



NSF/MPS

Division of Astronomical Sciences (AST)

**AAAC January 2024**

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Division of Astronomical Sciences, NSF/MPS

# Input we're looking forward to...



# Impactful AAAC Recommendations:

- AAAC reports can be a powerful tools, in that they are delivered directly to agency heads *and* congressional committees.
- Impactful reports are concise with clear findings and recommendations that are relevant and practical (and few in number)
  - Note: sometimes Findings can be as impactful as Recommendations

Look back through the series of AAAC reports online and see which AAAC findings and recommendations, as part of a broader arsenal of advice, supported strategic ideas that have helped deliver change for the astronomical community



# Laboratory Astrophysics

- Opportunity to build upon Astro2020 recommendations
- Ideas for “new approaches or programs”
  - Impacts on NSF’s Lab Astrophysics investments through AAG?
  - other mechanisms?

LATF



# Foundations of Profession: Workforce Development

		Description
AST	<b>AAG</b>	<b>General Astronomy and Astrophysics Grants program</b>
	<b>REU</b>	Research Experience for Undergraduates
	<b>AAPF</b>	Astronomy & Astrophysics Postdoctoral Fellows
MPS	<b>PAARE</b>	Partnerships in Astronomy & Astrophysics Research and Education (institutional)
	<b>ASCEND</b>	Postdocs with potential to broaden participation
	<b>LEAPS</b>	Early career faculty at institutions with little NSF STEM funding
NSF	<b>GRFP</b>	Graduate Student Research Fellowships Program
	<b>CAREER</b>	Faculty early career development for leadership
	<b>GRANTED</b>	Growing Research Access (institutional)

Throughout careers, NSF supports individual investigators with grant funding.

Key AST/MPS/NSF programs are devoted to training a diverse workforce and enhancing early careers.

**GAPS ??**



# Sustainable Astronomy



- Supplements provided for a photo-voltaic system and battery storage on Cerro Pachón
- Solar panels funded for NRAO Science Operations Center in Socorro, NM
- PV system at Advanced Simons Observatory
- Initial investments in electric vehicles with FY23 appropriations





**Inger Jorgensen**  
Chief Sustainability Officer

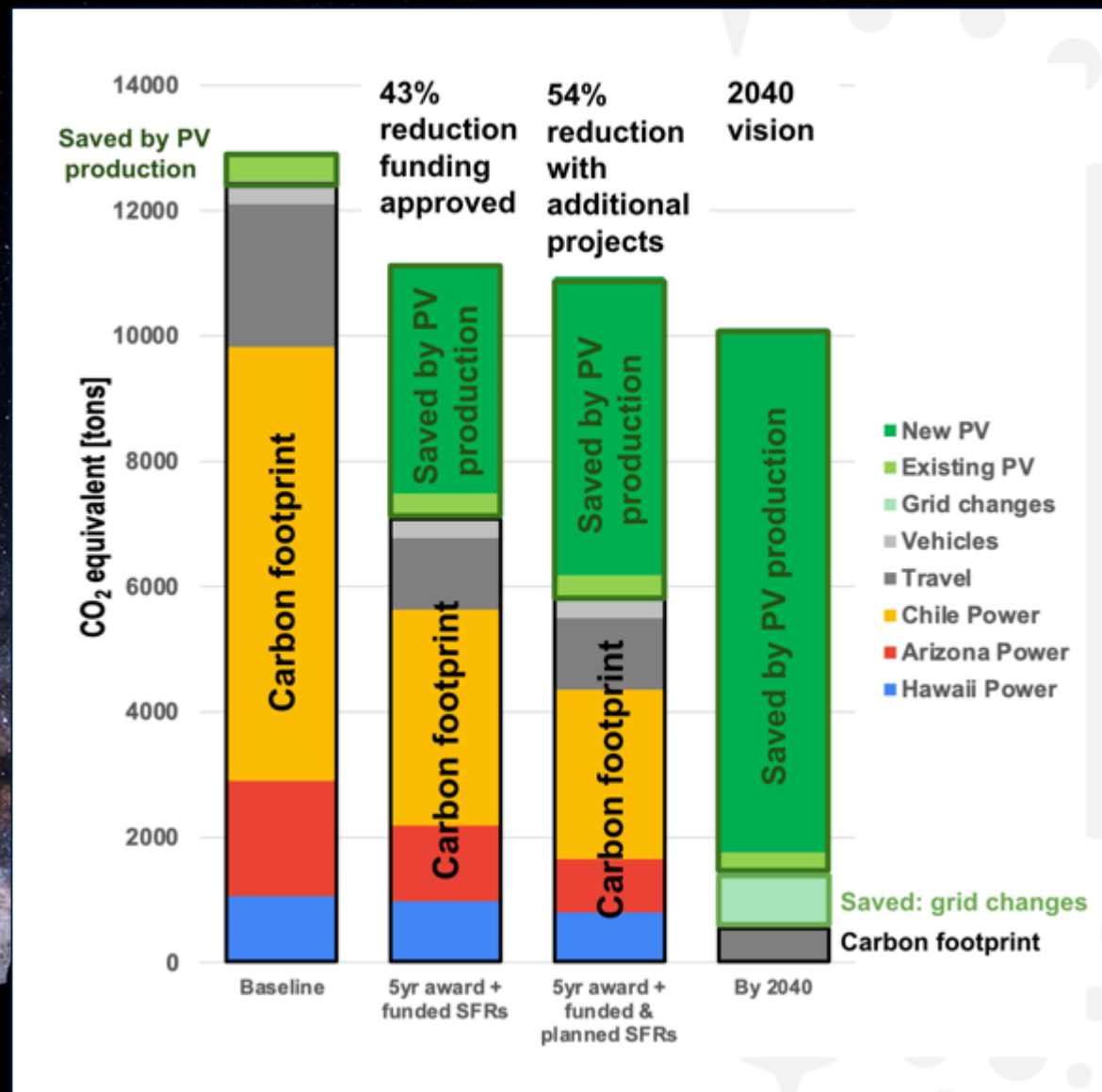
NOIRLab's goal: 50% reduction in carbon footprint

Gemini South: carbon neutral

Rubin Operations: 50-60% local energy

The reduction is equivalent to the consumption of ~1250 US homes.

*NSF Funding provided to reach a 43% reduction of carbon footprint by late 2027.*



# Sustainable Ground- & Space-based Observations

- NSF ESM efforts: Focus on Policy & Interagency/International coordination
  - Working with FCC, NTIA, and others on U.S. policy
  - Working with Industry on sustainable practices
  - Technical & Political aspects with State Department, International Policy
  - **More today: WRC report**
- NSF's FFRDCs amplifying efforts...





Progress on mitigation strategies, observations, policy and industry cooperation

- **Policy Hub** - position papers, recommendations, & analysis of regulations. Working with UN
- **Industry Hub – Mitigation** investments by SpaceX, Amazon/Kuiper, OneWeb
- **SatHub** - observing network for BlueWalker, Starlink V2 minis paper. Amazon Kuiper next
- **Community Engagement Hub** developed SatCons101 videos for understanding the challenge
- **CPS** hosted the IAU Symposium 385 on Astronomy & SatCons: Pathways Forward – Oct. 2023

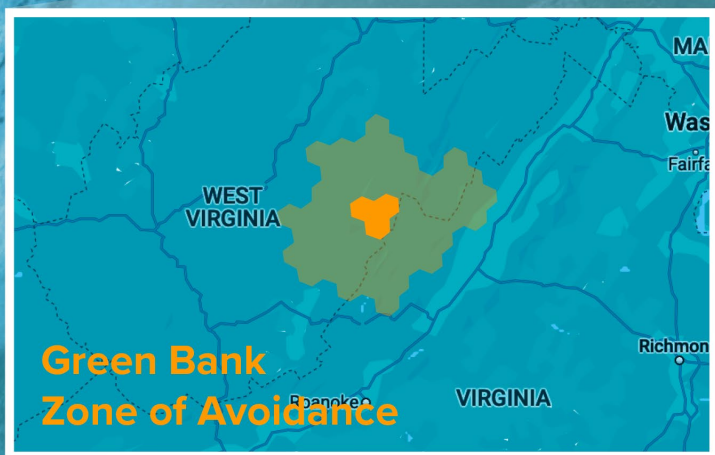
However there is a long way to go.  
This challenge will be with us for a long time.





# National Radio Astronomy Observatory

Observatory and sky-pointing  
Avoidance – SpaceX testing



## Sky Zone of Avoidance

- Ongoing research, development, coordination with SpaceX/OneWeb constellations.

# The Data Foundation

Build on reports from...

- Future of Astrophysical Data Infrastructure Workshop (Feb 2023)
- Windows on the Universe: Establishing the Infrastructure for a Collaborative Multi-messenger Ecosystem (Oct 2023)
  - **MORE ON THIS TODAY!**
- NSF programs
  - NSF-Simonyi Scholars, augmenting AST funding for Rubin science
  - AI Institutes for the Astronomical Sciences, looking to advance astronomy through fundamental AI research with help from Simons Foundation



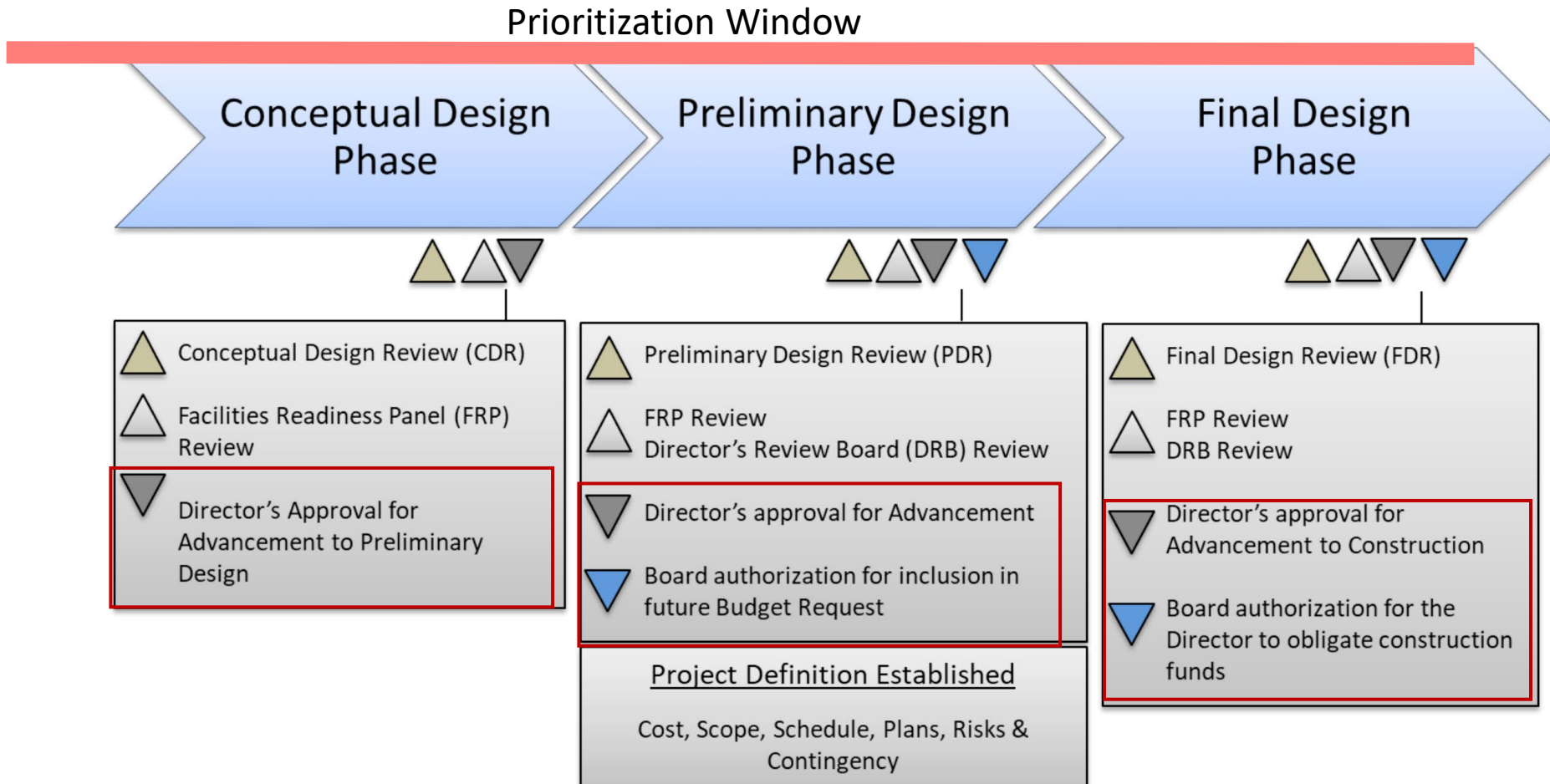
# Astro2020 & Major Facilities Recommendations

NSF advancing three key new facility recommendations:

- US ELT Program: entered Preliminary Design, completed PDR
- ngVLA: entered Conceptual Design, prototype antenna critical milestone
- CMB-S4: pending entry into Design stage, challenges with South Pole infrastructure capacity



# NSF's Major Facilities Design Stage



- Projects can enter at any point before PDR
- **Entry into Design Stage does NOT imply commitment to fund construction**

Source: NSF Major Facilities Guide (Sep. 2019), Figure 2.1.3-2.





# ~~AST~~ NSF Challenge: Major Facilities Full Lifecycle Costs

- Development & Design: Division funding
  - ROM 10-20% of Construction cost
  - Over 5-10 years, sometimes as part of previous facility
- Construction: **MREFC funding**
- Operations & Maintenance: Division funding
  - ROM 5-10% of Construction cost **per year**
  - 10-50 year commitment
- EXAMPLE for **next generation** facility...

Development & Design	Construction	O&M
\$150 to 250 million	\$1.5 Billion	~\$100-150 million <b>per year</b>



# AAAC Purpose (Charge for Report Writing...)

1. Assess and make recommendations regarding *the coordination* of astronomy and astrophysics programs of NSF, NASA, and DOE.
2. Assess, and make recommendations regarding, the status of the activities of NSF, NASA, and DOE as they relate to the recommendations contained in the Decadal and subsequent reports of similar nature.

