Validation of the IEA Task 19 Ice classification

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on behalf of
IEA RD&D Wind Task 19: «Wind Energy in Cold Climates»

Winterwind 2016

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IEA Task 19 site classification

From IEA T19 Recommended Practices Report, 2012

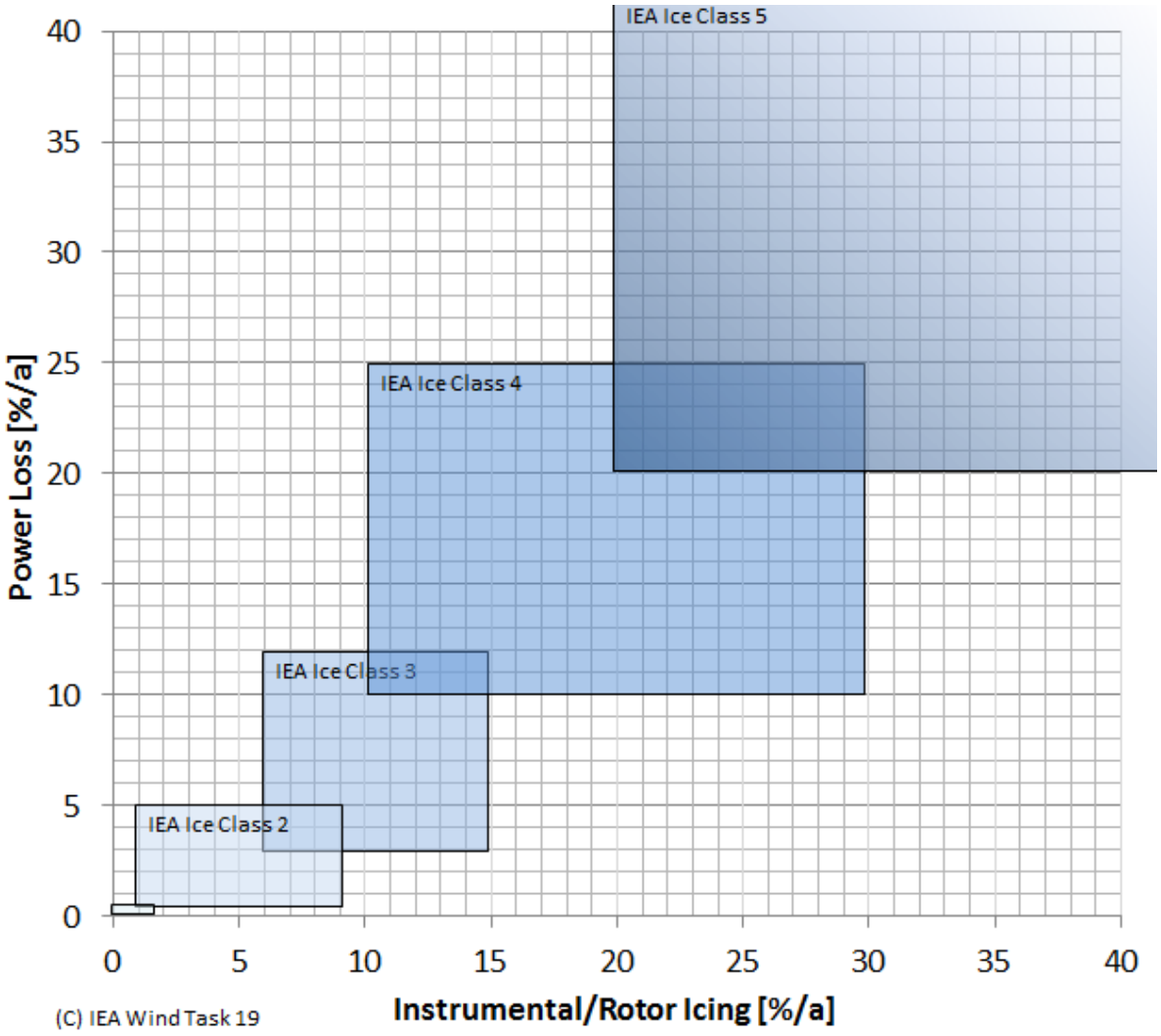
IEA ice class	Duration of meteorological icing [% of year]	Duration of instrumental icing [% of year]	Production loss [% of AEP]
5	>10	>20	>20
4	5-10	10-30	10-25
3	3-5	6-15	3-12
2	0.5-3	1-9	0.5-5
1	0-0.5	<1.5	0-0.5

→ Classification for wind turbines without ice protection system

Validation details

- **Anonymous** survey
- **Instrumental icing** versus **power loss**
- **Publicly available** data (proceedings, presentations)
- Anonymous data **provided by**
  - Meteotest
  - DNV GL
  - Vattenfall
  - Kjeller Vindtekknik
- **45 data pairs** from 23 sites (unvalidated, **hard to get!)**

IEA Task 19 site classification



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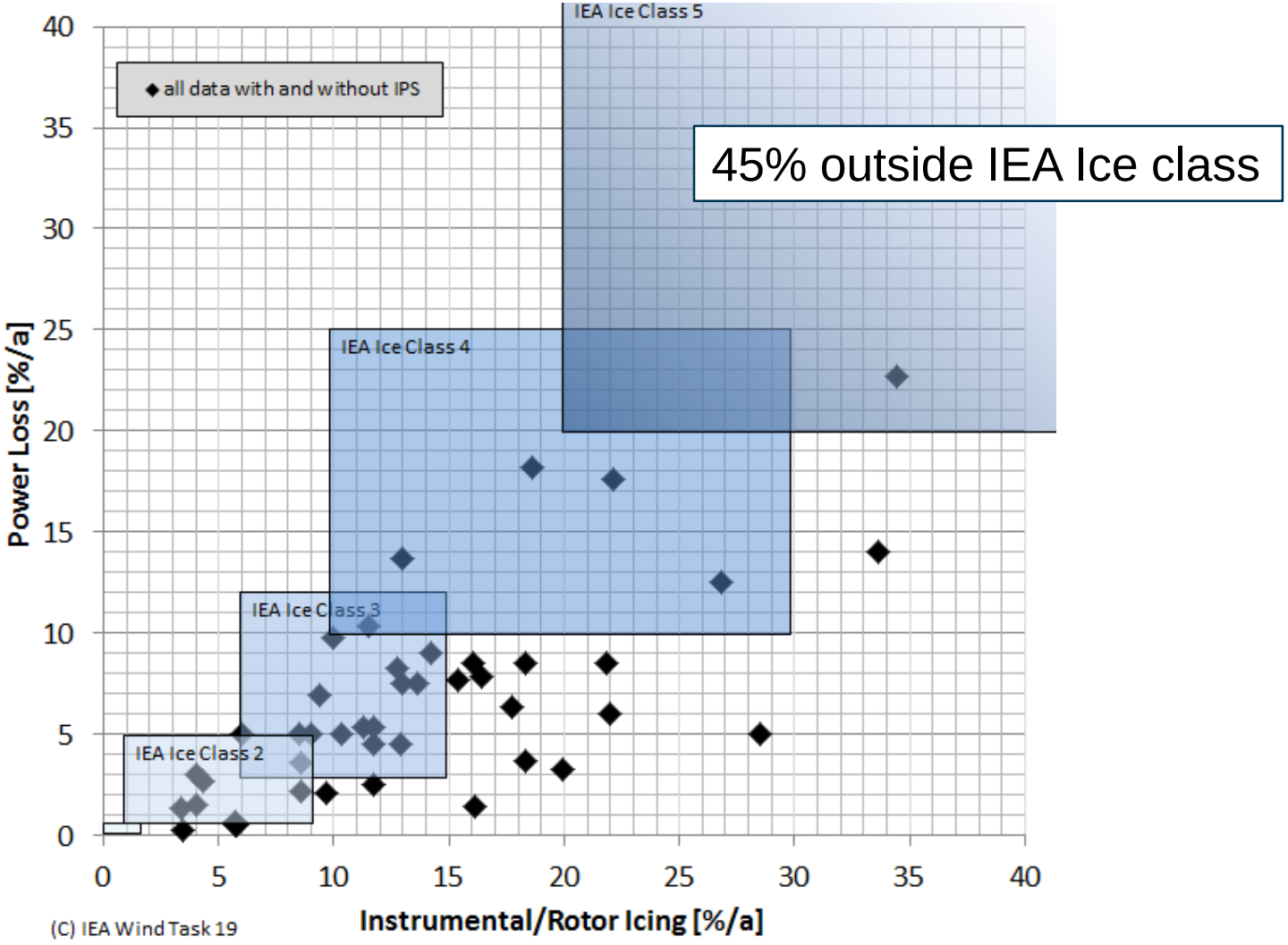
All avaliable data pairs



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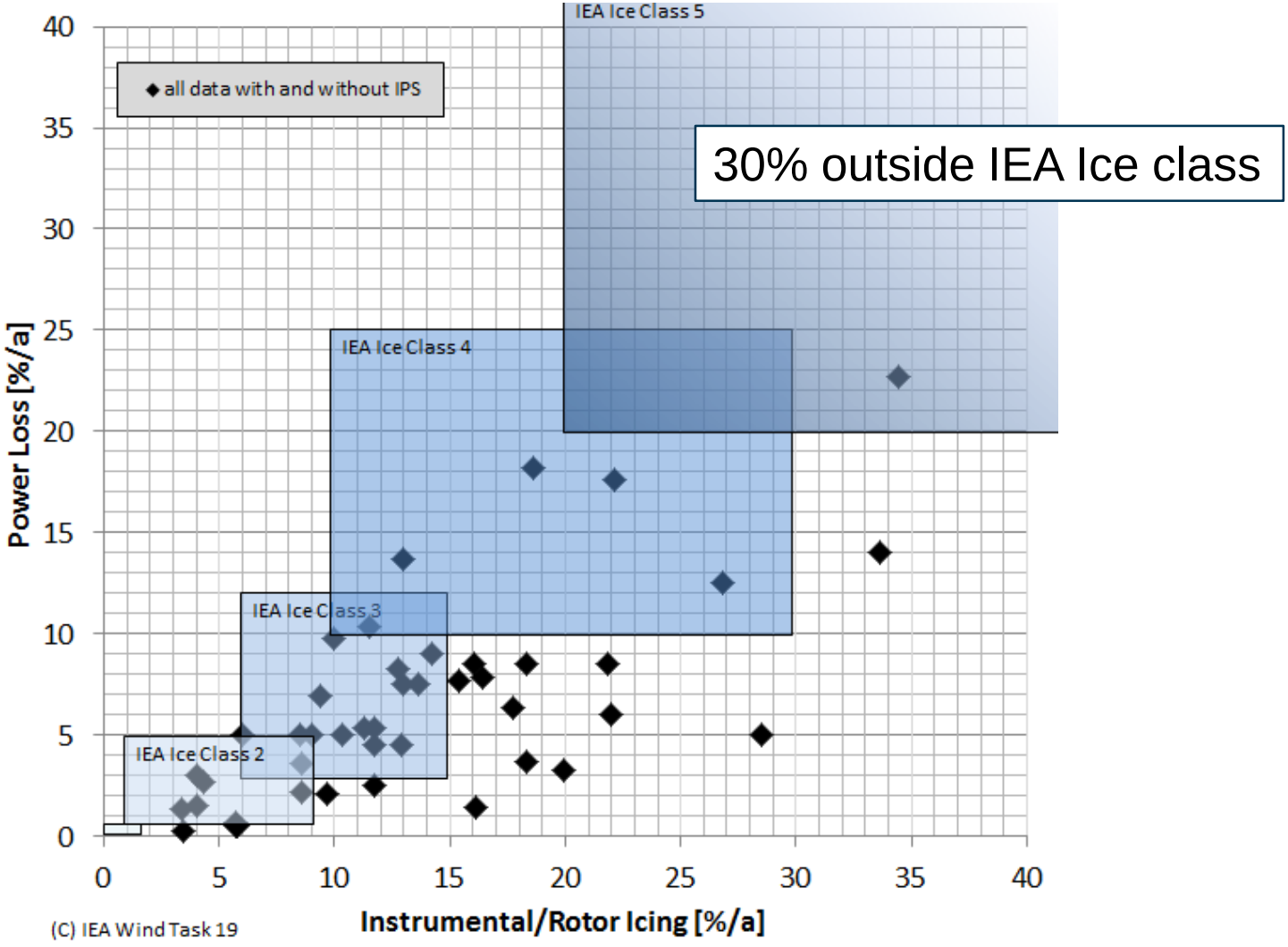
One average value per site



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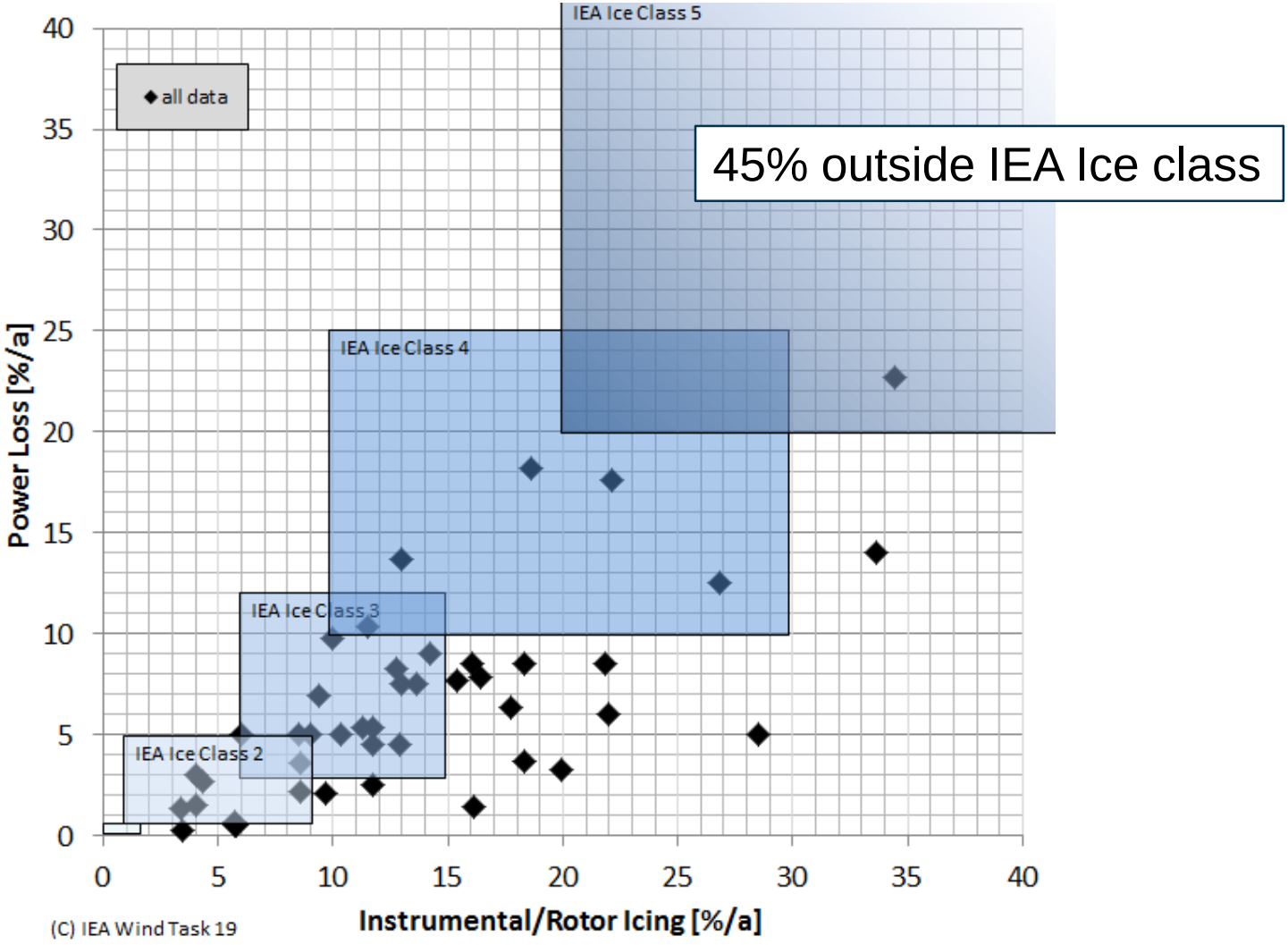
Ice protection systems (IPS)?

All data pairs with and without Ice Protection System



45% outside IEA Ice class

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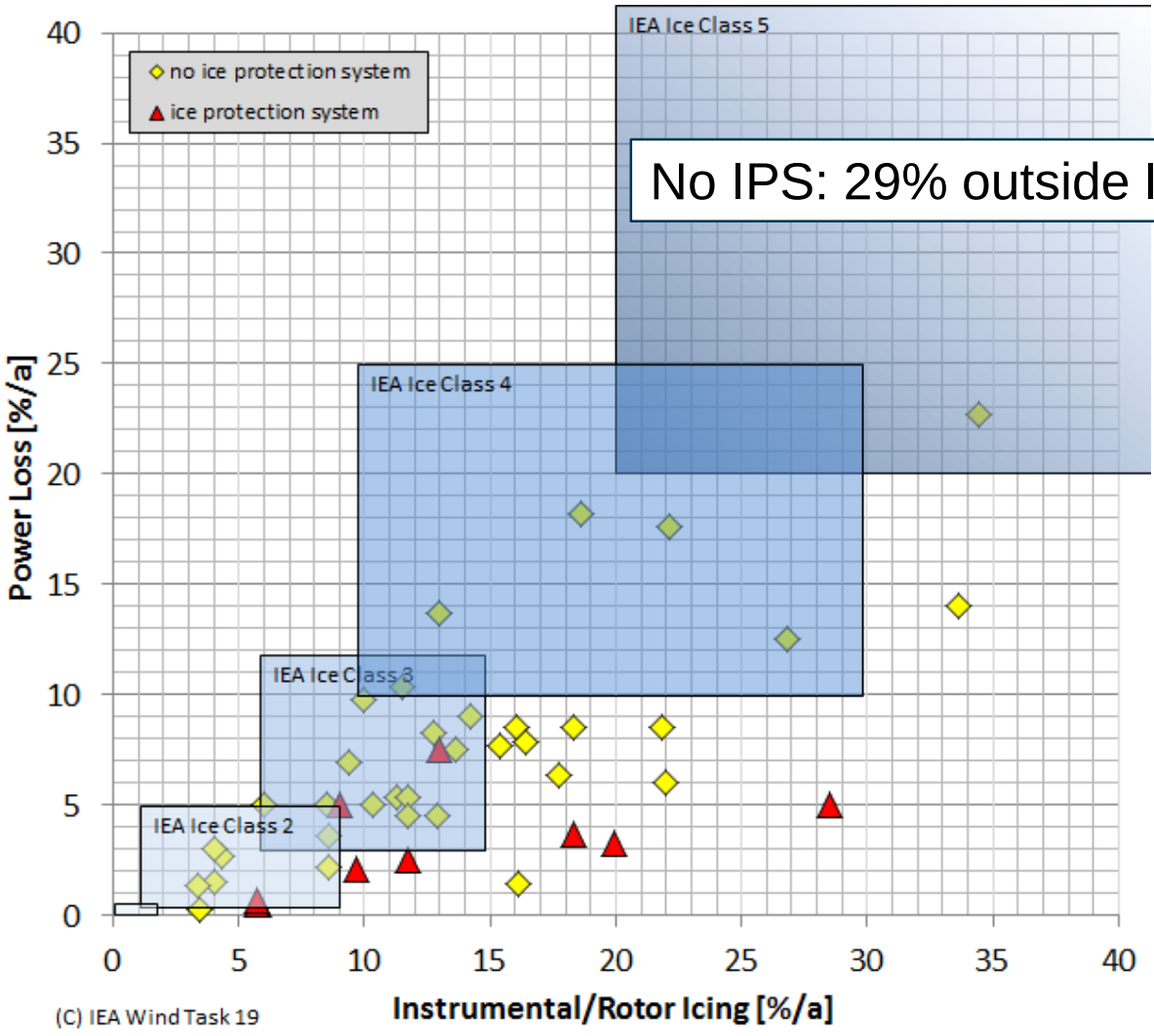
Ice protection systems (IPS)

All data pairs



No IPS: 29% outside IEA Ice class

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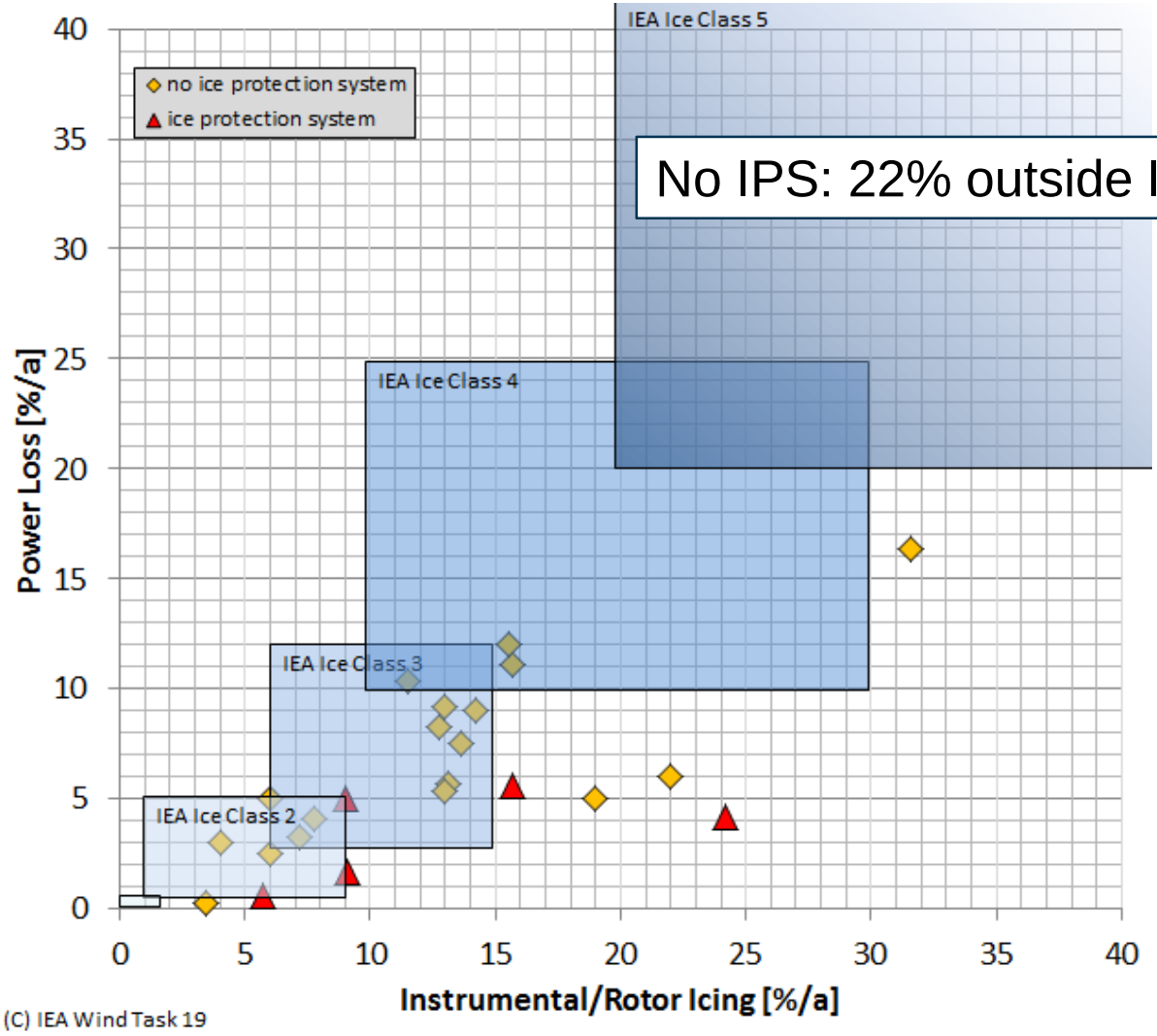
Ice protection systems (IPS)

Average per site



No IPS: 22% outside IEA Ice class

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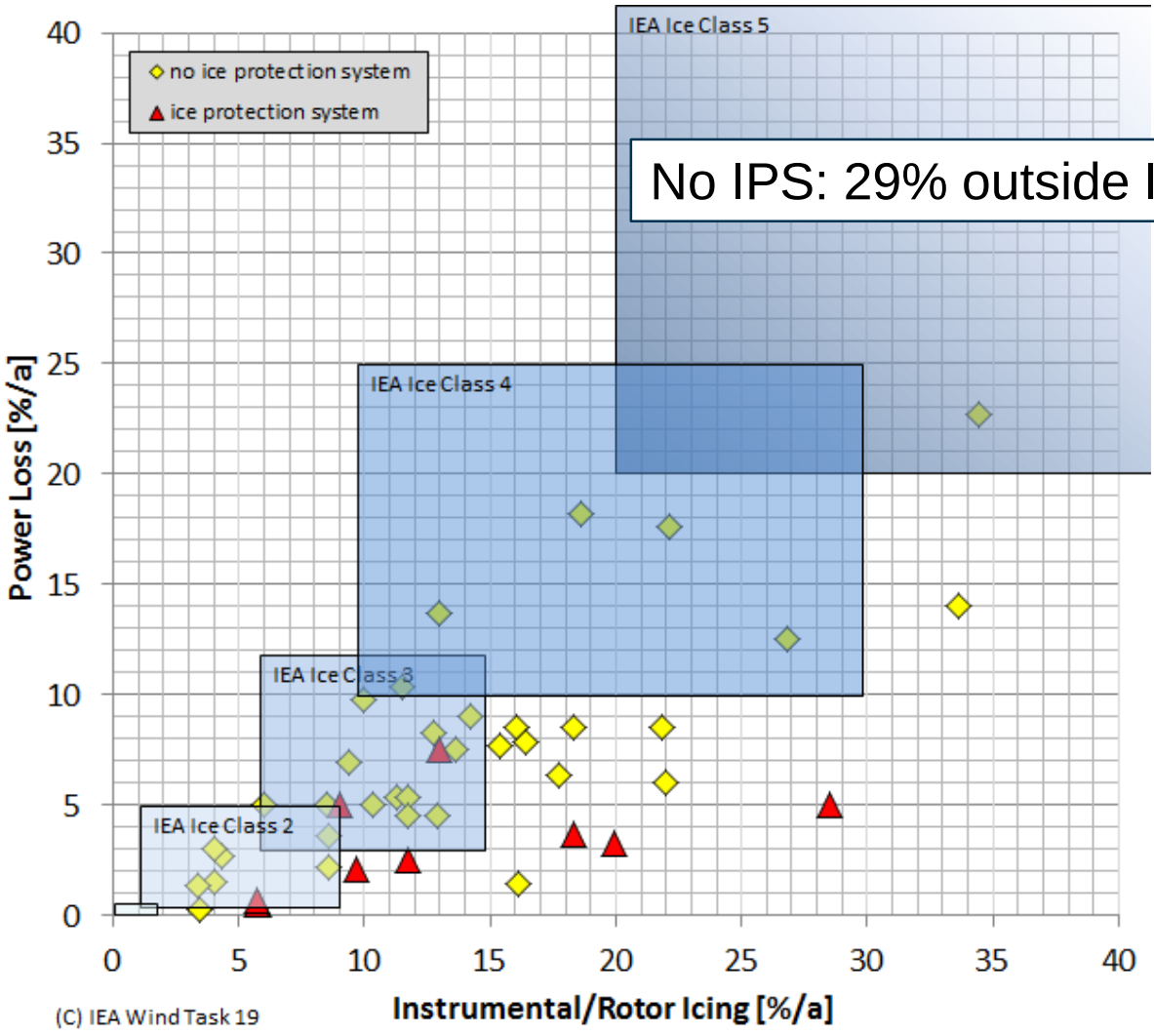
Operation or stand still?

All data pairs



No IPS: 29% outside IEA Ice class

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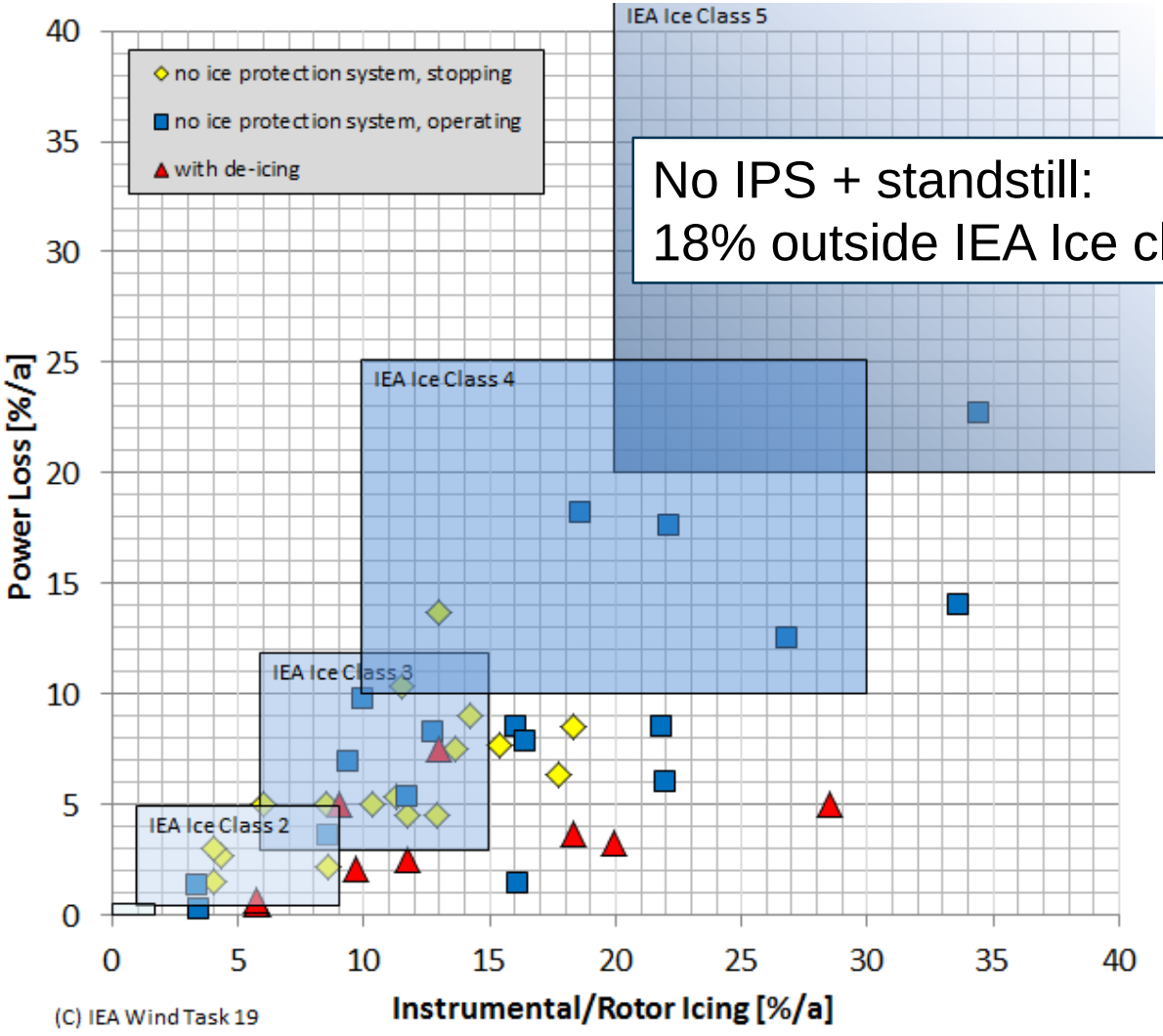
Operation or stand still

All data pairs



No IPS + standstill:
18% outside IEA Ice class

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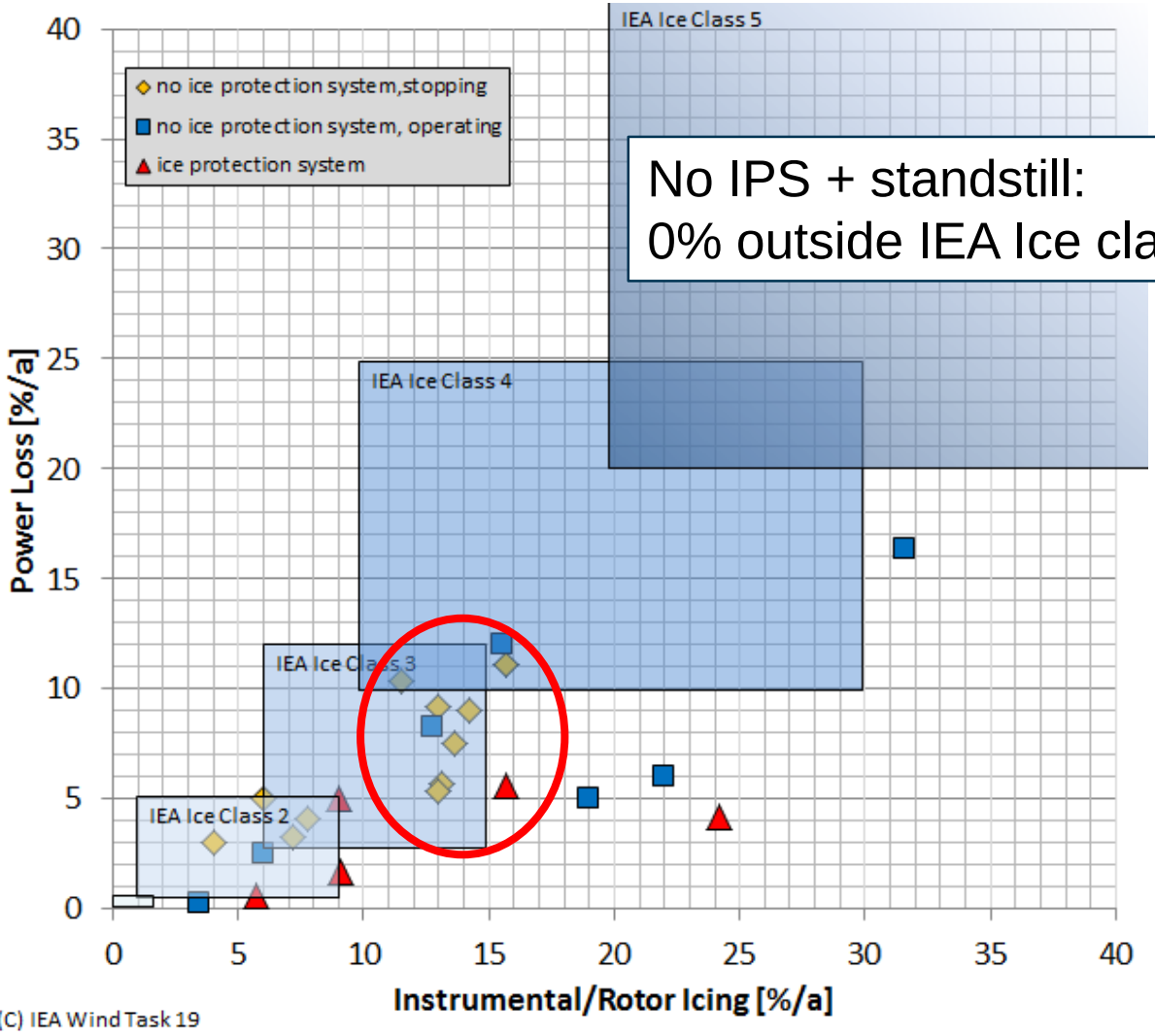
Operation or stand still

Average per site



No IPS + standstill:
0% outside IEA Ice class

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Wrap up

- Validation data is **hard to get**
- IEA Ice classification **isn’t that bad**
- It is a **long term classification**
- **Single years** do not necessarily fit in
- **No case** with **higher power loss** than predicted
- **Realistic** values for turbines **without Ice Protection System**, **stopping** when iced
- **Lower power loss** when turbine keeps **operating**
- **Even lower** power loss **with Ice Protection System**
- **Hardly any** validation data for **ice classes 4 and 5**
- Still **large scatter** in power loss for **similar icing** frequencies
- **More detailed understanding** of icing versus power loss needed


Thank you for your attention!

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