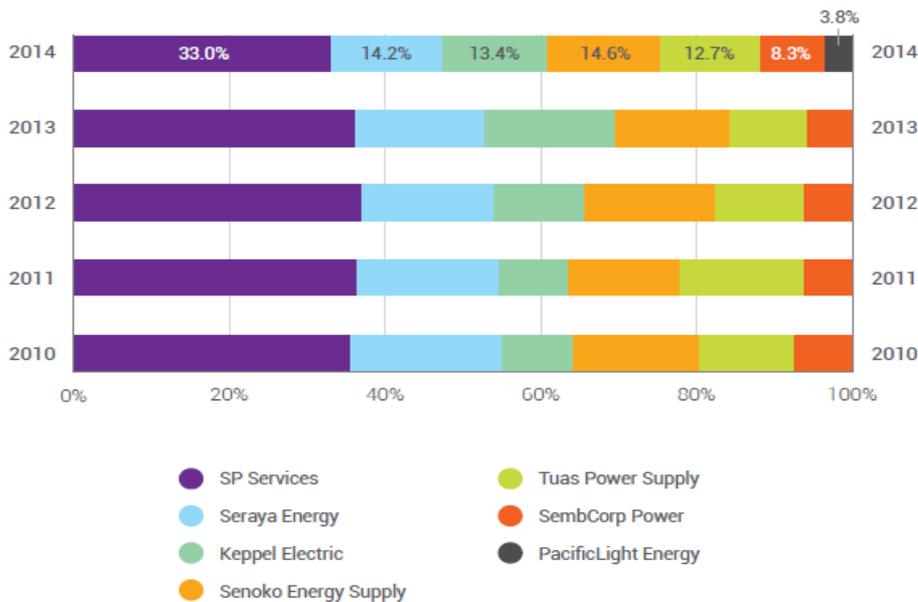


6 major generators & other small generators

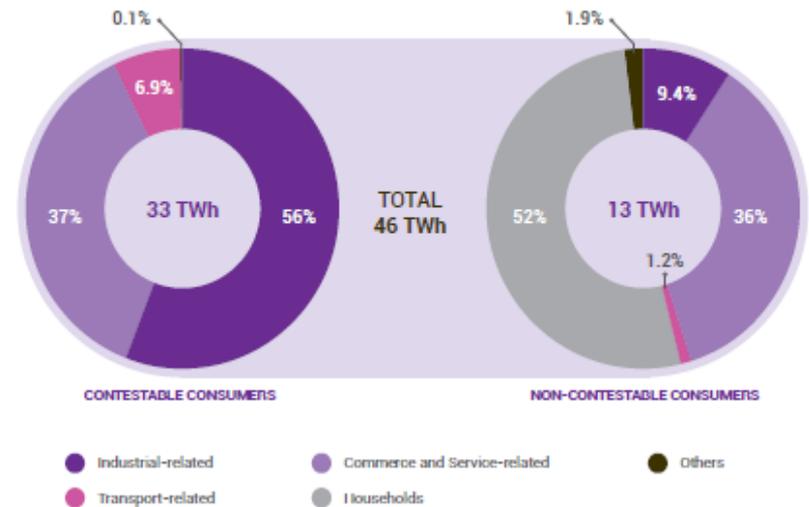
1 grid operator

14 electricity & SP retailers & Services

Market Share for Electricity Retail



Electricity Consumption by Contestability & Sector, 2014



Regulatory roles

Competitive Sector

(Power Generation Companies and Electricity Retailers)

Clear and transparent regulatory regime

Rely on market signals

Ensure level playing field

Low barriers of entry

Monopoly Service Providers

(Grid Operator, Market Support Services and Wholesale Market Operator)

Regulate revenue of monopolies

Incentivise efficient behaviour

Open access

Competitive Sector

Addressing the issue of market power

- In the electricity generation and retail businesses, companies compete with one another at competitive prices for dispatch and customers.
- However, there are three large generation companies who have market power. They could exercise market power and raise electricity price. As such, EMA introduced **Vesting Contracts to mitigate the exercise of market power of these players.**

Monopoly Service Providers

Ensuring outcomes of reliability, affordability & open access

Reliability

Performance standards

Annual system-wide emergency exercises

Affordability

Price Regulation framework

“Efficiency Carryover Mechanism”

Open Access

Separate ownership of infrastructure from competitive activities

KEY ACHIEVEMENTS

Competition motivated the switch from oil-fired steam plants to more cost efficient gas-fired plants



Consumers benefit from having a greater choice of retailers and pricing plans

- Today, around **80% of demand have retail choice**, and we are working on how to let the remaining 20% also enjoy the benefits of competition by 2H 2018.

Eligibility Threshold for Contestability:

Consumption \geq 2,000 kWh
Monthly electricity bill of at least \$450*

Consumers can add up their electricity usage across different locations in Singapore to meet the prevailing threshold.



Location 1 Location 2 Location 3

* Based on Q4 2015's regulated tariff of 20.35 cents/kWh (before GST).

More Choices.

Making an informed choice as a contestable consumer.

[Learn More](#)



What are your CHOICES?

1 Switch to become a Contestable Consumer

OR

2 Remain as a Non-Contestable Consumer

CHOICE A



Buy from an Electricity Retailer under customised price plans

CHOICE B



Buy from the Wholesale Electricity Market through SPS

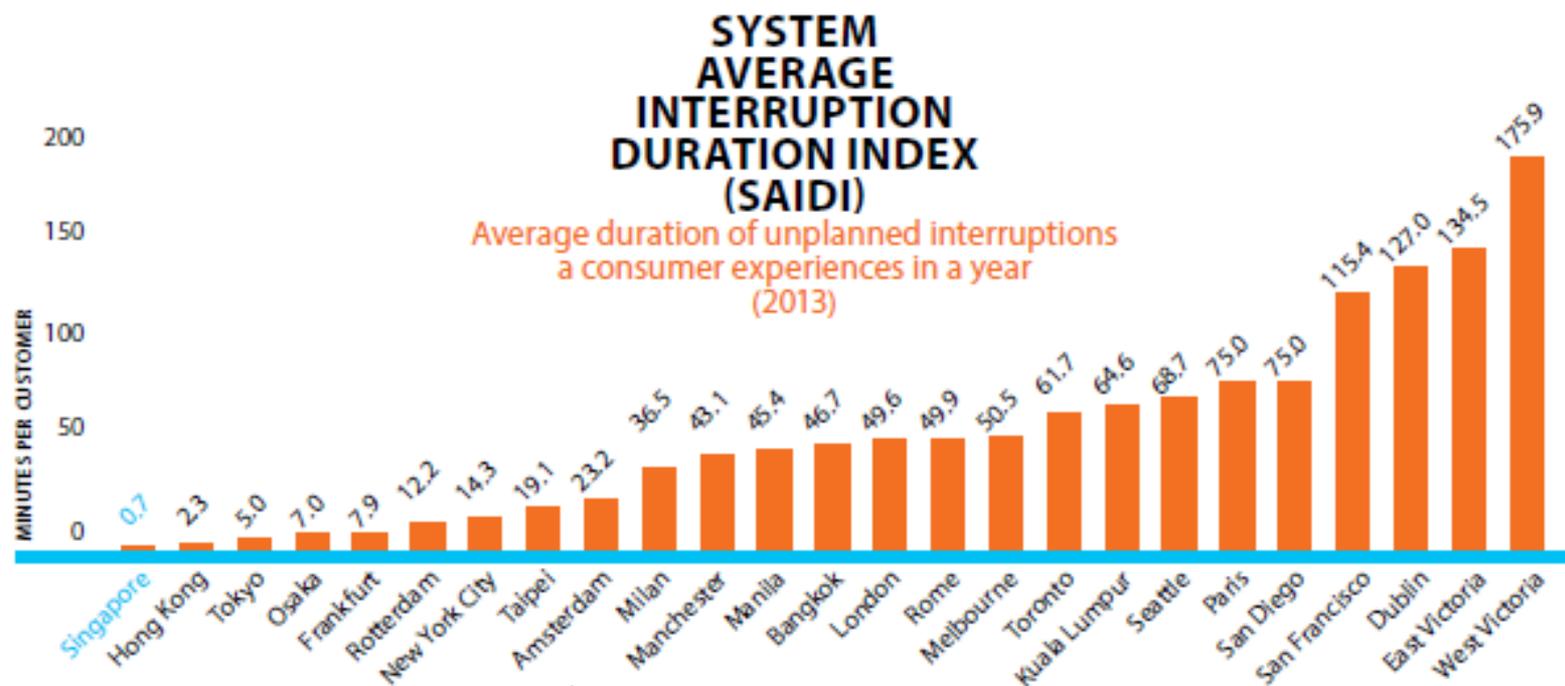


Buy from SPS at the regulated tariff

Electricity supply to your business will not be affected by the choice you make.

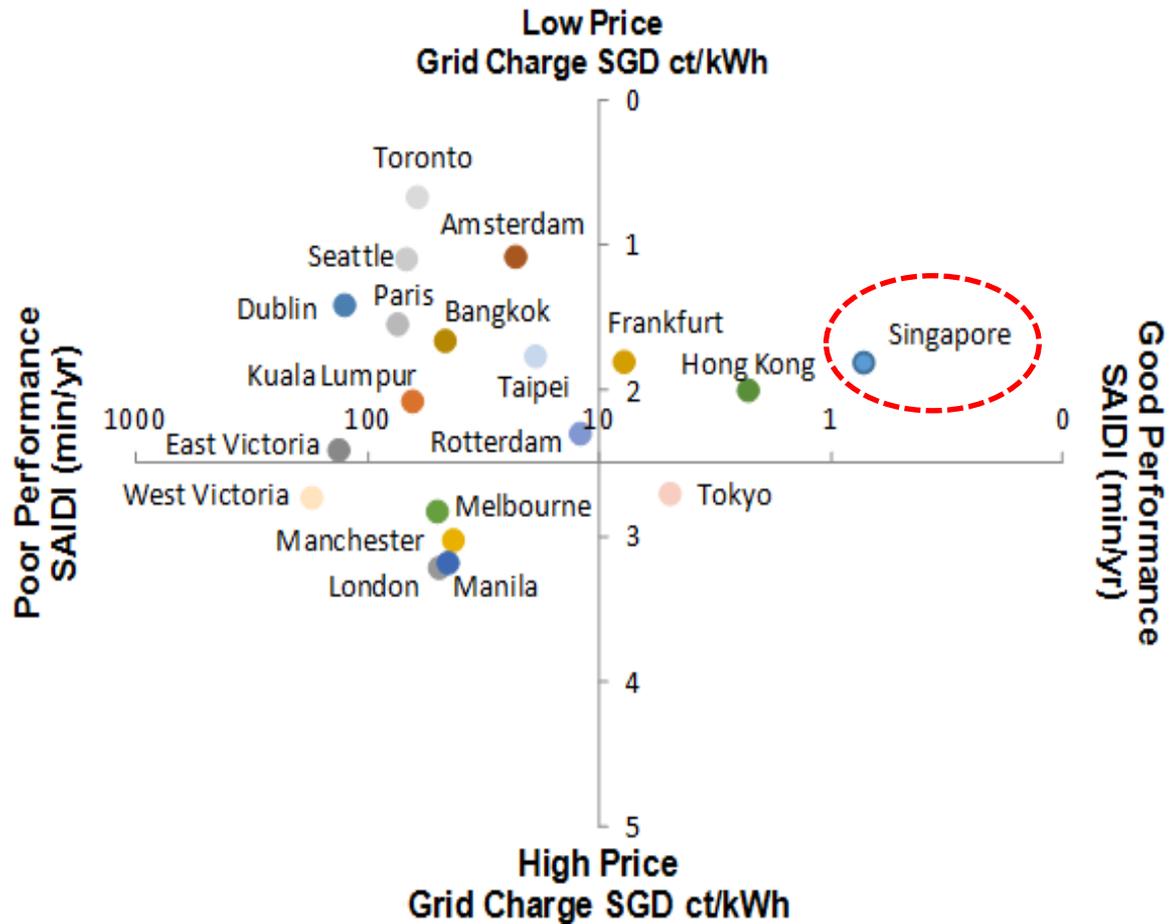


Singapore's enjoys high system reliability



Source: DNVGL, 2014

... at a relatively low cost (grid charge)



FUTURE DEVELOPMENTS

Electricity futures market as a platform for risk management and investment activities

Generators

- Platform to hedge their commercial and operational risks

Consumers

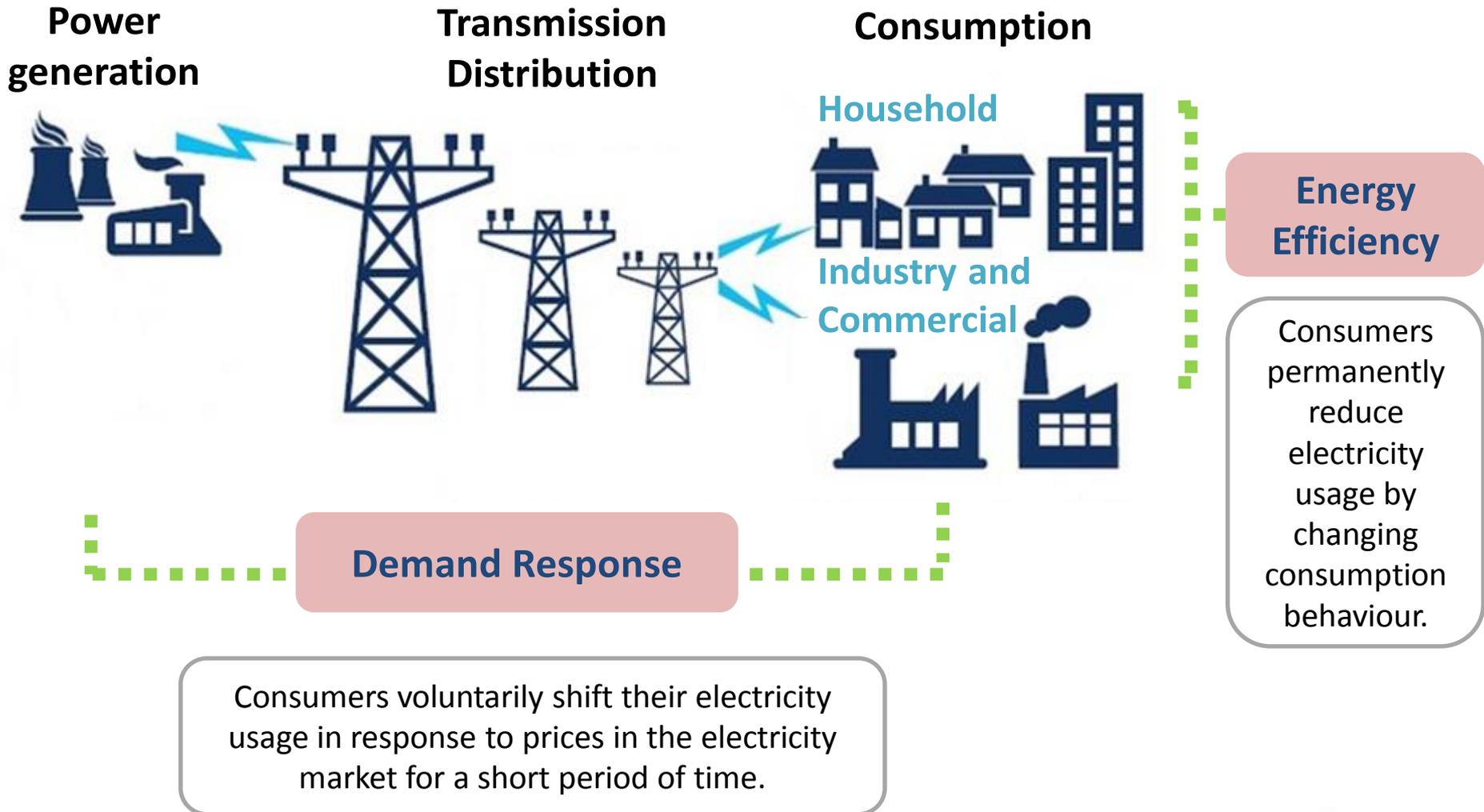
- Lock in long term prices
- Utilise futures price to negotiate their electricity retail package



Retailers

- Expand retail volumes
- Option to secure fixed price contracts for their customers

Improving demand side management



Introducing demand response to enhance competition

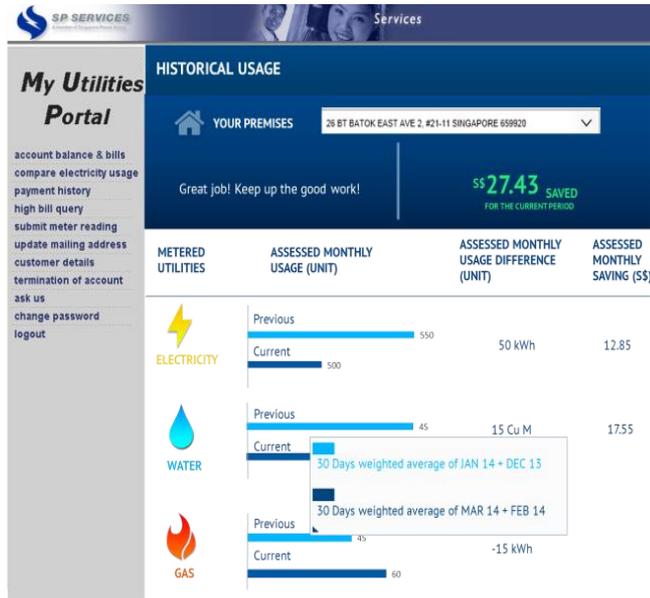
Demand side bidding where consumers can manage electricity usage in response to price signals

Reduce peak wholesale electricity prices

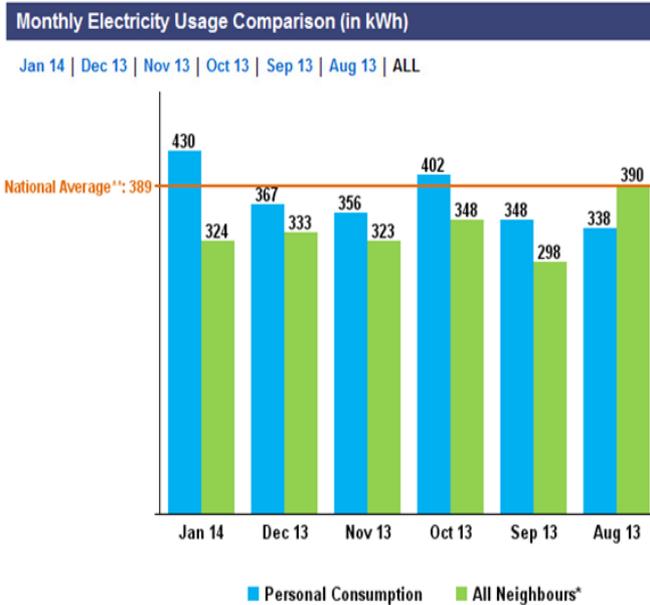
Promote more efficient investment

Provide additional resource to improve system reliability

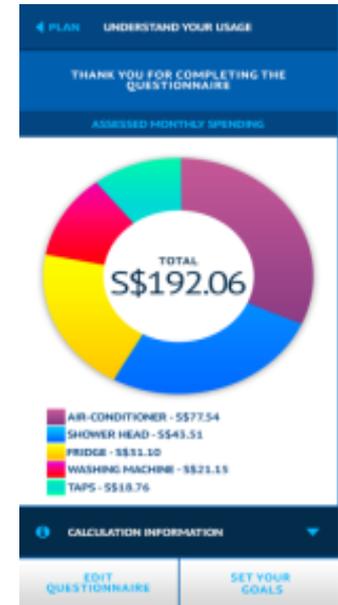
Joint pilot to nudge households to conserve water and electricity



Web portal



Six-month comparison against peers



Home Utility Audit



Project Rain Tree.mp4

Thank You