Are Smart Meters really SMART?

OUTLINE

Problem statement

Current solutions in the market

Drawbacks of the current solutions

Solution

Technical aspects

Business plan

SMART METER

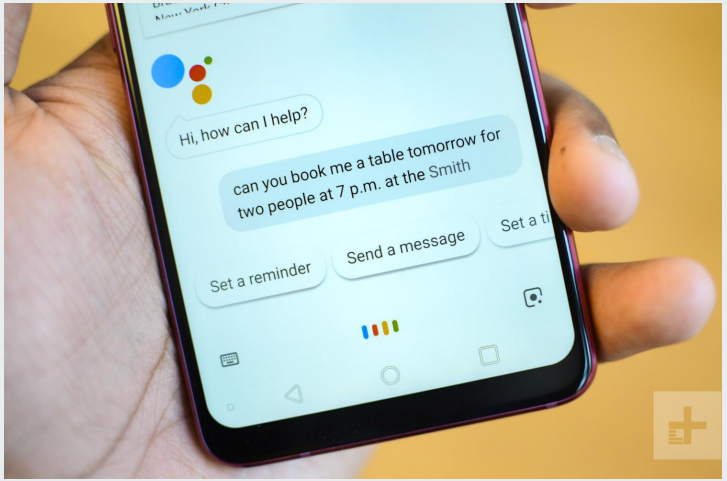
As per Wikipedia, a smart meter is an electronic device that records consumption of electric energy and communicates the information to the electricity supplier for monitoring and billing

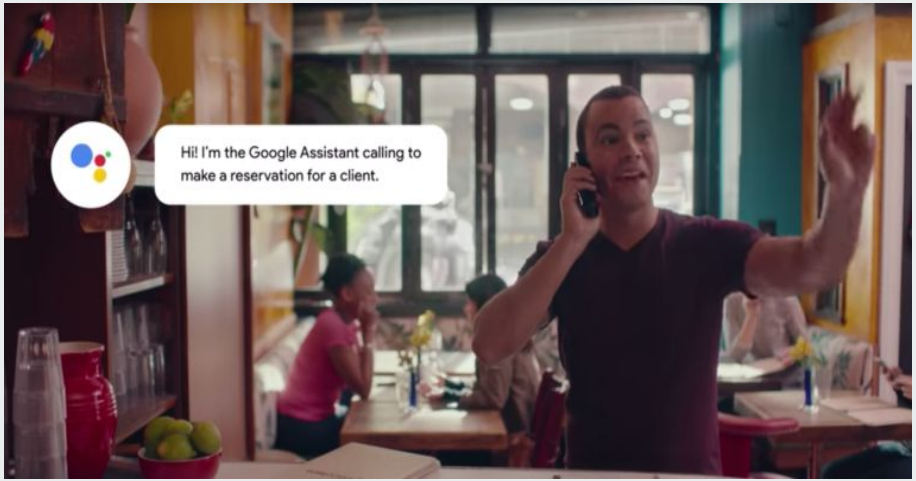
INNOVATIONS IN SMART METERS

Smart meters have been launched in the market which offer web-based energy reporting services to offer smart metering data to customers

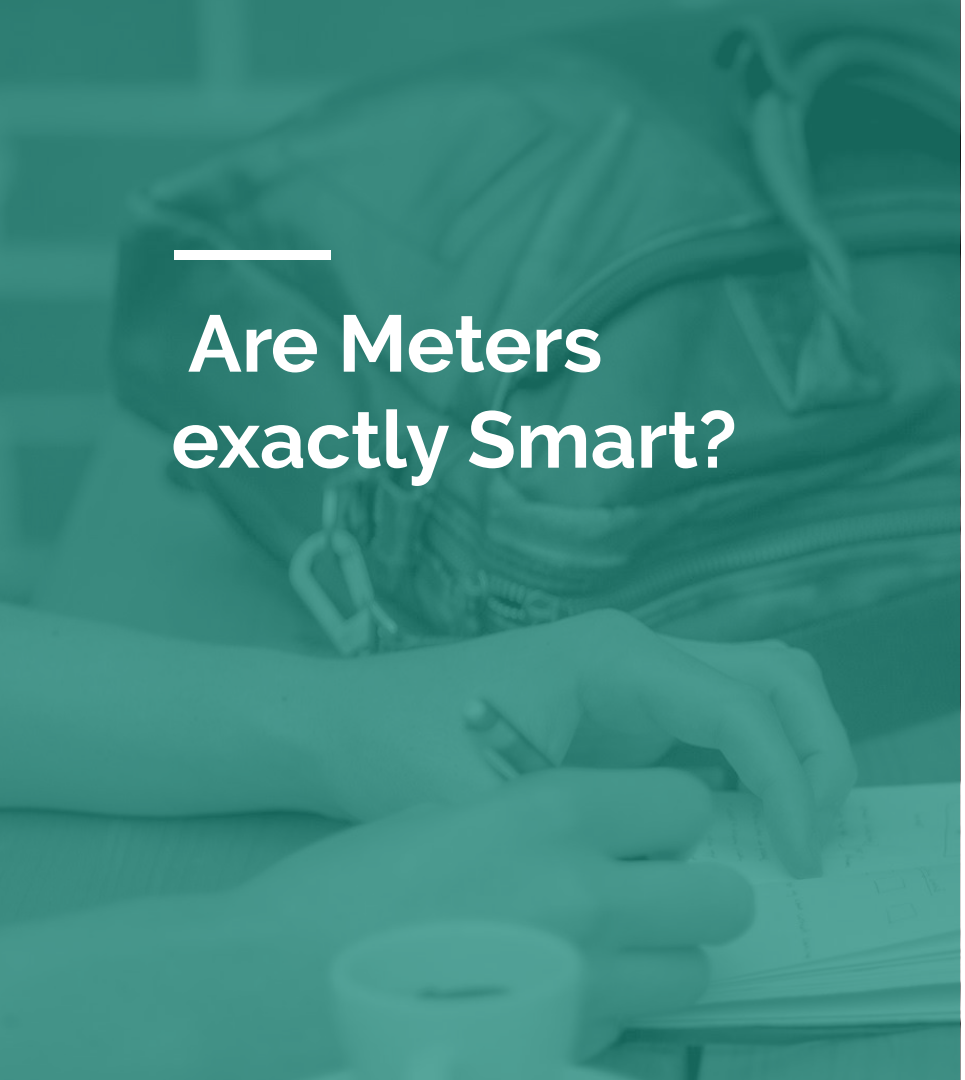
Smart meters come with an in-home display screen that shows you exactly how much energy you're using in pounds and pence and will display you the estimated bills.

SMART?


Hi, how can I help?
can you book me a table tomorrow for two people at 7 p.m. at the Smith
Set a reminder
Send a message


Hi! I'm the Google Assistant calling to make a reservation for a client.

SMART?



Are Meters exactly Smart?

Does estimation of bills or sending the readings to smart phones make the system SMART?

Are the meters SMART enough to reduce your consumption?

Does these meters address the basic issues of voltage instability?

Problem statement

How much of the energy you pay for each month is actually used to power your plant?

It could be less than half, with the rest escaping through leaky air compressors, inductive loads and other energy hogs.

In 2013, the United States had an energy efficiency of just 42 percent, meaning 58 percent of all the energy we produce goes to waste.

The industrial sector, which includes manufacturing, agriculture, construction and mining, accounts for nearly one third of all U.S. energy usage

SOLUTION

SMART METER=

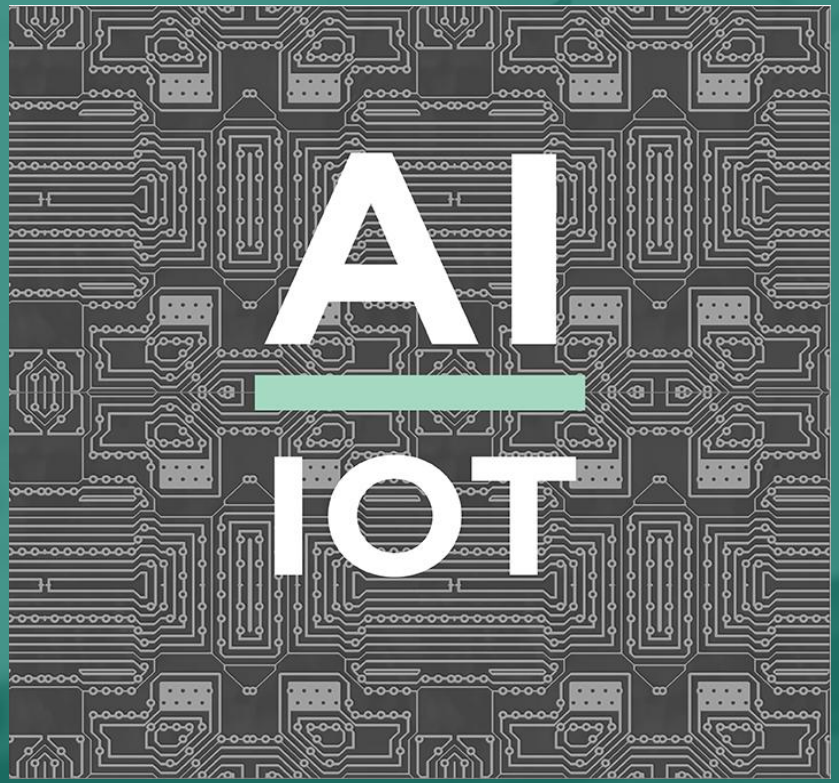
IOT

+

DEEP LEARNING

+

APFC


AI
IOT


INTELLIGENCE

We are introducing an INTELLIGENT Smart Meter which

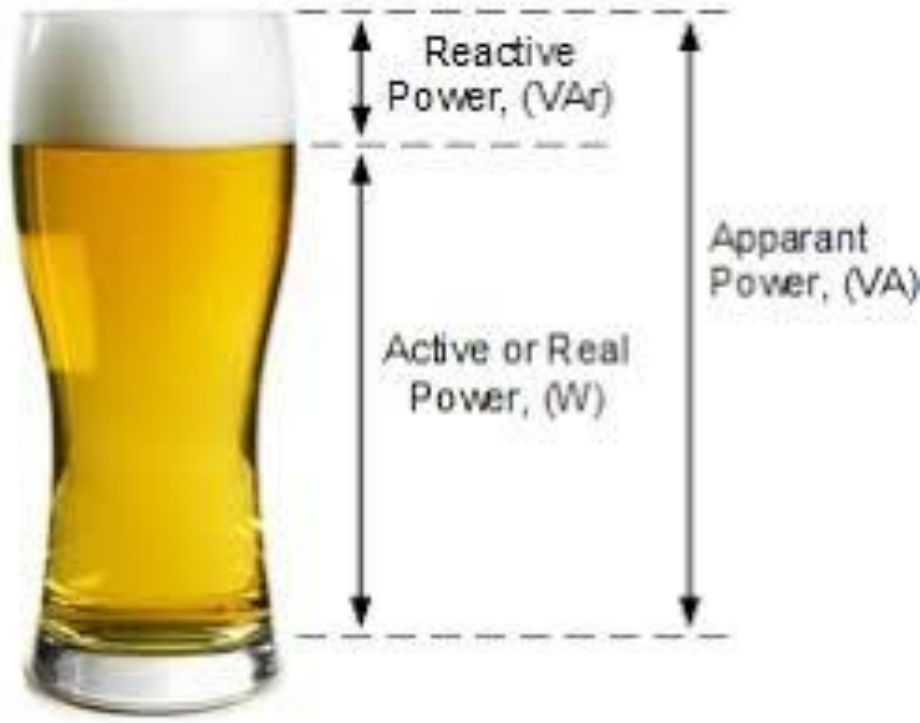
- Provides VAR optimisation
- Enhances voltage stability
- Uses APFC powered by AI-Deep Learning tools to make the system work at UPF and thus reduce power consumption
- uses IOT to communicate with Smart phone and bring in near real time usages & bills and will bring an end to estimated bills.

Automated Power Factor Correction Based on Artificial Neural Networks

Ever thought about a system which reduces electricity consumption

Understanding Power Factor

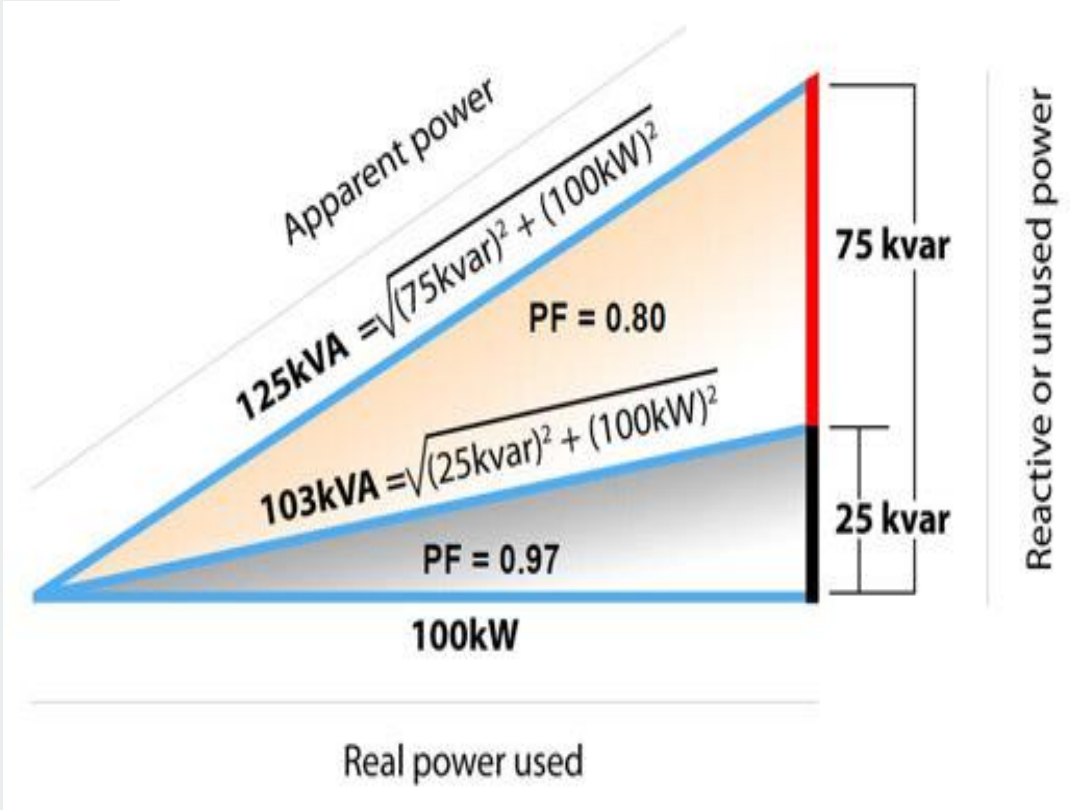
Reactive Power = Useless Power

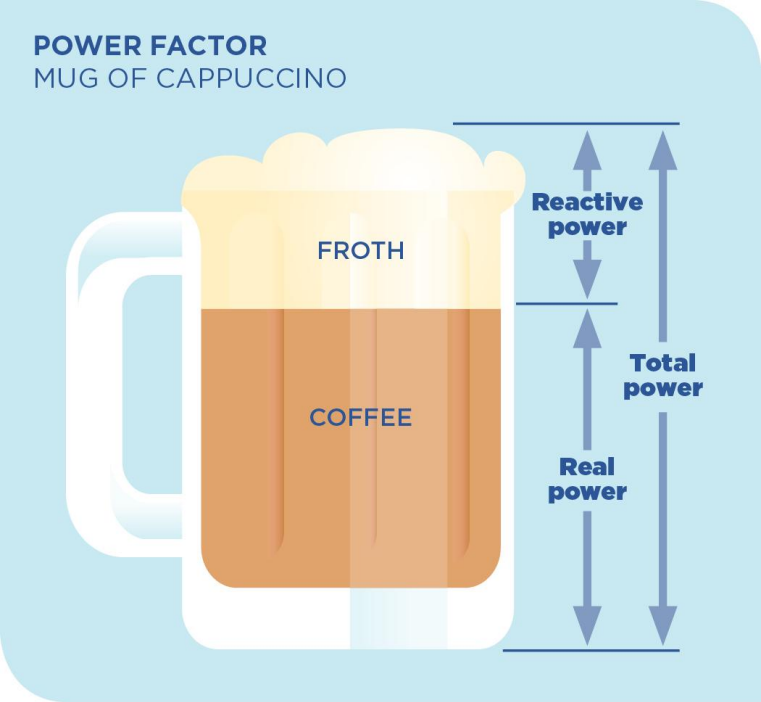


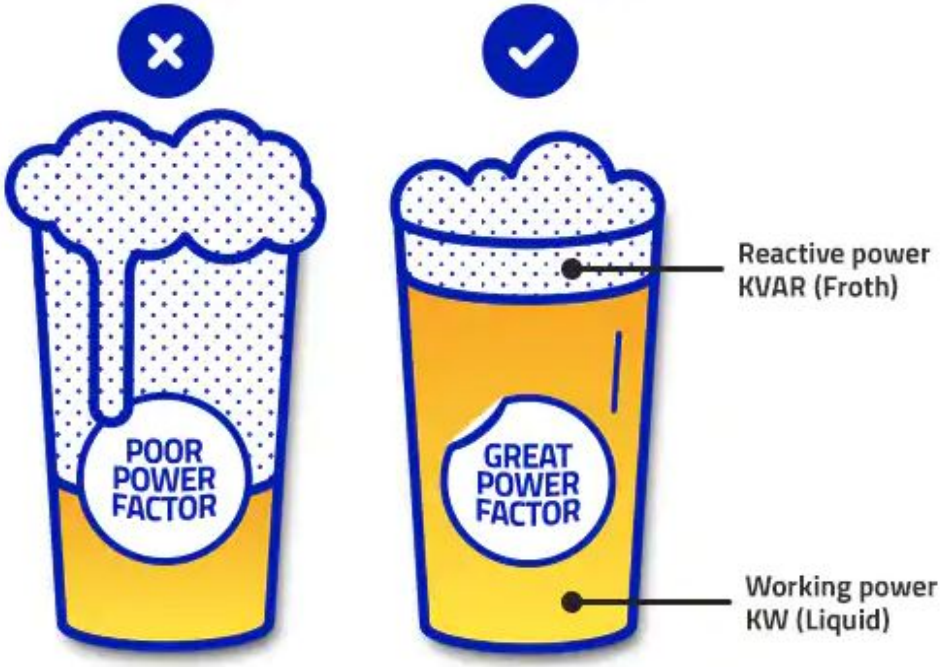
Understanding Power Factor

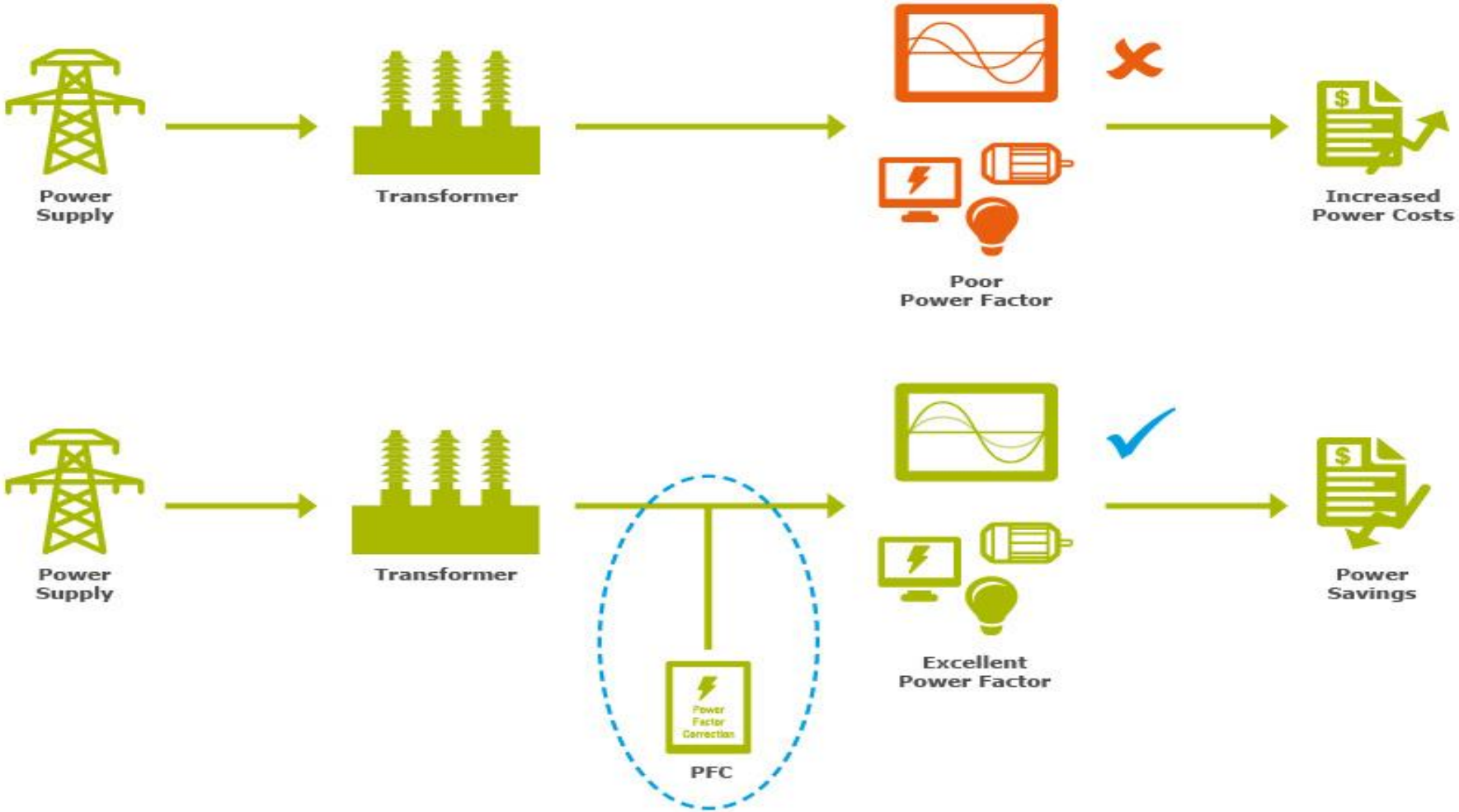
Decrease in power factor = increase in reactive power (kVAr)

ie, increase in Apparent Power(kVA)




POWER FACTOR
MUG OF CAPPUCCINO
FROTH
COFFEE
Reactive power
Total power
Real power


POOR POWER FACTOR
GREAT POWER FACTOR
Reactive power KVAR (Froth)
Working power KW (Liquid)


Power Supply
Transformer
Poor Power Factor
Increased Power Costs
Power Supply
Transformer
Power Factor Correction
PFC
Excellent Power Factor
Power Savings

No Power Factor Correction

Power utility supplying true and reactive power to consumption

With Power Factor Correction

Power utility supplying true and reduced reactive power only after capacitor bank installed. Reactive energy now supplied by capacitors

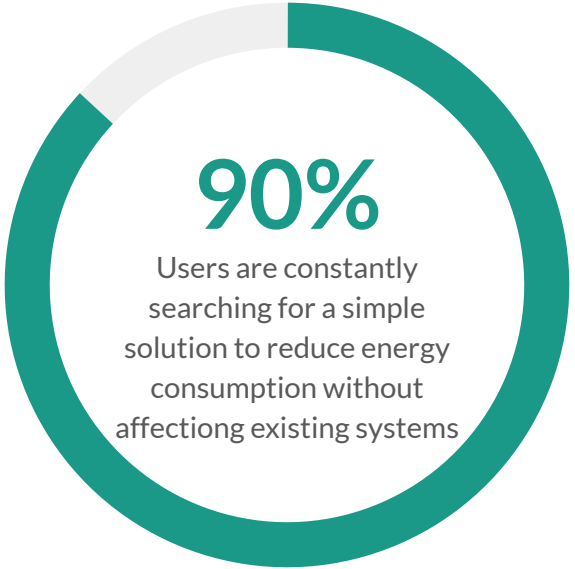
APFC Using Deep Learning

We are introducing an Automatic Power Factor Correction(APFC) tool based on artificial neural networks focusing on the compensation of reactive power, consequently improving the voltage stability.

A two layered feed-forward neural network employing back propagation algorithm was used to train the IEEE 22 bus system on a MATLAB environment.The capacitance to be introduced is predicted by the NN fitting tool and the predicted capacitance is to be switched to the load lines.

Power Saving Statistics using APFC

This is particularly focussed on industrial consumers, since power factor does not have much impact on domestic consumption



Use case of GEC-Thrissur

We were able to bring down the KVAr and thus KVA using AI based Smart Meter .

A two layered feed-forward neural network employing back propagation algorithm was used to train the bus connected to Machines Lab ,and PF jumped from 0.77 to 0.99

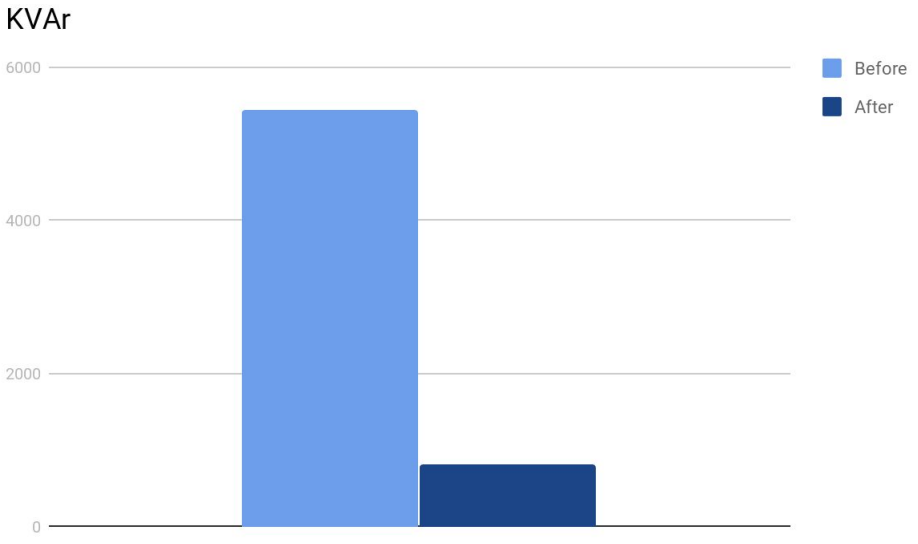
This ensured 10-20% of reduction in KVA consumption

Power Saving Statistics using APFC

KVAR

KVAR

BEFORE	AFTER
5436	818



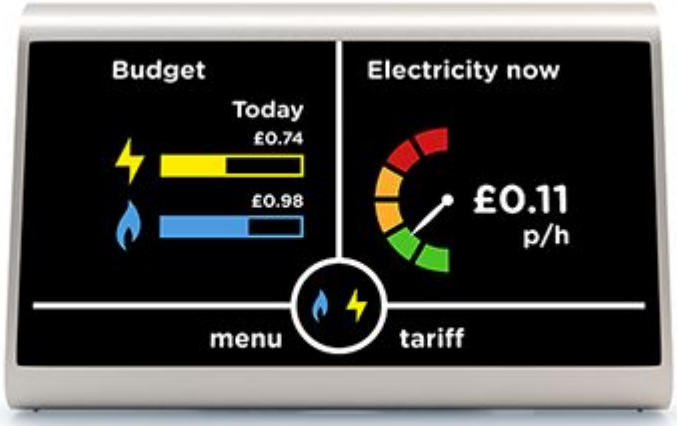
APFC TODAY

10 Step 100 KVAr = 1.5 - 3 Lakhs

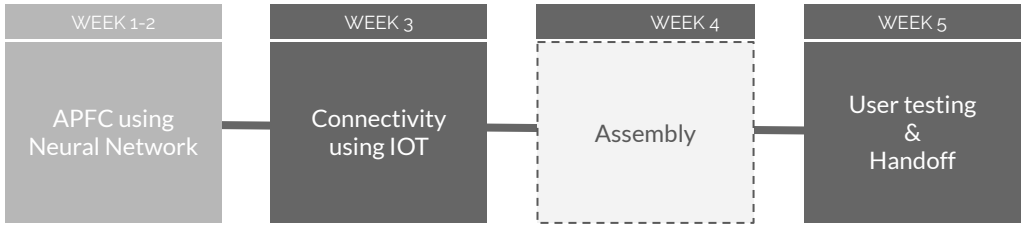
SIZE

Next Steps

Further , we can expand the applications to **Smart grid** implementataion at consumer level using these AI based Smart Meters



Timeline


WEEK 1-2
APFC using Neural Network
WEEK 3
Connectivity using IOT
WEEK 4
Assembly
WEEK 5
User testing & Handoff

Questions?