Promotion of Energy Efficient Air-Conditioners in India : Case Study from State of Tamil Nadu

By

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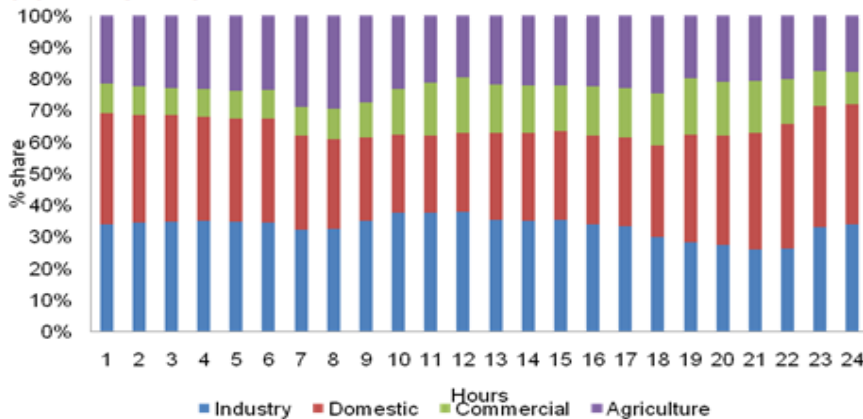
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Outline

- **Introduction**

- **Objective**

- **Approach & Methodology**

- **Survey Findings**

- **Analysis**

- **Institutional Framework**

First step was to undertake load research and identify key areas of DSM interventions

Share in load of different consumer categories at the state level (April-May 2010)

Share in load of different consumer categories at the state level (December- January 2010)
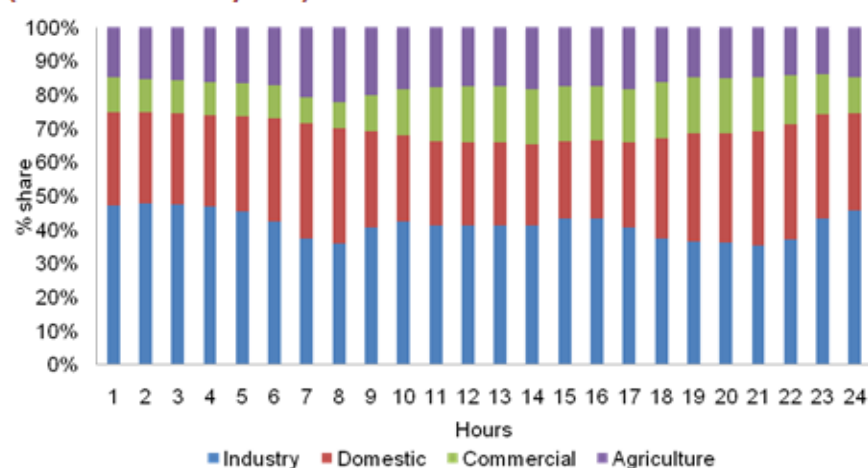
Load Research

- In summers, domestic category has the highest contribution during peak hours and industrial category in winters.

- Increasing shares of domestic and commercial categories during peak hours.

- Interventions in domestic and commercial categories are important due to high peak coincidence

Source: TERI Analysis

DSM Action Plan **Domestic consumers had highest share in evening peak demand – Mainly due to space conditioning appliances**
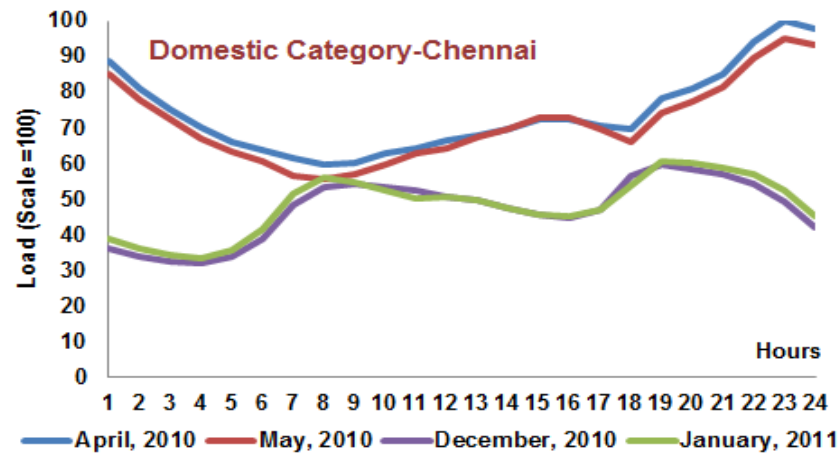
- Promotion of energy efficient AC was identified as one of the key strategies

- Pilot project in Chennai: peak demand expected to double in next 10 years with commercial and household categories contributing to 50% share of demand.
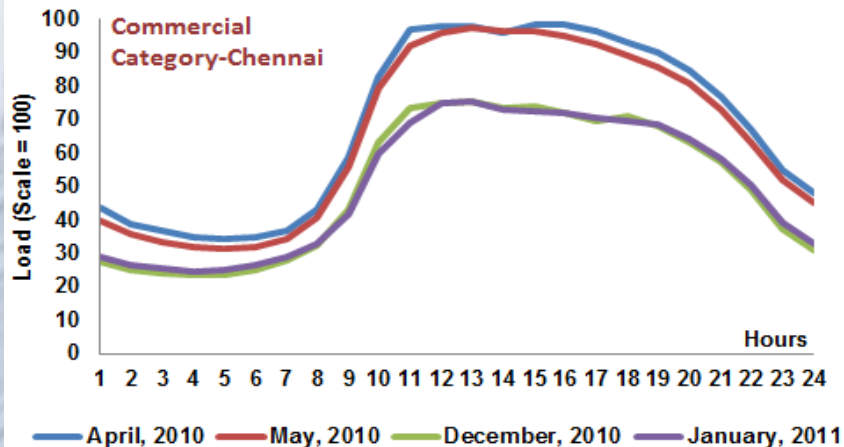
Objectives of the programme : **The study was conducted to design an implementable DSM programme for increasing penetration of energy efficient space conditioning appliances in Chennai**

Broad objectives:

- Understanding the market of energy efficient appliances in Chennai, consumer behavior, usage pattern and barriers to penetration of energy efficient appliances.

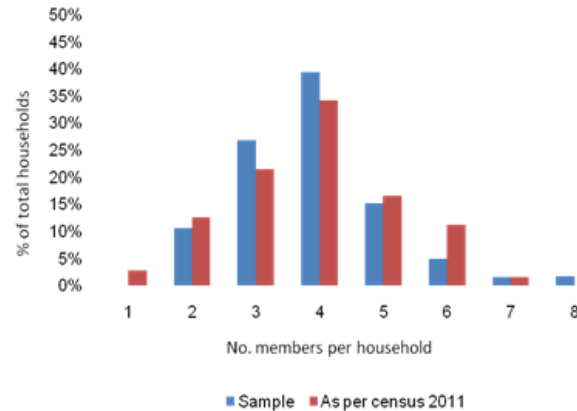- Designing an implementable scheme for penetration of energy efficient appliances.

Approach:

Stakeholder Interaction → Retailers and Manufacturer survey → Consumer survey → Analysis
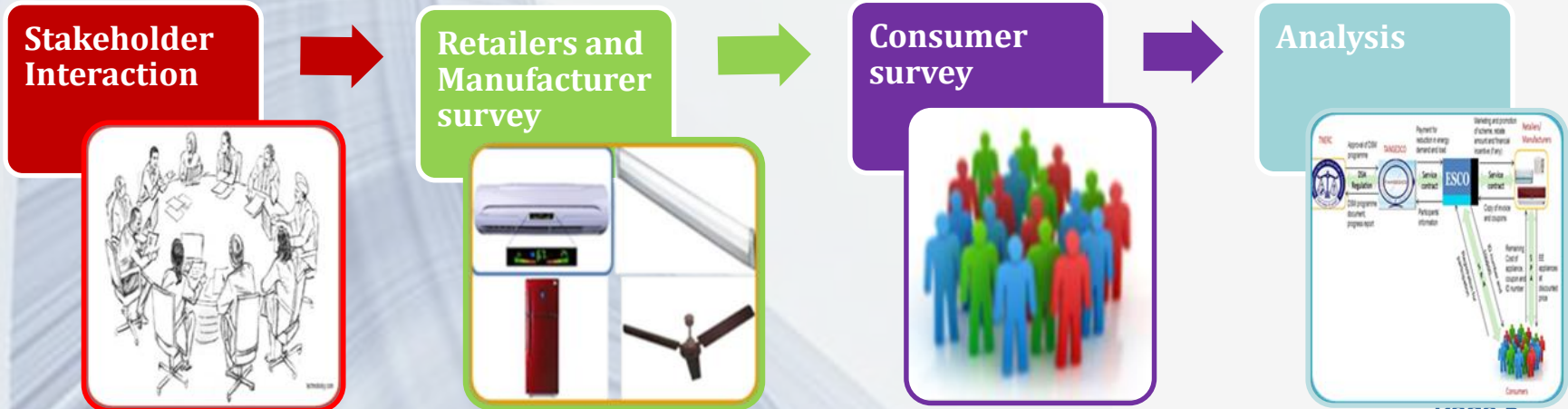
Approach and methodology: **Survey was conducted across the city of Chennai among domestic and commercial consumers**
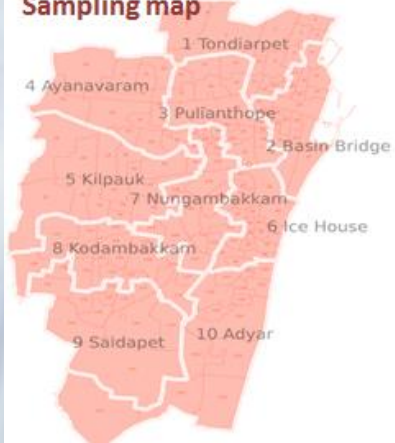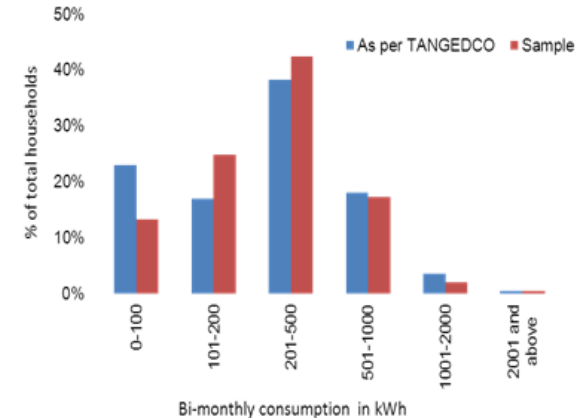
Stratified random sampling in Chennai

- Covering Chennai North, West, South and Central Circles; Covering all the administrative zones

- Households randomly selected from all the administrative zones of the city;

- Commercial shops serving to the selected households

Source: TERI Analysis

Survey results : **High usage of ACs – 5.6 hrs/day (domestic) and 6.6 hrs/day (commercial) almost throughout the year**

Daily usage hours of ACs in Chennai
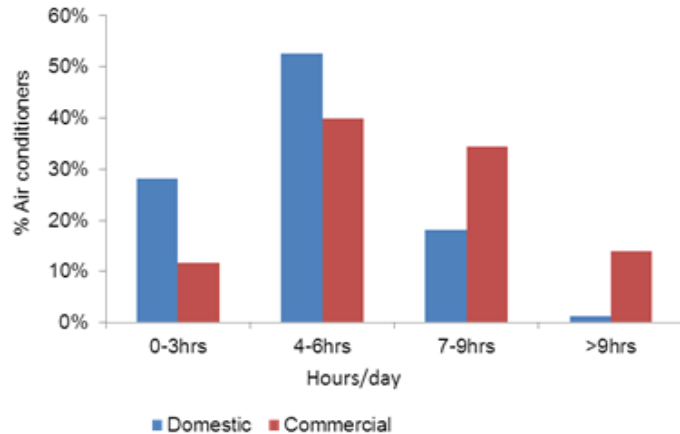
Monthly usage pattern of ACs in Chennai
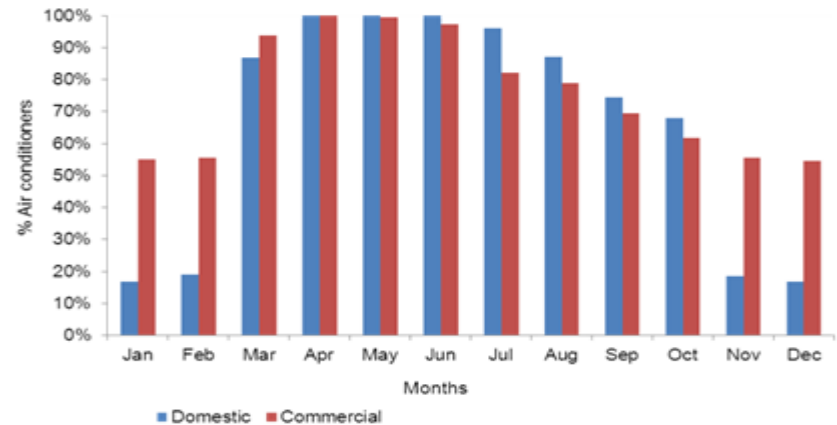
Key Observations:

- Around 15 % Domestic consumers and 55% Commercial consumers use ACs throughout the year

- Average daily usage hours for domestic and commercial users is 5.6 hours/day and 6.6 hours/day respectively.

- Operational months are 7.5months/year and 9.08months/year for domestic and commercial category respectively.

Source: Consumer survey, TERI Analysis

Survey results : **Overall market size of ACs is 1.5 lakh unit/year of which 70% is 2/3 star rated**

Awareness	Willingness	Preferences
• 68% aware of star rating in appliances • 90% of them were observed to be aware about star rating in ACs	• High upfront cost – major impediment in penetration of energy efficient appliances. • Level of willingness to replace their existing appliances is low.	• Split Air Conditioners are preferred because of non-availability of window ACs in some brands, less noise, multiple designs and colours. • 2/3 star rated ACs are more preferred because of lower upfront cost.

Chennai Market:

- Prevalence of a discount up to 5% on MRP being offered by retailers.
- Annual Market of 1.5 lakh air conditioners .
- Majority sales of 2/3 star rated ACs (65%)

Source: Market research, Consumer Survey and stakeholder interactions

Analysis: **Benefits to utility Saving potential of 18 MW in peak demand and 22 MU energy per year by targeting the market of ACs only in Chennai**

Appliances	Savings in peak demand (MW/Year)	Savings in energy demand (MU/Year)*
Air Conditioners	18	22

*inclusive of T&D losses of 15%

Benefits to the utility and state:

- Energy and peak demand reduction
- Savings in power purchase cost
- Improved Power Supply position
- Reduction in power cuts and load shedding
- Reduced need of additional generation capacity

Source: TERI Analysis

Analysis: **Benefits to consumers**

- **Consumers can save 200-350 kWh per year by using 5-star rated ACs**
- **A simple discount of 10% on upfront cost will motivate them to buy 5-star rated appliances due to reduced payback period**

Air Conditioners		Energy Savings (KWh/ month)		Payback Period (Years)		Payback after 10% Discount (Years)	
		Domestic	Commercial	Domestic	Commercial	Domestic	Commercial
2 Star Rated	Split	29	37	4.5	2.3	2.2	1.1
	Window	34	42	3.6	1.8	1.9	1.0
3 Star Rated	Split	18	23	5.2	2.6	1.4	0.7
	Window	21	26	4.3	2.2	1.6	0.8

- Savings in monthly electricity bills
- Reduced power cuts

Source: TERI Analysis

Analysis: **Net impact of investing in DSM programme should be zero : Benefits should be more than the costs**
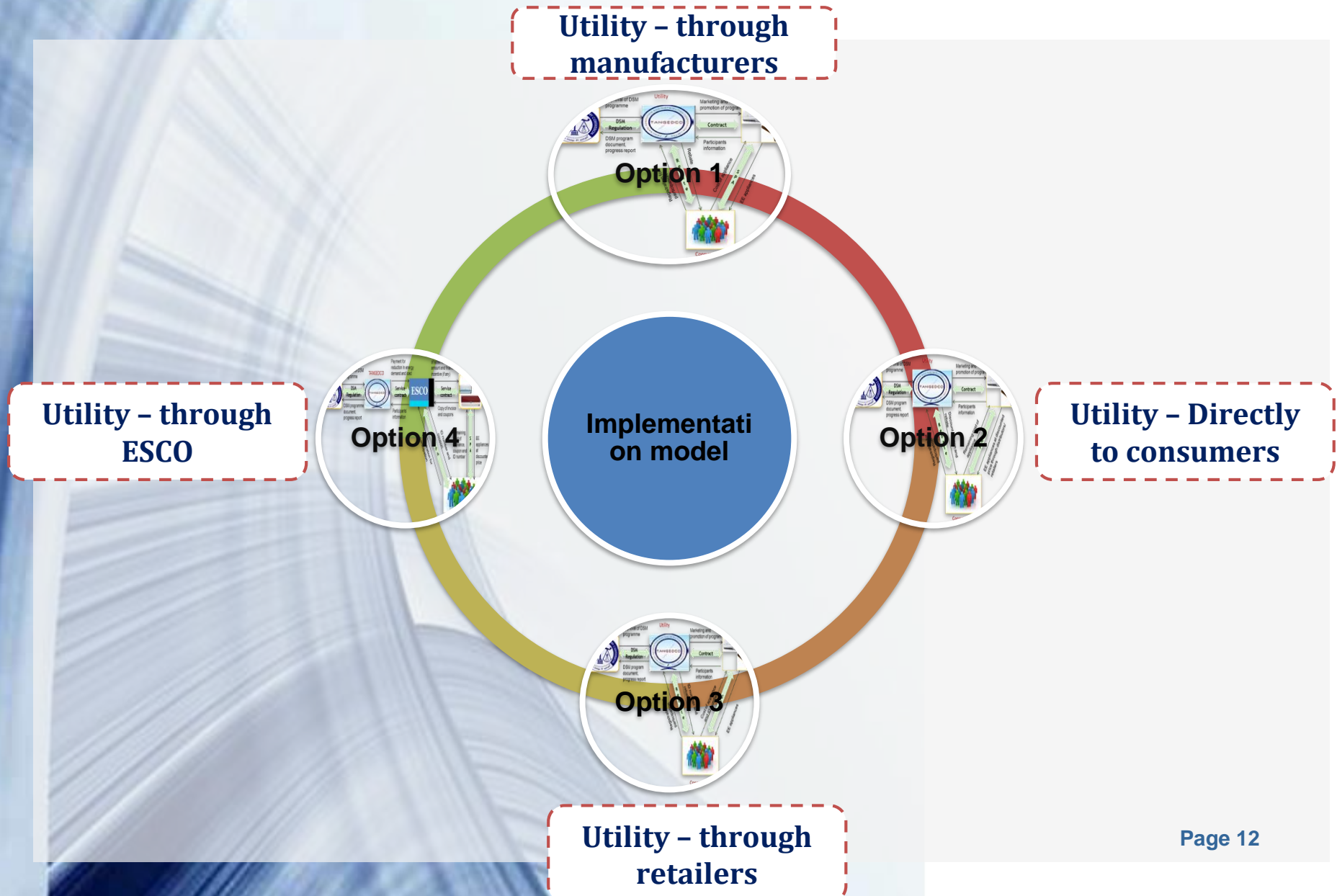
RIM Test

Ratepayer-Impact Measure test measures the impact of implementing DSM program on non-participants.

LRIRIM Test

Life-cycle Revenue Impact Measure test expresses the impact of the cost and benefits of DSM program on per unit (KWh) basis.

- Costs: Rebate cost, program administration, marketing and monitoring costs, loss in revenue
- Benefits: Avoided power purchase cost*

*Tariff petition of TANGEDCO for FY 2013-14

Institutional mechanism for implementation 1) Implementing agency; 2) Funding institution; 3) Vendors; 4) Consumers

Utility – through manufacturers

Option 1

Utility – Directly to consumers

Option 2

Utility – through retailers

Option 3

Utility – through ESCO

Option 4

Implementation model

Institutional mechanism for implementation **Institutional models for implementation through ESCO**
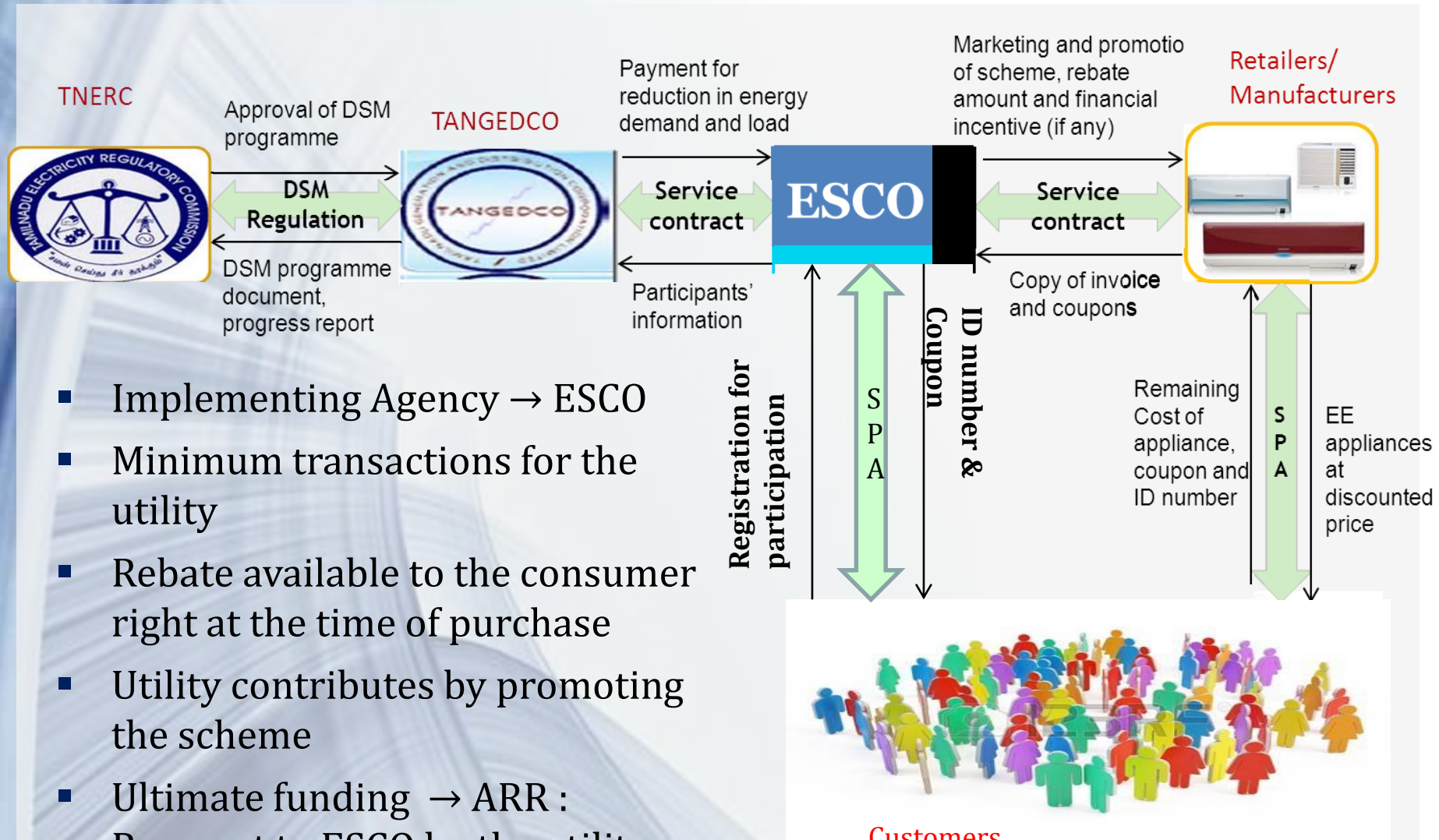
- Implementing Agency → ESCO
- Minimum transactions for the utility
- Rebate available to the consumer right at the time of purchase
- Utility contributes by promoting the scheme
- Ultimate funding → ARR : Payment to ESCO by the utility

Institutional mechanism for implementation **All the 4 actors have important role for successful implementation of DSM programme**

	Key actors	Responsibilities
①	Funding Agency: TANGEDCO	• Funding for program implementation cost and discount/rebate through DSM Fund/ARR • Promotion, awareness campaign and marketing • Monitoring and Verification
②	Implementing Agency: ESCO	• Overall management of the program • Provide funds for program implementation and discount/ rebate initially (to be received later from TANGEDCO). • Tie up with vendor/manufacturer for provision of discounts/rebate for consumers • Monitoring and verification, ex-post evaluation of program
③	Vendor: Retailer	• Participant verification • Distribution of appliances (at discounted price) • Marketing of program
④	Participants: Domestic households and small commercial units	• Avail benefits of program • Submit program participation form to retailers

Thank You For Your Attention!