



ADVANCED ENERGY MARKET ASSESSMENT 2022 SUMMARY REPORT

The [Maryland Clean Energy Center](#) (MCEC) uses the Advanced Energy Market Assessment Survey as a tool to assess the needs of the energy industry to better understand what resources, investments, policies, and partnerships the instrumentality may work to provide in the coming years.

This summary report reflects the compiled data received from 40 survey respondents, a 12% decrease from the number of respondents in the prior year. The survey was distributed to MCEC Advisory Council Members, clean energy stakeholders, newsletter subscribers, and partners in the spring of 2022.

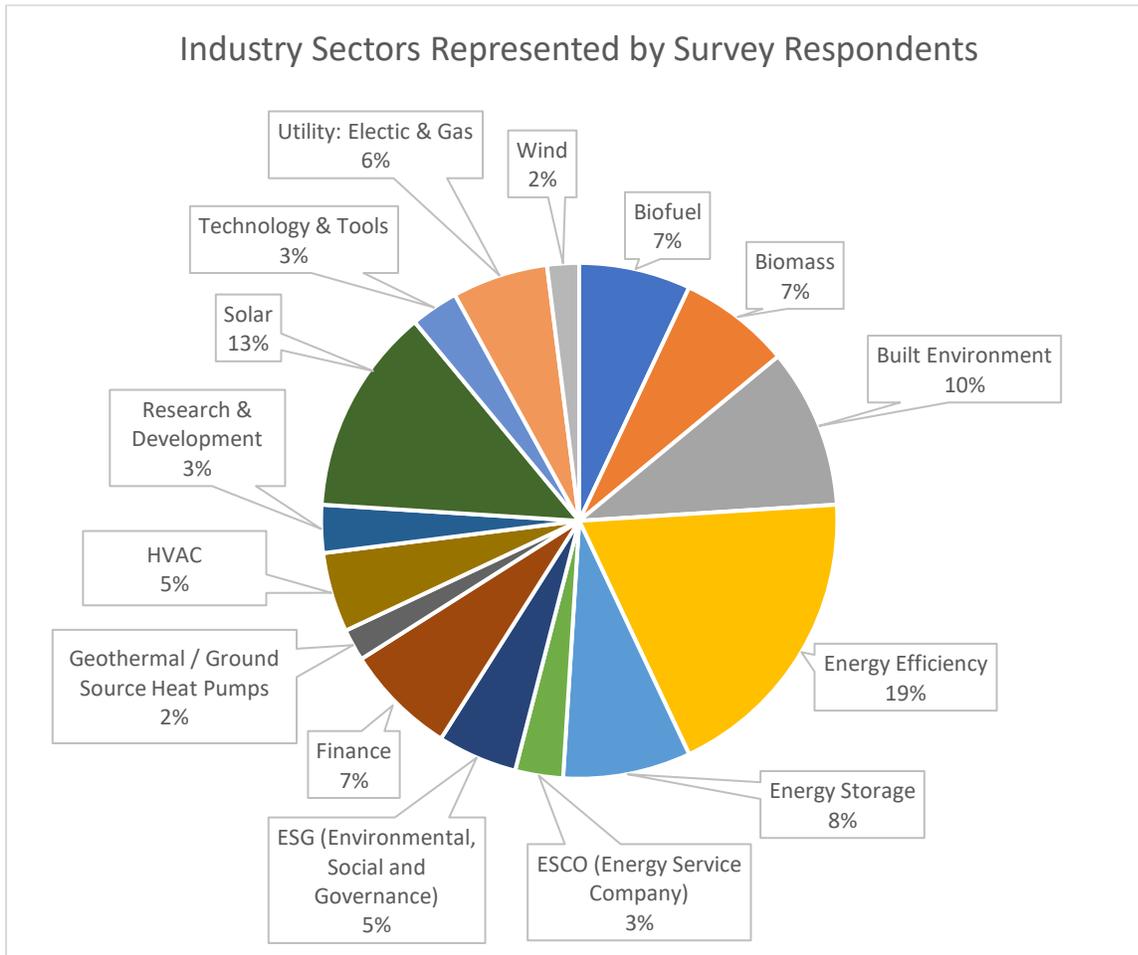
Stakeholders identified the following MCEC offerings as having the highest value (ranked):

1. Outreach & Education
2. Policy Information
3. B2B Networking Opportunities
4. Financing Assistance
5. Procurement & Tech Support
6. Innovation Support

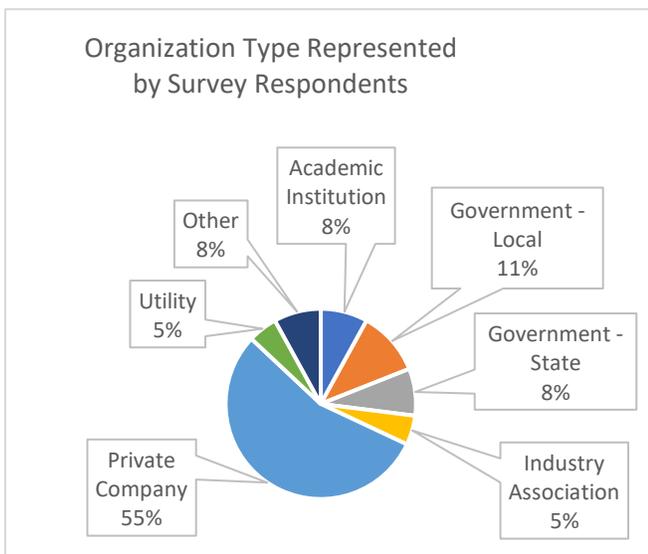
Based on compiled feedback, the following areas are recommended as priority focus areas for MCEC efforts:

- 1. More consumer outreach and education is needed.**
 - Stakeholders want market development support to reduce barriers to technology adoption
 - Content tailored for target audiences including LMI and Municipal/ K-12 Schools
 - Highlight local companies working in clean energy, and specifically the EV charging infrastructure space
- 2. Policy is a major consideration and stakeholder value MCEC's Policy Watch activities.**
- 3. Workforce availability and capability is a concern that MCEC could help address.**
- 4. There is a need for MCEC to facilitate connections between government and non-government entities.**
- 5. Engage Carbon Capture Sector, enable innovation in this space, and look into ways to use credits in financing projects.**

RESPONDENT OVERVIEW & GENERAL QUESTIONS



Survey respondents were able to select all industry sectors they represent.



“Other” organization types included volunteer environmental and community advocacy groups.

Please rate the following areas regarding your level of concern for how they will impact the stability of the advanced energy industry in Maryland.

5 = great importance, 1 = little/ no importance

Local Policy	Consumer Outreach & Education	Supply Chain (equipment & materials)	Access to Capital & Finance	Federal Policy	Workforce Availability	Macro and Microeconomic Energy Markets and Commodity Costs	Support for Tech Commercialization and Start-ups
4.3	4.2	4.1	3.9	3.9	3.8	3.7	3.4

Local Policy and Consumer Outreach & Education continued to be top priorities, compared to the 2021 survey. Supply Chain increased in priority compared to the previous year.

Other identified priority areas of concern, regarding impact to the stability of the advanced energy industry in Maryland, included:

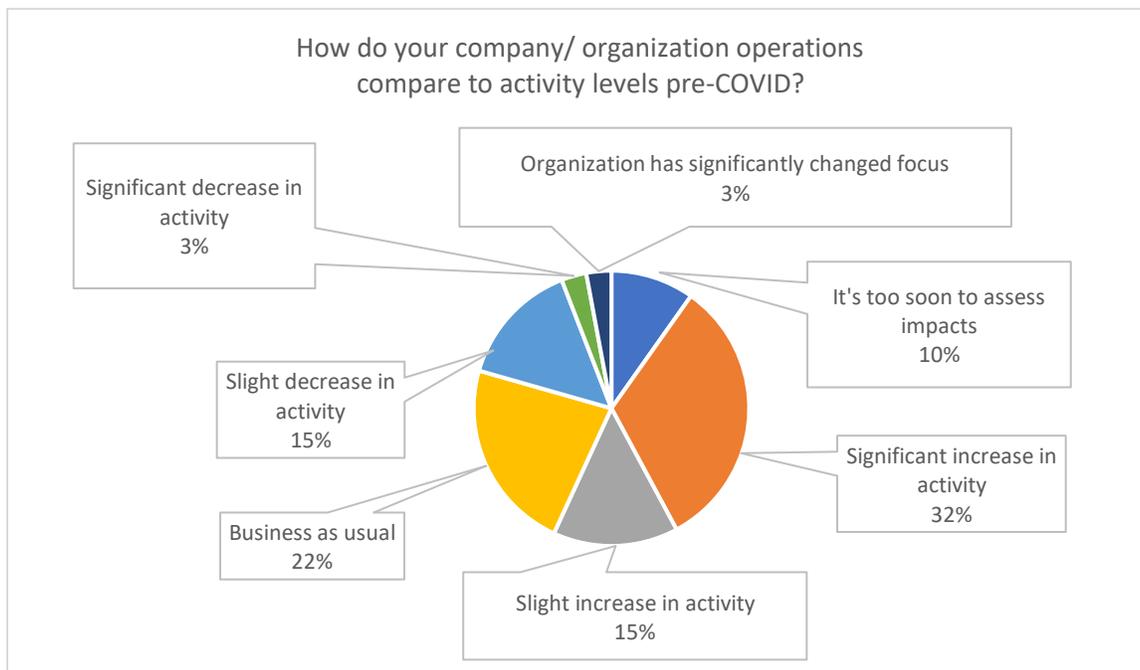
- A stable and predictable state and local policy environment for making investment decisions
- Advancing EV adoption, manufacturing, and charging infrastructure
- Better education to commercial and especially Government school systems that do not understand rebate programs and do not trust companies offering service with huge rebates. There is often no out of pocket and they are not interested in saving money on their electric bills because they are not paying them.
- Bright people and companies will continue to leave Maryland because there are more investment dollars elsewhere and more of an energy community in Boston and Silicon Valley
- Building codes and permitting process for EV charging stations
- Distributed Energy Resources for both on-site generation and storage of electricity
- Education and outreach; including to the general public, especially LMI consumers
- Energy price stability
- Environmental impact associated with off shore wind energy
- Grid modernization, including distribution system planning, resilience, and related equity concerns
- Have legislature, MD PSC, utilities, and PJM be on the same page and overall goals regarding enabling a clean energy future. Put accountability mechanisms in place so utilities and PJM comply with MD laws and regulations.
- I strongly advocate for statewide Building Energy Performance Standards, particularly for existing multifamily buildings
- Insufficient understanding of the role of 24/7 clean generation
- Investors--especially regionally
- Professional training
- Public prejudice about nuclear energy
- Supply chain for jobs from university, high school, & private education programs
- Support for R&D
- Support from federal, state, and local government agencies
- The capital markets are well equipped to provide need funds for responsible projects. I think consumers need better information about the disadvantages of intermittent generation. Under current PJM rules, solar and wind have an unfair advantage compared to natural gas units.

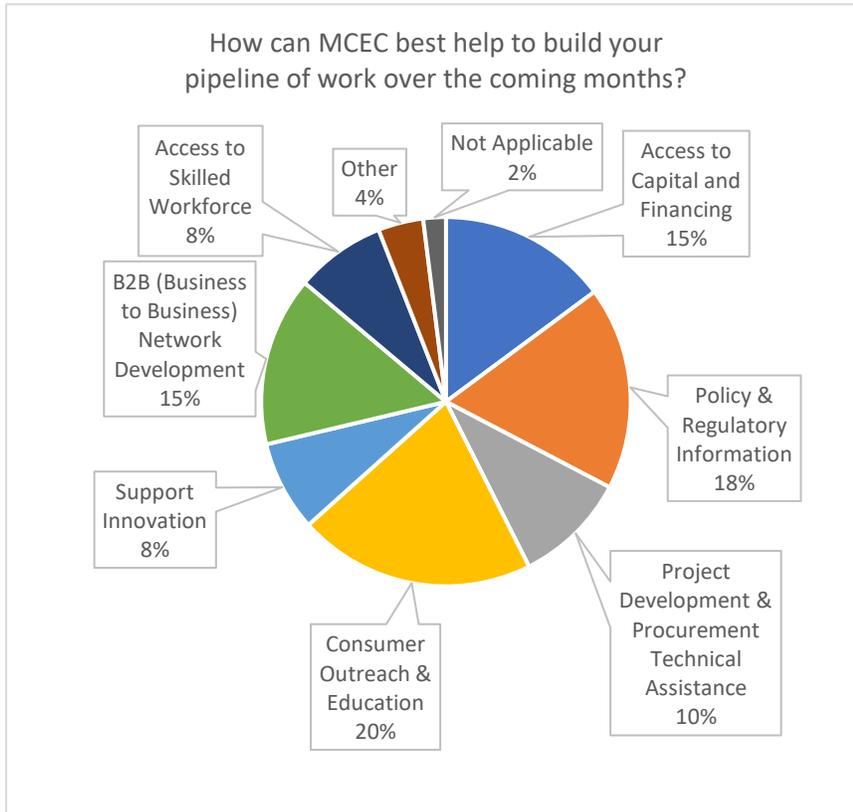
Other identified priority areas of concern, continued.

- The state and local governments should use as much renewable fuel as possible in existing vehicles and equipment and should facilitate that use for businesses (especially airlines) and the general public by working to make high ratios of renewable fuels available. Following the example of California's low carbon fuel standard could be one way to influence increased use of renewables.
- The technology for many buildings exists today but demand is low or it is a high cost to acquire customers. Would be useful to have market development support to reduce barriers to technology adoption.
- Uneducated decision makers at the local level
- The amendments to the Climate Solutions Now bill are a perfect example of state policy concerns - removed requirements for new buildings (a major source) that the GGRA identifies as being the most important step to meeting MD's climate goals.

FINANCE & PROJECT DEVELOPMENT

MCEC can provide access to private capital through the issuance of tax-exempt and taxable bonds, leveraged and direct lending. Since 2010 MCEC has leveraged over \$113M in private capital for energy project investments and is looking for partners to build on that success.





Other identified areas for MCEC assistance included:

- Technical support
- Writing proposed legislation

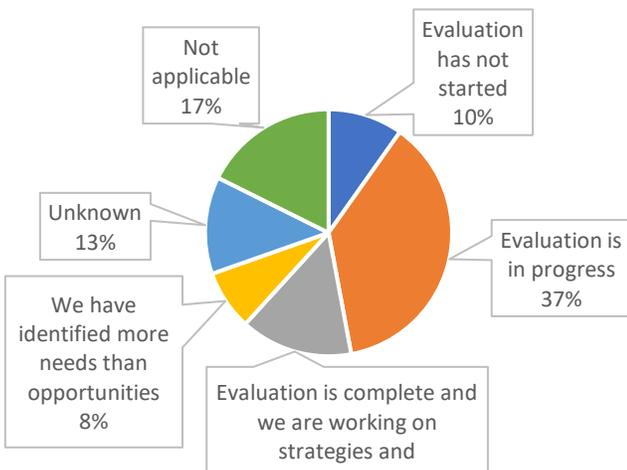
Identified areas for MCEC to support current and future operations included:

- B2B networking opportunities are greatly appreciated
- Better education to consumers and letting them know more about programs with rebates through electric companies and new technologies like endo cubes
- Breaking down the impact of federal policy on our operations. I find that businesses are duplicating efforts at understanding federal policy and its impacts on each business. If that could be formulated in a way that is applicable by industry that'd be great.
- Consumer awareness & education; help raise clean energy IQ among a broad set of audiences
- Continue to market MEA incentives and resources to grow and develop the clean energy, energy efficiency, energy resilience, and EV industries
- Continue to provide current info on renewable energy
- Continue tracking state legislative and policy developments and providing updates to the private sector
- Criteria for project assessment
- Develop policies to implement the Climate Solutions Now bill
- Education about nuclear power
- Establish an online database of Maryland entities that need CO2 and NOx reduction and what they are currently doing in that regard
- Fund work to research comparing strategies to reach the net-zero goal
- Give more attention to renewable liquid fuels
- Identify and fill the gaps not being provided by others
- Improved MDPACE website
- Introductions to projects looking for capital

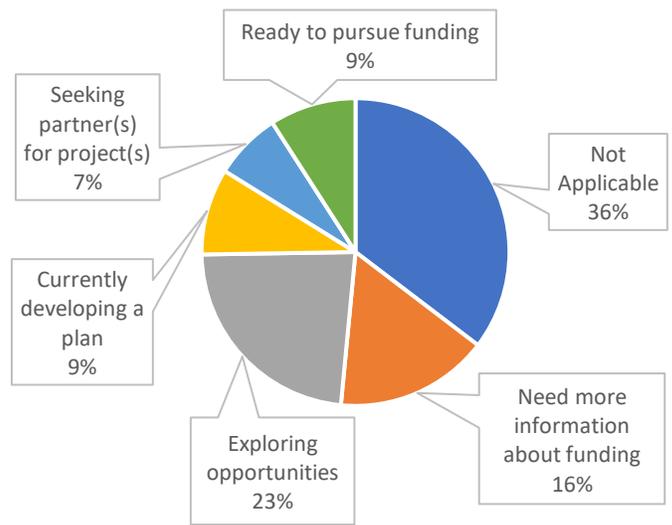
Identified MCEC support areas, continued.

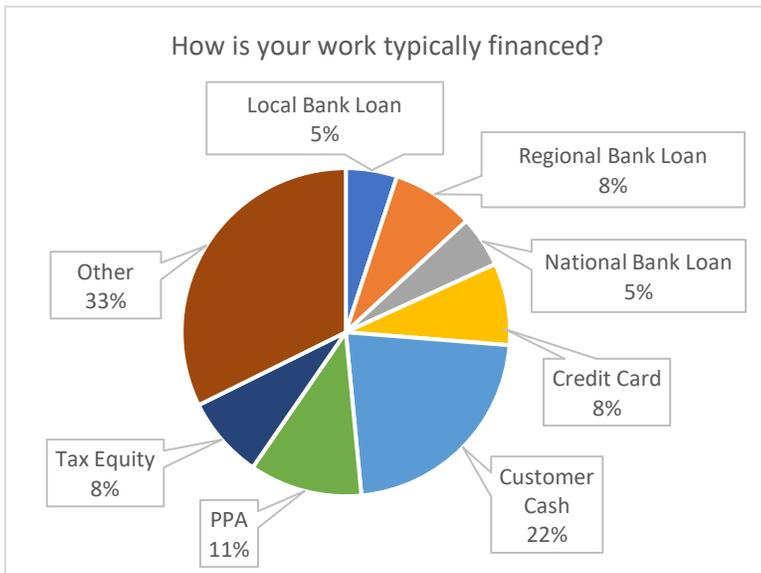
- Keep local governments (county and city) in the loop on upcoming opportunities, pending legislation, etc.
- Maintain current support. Be conservative about spending. A small amount of support over a long period of time is much better than a great amount of support for a short period time, which can be very disruptive.
- Marketing campaign about careers
- MCEC can best support our current and future operations by enabling connectivity between non-governmental and governmental agencies to facilitate communication and understanding of our unique value propositions
- Need more companies to fund at Maryland Momentum Fund
- presenting a realistic time frame to transition to clean energy
- Promote solar energy professional training programs such as those offered by Civic Works, IEC Chesapeake and Azimuth Solar LLC
- Provide a Town Hall setting with Utility representatives from the various IOUs to the advisory committee/ membership
- Provide disaggregated electricity data from PJM. Electricity price at 15 minute intervals at the nodes in the classic PJM region along with generation sources.
- Provide innovation support and investment capital
- The translation of policy to "what does this mean for us" is a significant time and energy investment. Any assistance to provide this service at the industry, sector, and more granular levels would be great.
- Upgrade speaker series
- We would appreciate a connection to DHCD to pilot energy efficiency for any of their multifamily properties
- Work development is key

To what extent has your organization evaluated opportunities and needs associated with proposed new state greenhouse gas emissions goals and your technologies, services, and operations?



To what extent is your organization pursuing federal Infrastructure Investment and Jobs Act funds or Build Back Better legislation related to climate change, economic recovery, or environmental justice?





“Other” sources of financing were identified as:

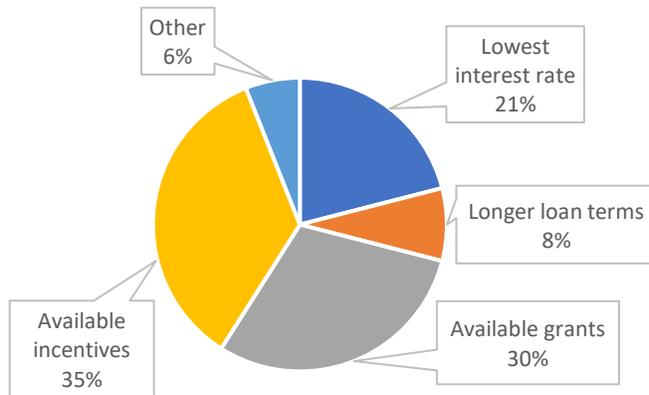
- Balance sheet
- Equity raise + revenues from end customers
- Federal funding and private investment
- MEA is a State agency primarily funded by the Strategic Energy Investment Fund
- Other non-conventional
- Private equity
- Public entity budgets
- self-financed
- State and Federal Grants
- State appropriations
- We are a source of capital

This question was not applicable to 20% of survey respondents.

The type(s) of specific clean energy / energy efficiency projects identified for future financing included:

- Any kind beyond super early stage with product market fit and customer traction
- Biofuel
- CHP and Fuel Cell systems
- Community solar, especially any guarantees on subscribers' payments
- Community-based
- Electrification projects
- Energy efficiency
- Energy storage & batteries
- EV charging station installations
- Ground Source Heat Pumps, Combined Heat and Power, Energy Efficiency Measures, Weatherization, Microgrids, Resiliency Hubs, and other DER systems
- Hydrogen and Electric Gas Stations, Photobioreactors.
- Innovative technologies / solutions
- Microgrids
- New county fleet vehicles - converting to EV
- Projects that utilize C-PACE financing
- Reduction of CO2 and NOx Projects and R&D
- Renewable energy and clean fuels
- Retrofit and new construction of member facilities
- Solar PV & Solar Thermal
- Solar with workforce training support
- Wind

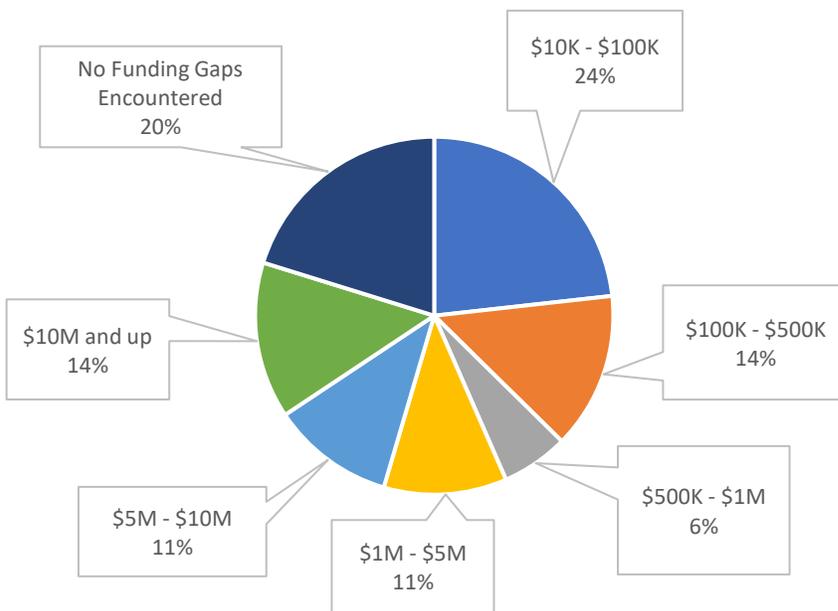
Which of the following financing tools do you believe are more likely to motivate consumers in your target market to move forward with a project?



Other identified financing tools likely to motivate consumers in target markets were identified as:

- As local government, tax incentives don't help. Rebates and the like are helpful incentives
- Combination of listed financing tools
- Higher discount to subscribers of CS projects
- Tax abatements

Experienced Gaps for Available Capital to Finance Energy Projects



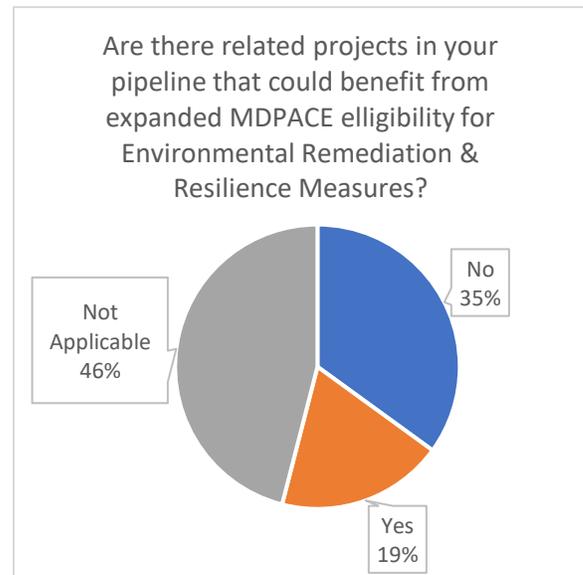
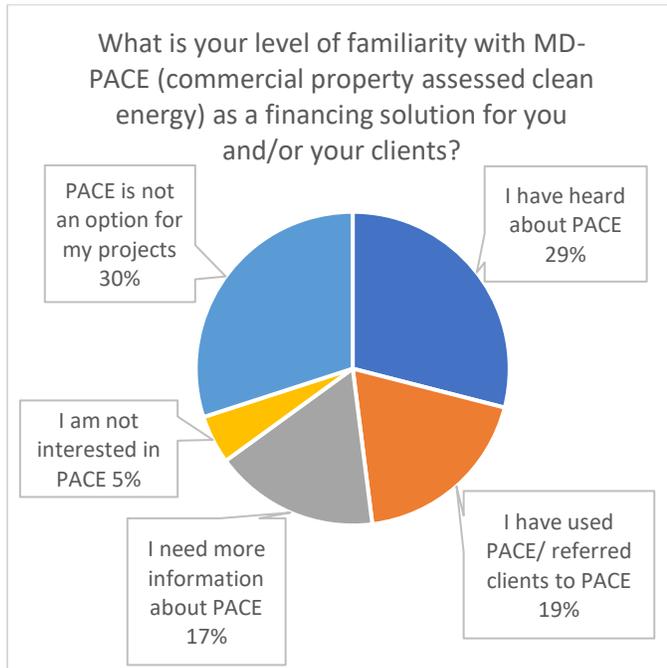
The average size of energy project financing needs encountered in a given year, were identified as follows:

- \$15,000
- \$50,000
- \$250,000
- \$300,000
- \$500,000
- \$500,000 - \$2M
- \$1.5M
- \$3M +
- \$3.8M
- \$5-10M
- \$7M
- 100MW
- 4MW
- 4-tons

This question was not applicable to 30% of survey respondents.

For information about MCEC's financing programs and resources, visit www.mdcleanenergy.org/finance

MDPACE is now available to cover environmental remediation, air quality and resilience related measures.



The approximate size of prospective projects, were identified as follows:

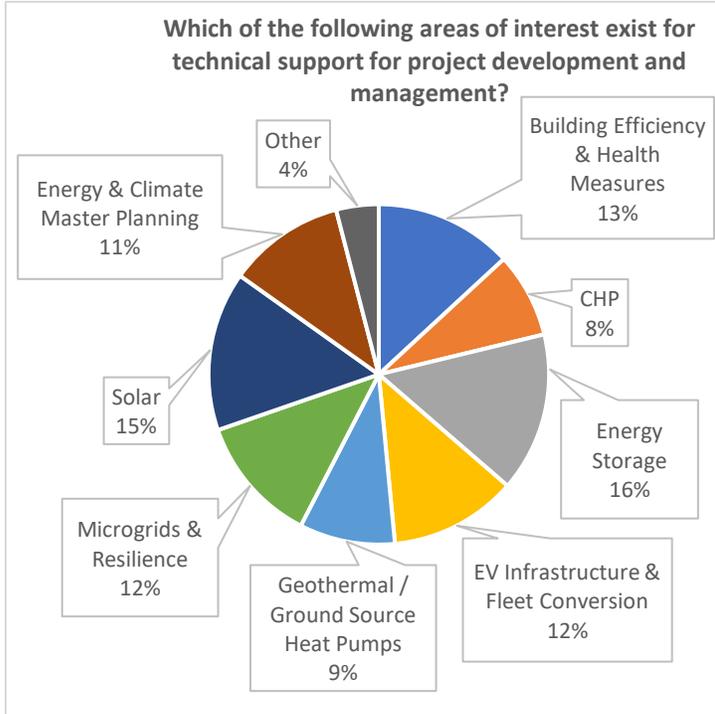
- \$100k
- \$1M+
- \$3M
- \$5M (multiple responses for this amount)



MDPACE is a statewide C-PACE program that provides turn-key, low cost, standardized C-PACE program services to property owners, capital providers, contractors, and local governments in the state of Maryland. For additional details regarding project eligibility and financing options, visit www.md-pace.com

PROCUREMENT & TECHNICAL SUPPORT

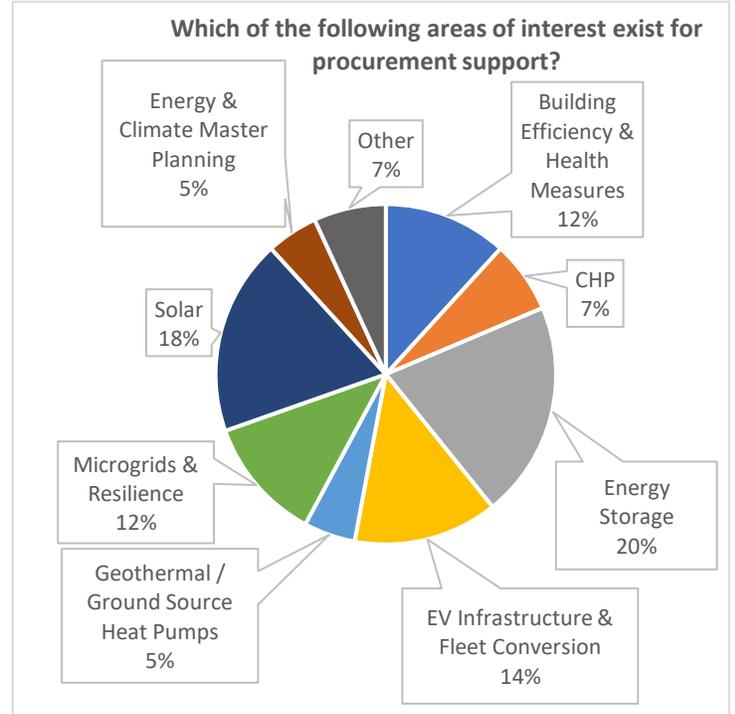
As a neutral third-party advisor, MCEC offers technical and procurement assistance to help create demand for market ready energy products, services and technologies.



This question was not applicable to 20% of survey respondents.

“Other” areas of interest for project management included:

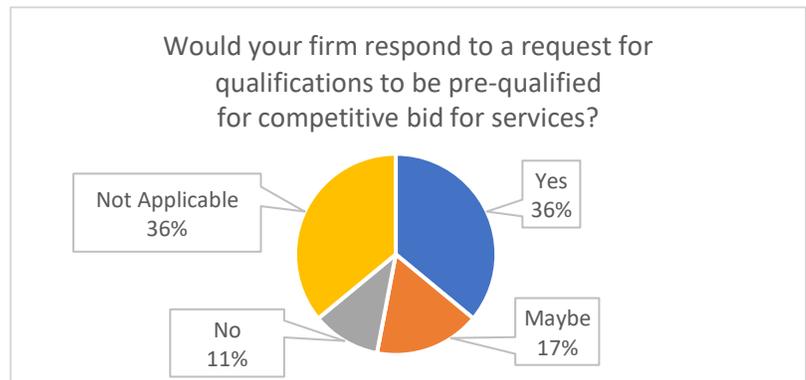
- Getting more "gas" stations to sell higher level blends of renewable fuels. Making state grants available; helping them obtain federal support.
- Micro hydro
- Renewable Natural Gas
- Wind; both offshore and inland



This question was not applicable to 43% of survey respondents.

“Other” areas of interest for procurement services included:

- Advanced software platform
- Endo Cubes for refrigeration and HVAC
- Renewable transportation fuel infrastructure and fleet conversion. See DC DPW conversion of trucks to use 100% biodiesel, for example.



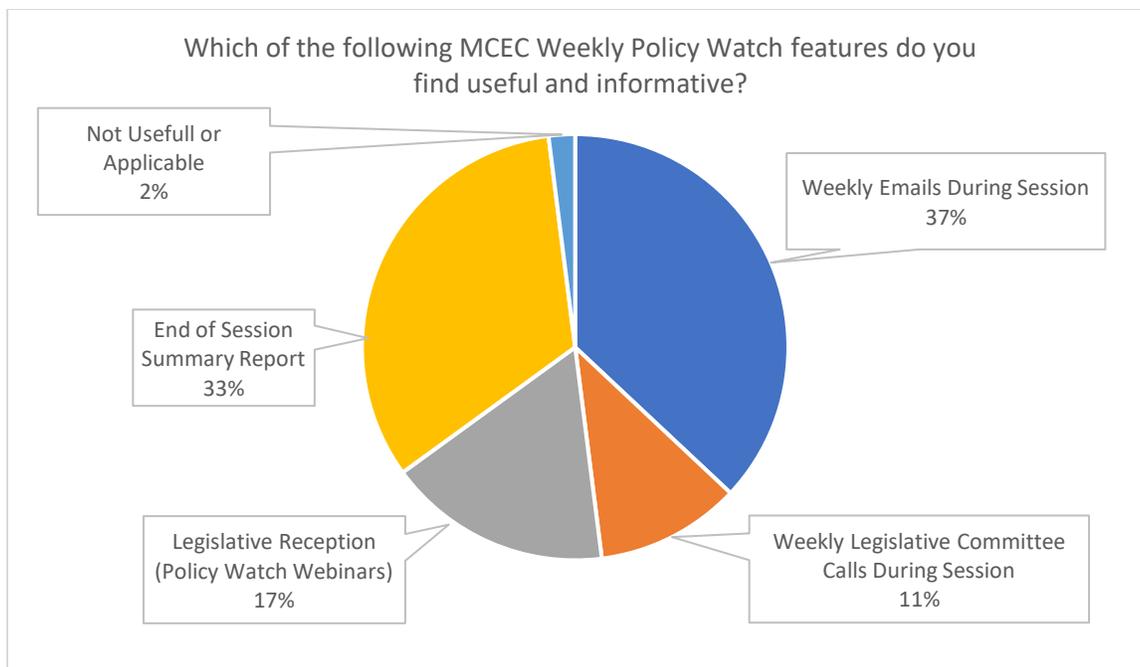
POLICY & REGULATION

MCEC staff monitors activity in the Maryland General Assembly, looking for legislation relevant to our mission and with the potential to impact the successful growth of the clean energy sector. Interested stakeholders can participate in legislative committee calls, and obtain legislative updates via email or posted to MCEC’s website at www.mdcleanenergy.org/policy.

Please rate the following topics based on your interest, as they relate to policy and regulation in Maryland. 5 = great importance, 1 = little/ no importance

Grants & Incentives	Energy Innovation & Commercialization	Climate Change Mitigation	Customer Protections & Education	Renewable Portfolio Standard (RPS)	Electrification of Transportation
4.3	3.9	3.8	3.6	3.6	3.5

Resilience in the Energy Equation	Carbon Tax Strategies	Climate Bank & Finance	Public Service Commission Orders	Future of EmPOWER Surcharge	FERC MOPR
3.5	3.4	3.4	3.3	3.0	2.5



For information about MCEC’s Policy Watch activities and resources, visit www.mdcleanenergy.org/policy

To what extent has your organization developed priorities for climate and energy policy and program engagement in 2022 and 2023 and in what areas?

- 5 year construction plans
- Advocacy and outreach are well developed. Working with clients on BEPS where requested.
- CHP
- Energy efficiency
- Energy policy and climate action planning are key focus areas for customers and so too for us
- EV infrastructure
- Forming now / In development
- Have begun looking at legislation
- High priority on technologies to reduce CO2 and NOx.
- Many of our ideas were developed as part of the Frederick County and City Climate Emergency Mobilization Work Group and can be found here: <https://advancedbiofuelsusa.info/one-community-at-a-time-how-to-gain-real-ghg-benefits-quickly-for-least-cost-experiences-with-the-frederick-county-and-city-climate-emergency-mobilization-work-group/> These proposals, if not completely relevant on a state-wide scale, can be scaled up.
- MEA is currently hard at work on devising its FY23 incentive suite and making the necessary updates and modifications as we continue to help improve Marylanders' access to clean energy technologies that reduce greenhouse gas emissions, enhance sustainability, improve efficiency, bolster resiliency, improve affordability, and deliver equitable solutions to our entire State, including communities and populations disproportionately affected by socioeconomic and environmental challenges, vulnerabilities, and risks. Our efforts have created an impactful network of energy industry stakeholders that we will continue to leverage and grow as we market our incentives and resources, increase awareness and education of clean, efficient, resilient energy solutions, and identify projects in need of MEA support. We aim to continue growing this network in FY22 and beyond.
MEA has also introduced a set of innovative new pilot programs in FY22 that provide crucial capital support for resilient microgrid and other DER systems, aid in school decarbonization efforts, help jurisdictions convert to more efficient and reliable street lighting, and help to develop and implement innovative technologies and solutions with potential for substantial positive impact on Maryland's clean energy economy.
- My organization funds renewable energy projects
- Resilience project development
- Very little
- Very little as a county government - I would like to spur this though!
- We are looking at solar electric vehicle opportunities
- We are working to accelerate the evolution from RPSs to Clean Energy Standards
- We have both a zero emission and a carbon negative strategy for climate and energy policy in 2022 and 2023. The zero emission plan covers both electric vehicle conversion and electricity generation. The carbon negative plan seeks to treat greenhouse gas emissions as a feedstock to produce both biomass and biofuels.

How could MCEC better assist you with energy and environmental policy and regulation in Maryland?

- Advocacy
- Advocacy for BEPS and increased grant and EmPOWER Maryland funding
- Better education for commercial and government locations that are not looking into programs to reduce their demand on electric and gas
- Continue weekly emails after session with a focus on policies to implement the regulations - GGRA, (hopefully) Climate Solutions Now
- Deep dives in energy products and services to LMIs. This is the most underserved market and it's a growing segment within community solar. Facilitating LMI CS project financing, marketing, education is a specific need helping clean energy and households that need economics savings the most.
- Expand coverage of MEA and PSC activities
- Get more involved with liquid transportation energy
- I think MCEC could be more effective if it also had a general public education component. Currently, all of its emphasis is on business entities.
- I'd love to chat with someone to provide direct translation of policy and opportunities and how it applies to us.
- Keeping me current on energy goals and guidelines and to be available to educate customers as they plan for future capital projects
- LMI outreach
- MCEC has already facilitated the creation of venues in which business relationships may form. There is a great deal more work to do on the carbon capture and use front to turn our emissions into valuable commodities.
- Public education about nuclear power
- Offer opportunities, where possible, to meet with legislators of interest during session
- Provide support for curricula-based materials and expertise. Maybe a speaker's bureau for school access for classroom presentations.
- specific calls to action
- The MCEC's granular-level view on energy capital financing solutions that it gains in its day-to-day operations with its clients is important to understand where needs in the transition to a clean energy economy lie. MEA would welcome the opportunity to review insights that MCEC has received in its work to help advise our programs so that we can continue in our mission by providing incentives that dynamically respond to changing market shortfalls with impactful solutions.
- Virtual topic sessions

OUTREACH & EDUCATION

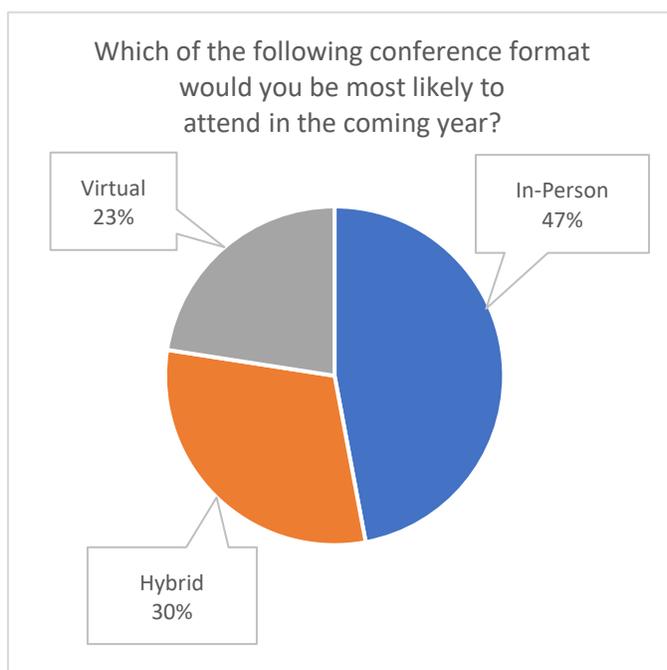
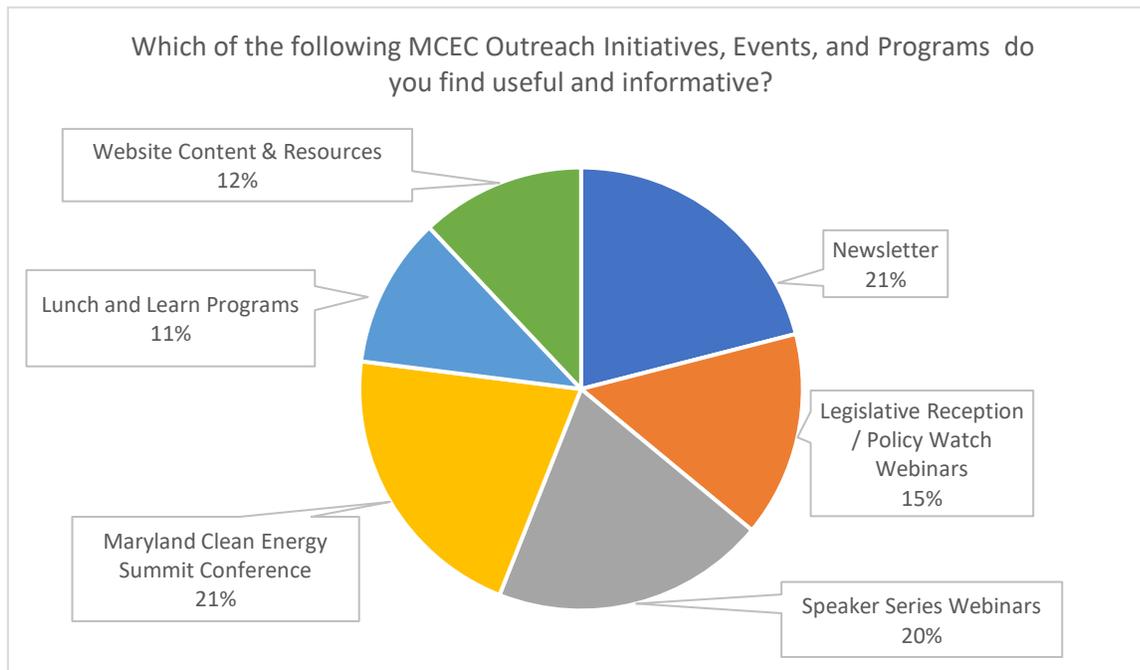
MCEC hosts programs and shares educational resources to advance clean energy deployment. Please help us determine the best ways to provide educational content and networking opportunities to meet the needs of our stakeholders and the general public.

What educational topics and resources would be of the most interest to you and your networks?

- All solar-related professional development topics
- Clean energy finance
- Clean energy options and their impact on the grid- going beyond simply replacing current dirty electricity for energy for other applications
- Cleaning up the grid and industrial energy uses
- Effect of nuclear power on fighting global warming
- Electric transportation and building electrification
- Electrification, decarbonization
- Emerging markets, technologies and trends. IoT for the energy industry, blockchain applications.
- Energy storage costs and technology
- MD energy policy
- EV infrastructure
- Examples of completed C-PACE Projects in MD and throughout major cities in the nation
- Federal, State and private investment opportunities
- Finance opportunities
- Grant programs
- Incentives
- Tax Credits
- How to bring more companies to Maryland
- How to engage students in schools and colleges.
- How best to connect with the Maryland Department of the Environment and Energy through their existing programs
- I think the State does a great job with the 'carrot' incentives - grants, investment, loans. But the 'stick' incentives - regulations, codes and ordinances, etc. - are not often understood or utilized.
- I'd like to have topics and resources that are discussed by "end users". What can municipalities take advantage of in the energy space? What can residential customers take advantage of?
- Impact of sea level rise on Maryland
- SMRs for federal facilities
- Increasing use of renewable liquid/gas transportation fuel
- Mitigation of CO₂ & NO_x and Renewable Natural Gas
- Multifamily, real estate
- Navigating economic uncertainty and its impact on the energy industry, grid modernization efforts, the role of DER on a wide scale, energy equity solutions and challenges, and encouraging more private investment in the energy sector
- Networking and Roundtable discussions
- New tech, upcoming legislative changes and business opportunities
- PSC related topics

Educational topics & resources, continued.

- Rate design for EV charging; Streamlining permitting for EV charging; Optimizing building codes for EV charging
- Rebate programs for energy savings for commercial and government buildings savings in the market with newer technologies
- Resilience
- Virtual library by topic including business case studies highlighting how barriers were overcome
- Workforce



View MCEC's upcoming events
www.mdcleanenergy.org/events

TECH COMMERCIALIZATION & START-UP SUPPORT



To better achieve its mission to advance energy-related research and technology commercialization, MCEC founded the Maryland Energy Innovation Accelerator (MEIA). MEIA strives to achieve the objective of creating investible clean energy businesses that have the momentum and credibility to obtain third party investment, grow their operations, and launch their business. MEIA identifies inventors with licensable energy related technologies and intellectual property and pairs them with appropriate executive expertise to investigate marketability and support business formation. MEIA also provides fee for service technology to market support for federal and state research grant awardees and to startup companies working in the energy sector.

What new technologies are you or your organization most in need of?

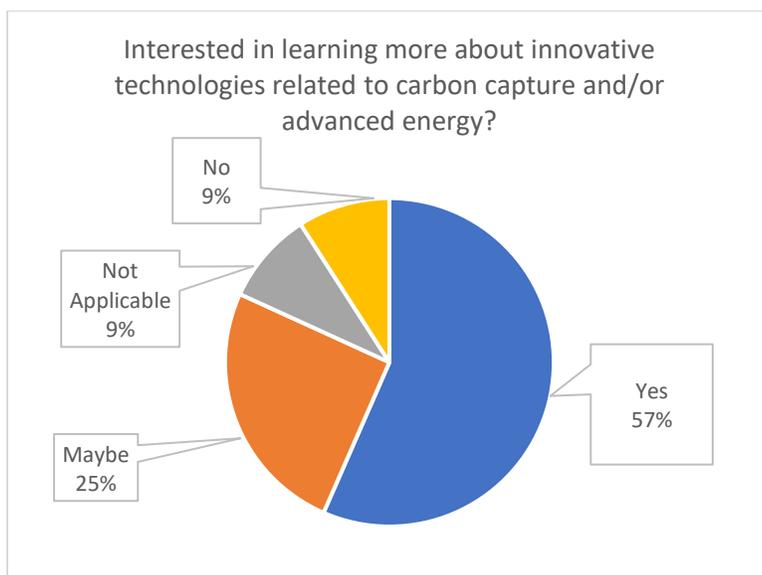
- Transportation sector - not just EV, also engine modifications for improved fuel efficiency, as well as biofuels
- 24/7 clean electricity product
- Access to LoRa microelectronic components
- Additional resiliency strategies. Climate change mitigation tool kits.
- Battery Management Systems
- Building sector - materials with true life cycle carbon reductions
- Electric Vehicles and charging stations
- EV infrastructure for test applications
- More domestic semiconductor and chip manufacturing to alleviate supply chain concerns
- More technology in efficiency of buildings energy loads and ways to reduce
- Related to the carbon capture item: Farmers especially need more information about carbon capture, carbon credits and carbon markets related to improving soil carbon and soil health.
- Technology outreach
- Thorium cycle reactors, pebble bed reactors
- We are in need of technologies which can provide market based incentive to turn emissions into recognized commodities with an established market.

What new technologies are you or your organization most interested in exploring?

- 5G deployment
- Advanced building control systems
- Advanced nuclear, energy storage, hydrogen, ammonia
- Bidirectional EV charging; DC fast charging
- Biomass as a thermal energy source since we are close to a lot of potential feedstock.
- Clean fuels
- Electrification, decarbonization, energy storage
- Energy generation
- Energy Storage (multiple responses)
- Enhanced photosynthesis, Renewable Natural Gas and Molten Carbonate Fuel Cells
- EV infrastructure
- Human location within existing commercial structures combined with active/adaptive building systems

Technologies of interest, continued.

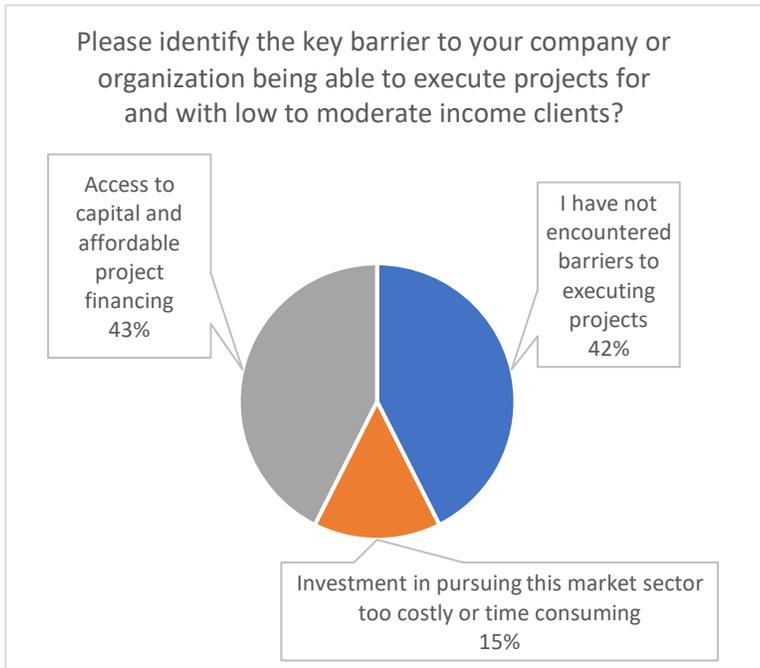
- Hydrogen as fuel, hydrogen synthesis and storage potential, fuel cells, developing solar technologies, industrial efficiency improvements, technology's role in clean energy workforce development, and its role in both identifying and achieving energy equity for disadvantaged groups, communities, and populations.
- Hydrogen development both green and blue
- Hydrogen manufactured and transported, materials required to distribute and pipe to customers
- IoT, LoRa, WiFi mesh, and other smart buildings communications technologies.
- Light commercial fuel cell technology
- Micro CHP
- Microgrids
- Necessary improvements to our infrastructure to accommodate H
- New software solution to integrate decentralized energy resources into the electricity grid
- One project in Maryland that we have been following is based at University of Maryland Eastern Shore and involves research at Hood College and The Ohio State University. Enzymes developed at Hood are used to break down the agricultural residues from hemp and cannabis that remain after the buds are harvested or when a field is too "hot" and exceeds the THC limits. The resulting sugars can be fermented into ethanol for fuel (including a precursor to jet fuel) and into chemicals from which plastics can be made. That kind of technological research, development and deployment should be supported.
- Small commercial battery storage
- Small modular nuclear reactors
- Solar and battery storage (multiple responses)
- Solar deployment as a means to reduce carbon emissions
- Solar endo cubes battery power for buildings
- Technologies which can transform greenhouse gas emissions into valuable products



For more information about the Maryland Energy Innovation Accelerator's (MEIA) programs and ways to participate, visit www.mdeia.org

WORKING WITH LMI STAKEHOLDER AUDIENCES AND CONSUMERS

As MCEC looks for ways to support energy equity and expand access to clean energy resources, please tell us more about how your organization engages with low-to-moderate income communities and individuals.



“Other” identified key barriers included:

- A lot of the reasons are true.
- Public entities we serve all provide services to the entire community
- Established utility/ state approved program for Community Solar
- Outreach to potential workers
- Access to capital that helps fix health and safety repairs necessary for clean and efficient energy technologies to be installed
- Many not set up to receive new information

Additional thoughts and suggestions for MCEC to help inform future programs, initiatives, and the appropriate investment of resources.

- Doing great, keep on keeping on
- Thanks for all your efforts - I really do appreciate the resources you make available and the events you host are very educational.
- We would appreciate more opportunities to highlight Maryland companies that are active in EV charging and clean energy industry investments.
- Just need better education to the consumers about what is available and why it is so good
- Community Solar, and moving beyond a PILOT program, but a sustainable, replicable program for future renewable energy growth.
- More marketing resources for C-PACE - e.g., one-pagers that give a good overview to someone who isn't familiar with how it works. MD-PACE is a GREAT resource, but having something that allows individuals to gain a basic level of understanding would be good to avoid information overload.
- An online webpage that allows entities needing Greenhouse Gas (GHG) emissions reduction to state what they need so companies can easily link with them to discuss solutions.
- My suggestions are included in the survey.
- While there's a lot of willingness to do something in this area, we see there's a clear gap to serve less affluent communities. For as far as solar energy is concerned, there's no clear state-supported program for the LMI market segment. There also needs to be a more widespread awareness of clean energy options at the consumer level.
- Solar, wind and other renewable sources will diminish the need for fossil fuels. Nuclear power will eliminate it.