Preparing for 5G: Research and Policy Efforts Relating to RF Exposure

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Introduction

- The MWF is an international non-profit association of telecommunications equipment manufacturers with an interest in mobile or wireless communications.

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5G

- Meets the huge growth in data and connectivity
  - Monthly data increase from 3.4 GB (2017) to 17 GB (2023)
  - By 2023 over 1B 5G devices connected
- Offers much faster connections, shorter response times (latency) and increased capacity
- A key infrastructure for IoT and emerging technologies such as autonomous vehicles, smart manufacturing and virtual reality.

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20 years of EMF research

- Since 1998, MWF's research mission:
  - Facilitate between governments, industry, universities and health organisations
  - Follow WHO Research Agenda
  - Respond to concerns about safety of mobile and wireless devices
  - Transparency and peer review
  - Require publication of all research results to build a body of scientific evidence
- Provide high quality public information
- Rely on weight of scientific evidence

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MWF's contribution to 5G research

- Program 9 "Emerging and Future Technologies"
  - Related to 5G networks and devices
  - Focussed on transition from SAR to power density
  - Dedicated to create better understanding of
    - how higher frequencies (6 to 100 GHz) are absorbed within the skin;
    - associated temperature increases; and,
    - necessary compliance testing framework for devices.

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5G Research Projects

- **Dosimetric understanding above 6 GHz**
  - Objective: Suggest possible improvements of the basic restrictions at frequencies above 6 GHz for whole-body and localized exposure in terms of power density limits and related averaging areas.

- **Compliance testing above 6 GHz**
  - Objective: Define compliance assessment methods and procedures to demonstrate compliance of wireless equipment with the basic restrictions at frequencies above 6 GHz. The focus was on measurements for portable devices used in close proximity of the body.

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5G Research Projects

- **Measuring small cell exposures**
  - Objective: Perform a study of RF EMF exposure from a variety of small cells in real world settings in several countries.

- **Enhancing compliance testing for 5G devices**
  - Objective: identify the most accurate limits and suggest possible improvements to the power density limits applicable for 5G devices operating above 6 GHz.

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5G Research Projects

- **Testing 5G devices with smart antennas**
  - Objective: look at the skin temperature increase caused by exposure to the fields of 5G devices and establish the relationships between different types of antennas, interaction with the skin models and temperature increases.

- **Measuring power density**
  - Objective: Investigate the practicality of back-propagation to calculate the power density of an RF source using 28 and 60 GHz antennas.

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5G Research Projects

- **Power density and temperature increase**
  - Objective: Investigate the correlation between power density and temperature increase by utilising MRI scans of participants immediately after exposure to determine the real temperature increase experienced (Underway).

- **Workshops at BioEM to present findings and promote discussions**
  - Supported workshops in 2016, 2017 and 2018 at the BioEM conference to present findings and encourage discussion.

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Overview of MWF Research Efforts

http://www.mwfai.org/docs/eng/2018_05_MWF_20YearsofResearch.pdf

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Policy Efforts Relating to 5G

- The MWF promotes international harmonization of RF exposure limits.
- But we continue to see discussions in different countries about adopting lower RF limits without a real understanding of the implications.
- These implications apply to existing networks as well as to 5G.

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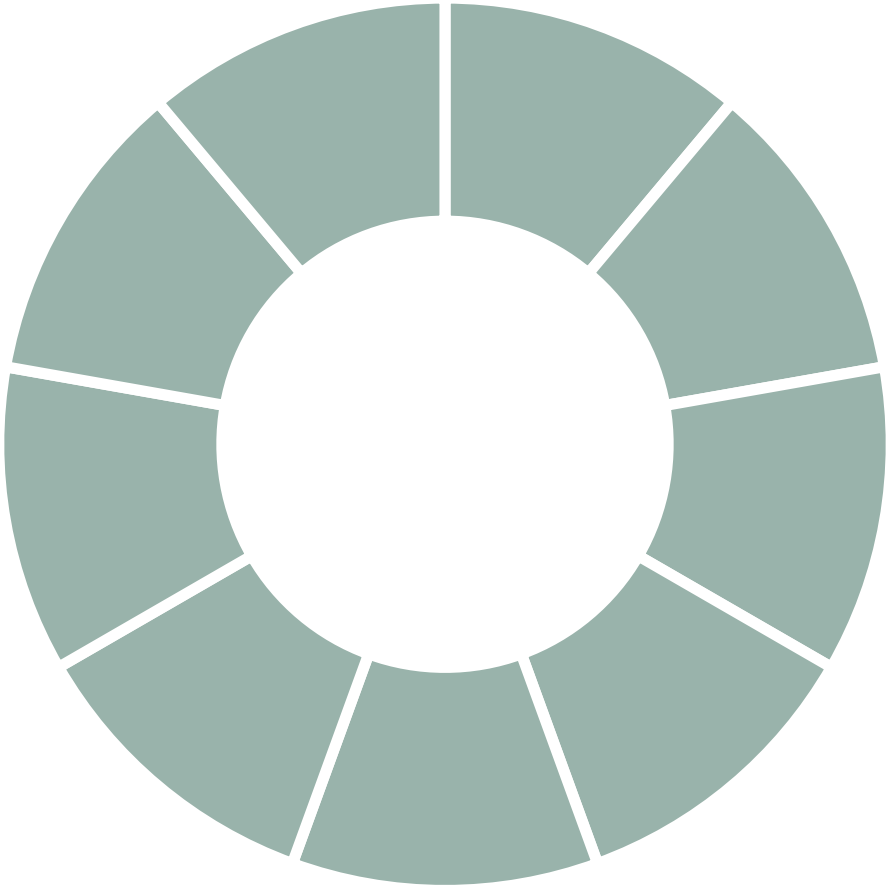
What are the implications to 5G from lower limits?



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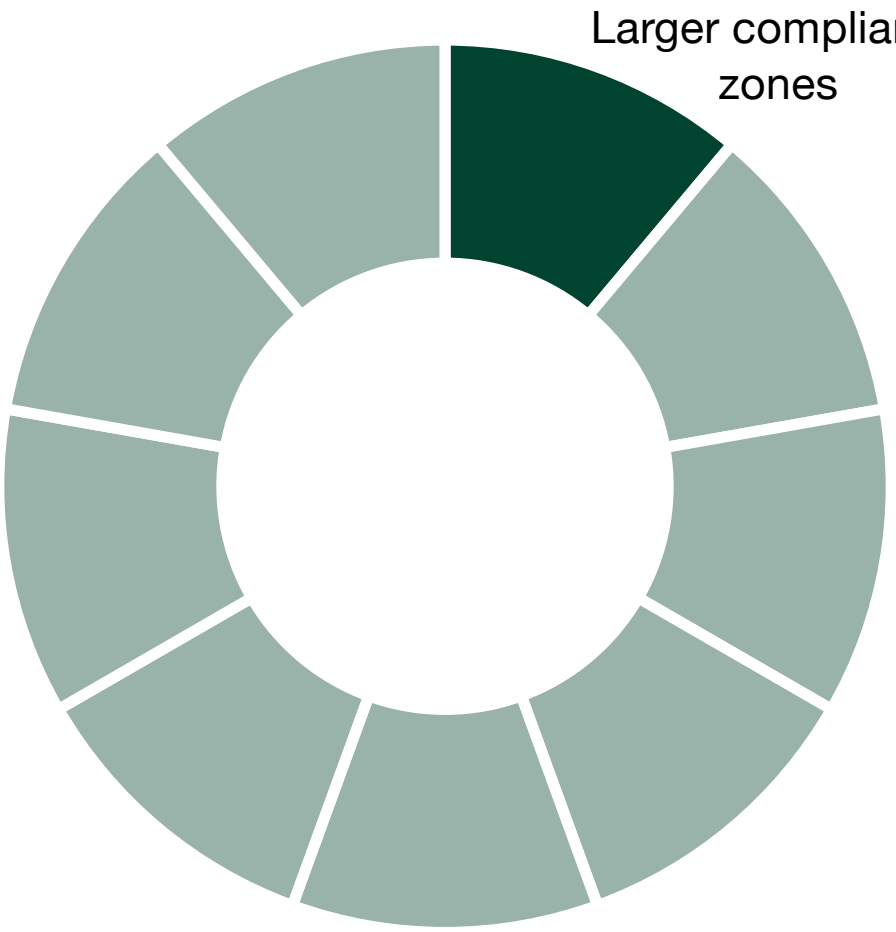
Larger compliance zones



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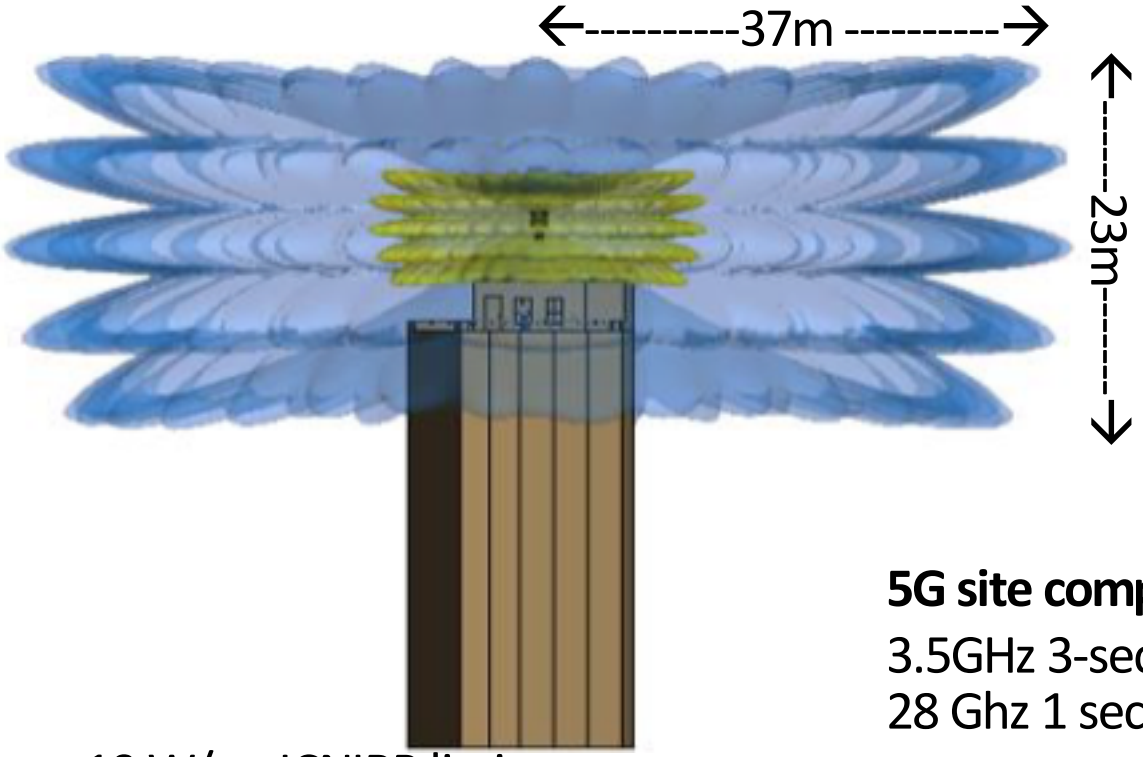
Example 1: ICNIRP vs 1/10 ICNIRP



5G site comprising:

3.5GHz 3-sector antennas
28 Ghz 1 sector antenna

Exclusion zone 10 W/m² ICNIRP limit
Exclusion zone 1 W/m² 1/10 of ICNIRP limit

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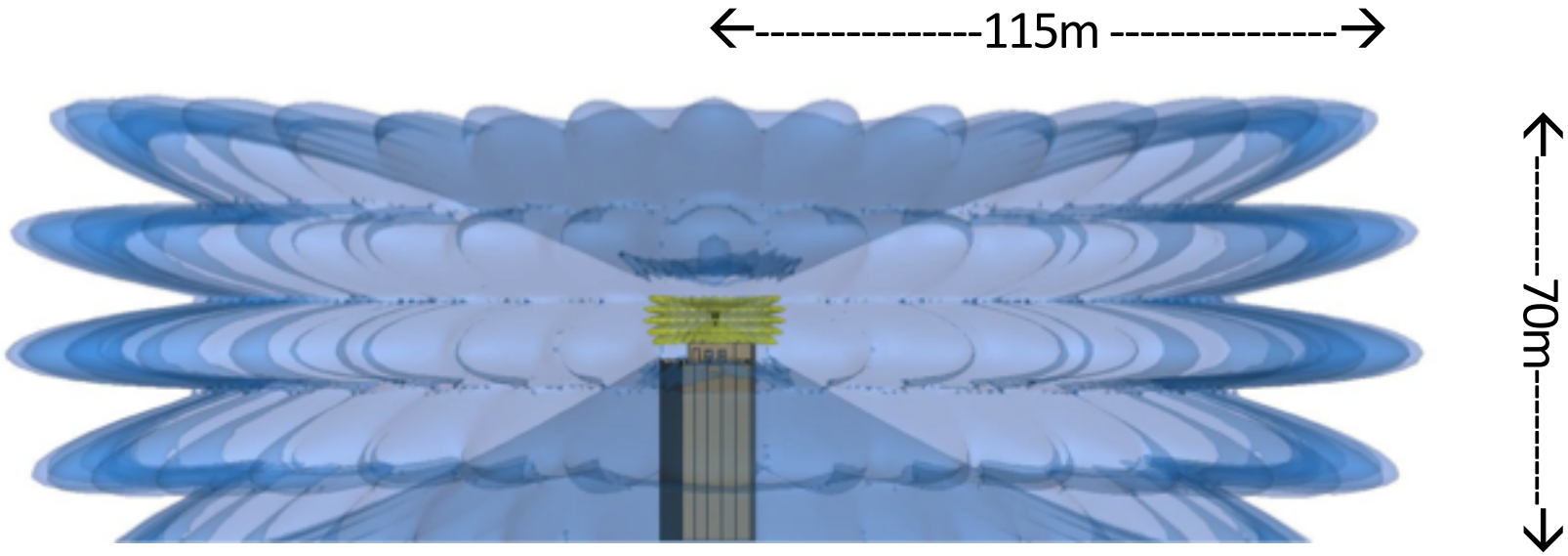
Example 2: ICNIRP vs 1/100 ICNIRP



Exclusion zone 10 W/m² ICNIRP limit

Exclusion zone 0.1 W/m² 1/100 of ICNIRP limit

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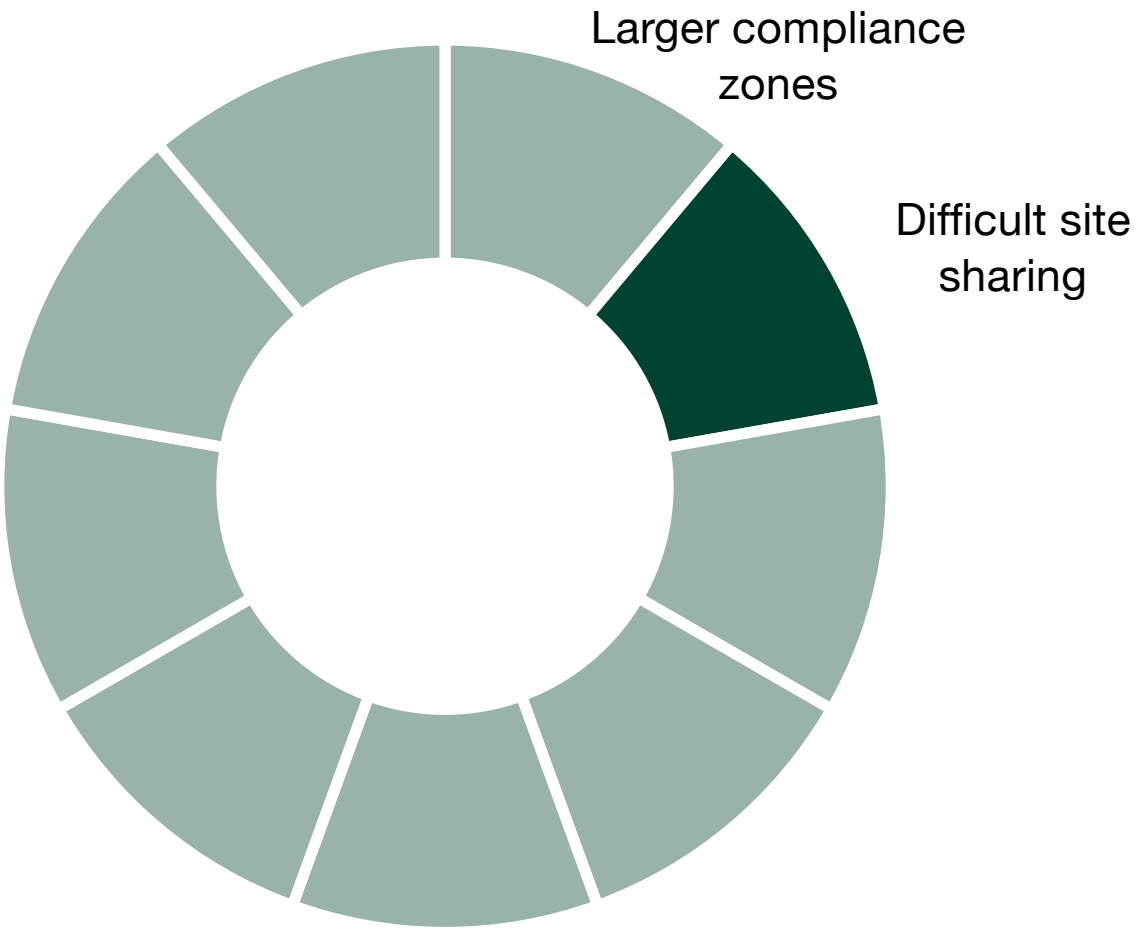
Difficult site sharing



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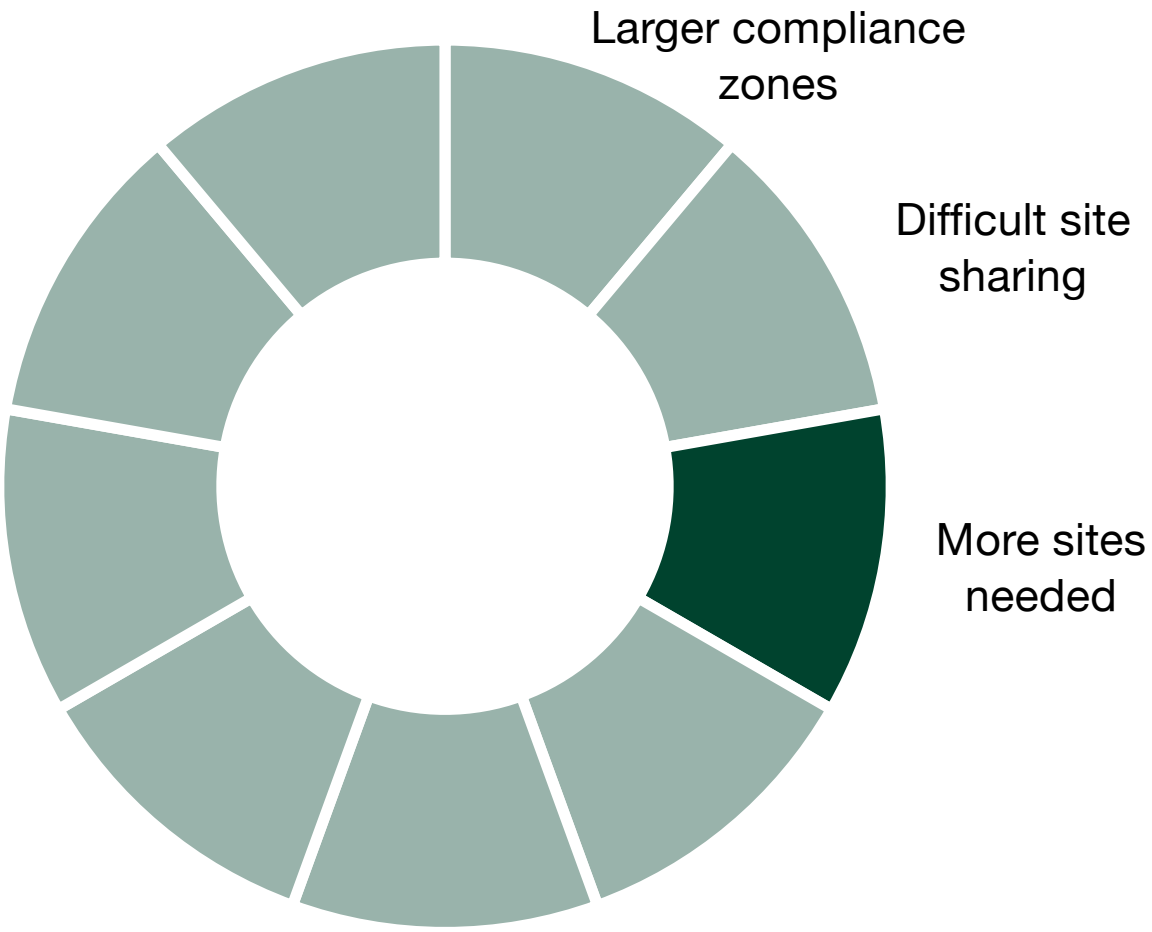
More sites needed



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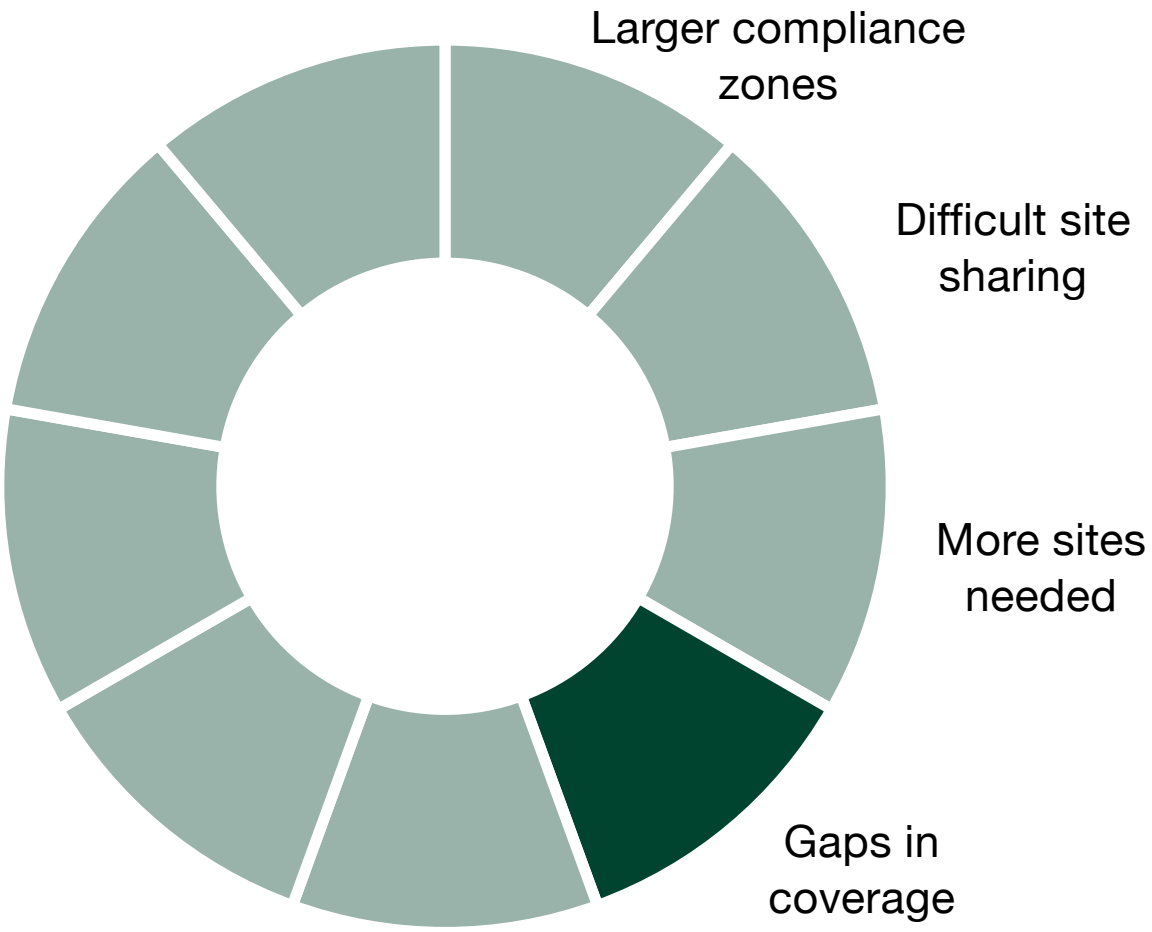
Gaps in coverage



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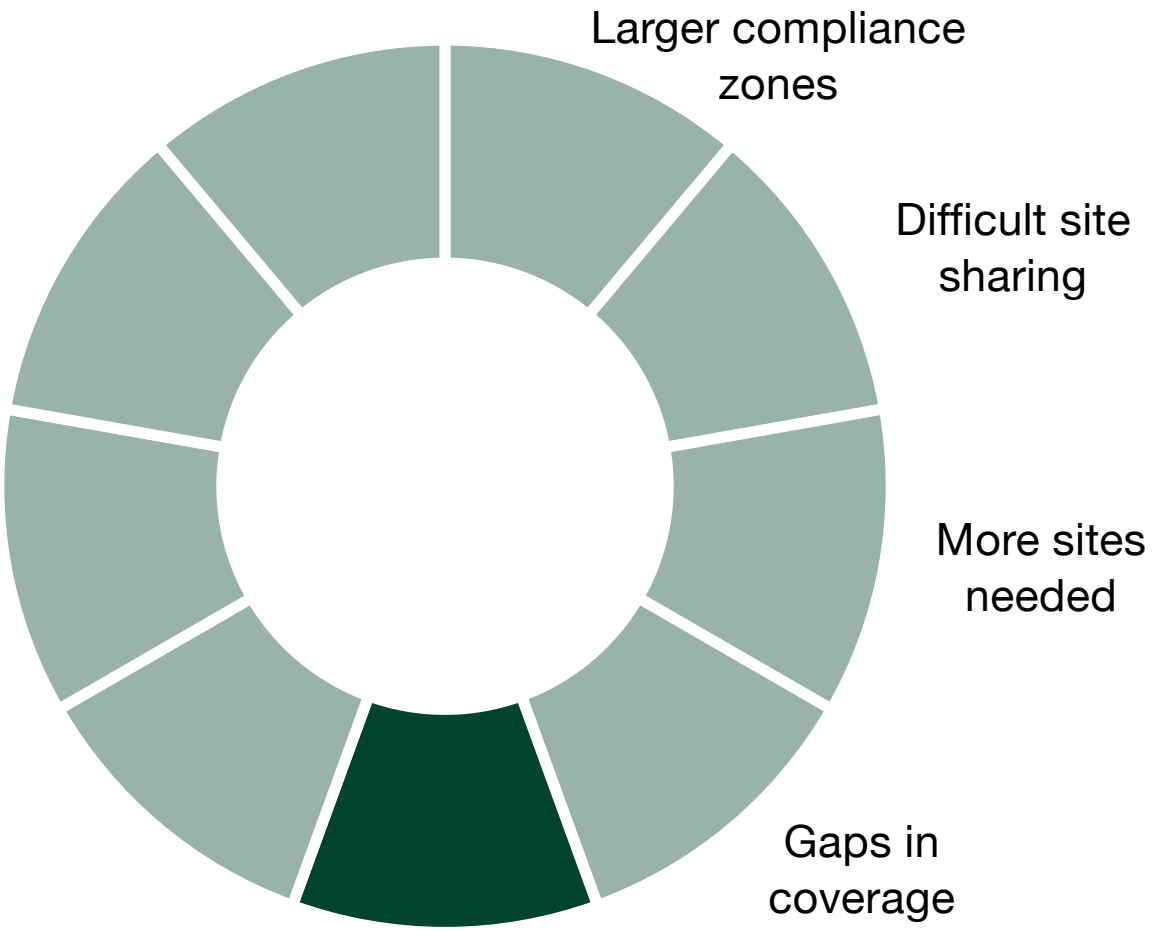
Restricting technology innovation



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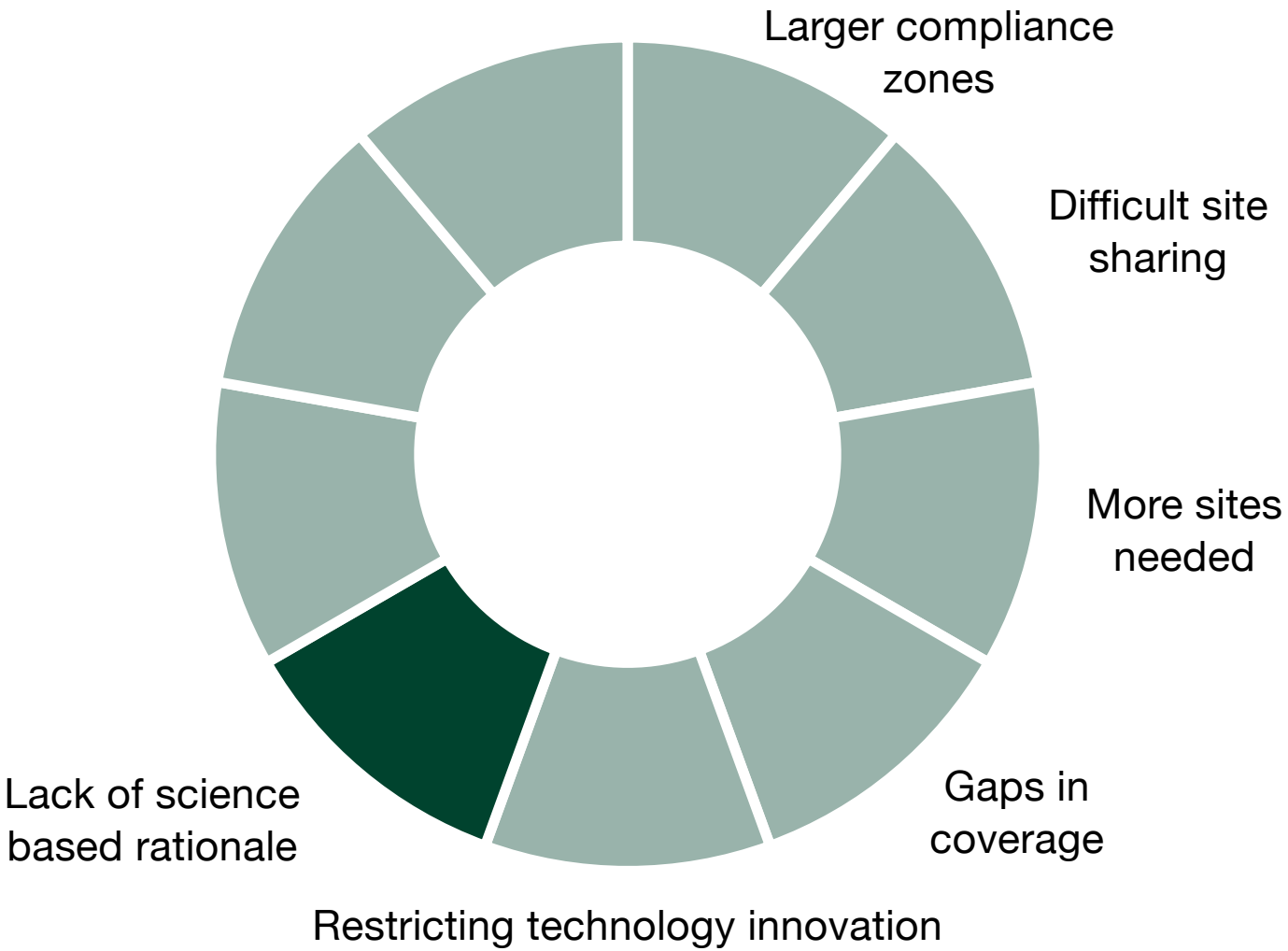
Lack of science based rationale



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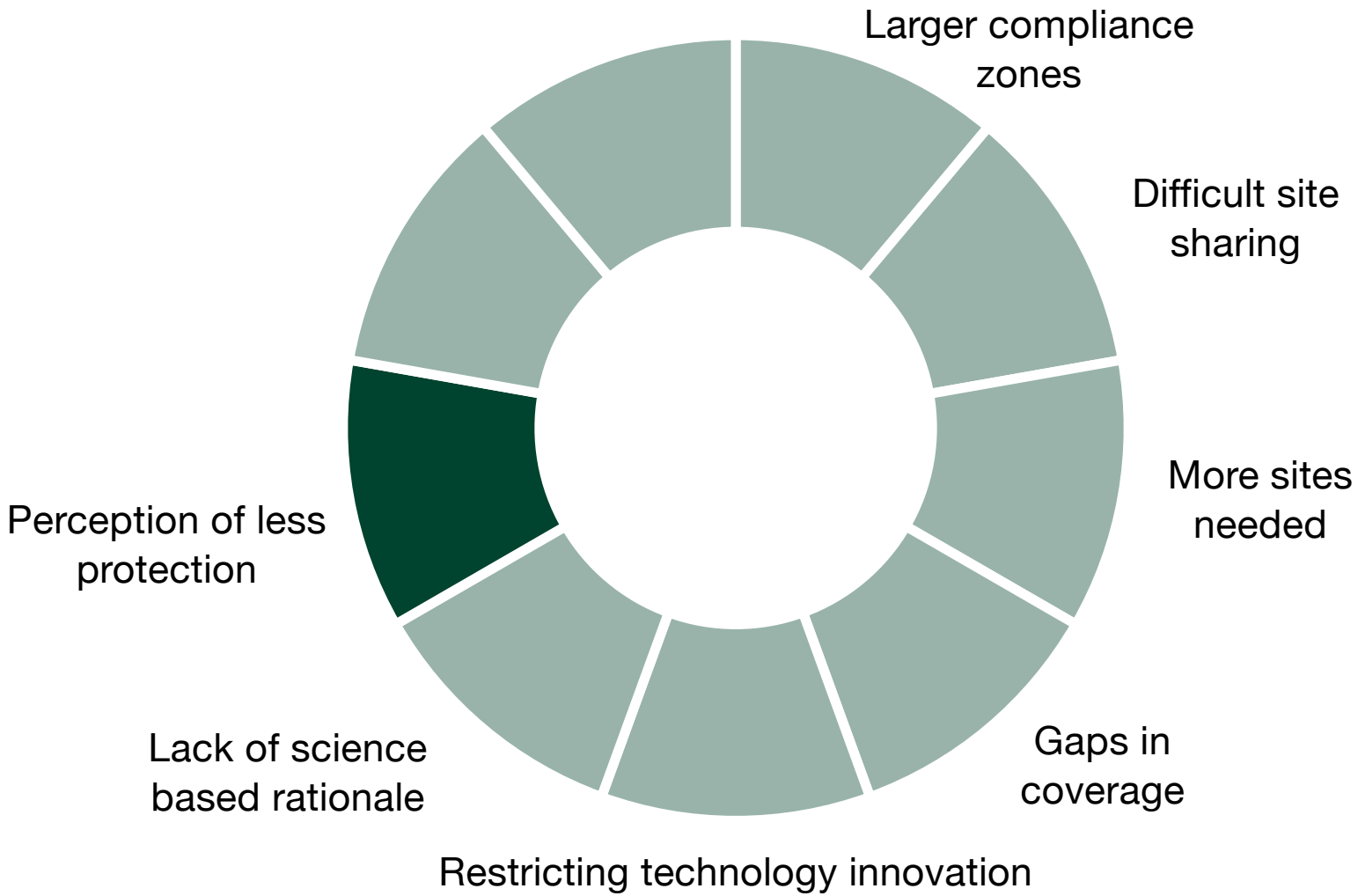
Perception of less protection



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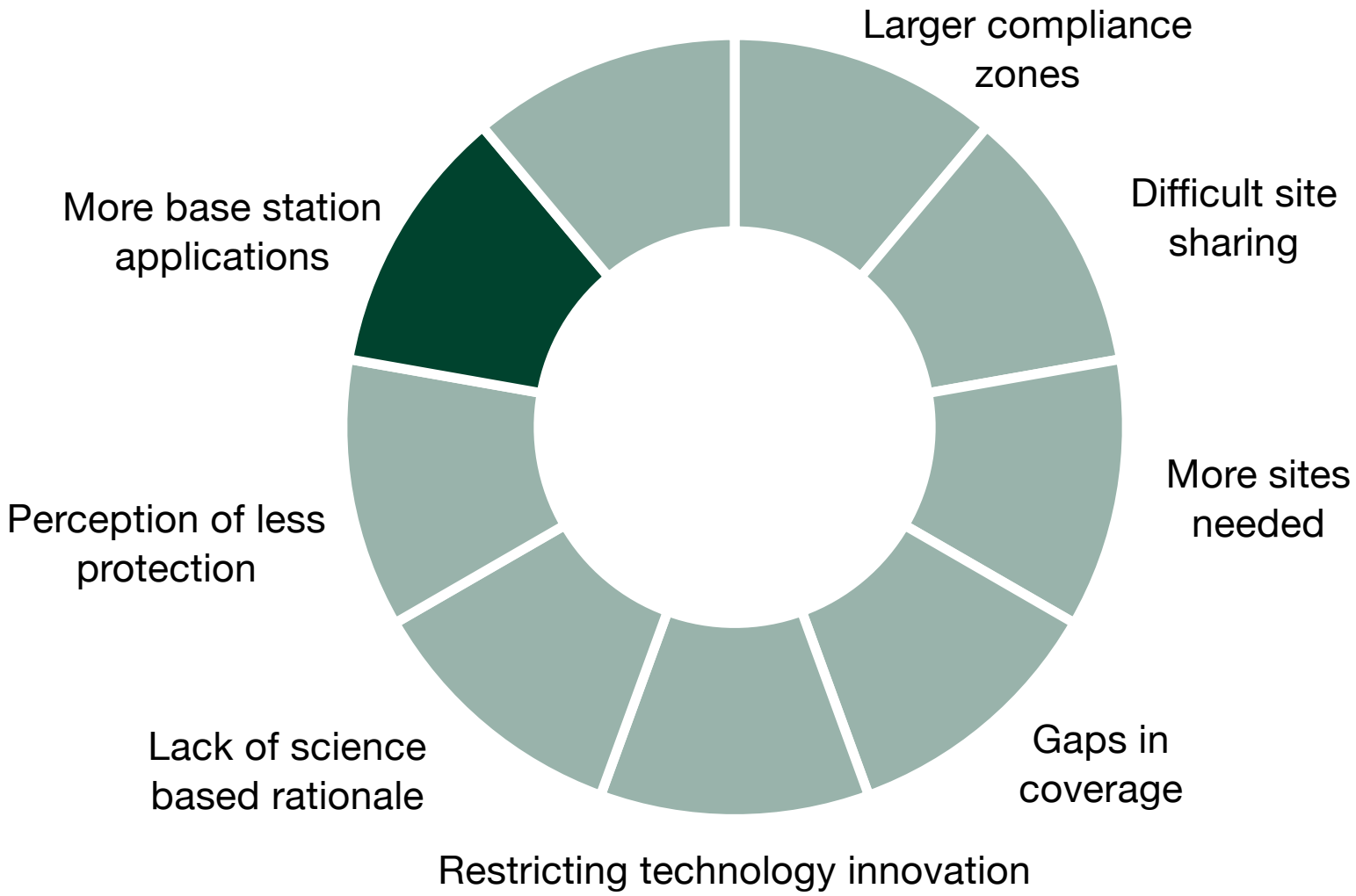
More base station applications



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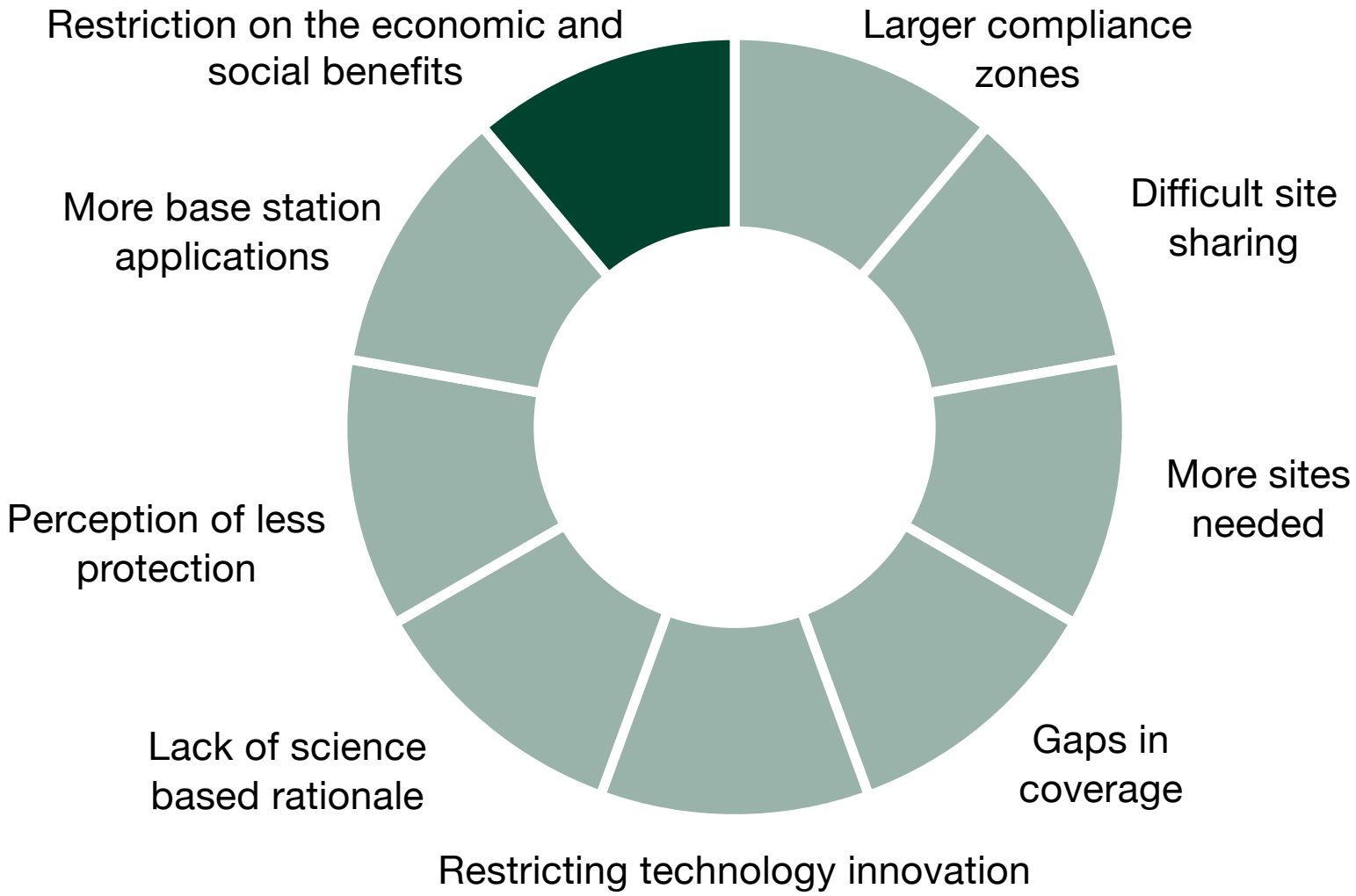
Restricted economic and social benefits



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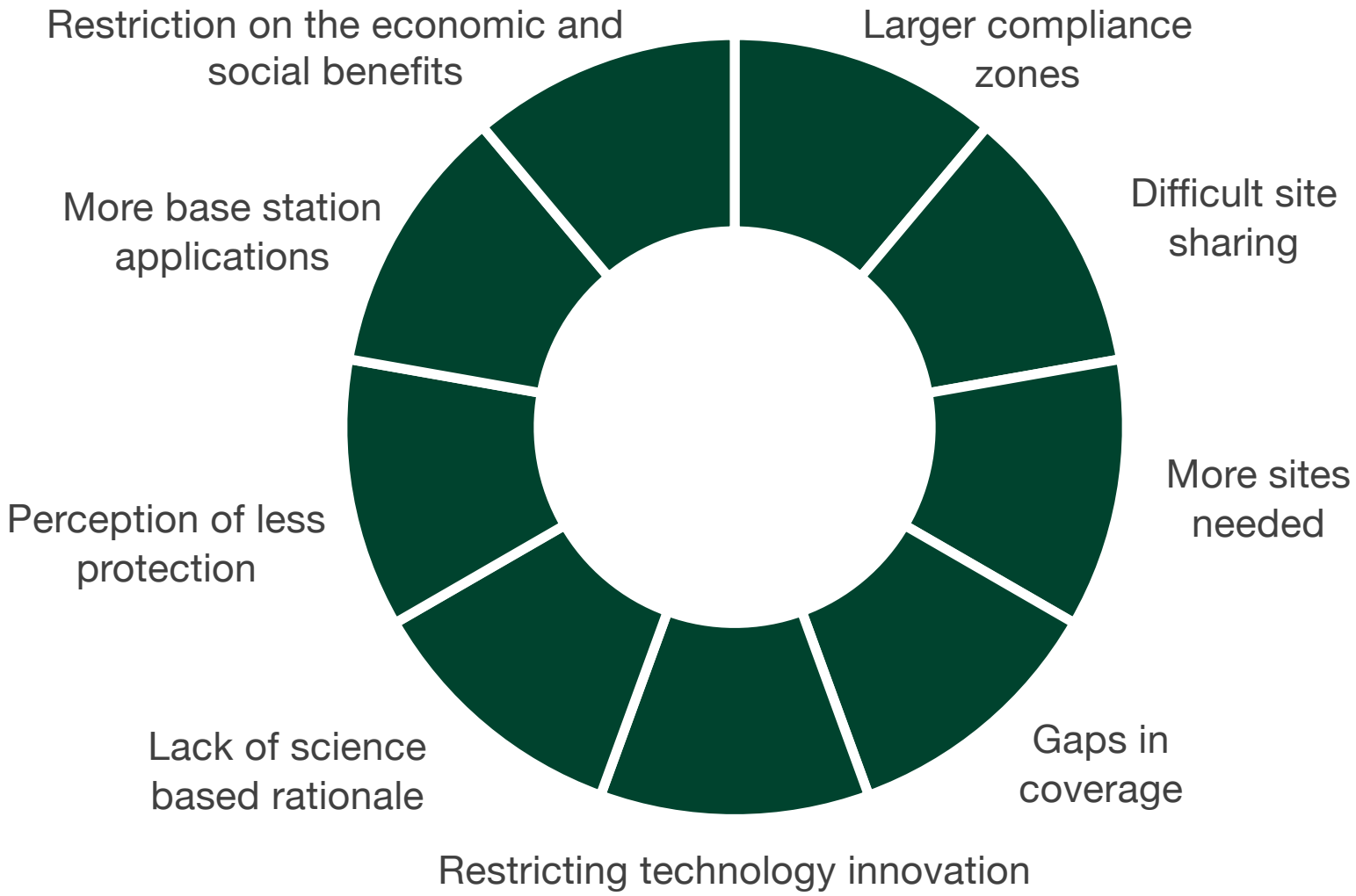
What are the implications to 5G from lower limits?



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Lower limits ignore…

- The substantial body of scientific evidence that backs up the safety of RF exposure limits and resulted in the development of protective and internationally accepted RF exposure standards.
- Both the standards and the underlying research are subject to review (ie. current ICNIRP review)
- Network equipment and devices are designed and tested for compliance with the standards.
- Industry and government communicate openly on the issues and continue to support ongoing research.

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Implications to 5G from Lower Limits: Conclusions

- Adoption of lower limits might seem politically attractive but it comes with a number of problematic implications.

- ITU's estimates that 64% of mobile data traffic demands will not be served in cities where limits are significantly stricter than ICNIRP

- Adoption of limits below ICNIRP is a poor policy choice
  - Actually threatens the proven safety, security and economic benefits that mobile communications provides to the community.

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Thank you

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