

# Heliostat Field & Pod Placement

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University of Stellenbosch

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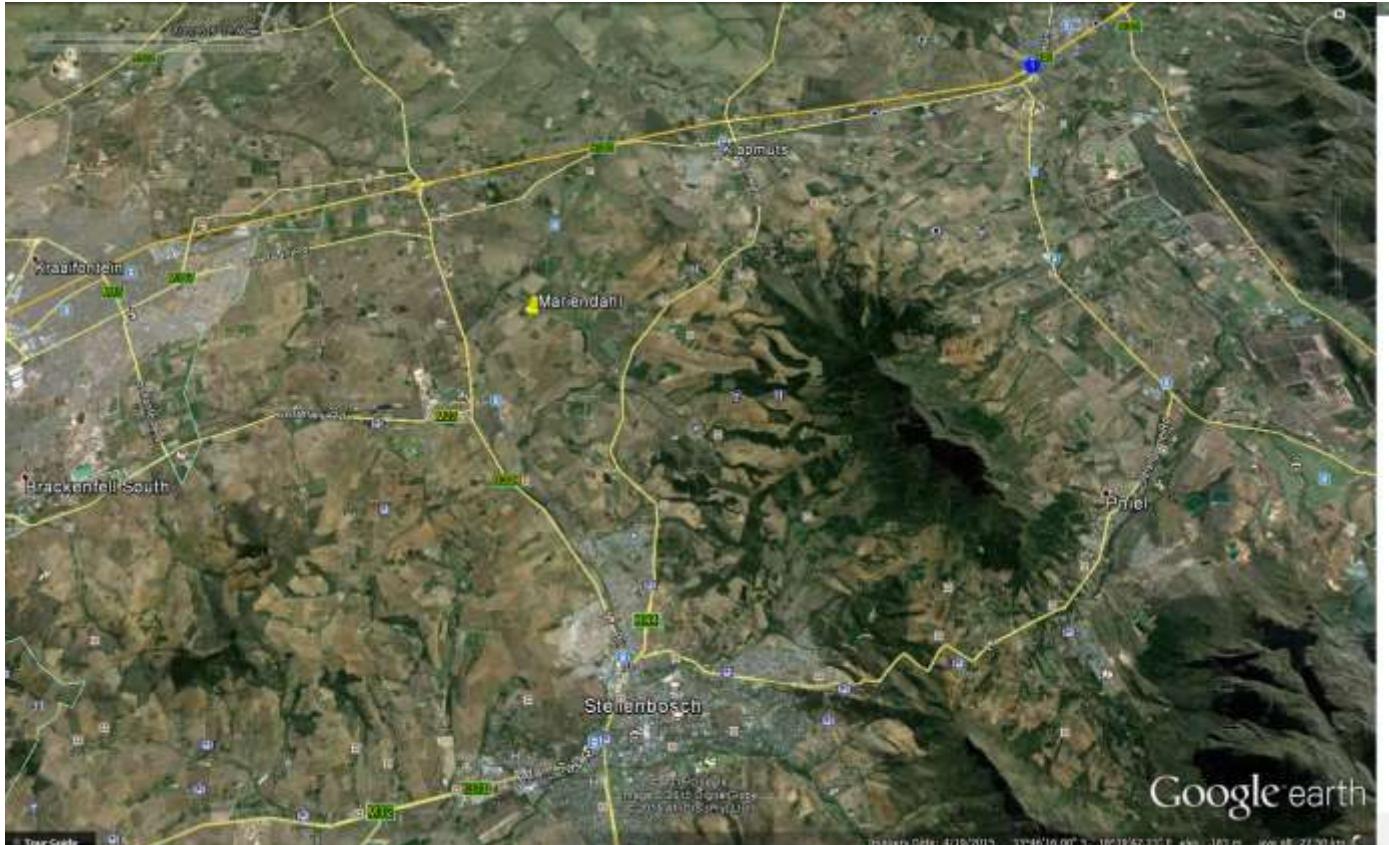
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- Quick overview of the  HELIO100 project
- Optimisation procedure
- Optimised results
- Where Helio100 is now

# Helio100



## Location



# Helio100



## SITE



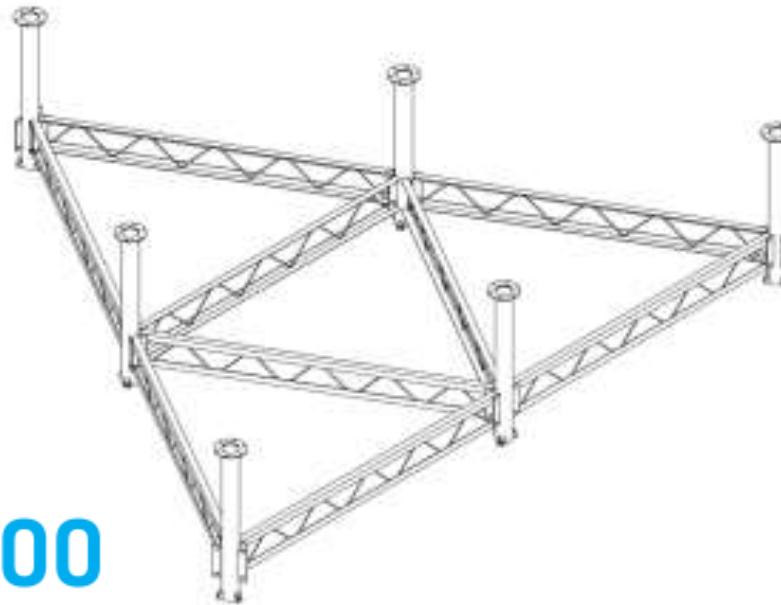
# Site

# Piggery



# Pods

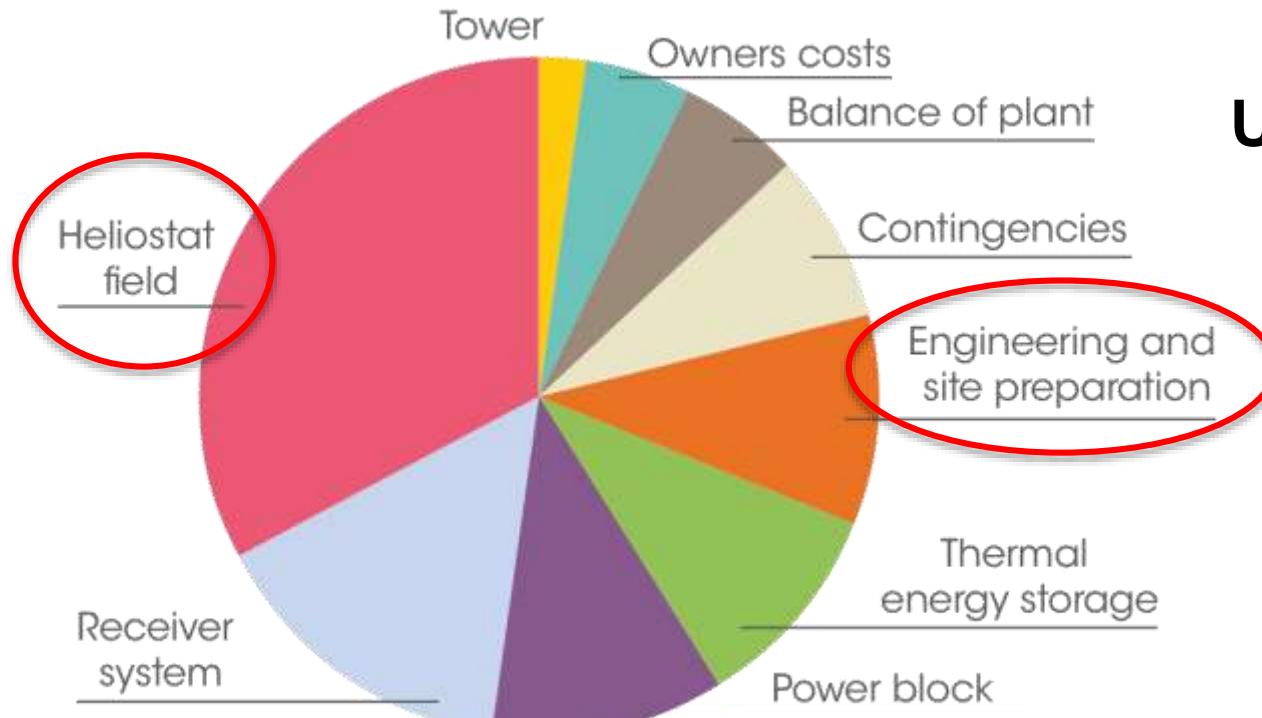
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**HELIO100**

# Why Pods?

## Solar Tower CAPEX

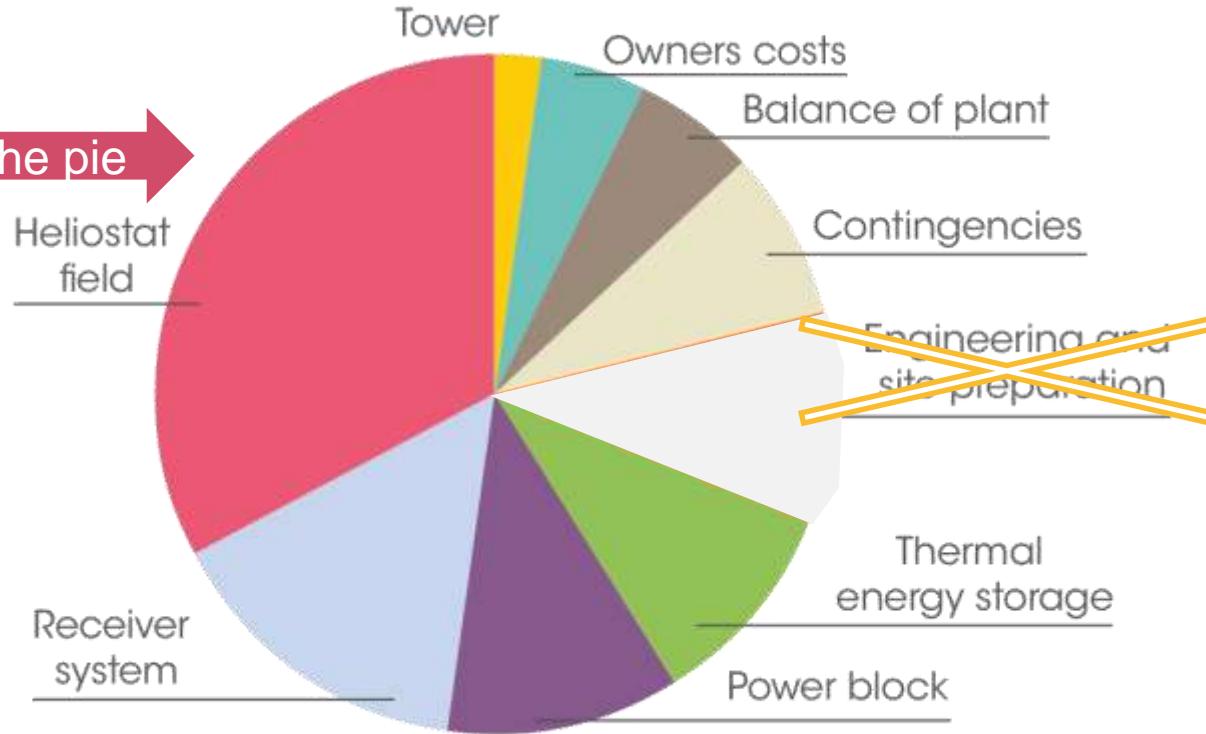


**~50% =  
USD 2.15 trillion**

# Why Pods?



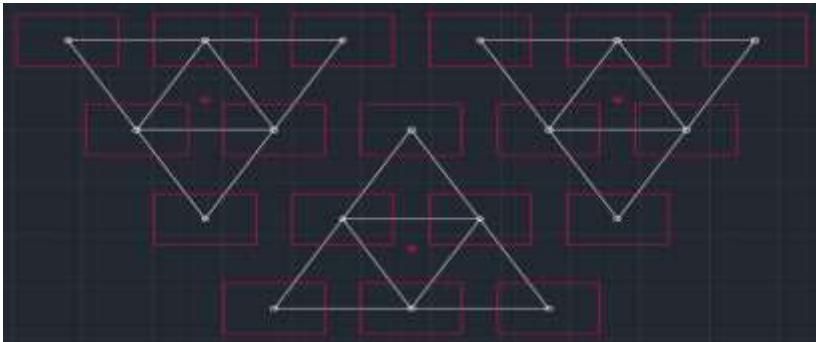
Our slice of the pie



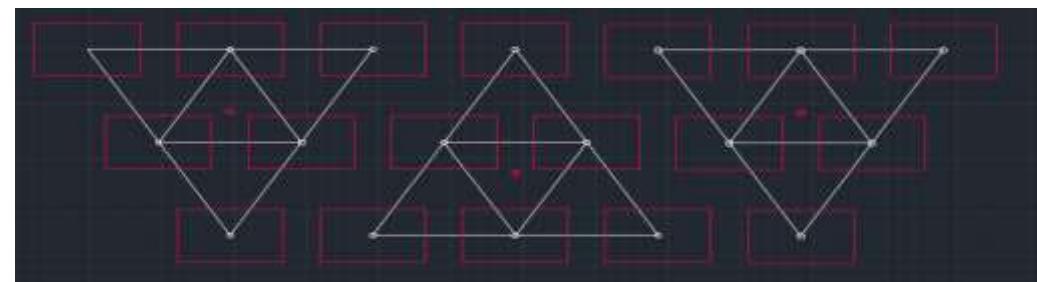
# Field Layout Optimisation



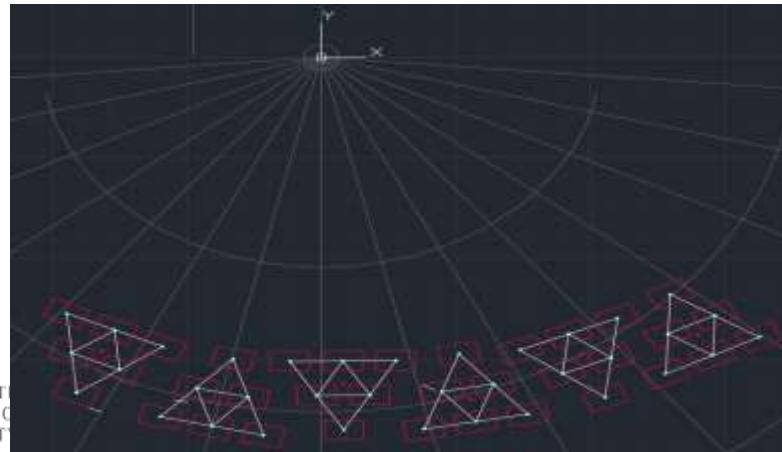
# Pod Placement



Offset



Inline



Surround

# OPTIMISATION PROCEDURE

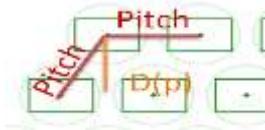
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- No standard procedure for optimisation of pods
- Little (or no) literature on pod optimisation
- High level *manual* optimisation for the field layout  
(Parametric study)
  - Begin with a ‘generic field’
  - Manually change variables and record affect on the power and efficiency
  - Iteratively keep changing variables to obtain an *feel* for the field

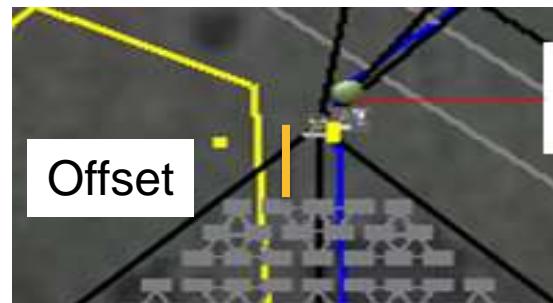
# Optimisation Parameters

- Optimisation run to optimise:
  - Tower height

ii. Pitch



iii. Focal Distance

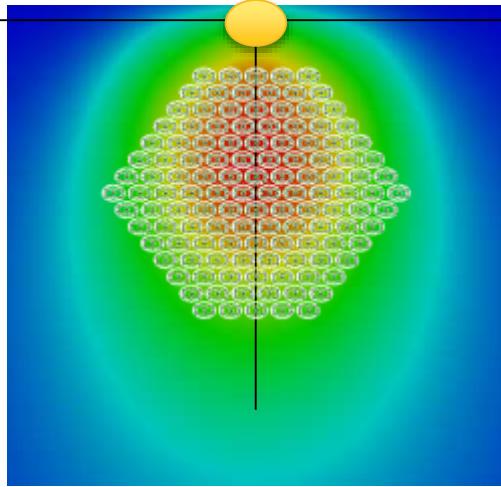


iv. Offset (distance from tower)

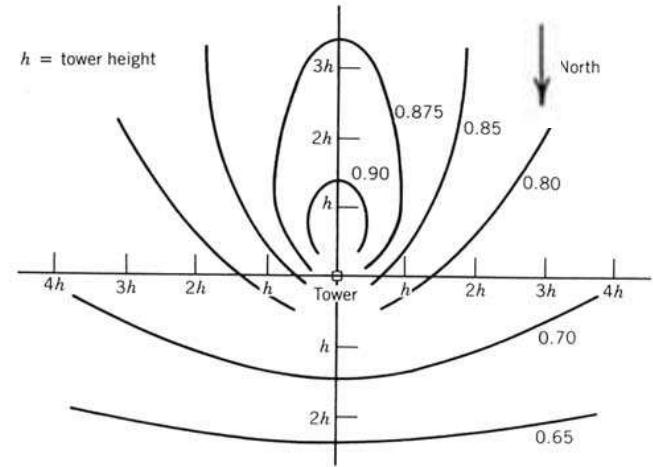


v. Receiver tilt angle

# ANNUAL FIELD EFFICIENCY



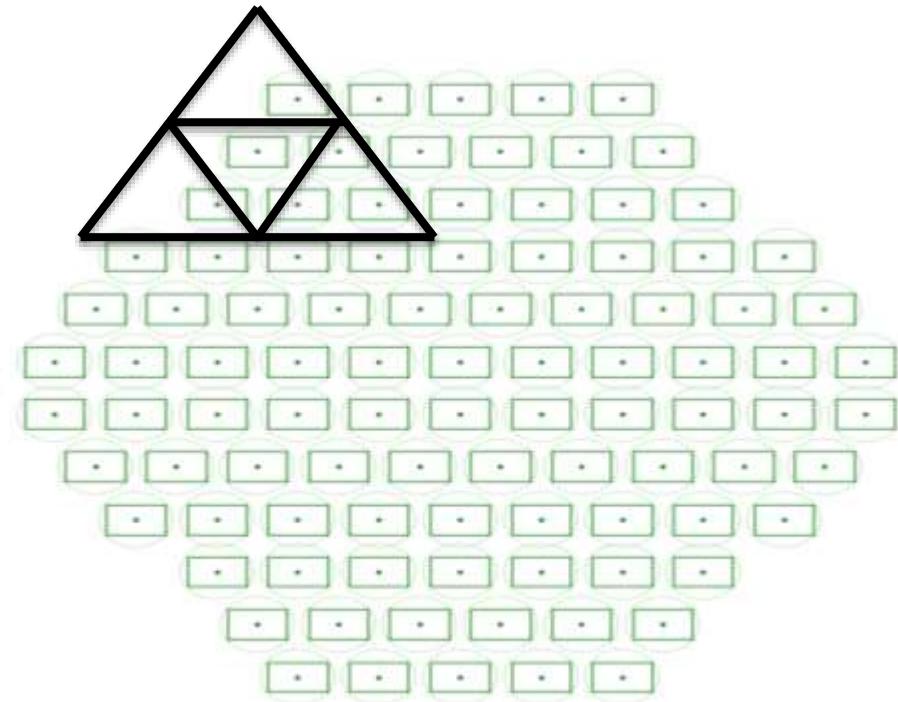
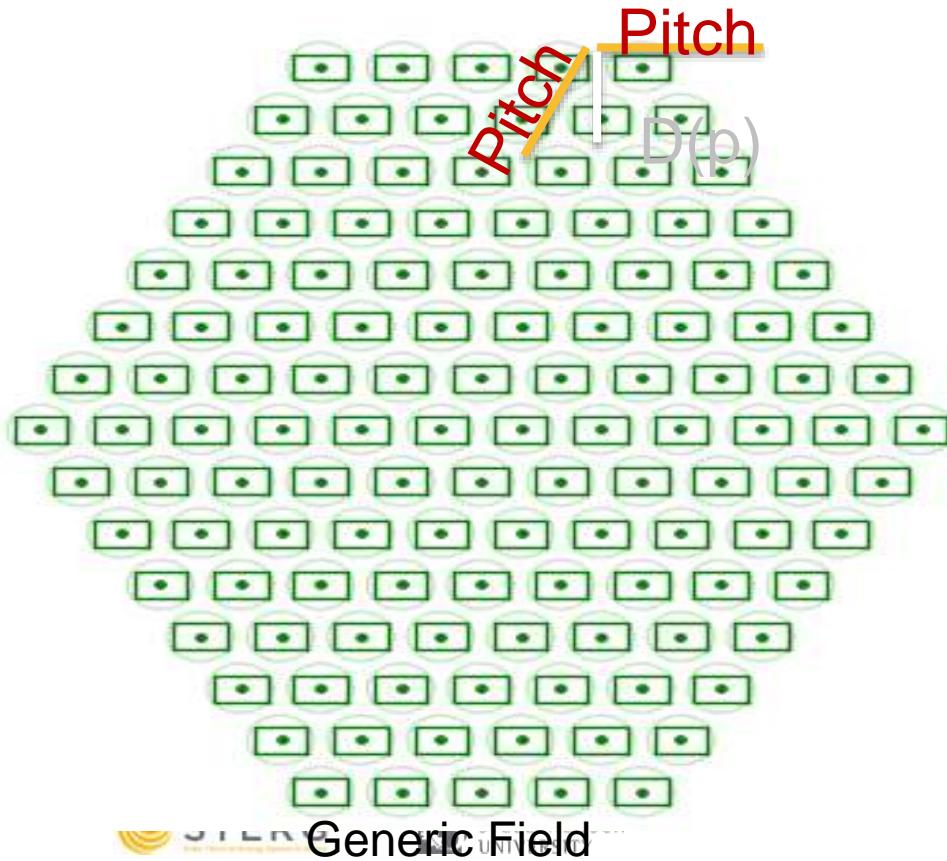
Annual combined efficiency



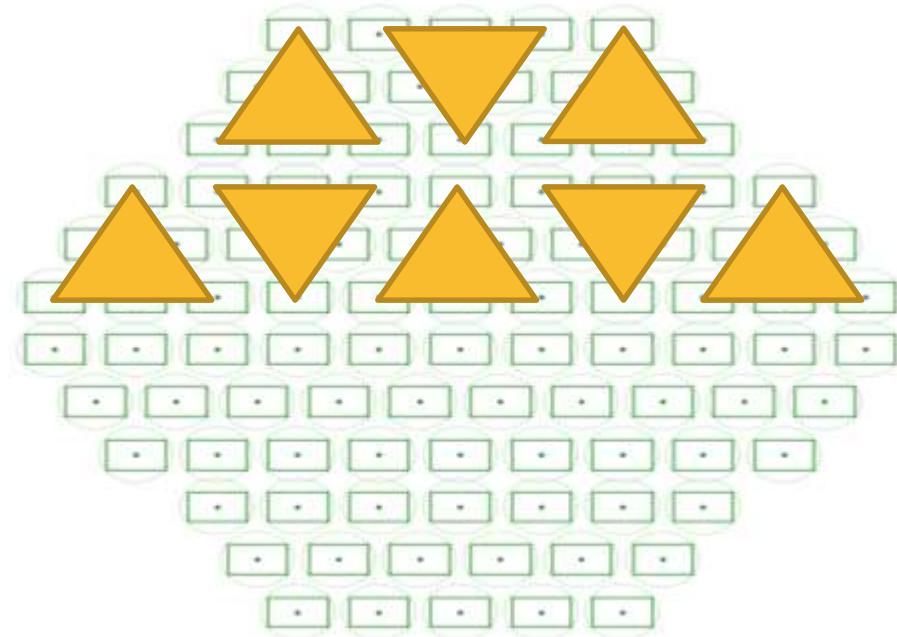
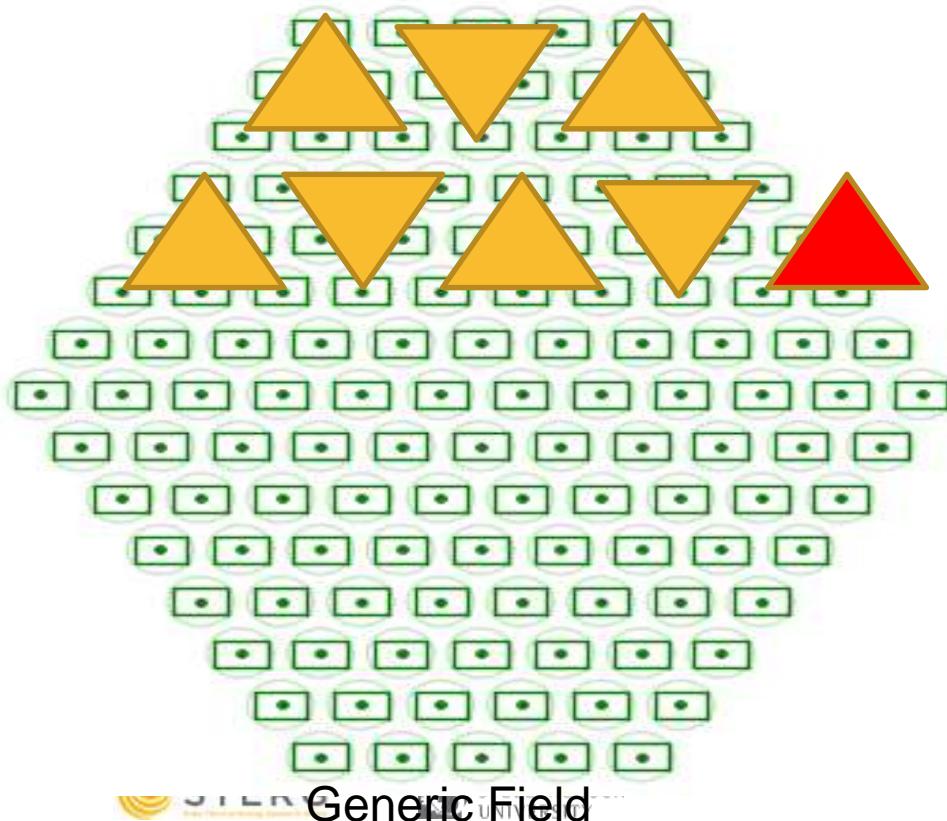
Cosine efficiency<sup>1</sup>

<sup>1</sup>Power from the Sun, Chapter 10

# Procedure Inline = Generic



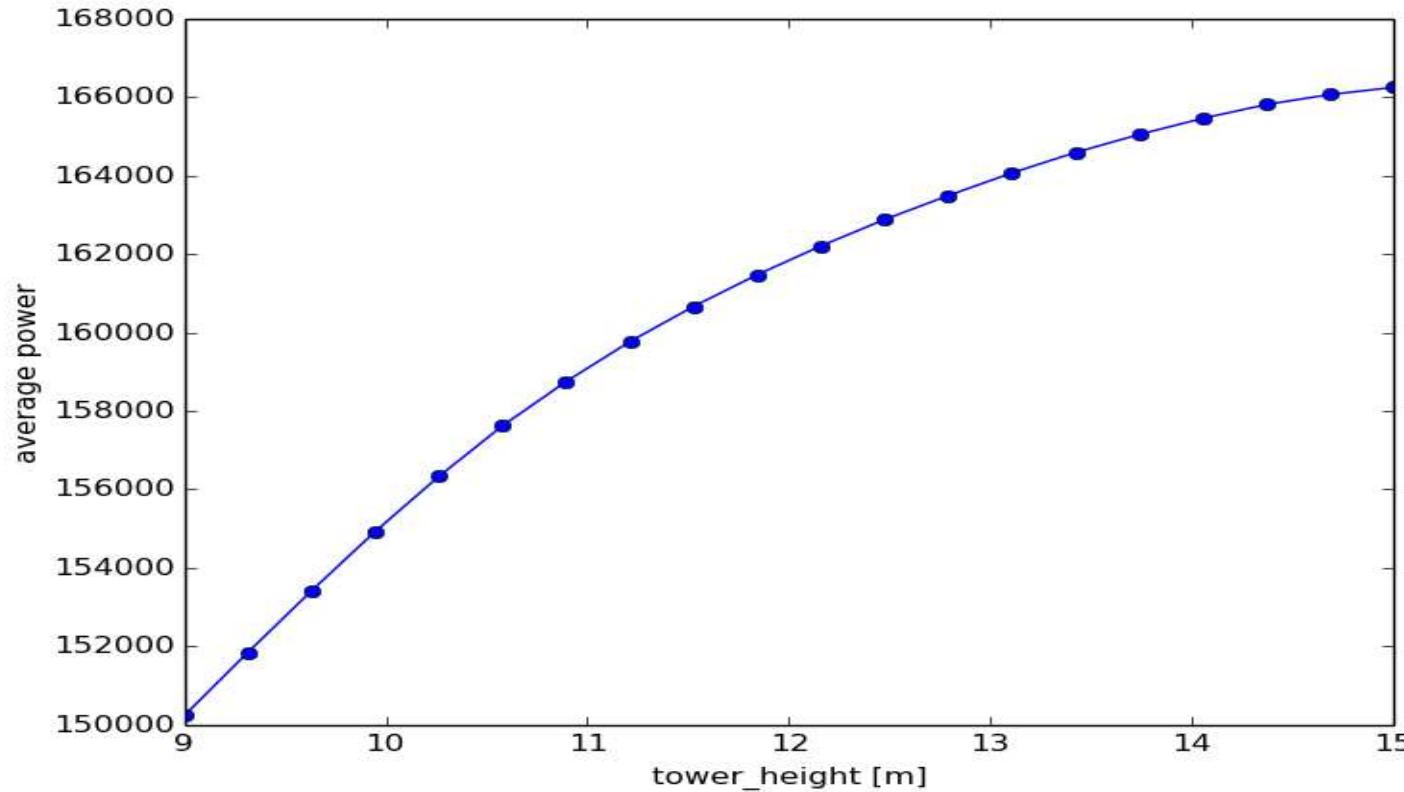
# Procedure Inline = Generic



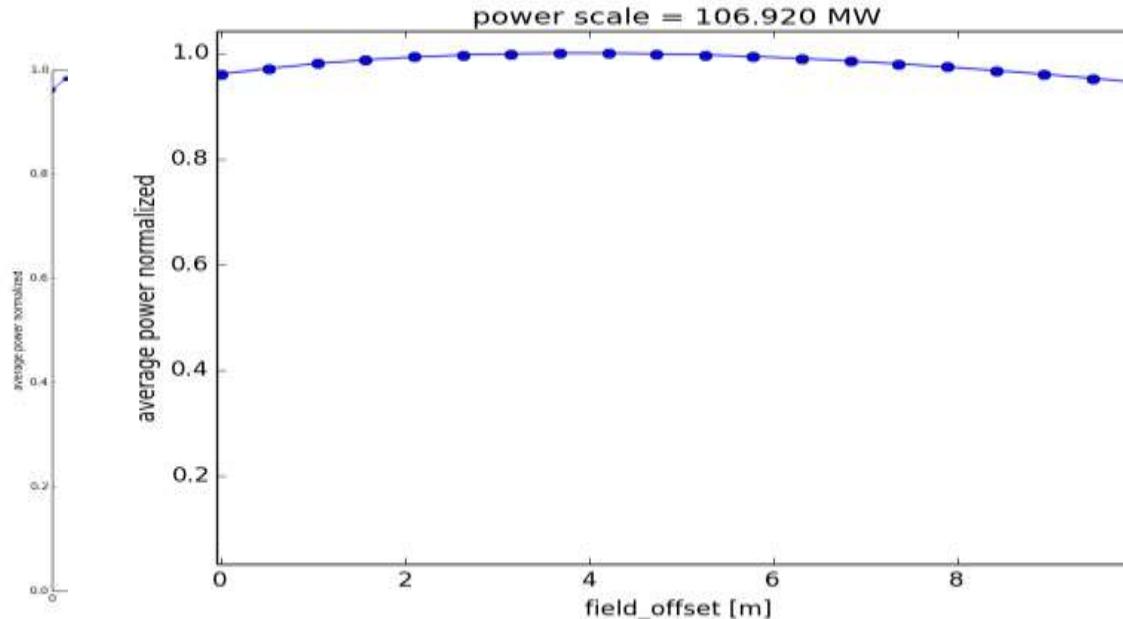
Results

# SENSITIVITY STUDY

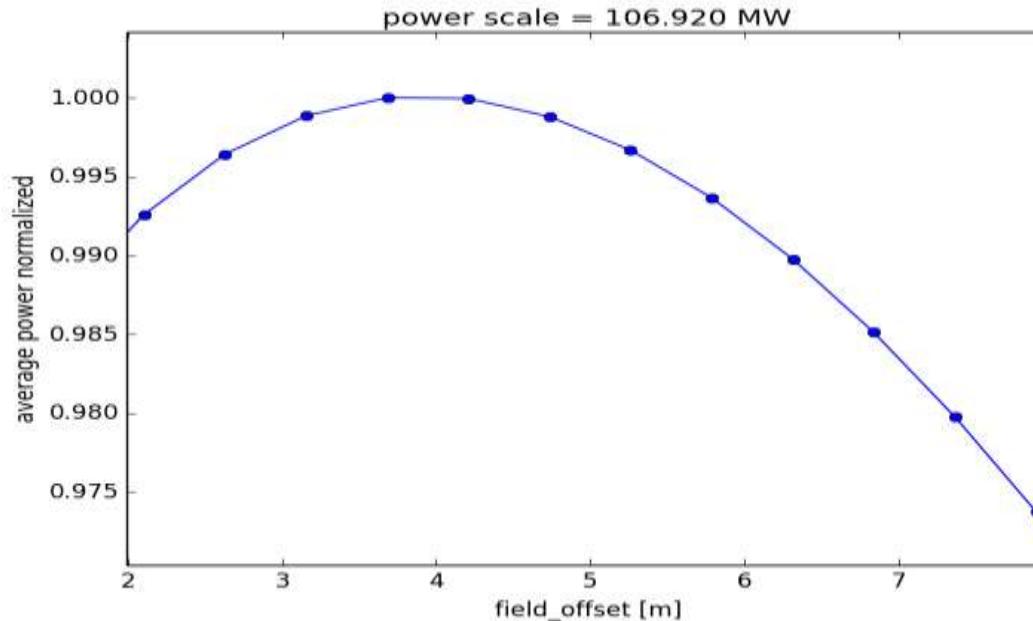
# Tower Height



# Field Offset

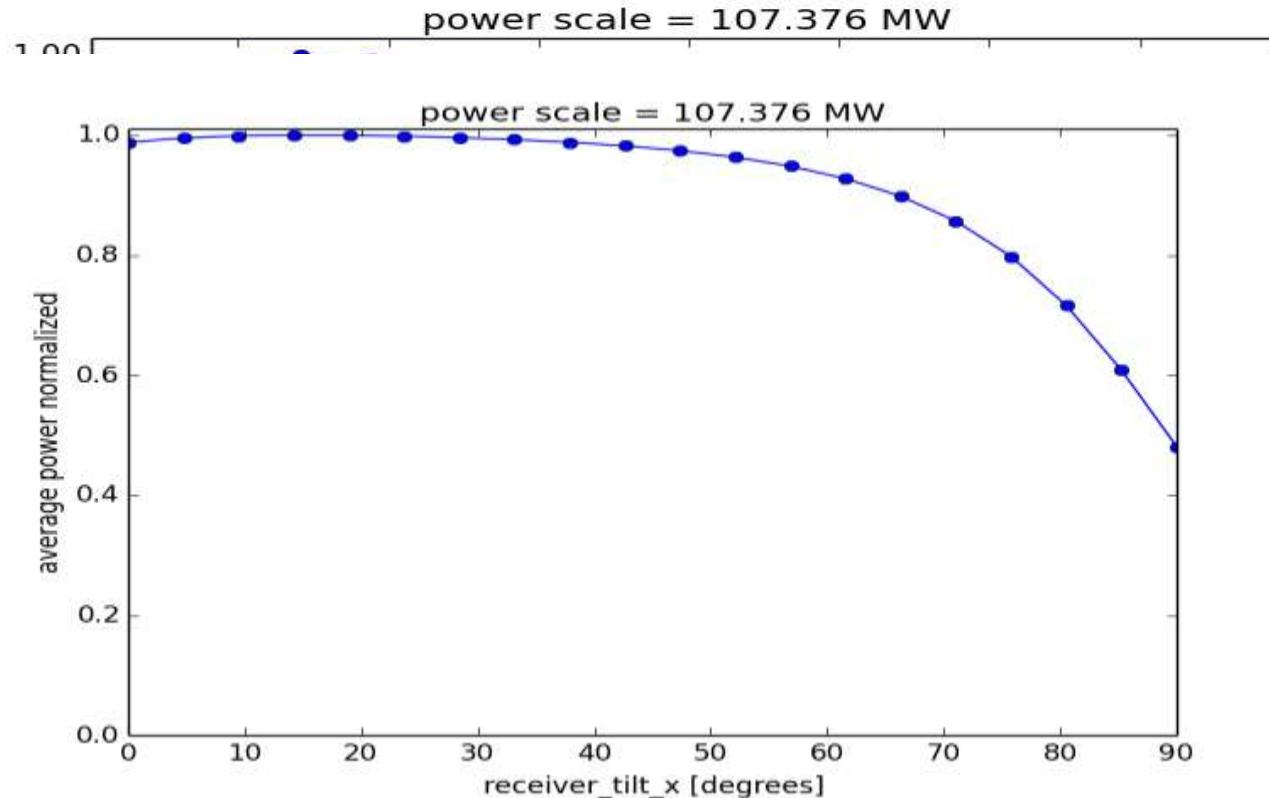


# Field Offset

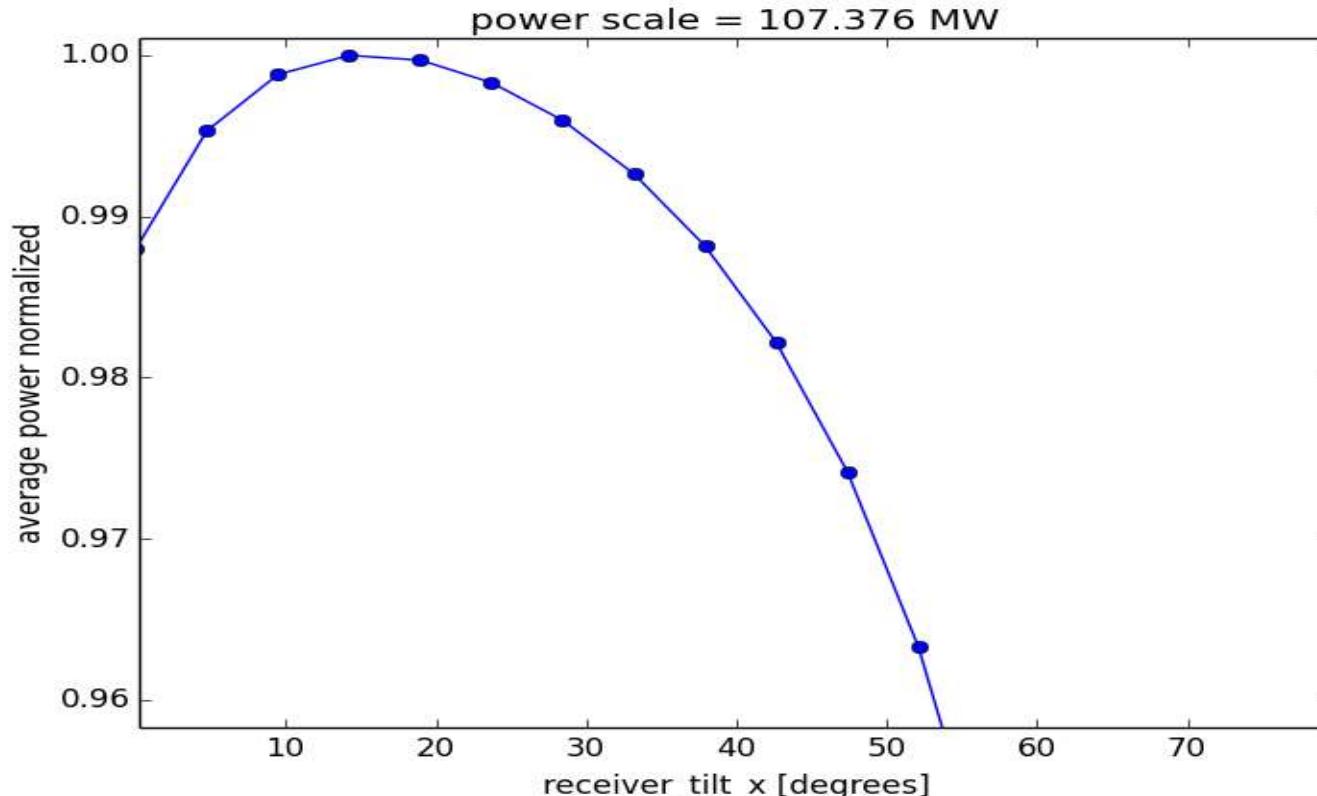


Field offset of 6m for practical reasons

# Receiver Tilt - Individual focal

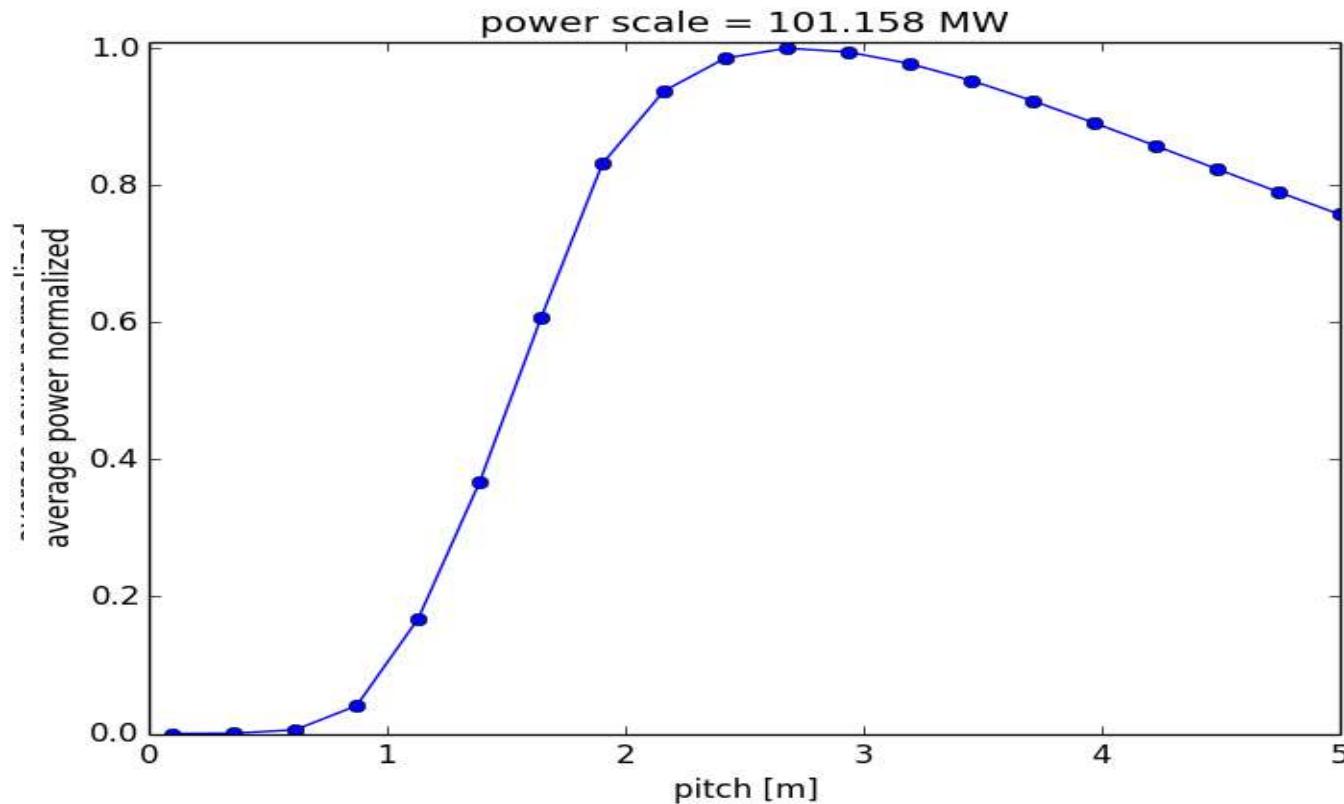


# Receiver Tilt

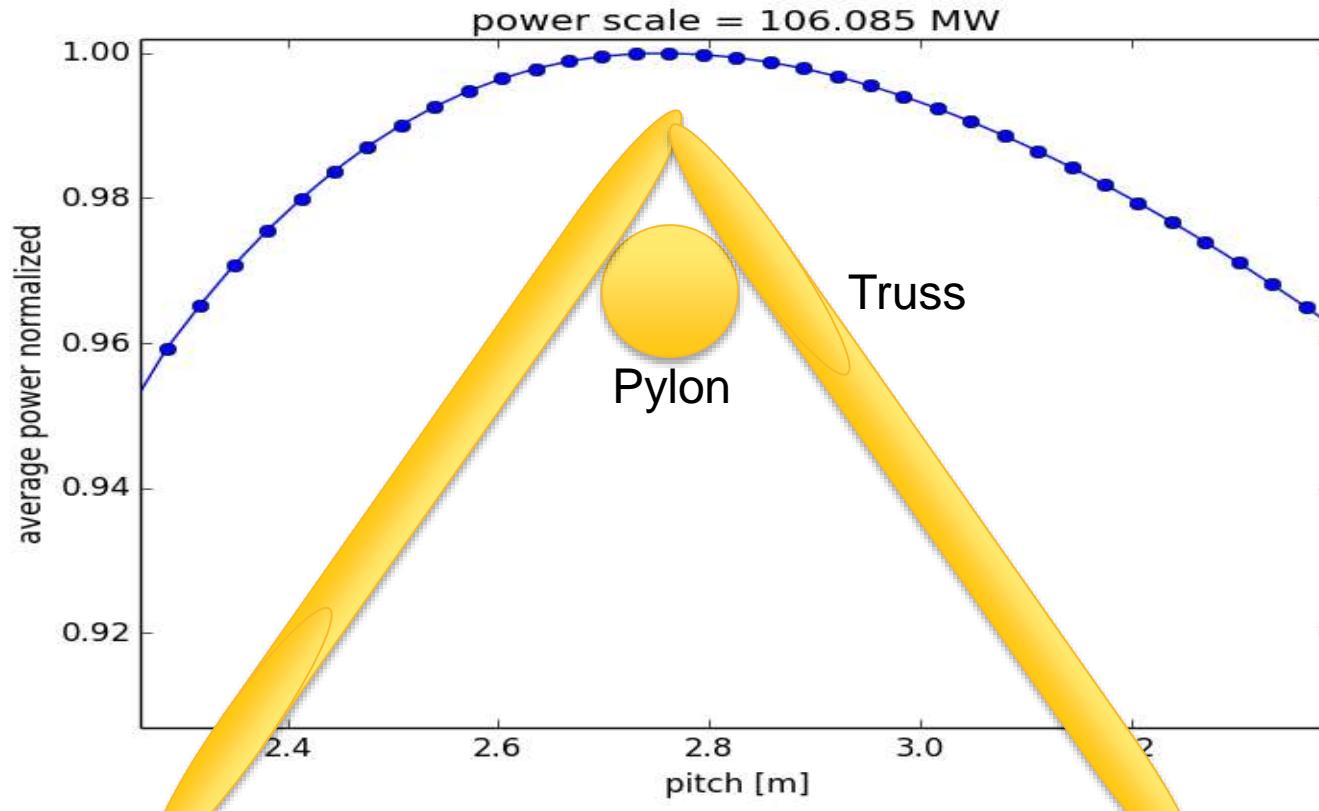


Receiver tilt of 30°

# Pitch

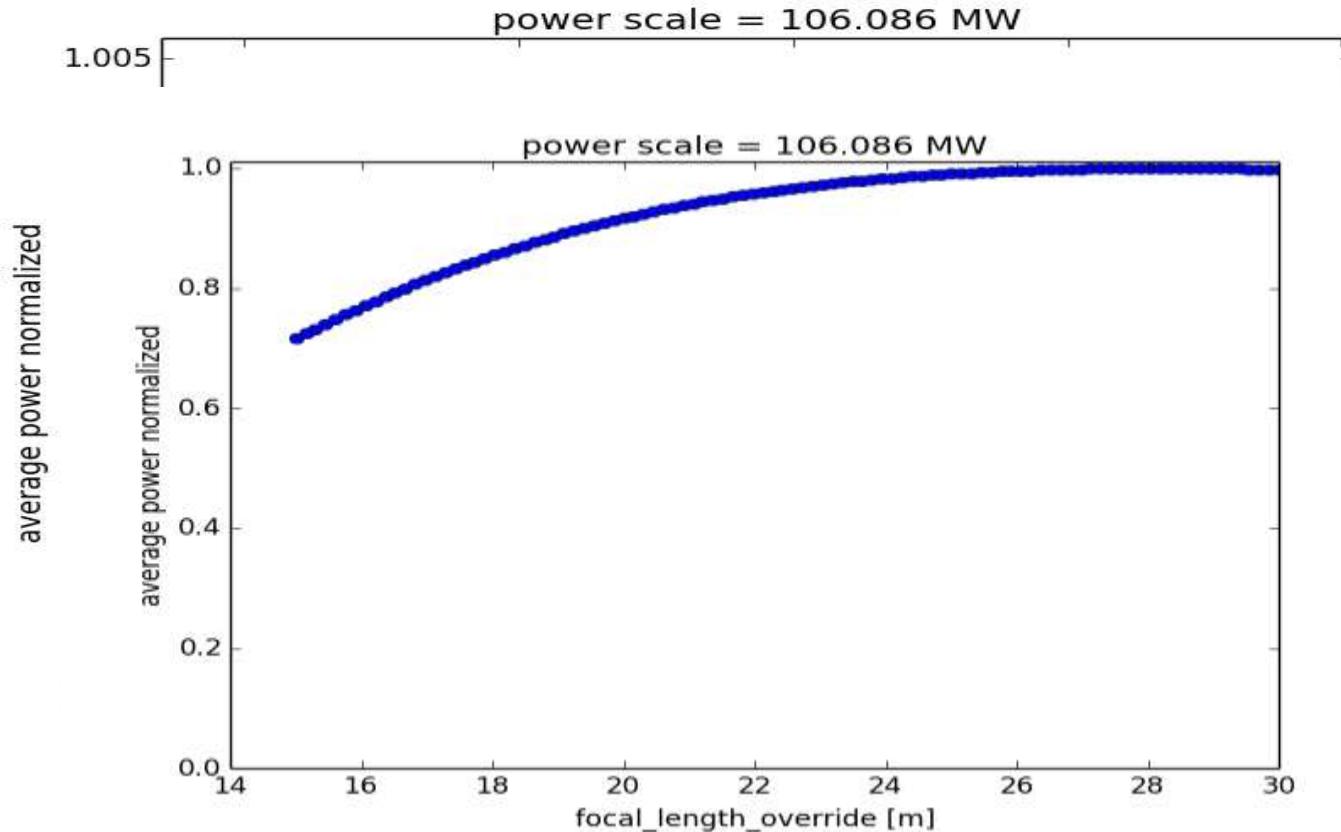


# Pitch

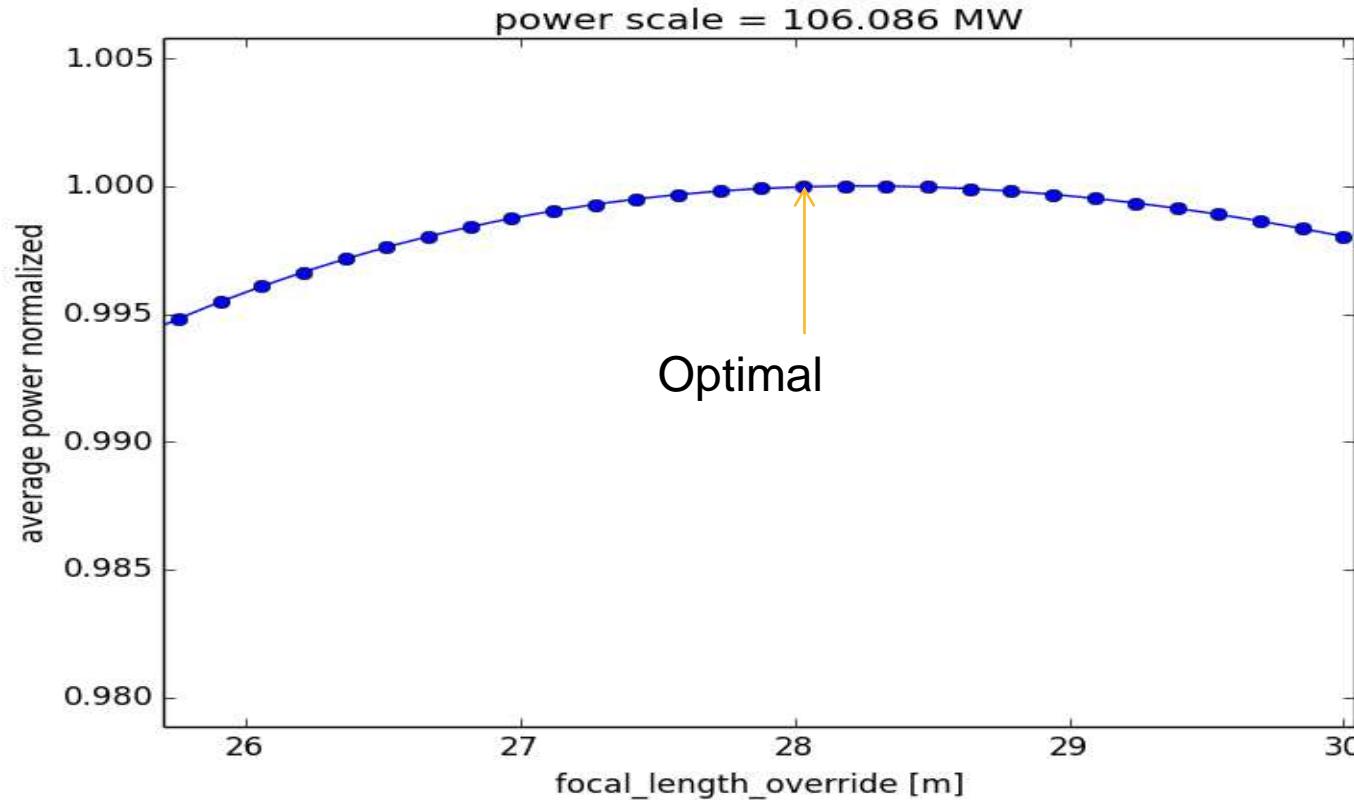


Pitch of 2.7m = 3m for practical reason

# Focal Length

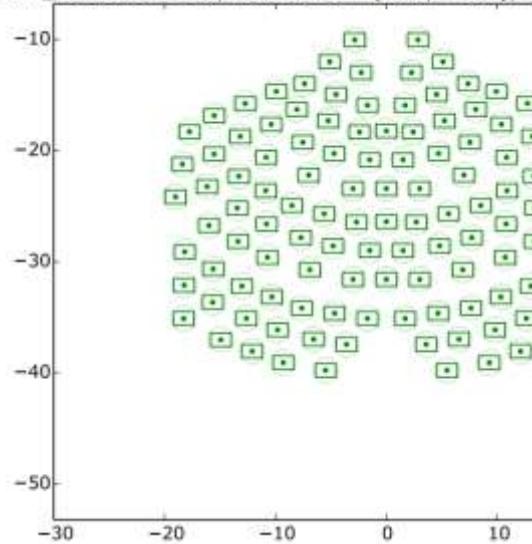


# Focal Length

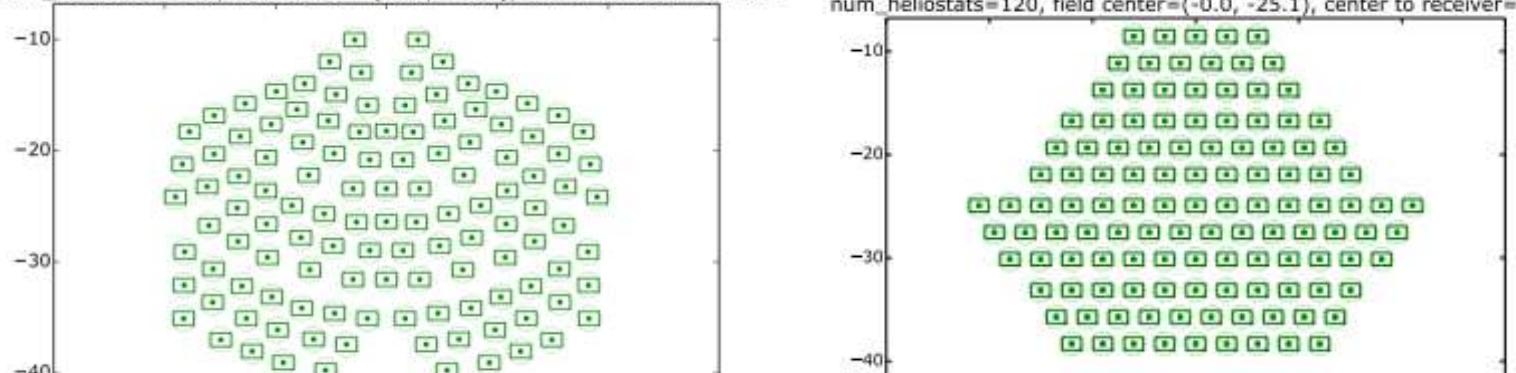


# Various Pod Layouts

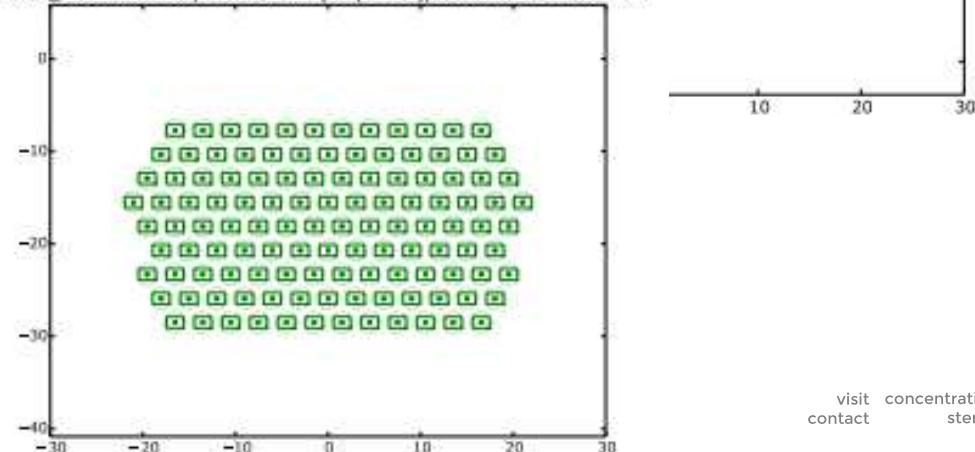
num\_heliostats=120, field center=(-0.0, -25.6), center to receiver=28.1



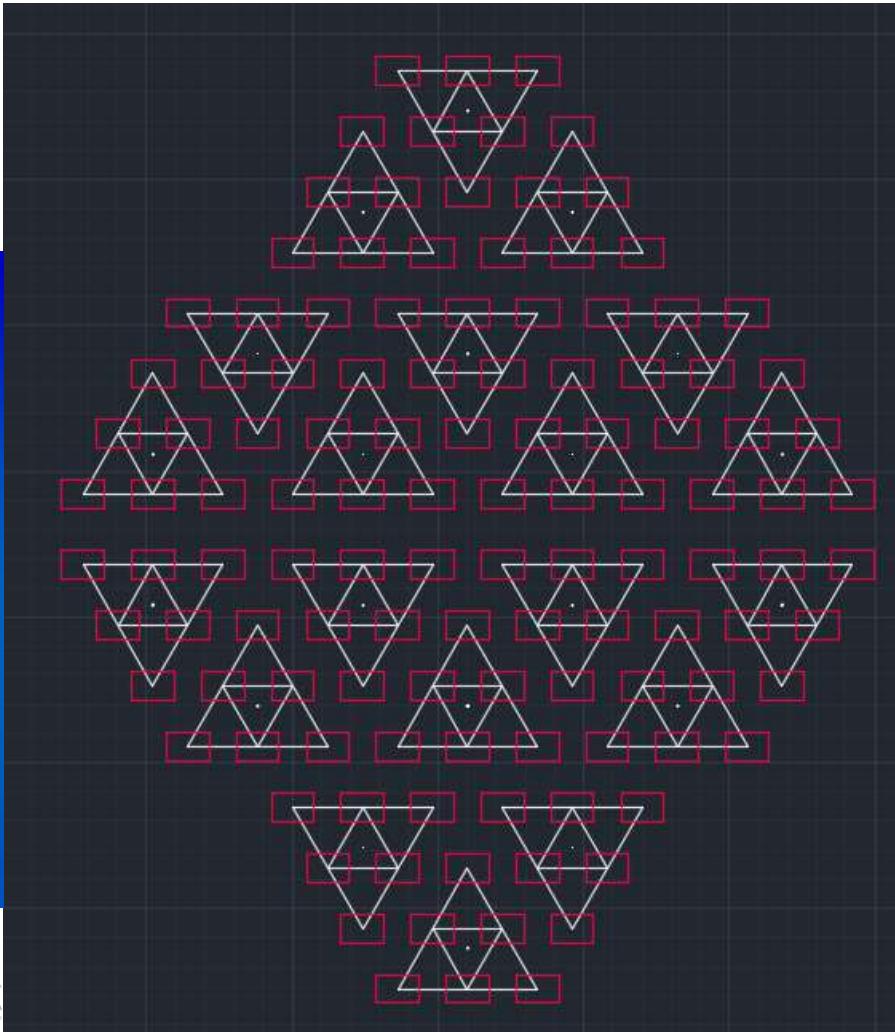
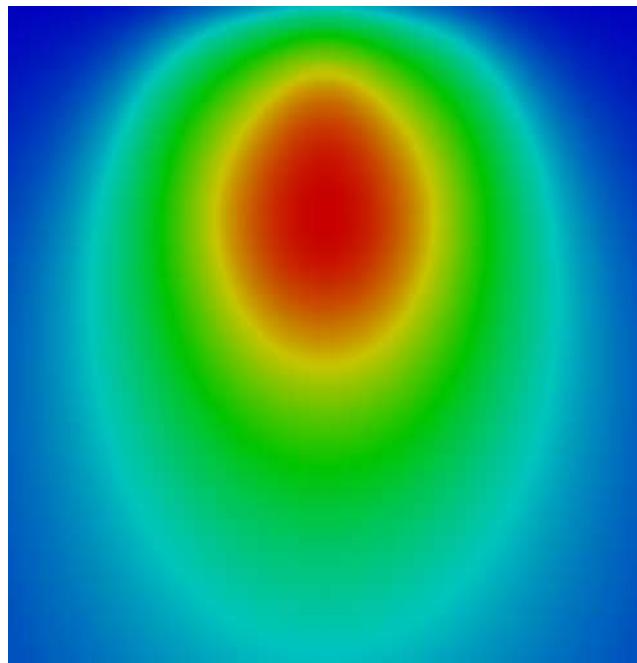
num\_heliostats=120, field center=(-0.0, -25.1), center to receiver=27.7



num\_heliostats=120, field center=(0.0, -18.1), center to receiver=21.4



# Final Pod Placement



# Final Pod Placement



# Current Status



# Site Current Status





# Thank You

## ACKNOWLEDGEMENTS:

Technology Innovation Agency



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