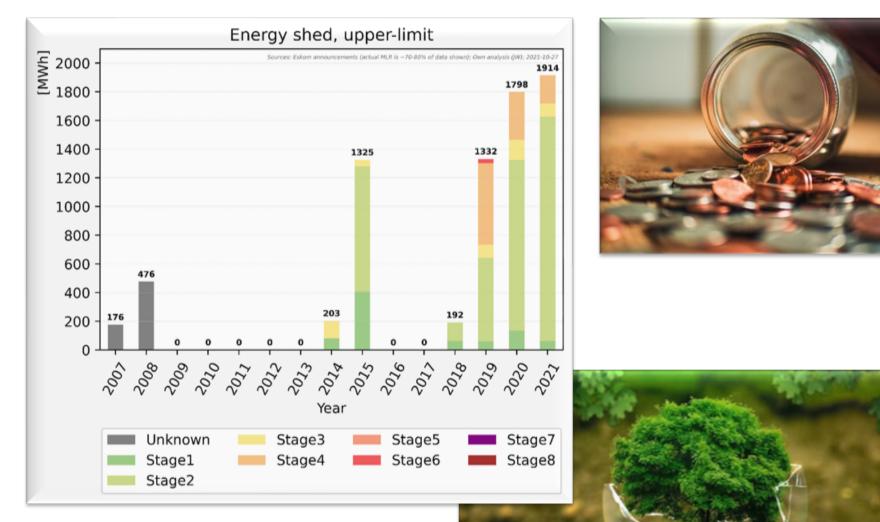


# Application of the SEEL (SANEDI Energy Efficient Lighting Tool): Results and Experiences from the Field

Presenter: Dr Karen Surridge karenst@sanedi.org.za

# Why Go Energy Efficient?

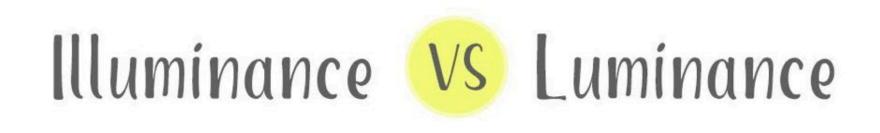


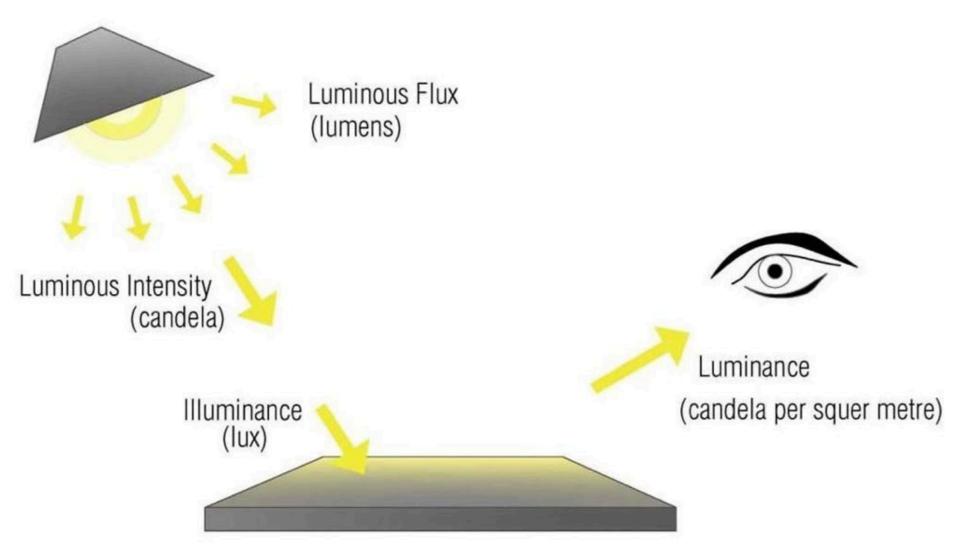


# **Lighting Basics: Lighting Technologies**



- Lighting is a major energy load in public and commercial buildings
- Lighting energy improvements are focussed on replacing lower efficiency lighting with higherefficiency lighting technologies
- Key factor is to maintain the same level of service (same amount of illumination/light in a given space)
- Lighting technologies come with various Efficiencies





## **Lighting Basics: Lighting Technologies**



A Thomas Edison invented the first incandescent light bulb in 1879, since then many lighting technologies (lamps) have been developed to meet lighting needs

Light Source	Efficiency Range (Lm/W) (higher is better)
Incandescent	10-18
Halogen	15-20
Compact Fluorescent—CFL, incl. ballast	35-60
Linear Fluorescent, incl. ballast	50-100
Metal Halide, incl. ballast	50-90
High Pressure Sodium	85-150

**ENERGY INNOVATION FOR LIFE** 

A Ballast regulates the current and provides the voltage to the Lamp







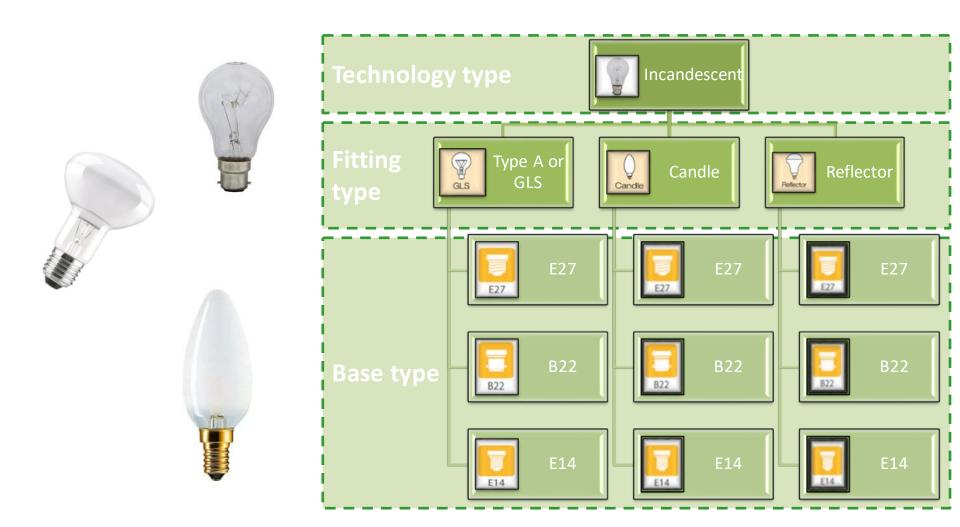
# SANEDI Energy Efficiency Lighting (SEEL) Tool



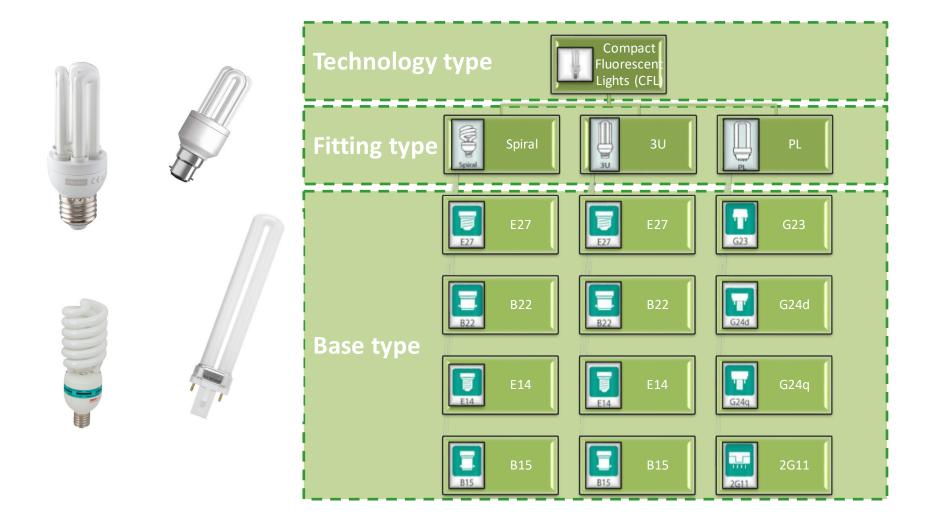


# **Lighting Basics**

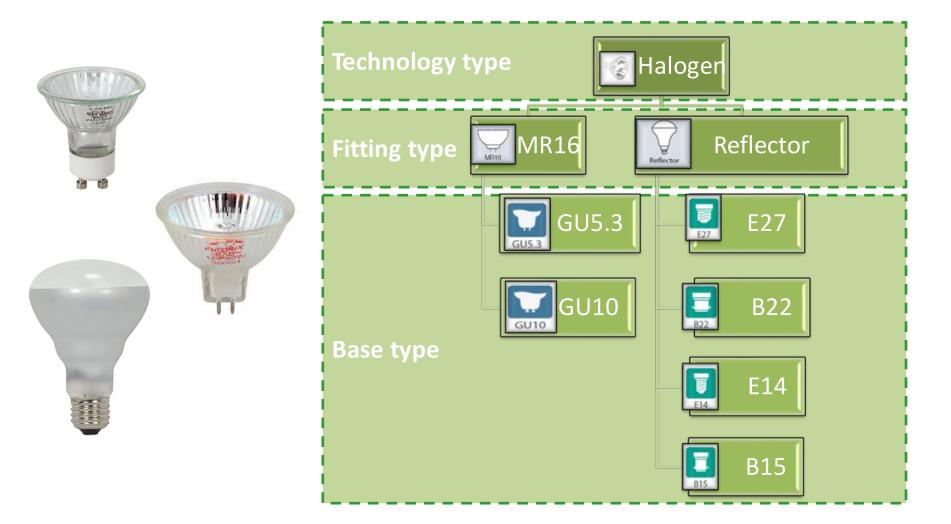


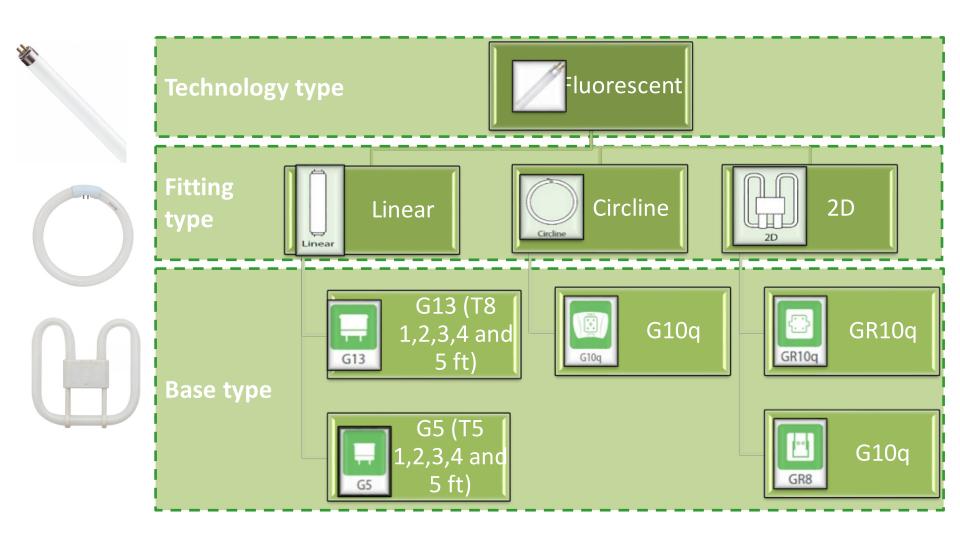


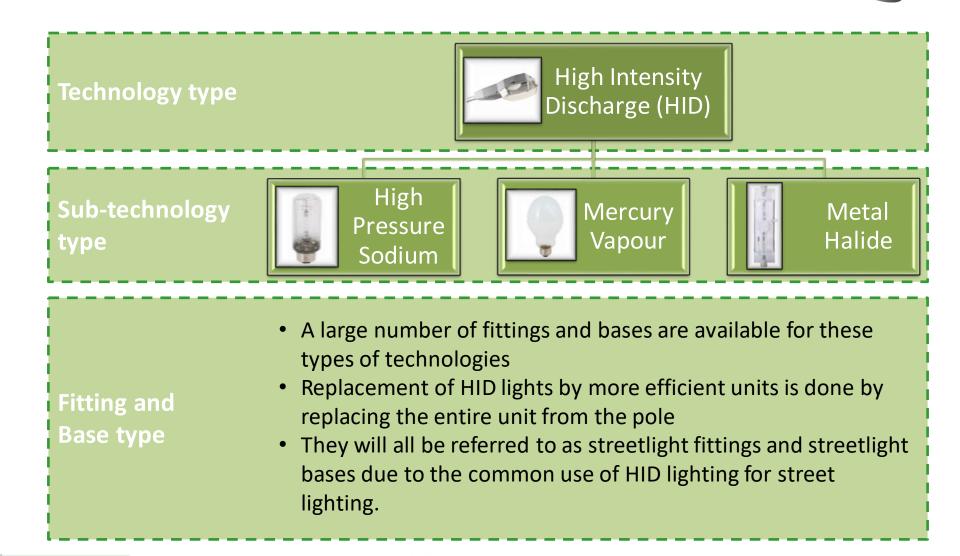














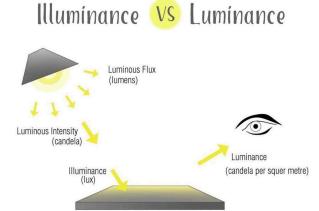
# **Planning for the Retrofit**

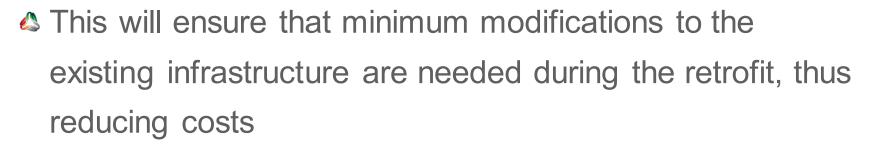
### **ENERGY INNOVATION FOR LIFE**

## **Planning for Retrofit**

Data collected about the existing lighting is used to identify compatible LED replacements.

- LED is short for Light-Emitting Diode
- Compatibility is ranked according to:
  - Fitting type
  - Base type
  - Luminous flux







# **Planning for Retrofit**

- LED lighting technology has seen rapid development in these past decades
- Most lighting systems (with exception of some specialised applications) can readily be replaced by LEDs
- Fittings and base types of all technologies discussed so far have LED alternatives.
- Advantages of LEDs include
  - High Luminous Efficacy/Efficiency
  - Quick to light even at cold temperatures
  - Flexible control
  - Superior Colour Rendering Index
  - Safer operation

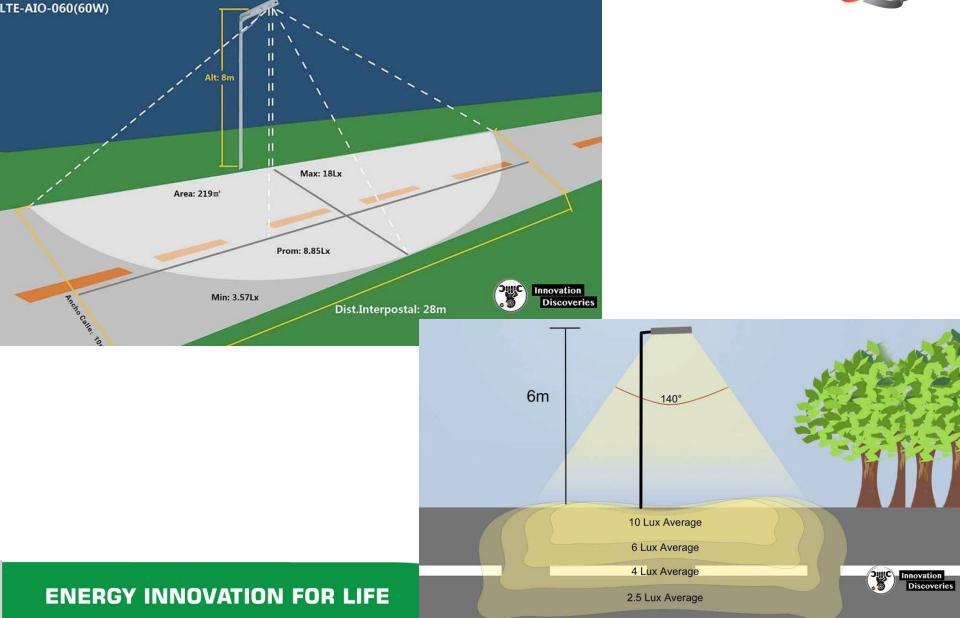






## **Planning for retrofit**



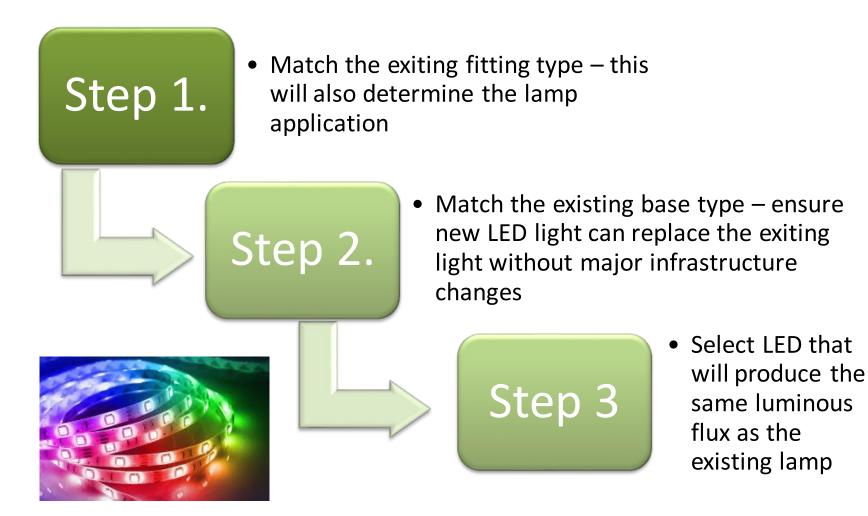






## **LED** selection





## LED Selection – Luminous Flux Selection Guide

- LED technology produces directional lights and can be focused toward the area to be illuminated.
- In some non-LED lighting system, up to 40% of the emitted light is directed outside the area needing to be illuminated (Lack of direction)
- Lower lumen rated LEDs could provide the same useful illumination in the area as indicated in the table below:

GLS ,Candle, Spiral, 3U, PL	Reflector, MR16	Linear and circline Tubes	Streetlight
Select an LED replacement with same luminous flux as the existing fitting (or a little higher if not available)	Select an LED replacement with same luminous flux as the existing fitting (or a little higher if not available)	Select an LED replacement with at least 60% of the luminous flux of the existing fitting	Select an LED replacement with at least 60% of the luminous flux of the existing fitting



# **Costs and Benefits**



## Energy and Cost saving Calculations : Payback period



- The payback period is an easy and quick tool to assess the economic viability of an investment
- A short payback period means that the investment will provide faster benefits/cost savings for the facility
- A simple payback period calculation can be calculated as follows:

 $Payback \ period \ (in \ year) = \frac{Cost \ of \ Retrofit}{Cost \ Savings \ per \ year}$ 

## Energy and Cost saving Calculations : Payback period



- The yearly cost saving is calculated as the sum of all savings achieved through lamp/light replacement
- A The retrofit/project cost is in turn calculated as follows:
  - Cost of Retrofit or Project
  - = Light purchase cost + Total recycling cost
  - + installation cost

## Note:

Recycling costs must be included since old lighting technologies such as fluorescent and high intensity discharge (HID) light contain toxic substances and are required by law to be disposed safely.

Electricity cost increases yearly which could impact the payback period if it spans for more than a year.



# **Responsible Disposal**



# **Recycling and Disposal**



- Fluorescent and HID bulbs contain hazardous substances such as mercury
- Lighting waste (as electronic waste) is classified as a hazardous waste according to the National Environmental Management Act (Act No. 59 of 2008).
- Since 2016, bulbs may no longer be sent to landfill for disposal, but must be recycled or treated prior to disposal
- Sor any lighting retrofit intervention, it is critical to make sure the service provider would dispose of the waste bulbs/lamps in a legally compliant manner

# **Recycling and Disposal**

- In addition to safely disposing of hazardous substances, recycling will also ensure that glass, non-ferrous metals, ferrous metals, plastic, phosphor powder and electronic components are recovered from the bulbs and fittings and used inother manufacturing processes
- Recycling companies usually charge different rates according to the technology to be recycled or treated on a per fitting/lamp basis
- To ensure that the waste is managed correctly, it is imperative that a Safe Disposal Certificate from the waste service provider is issued after all the bulbs and fittings have been safely disposed

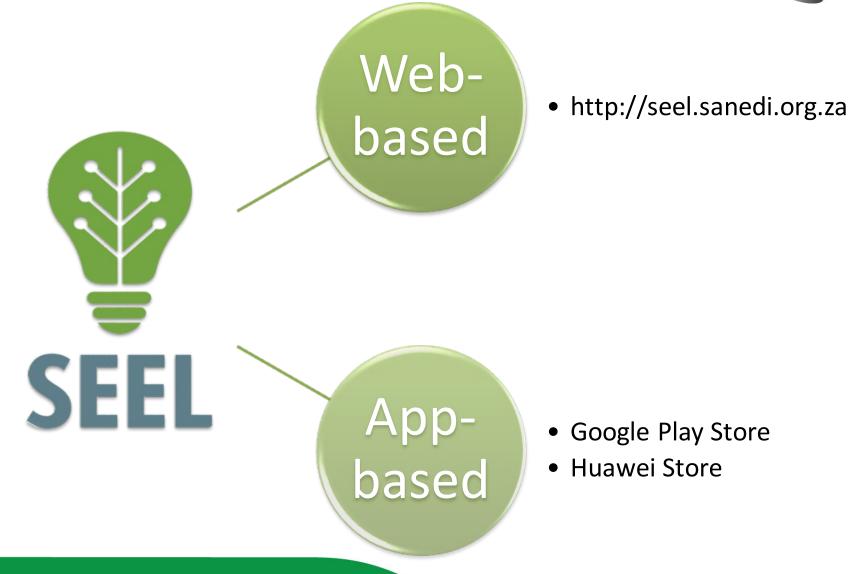


# SANEDI Energy Efficiency Lighting (SEEL) Tool



# **Available on Two Platforms**





## What can the Tool do?

### **Record existing lighting**

Indoor and outdoor

#### Calculate current use

Based on electricity tariffs

Calculate potential electricity savings

• Based on replacement of current lights with energy efficient technologies

Calculate potential monetary & GHG emission savings

Based on potential electricity savings

Calculate the replacement cost of existing lights

Based agreed average cost of energy efficient lights

Calculate A pay-back period

Based on the replacement cost and the potential savings

Cost-comparison between BAU & switch to EE lighting

Based on projected savings



# **SEEL Web**



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# **SEEL Web**



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# **SEEL Web**



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# **SEEL Web (Excel output)**



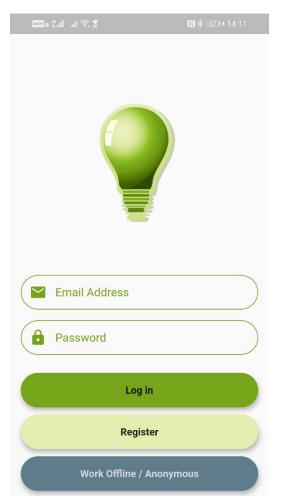
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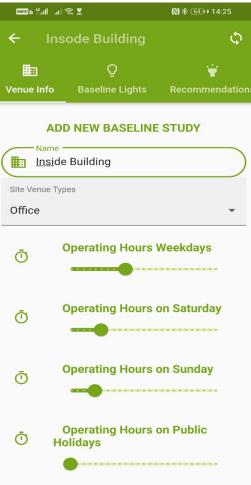
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# **SEEL App**

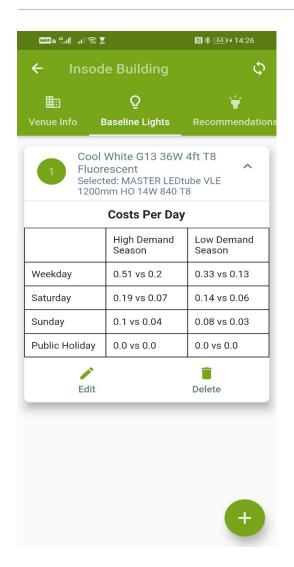


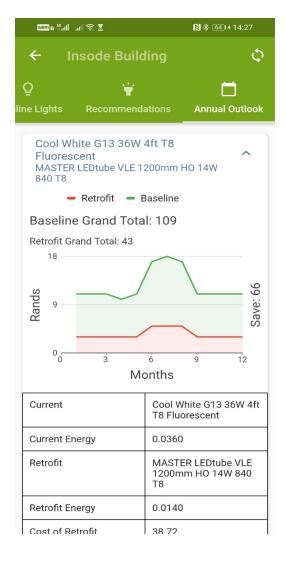


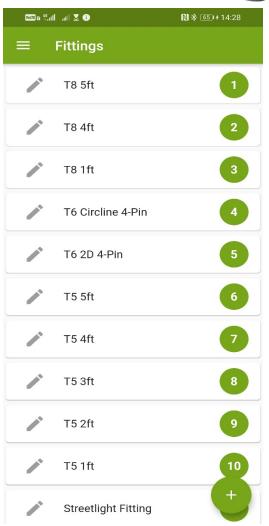
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# **SEEL App**











# **Case Studies**



## **Examples**



