Data Visualization and information Design

Designing a Data meter

to track LPG consumption

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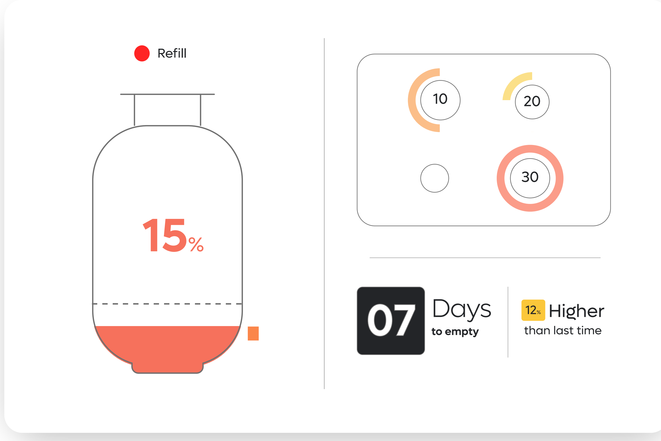
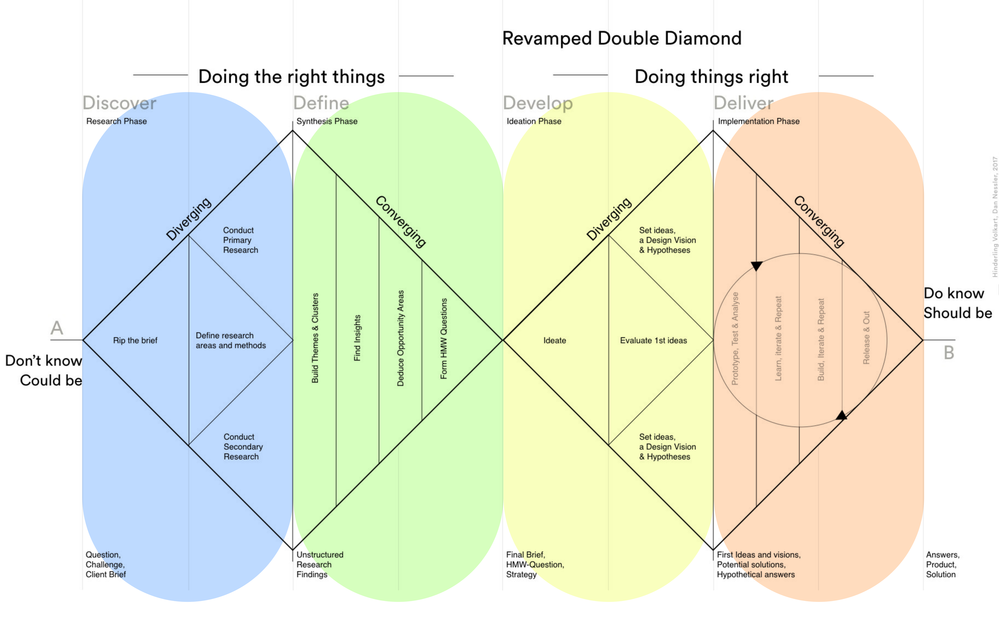
Liquified Petroleum Gas is a major source of energy for cooking in households. The gas consumption has increased drastically in the past few years and there is no proper method to track the daily usage of gas provided in cylinders. This project aims at designing a user friendly data meter for households which provide relevant information related to the consumption of LPG in houses.



The Process



Stage 1

Discover

Aim

To understand **What** information people seek? **why** people seek information and **how** they use it

Secondary Research

12
Subsidized 14.2-kg cylinders per year

Households accessing subsidized LPG are currently entitled to use up to this limit, with additional cylinders supplied on an unsubsidized basis

4.3%
Higher than last year

Covid-19 and winter push cooking gas consumption above petrol in India. Domestic consumption accounts for 87% of total consumption

2nd
Largest consumer of LPG in the world

Rapid increase in population combined with LPG penetration in rural areas made India the second-largest consumer of LPG in the world at 22.5 million tonnes.

LPG can be used for numerous purposes

Homes
cooking, heating, BBQ

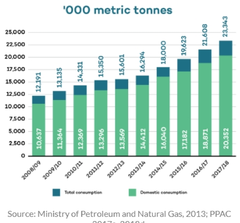
Electricity Generation
Co-gen, Tri-gen and Gas Turbines

Agriculture
greenhouses, flame weeding, crop drying

Business & Industry
for forklifts, ovens, boilers, furnaces

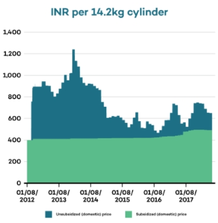
Transportation
for taxis, buses, autogas, commercial vehicles

Figure 2. Total and domestic LPG consumption, FY 2008/09 to FY 2017/18



Source: Ministry of Petroleum and Natural Gas, 2013; PPAC 2017a, 2018d.

Figure 1. Subsidized and unsubsidized domestic prices, FY 2008/09 to FY 2017/18



Source: PPAC, 2017b, 2018e, 2018f.

various kinds of gas flow meters which measure the volumetric flow rate or mass flow rate of gases are used in industries. Cities with natural gas supply lines also provide meters for reading the monthly consumption.

Any type of gas meter can be obtained with a wide variety of indicators. The most common are indicators that use multiple clock hands (pointer style) or digital readouts

Primary Research

What is happening in the kitchens?

Having an idea about the thoughts of people on the consumption of cooking gas and how are they going to evaluate the daily consumption was important.

And I talked to few people around me

Do you care about the daily gas consumption?

- Not really
- Yeah, That's why I prefer traditional stoves
- I do. But I don't know how to deal with it
- I am not able to

When do you make out that you have to book a new cylinder?

- I book cylinder just after 1-2 week of use
- usually I realise when gas gets over
- To avoid risk, I keep a count on days

Insights

Users has least role in energy conservation. There is no proper way to track the cooking gas consumption at

LPG is the purest and safer form of energy used in households. The gas consumption in India has increased drastically.

Its important to understand the daily usage of the gases at house holds. Users must be aware of the usage and it should not add another mathematic to them to remember

Define

Persona

The self made chef

She is a middle aged woman who takes care of the kitchen mostly. She is the one who uses the gas stove more at home.

Painpoints

- Not able to understand quantity of gas used
- Knob position comprehends status of stove
- Unaware about her consumption

Aspirations

- Easy to understand consumption
- Quick indication about flame status
- Display of gas remaining

The responsible youth

She is a working woman. She is the one who books refilled gas cylinder every time when the cylinder in use gets empty.

Painpoints

- Knows that cylinder is empty only when stove stops functioning
- Should keep an extra cylinder at home

Aspirations

- Need to know when to book the cylinder
- Convenient if booking happens automatically
- Know gas remaining without checking cylinder

What is the problem?

The consumption of cooking gases in households is increasing rapidly. Users are unable to monitor the consumption of LPG in a daily basis.

Why this is important?

Despite the rapid uptake of LPG for cooking, approximately 500 million people in India remain without access to clean cooking fuel.

Where is the actual problem present?

The LPG consumption for domestic purposes is increasing and the consumers are not able to control it. Even though its because the shift towards more safer and eco-friendly energy sources, The primary reason is the lack of a facility to monitor the consumption and keep an account of it.

Its almost one month we are using this cylinder. This will get empty any soon. I guess we should book for refilling.

At present the usage is based on assumptions

If you can't measure it, you can't improve it

- Lord Kelvin

Requirements

- A meter which enable the user to know the consumption
- An in-home display for monitoring the usage
- Cut the expense on LPG short

Develop

Design brief

The domestic users of cooking gas are unable to monitor their daily consumption. There is a need for a measuring device along with a data meter which gives visual clues about the usage. This should help the users to evaluate the live data without observing or physically measuring the weight of cylinder or following any other unscientific methods.

Existing
Gas meters

Communication

Use multiple clock hands (pointer style) or digital readouts

Measurement

Amount of gas flowing per unit time(m^3 or L)

Gap

- Complicated information
- Lack of segregation
- Expertise required
- Information irrelevant to user

Information to be conveyed

1⁰ Days remaining to empty
Gas consumed
Gas remaining

2⁰ Active Burner
Gas consumption by each Burner
Last month usage

3⁰ Book a cylinder
Over temperature

Sovereign
Always visible

Transient
Invoked when needed

Some values are **Daemonic** and irrelevant to user

Volumetric flow rate
Pressure
Heating value compensation

Attributes of data meter

- A non intrusive easy to use digital display
- A tool which Put forward information which user needs

Plan

To create a digital data meter which integrates itself into the user journey and make the overall experience better

Information Layout Ideations

Information

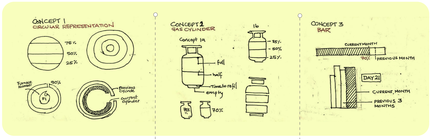
At first glance
Gas consumption
Days to empty
Notifications/ warnings

Secondary
Burner details
Usage details

User need to know some information at first glance. Such information should not take much time. So according to Fitts law , they are made to appear larger in size or prominent.

Gas Consumption

To represent the data related to consumption of gas which is the primary data user need to know, various methods were considered.



Different types of circular charts, were chosen to represent consumption. (Some considered comparison with previous month, representing furnace in use also.)

To communicate more easily, an icon representing gas cylinder is used to show the consumption status.

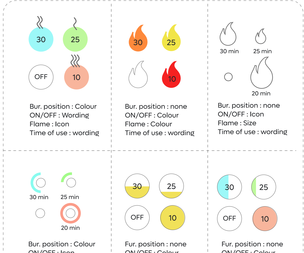
Easy to relate

More abstracted form of communication. The consumption is represented using bar graphs. (Consumption is also compared with that of previous months.)

Burner details

The major information to be communicated to user related to furnace

Burner position
ON/OFF status
Flame (High, Medium or Low)
Time of use (How long the furnace is in ON position?)



Bur, position : Colour
ON/OFF : Wording
Flame : Icon
Time of use : wording

Bur, position : none
ON/OFF : Colour
Flame : Colour
Time of use : wording

Bur, position : none
ON/OFF : Icon
Flame : Size
Time of use : wording

Bur, position : Colour
ON/OFF : Icon
Flame : Icon
Time of use : wording

Fur, position : none
ON/OFF : Colour
Flame : Colour
Time of use : wording

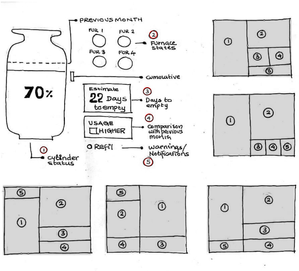
Fur, position : none
ON/OFF : Colour
Flame : Colour
Time of use : wording

The positions of burner icons are mapped to the arrangement of burners. So there is no need for a separate signifier for that.

To reduce the complexity, different flame states can be represented by a circular chart mapping the actual knob positions along with different colours for different state.

The size of icons represents the size of burners. So larger burners will have larger icons.

Layout



The **gas consumption status** is the primary information user want to know. So it is at the top left side and bigger in size.

When a **warning or notification is invoked** it is the information to be communicated first. So it is placed above the gas consumption status.

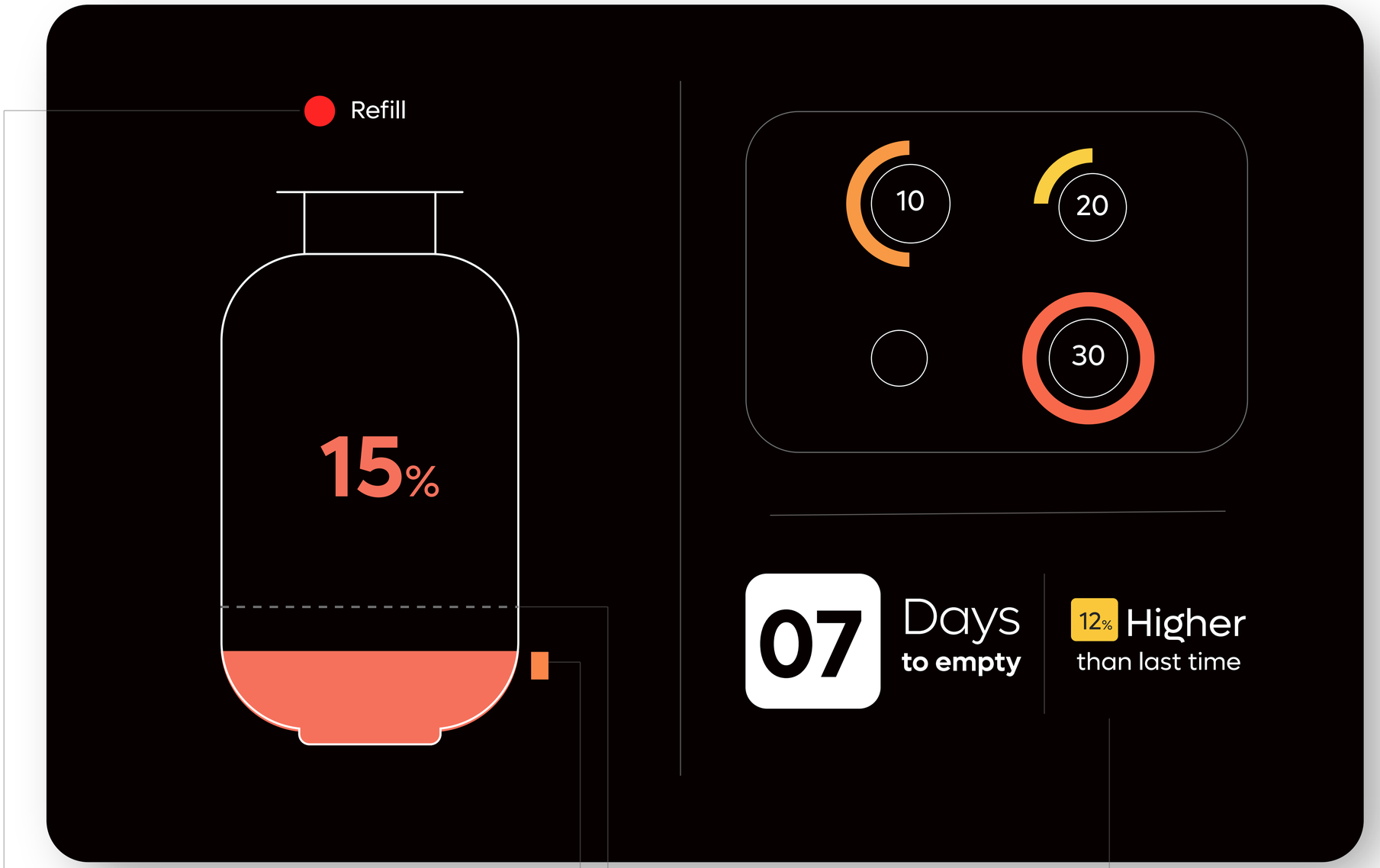
Days to empty should be prominent and visible

The **furnace status** must have a decent space since it contains more than one data.

All other information which are of **lesser importance** are placed at the bottom right.

Deliver

Data meter Layout Design



Notifications

Last cylinder
After n number of days, the status of present cylinder and previous cylinder is compared

Cumulative
If burners are ON continuously for next 15 min at present condition how much gas will be consumed

Consumption
Comparison with previous cylinder