Energy Efficiency Policy Training Week: Appliance & Equipment Stream

Appliances & Equipment Stream: Day 2, Tuesday 3 May

Introduction

Meet the team

Mel Slade

Head of Energy Efficiency in Emerging Economies (E4) Programme,
International Energy Agency

Kevin Lane

Head of Energy Efficiency Analyst Team,
International Energy Agency

Emily McQualter

Energy Efficiency Analyst in Emerging Economies (E4) Programme,
International Energy Agency

Charles Michaelis

Director of Strategy Development Solutions,
Strategy Development Solutions

Norma Morales

Director of Regulations in Energy Efficiency,
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Virginia Zalaquett

Professor of the Diploma in Energy Efficiency,
Pontificia Universidad Católica de Chile

Nisla Sauri

Regulatory Expert,
LG Electronics Panama

Andika Hermawan

Energy Efficiency Analyst (Intern),
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Chief of Department for Equipment Standards,
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Overview of the appliance and equipment training sessions

Day 1	**Opening Day: High-Level Plenary Sessions, Open to the Public**
Day 2	**Appliances and Equipment Stream** Trainers: Kevin Lane, Melanie Slade, Emily McQualter and Charles Michaelis
Day 3	The Training Week will consist of three parallel streams, with each participant following one stream throughout the week. Daily instruction will combine lectures with group work and self-study to present and reinforce the course material. At the end of Day 4, participants will begin a group activity, to be completed on Day 5, where participants from across streams will interact with each other to answer a policy-related challenge.
Day 4	
Day 5	**Group Activity and closing**
	Participants will work in groups to develop a policy solution to a problem posed by the instructors. The assignment will cut across all three modules of the training.

What to expect?

Summary	This Appliance and Equipment Stream will focus on how policy makers can implement cost-effective policies and programmes to transform markets and scale up the use of efficient appliances and equipment. Using a number of scenarios the course takes a step-by-step approach through prioritisation of products and policy tools. A strong focus will be placed on policy implementation and enforcement. The course will also explore the opportunities for building an efficient local manufacturing industry for efficient equipment and appliances.
Aim of the Course	Develop skills and knowledge to design, implement, and evaluate appliance and equipment energy efficiency policy
Training Philosophy	**Where to start**: we discuss the basic principles **Toolkit**: we discuss what can be done, what are the solutions **What are the steps**: how you can implement what you have learnt

What to expect?

Plenty of activities all aimed to increase your understanding

Actively participate and share experiences!

Self-study

Use the opportunity to network!

Ask questions

Group Assignment

Learning outcomes – slide on what we are covering today

Appliance & Equipment Stream - Tuesday 3 May		
Time		**Activities**
Panama	Paris	
08.00 – 09.30	15.00 – 16.30	Opening Lecture ▪ Why is appliance energy efficiency important ▪ What are Minimum Energy Performance Standards: MEPS ▪ Understanding the Market
09.30 – 11.00	16.30 – 18.00	Self-study and Assignment: Quiz, and Exercise
11.00 – 12.00	18.00 – 19.00	Group Work ▪ Group Assignment: Setting MEPS
12.00 – 13.30	19:00 – 19:30	Group report back

Question!

What do you hope to get out of this training?

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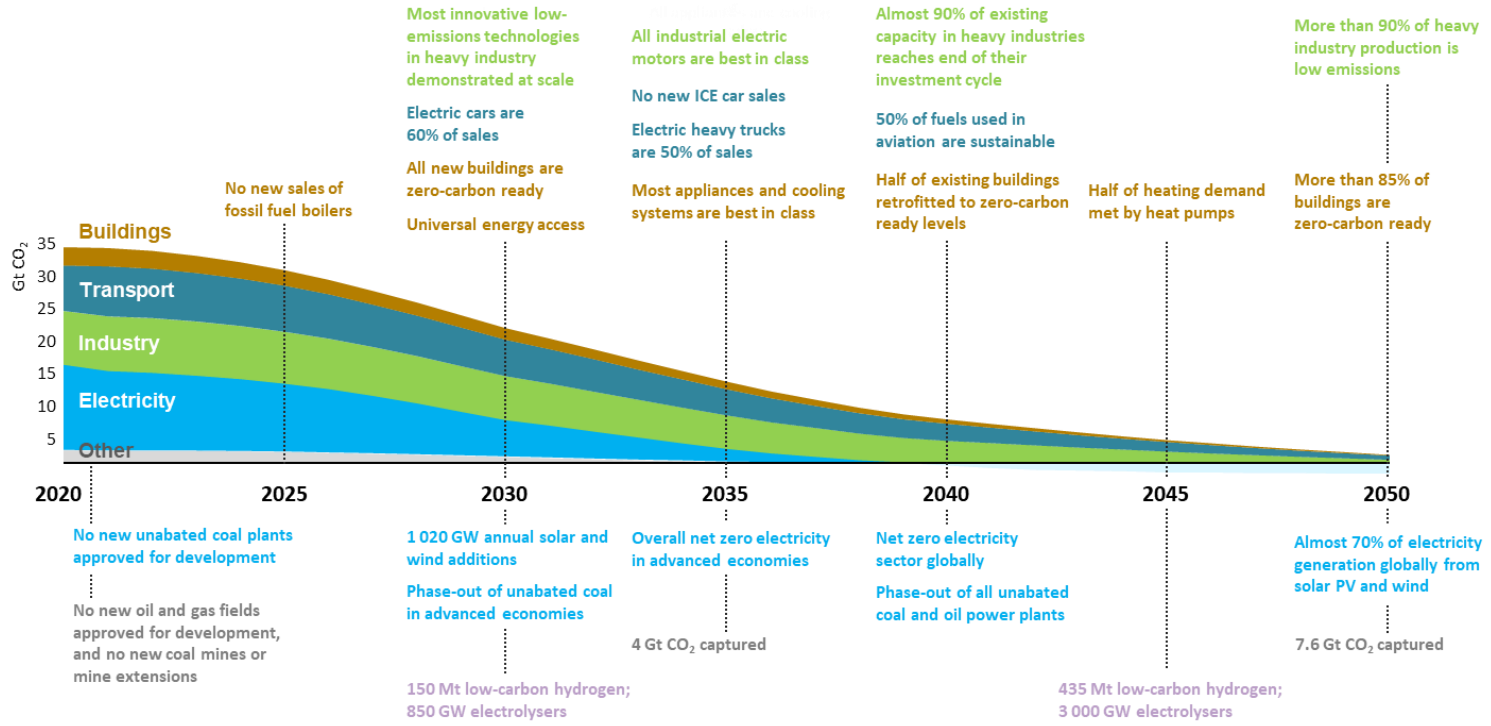
or

Go to www.menti.com and use the code **3057 7577**

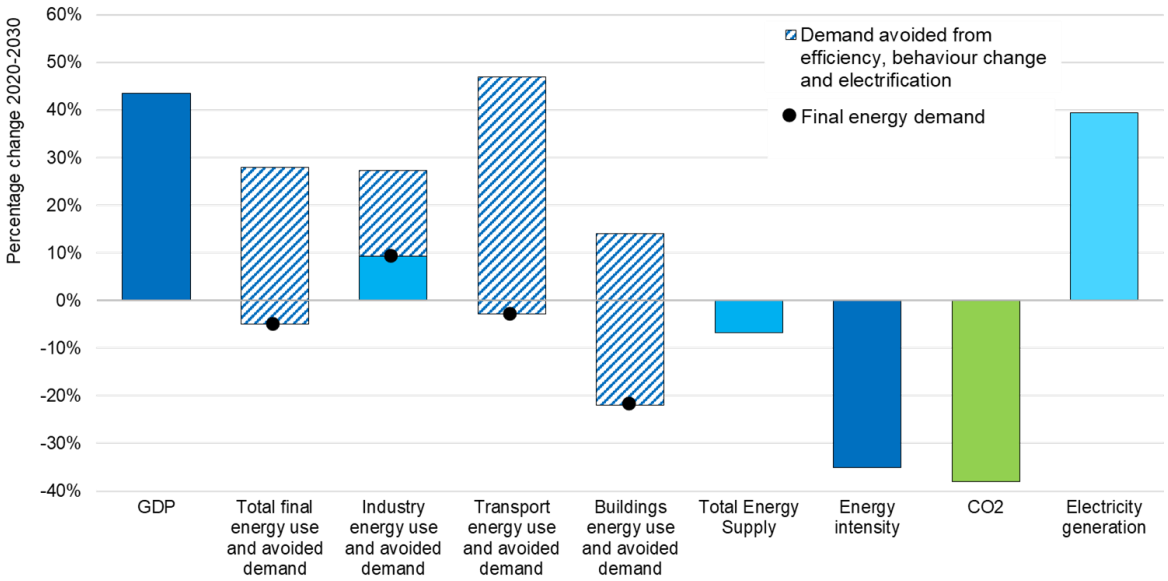
Why is appliance energy efficiency important?

Over 40 efficiency milestones on the road to net zero emissions



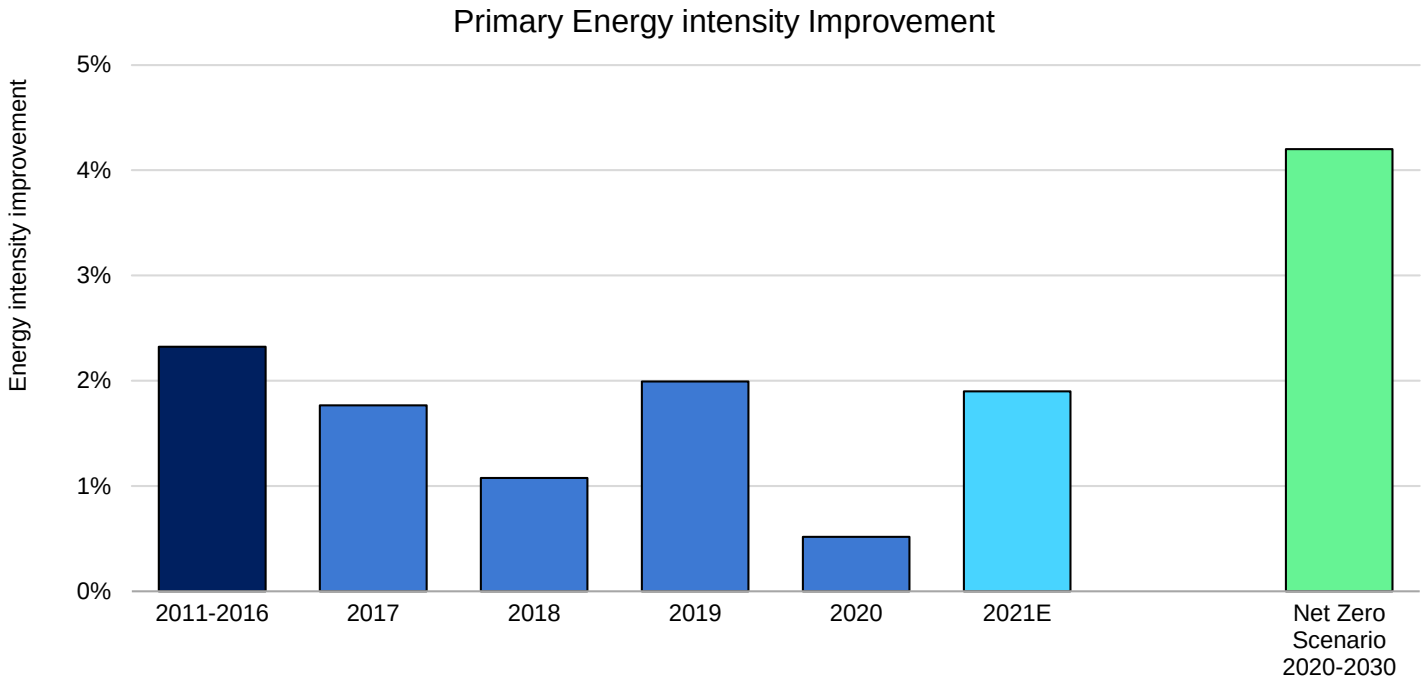
By 2030, the economy could grow by 40% using less energy than today

Key energy and economic trends in the Net Zero pathway, 2020-2030



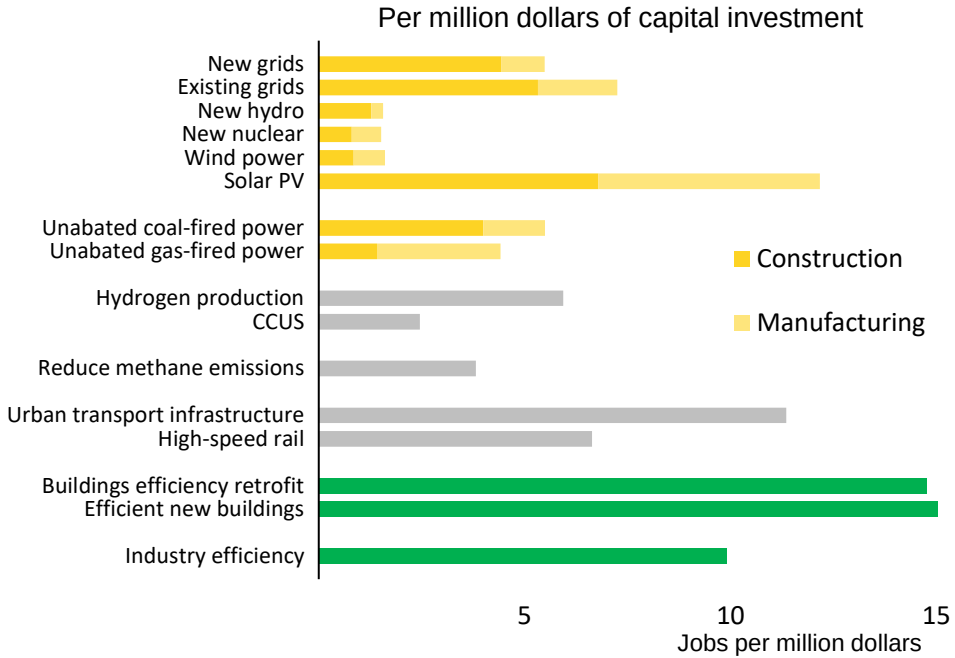
Many energy efficiency include cost effective solutions that are available today.
Without strong, early action on efficiency by 2030 net zero by 2050 will be out of reach.

Efficiency progress recovering after slowest year in a decade



Annual efficiency improvements would need to double to match the ambition of the IEA Net Zero by 2050 Scenario

Energy efficiency - job creation at the heart of sustainable recovery

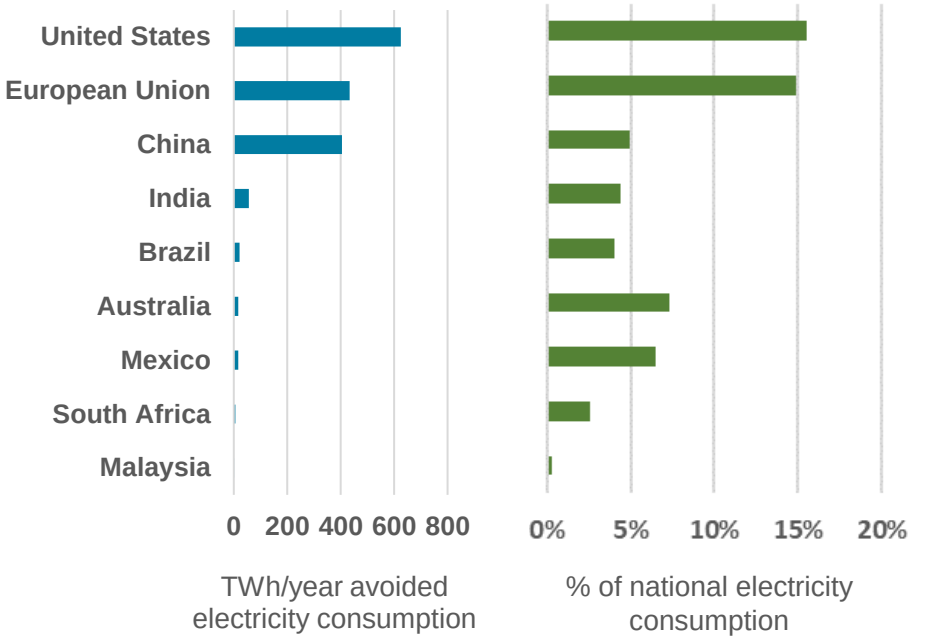


The IEA Sustainable Recovery Plan envisions average annual investments of USD 1 trillion for the next three years. Energy efficiency related investments are the largest category of spending and creates most jobs per unit of investment

Appliance efficiency policy achievements

- The longest running appliance efficiency programmes with the largest product coverage have saved around 15% of their country's total electricity consumption.
- In 2019, annual global electricity demand was reduced by at least 1 600 TWh, equivalent to the total production of wind and solar energy in the top 10 producer countries.
- If all countries worldwide had adopted similar measures, global savings of 3 600 TWh could have been realised in 2019. This is equivalent to cutting China's total electricity consumption in half.
- These types of savings could be achieved across Latin America but they are not being realised at the moment – policies would need to become more ambitious

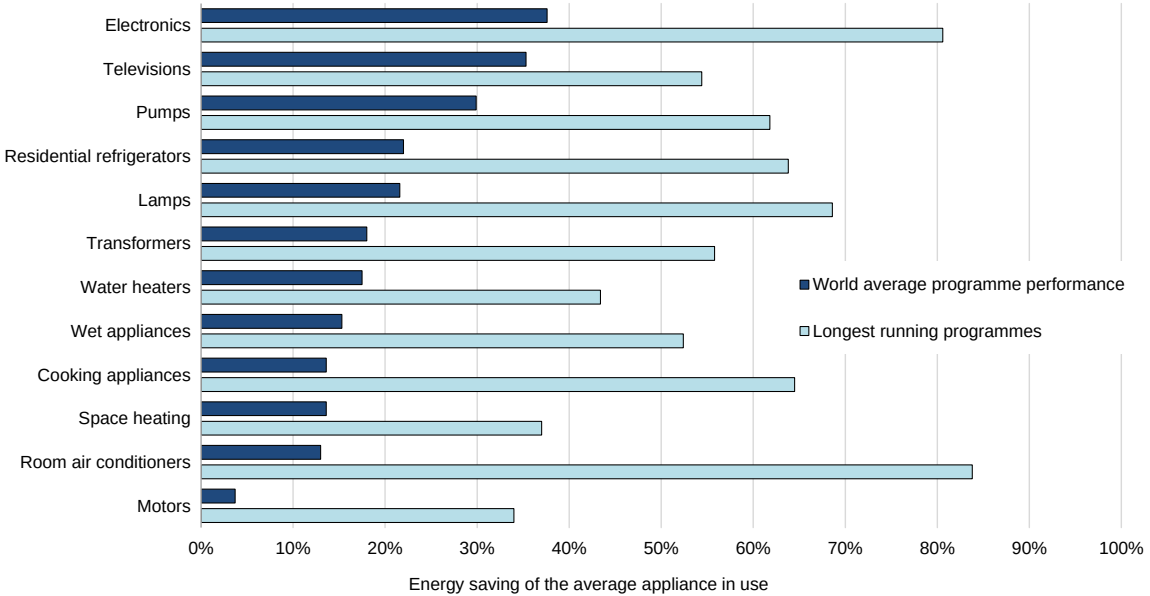
S&L programme-related reduction in electricity consumption



Source: IEA-4E 2021 EESL Assessment Report

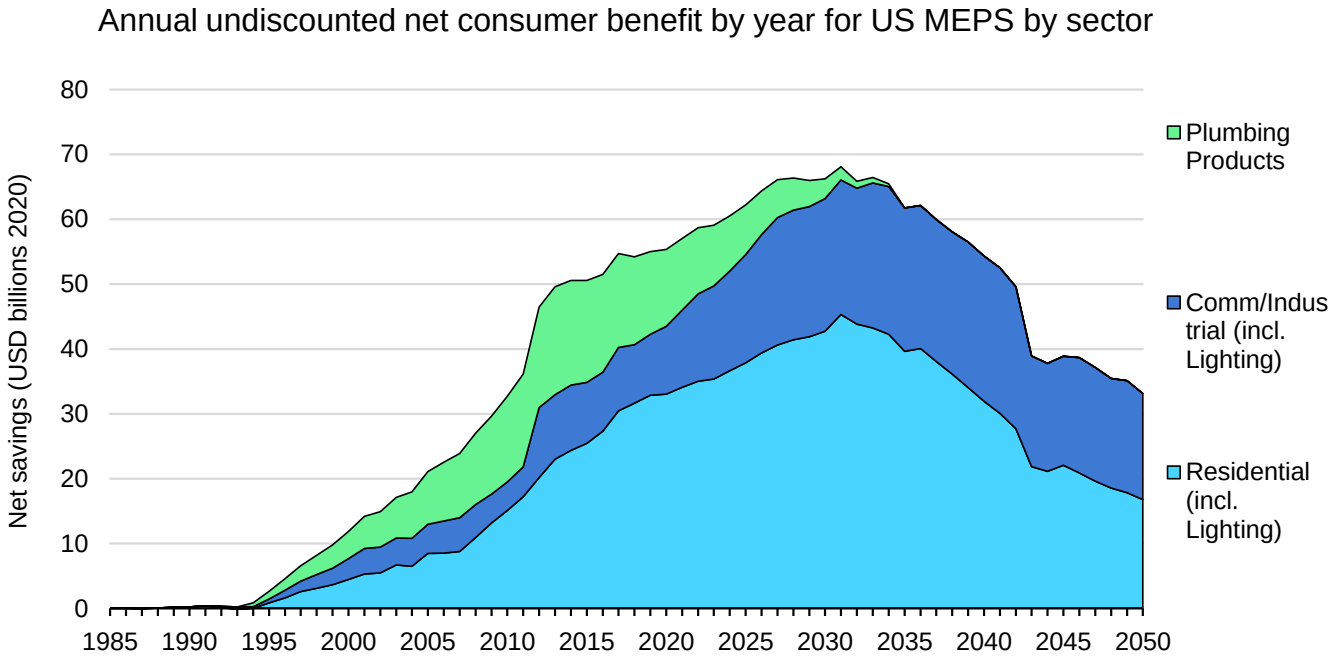
Energy savings impact of programmes increases with time

Average equipment level energy consumption reduction from standards and labelling programmes



For countries with the longest running and most effective policies, appliances are now typically consuming at 30% less energy than they would otherwise have done

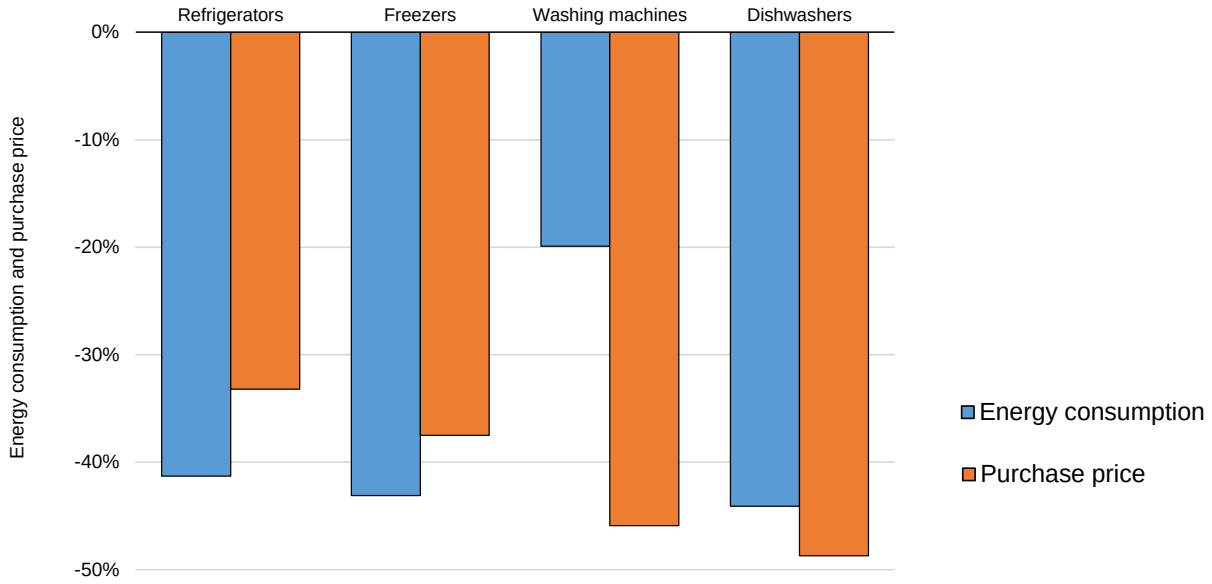
Appliance programmes cut bills for households and businesses



The US financial benefits for consumers from MEPS are substantial, now reaching over USD 40 billion per annum in reduced energy consumption, or USD 320 per customer each year

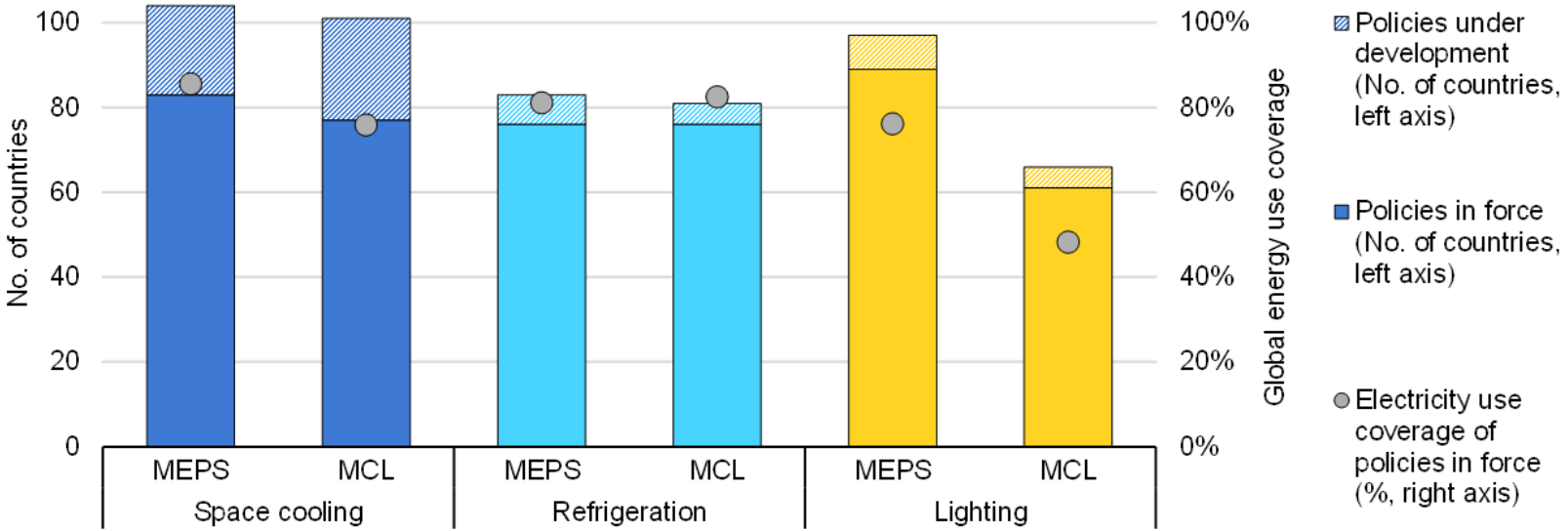
Standards and labelling stimulate innovation

Changes in residential appliance prices and energy performance in Australia, 1993-2014



New appliance purchase prices have continued to decline – around 40% cheaper over 20 years, whilst average energy consumption has fallen by one-third

Global coverage of mandatory MEPS and mandatory comparative labels, 2021



Notes: Coverage for space cooling, refrigeration and lighting is shown for residential sectors. Global electricity use coverage is shown by end-use. MEPS = Minimum energy performance standards. MCL = Mandatory comparative labels.

Source: IEA analysis based on CLASP Policy Resource Center and other sources.

Scenario

The government wants a range of options for interventions
to rapidly increase residential energy efficiency for appliances and equipment.

How do you identify, prioritise and quantify options for interventions?

Question

List all the different kinds of activities (policy measures) your government is undertaking on energy efficiency

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or

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Policy Measures [1/2]

MEPS/Labels

- MEPS
- Comparative Labels
- Endorsement Labels

Mandatory Obligations on Utilities

- White Certificates

Financial Incentives

- To consumers/retailers/suppliers/third parties (architects, plumbers, etc.)
- Grants and subsidies
- Loans
- Tax relief
- Taxes

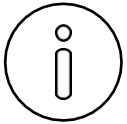
Procurement by Institutions/Governments

Policy Measures [2/2]

Awareness raising campaigns

Education

- School programmes
- Professional training and qualifications/accreditation



Information

- Appliances labels
- Retail and/or trade staff training
- Advice centres, hotline, publications, etc.

RD&D

- Research
- Demonstration
- Commercialisation

Policy Tool kit

Regulation

- Regulations are used to remove the poorest performing appliances, equipment, buildings, vehicles and practices from the market, for example Minimum Energy Performance Standards for Appliances.
- Regulations are sometimes used to define rules for markets, for example requiring energy retailers to achieve certain levels of efficiency.
- Regulations are also used to define the rules around how other measures are applied, for example labels and other forms of information.

Information

- Information is used to help energy users make more efficient choices.
- Examples are appliance labels that help consumers understand their running costs and building performance information that helps potential buyers or lessors of buildings understand their running costs.
- Information, such as labelling, can be used to satisfy requirements for incentives.

Incentives

- Incentives are used to speed up the turnover of stock of appliances, buildings and vehicles to achieve energy efficiency improvement more rapidly than if the market were left to itself.
- Incentives can also be used to encourage the use of new technologies.

Most advances in energy efficiency are made when all three tools are used together

Appliance Policy Package

Regulation

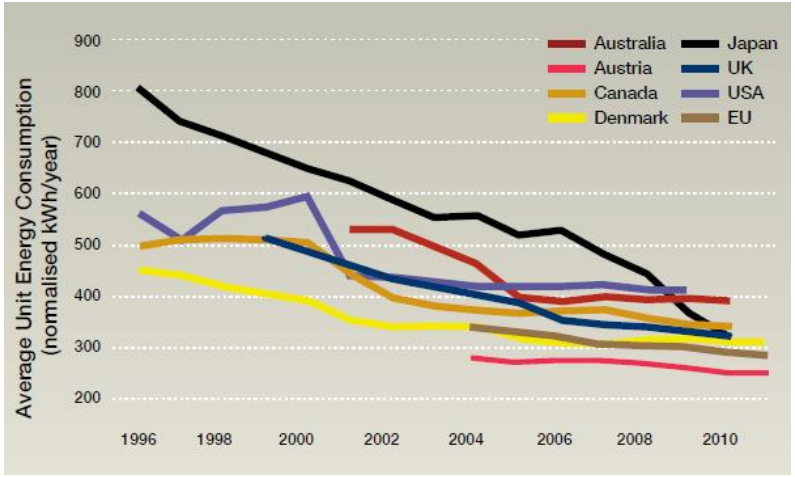
- Minimum Energy Performance Standards
- High Efficiency Performance Standards
- Demand response ready appliances
- Energy retailer obligations

Information

- Comparative Labels
- Endorsement Labels
- Information campaigns
- Product lists

Incentives

- Rebates to consumers
- Public and private sector procurement (e.g. Super-ESCOs)
- Concessional finance or tax incentives for manufacturers
- Technology procurement competitions
- Dynamic electricity pricing



Long-term plans
Roadmaps, inclusion in NDCs, Cooling plans, doubling efficiency of key products by 2030.
International Agreements.

Capacity
Institutions, agencies, testing centres, standard setting bodies, international collaboration

Financing
Funding for R&D
Development of test facilities

Digitalisation
Facilitation of data collection for programme management including market monitoring and compliance.
Consumer information

Minimum Energy Performance Standards

Minimum Energy Performance Standards

- **MEPS** specify the **minimum** level of **energy performance** that appliances, lighting and electrical equipment (products) must meet or exceed before they can be offered for sale or used for commercial purposes
- MEPS are an effective way to increase the energy efficiency of products
- Inefficient products are prevented from entering the marketplace, and manufacturers are given appropriate signals to increase product efficiency
- For consumers, MEPS mean that products available in the market use less energy and have lower running costs over their lifetime

Defining new MEPS

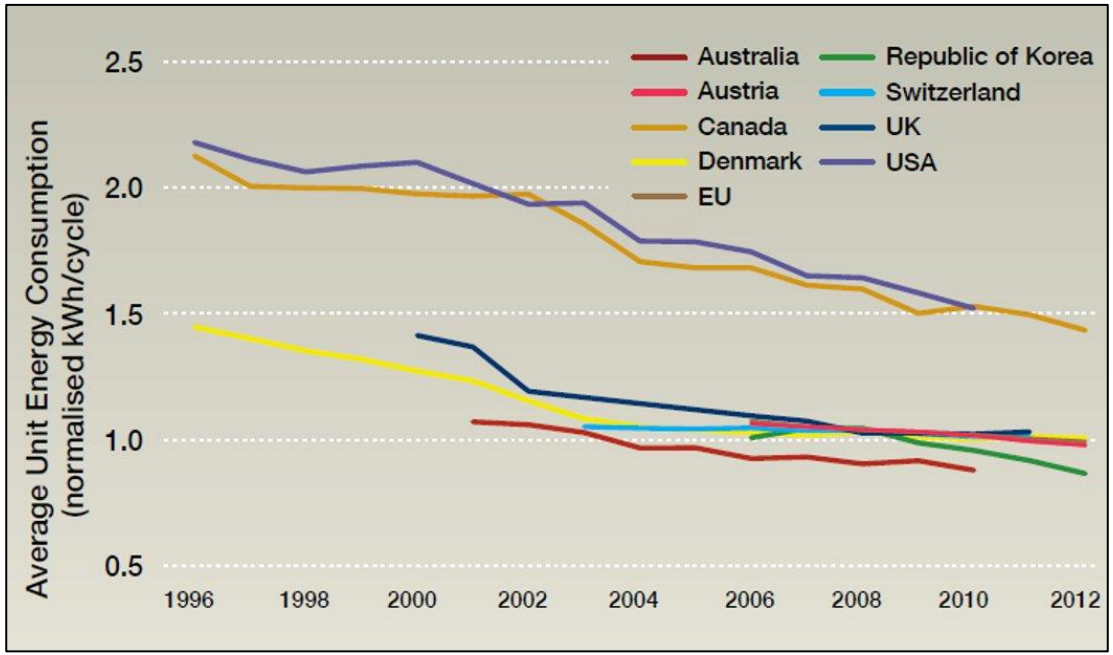
Consider specifications in similar markets

Consider global or regional harmonisation

Cost-benefit analysis

- Use a market analysis (e.g. eliminate worst 20%)
- Undertake an engineering analysis (least life cycle cost)

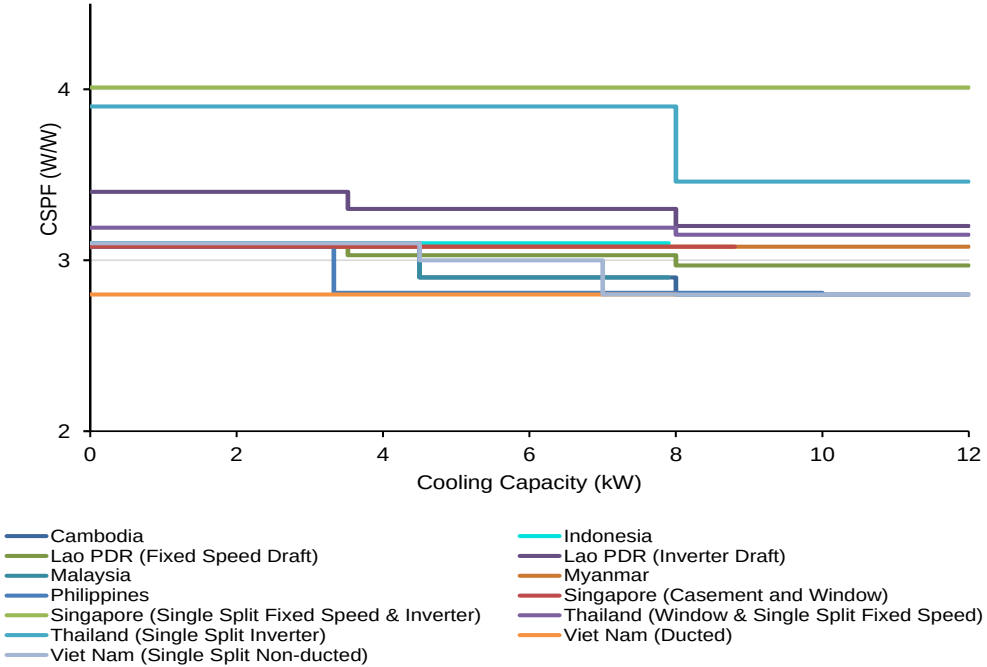
Defining new MEPS



Source: http://mappingandbenchmarking.iea-4e.org/shared_files/555/download

Performance - Comparing like with like

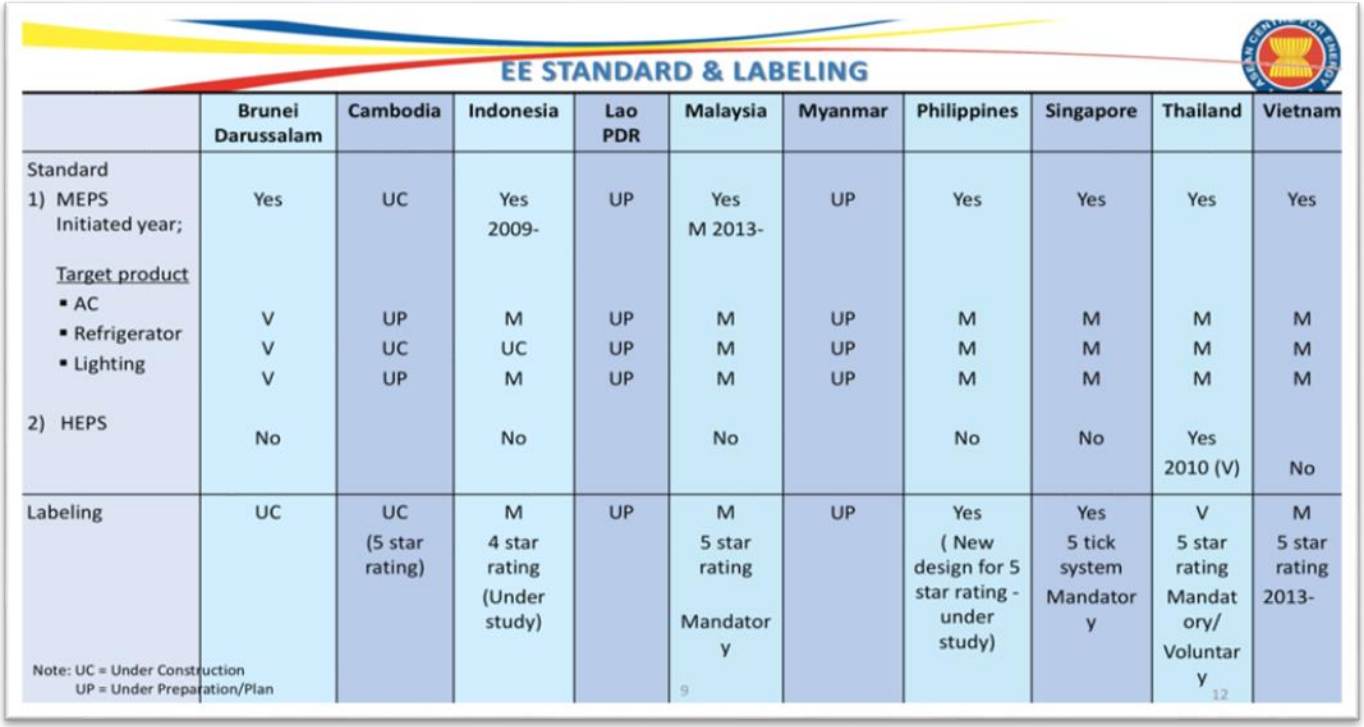
Current MEPS – Air Conditioners in Southeast Asia



Significant energy saving benefit to be gained from harmonising test standards and aligning performance standards

Explore synergies within the region

Many opportunities for harmonisation (policy and technical) are already available!



EE STANDARD & LABELING

	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam
Standard										
1) MEPS Initiated year;	Yes	UC	Yes 2009-	UP	Yes M 2013-	UP	Yes	Yes	Yes	Yes
Target product										
▪ AC	V	UP	M	UP	M	UP	M	M	M	M
▪ Refrigerator	V	UC	UC	UP	M	UP	M	M	M	M
▪ Lighting	V	UP	M	UP	M	UP	M	M	M	M
2) HEPS	No		No		No		No	No	Yes 2010 (V)	No
Labeling	UC	UC (5 star rating)	M 4 star rating (Under study)	UP	M 5 star rating Mandatory	UP	Yes (New design for 5 star rating - under study)	Yes 5 tick system Mandatory	V 5 star rating Mandatory/ Voluntary	M 5 star rating 2013-

Note: UC = Under Construction
UP = Under Preparation/Plan

9 12

Existing Programme in Trading Partner / Neighbouring Economy

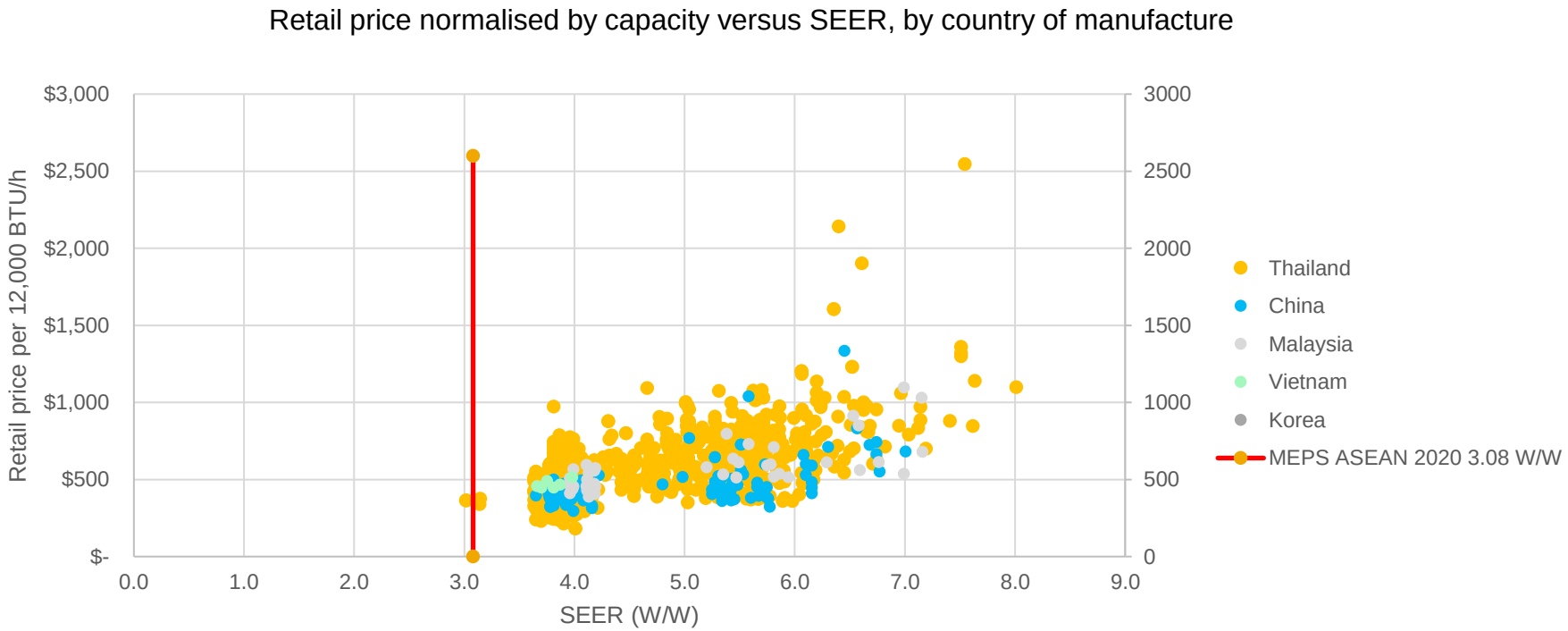
This can simplify market acceptance by domestic and international manufacturers

Can help simplify MEPS adoption

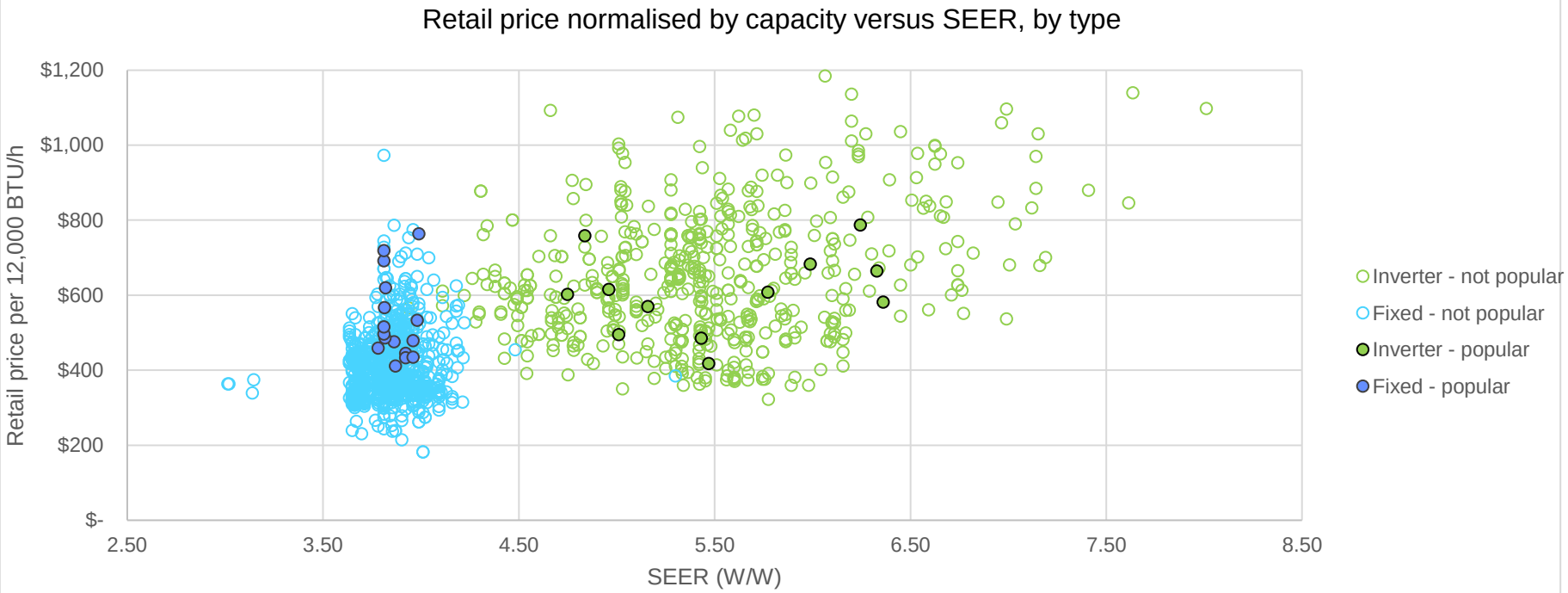
Pacific Islands Case Study

- Limited data on household energy use and appliance uptake
- Issues with customs classification for appliance
- Limited capacity and resources available
- Opted to adopt S&L based on main country of origin and focusing on highest consuming appliances

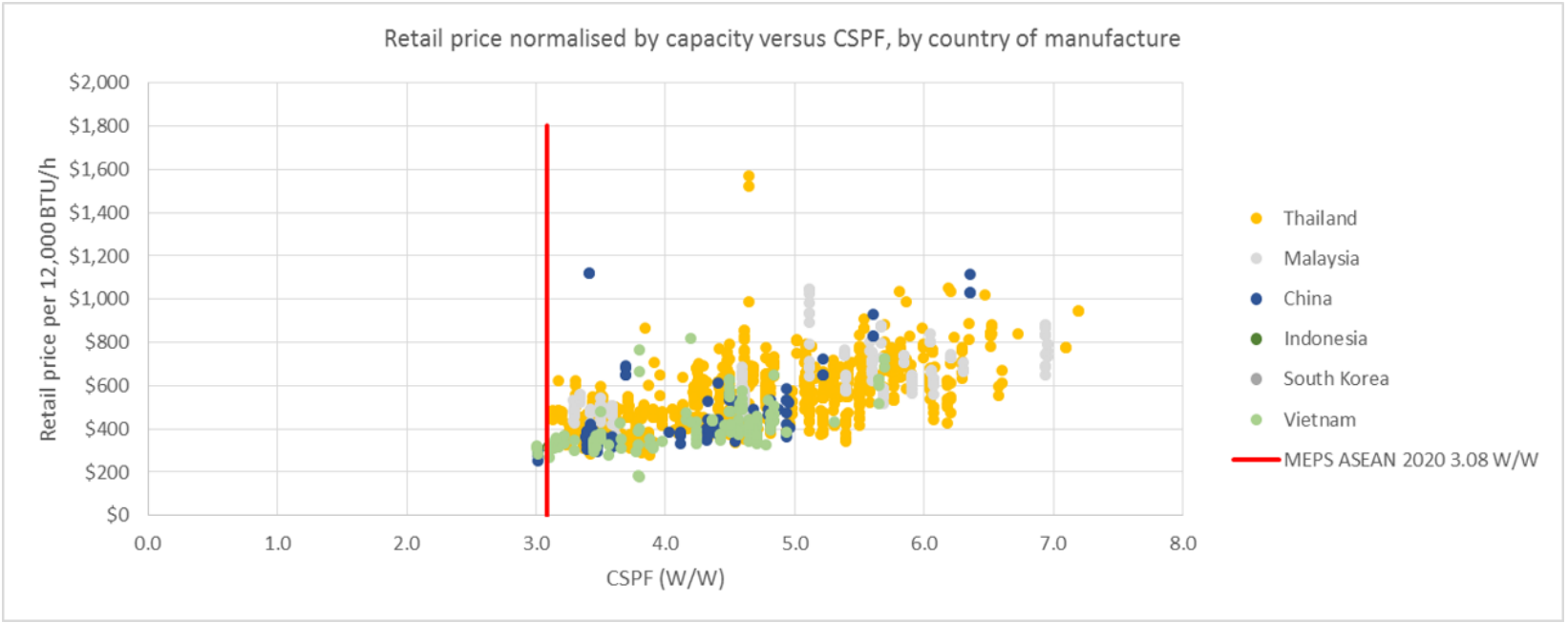
Thailand – Retail price vs capacity (and country manufacture)



Thailand - Retail price vs capacity (and technology)



Vietnam – Retail price vs capacity (and country manufacture)



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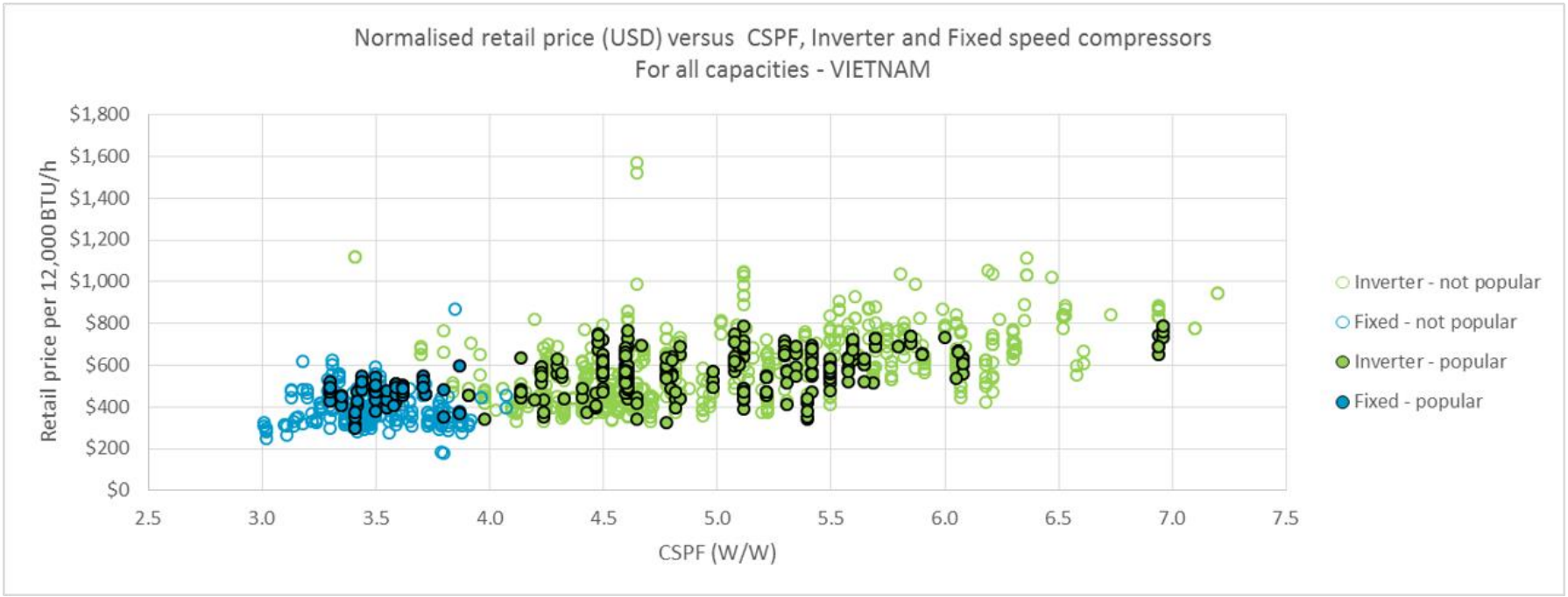
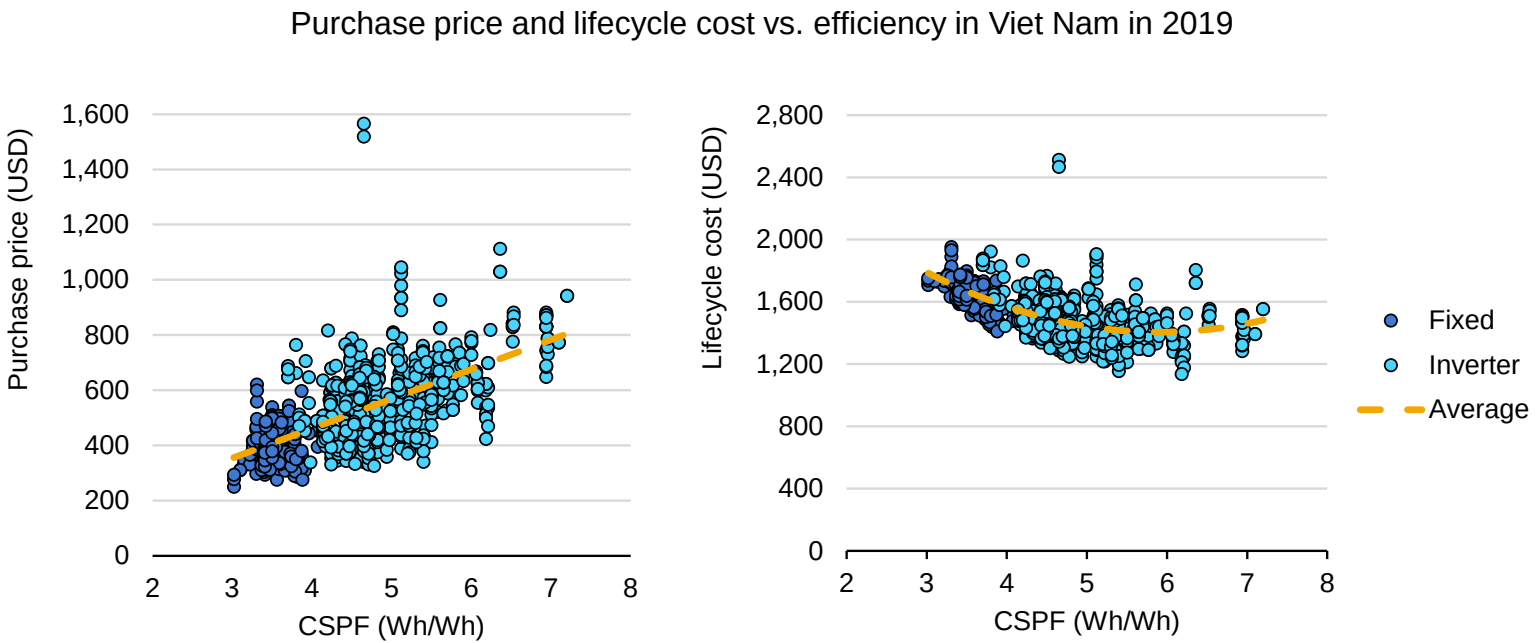


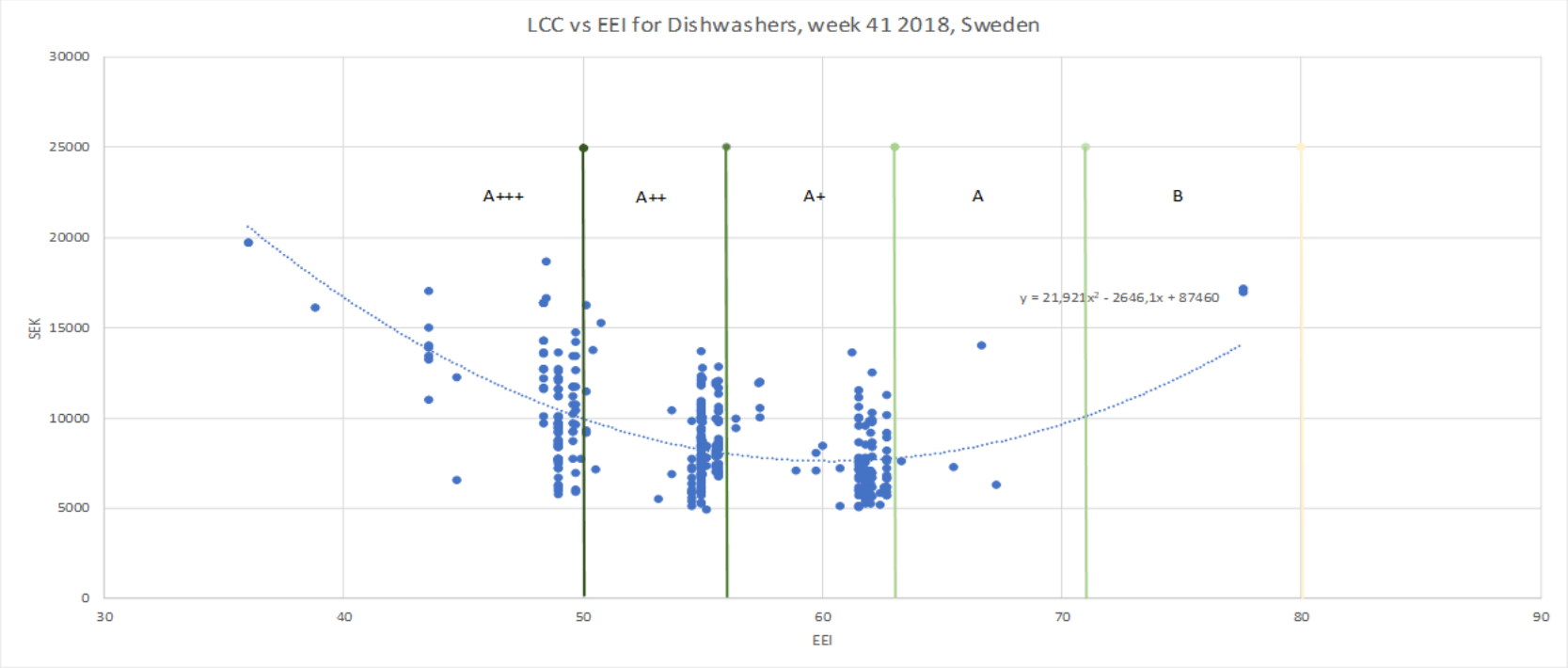
Life cycle costs – Current market in Viet Nam



Notes: ACs normalised to electricity consumption of 1,000 kWh/year and cooling capacity of 12,000 BTU/hr. Source: Based on IEA (2019). The Future of cooling in Southeast Asia.

Energy-efficient appliances often tend to be cheaper across their lifetime. However, evidence from Viet Nam shows that some energy-efficient appliances can be cheaper on purchase price alone, with several efficient models on the market that are well below the average purchase price.

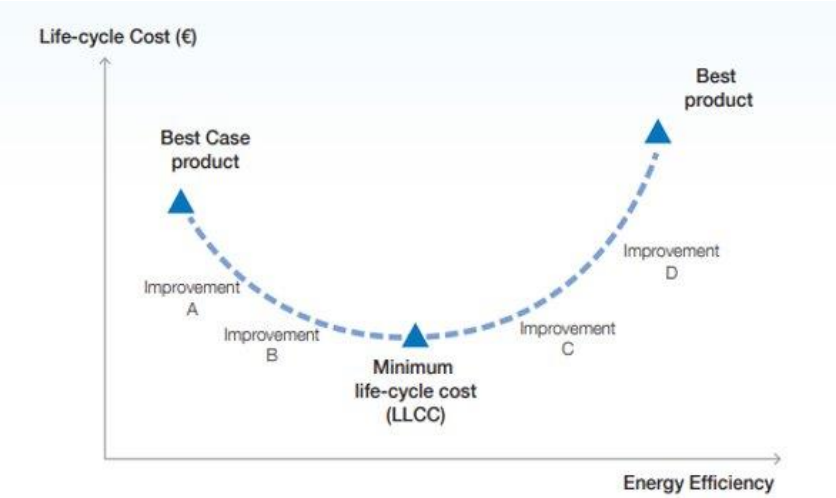
Crawled data on dishwashers for LLC

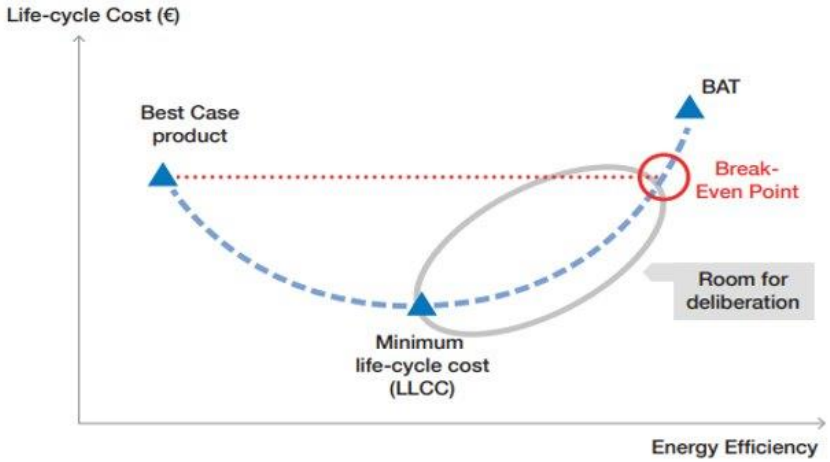


Life-Cycle Cost

	Average product	Energy efficient product
Capital Cost ($)	$300	$350
Running cost per annum	=150 kWh x $0.2 = $30	=120 kWh x $ 0.2 = $24
Lifetime (years)	12	12
Total lifetime cost (LC)	= 300 + (30 x 12)	= 350 + (24 x 12)
LC	$660	$638

What about least life cycle costs?

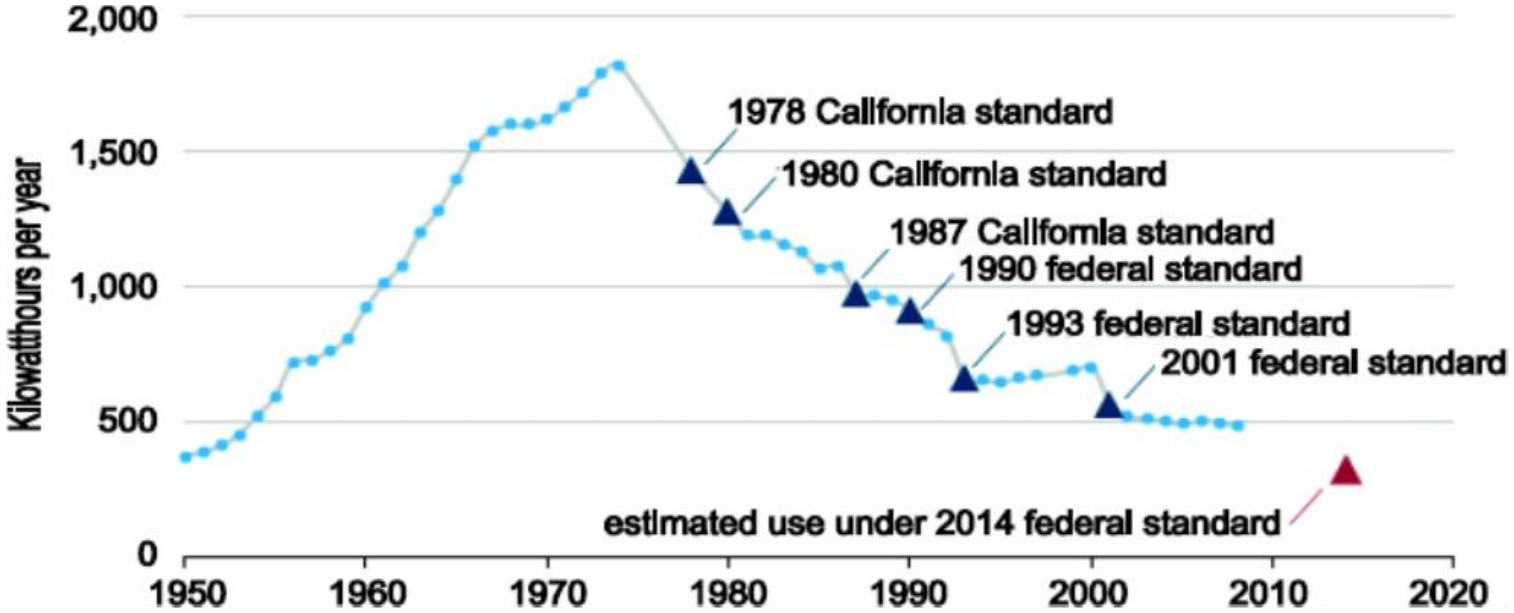




So that is the theory…

Now let’s look at what is actually happening to product prices?

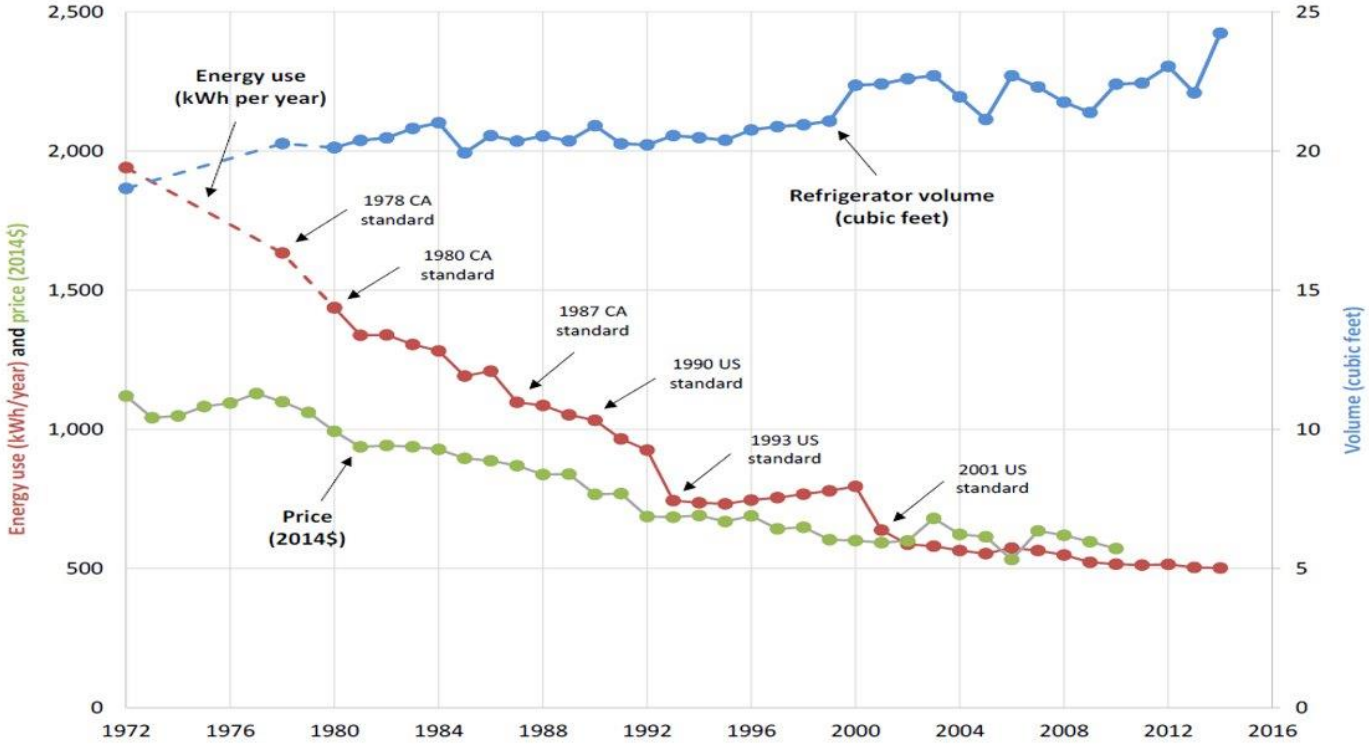
US



Source:EIA,2013

Ratcheting MEPS has reduced energy consumption of new US refrigerators by 75%

US

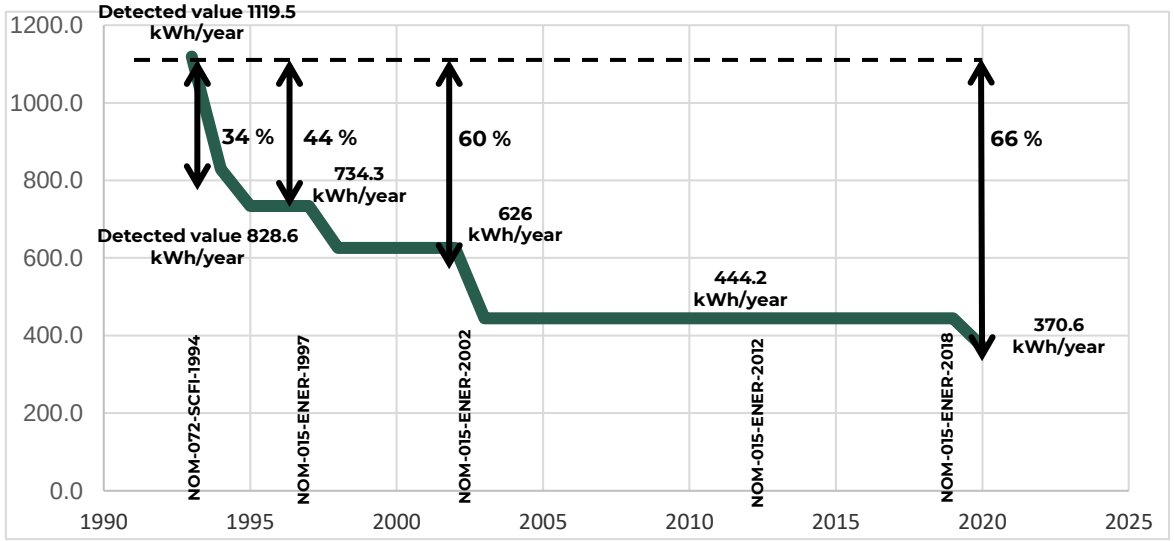


Source:EIA,2013

ACEEE, 2017. Energy-Saving States of America: How Every State Benefits from National Appliance Standards

Mexico

Refrigerator – Freezer Standards Evolution



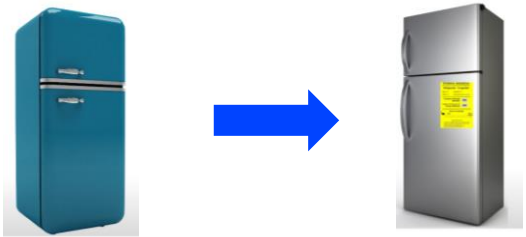
*Refrigerator only with manual defrost 14 ft (3 400 dm^3)

SENER SECRETARÍA DE ENERGÍA | CONUEE COMISIÓN NACIONAL PARA EL USO EFICIENTE DE LA ENERGÍA

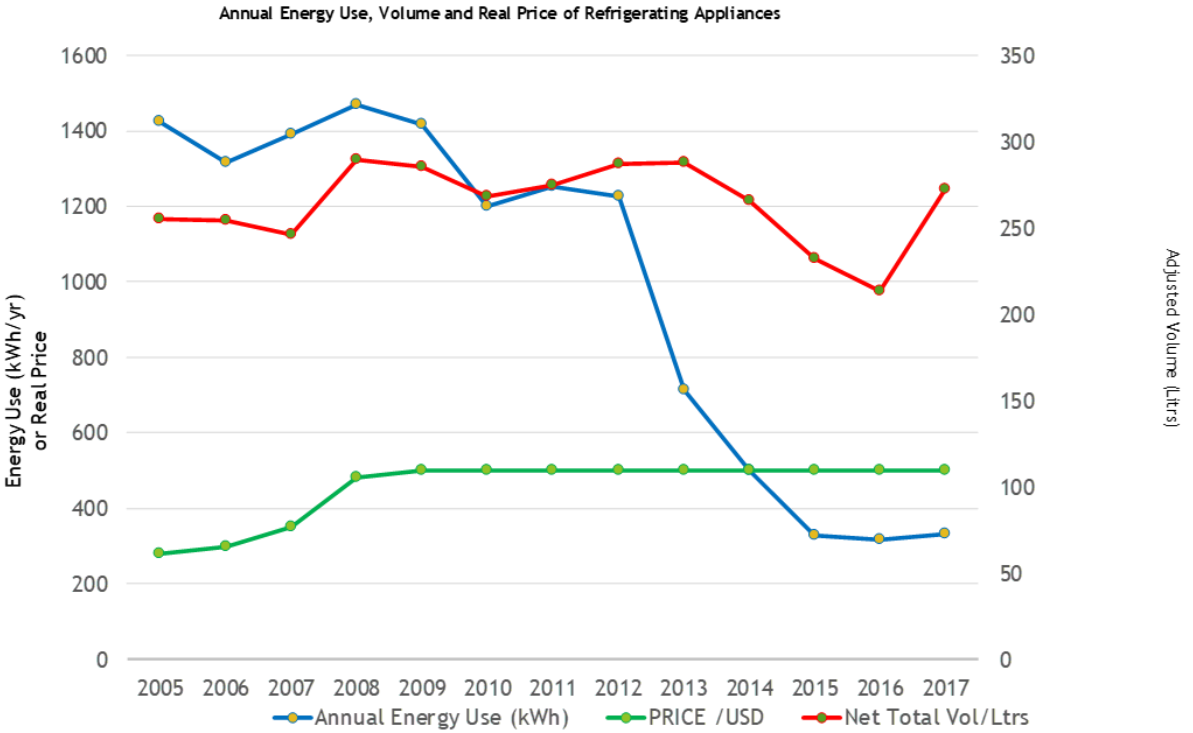
Source: Energy Efficiency Standardization in Mexico (CONUEE, 2022)

25 years ago, a medium refrigerator consumed **1,200 kWh/year.**

Today, an average house on temperate climate consumes **1,000 kWh/year**

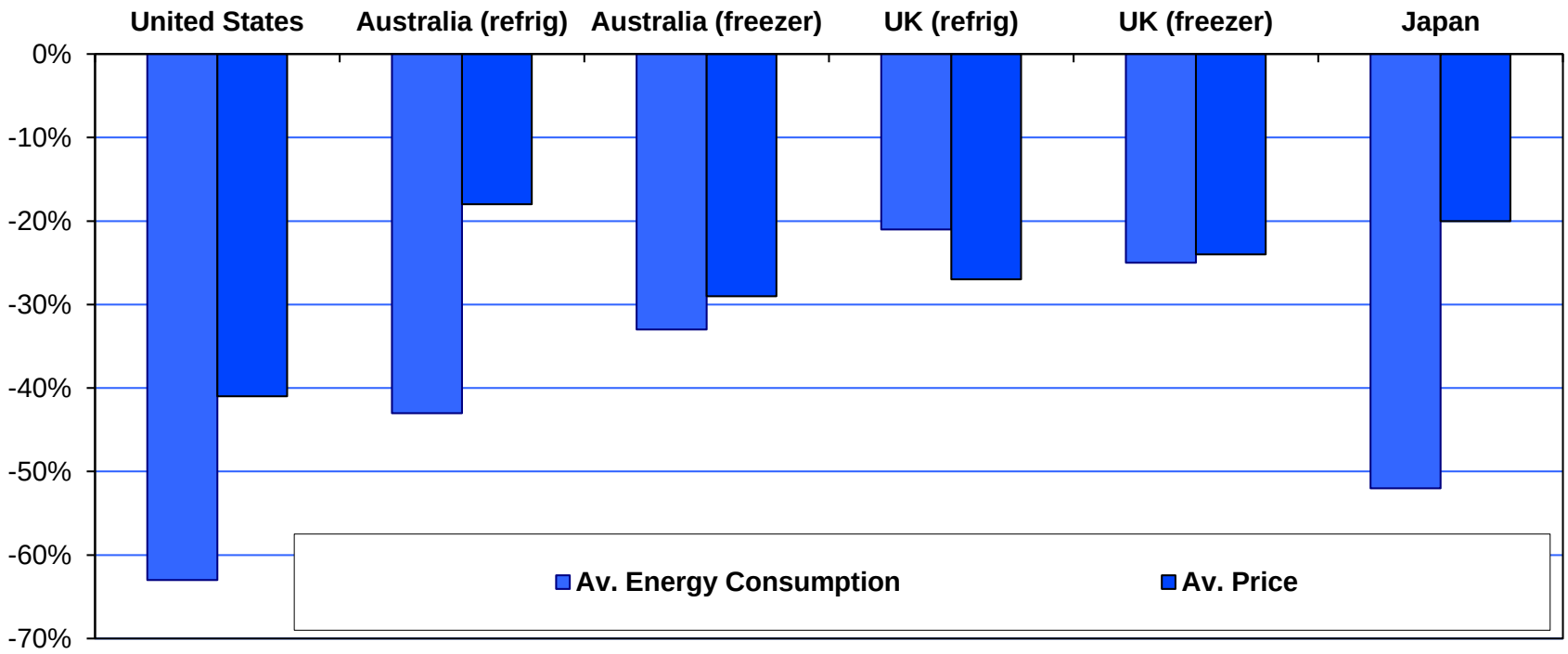


Analysis: Impact of refrigerators standards in Ghana

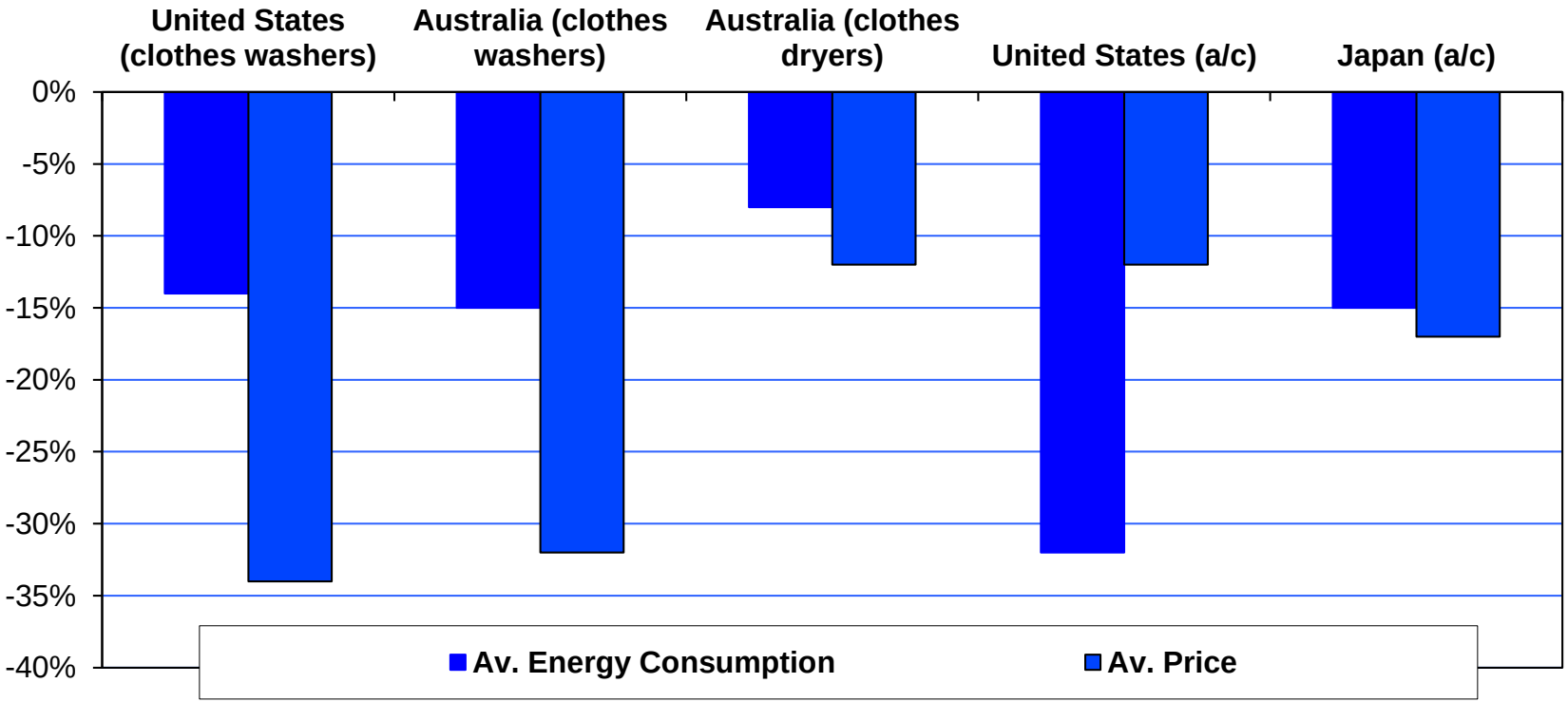


Source: Kofi Agyarko, IEA EE Global 2018

Examination of MEPS impacts: Cold appliances: % change



Examination of MEPS impacts: other appliances: % change



What does this tell us?

No evidence that Standards and Labeling policies have increased real prices to consumers. Some minor movements, usually explained by other factors.

Generally average real prices for studied products have fallen ***faster*** than for other goods in these markets.

No correlation with energy/electricity prices (Increasing energy price is a less effective policy, and has inequity issues).

Manufacturers confirm that, given notice, energy efficiency requirements can be absorbed into design process with little or ***no extra cost.***

What does this tell us?

No correlation between product price and efficiency.

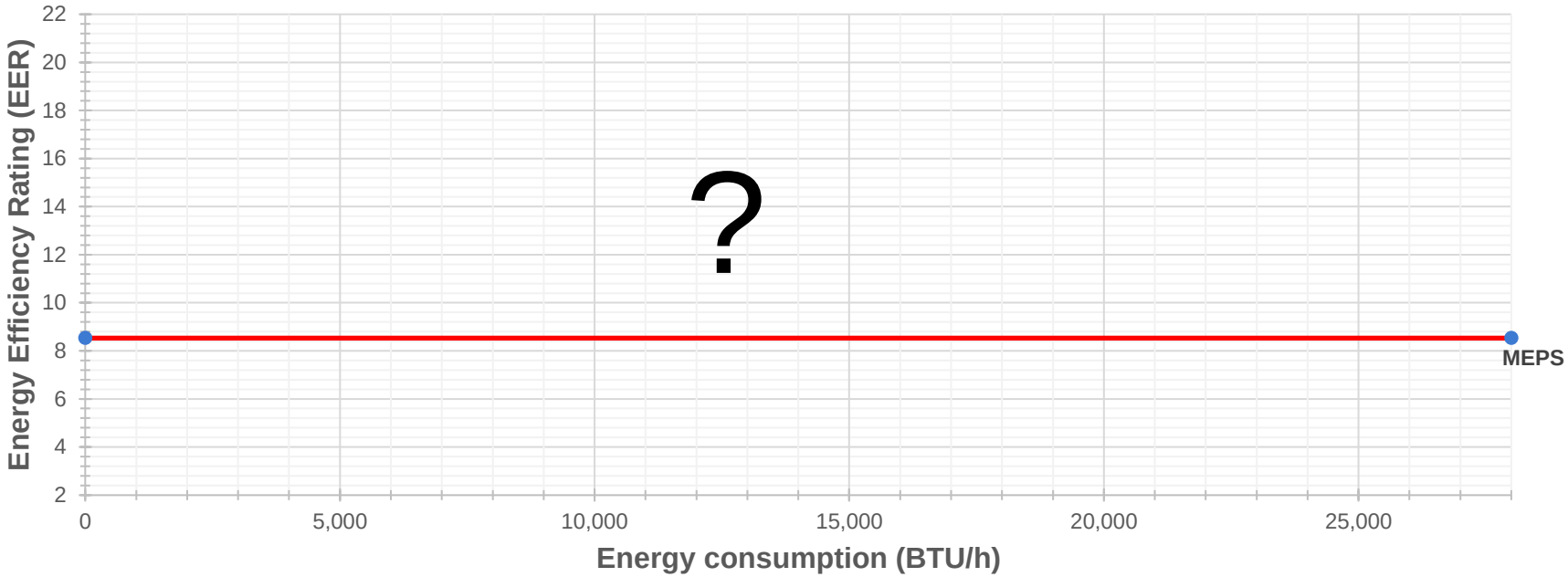
However, sometimes the most efficient products are also the most expensive, because:

- High priced products differentiate though:
  - Branding
  - Quality of materials
  - Design
  - Energy Efficiency is a further indicator of quality

Understanding the Market

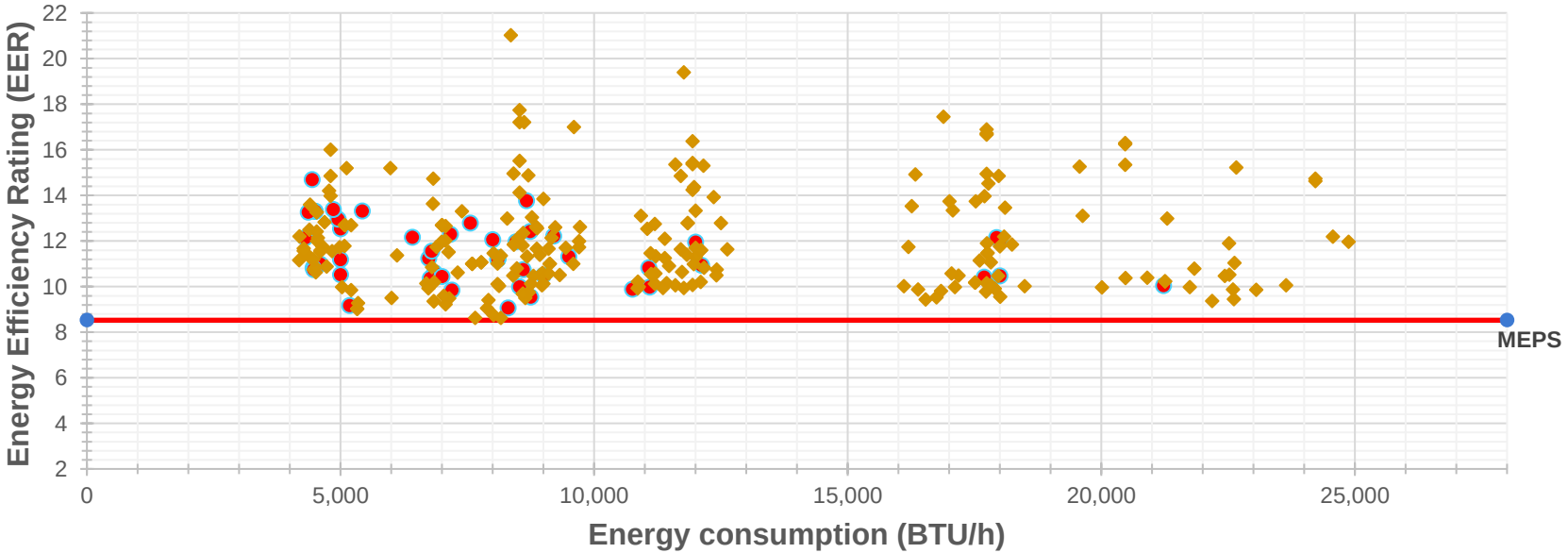
Why does effective policy design require appropriate data?

Case study: defining MEPS in the absence of national market data



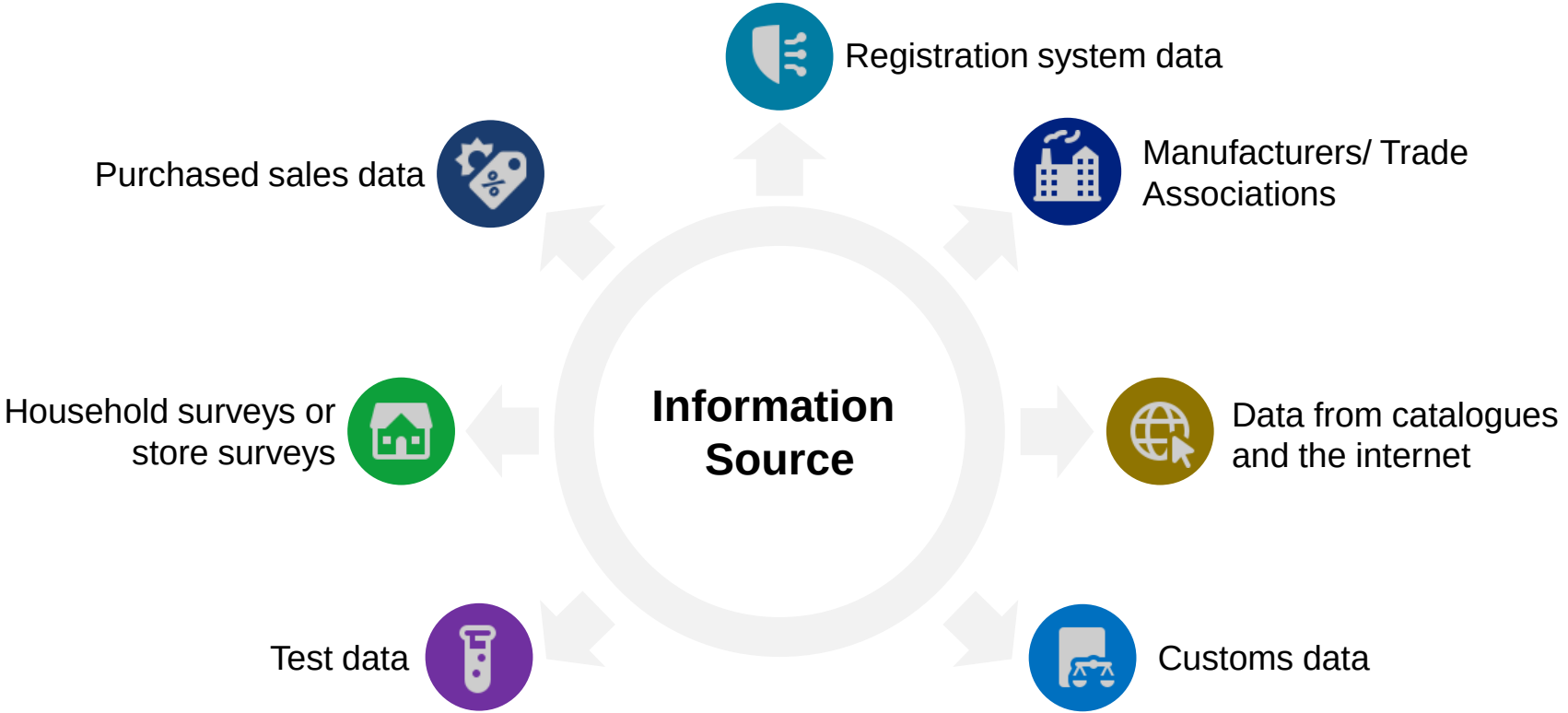
Policy design without appropriate data may not be optimal

Efficiency rating of selected air conditioners in national/regional market – data collected after MEPS



Without appropriate data, minimum energy performance levels were set too low to impact the market

Information Source



What's on the market? Registration system data

Help on Headings | Data Dictionary

Australian Government
Department of the Environment and Energy

Greenhouse and Energy
Minimum Standards Regulator

EECA Energy Efficiency and Conservation Authority
Te Tari Tiaki Pūngao

Cost Calculator
Basic Search
Advanced Search

Product
Air Conditioners

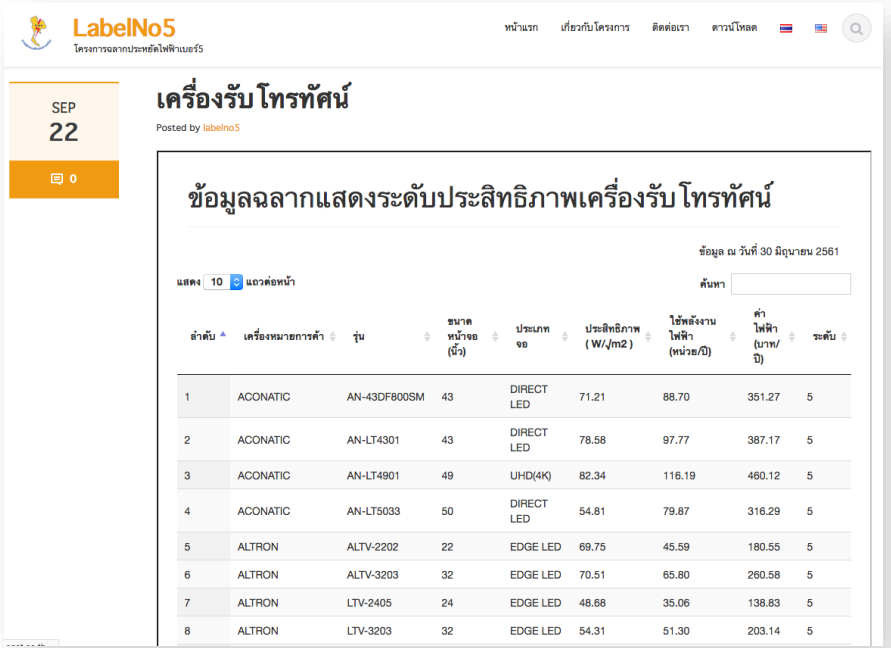
Click the column header to sort the table. The table is currently sorted descending by Star Rating

Cooling

Calculator Result	Brand	Model	Installation Type	Indoor air distribution	Phase	Available	Country of Manufacture	Star Rating	Output (kW)	Power Input (kW)	Star Rating
N/A	MITSUBISHI HEAVY INDUSTRIES	SRK20ZSXA-W	Single Split System	Non Ducted	Single	Australia,Fiji,New Zealand	Thailand	7.0	2.00	0.31	7.0
N/A	DAIKIN	FTXZ25N / RXZ25N	Single Split System	Non Ducted	Single	Australia,New Zealand	Japan	7.0	2.50	0.42	7.0
N/A	MITSUBISHI HEAVY INDUSTRIES, LTD.	SRK20ZMXA-S / SRC20ZMXA-S	Single Split System	Non Ducted	Single	Australia,Fiji,New Zealand	Thailand	6.0	2.00	0.35	5.5

Registration data provides a complete snapshot of the market

What's on the market? Registration data are available in many markets



ลำดับ	เครื่องหมายการค้า	รุ่น	ขนาดหน้าจอ (นิ้ว)	ประเภทจอ	ประสิทธิภาพ (W/√m2)	ใช้พลังงานไฟฟ้า (หน่วย/ปี)	ค่าไฟฟ้า (บาท/ปี)	ระดับ
1	ACONATIC	AN-43DF800SM	43	DIRECT LED	71.21	88.70	351.27	5
2	ACONATIC	AN-LT4301	43	DIRECT LED	78.58	97.77	387.17	5
3	ACONATIC	AN-LT4901	49	UHD(4K)	82.34	116.19	460.12	5
4	ACONATIC	AN-LT5033	50	DIRECT LED	54.81	79.87	316.29	5
5	ALTRON	ALTV-2202	22	EDGE LED	69.75	45.59	180.55	5
6	ALTRON	ALTV-3203	32	EDGE LED	70.51	65.80	260.58	5
7	ALTRON	LTV-2405	24	EDGE LED	48.68	35.06	138.83	5
8	ALTRON	LTV-3203	32	EDGE LED	54.31	51.30	203.14	5

How similar is your market?

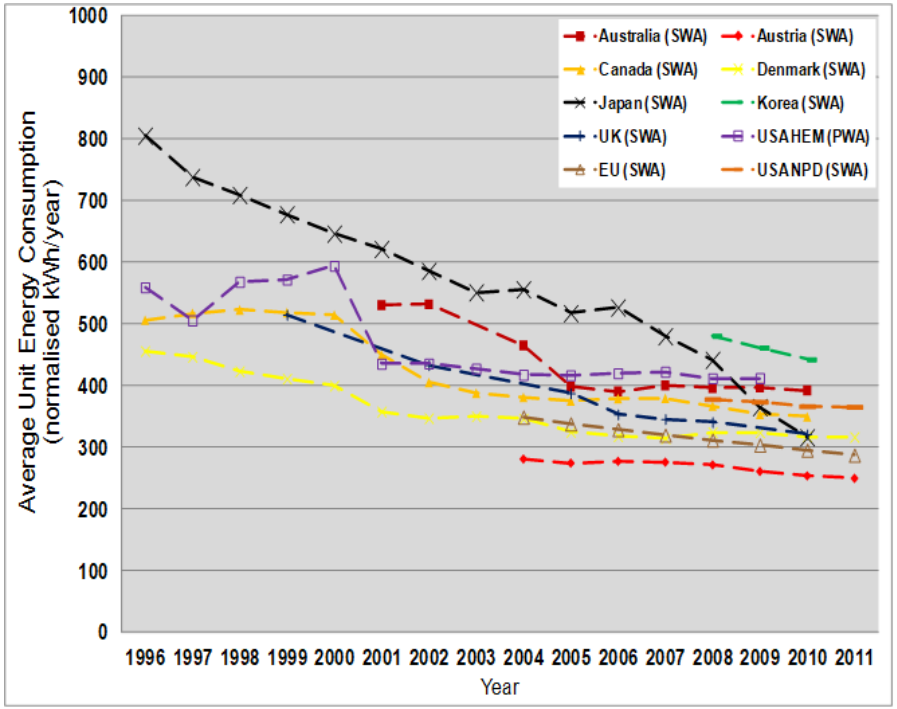
What's on the market? Registration data are available in many markets

Model	ALL
EER	ALL
Nominal marketing capacity	ALL
star rating	ALL

Export to PDF

S.No	Brand Name	Type	Model Number	EER (W/W)	Nom. Marke. Cap. (Ton)	Coling Cap. (W)	Power Cons. (W)	Approval Date	Valid Till Date	
1	HITACHI	Split air conditioner	RAU518HSDG	3.4	1.5	5410	1590	19-12-2013	31-12-2015	
2	HITACHI	Split air conditioner	RAU318KSD	3	1.5	5200	1735	26-12-2013	31-12-2015	
3	HITACHI	Split air conditioner	RAU312KSDC	3.09	1.0	3371	1090	26-12-2013	31-12-2015	
4	HITACHI	Cassette air conditioner	MRAG518HSD	3.2	1.5	5400	1685	27-02-2012	27-02-2015	
5	HITACHI	Split air conditioner	RAU318KSD-CH	3	1.5	5200	1735	26-12-2013	31-12-2015	
6	HITACHI	Split air conditioner	RAU318KSD-GD	3	1.5	5200	1735	26-12-2013	31-12-2015	
7	HITACHI	Split air conditioner	RAU324HSDA	3	2.0	6950	2320	24-12-2013	31-12-2015	
8	HITACHI	Split air conditioner	RAU318KSDC	3.09	1.5	5275	1705	26-12-2013	31-12-2015	
9	HITACHI	Window air Conditioner	RAV322HSD	2.8	2.0	6160	2200	26-12-2013	31-12-2015	

What's on the market? Market research data



Source: *IEA 4E Benchmarking Report for Air conditioners, 2011*

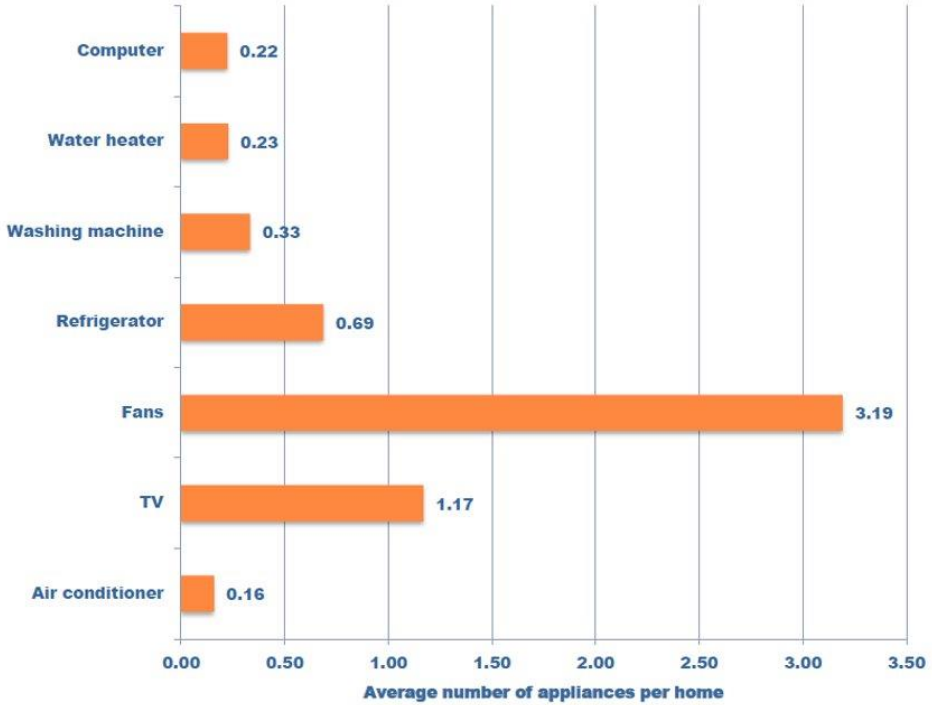
Purchase reports and/or data directly from market research companies

- Have consumer panels (many thousands)
- Links with retailers (and access to sales data)
- Detailed data possible, but very expensive

Subscribe to omnibus surveys

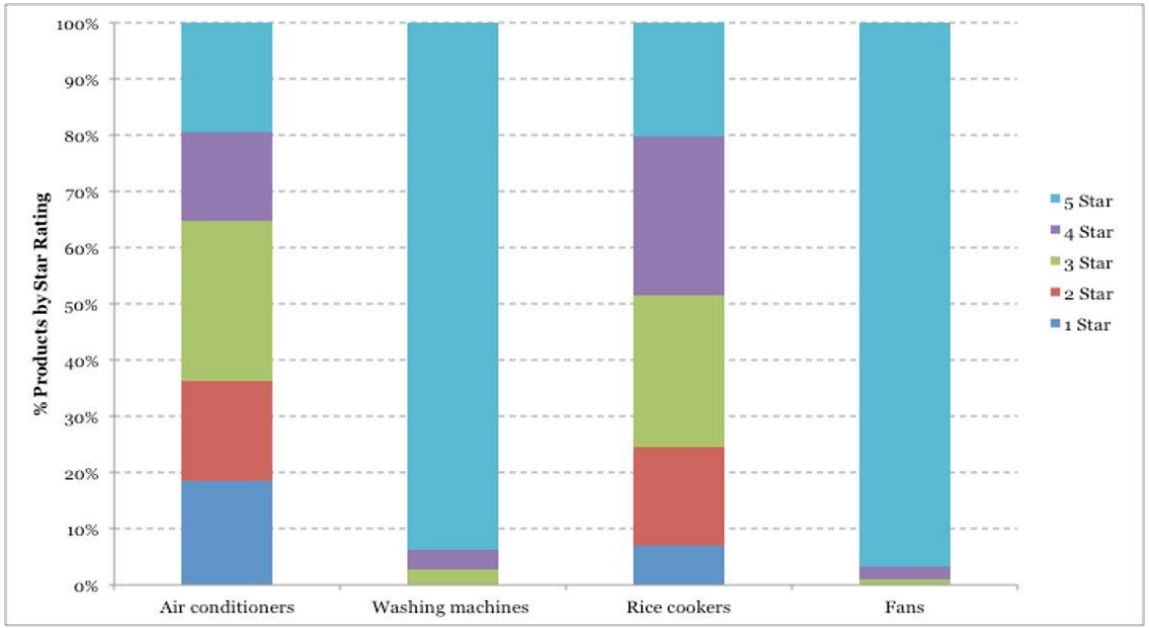
Commission bespoke research

Household Survey: Viet Nam



Source: Vietnam Energy Efficiency Standards and Labelling Programme

Store survey: Vietnam



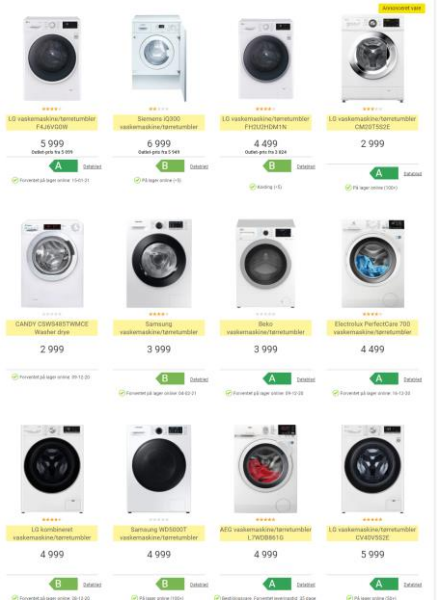
Source: Vietnam Energy Efficiency Standards and Labelling Programme

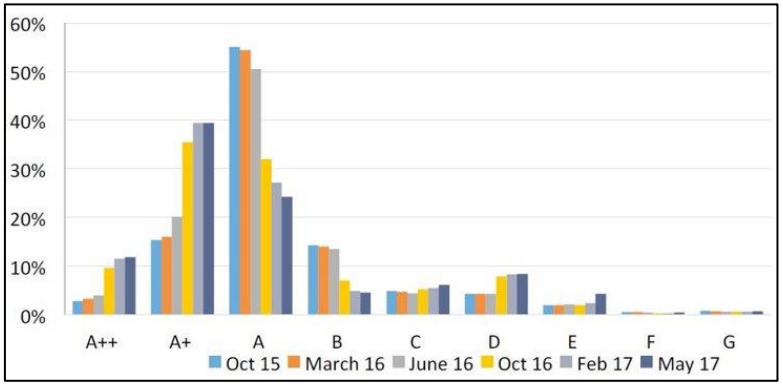
Using Internet Data: Web Crawling

Possible to follow the market in real time, and over time

Information on:

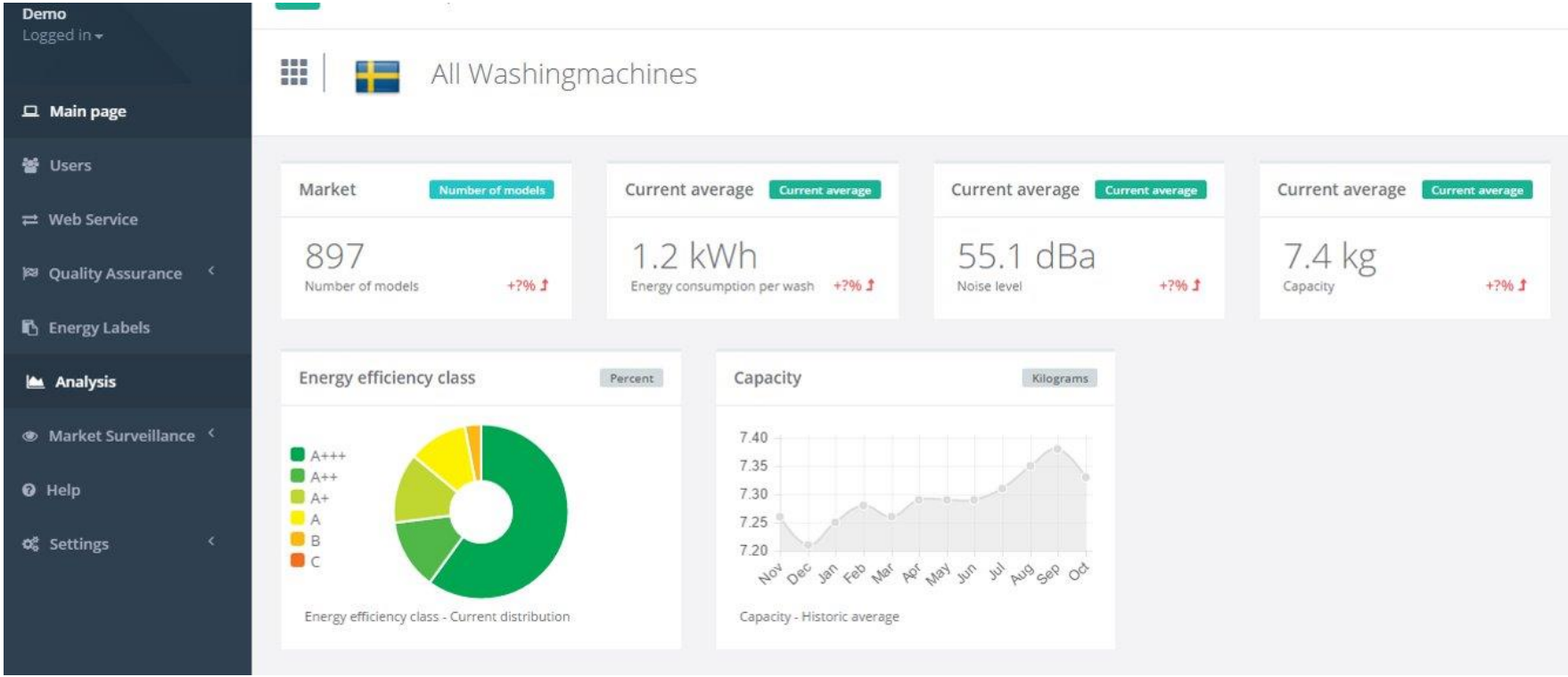
- Adaptation patterns
- Speed at which the market evolves
- Market compliance rate – allowing the regulator to focus on risks
- Find retail pages where products have missing labels
- Evaluate current MEPS levels





Source: Big2great

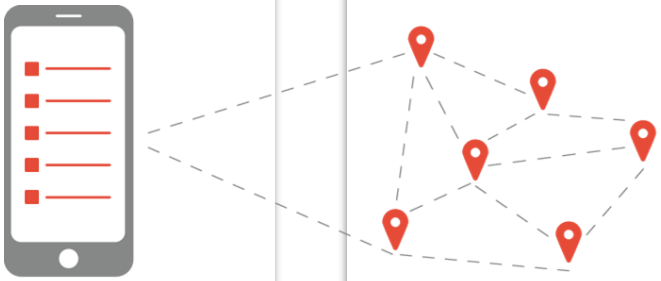
Web-Crawling: Can glimpse the market at any instance



Source: Swedish Energy Agency

Applications: Allowing Data on-Demand

PREMISE



Define Requirement

Set objectives, refine geographic parameters, determine time series, design tasks, and target population segments.

Task the Network

Premise review of tasks, language localization, translation, and task dissemination to the contributor marketplace at market rates.

Time – Hours to Days

Visualise & Deliver

Source: Premise

Self-study

Instructions

- Review the slides from today's session
- Complete the self-assessment quiz here: https://eu.surveymonkey.com/r/V5636Q2

- Complete the self-study exercise: Setting Performance Standards (MEPS) (**Read the Word Document provided**)
- Please submit your self-study questions answers here: Energy.Efficiency@iea.org
  - Please label file: Last Name_First Name_03May
- If you have any questions don’t hesitate to reach out!