



# TASK 7 Smart Lighting



Experts Webinar 3. Nov. 2021



Casper Kofod and Jonas Pettersson

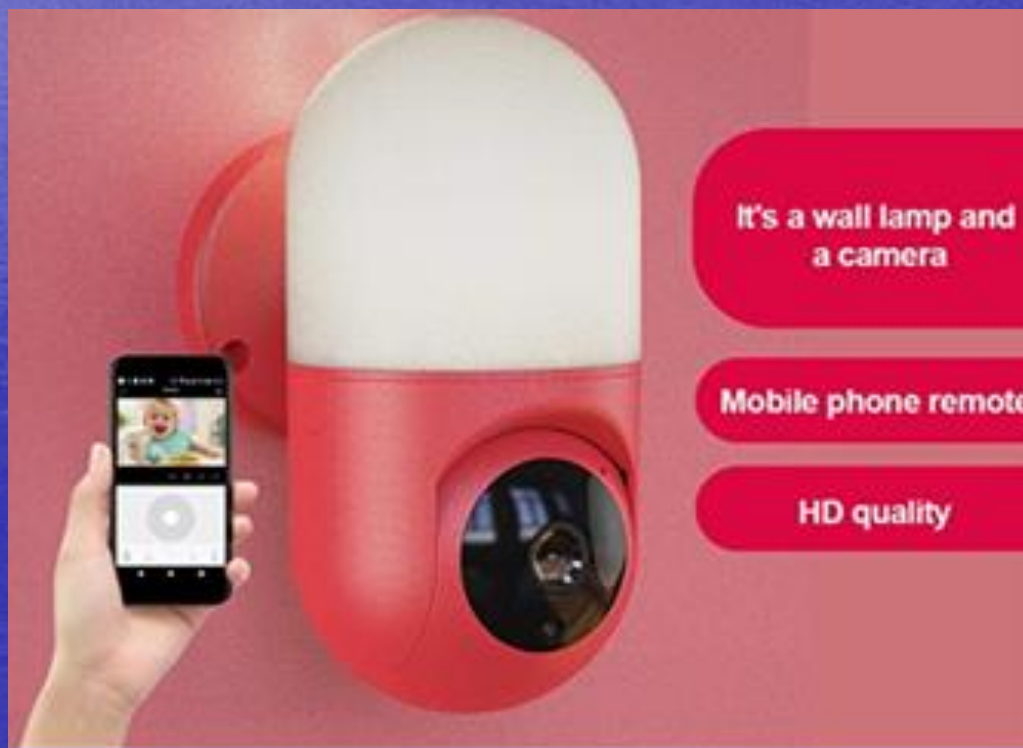
# Agenda



1. Test data provided by member countries
2. Market News and Trends
3. Co-operation with EDNA
4. IEC/CIE Standardisation
5. Second Report Draft
6. Expert Discussion and next steps

# 1.1.1 Swedish Test: Pulley Smart Snap Wall Luminaire with camera

- No lumen and W (ON) measurements as it was not possible to establish connection.
- Standby **1.41 W** (without network).



360° panoramic wireless smart camera  
Motion detection alarm voice intercom card recording

# 1.1.2 Swedish Test: Aukey LT-T6 Touch Control Luminaire



**FULL**

447 lm

7.3 W

62 lm/W

87 Ra

**HALF**

243 lm

3,6 W

67 lm/W

88 Ra

**LOW**

45 lm

0.8 W

57 lm/W

88 Ra

Pst 0.1    SVM 0.0

Standby (no network) **0.17 W**

# 1.2. Danish Test: VR CAM lamp



- Very difficult to connect (took 45 minutes)
- Speaks Chinese
- Low quality speaker

0.78 W

1.6 – 3.0 W

2.0 – 2.6 W

3.6 W

**2 W**

Initially

During upstart that takes one minute

Using camera (movie or snap shot)

Lighting ON (very little lighting)

When the app is closed = Standby

**NOT A LIGHTING PRODUCT**

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# 2.1 Zhaga supports Smart Lighting

## Zhaga Book 20 connects smart standards (LED MAGAZINE)

Jun 1st, 2021

DEE DENTENEER explains the complementary specifications from Zhaga and DiiA that will provide essential support for smart building infrastructure.

[Dee Denteneer](#)



**Zhaga Book 20 provides:**

*Interoperability between an indoor LED luminaire and a module*

*by specifying the interconnection as well as the mechanical interface to mount sensors directly into the luminaire.*

“What’s needed are smart LED luminaires that can be **easily upgraded** to allow for future **IoT** [Internet of Things] **connectivity**. **Standardization can enable that.**”

Smart lighting systems have the potential to use lighting controls to connect a range of other services: Data collection and Analysis, Security, Fire safety, Climate control, Navigation, and so on.

## 2.2 HUE App 4<sup>th</sup> - Easier to navigate



4<sup>th</sup> generation App  
called "*Tile View*"

*"This App rebuilt from  
the ground up."*

Based on usability  
studies and beta test

- Possible to set scenes for all the smart lamps in a room *without bogging back and forth* between screens
- Easier switch between multiple Hue systems in the users' different homes or in different areas of the same home



## **2.3 Hue and WiZ Compatible with the protocol Matter 2022-01-01**

**Signify announced they will be compatible with Matter by the end of 2021.**

**Matter is a protocol that supports interoperability between all Internet-connected things in a smart home such as doorbells, locks, thermostats, TVs, virtual assistants, and TVs.**

## 2.4 OSRAM Lightify Stops Outside Home Service

- **2021-08-31 Osram Lightify servers switched off after 7 years in use.**  
<https://www.osram.com/cb/lightify/index.jsp?>

### What you need to know now:

With the shut-off of the LIGHTIFY cloud servers the control outside of the home WiFi, the use of voice assistants and the use of external apps will no longer be possible. Compatibility to newer versions of the IOS and Android operating systems can't also be assured thereafter.

The usage of your LIGHTIFY system via the LIGHTIFY App will remain unchanged within your home Wi-Fi if your Gateway and App run on the latest version.



## 2.5 Innr Lighting New Gateway

### In 2022, No Support of the old Gateway

#### What happens if I don't switch?

The system you are using now will no longer be supported after a transition period at the end of 2021. It will still work, but there will be no more software updates and we will no longer be able to provide some online support. That is why we are offering the new Bridge at a discount: for 20 euros you can get the Bridge and switch to our new system. Of course we hope you will join Innr in taking the next step to a better system!



# 2.6 1<sup>st</sup> IEEE-FDC Smart Lighting seminar (1)

## IEEE-FDC seminar on smart lighting 2021 10 19

9:00-9:05	Georges Zissis	Chair FDC Smart Lighting Project	Call to order & housekeeping
9:05-9:15	Steve Welby	Executive Director and Chief Operating Officer, IEEE	Opening, IEEE welcome address
9:15-9:25	Mark Lien	Industry Relations Manager, Illum. Eng. Soc., USA	Opening, IES welcome address
9:25-9:45	Mark Rea	Prof, Mount Sinai School of Medicine, USA	Smart Lighting - Developing a focus on benefits, not on more features and lower cost
9:45-10:05	Larissa Paredes Muse	Urbanist, Quanta Technology, USA	Smart Lighting for cities - The urbanist's point of view
10:05-10:25	Ashok Jagatia	President & CTO, Acevin Solutions, India	Technology Aspects of Intelligence and Communication in Smart Lighting
10:25-10:30	<b>Stretch break</b>		
10:30-10:50	Marco Dalla Costa & Nelson Spode	Federal University of Santa Maria, Brazil & Zagonel S.A. - Brazi	Communication Technologies for Smart Lighting
10:50-11:20	Bruno Foucras	Aix-Marseille Université, France	Smart lighting and Digital sobriety
11:20-11:40	Teri Nolan-Range	hannel Sales Manager, Smart Cities & Streetlighting, North America	Streetlights and the Path to Sustainability
11:40-12:00	Toby Cumberbatch	SociaLite Lighting Systems, USA	Lighting The Middle of Nowhere
12:00-12:05	Georges Zissis	Chair FDC Smart Lighting Project	Closing remarks

> 400 registered and around 240 participants

# 2.6 1<sup>st</sup> IEEE-FDC Smart Lighting seminar (2)

*Introduction*



*IES*

*"Lighting is involved in all Eight Technologies"*

Convergent Technologies  
Experiencing Exponential Growth

Computing

IoT / Smart &  
Connected  
(includes networking &  
sensors)

Artificial  
Intelligence /  
Machine Learning

3D Printing

Robotics/Drones/  
Autonomous  
Vehicles

XR  
(Augmented, Virtual,  
Mixed, Parallel Realities)

Materials Science

Synthetic Biology  
(design/discovery of  
new materials through  
fusion)

# 2.6 1<sup>st</sup> IEEE-FDC Smart Lighting seminar (3)



*Prof. Mount Sina School of Medicine, USA*

## Focus on benefits

*"Not on more features and Lower Costs"*



- The lighting industry is looking for new technologies that have more features and lower cost
- Result: "Smart stuff"
- A new business model
  - Focus on benefits not features
  - Deliver value by focusing on the benefits
- Connected lighting should enhance value
  - "You can do anything you want" is not a benefit
- New value applications: health, safety, nutrition
  - Quantify the benefits
- Photometry: "We do what we measure"
  - Horizontal illuminance is not a benefit

# 2.6 1<sup>st</sup> IEEE-FDC Smart Lighting seminar (4)



Marco Dalla Costa

*Communication Technologies for Smart Lighting*

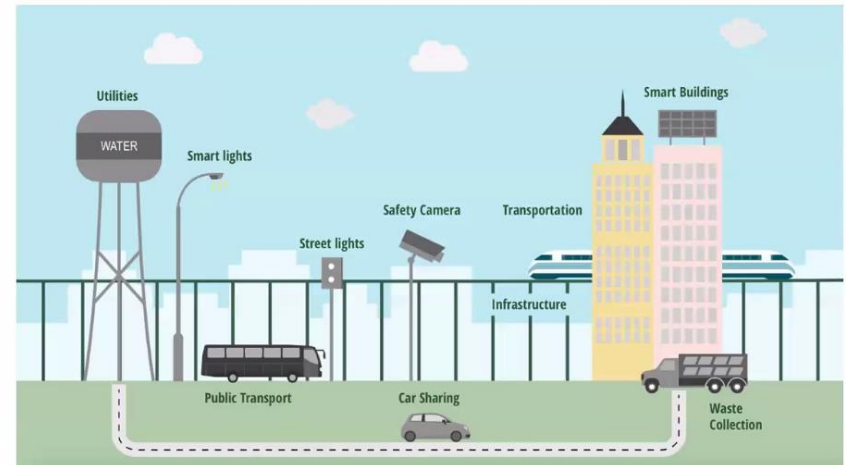
*Federal University of Santa Maria, Brazil & Zagonel*

## Features of Smart Lighting Systems



Advanced Features of Smart Lighting Systems:

- Dimming profiles based on sensors
- Environmental sensing (air quality, noise)
- Traffic monitoring
- Smart parking applications
- Waste management
- Traffic lighting controls
- Public messaging
- Security (shotspotter, cameras)
- **Medium to high requirements for the communication network**



# 2.6 1<sup>st</sup> IEEE-FDC Smart Lighting seminar (5)

Bruno Foucras, Aix-Marseille University



## Results and conclusions



### Residential premises

- Connected lighting will never be energy efficient
- Relevance of this type of system for private use?

### Tertiary premises

- Unconnected automation leads to significant gains in consumption
- The connected layer must often be justified other than by direct savings

## Results from case studies





# 2.6 1<sup>st</sup> IEEE-FDC Smart Lighting seminar (6)

## SociaLite Lighting Systems (USA, from 2017)

### Lighting the middle of Nowhere (1)

*Light poverty by developing and installing solar powered micro-grid systems.*

*With light and communication come education and the possibilities.*

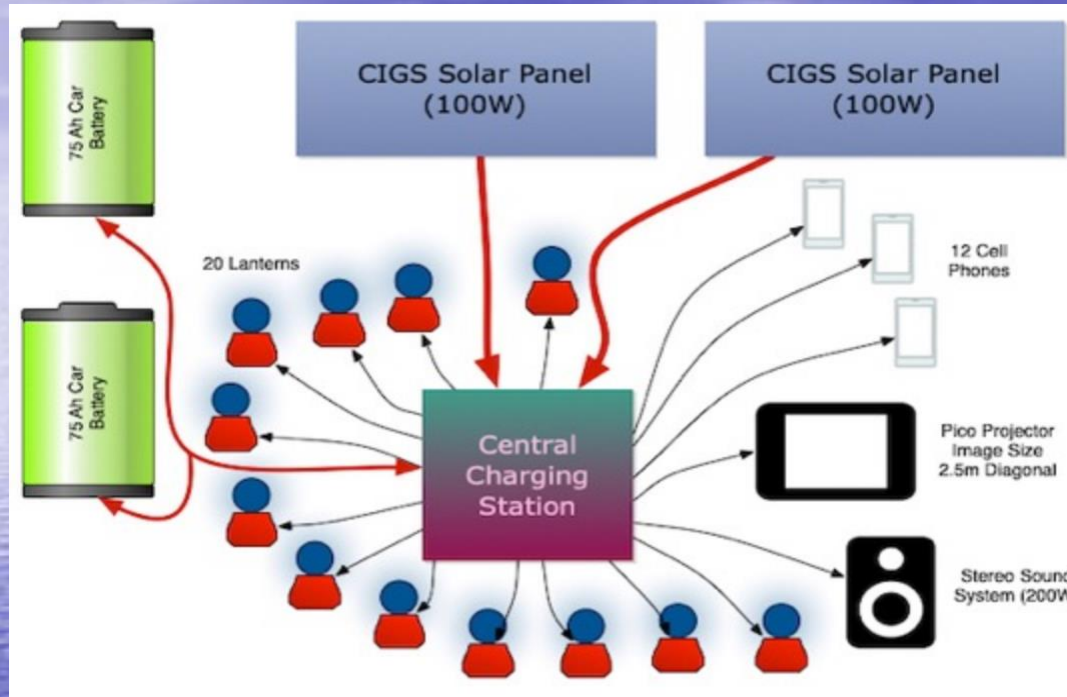
**Toby Cumberbatch**



# 2.6 1<sup>st</sup> IEEE-FDC Smart Lighting seminar (7)

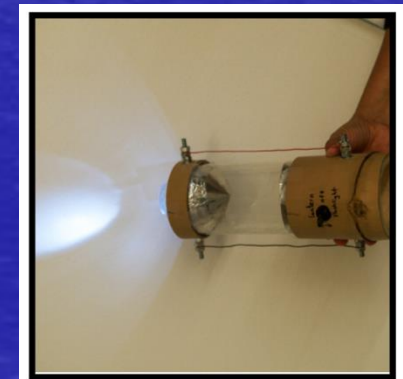
SociaLite Lighting Systems (USA, from 2017)

Lighting the middle of Nowhere (3)



## Lighting by Lanterns

- Powered by 4.5 Ah, 6V lead acid batteries.
- Run at full power for about **40 hrs** (reduced power for about **120 hrs**)
- Requiring a **weekly recharge** and enabling each outlet to support up to 7 lanterns.



# 2.6 1<sup>st</sup> IEEE-FDC Smart Lighting seminar (8)

SociaLite Lighting Systems (USA, from 2017)

Lighting the middle of Nowhere (2)

Mobile A/V Micro-Grid/Charging Station

Wa, Ghana



PV panels, screen, A/V system  
Charging Station/Micro-grid



Energy piano



Swedish  
Energy Agency

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# 3. Co-operation with EDNA

- 1. 13.10.2021 Users TCP and 4E EDNA presentation by Tom Furlong**  
**“Are we getting the best out of smart home technology? The role of Usability”**
- 2. Common workshop in 2022 depending on the COVID 19 situation.**

# 3.1.1 Copper Alliance Webinar 13-10-2021



Are we getting the best out of Smart Home Technologies? The role of usability.

Energy Systems Catapult on behalf of Users TCP and 4E EDNA

13-10-2021

Tom Furlong



**BELOW : 5 slides with CK Subtract of things relevant for smart lighting**



## 3.1.2 Why so little success so far?

- Many smart appliance domestic energy savings not realized at present
- Interview of 12 experts from 4 countries:
  1. "Poorly or inaccurate communication"
  2. "Fails to meet user's needs"
  3. "Fails to prepare users to operate"
  4. "Errors under installation"
  5. "Automation only ok if users are in control"

# 3.1.3 Different Needs



## Different users have different needs



**User needs are complicated and diverse, but smart systems tend not to account for this**

- User age, culture, attitude, climate, lifestyle, interest in technology, routine, gender, homeowner status, economic status, definition of comfort, typical driving range, trust in data sharing, and various psychological factors (e.g. perception, attention and retention) are all said to contribute.
- Furthermore, user needs are dynamic and change over time.
- These factors influence how users engage with smart technologies, the support they require, the outcomes they seek to achieve and ultimately how the success of the smart technology is measured.
- Smart Home Technologies however generally do not seek to cater to different user types by offering different user experiences. This means the needs of users are often not met and the products therefore often fail to meet expectations which can damage engagement and reputation.



Audio Settings ^



Chat



Raise Hand



Q&A

Leave



Energy piano





# 3.1.4 Intuitive Interface Needed



## Lessons to learn from



- Products should be intuitive wherever possible. There may be a need for a sector wide discussion to boost consumer awareness of the potential of Smart Home Technologies to help reduce carbon emissions. Business will need to find a way to help users understand how to set up and use their products so they can experience the benefits.
- Seek to reap the benefits of offering a bespoke experience e.g. multiple user profiles. Allowing users to tailor the experience to suit their own diverse and dynamic needs will improve experience and boost engagement.
- Implement standards into user interface design to help support better understanding and operation. Include command prompts, cues and the ability to undo actions to help users with navigation. This will also give users the confidence to experiment with changes
- User interface design should facilitate the adoption of *convenient* behaviours. The advice provided should not be overly demanding of the user. Both cognitive and practical workload should be minimised



Audio Settings ^



Chat



Raise Hand



Q&A

Leave



Energy piano



# 3.1.5 Interoperability Requested



## The issue of interoperability

**CATAPULT**  
Energy Systems

### The issue of interoperability was rarely discussed in the reviewed evidence

- If Smart Home Technologies cannot work seamlessly with one and other, this will mean a poor user experience and suboptimal operation. For this reason offering interoperability is believed to be of critical importance.
- Evidence of issues with interoperability however were rarely discussed in the reviewed evidence. This was because:
  - Academic studies run trials in laboratory settings or install the Smart Home Technology on behalf of their subjects. This means users rarely encounter the issue.
  - Experts from private industry indicate there is no value in promoting the mistakes made by a commercial organisation. This is because it can enable business rivals to benefit or be reputationally damaging – so these learnings are not publicised.
- But uptake of Smart Home Technologies is relatively low at present. This is expected to change in the coming years. As uptake increases, it is likely issues owing to lack of interoperability will become better known



Audio Settings ^

Chat

Raise Hand

Q&A

Leave



Energy piano

Swedish  
Energy Agency

# 3.1.6 Learn from smart phone adoption



## Learning from other sectors

**CATAPULT**  
Energy Systems

**When the first web-enabled and camera phones came to market people were excited.**

- Poor usability and lack of interoperability however impeded widescale adoption. This included:
  - Operating systems were hard to navigate
  - Handsets were ugly and cumbersome, making them difficult to control
  - Lack of supporting infrastructure, such as the availability of mobile-friendly websites and supported email clients reduced their usefulness
  - The lack of a critical mass of users, limited the number of others to send emails or photos to, which also reduced their initial usefulness.
- Widescale adoption of web-enabled phones only occurred when both usability and infrastructure issues were resolved. This process also revealed new and unexpected uses as people appropriated the technology into their lives.



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Chat <sup>11</sup>

Raise Hand

Q&A

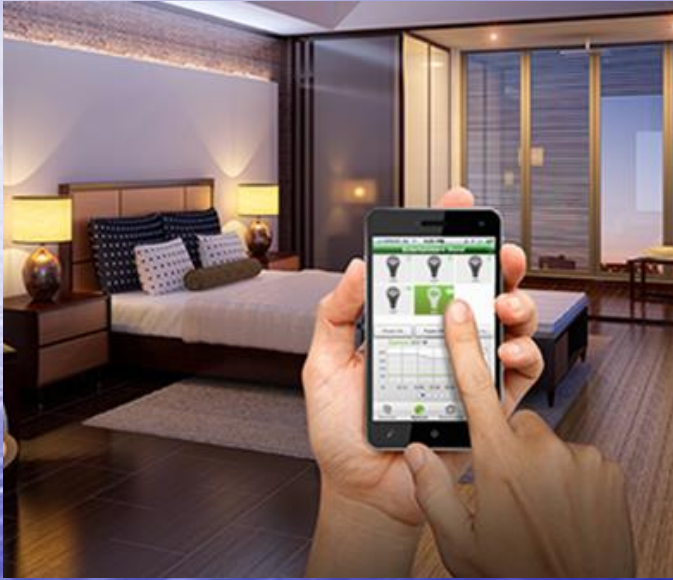
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Energy piano

Swedish  
Energy Agency

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# 4.1 EU Standardisation Request (1)

- Draft request to CEN and CENELEC
- Write new standards and revise existing
- Deadline 01.01.2024 (27 months after notification of this Decision to the ESOs)
- Standby power: Ref. to EN IEC 63103:2020

# 4.1 EU Standardisation Request (2)

**COMMISSION IMPLEMENTING DECISION**

of **XXX**

**on a standardisation request to the European standardisation organisations in support of**

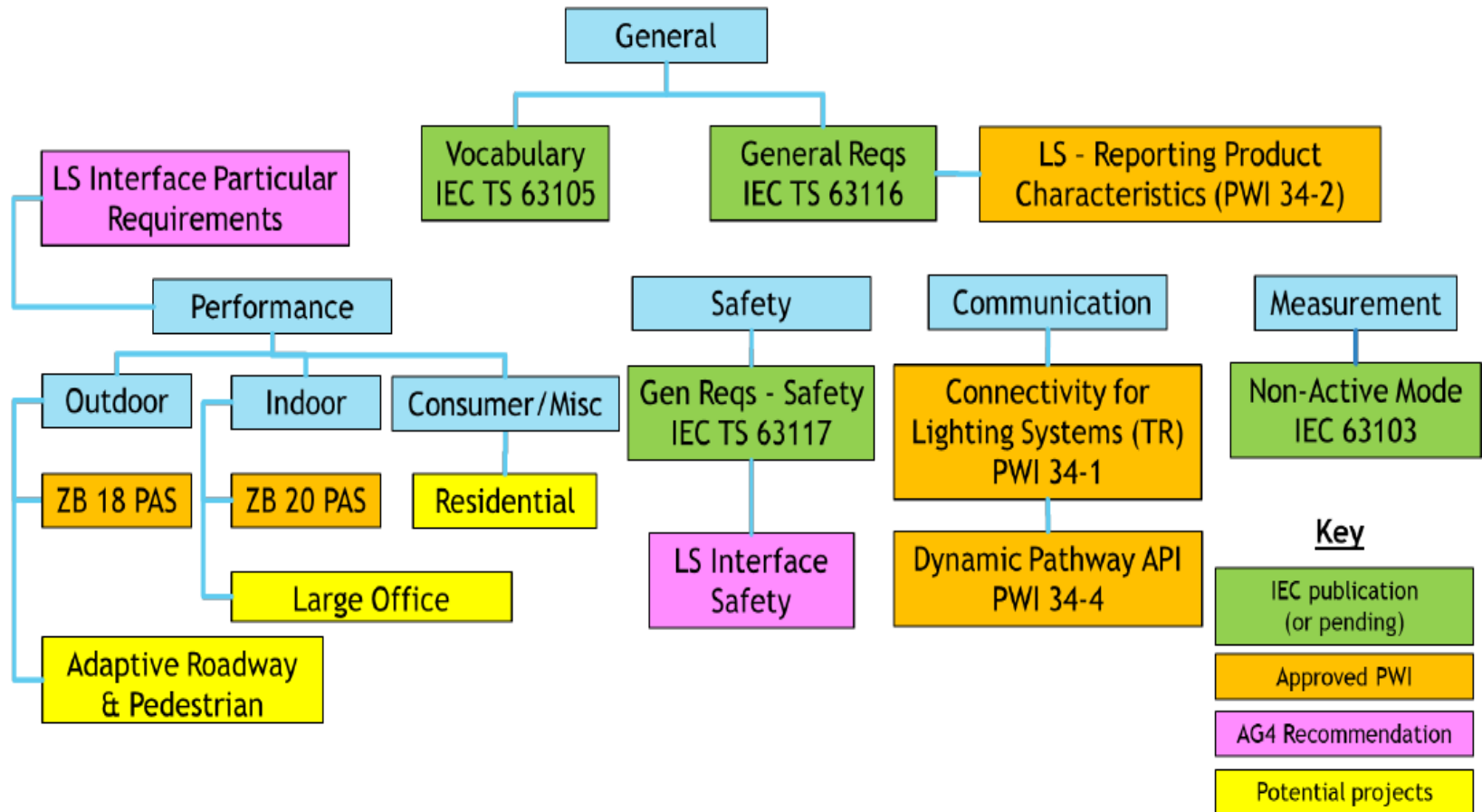
**Commission Regulation (EU) 2019/2020 laying down ecodesign requirements for light sources and separate control gears pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulations (EC) No 244/2009, (EC) No 245/2009 and (EU) No 1194/2012,**

**and**

**Commission Delegated Regulation (EU) 2019/2015 supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of light sources and repealing Commission Delegated Regulation (EU) No 874/201**

	EMPIR, 2019KRM01, METEM research project	
2.	<b>European standard(s) on measurement of Standby power (Psb) and Networked standby power (Pnet) in Watts (W) of light sources</b>  References: EN IEC 63103:2020, Lighting equipment - Non-active mode power measurement	01.01.2024 / 27 months after notification of this Decision to the ESOs

# 4.2 TC34 Structure for standardisation of Lighting Systems



## 4.3 Cooperation: IEC and Zhaga

IEC and Zhaga agreement allowing IEC use of two Zhaga Lighting System Books:

1. Zhaga Book 18: Smart Interface between **Outdoor** Luminaires and Sensing/Communication Modules
2. Zhaga Book 20: Smart Interface between **Indoor** Luminaires and Sensing/Communication Modules





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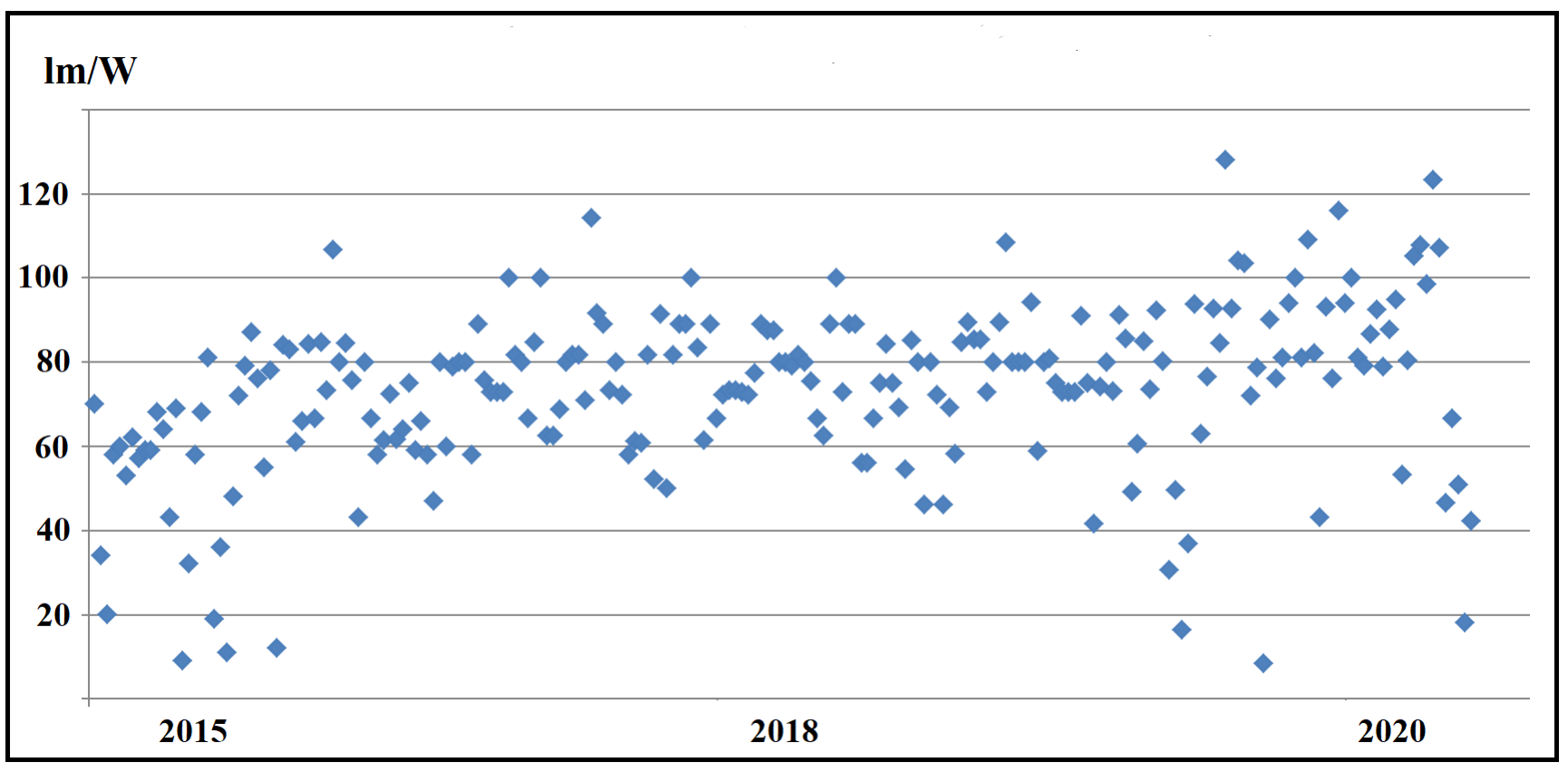
# 5.0 2nd Report Contents

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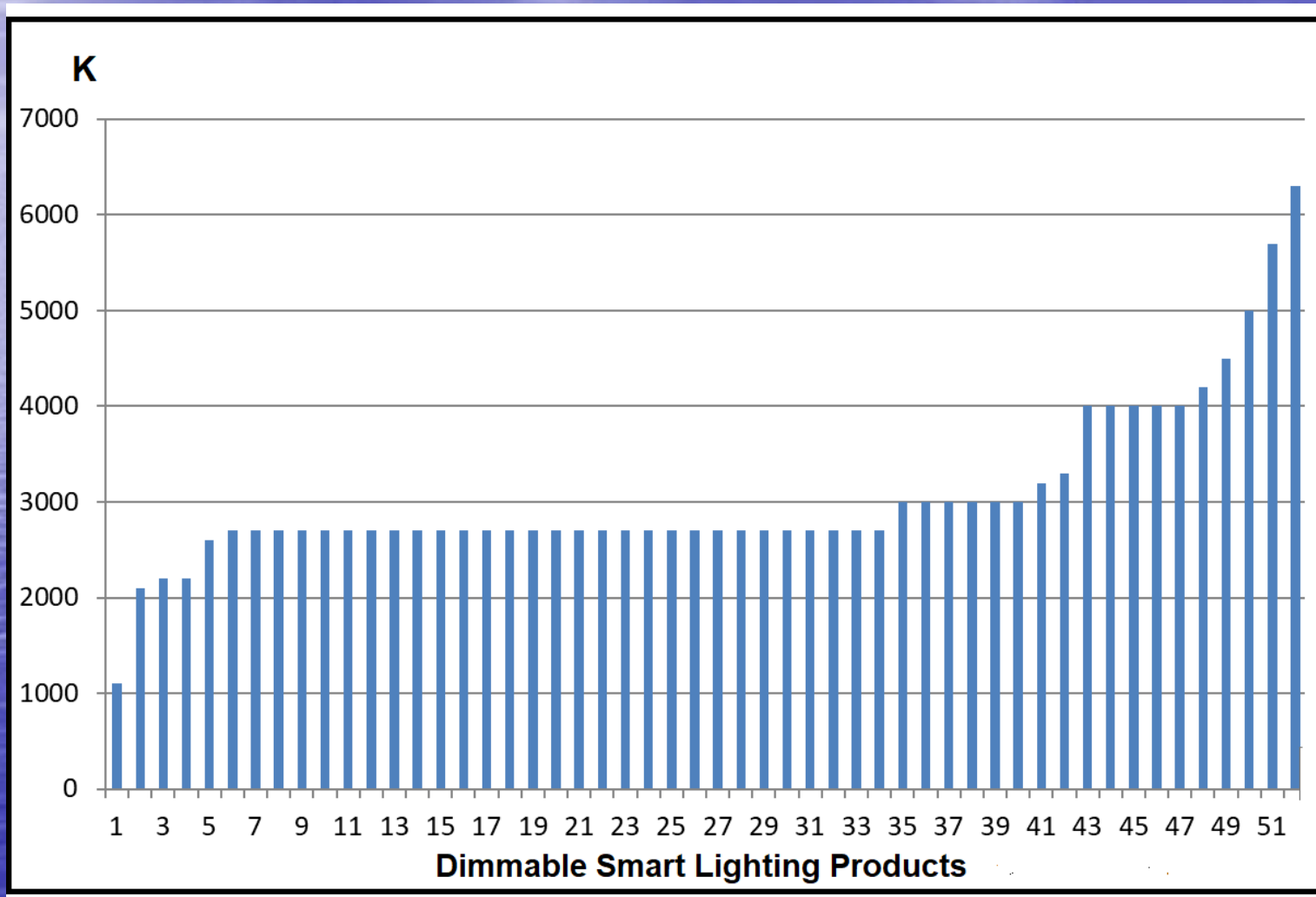
# 5.1 Efficacy Lower for Smart Lamps



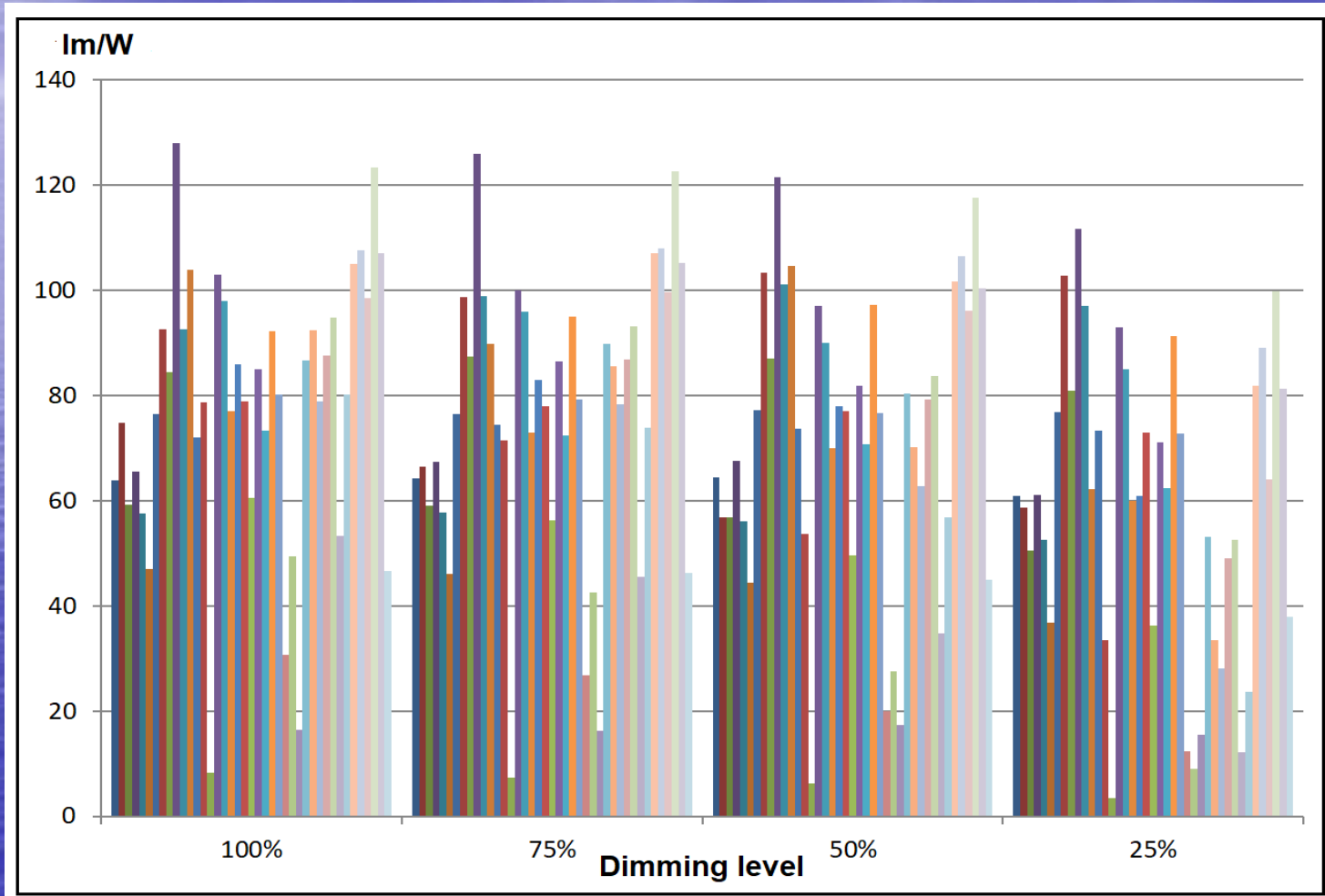
**Average Efficacy 2015 - 2019 73 lm/W**  
**Energy Star Lamps 2015 – 2019 83 lm/W**  
**(lamps with at least 80 lm/W)**



# 5.2 Default Factory Setting which is used for Dimming measurements



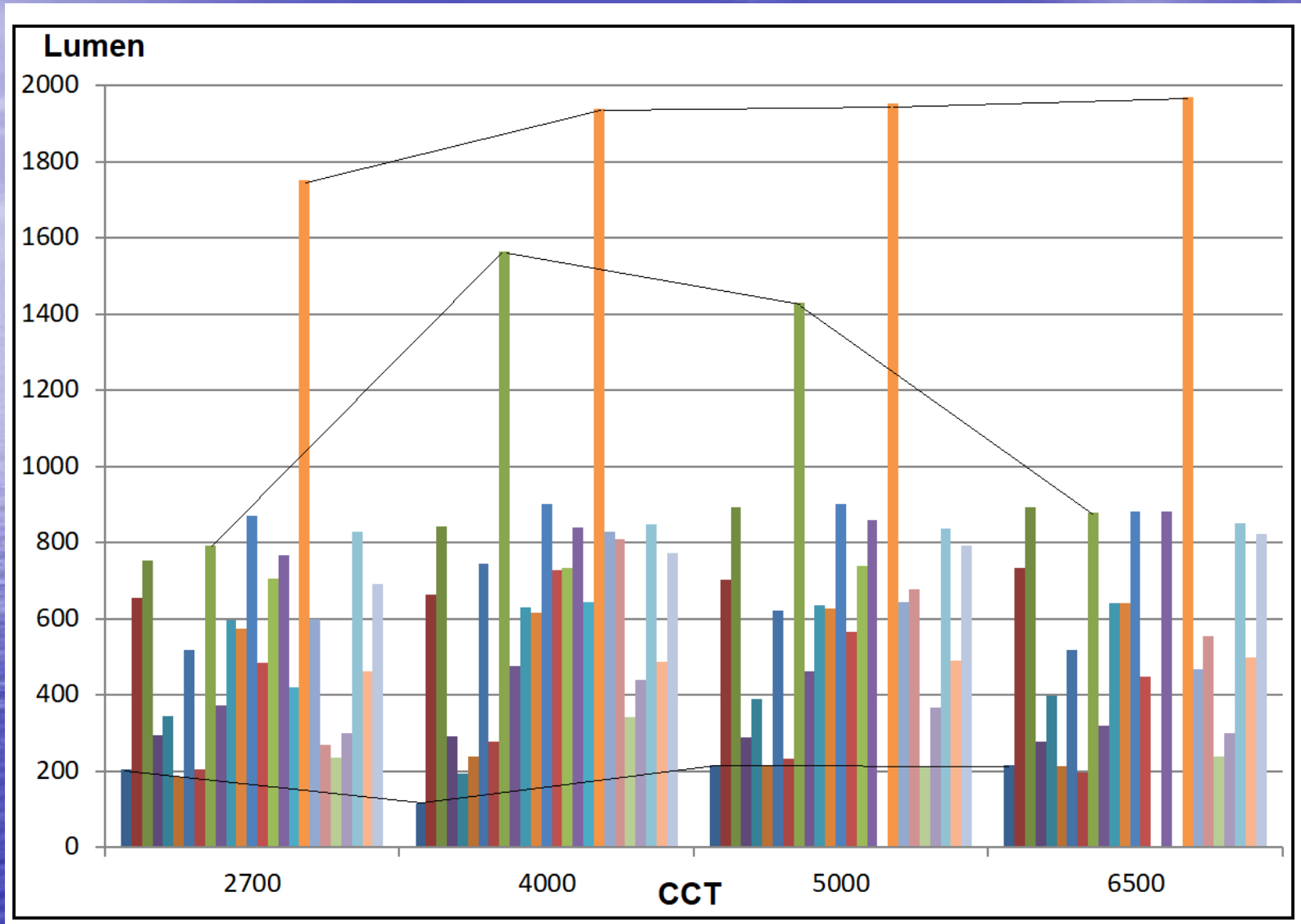
# 5.3.1 Efficacy when Dimming at Default factory setting CCT (1)



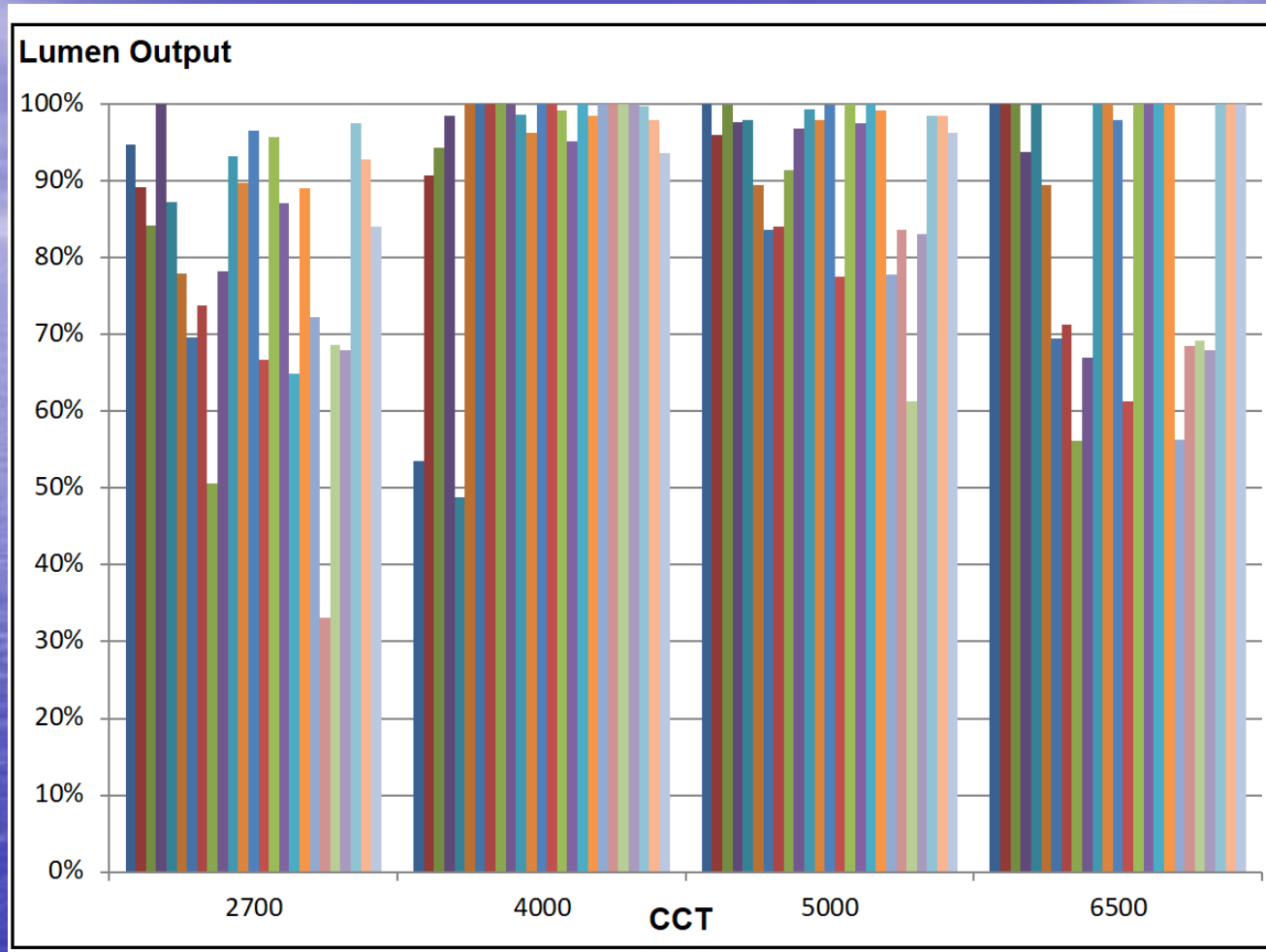
## 5.3.2 Efficacy when Dimming at Default factory setting CCT (2)

	Dimming Level		
	75%	50%	25%
Average percentage decrease in efficacy	2%	8%	26%

# 5.4.1 Luminous Flux (lm) for different CCT's (1)



## 5.4.2 Luminous Flux (%) for different CCT's (2)

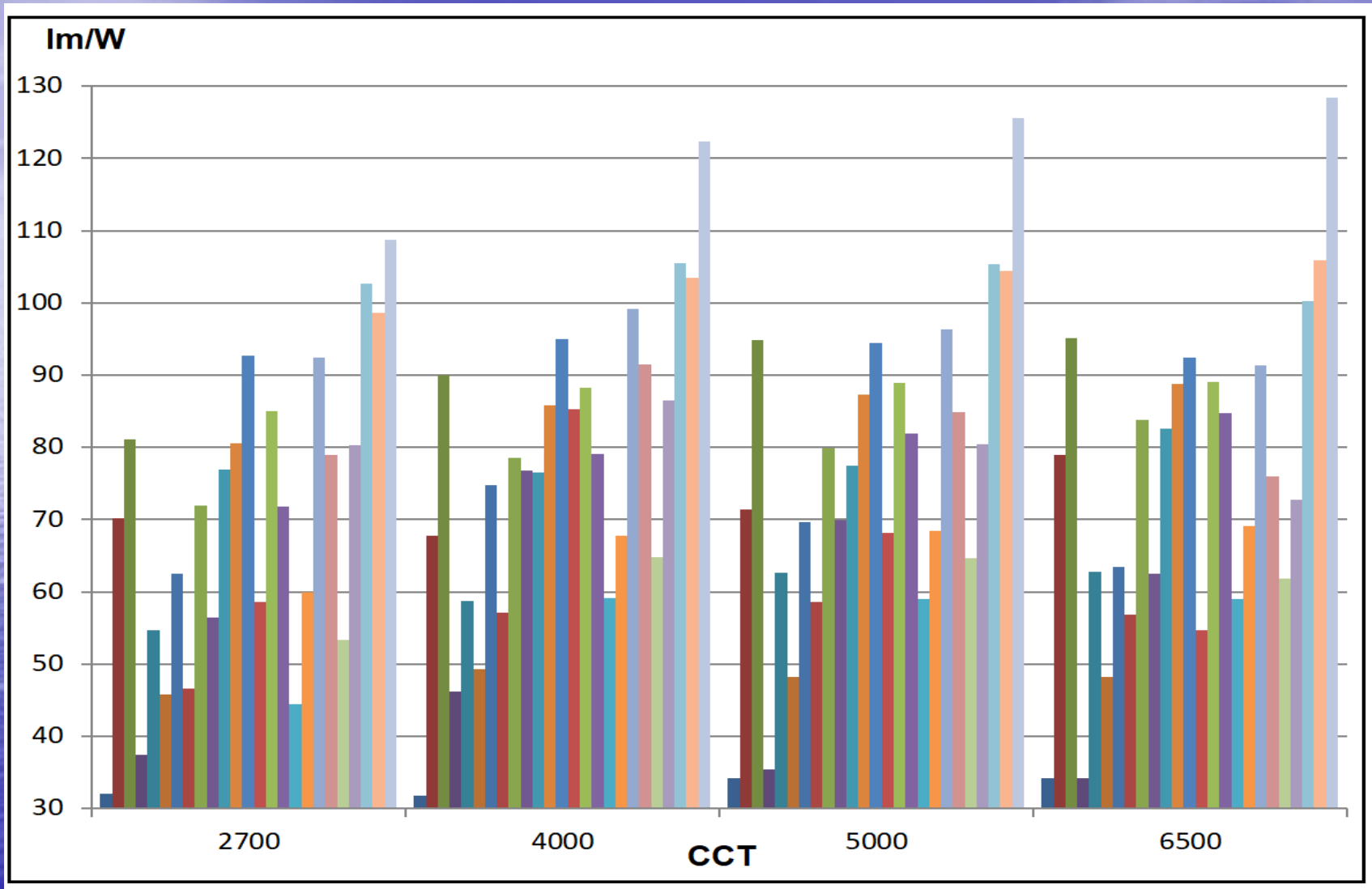


- Max primary at 4000 K or 6500 K
- The luminous flux decreases down to min 33% in the worst case
- The lowest luminous flux per product is in average 76%

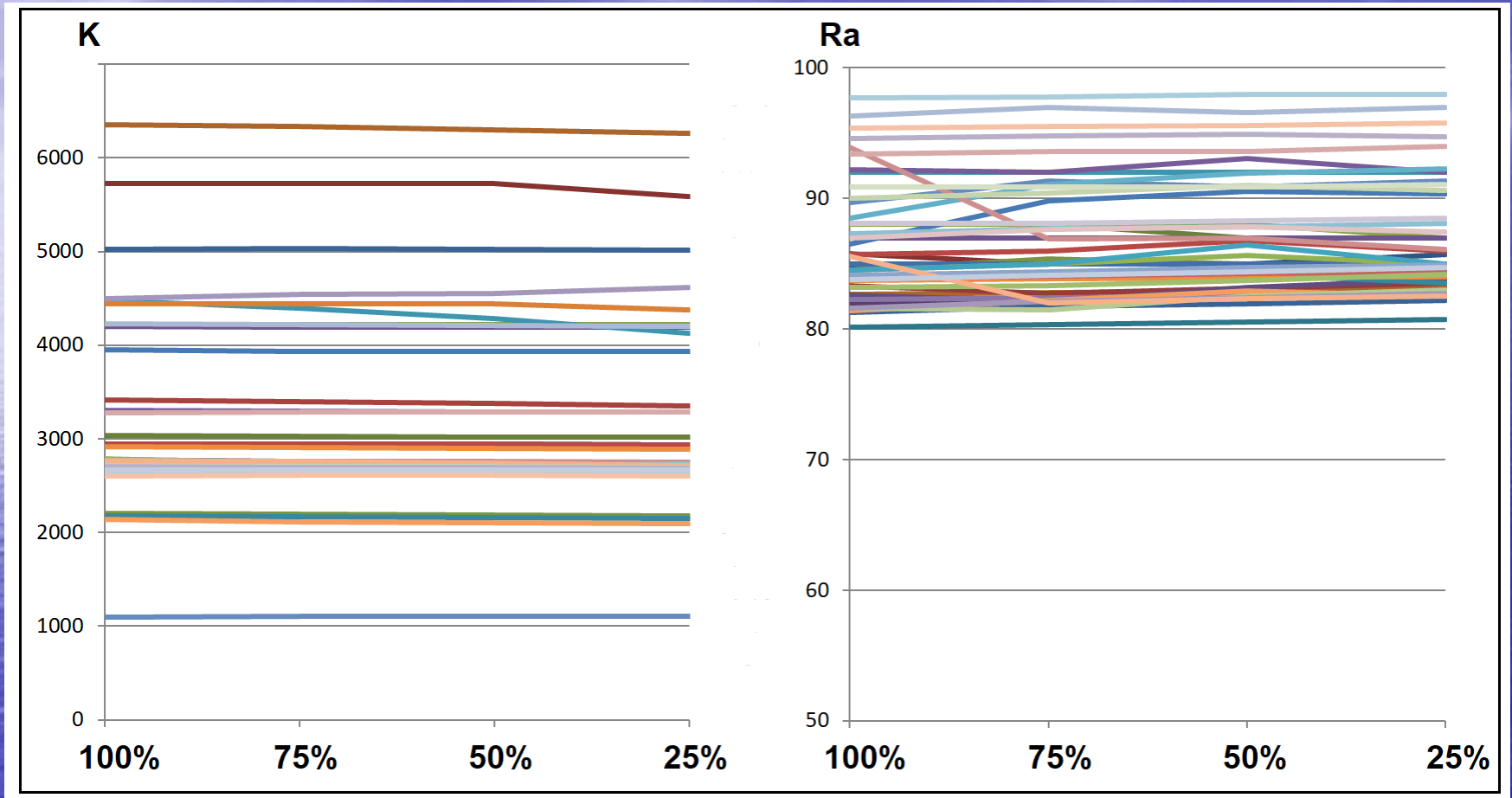




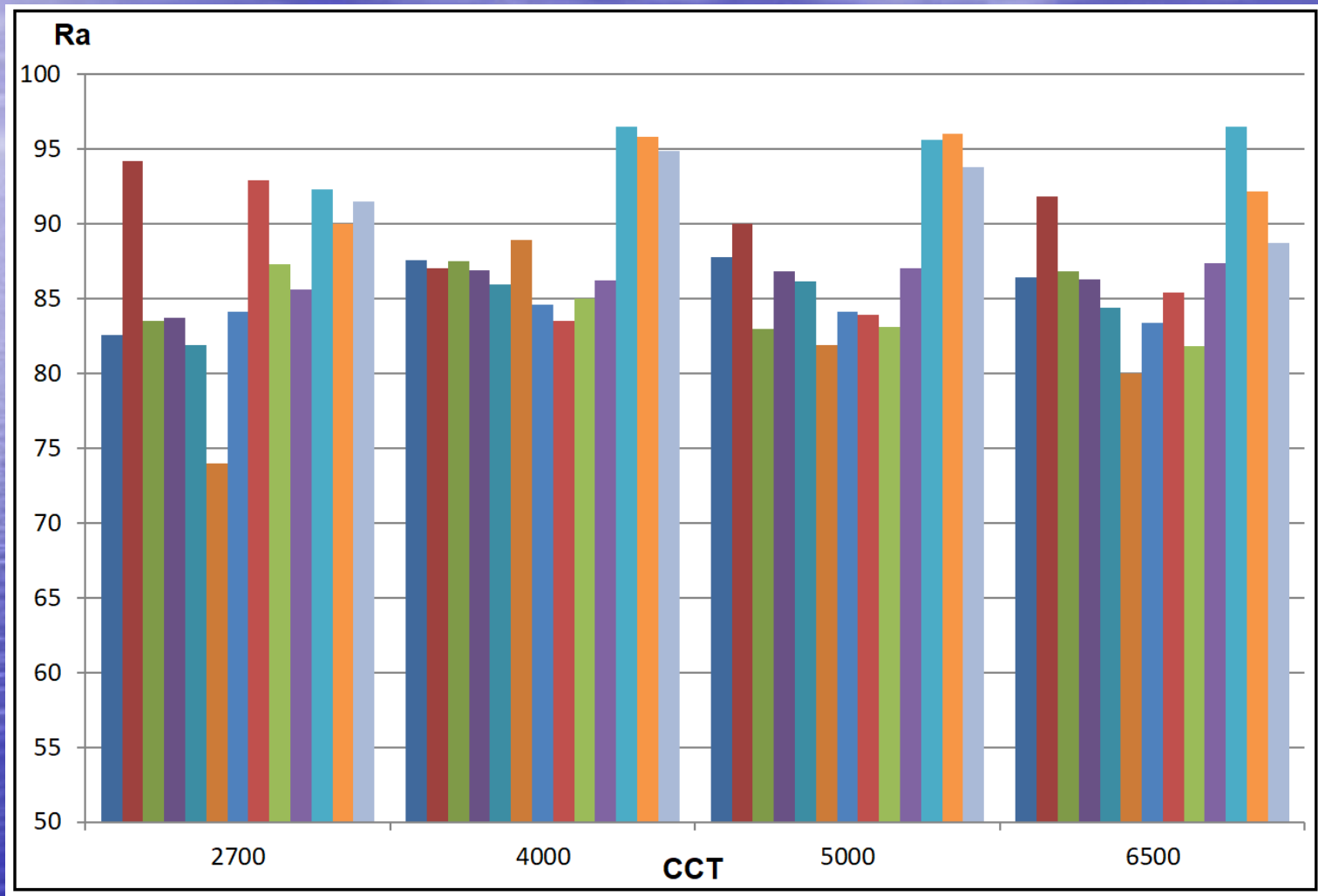
# 5.4.3 Efficacy for different CCT's



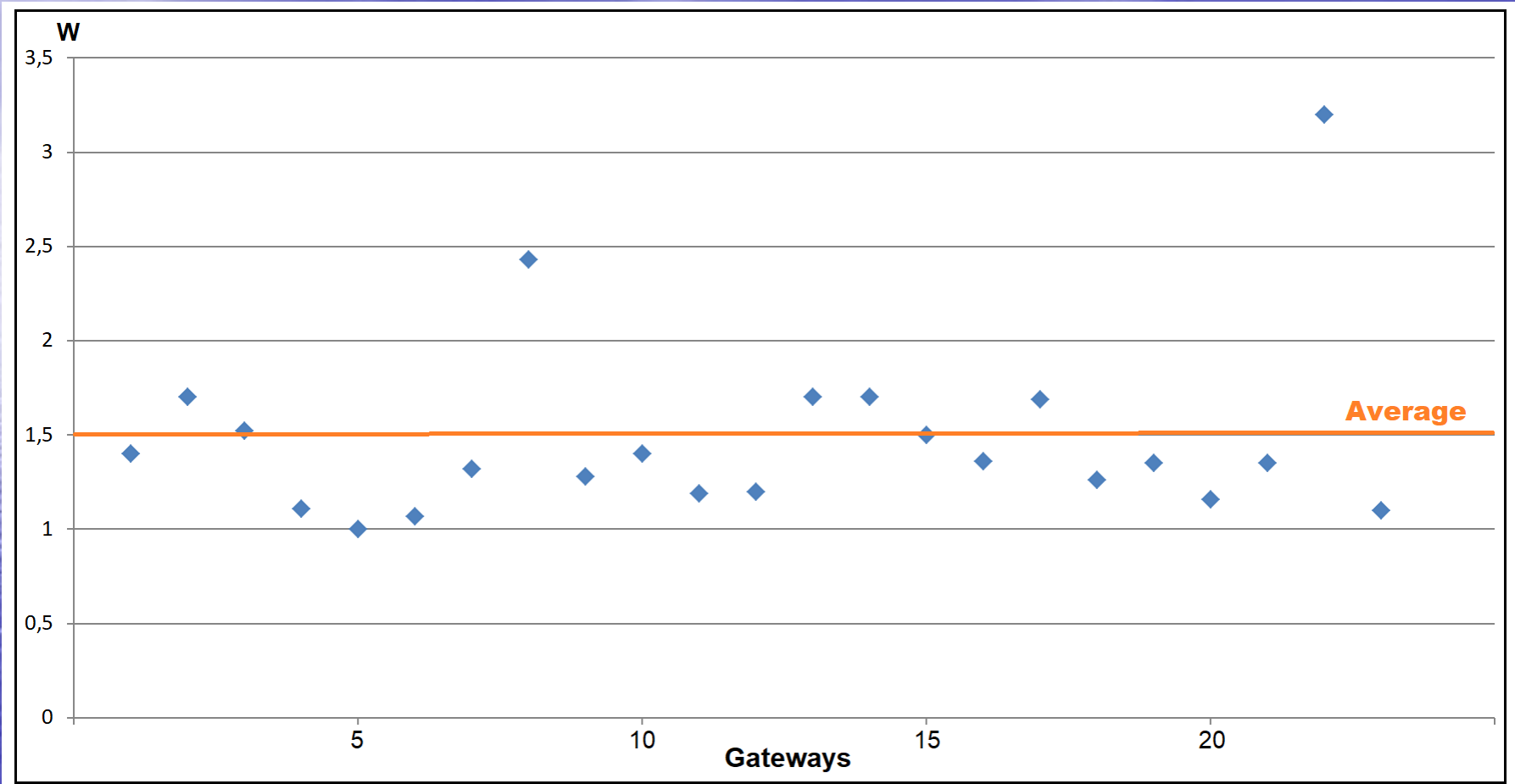
# 5.5 CCT and CRI when Dimming at Default factory setting CCT



# 5.6 CRI for different CCT's



# 5.7.1 Gateway Power 2015-2020

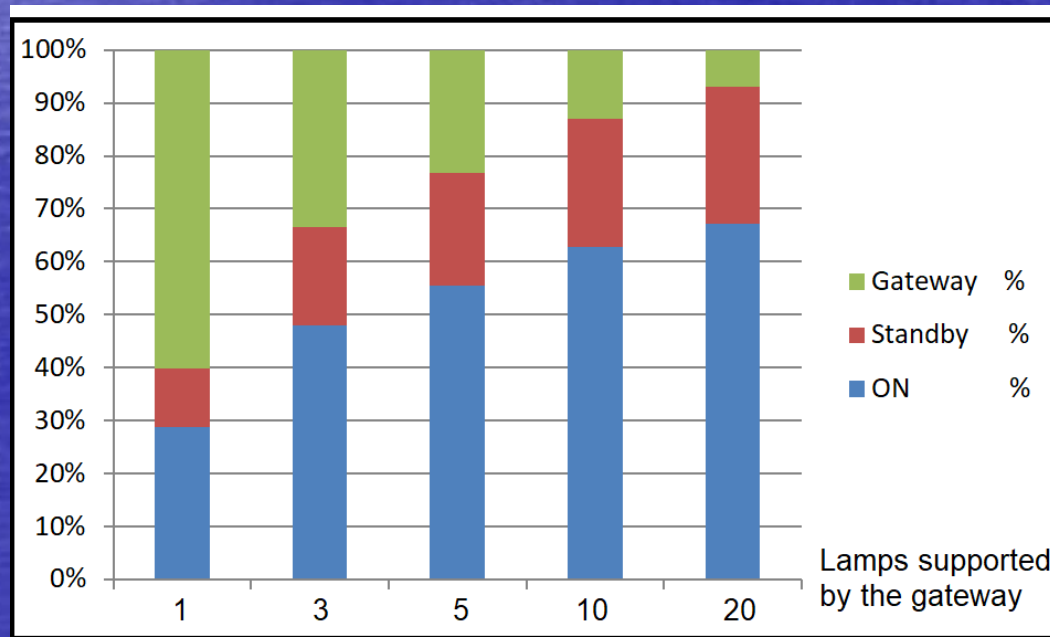


**Average standby power 1.5 W**  
**Energy Consumption 13.1 kWh/year**

# 5.7.2 Example: Gateway Power Per Lamp

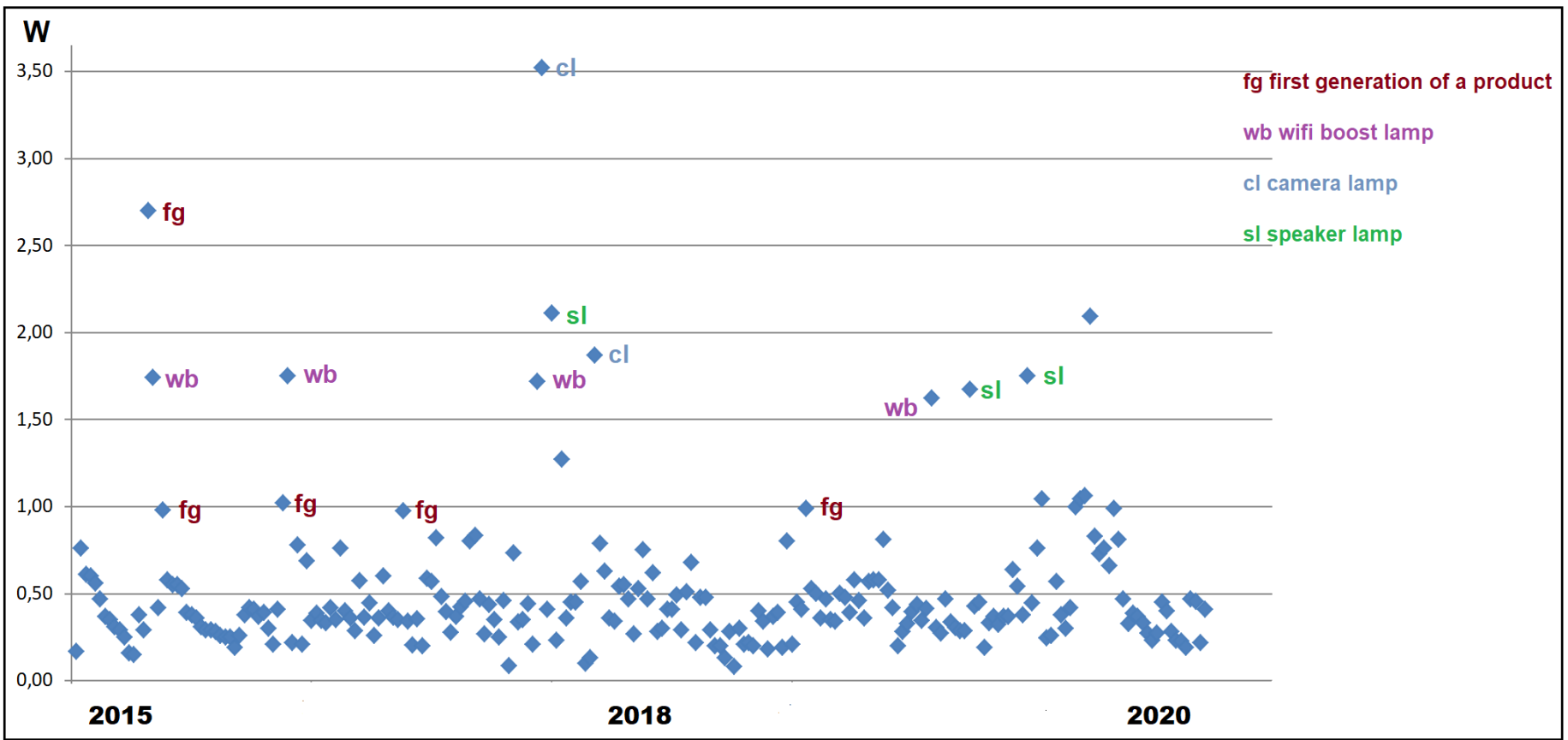
**Standard  
Smart Lamp**  
**9W**  
**806 lm**  
**1.5 W Gateway**  
**0.3 W Standby**  
**700 h/year ON**

Lamps/home	ON kWh/year	Standby kWh/year	Gateway kWh/year	TOTAL/lamp kWh/year
<b>1</b>	6,3	2,4	13,1	<b>21,9</b>
<b>3</b>	18,9	7,3	13,1	<b>13,1</b>
<b>5</b>	31,5	12,1	13,1	<b>11,3</b>
<b>10</b>	63,0	24,2	13,1	<b>10,0</b>
<b>20</b>	126,0	48,4	13,1	<b>9,4</b>



# 5.8.1 236 Standby Power Measurements 2015-2020

## From 67 different manufacturers



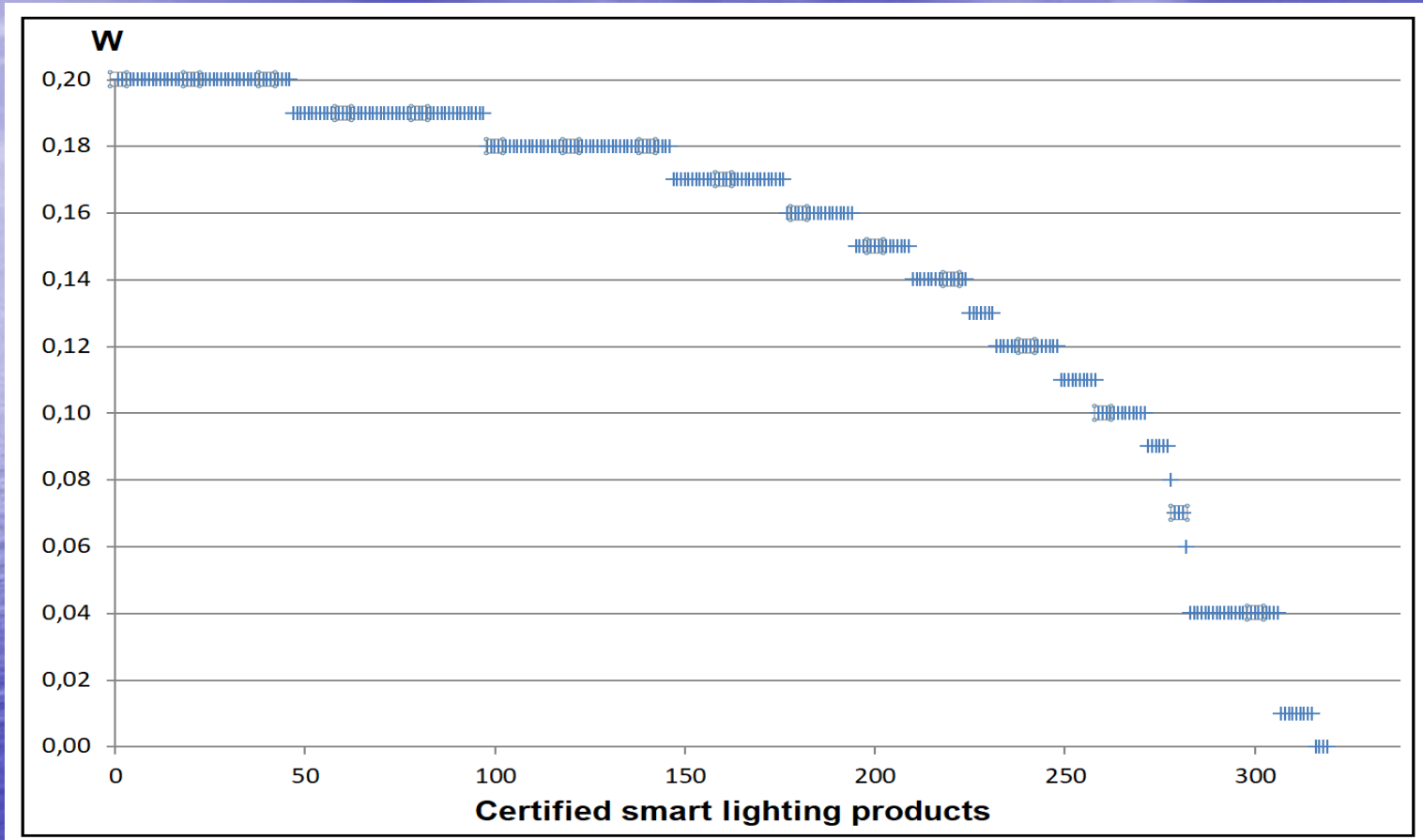
**Average standby power 0.51 W**

## 5.8.2 Average Standby power Major types of Lamp Link

WiFi	0,55
Bluetooth	0,39
Zigbee	0,36

- If gateway consumption is added, the total energy consumption is lowest for Bluetooth
- For the homes, Bluetooth seems to become de facto standard
- For products using gateway, the yearly gateway consumption should be informed by the manufacturer.

# 5.8.3 In California, 319 Certified smart lighting product with standby power $\leq 0.2$ W



California Code of Regulations (CCR) Title-20, section 1602(K) from July 1, 2019 requires standby power  $\leq 0.2$  W

Includes products manufactured and used elsewhere in the world.



## 5.8.4 Recommendations for max Standby power (2023) and Gateway

**0.2 W for Tier 1 in 2023** (0.5W in 2016)

**0.1 W for Tier 2 in 2023** (0.3W in 2016)

**0.01W for Tier 3 in 2023** (0.2W in 2016)

For products with gateway, it is recommended the yearly consumption for the gateway is stated at the pack and at the manufacturer web site.

# 5.9 Usability Recommendations

- Request **open** systems
- Request **interoperability**. For the commercial sector, it is very positive that Dali Alliance has specified gateways between the wireless protocols **Bluetooth** respectively **Zigbee** and the wired **Dali** plus forwarded these to **IEC**.
- Request **consistent** Smart Lighting Systems without changes that out-date earlier bought products.
- For complex lamps, it is recommended it is **possible to switch on/off different extra functions** (many of them are non-lighting features) – this makes also possible to measure the consumption for the different features.
- For mass use, **improved user-friendliness/usability** and **simplicity** is absolutely necessary.

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3. Co-operation with EDNA
4. IEC/CIE Standardisation
5. Second Report Draft
6. Expert Discussion and next steps

# 6.1 Second Report – Next Steps

1. **Primo Oct. 1st Draft ready**
2. **Review Jonas and Review Mike**
3. **25/10 - 8/11 1st draft Experts Review**
4. **3/11 Expert meeting Presentation**
5. **9-26/11 Prepare 2nd Draft**
6. **1-15/12 2nd Draft Expert Review**
7. **10-24/1 2021 MC Review**
8. **1/2 2022 Publication**

# Thank You



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