

2020 EQT Seed Grant Program

The [Scott Institute](#) is coordinating with the EQT Foundation to provide ~\$180K in funding aimed at seeding new research in the natural gas arena, including exploration and extraction, as well as related water, environmental and policy issues. We expect to make awards in the range \$50,000 – 150,000 to individuals or small groups.

Areas of interest to the program include, but are not limited to:

- materials for drilling tools or pipelines
- novel approaches to sensing in the downhole environment, in pipelines or on surface equipment used in the oil and gas industry
- new proppants that may help understand subsurface conditions post hydraulic fracturing
- modelling of subsurface geology and geochemistry
- novel data analytic techniques that may be useful to predict outcomes when dealing with small sample sizes

Interested faculty should [apply online](#) to become a Scott Institute Faculty Affiliate, if they are not so already. Then, faculty should prepare a brief proposal (< 2 pages, 12-point type) following the format below. Submissions as PI to this and to the 2020 Scott Institute Seed Grants for Energy Research Program will be limited to one per person (not precluding participation on other proposals).

- **Project Summary** - Brief summary of the proposed activity that outlines the problem to be addressed, explains why it is important to development of natural gas-related technologies, and who will be involved in the work.
- **Leverage** - Discussion of how a modest seed grant can lay the foundation for an expanded activity, preferably including specific suggestions for sources of future support and some indication of the long term potential for growth of this activity. Please give some indication of the closest related work currently underway at Carnegie Mellon and any prospects for matching or in-kind support that can amplify the impact of the grant.
- **Impact** - Please articulate the expectations for impact of the proposed work and its potential for increasing the effectiveness or efficiency of natural gas technologies.
- **Budget** - Budget will be provided preferentially for support of PhD students, equipment, and salary of non-tenure track faculty or staff. Overhead will not be charged. Budgets must be spent out by June 30, 2021 (end of FY 2021).

Applications must be submitted using [this online form](#) by 01/31/2020.

Priority will be given to those proposals with the capacity to create new activities that can ultimately engage multiple faculty members. Proposals that look like they are simply requesting

funding to continue an existing line of work will receive low priority. Proposals relevant to natural gas will be considered for support from the EQT Energy Seed Funds.

While we will treat all proposals as moderately confidential so as to protect faculty ideas, we reserve the right to be proactive. For example, depending on the ideas we receive, we may explore possible collaborations among separate investigators when it might be beneficial or add valuable new perspectives to a project.

Proposals will be reviewed by a faculty committee comprised of the Scott Institute faculty affiliates. Reviewers who are party to a proposal will not be asked to rank their own submission. Final selection of grant winners will be made by Scott Institute Directors Jay Whitacre and Andy Gellman and Executive Director Anna J. Siefken in consultation with representatives of EQT. Proposals considered for EQT Seed funds are subject to the approval of President Jahanian and a representative from EQT.

Challenges Facing the Natural Gas industry

AIR, ESPECIALLY METHANE DETECTION OR CONTROL

Methane emissions control/reduction/detection from valves, piping and vented sources; control of flashing emissions from tanks, improved pressure relief devices and new designs to contain flashing emissions; smokeless burners for flash emissions combustion; flare control and flare efficiency improvements; remote sensing; non-emitting field equipment such as chemical pumps. Specific interest in next generation technologies that can replace pneumatic control systems and pneumatic pumps to eliminate methane emissions and gas to liquid vaporization for emissions minimization and flare management.

BLOCKCHAINS

Blockchains are an immutable, distributed database that opens up new use cases between trust boundaries, such as between disparate organizations. Applications of blockchain technology in mining could include the creation of efficient, trusted marketplaces; or distributed transactional platforms that can provide value in many areas of the business (such as compliance, CSR and social engagement, supply chain efficiency and tracing, and commodity trading).

A recent example is the creation of a consortium involving Shell, BP, and Statoil who are working on the development of a blockchain-based energy commodity trading platform, along with three large commodity traders. The common thread found in most emerging blockchain based solutions is increased efficiency between boundaries of trust- either through disintermediation of 3rd parties or by enabling the digitization of cross organizational processes.

UNMANNED AERIAL VEHICLES

More energy efficient and safer operations, including inspection; environmental monitoring; supply delivery systems.

THE INTERNET OF THINGS/DIGITAL OILFIELD/BIG DATA

Utilization of large scale computing to solve technical problems. Low cost sensors and actuators with data collection, networked for monitoring, optimization and decision making to improve environmental monitoring; low cost hardware for problem detection and spill prevention.

ITEMS TO REDUCE TRUCK TRAFFIC

Technologies for more efficient supply use; technologies to reduce waste generation; beneficial use of drill cuttings and produced/flowback water.

SPACE SAVING ITEMS TO REDUCE FOOTPRINT

More space efficient separators, treaters, drilling systems to reduce land footprint.

PLANT OR BIOLOGICAL SOLUTIONS

Salt tolerant vegetation or trees targeted for beneficial use of produced water; vegetation or trees targeted for growth in drill cutting based soils; site or spill remediation solutions. Biochar for produced/flowback water cleanup, soil remediation.

WATER

Real-time monitoring including efficient sampling, and analysis; beneficial re-use of produced water including recycling or conversion to solid salt suitable for winter road maintenance or dust control; recycling of flowback water; new disposal methods; minimization of water volumes; well bore integrity monitoring systems; alternative sourcing and processing to freshwater. Water-less fracking technologies (e.g. use of cold compressed natural gas or LNG in place of water).

REMOTE/DISTRIBUTED POWER

Rechargeable sources including batteries, fuel cells; modular combined heat and power; micro/islanded grid technology; field gas powered equipment. Specific interest in high efficiency, low-emissions, cold weather-tolerant small scale power generation technologies (50 watts to 1 megawatt) applicable to off-grid multi-well pads or other off-grid oil and gas facilities (e.g. methanol fuel cells that can use field-grade methanol, higher efficiency thermoelectric generators, micro-CHP systems).

POWER MANAGEMENT

More energy efficient and responsive natural gas engines; efficient and clean generators; more efficient dual fuel (diesel and natural gas) engines that coordinate operations to provide power and response. Technologies that can economically convert waste heat sources (reciprocating engine exhaust heat and jacket water heat) into electricity at smaller scales (e.g. 20kW to 250kW). High efficiency engine technologies could include smaller scale natural gas fueled micro-turbine engines (<500kW).

ADVANCED MATERIALS AND CHEMICALS

Novel materials or chemicals comprised of no or fewer hazardous chemicals; advanced materials less likely to rust or corrode which will improve containment; improved treating chemicals and detection methods; chemicals to extract hazardous items from produced fluids; new products made from captured CO₂, new ways to capture/separate CO₂ and NGLs.

OTHER

Limiting water and energy usage in operational divisions; mitigating engine noise pollution; dust control; information technology applications that limit environmental impact. Sound attenuation

systems for low frequency noise from drilling/completion sites in proximity to residents. Multi-phase gas compression technologies.