



LIGHT-EMITTING DIODES (LEDS)

TECHNOLOGY DESCRIPTION

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A light-emitting diode (LED) is a semiconductor that emits light when an electric current is passed through it¹. LEDs have several benefits compared to other lighting technology such as CFL and incandescent, which include longevity, brightness, and electrical cost. In terms of longevity, LEDs can last up to 25,000 hours. Putting this into perspective, if you were to use a LED bulb 24/7, you would have to replace the bulb every 15 years. CFL bulbs tend to have a lifetime of about 8,000 hours and incandescent 750 hours². Incandescent light tends to emit 15 lumens per watt, whereas CFL emits 60 lumens per watt. However, LEDs emit 72 lumens per watt. Therefore, to reach a brightness of 800 lumens, an incandescent bulb would require 60 watts, CFL about 14 watts and an LED, 10 watts³. This makes LED highly efficient lighting technology. Those that are “ENERGY STAR” rated use up to 75% less energy⁴.

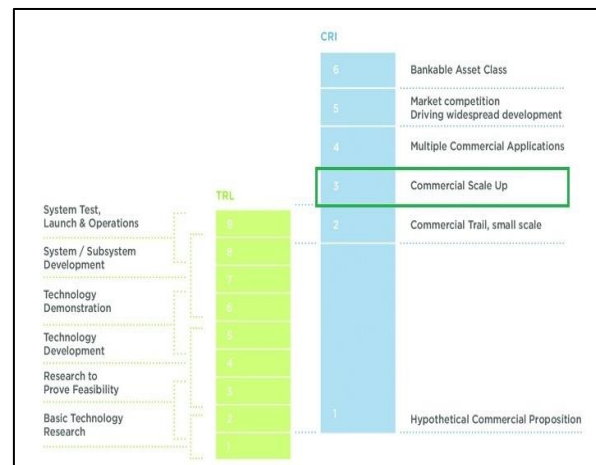


CURRENT COMMERCIAL READINESS INDEX

The Commercial Readiness Index (CRI) is a framework used to assess the commercial maturity of the technology under investigation using six (6) indicators (see figure). It complements and is often used in tandem with the Technology Readiness Level (TRL) method which measures the technology’s technical maturity.

LEDs are currently at Level 3 commercial scale up, which indicates that the technology is commercially available in Antigua and Barbuda.

However, there are other technologies which are less efficient and cost less. There is currently limited verifiable data about what factors most often influence consumer choice but, cost of technology is a major factor. This is the reason people tend to lean towards the cheaper technology option.



¹ <https://www.ledsmagazine.com/leds-ssl-design/materials/article/16701292/what-is-an-led>

² <https://www.nopec.org/blognewsroom/blog/comparing-led-vs-cfl-vs-incandescent-light-bulbs/>

³ <https://www.homeelectrical.com/cfls-vs-halogen-vs-fluorescent-vs-incandescent-vs-led.6.html#:~:text=Traditional%20incandescent%20light%20bulbs%20emit%20about%2015%20lumens%20per%20watt.&text=CFL's%20or%20fluorescent%20light%20bulbs,as%20a%2060%20watt%20bulb.>

⁴ <https://www.energy.gov/energysaver/save-electricity-and-fuel/lighting-choices-save-you-money/led-lighting>



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CRI Level 3 indicates that, LED technology is in the Deployment phase of Technology Readiness.

CLIMATE RATIONALE OF THE TECHNOLOGY

Antigua and Barbuda currently has the highest per capita consumption of electricity of all Eastern Caribbean states⁵. Additionally, the country has one of the highest domestic electricity tariffs in the Caribbean region. Domestic consumption of electricity accounts for some 40% of all national consumption and the percentage of the population not consuming energy is equivalent to 0.48%⁶.

In terms of energy consumption for households in Antigua and Barbuda, there is an estimated total of 30 000 households with an average household electricity consumption of 8.25 kWh/day or just above 3 000 kWh/year⁷. Due to its relative flatness and ease of access to almost all areas, Antigua and Barbuda has electricity penetration to 95.4% of the country. Only 1.2% of households were identified as not having access to any form of lighting⁸.

The Department of Environment conducted a socio-economic study in 2020, including a national survey of 1100 people in Antigua and Barbuda to evaluate the costs and effects of climatic events on households. The survey found that the average household in the country typically pays approximately 7-10% of its monthly income on electricity. The survey targeted persons with an income of less than XCD1,500 monthly.

Higher adoption of LED technology can assist in reducing the household consumption of energy of the citizens while also giving them the opportunity to save money on their electric bills. These savings can then be redirected to other expenses in the home.

AMBITION OF THE TECHNOLOGY

SCALE FOR IMPLEMENTATION AND TIME-LINE

The aim will be to replace 20,000 incandescent light bulbs and 10,000 CFLs over 2 years in 5000 homes while reducing the capital investment required for purchasing the technology. With access to the technology, home owners will gather an appreciation for energy-efficient technology and the ability for it to reduce their energy consumption. The replacement of the 20,000 incandescent bulbs is expected to save 808,000 kg/ 808 tonnes of CO₂ emissions annually whilst the replacement of the 10,000 CFL would save 39,400 kg/ 39.4 tonnes of CO₂ annually.

EXPECTED IMPACTS OF THE TECHNOLOGY

As stated above, Antigua and Barbuda has the highest per capita consumption of electricity of all Eastern Caribbean states and one of the highest in the Caribbean. The use of LED bulbs can assist with the reduction of energy consumption in buildings through increased energy efficiency. This in turn results in the reduction in the energy cost for the building.

⁵ <https://antiguaobserver.com/500-led-lights-arrive-for-roadways/>

⁶ Antigua and Barbuda's Third National Communication

⁷ Antigua and Barbuda Renewable Energy Roadmap, IRENA, 2021.

⁸ 2011 Population and Housing Census of Antigua and Barbuda



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On a countrywide scale, the reduction of energy consumption for buildings means that the energy demand of the country would be reduced. The result of this means less burning of heavy fuel oil to meet the demands on the country, which could also lead to a reduction in the amount being imported annually.

POLICY ACTIONS FOR TECHNOLOGY IMPLEMENTATION

EXISTING POLICIES IN RELATION TO THE TECHNOLOGY

Currently, there are no policies for this technology in Antigua and Barbuda.

PROPOSED POLICIES TO ENHANCE TECHNOLOGY IMPLEMENTATION

For LED technology to diffuse and be implemented in Antigua and Barbuda, there must be policies restricting the use of other lighting technologies such as incandescent and CFL bulbs. Currently, all three of the technologies are available on the island, but because LEDs are the most expensive of the three technologies, citizens tend to purchase the cheaper options, rather than looking at the long-term benefits.

COSTS RELATED TO THE IMPLEMENTATION OF POLICIES

It is estimated the development and implementation of the policies for the diffusion of LED technology should cost around USD20,000.

USEFUL INFORMATION

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LINKS TO TNA REPORTS

<https://tech-action.unepdtu.org/country/antigua-and-barbuda/>