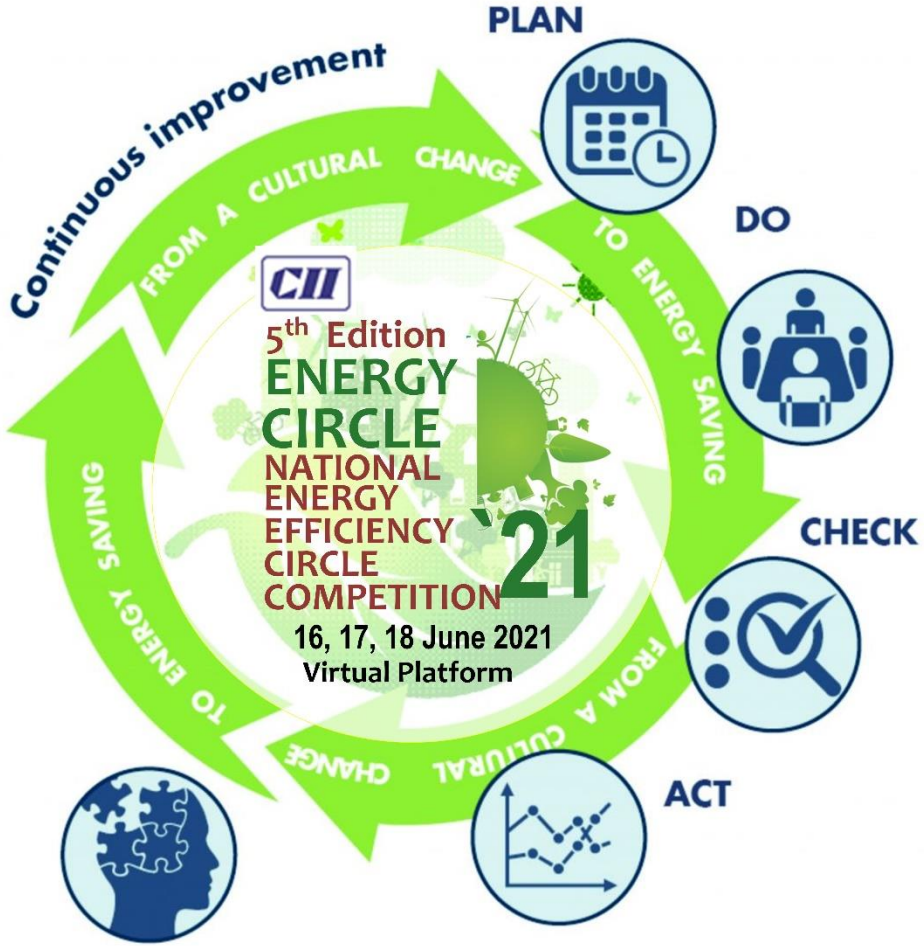


Best ESCO Case Study

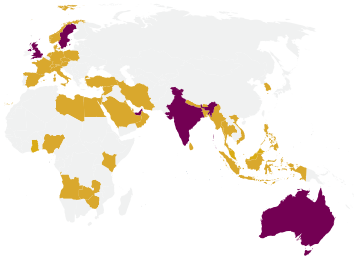
Secure Meters Ltd., Udaipur

Sanket, Nageswar Rao, Patranjan & Sunit

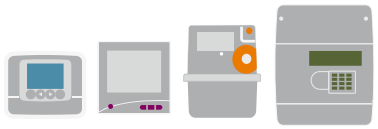
Prakashan, Mahendra, Shaleen, Surjeet, Abhyant & Neeraj

About the Organisation

Confederation of Indian Industry

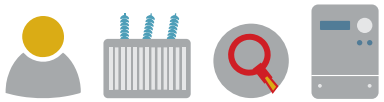


- Meters in over **50** countries
- Office in **5** countries



More than

- **40 million** Meters worldwide
- **8 million** Smart Meters



- Pump Testing: **15,000** pumps/blowers
- Energy audit: **40,000** feeders and **200,000** distribution transformers
- Meter Testing: **7 million** meters
- Smart elect meter data service: **5 million**

- Employees: 7000 No.

Our factories and logistics centres

India
Secure Meters Limited, Udaipur
Secure Meters Limited, Solan
Secure Meters Limited, Sanand
Secure Energy Services Limited, Gurgaon
UK
Secure Meters (UK) Limited, Eastleigh
Australia
Secure Meters (Australia) Pty Limited, Melbourne
Sweden
Secure Meters (Sweden) AB, Nyköping
UAE
Secure Meters (Middle East), Dubai

Pump Performance Measurement

Confederation of Indian Industry

Thermodynamic method

$$\text{Pump Efficiency} = \frac{\text{Output}}{\text{Output + losses}}$$

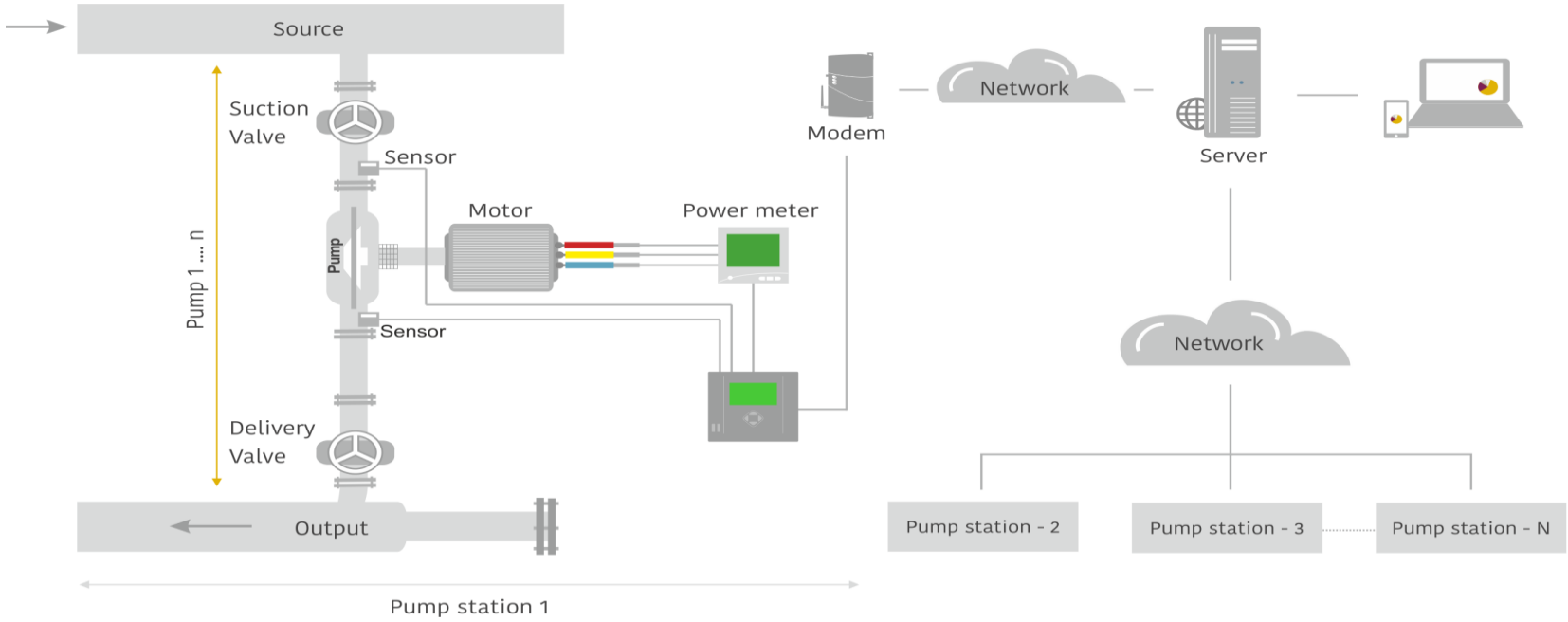
$$\text{Output} = \rho \times g \times Q \times H$$

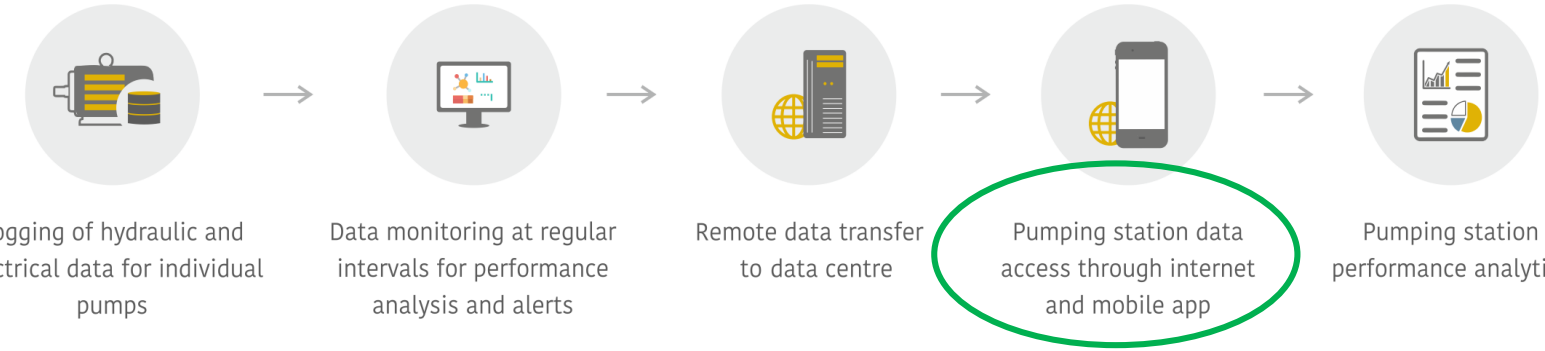
$$\text{Losses} = \rho \times Q \times C_p \times dT$$

$$\text{Pump Efficiency} = \frac{1}{1 + (C_p \times dT / g \times H)}$$

No Need to measure flow to find pump efficiency

ρ = Density (kg/m^3), Q = Flow rate
dT = Differential temperature (mK)
C_p = Specific Heat
H = Pump Head





ESCO– Udaipur Drinking Water Scheme

Confederation of Indian Industry

Project Start : Feb 2018

Project Completion : Feb 2021

About the project:

- Reduce energy consumption per kl (SEC in kWh/kl) of water produced
- Number of Pumps : 4 (2 W + 2 S)
- Duty Flow: 1800 m3/hr ; Duty Head : 165 m
- Motor Rating: 600 kW, 6.6 kV

Baseline parameters:

- Energy Consumption in 2016-17: ~ 9,900 MWh
- Energy Bill in 2016-17: ~7.25 Crore INR
- SEC : 0.6582 kWh/kl

Problem definition:

- Low efficiency of pumps resulting in high energy bill
- Power factor < 0.93, resulting in penalty from electricity board

Steps towards energy efficiency…

Problem Definition

- Low efficiency of pumps resulting in higher energy bill
- Power factor < 0.93, resulting in penalty from electricity board

What we did

- Identified low efficiency pumps using pump monitoring system
- Rescheduling
- Pump Refurbishment
  - Anti friction coating
  - Rehabilitation of Pump spares like Impeller, Bearings, Shaft etc.
  - Balancing of rotary parts
  - Pump-motor laser alignment
- Enhanced capacitor bank from 200 kVAr to 338 kVAr

Pump Refurbishment

Confederation of Indian Industry

@ Project Start

During

Improved

Challenges:

- Pump OEM stopped supporting/ supplying spares
- Poor health of pumps

Efficiency improvement after Refurbishment (10 to 12%)

Initial Efficiency (66-67%)

Overcoming challenges:

- Developed suppliers
- Improved health of pumps
- Rescheduling Pump Operations

Results Achieved

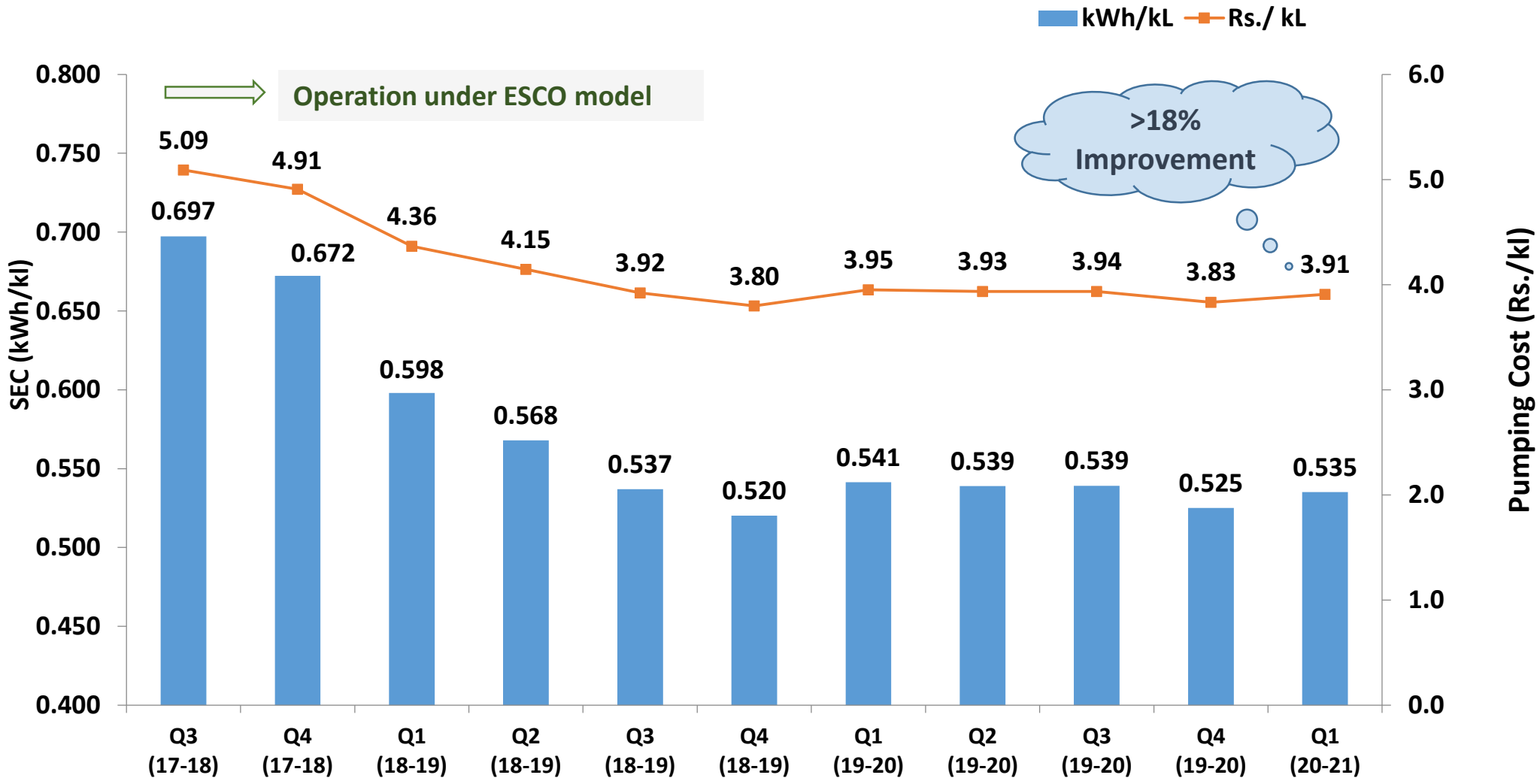
Year	SEC (kWh/kl)	% Improvement from baseline	Savings (Crore)
Baseline	0.6582	-	-
2018-19	0.5617	14.6	0.82
2019-20	0.5357	18.6	0.93
2020-21	0.5168	21.5	1.32
	0.5380	**18.3**	**3.07**

Pump	Initial Efficiency	Improved Efficiency
Pump-1	66 %	79 %
Pump-2	66 %	78 %
Pump-3	66 %	80 %
Pump-4	67 %	81 %
% Improvement		**14 %**

Results Achieved

Confederation of Indian Industry

SEC (kWh/kl) and Pumping cost (Rs/kl)



ESCO– Ujjain Drinking Water Scheme

Project Start: June 2020 Project Completion : Oct 2020 Phase (I)

About the project:

- Reduce power consumption minimum by 5% of baseline Specific energy consumption (SEC) in kWh/kl.
- Web based monitoring solution to improve the efficiency on ESCO mode.
- Implementation of energy saving measures in pumps
- Maintain notified flow
- Maintenance of pumps

Problem Definition:

- Low efficiency of pumps resulting in high energy bill

Results Achieved

Month	Overall SEC, kWh/kl	% Improvement	Saving (Crore)
Baseline	0.2872	-	-
Nov-20	0.2641	8.0	0.11
Dec-20	0.2610	9.1	0.12
Jan-21	0.2691	6.3	0.09
Feb-21	0.2655	7.5	0.11
Mar-21	0.2657	7.5	0.10
Apr-21	0.2737	4.7	0.07
Total	**0.2664**	**7.24**	**0.60**

Pump	Efficiency @ start of the project	Improved Efficiency
Gambhiri HT P1	68 %	78 %
Ambodiya P3	69 %	76 %
Gambhiri HT P2	68 %	75 %
Gambhir LT P6	68 %	75 %
Gaughat Phase 1 P3	64 %	72 %
Gaughat Phase 1 P4	66 %	72 %
Gambhiri LT P5	62 %	70 %
Gaughat Phase 3 P1	61 %	68 %

Results Achieved

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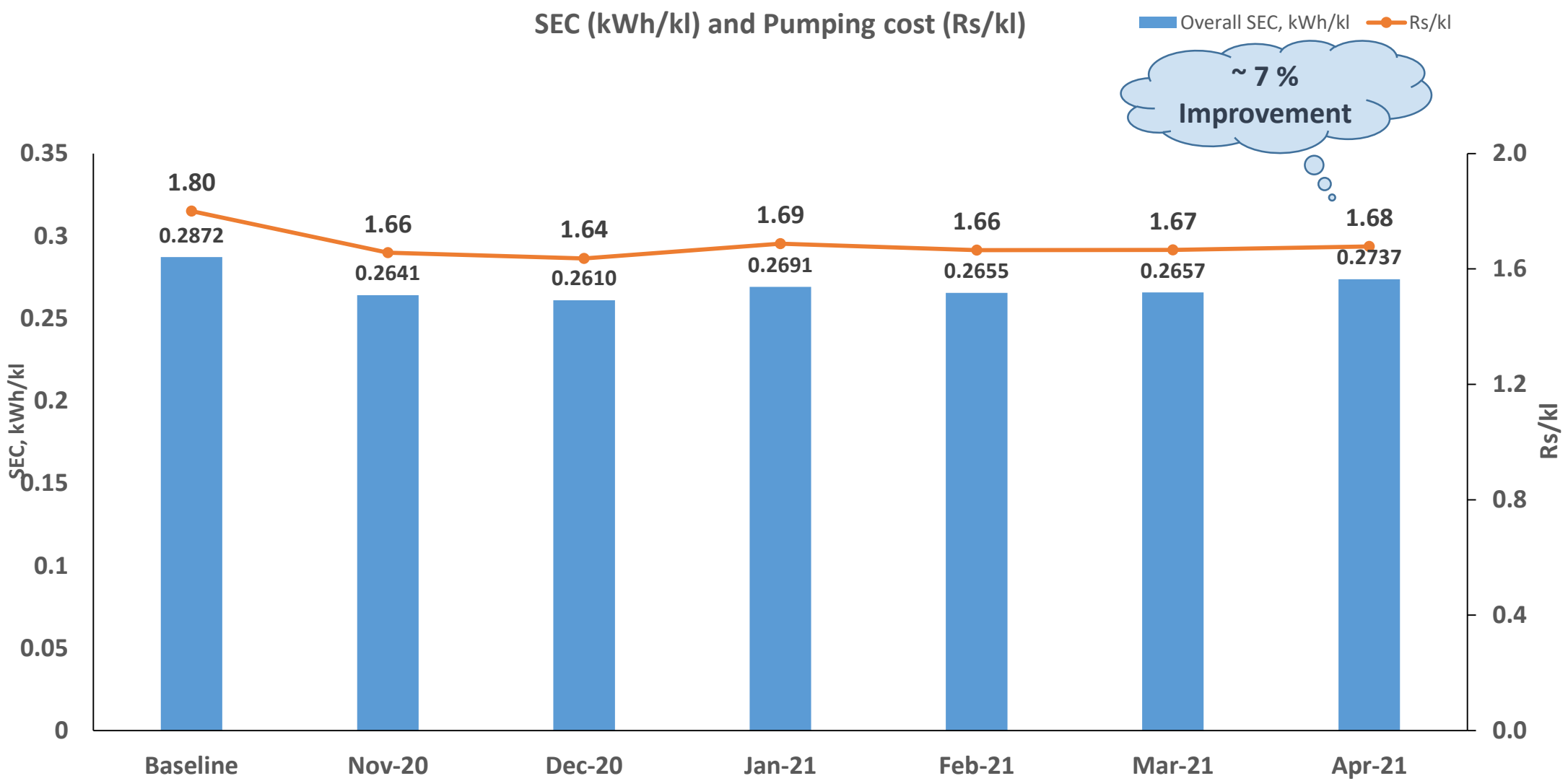

Benefits

Udaipur

- 4200 MWh units saved in 36 months.
  - Carbon emission of 25 lakh kg saved
- Saved power factor incentive of INR 45.6 lakh
- Prevention of water leakages from pipe by survey & maintenance
- Reduced maintenance cost

Ujjain

- 950 MWh units saved in 6 months.
  - Carbon emission of 5.8 lakh kg saved

Future Plan (Phase II):

- Repair and refurbish remaining pumps in next 6 to 8 months

Benefits To Water Utilities

- Improved pump health & reliability
- Online monitoring of individual pumps performance
- Monitoring data are available through mobile app to utility officials

Confederation of Indian Industry

Thank you !