



# ***UTSA STRATEGIC RESEARCH ALLIANCE: PROJECT HIGHLIGHT***

*INTRODUCTION BY:*

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Informational

# AGENDA



- **MULTIPLE RESEARCH CHANNELS**
- **THE UTSA COMMITMENT**
- **BENEFITING FROM THIS PARTNERSHIP**
- **UTSA RESEARCH PROJECTS**
- **SOLAR FORECASTING**
- **HOW IT WORKS**
- **RESEARCH PHASES**
- **APPLICATIONS**

# MULTIPLE RESEARCH CHANNELS



- TO DATE, OUR R&D HAS BEEN HELPFUL:
  - These services are meant to be exploratory in nature
  - Applied Research is particularly helpful to us



Relationship Term	Decades	Project Specific	9 years
Avg. Annual Spend	\$1-2 M	Varies	\$1-2 M
Forward Funding Commitment	Determined annually	Determined by project	Up to \$41M
Sample Projects	Energy Storage, Power Quality, Asset Management, Environmental Controls, etc.	Solar+Storage	Smart Grid, Energy Efficiency, Elec Transportation, Solar Forecasting

**Relative to recent Board of Trustee inquiries, over the next several months we will provide more information on UTSA**

# THE UTSA COMMITMENT



- INITIAL ESTIMATE = \$50M over 10 Years
- STATUS TO DATE = Spent Approx. \$8.7M over 9 Yrs
  - We have a better run rate than first projected
  - It helps us to have more time to scope and adjust projects that work for us
  - It makes the work more financially manageable
  - **@ Levels of \$2M or Less a Year it represents > .08% of Gross Revenues**

## Research and development

From Wikipedia, the free encyclopedia

**Research and development (R&D, R+D, or R'n'D)**, also known in Europe as **research and technological development (RTD)**, refers to innovative activities undertaken by corporations or governments in developing new services or products, or improving existing services or products.<sup>[1]</sup> **Research** and development constitutes the first stage of development of a potential new service or the production process.

- COMPARED TO OTHER COMPANIES
  - Industrial @ 3.5%
  - Tech @ 7%
  - Pharmaceutical @ 14%-15%

In the United States, a typical ratio of research and development for an industrial company is about 3.5% of revenues; this measure is called "R&D intensity".<sup>[citation needed]</sup> A high technology company, such as a computer manufacturer, might spend 7% or a pharmaceutical companies such as Merck & Co. 14.1% or Novartis 15.1%. Anything over 15% is remarkable, and usually gains a reputation for being a high technology company such as engineering company Ericsson 24.9%, or Allergan a biotech company, tops the spending table with 43.4% investment<sup>[2]</sup> Such companies are often seen as credit risks because their spending ratios are so unusual.<sup>[citation needed]</sup>

# OUR COMPANY IS BENEFITTING FROM THIS PARTNERSHIP



- This month we will do a deep dive on one of our successful UTSA projects
- Over the next couple months, we will bring forward other examples
- Then going forward we will provide timely report outs

## Past Projects (2011 – 2017)

- Education for Sustainability Alliance for South Texas
- Carbon Capture, Storage, Sequestration, Reutilization and Management
- Smart Grid Network
- Energy Efficiency and Conservation
- Augmented Reality Science
- Large Scale PV
- Energy Efficiency in Residential Buildings
- Alternative Transportation Initiatives
- Energy Efficiency in Residential Buildings
- Energy Efficiency and SmartLiving
- Electric Transportation
- Intelligent Energy Systems
- Transforming and Modernizing the Electric Sector

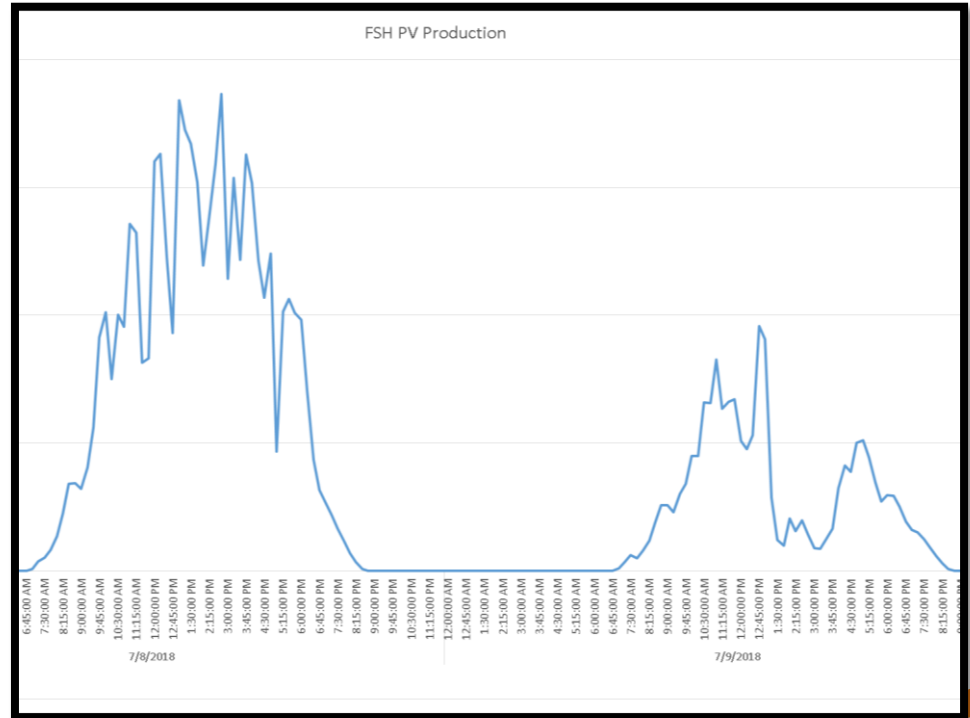
## Current Projects

- Intelligent Building Energy Management
- Solar Forecasting at JBSA Microgrid
- Energy Harvesting from Roadways
- Smart Grid Security

# WHY DO SOLAR FORECASTING?

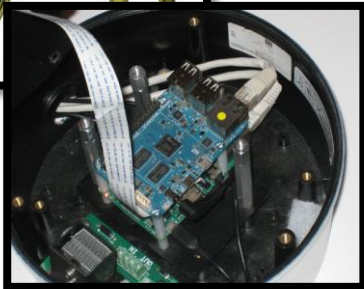


- The intermittent nature of solar generation
- Impacts on grid stability
- Supports dispatch strategy
- Financial impact

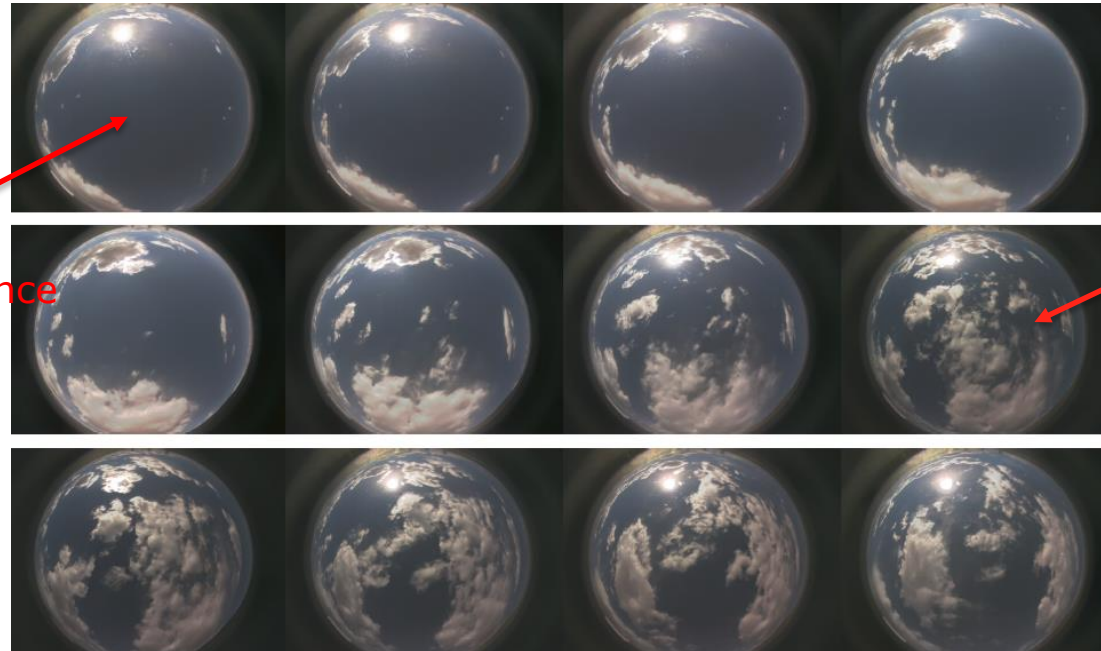




# HOW IT WORKS



Minimal interference



Cloud interference

Sky Imager camera detects cloud cover, direction and speed every 15 seconds to estimate intra-hour solar production

# RESEARCH PHASES

Development of the Sky Imagers has been a multi-stage, iterative design process

## Phase 1

Day-ahead algorithms developed

Process of forecasting patented

## Phase 2

Intra-hour algorithms developed

Sky Imager developed

Multiple iterations constructed

## Phase 3

Low cost Sky Imager developed

Deployed at CPS Energy Microgrid



## Phase 4

Artificial intelligence to improve forecasting

Deploy cloud-based network of sky imagers

# APPLICATIONS

- A grid of Sky Imagers deployed across our service territory allowing for macro and micro forecasting
- Significantly improved forecasting accuracy of Distributed Energy Resource's versus satellite-derived forecasts
- UTSA licensing commercial rights to patented algorithms to a local startup
- CPS Energy owns a portion of the patent



**JBSA Microgrid**



***Questions***