Illinois Energy Efficiency Stakeholder Advisory Group

2020 SAG Portfolio Planning Process
Proposed Energy Efficiency Ideas Template

Submitter Contact Information

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Energy Efficiency Idea Questions

Please check the boxes below to identify 1) the type of idea; 2) which Illinois utility or utilities will be impacted by the idea; and 3) which EE sector the idea impacts.

Check	Type of Energy Efficiency Idea
☒	New Measure or New Program Idea
☒	Proposed Program Approach
☐	Innovative Idea

Check	Illinois Utility Impacted by Energy Efficiency Idea
☒	Ameren Illinois
☒	ComEd
☐	Nicor Gas

☐	Peoples Gas & North Shore Gas
☐	All Illinois Utilities

Check	Energy Efficiency Sector Targeted by Energy Efficiency Idea
☐	Residential Customers – Single Family (non-income qualified/income eligible)
☒	Residential Customers – Multifamily (non-income qualified/income eligible)
☐	Residential Customers – Single Family Income Qualified/Income Eligible
☒	Residential Customers – Multifamily Income Qualified/Income Eligible
☐	Small Business Customers (commercial & industrial sector)
☒	Medium/Large Business Customers (commercial & industrial sector)
☒	Other (research & development, emerging technologies, market transformation)

Variable Refrigerant Flow Technology

Description of Idea

Variable refrigerant flow (VRF) is a relatively new technology, with broad application, particularly in medium and large commercial buildings. Essentially it is similar to a building-scale split system heat pump, in that it uses refrigerant tubing to connect evaporator coils to the condenser coils and compressor(s). However, rather than being dedicated to a single set of components, the refrigerant tubing essentially serves as the HVAC distribution system in the building, in lieu of pipes or ducts. This offers some significant advantages. First, refrigerant tubing is much smaller freeing up usable space and can be easier and less costly to install. It also provides wide flexibility throughout the building, and can accommodate localized comfort solutions and facilitate changes of space use because heat pump components can effectively be located where most needed. It can also improve efficiency through the diversity of not having every zone calling for climate control simultaneously, meaning the compressors and condensers can operate at higher efficiency. Finally, if using a two-pipe system, it can provide very efficient simultaneous heating and cooling, which in large buildings can be important. Because it is fundamentally a heat pump technology, it can allow simply “moving” the heat/coolness that already exists from one zone to another at extremely high efficiency. For example, a large office building may need to heat perimeter zones while simultaneously cooling interior space.

Because of the flexibility and other factors, VRF systems now can often be the lowest first cost HVAC option in some commercial new construction. However, the technology overall is fairly new and penetration, and contractor experience are very low. In addition, we see VRF as a key emerging technology that will benefit from some early adoption to build capability and awareness. We think it could be particularly important as a way to convert some large existing buildings with electric resistant heating to HP technology. For example, large multifamily buildings, particularly in the IQ sector, may be a good initial target for this technology. While it is likely to be first and most easily embraced for new construction, because refrigerant tubing is very small, and

can likely fit in existing pipe chases or other cavities, it can also offer significant retrofit opportunities, and we encourage utilities to consider efforts addressing both markets.

Greater early adoption of VRF can help to build contractor installation capability and knowledge, help spur product development and widespread availability, and likely bringing costs down and spur greater innovation. There are also emerging significant concerns with common refrigerants that are potent greenhouse gases. Ultimate significant use of VRF systems is a cause for concern around the potential significant increase leaks of high-GHG potential refrigerants. Use of alternative refrigerants is in its infancy—especially in the U.S.—but they do exist. The PAs could perhaps encourage both greater adoption of VRF, but also with a specific effort to advance the transition to newer low-GHG refrigerants.

While it is likely the PAs may have already been involved in some custom VRF projects, we propose some targeted focus on this technology that could help to advance it while capturing cost-effective savings and providing good customer solutions. We envision this would primarily be through the Business Custom program, but could include some targeted outreach to specific customer segments, and development of one or more case studies that could be used to build interest and participation in future projects. We also suggest outreach to the manufacturer and contractor community. Many of the heat pump manufacturers provide training directly for contractors, and there may be opportunities to cooperatively work with them to build the contractor capacity and for joint marketing/outreach efforts. There may also be opportunities to educate the design community around this technology. Heat pump manufacturers are well aware of longer term policy goals around electrification and ready to engage with utilities and others to further this significant market opportunity for them. It is not clear whether efforts to advance VRF are best done through some targeted efforts within existing programs, or more appropriate for a more discrete pilot or R&D effort. For example, this could be a logical follow-on pilot effort similar to the IQ multifamily electric resistance to ductless minis-split pilot. This may also be of particular interest for new construction by large corporations with renewable energy goals that are pursuing all electric buildings.