WEBINAR

Envision the Future of Energy Efficiency in Singapore & ASEAN

2 July 2020

10h (Paris time) / 4pm (Singapore time)

Adeline Aw
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EDB

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TEAM FRANCE EXPORT | French Chamber Singapore | BeeBryte Energy Intelligence & Automation | EDB singapore

Today’s speakers

Sylvain APARICIO

Geraldine MABILLE

Adeline AW

Elodie HECQ

TEAM FRANCE EXPORT | French Chamber Singapore

TEAM FRANCE EXPORT | BUSINESSFRANCE

EDB singapore

BeeBryte Energy Intelligence & Automation

French Chamber of Commerce & Team France Export

TEAM FRANCE EXPORT

The French Chamber of Commerce in Singapore

French Chamber Singapore | Towards Sustainable Business

Who we are

A **non-profit association** under local law, self-financed by its members and the activities and services it offers.
With **40+ years of existence**, we offer a **business platform** for corporates serving other corporates.

Our Mission

- ✓ ***Facilitate set-up and accelerate development of French companies in the local market***
- ✓ ***Develop relations between our members and the Singapore business community***
- ✓ ***Encourage economic, commercial and investment relations between France and Singapore***

Our DNA

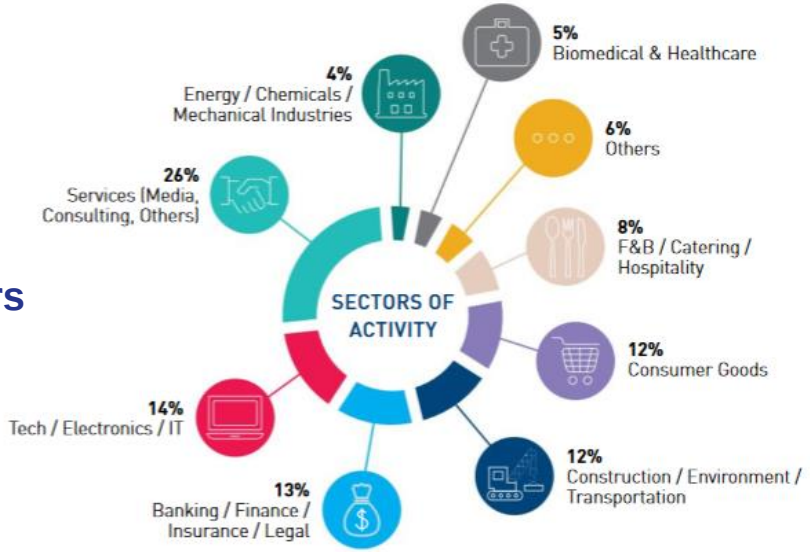
Connect & Energise the Franco-Singaporean business community

+

Provide Business Services to support companies in their development

750+
corporate members

200+
events / year



We boost your business	We support your business
Market study & product testing	Company set-up
Business matching	Recruitement / Visa
Acceleration programs	Business Center
Corporate events	Advertising / Communication

Team France Export

What is TFE?

1. **A joint initiative** (French government, the French regions, Business France, the “Chambre de Commerce et d’Industrie” and Bpifrance) since January 1st 2019.

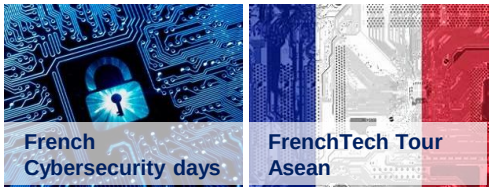
2. **A common ambition: boost the international development of French companies**

3. **A unique representative** of Team France Export per country (French Chamber of Commerce for Singapore)

Our successes in 2019

Our acceleration programs

And coming up in 2020



Energy Efficiency in ASEAN

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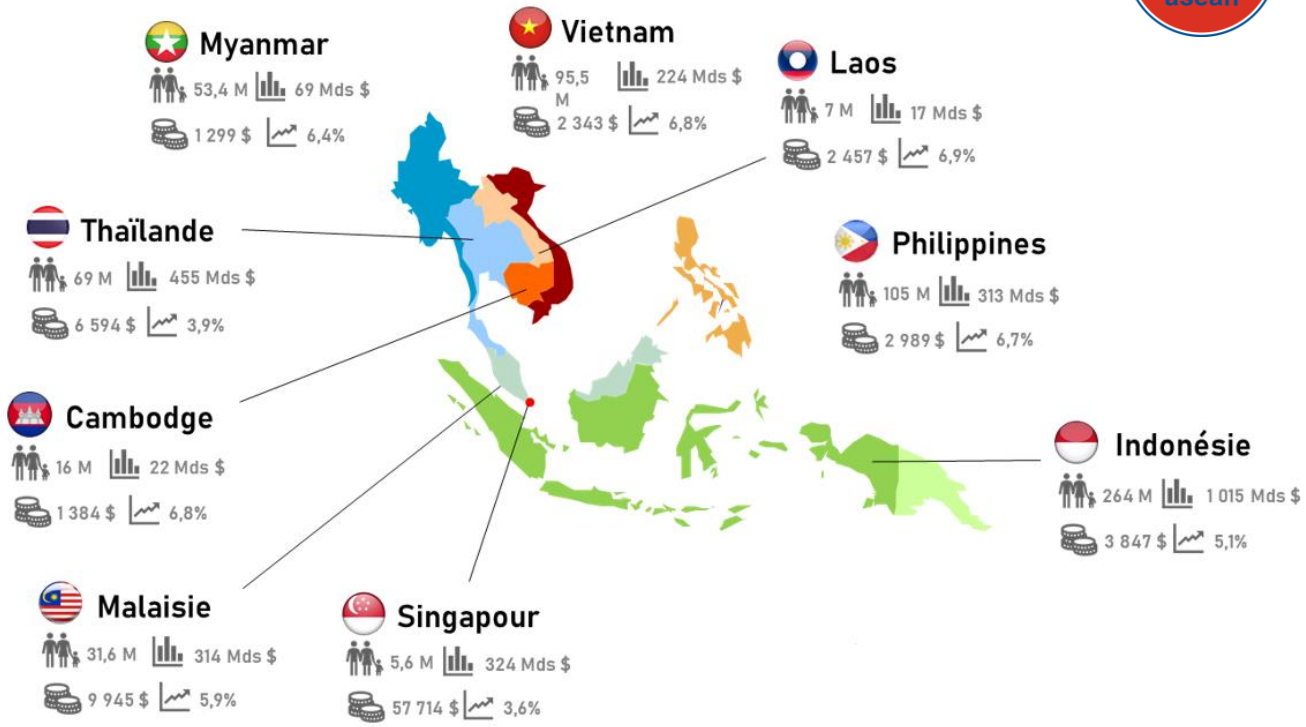
ASEAN

10 countries with different development stages

3rd most dynamic region after China and India



Energy Efficiency Drivers

- Public institutions pushing for energy efficiency
  - Reason : Energy security / increasing local reserves of energy and trade balance improvement / willingness to fight climate change by reducing CO2 emission, Paris Agreement goals…
  - Means : policy, taxes incentives, grants, rating systems, requirement of minimum efficiency performance standards…
- Primary drivers : technologies and process are becoming more efficient
  - Transport : development of electrical cars, public transports development and efficiency…
  - Industry : efficiency in industrial process, recycling of products…
  - Building : lighting, space cooling, appliances, equipment, building envelope, building resilience to climate pressure…
  - Digitalization : car sharing application/ building management / Grid flexibility / increasing productivity and improving safety
- Offsets : end user preference and behavior / Structural trends
  - Middle class growth : growth in average per capita residential floor area, purchase of larger equipment's (air con, cars ..)
  - Social license required for digitalization trends : security and privacy concerns on data management

Energy Acronyms

toe = *Ton of Oil Equivalent*

Total Primary Energy Supply (TPES)

TPES (toe) = $Energy\ Production + Energy\ Imports\ - Energy\ Exports$

Total Final Consumption

TFC (toe) = $\sum Consumption\ by\ the\ different\ end\ use\ sectors$

TFC < TPES, due to losses during the conversion of primary to final energy

ASEAN

Vietnam
95,5 M hbts |
TPES / capita : 0,8 toe
Energy Trade balance: -14 Mtoe

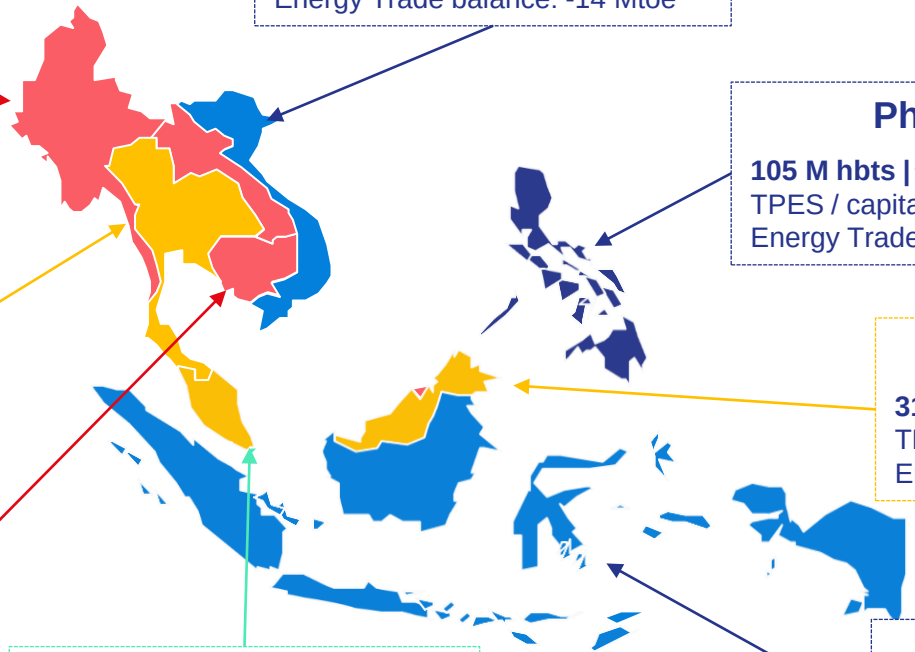
Myanmar
53,4 M hbts |
TPES / capita: 0,4 toe
Energy Trade balance: + 6 Mtoe

Philippines
105 M hbts |
TPES / capita : 0,6 toe
Energy Trade balance : - 31 Mtoe

Thailand
69 M hbts |
TPES / capita : 2,0 toe
Energy Trade balance : - 69 Mtoe

Malaysia
31,6 M hbts |
TPES / capita : 2,7 toe
Energy Trade balance : +8 Mtoe

Cambodia
16 M hbts |
TPES / capita : 0,5 toe
Energy Trade balance : - 3 Mtoe



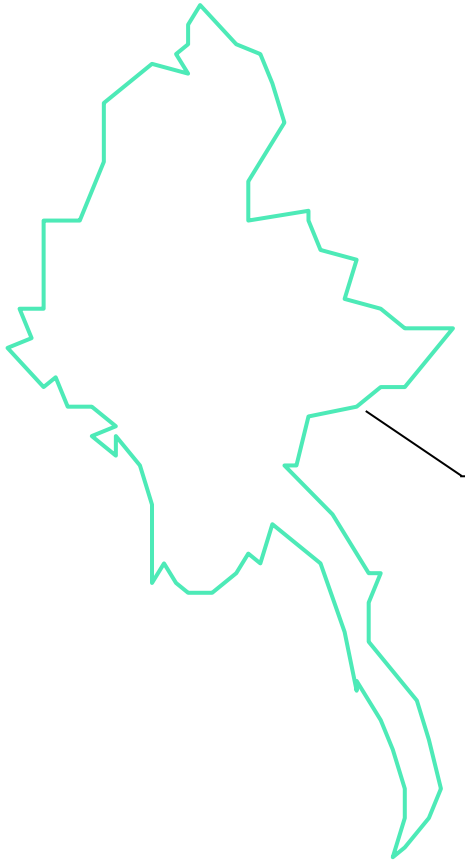
Singapore
5,6 M hbts |
TPES / capita: 6,5 toe
Energy Trade balance : - 93 Mteo

Indonesia
264 M hbts |
TPES / capita : 0,9 toe
Energy Trade balance : +201 Mtoe

Myanmar

TFC / Source	2017
Biofuels & waste	10 886 (ktoe)
Oil Products	6 677 (ktoe)
Electricity	1 466 (ktoe)

TFC / Sector	2017	
Residential	11 287(ktoe)	57 %
Industry	3 441(ktoe)	17 %
Transport	2 034 (ktoe)	10 %



| 53,7 M hbts
| 1 299 $

Indonesia

TFC / Source	2017
Oil products	71 294 (ktoe)
Biofuel & Waste	56 138 (ktoe)
Electricity	19 201 (ktoe)
Natural Gas	14 749 (ktoe)

TFC / Sector	2017	
Residential	64 141 (ktoe)	37 %
Transport	49 335 (ktoe)	28 %
Industry	45 012 (ktoe)	26 %

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Vietnam

TFC / Source	2017
Oil products	19 775 (ktoe)
Coal	14 778 (ktoe)
Electricity	14 856 (ktoe)
Biofuel & Waste	13 600 (ktoe)

TFC / Sector	2017	
Industry	35 293 (ktoe)	55 %
Transport	12 667(ktoe)	20 %
Residential	11 795 (ktoe)	18 %

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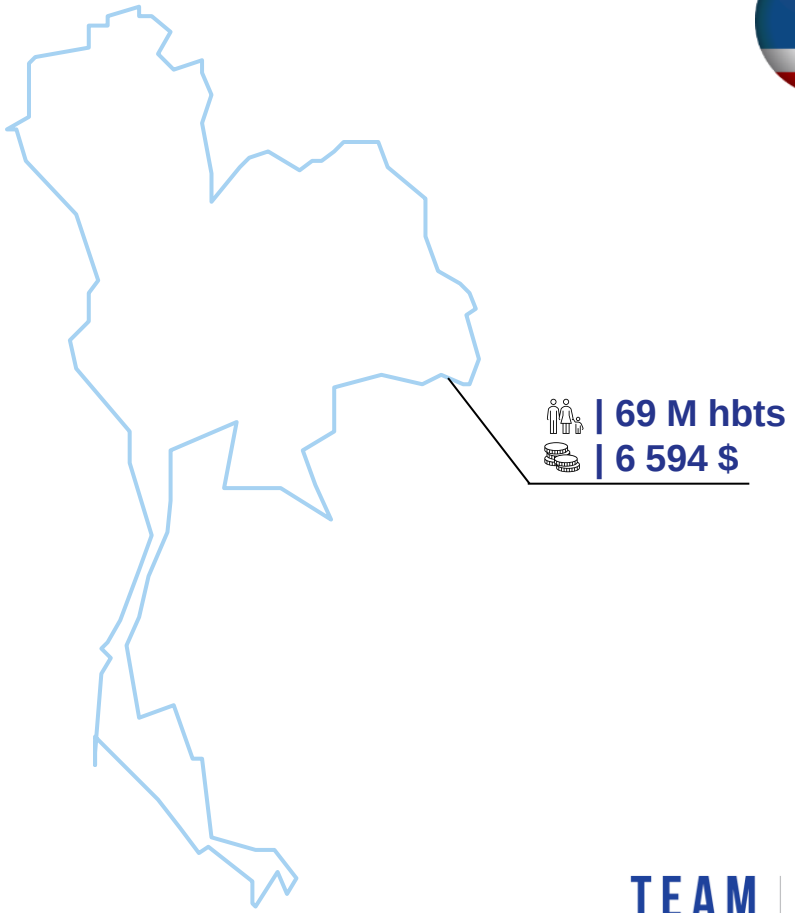
BUSINESSFRANCE

Thailand

TFC / Sector	2017	
Industry	31 200 (ktoe)	32 %
Transport	27 275(ktoe)	28 %
Non energy – use	22 815 (ktoe)	23 %
Residential	9 610 (ktoe)	10 %

TFC / Source	2017
Oil products	53 232 (ktoe)
Electricity	15 934 (ktoe)
Biofuel & Waste	14 650 (ktoe)



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BUSINESSFRANCE

Malaysia

TFC / Source	2017
Oil Products	28 962 (ktoe)
Natural gas	16 838 (ktoe)
Electricity	12 607(ktoe)
Coal	1 804 (ktoe)
Biofuels & Waste	380 (ktoe)

| 31,6 M hbts
| 9 945 $

TFC / sector	2017	
Transport	20 946 (ktoe)	35 %
Industry	17 781 (ktoe)	29 %
Non Energy Use	12 517 (ktoe)	21 %

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Singapore

TFC / Source	2017
Oil Products	18 937 (ktoe)
Electricity	4 269 (ktoe)
Natural Gaz	1 295 (ktoe)
Coal	173 (ktoe)

| 5,6 M hbts
| 57 714$

TFC / sector	2017	
Non energy Use	12 766 (ktoe)	52 %
Industry	6 837 (ktoe)	28 %
Transport	2 526 (ktoe)	10 %

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Post Covid 19 trends

- Consumer : Too early to see the impact of Covid 19 on consumers behavior
- Private sector : so far, the pandemic put a brake on energy efficiency investments
- Government : To follow up closely Covid 19 recovery plans

  ⇒ Building sector will very likely benefit from a strong support from governments: pushing for employment, it might contain energy efficiency requirements

  ⇒ No set back on the renewable energy path, improving energy efficiency / reducing energy consumption will increase the share of renewable energy in primary energy mix and help reach COP 21 goal NDC's

- IFI's : projects often linked with a climate resilience component

Adeline AW

VP Environmental Sustainability Economic Development Board

Future of Energy Efficiency in Singapore

2nd July 2020

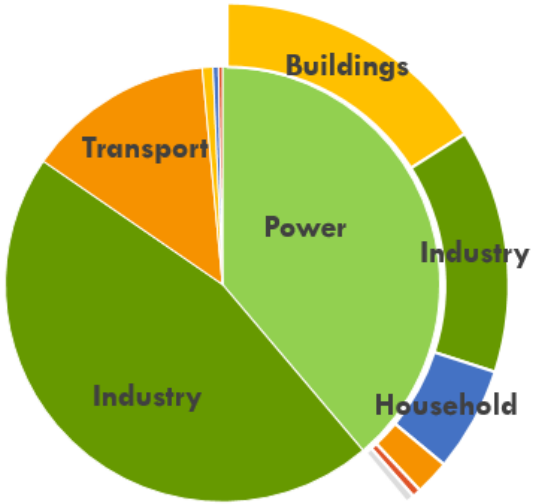
SINGAPORE'S CLIMATE CHANGE COMMITMENTS

Singapore's long-term low-emissions development strategy (LEDS)

To halve its 2030 peak greenhouse gas emissions by 2050, and to achieve net zero emissions as soon as viable in the second half of the century.

Primary Emissions

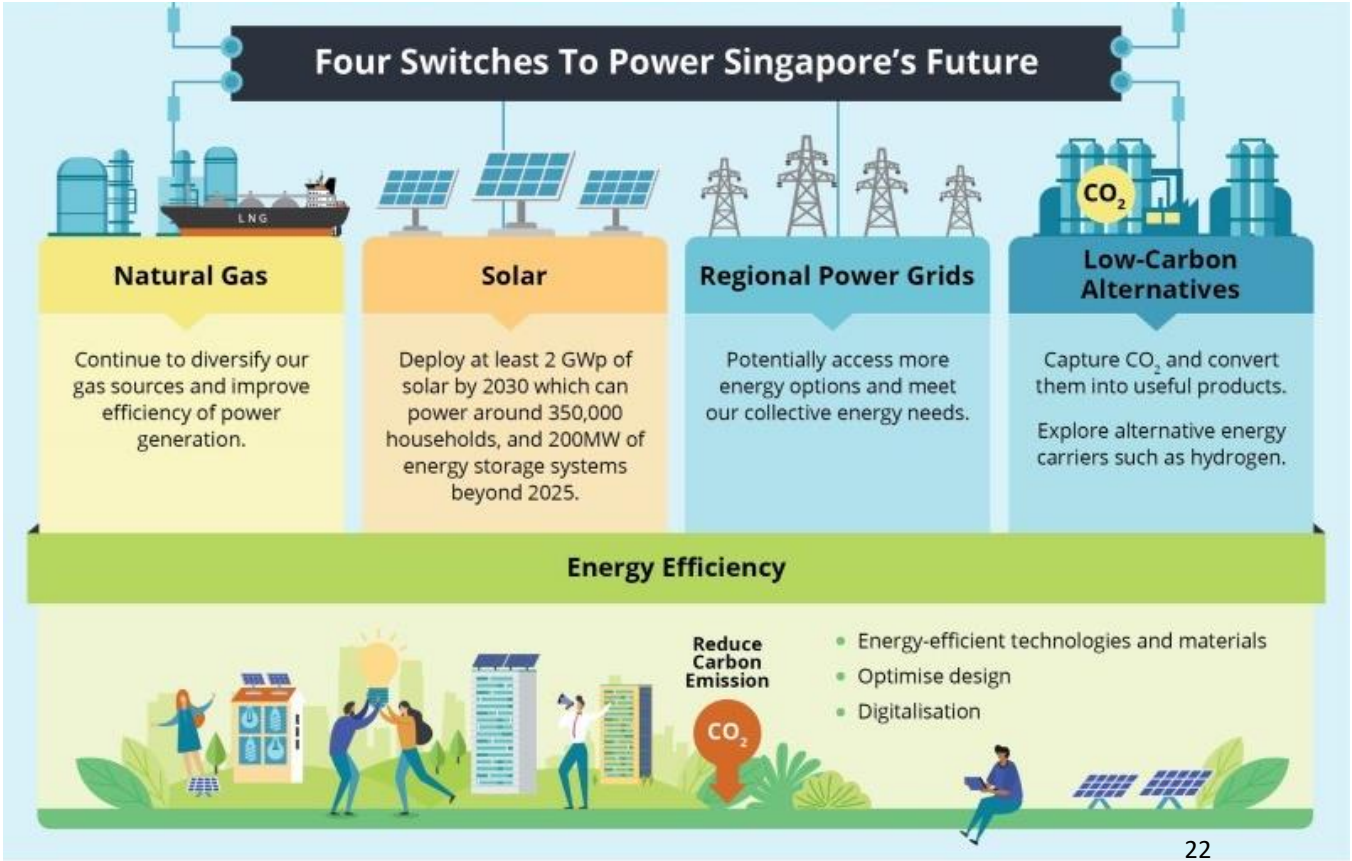
- Power 39%
- Industry 46%
- Transport 14%
- Buildings 0.8%
- Household 0.4%
- Waste 0.3%



Secondary Emissions

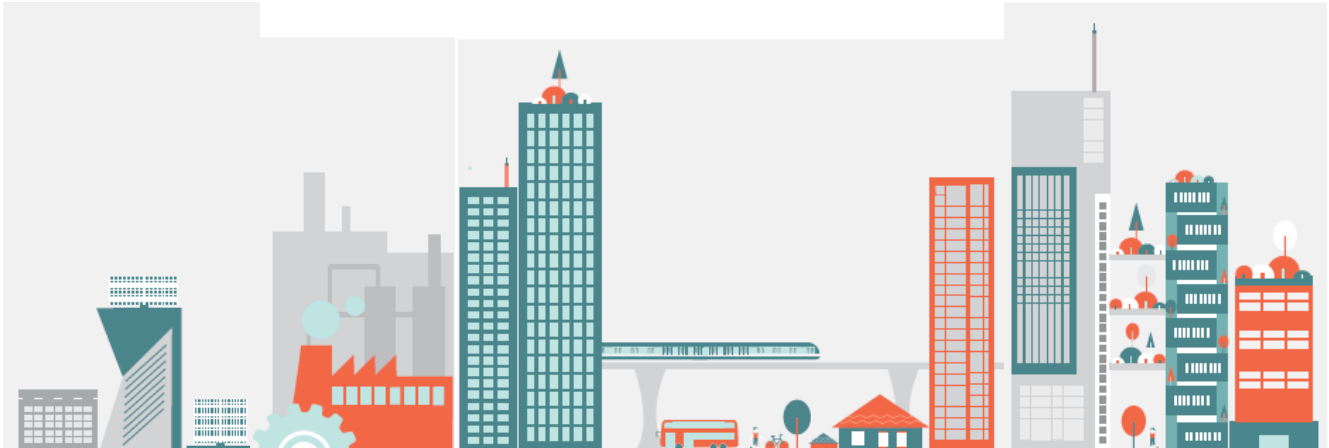
- Buildings 16%
- Industry 14%
- Household 6%
- Transport 2%
- Waste & Water 0.5%
- Others 0.5%

SINGAPORE'S ENERGY STORY

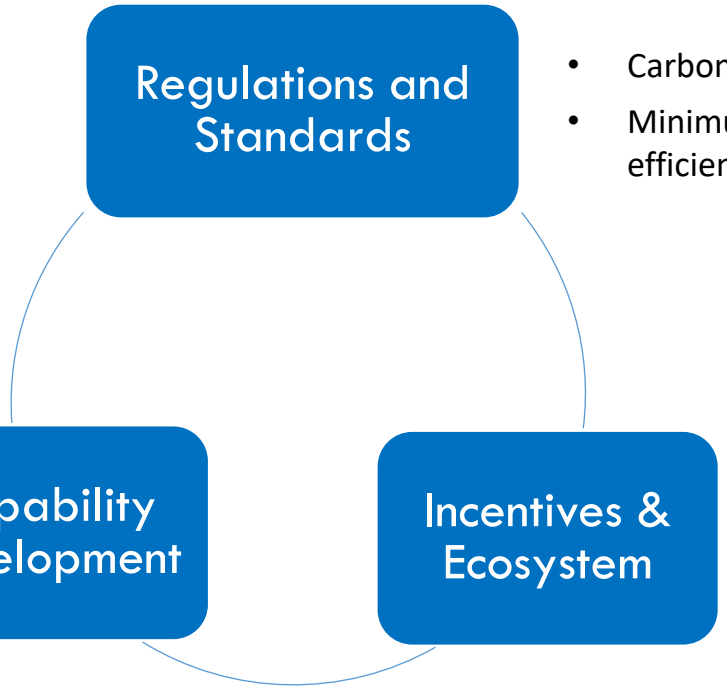


A WHOLE-OF-GOVERNMENT EFFORT TO MITIGATION

Power Generation	Industry	Buildings	Transport	Households
Energy Market Authority National Environment Agency	EDB Singapore National Environment Agency	Building and Construction Authority Housing & Development Board National Environment Agency	Land Transport Authority CAAS MPA Singapore	Building and Construction Authority Housing & Development Board National Environment Agency



IMPROVING INDUSTRIAL ENERGY EFFICIENCY

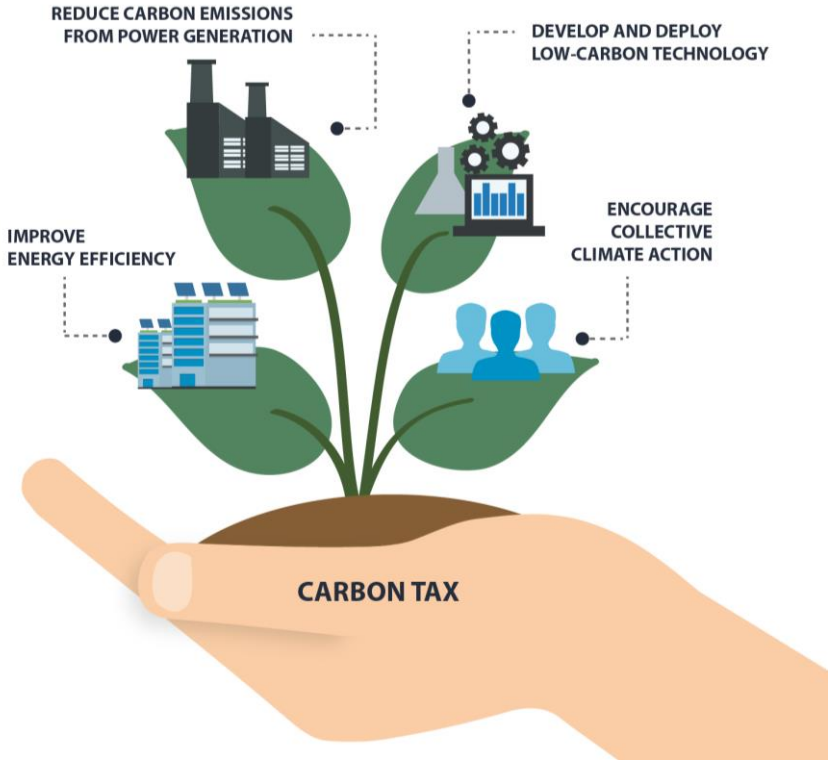


- Carbon tax and energy conservation
- Minimum energy performance and efficiency standards

- Training and certification programmes
- Platforms to learn and share best practices

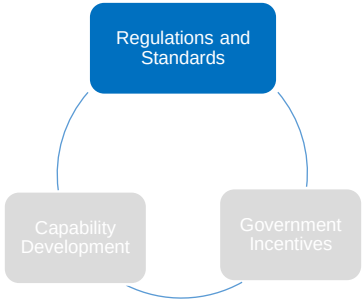
- Energy Efficiency grants and incentives
- Research and Innovation
- Fostering the ecosystem

CARBON PRICING ACT (CPA)



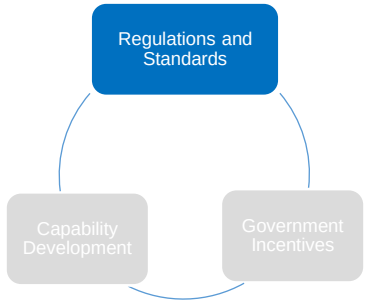
HOW IT WORKS

- Introduce a tax on emissions
- Encourage EE & support more green actions
- Lower carbon, greener economy

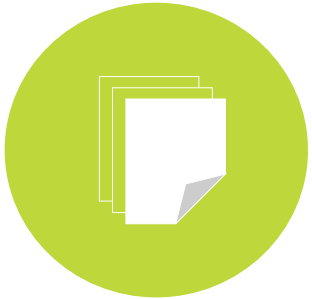


ENERGY CONSERVATION ACT (ECA)

Mandating energy management practices under the ECA



Appoint energy manager (SCEM-certified)



Monitor & report energy use & GHG emissions

Submit energy efficiency improvement plan

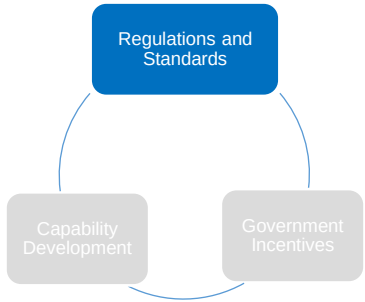
SECTORS COVERED

1. Manufacturing & related services
2. Supply of electricity, gas, steam, compressed air & chilled water
3. Water supply & sewage & waste management

ENERGY-INTENSIVE CONSUMERS

≥ **54** TJ/yr

ENERGY CONSERVATION ACT (ECA)



New facilities & major expansions

- Review facility design for EE[1]
- Report measured energy data[1]

Existing facilities

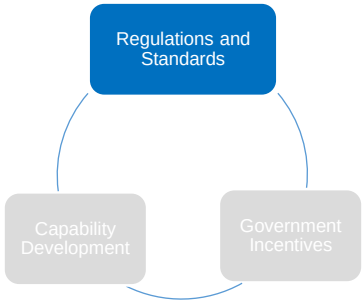
- Implement structured energy management system[2]
- Conduct regular EE opportunities assessments (EEOAs)[2]

Common industrial equipment & systems

- Introduce minimum energy performance standards, starting with motors[1]

[1] From 2018 onwards
[2] From 2021/22 onwards

MANDATORY STANDARDS



1 Minimum Energy Performance Standards For Industrial Equipment and Systems

- Phasing out inefficient models and catalyze the transformation towards more efficient models
- WEF 1st Oct' 18: Single speed, three-phase 50 Hz or 50/60 Hz induction motors sold in Singapore must have a minimum energy efficiency level of IE3 (International Energy Efficiency class 3).

2 Minimum Energy Efficiency Standards for Water-Cooled Chilled Water Systems in Industrial Facilities

- Cover electrically-driven, water-cooled chilled water systems in industrial facilities that:
  - (i) have a total installed capacity of 1055 kW (300 RT) or more; and
  - (ii) produce chilled water at a temperature of at least 3°C
- Compliance timeline: By 1 Dec 2025 or 2029 depending on type of industrial facility

** Further information can be found in this link*

CAPABILITY DEVELOPMENT

EENP Learning Network and Conference

- Promote adoption of in-house energy management systems
- Provide opportunities to learn and share

Module-based training for Singapore Certified Energy Managers

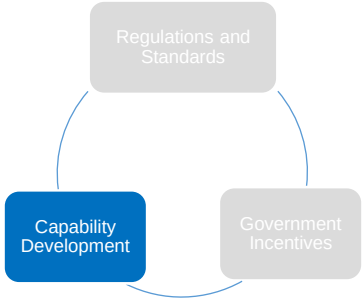
- Training and certification system in energy management
- Training grant for companies to train their employees

Energy Services Company (ESCO) Accreditation Scheme

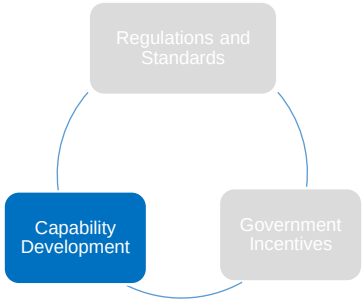
- Enhance professionalism and quality of services offered by ESCOs
- Enhance confidence in the energy services sector and helps to promote the growth of industry

Energy Efficiency Opportunities Assessment (EEOA) Framework

- Certify qualified EE professionals with expertise in assessing energy efficiency opportunities



CAPABILITY DEVELOPMENT



New Energy Efficiency Technology Centre (EETC) to boost industry capabilities

- The National Environmental Agency (NEA) and the Singapore Institute of Technology (SIT) collaborated to set up the EETC at SIT's campus

- The EETC aims to:

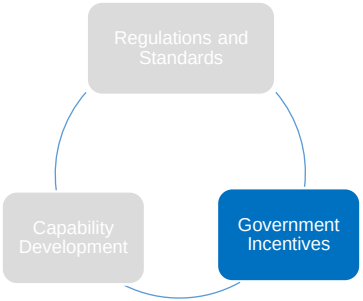
✓Catalyse EE improvements at SMEs

✓Train a pipeline of engineering undergraduates in industrial energy efficiency; and

✓Upskill existing engineers or EE practitioners.

MOU signing ceremony for the launch of the EETC

EDB'S ENERGY EFFICIENCY INCENTIVES



Resource Efficiency Grant for Energy ((REG(E))

- Supports EE improvement and removal of non-CO_2 GHG projects
- Grant support will correspond to the amount of carbon abatement achieved, with minimum carbon abatement of 0.5 ktpa

Investment Allowance for Energy Efficiency (IA-EE)

- Supports EE improvement projects
- Provides capital allowance of 30% of more of approved fixed capital expenditure, on top of normal capital allowance

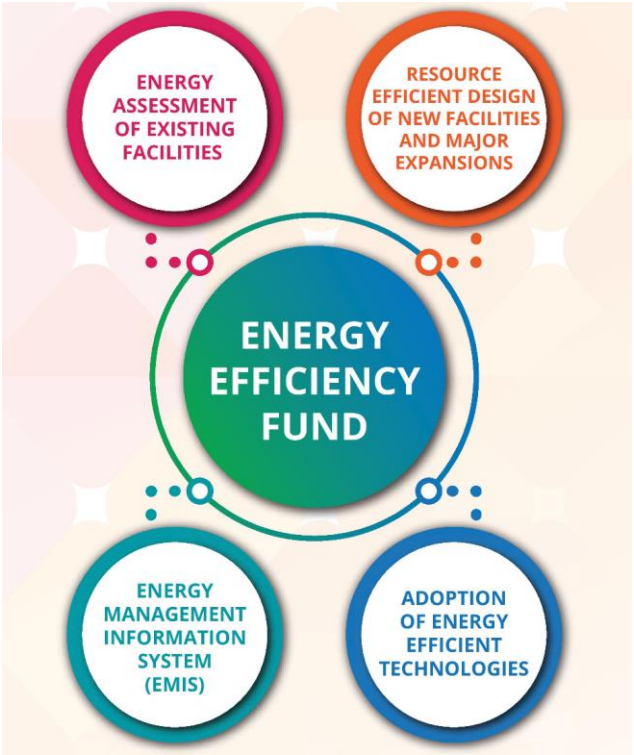
EE Financing Programme

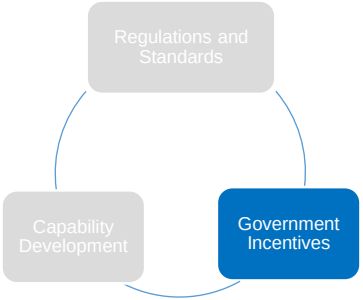
- Provides 3rd party financing for upfront costs of EE improvement projects
- Investment return can typically be 'paid' from savings

NEA'S ENERGY EFFICIENCY FUND (E2F)

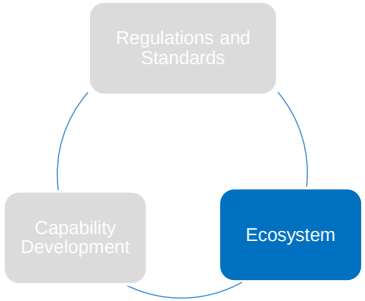
- The E2F supports businesses to improve energy efficiency of industrial facilities.

- E2F provides up to 50% co-funding for:
  - ✓Energy assessment of existing facilities
  - ✓Resource efficient design of new facilities or major expansions
  - ✓Adoption of energy efficient technologies
  - ✓**Implementation of an energy management information system**





FOSTERING THE ECOSYSTEM



- EDB is responsible for strategies that enhance Singapore as a global centre for business, innovation and talent. EDB works with companies by providing information, connection to partners and access to government incentives for their investments, as well as their transformation and growth initiatives.

- EDBI is a Singapore-based investor investing in future industries of Singapore in the knowledge and innovation-intensive sectors of Information and Communication Technology (ICT), Emerging Technology (ET), Healthcare (HC) and other strategic industries.

- Startup SG represents the shared interests of the startup community and positions Singapore as a leading start up hub. It provides entrepreneurs with a launchpad and a platform to connect them to the global stage and access to local support initiatives.

EE PROJECTS WE HAVE SUPPORTED

	Type of EE Project	Details
1	Air Compressor Upgrade	Changing air compressors to higher efficiency models, to reduce power and/or utilities consumption.
2	Heat Exchanger Upgrade	Upsizing or upgrading to heat exchangers with higher overall heat transfer coefficient, to reduce further heating needs e.g. reduce steam consumption and/or fuel consumption.
3	Heat Integration	Addition of heat exchangers, or reconfiguration of heat exchanger train, to integrate heating/cooling needs of process streams, leading to reduction in utilities consumption.
4	Motorization of Steam Turbine	Replacement of steam-driven turbines with electric motors.
5	Waste Heat Boilers	Steam generation using hot process streams to reduce one or more of the following benefits (non-exhaustive): i. Fuel consumption in conventional boilers, ii. Steam import from 3rd party utilities iii. Cooling demand for process stream
6	Chillers	Replacement of air-cooled chillers with higher efficiency water-cooled chillers.

PILOTING INNOVATION

- Energy monitoring & digitalisation
- Process heating – low grade waste heat recovery
- District cooling systems (building sector)

Pilot of Organic Rankine Cycle Waste Heat Recovery System for Steel Rolling Mill Reheating Furnace in Singapore

District cooling system for Punggol Digital District to be designed by ENGIE

WHAT LIES AHEAD

1. More EE opportunities as we transition to a lower-carbon economy
2. Expertise needed to tackle more complex EE projects
3. Government resources available to support businesses

Thank You

BeeBryte

Energy Intelligence & Automation

The Future of Energy Efficiency in Singapore

THE FUTURE OF ENERGY EFFICIENCY | A start-up point of view

1. About BeeBryte
2. GreenMark certification
3. Energy efficiency vs. Energy conservation
4. Habits and expectation of the market

Elodie HECQ

Head of Sales & Acting Managing Director – Asia, BeeBryte

A BIT MORE ABOUT US | Energy Intelligence & Automation Software

Founded
2015

Team of
25

Offices in
FRANCE &
SINGAPORE

Selected customers

NGEE ANN POLYTECHNIC
Groupama Stadium
Olympique Lyonnais
picard
DHL
ENGIE
KUEHNE+NAGEL
CertiNergia
dalkia GROUPE EDF
STEF
MAIRIE DE PARIS
voltalia
THE LINDE GROUP
Mercedes-Benz
CEVA Logistics
SOLVAY
BOUYGUES CONSTRUCTION

Accelerated by

intel
Microsoft
Schneider Electric

Supported by

CNR
bpifrance
Energy Market Authority

OUR CORE PRODUCT « HIVE OPTIMAL »

Software-as-a-Service + IoT Gateway

FORECAST

Weather

Occupancy & Activity

Electricity Price

AUTOMATED CONTROL

Cloud Platform

Smart Box

Thermal

Chillers/VRVs

AHUs

Heating

Process

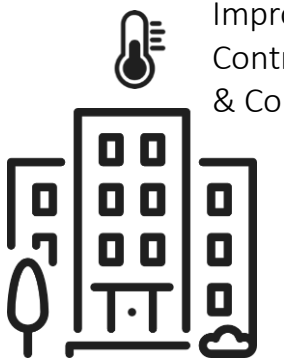
Flexible Systems

Storage

Batteries

PATENTED

Intellectual Property



Improved T° Control & Comfort

10-40 %

ENERGY COST SAVINGS

CASE STUDY | Logistics warehouse in Singapore – Hive Optimal

Key figures

- **30%** elec. load from HVAC
- **S$2.5m** annual elec. bill
- **90,000** m^2
- **18-25°C** Indoor T° flexibility
- **VRV** 77 CUs – 154 FCUs

Controlled parameters

FCUs (ON/OFF, temperature, fan speed…)

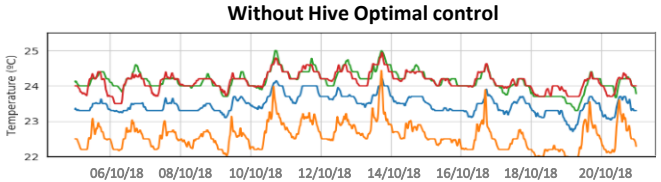
Strategies

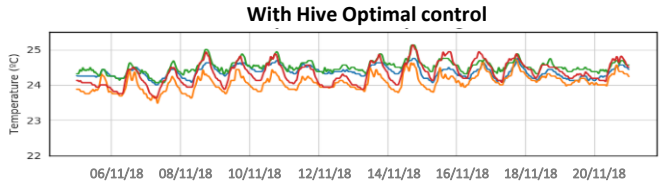
Temperature homogenisation

Anticipation of weather & activity changes

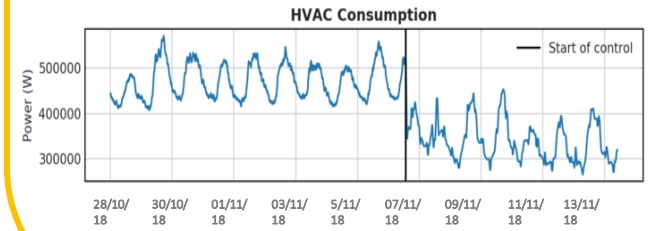
Identification of system anomalies

RESULTS





Better control of inside temperature: **homogenisation** and **stabilisation**



- **37%** HVAC energy consumption
- **1,000** tons of CO_2 / year
- **28%** Uncontracted capacities

S$300,000 savings annually

GREENMARK CERTIFICATION

Building and Construction Authority

Section 1 – SUSTAINABLE MANAGEMENT

1.1 Environmental Credentials of Facility Managers and Consultants
1.2 Sustainable Policy and Action Plan
1.3 Green Building Committee
1.4 Green Education
1.5 Green Fit-out Guidelines
1.6 Green Lease
1.7 Green-related Activities for Building Occupants
1.8 Greenery
1.9 Refrigerant
1.10 Green Transport
1.11 Sustainable Operation

Section 2 – BUILDING ENERGY PERFORMANCE

2.1 Façade Performance
2.2 Air Conditioning System Operating Efficiency
2.3 Natural / Mechanical Ventilation Performance
2.4 Lighting System Efficiency
2.5 Vertical Transportation System
2.6 Ventilation in Car Park
2.7 Ventilation in Common Areas
2.8 Energy Efficient Practices and Features
2.9 Renewable Energy

Section 3 – RESOURCE STEWARDSHIP

3.1 Water Efficient Fittings
3.2 Landscape Irrigation
3.3 Reduction of Water Consumption of Cooling Towers
3.4 Water Monitoring and Leak Detection
3.5 Water Usage Portal and Dashboard
3.6 Use of Alternative Water Sources
3.7 Green Products and Materials
3.8 Recycling Facilities
3.9 Storage Area for Recyclable Waste
3.10 Promotion of Waste Reduction
3.11 Waste Monitoring

Section 4 – SMART AND HEALTHY BUILDINGS

4.1 Occupant Comfort
4.2 Outdoor Air Control
4.3 Enhanced Filtration Media
4.4 Indoor Contaminants
4.5 Lighting Quality
4.6 Acoustics
4.7 Biophilic Features
4.8 Energy Monitoring
4.9 Demand Control
4.10 Integration and Analytics

Section 5 – ADVANCED GREEN EFFORT

Non-residential existing facilities

A certification to assess how “green / sustainable” a building is, along 4 main categories:

- Management / strategy
- Electricity consumption
- Water and waste management
- Healthy facilities

Different levels (gold, platinum, etc.)

Becoming more and more applied: mandatory for new government buildings for instance

https://www.bca.gov.sg/GreenMark/green_mark_criteria.html

ENERGY EFFICIENCY VS. ENERGY CONSERVATION

2. AIR CONDITIONING SYSTEM MINIMUM OPERATING EFFICIENCY

(i) For Buildings using Water-cooled Chilled-water Plant

Green Mark Rating	Building Cooling Load (RT)	
	< 500	≥ 500
	Minimum Efficiency (kW/RT)	
Certified	0.8	0.75
Gold	0.75	0.70
Gold^{PLUS}	0.7	0.68
Platinum	0.68	0.65

(ii) For Buildings using Air-cooled Chilled-water Plant or Unitary Air-Conditioners

Green Mark Rating	Building Cooling Load (RT)	
	< 500	≥ 500
	Minimum Efficiency (kW/RT)	
Certified	1.1	1.0
Gold	1.0	*N.A
Gold^{PLUS}	0.85	
Platinum	0.78	

*For buildings with cooling load of more than 500 RT, the air-cooled chilled-water plant or unitary air-conditioners will be assessed on a case-by-case basis. It will only be considered when it meets the same efficiency requirement as stipulated in 2(i).

Note: Performance of the overall air-conditioning system for the building is based on the Operating System Efficiency (OSE) of the system during standard building operating hours as defined below:

Office Building: Monday to Friday: 9am to 6pm Retail Mall: Monday to Sunday: 10am to 10pm	Hotel and Hospital: 24-hour Industrial Building and Other Building Types: To be determined based on its normal operating hours

Non-residential existing facilities

Huge emphasis on **energy efficiency** and not a mention on **energy conservation** strategies (in general, not only HVAC)

1. Most large commercial facilities are **efficient** = low number of kWh for service provided

2. Very few are actually wondering how much of a service they actually need (**energy conservation**), hence leading to energy wastage:
   - Facilities over-cooled (people wearing jumpers inside while 30+ deg outside)
   - LEDs on 24/7

Opportunity !

EXPECTATIONS & HABITS

Proof of Concept

Even though your solution may be proven in 100s of buildings and in the one across the street, they still want to “test it out” for free for a 3-6 months.

Baselines are expected to be about efficiency (kW/RT) not consumption and “basic” averages of the previous years

Baseline in kW/RT

(HVAC only)

This doesn’t mean you HAVE to comply
but to be prepared to carefully explain and justify why you’re not doing it,

like we did!

Non-residential facilities

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Energy Intelligence & Automation

Join us in the energy revolution!

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