



Long-Term Transmission Planning Reform Workshop

Amy Jo Miller & Sumeet Mudgal | PJM | March 29th, 2022



Q CELLS USA, Hanwha Solutions' US renewable energy platform, **develops**, **constructs**, and **owns** photovoltaic (PV) and energy storage systems (ESS) throughout North America.

6.7 GW Solar Pipeline
11.0 GW ESS Pipeline

2020

\$301 million net sales
\$343 assets
(audited)

2021

\$193 million net sales
\$316 million assets
(as of 9/21)

Q CELLS

STRONG BACKING FROM HANWHA GROUP

Q CELLS is one of the core affiliates of Hanwha Group, a Fortune Global 500 Company (ranked 261) and the 7th largest conglomerate in South Korea.



Amy Jo Miller

Director of Policy and Market Strategy

amyjo.miller@qcells.com



Sumeet Mudgal

Senior Interconnection Planning Engineer

sumeet.mudgal@qcells.com

Q CELLS supports planning for future scenarios and modeling anticipated future generation in the regional planning process. It also supports augmenting existing processes to further such efforts. Q CELLS supports 5, 10, and 15 year planning models to identify and trend future transmission and generation project needs.

Q CELLS agrees with PJM's suggestion of all transmission planners to be required to develop a 15-year forward-looking master plan to identify any potential long-lead transmission needs as they first begin to materialize. Q CELLS encourages the review of utility scale storage to be an alternative to transmission line construction.

Energy Storage Systems are a cost-effective and timely way too:

1. Avoid costly transmission build
2. Provide flexible capacity while also maintaining grid stability (especially in peak times)

Scenarios should include state & federal public policy initiatives as well as consideration of the commercial customer goals. Q CELLS recommends these goals/initiatives are deterministic in scenario planning and a trigger for initiating a project. These goals and initiatives increase the reliance of renewable generation and utility scale energy storage needs to be utilized to avoid power disruptions/ensure reliability.

Q CELLS is open to the development of potential renewable zones due to the growing penetration of renewables.

Q CELLS Feedback Regarding Scenarios

1. Are there other drivers that should be considered when altering scenarios beyond the sources of information traditionally used in PJM analysis (discussion paper Scenario Drivers page 5)?

- Emerging technologies
 - Performance Improvement of intermittent resources and utility scale storage
 - Growth of Distributed Energy Resources and Electrification
 - Adoption of dynamic ratings resulting in higher system availability
- Process inefficiencies
 - An example is MISO-SPP JTIQ study, which addresses affected system study delays driven by seams constraints

2. Should generation beyond what is included in the Interconnection Queue be included in Long Term Planning Studies? If yes, how should it be determined where generation is to be located?

- Yes. Approximation based on site potential should be used.
 - Likely that renewables/storage will replace retiring units
 - Areas with higher irradiance or wind potential will drive respective resources

3. How and when should PJM transition from probabilistic to deterministic methodologies in the scenarios?

- Agree with the transition at intermediate term as recommended in the discussion paper.

Q CELLS Feedback Regarding Scenarios

4. How do we funnel down from a multitude of potential scenarios into a subset of scenarios that are actionable (discussion paper Scenario Development Criteria page 5)?

- Carefully picked sensitivities that cover a wide range of scenarios parameters is a great way to reduce the number of scenario.

5. What is the decision-making criteria to initiate a project at year 15? At year 8? (discussion paper

Step Four page 7)

- 15 Year projects must perform well in multiple sensitivities in order to drive a project. Smaller number of sensitivities should be sufficient for 8-year time frame as the scenario is more deterministic. Scenario study criteria referenced in the discussion paper looks apt for performance testing projects.

6. Who determines whether a given set of scenarios are the ones which should form the basis for ordering new projects?

- PJM should do so with feedback from all stakeholders via meetings held to discuss such a list of scenarios

7. How should PJM address changes to initial scenario drivers input assumptions that alter the need for projects previously set in motion?

- PJM should do so with feedback from all stakeholders via meetings held to discuss such a list of scenarios

Questions for PJM

1. What are PJMs plan for incorporating dynamic ratings into long term planning studies?
2. Is PJM going to consider 20 Year outlook in long-term planning like CAISO?



THANK YOU

Q CELLS USA Corp.
300 Spectrum Center Drive
Suite 1250
Irvine, CA 92618

Amy Jo Miller

Director of Policy and Market Strategy
amyjo.miller@qcells.com

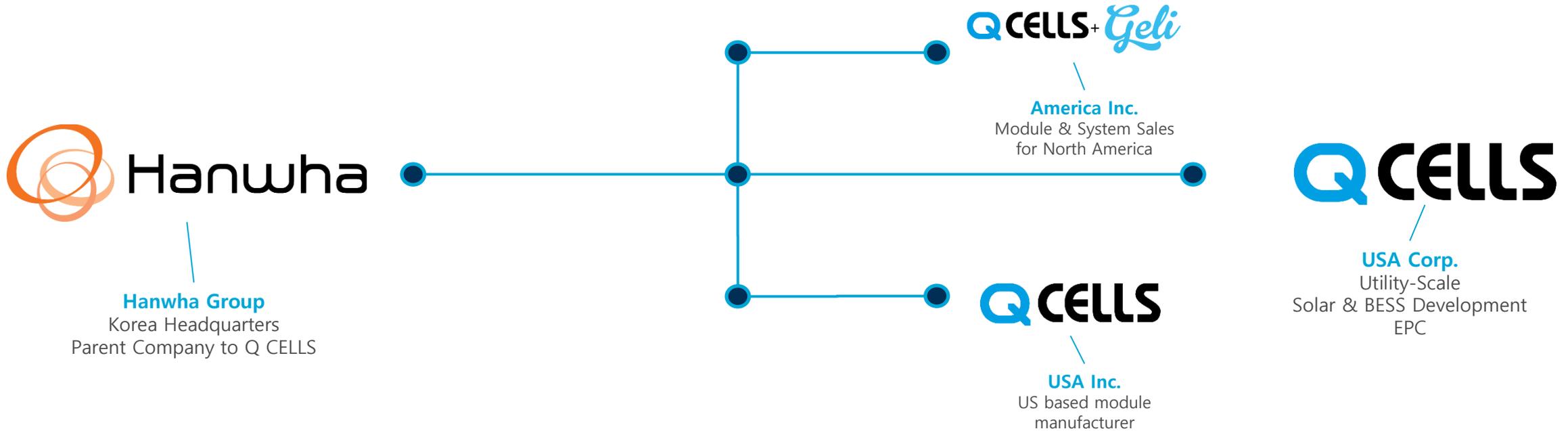
Sumeet Mudgal

Senior Interconnection Planning Engineer
sumeet.mudgal@qcells.com

Appendix

Q CELLS BUSINESS UNITS

Q CELLS USA Corp. is a part of a global network of entities all headed by Hanwha Group, which has its headquarters in Korea.



Q CELLS USA DEVELOPMENT PLATFORM

Q CELLS USA Corp. is a part of a global network of entities all headed by Hanwha Group, which has its headquarters in Korea.

Kellam

- **Capacity:** 82MWdc
- **COD:** 2020
- **Dev Contributions:** Project Development
- **Financing:** Raised Tax equity, Financed on Balance Sheet
- **Strategy:** Long term owner



Ripsey

- **Capacity:** 82MWdc
- **COD:** 2020
- **Dev Contributions:** Project Development
- **Financing:** Raised Tax equity, Financed on Balance Sheet
- **Strategy:** 100% Divestiture



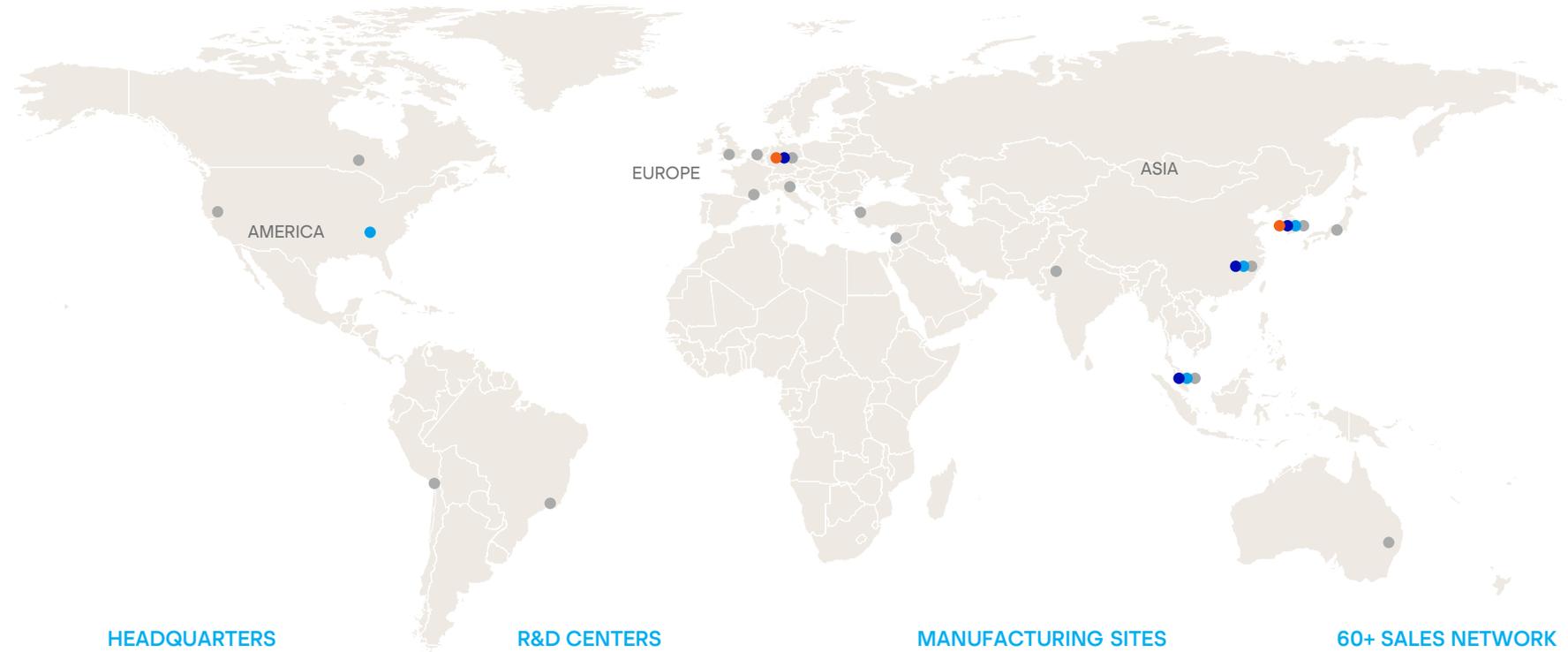
Coniglio

- **Capacity:** 168MWdc
- **COD:** 2021
- **Dev Contributions:** Project Development
- **Financing:** Raised Tax equity, Financed on Balance Sheet
- **Strategy:** Long term owner



Q CELLS GLOBAL NETWORK

Q CELLS works closely with global R&D and manufacturing sites to deliver the highest level of quality in manufacturing, sales and support.



2 Countries
● HEADQUARTERS

4 Countries
● R&D CENTERS

4 Countries
● MANUFACTURING SITES

60+ Countries
● SALES NETWORK

HEADQUARTERS

In Seoul, South Korea (Global Executive HQ) and Thalheim, Germany (Technology & Innovation HQ)

R&D CENTERS

R&D Centers in 4 countries (Germany, South Korea, Malaysia, and China)

MANUFACTURING SITES

Manufacturing Facilities in 4 countries (USA, South Korea, Malaysia, and China)

60+ SALES NETWORK

Spanning Europe, North America, Asia, South America, Africa and the Middle East