Carbon Free Hydrogen from Nuclear Power

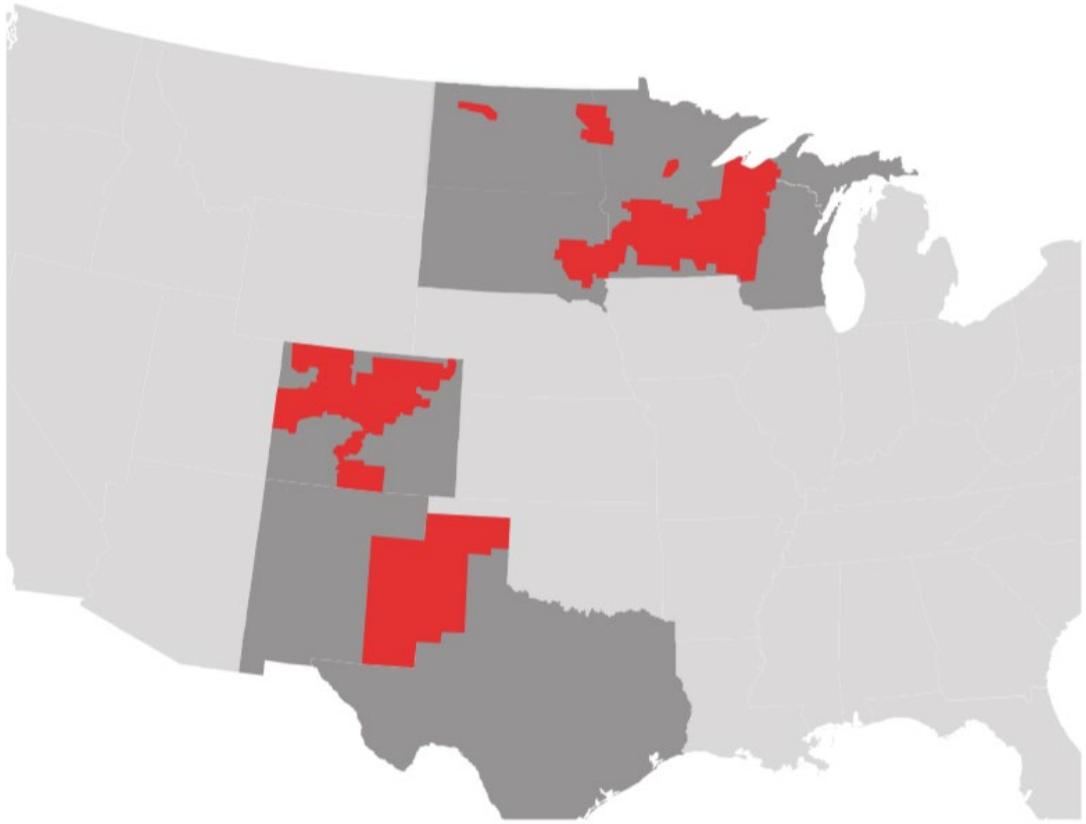
Dan Ludwig – Sr. Engineer, Nuclear Innovation

7/20/2021

© 2021 Xcel Energy

Xcel Energy Company Overview

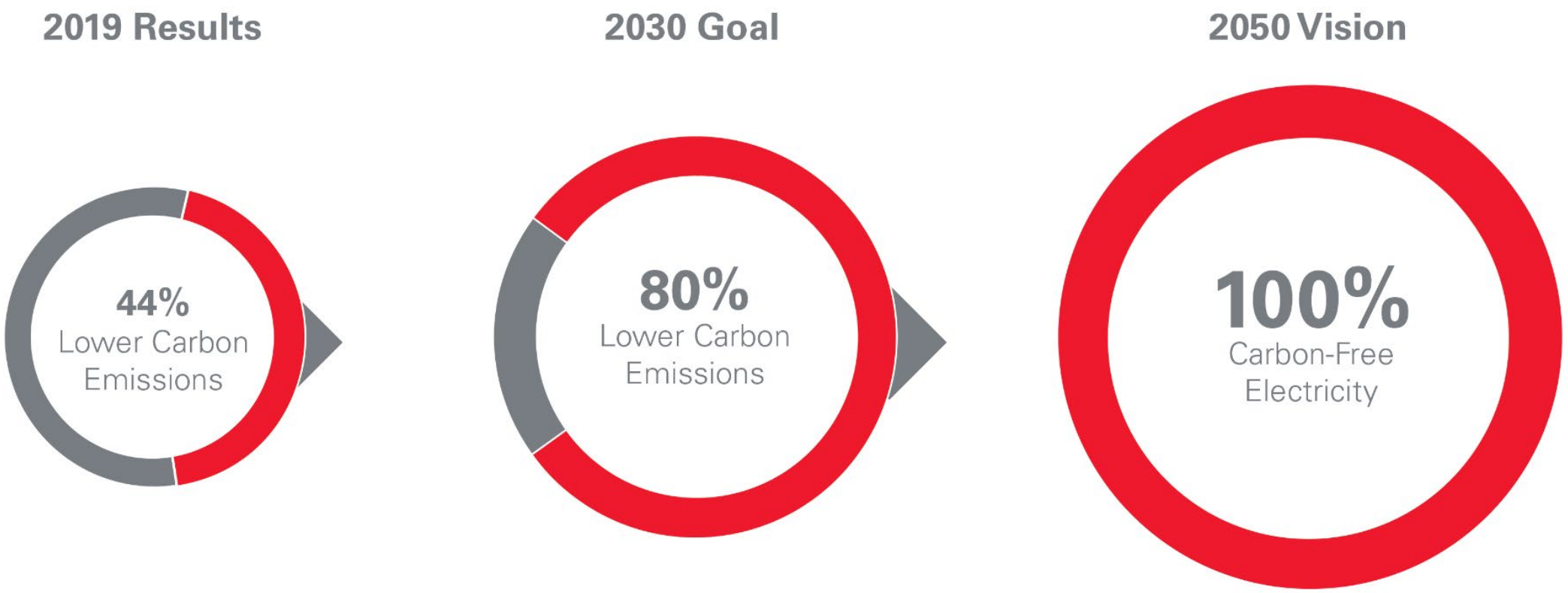
3.7 million electric customers
2.1 million natural gas customers



© 2021 Xcel Energy

Leading the Clean Energy Transition

A bold vision for a carbon-free future



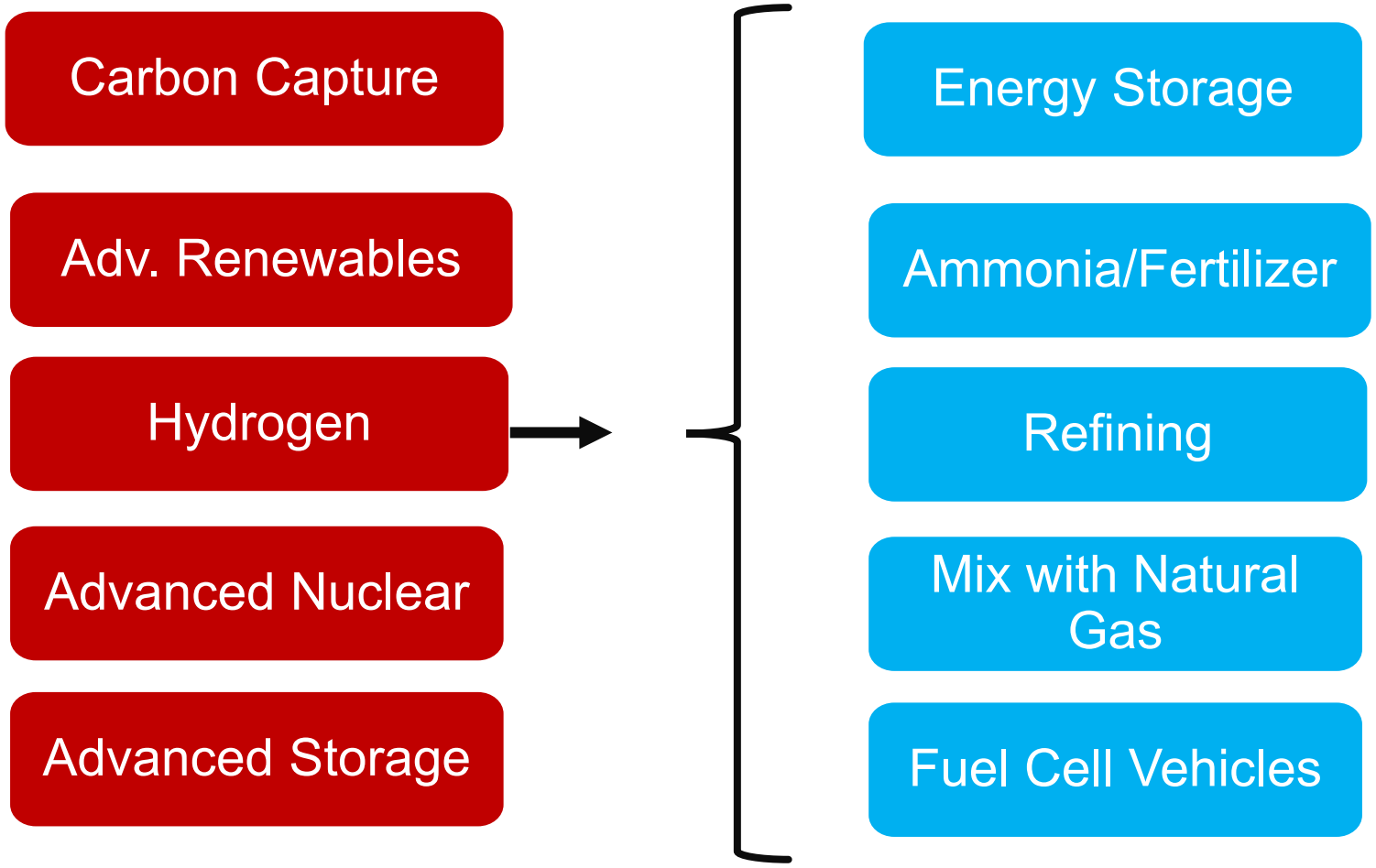
Company-wide emissions reductions from the electricity serving our customers, compared to 2005

GETTING TO 100% CARBON FREE REQUIRES NEW TECHNOLOGY

- ***Evaluate*** and develop new technologies
- ***Explore*** partnerships to reduce costs and bring products to market
- ***Invest*** in new technology at the right time

© 2021 Xcel Energy

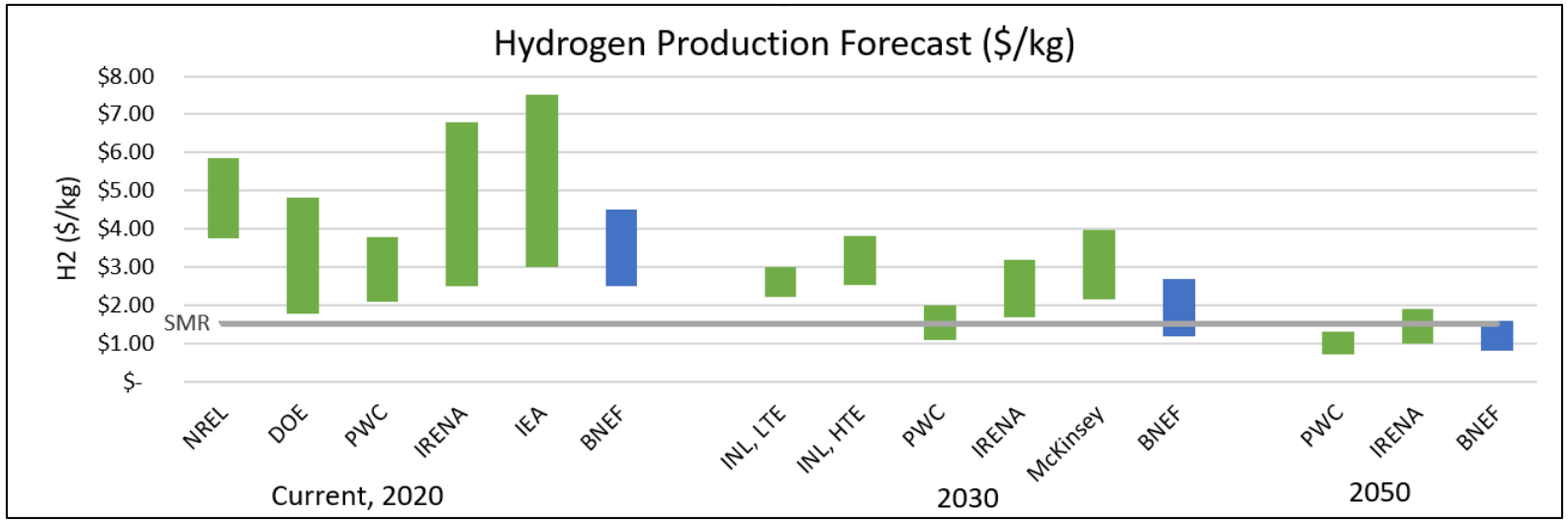
EXPLORING HYDROGEN FOR ITS MANY USES



© 2021 Xcel Energy

Hydrogen Cost Predictions

As the hydrogen industry matures, costs are expected to become competitive with steam methane reforming (SMR).



Source: Various public forecasts

The green and blue bars represent predictions of H2 costs from different organizations.

© 2021 Xcel Energy

NUCLEAR CONSORTIUM:
WORKING FOR THE FUTURE OF NUCLEAR

Xcel Energy®

energy harbor

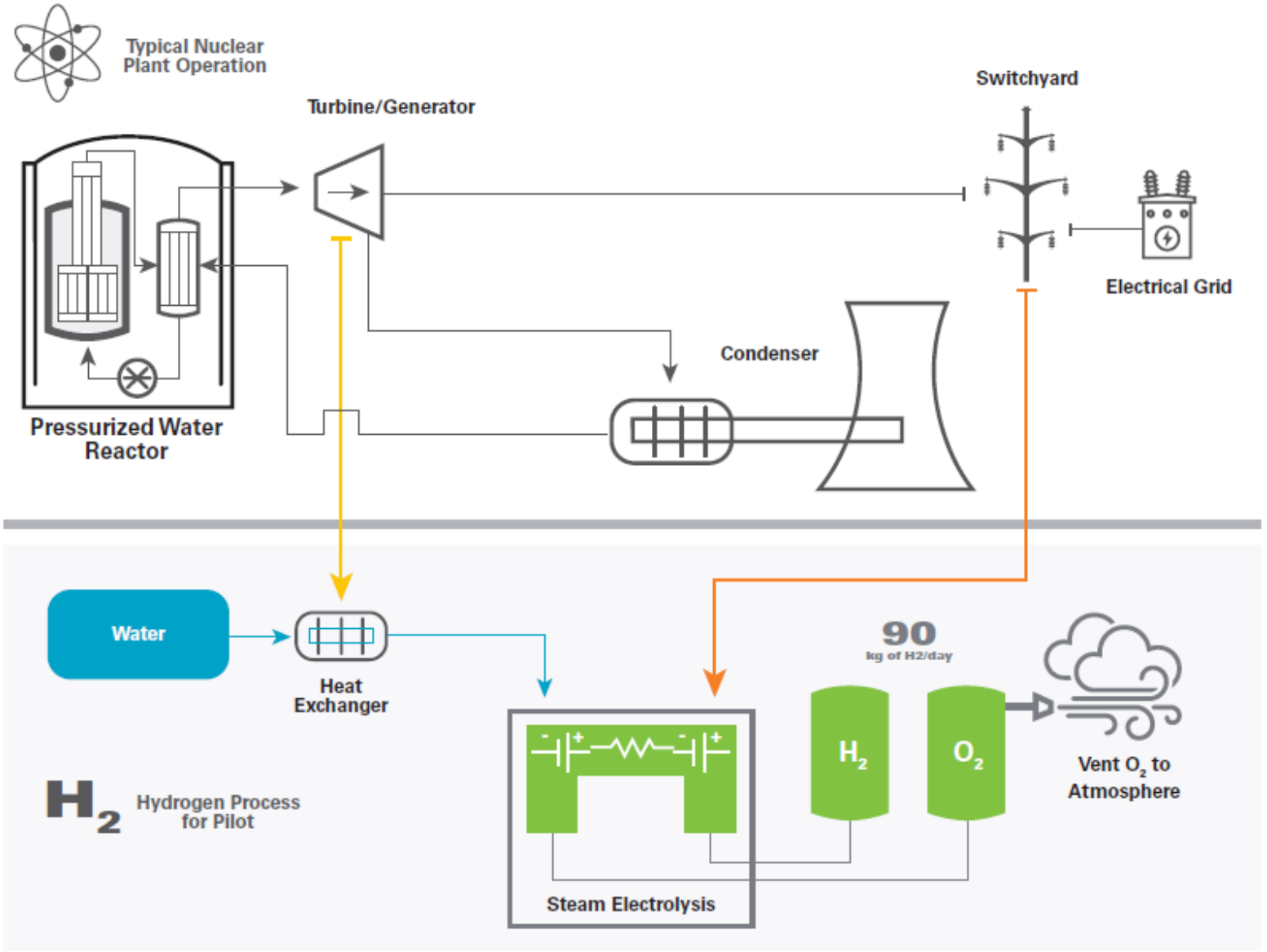
aps

INL Idaho National Laboratory

Phased Approach - DOE Funded Scope
Phase 1 Install Low Temperature Electrolysis (LTE) Skid ***[Energy Harbor]*** Technical and Economic Assessments (due mid-2021) ***[Xcel Energy & APS]***
Phase 2 Installation of High Temperature Steam Electrolysis (HTSE) Skid ***[Xcel Energy]*** Complete design work for Reversible HTSE skid ***[APS]***
Phase 3 – Future Expansions on Phase 2 work, hydrogen storage, use demonstration, other. ***[TBD]***

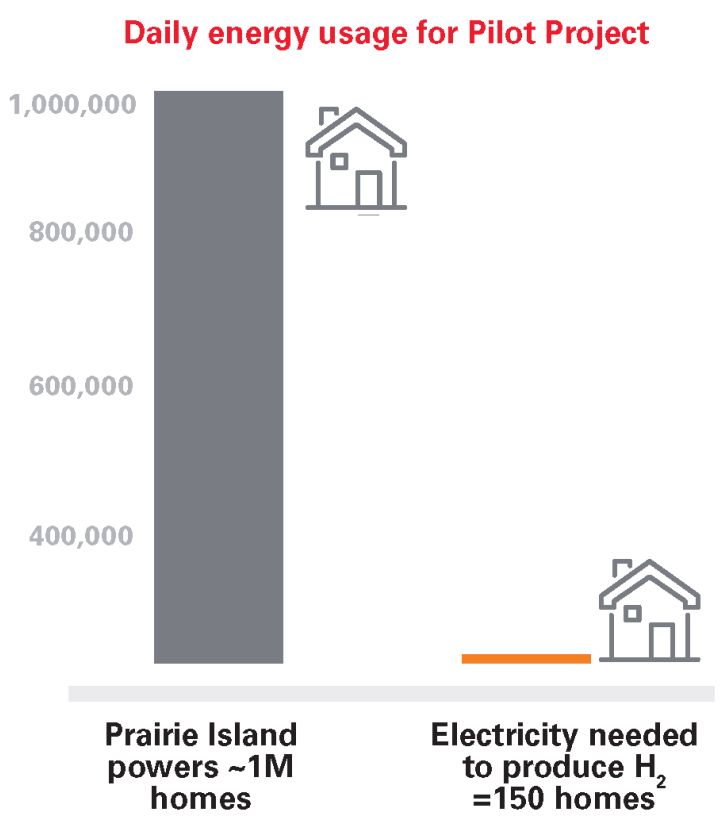
© 2021 Xcel Energy

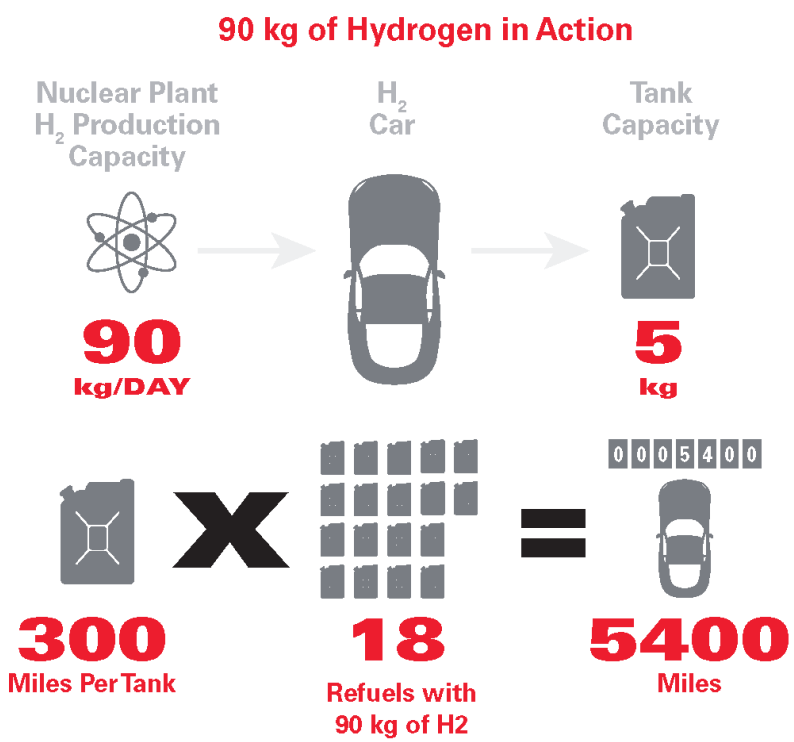
Producing Hydrogen From Carbon-Free Nuclear Energy



© 2021 Xcel Energy

Producing Hydrogen From Carbon-Free Nuclear Energy

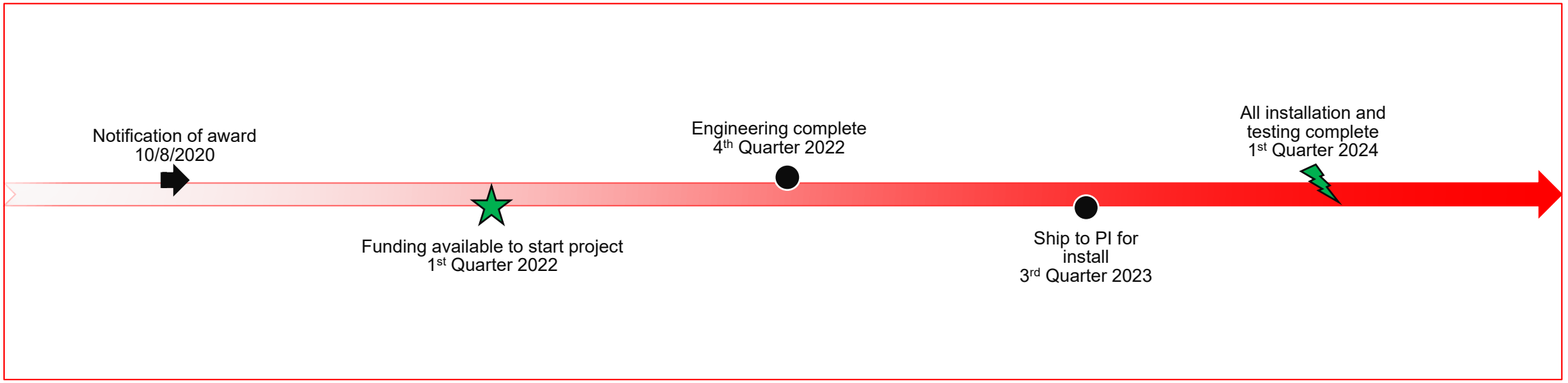




© 2021 Xcel Energy

Pilot Project Schedule

- Project must be completed within 2 years of funding receipt
- All dates pending receipt of funding



© 2021 Xcel Energy


Xcel Energy®