
Maine Greenhouse & Covered Agriculture Program

Topic:

**REGIONAL YEAR ROUND AGRICULTURE
INFRASTRUCTURE DESIGN, SOCIO-
ECONOMIC & CULTURAL LEADERSHIP FOR
CONSIDERATION IN MAINE**

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M E S A S
The Maine Sustainable Agriculture Society

New approaches to year round food production are emerging in a number of temperate regions that share aspects of Maine's culture and winter climate. Below we feature a selection of social, ecological and economic approaches to leadership in the field. Please follow the embedded links for more information.

Regional Year Round Agriculture Infrastructure Design Leadership

Ceres Greenhouses Modular Systems - Boulder, CO

The VESTA Kit homekit and the Commercial Modular System

In our work with greenhouse design and developers, as well as field experience with infrastructure from Rimol, Ledgewood, ArchSolar and Harnois Brothers, we've seen a proliferation of greenhouse and tunnel designs. Ceres Greenhouses out of Boulder, CO offers a different model; they offer design, engineering, and construction management services that facilitates the use of local building materials and construction teams. While based out of Boulder, Colorado their systems are worth a look. They've developed a Ground to Air Heat Transfer (GAHT) climate battery system, have been testing phase change materials for everyday heat regulation, and have developed a monitor/controller for management of utilities.

For homescale/homestead and rural development needs the [VESTA homekit system](#) is notable. For commercial farms the [Commercial Modular Systems](#) offer some important insights Maine farms should take a look at. They are a young company serving a global market. Salt Flower Farm in Trenton, ME has recently installed a small Ceres designed greenhouse with their ground to air heat transfer system.

Threefold Farm's Climate Battery System Trials - Mechanicsburg, PA

[Threefold Farm's research](#) in collaboration with Penn State University has helped farmers understand the efficacy of climate battery systems. Their trials employed underground piping that circulated air from the growing environment of a high tunnel [removed comma] into the earth underneath with only small fans. This can drastically reduce the need for carbon fuel sources for heating in the winter.

Their efforts have helped launch a design and consulting firm Atmos Greenhouse Systems. They offer consulting services, blue prints, and custom design services.

University of Minnesota Cooperative Extension Deep Winter Greenhouse - Statewide, MN

Recent publication from the UMM Extension's Deep Winter Greenhouse Program are very useful for Maine farmers. Maintaining a cost effective structure in the winter is essential to improving covered systems on Maine farms. We all would like to build a state of the art greenhouse, however what can be done in the 20-30k range? UMM Extension has done a great job with their case studies and participatory field research.

View an early 2015 enterprise analysis [here](#).

View the full program report and analysis is available [here](#).

University of Vermont Cooperative Extension, Wash/Pack House Case Studies - Bennington, VT

The Ag Engineering program conducts research and education that's already impacted Maine farms. In fact, the program helped support Maine farms as they explore new wash & pack house systems including Hall Brook Farm in Thorndike, Wise Acres Farm in Kenduskeag, Ripley Farm in Dover-Foxcroft, Goranson Farm in Dresden, and Chewonki Farm in Wiscasset. Like UMM's analysis on deep winter infrastructure, UVM Extension has worked with growers to develop a model for wash/pack house planning across scales of operation, different crops, size, and various amounts of bells and whistles. The program grew from demand to help farms improve efficiency and profitability while also staying in compliance with buyer's standards and The U.S. Food and Drug Administration's [Food Safety and Modernization Act \(FSMA\)](#) and its provisions for produce. It's a great resource for planning your wash pack house project.

Case studies are available [here](#), and an 8-part webinar showcasing systems is available [here](#).

For more information on UVM Ag Engineering's work visit their blog and subscribe to their [podcast](#).

Social Equity, Digital Culture, and Steps to Tribal Sovereignty: The Greenhouse Program in Mi'kmaq'ik (a/k/a Nova Scotia)

Introduction

Digital Mi'kmaq is an indigenous led initiative based in the Canadian Maritimes. Their programs address the interplay of science, culture, education and digital skills. In addition to digital skills for youth, a new program centers greenhouse and food production in Potlotek, Lennox Island, Eel River Bar, Annapolis Valley and Miawpukek communities. as part an educational mission and building scalable economies.

Background and Application to Maine Agriculture and MESAS' Mission to Build Strong Communities

Mi'kmaq tribes, similar to other Wabanaki Confederacy tribes in Maine, played an enormous role in shaping the landscapes of abundance that North American agriculture stepped into - archeological and quaretnary research is showing what tribal people have been saying all along, that pre-colonial food culture was a system of ecosystem collaborations with the plant and animal world that created the abundance that colonial peoples stepped into when they arrived on the new continent.

Settler-colonial culture here in Maine suggests Ezekiel Holmes - who among other projects brought the Jersey and Dexter dairy breeds to regional farms - is the "father of Maine agriculture". While that's not untrue, it's fractional and recent when we begin to understand the multigeneration land management legacies of tribal peoples who's decendents make up today's renewed Wabanaki Confederacy.

Today, tribes maintain their identities and resilience despite being systematically cut off from seasonal patterns of ecosystem engagement by state and multi-generational settler claims to land. Currently, there is a deeper conversation of [clean water access](#), natural resources, [fishing rights](#), land access, [land expropriation](#), to be had. Good starting places for undersanding the erasure and replacement of Abenaki people in Southern Maine can be found [here](#). However, as we work to improve models of sustainable agriculture for the future Digital Mi'kmaq's approach stands out and may be a useful guide for Maine farmer/rematriation/development groups to follow. What is the relationship between digital culture and agriculture?

From the Digital Mi'kmaq [Website](#):

OUR MISSION

Digital Mi'kmaq is a ground breaking grassroots built Indigenous led initiative that aims to create lasting foundational change for a new generation through the interplay of science, culture, education and digital skills.

OUR VISION

Through the active implementation of programs, partnerships and innovation, Digital Mi'kmaq aims to create a new paradigm of social change by building economies of scale aligned with the concept of Etuaptmumk, Two-eyed Seeing

The Community Garden and Food Security Program

One of Digital Mikmaq's latest programs has begun to build geothermal greehouses and winter production spaces as part of a three tiered approach to greenhouse development programs that are part of a strategy of rebuilding long term economic and community resilience.

Maine's covered agriculture farmers and service providers, as well as aspring farmers, greenhouse classrooms, developers and farm tech entrepreneurs are brash to consider only economic opportunity of covered agriculture. We must value their socio/ecological impact and the continued importance of public-private partnership to help spearhead lasting economies of scale and deeper our collective understanding of the Mi'kmaq concept of [Etuaptmumk](#), Two-eyed Seeing.

Additional Covered Agriculture Businesses and Related Info/Services

Greenhouse and High Tunnels

ARCHSOLAR GREENHOUSES, Maine.....	www.archsolar.net
FARMER'S FRIEND LLC, Tennessee	www.farmersfriend.com/
HARNOIS INDUSTRIES, Ontario.....	www.harnois.com/en/
JOHNNY'S, Maine	www.johnnysseeds.com
LEDGEWOOD GREENHOUSES, New Hampshire	www.ledgewoodfarm.com/
NIFTY HOOPS, Michigan	www.niftyhoops.com/
RIMOL GREENHOUSES, New Hampshire	www.rimolgreenhouses.com/

Wood and Pellet Boilers for Hydronic Systems:

EasyPell Boilers (for smaller systems)	www.maineenergysystems.com/easypell/
Evo Wood Chip Boilers and Pellet Boilers.....	http://evoworldusa.com/
OkoFEN/MaineSYS Boilers	www.maineenergysystems.com
Kedel Boilers.....	https://kedelboilers.com
Fröling/TARM Chip, Pellet and Wood Gasification Boilers.....	https://woodboilers.com/

note: Check EPA Emission Standards to ensure the pellet-system you select will meets your needs

Solar Hot Water

A solar thermal water heater can supplement year round heating demand in a properly designed and sized “dual source” system. This can lead to significant savings in yearly heating cost. We'd like to see folks get better at adding and maintaining solar thermal in their systems.

[Here is a primer](#) from Vaughn Woodruff on adding solar heat to your hydronic system.

Solar Thermal Mass Water Tubes	www.solar-components.com/TUBES.HTM
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Heat Pumps

Air to water heat pump systems are currently not recommended for winter heating in greenhouses in Maine. They can be used effectively in the shoulder seasons and when temperatures don't frequently dip below 20degrees F.

Mini-split and single zone systems may be useful to supplement winter heating, or for shoulder season needs. We recommend talking to your HVAC service provider about whether a heat pump is right for your farm.

Maine Renewable Heating and Energy Businesses

ASSURED SOLAR, Falmouth.....	www.assuredsolar.com
INSOURCE RENEWABLES, Pittsfield.....	www.insourcerenewables.com/
REVISION ENERGY, South Portland & Liberty	https://www.revisionenergy.com/
SUNDOG SOLAR, Searsport	www.sundog.solar/
TRUE NORTH ENERGY SERVICES, Windham	www.truenorthenergyservices.com/

Government and Non-Profit

Maine Department of Agriculture Conservation and Forestry's agricultural solar siting [resources and fact sheets](#).

For other statewide info and resources on heating fuel and available systems visit the [Efficiency Maine's BioMass Boilers rebate program page](#) and their vendor [search tool page](#) helps you locates vendors that may not be listed here.

View the National [EPA's Renewable Heating and Cooling](#) fact sheet.

Farmer grants for high tunnels and conservation infrastructure [NRCS EQUIP Program](#)

Additional Resources

[UMaine Cooperative Extension's Agricultural Plastics Recycling Program](#) .Please recycle ag plastics.

Need help budgeting for new tools and infrastructure? Check out [ME SAS' draft editable Enterprise Greenhouse Budget Planning Tool](#). Use the tool to plug in and calculate cost, depreciation, estimated payback and carbon emissions for whole farm accounting and planning. This draft of the tool comes pre-loaded with a model budget.

For more info on solar greenhouse technologies see [National Center for Appropriate Technology "Solar Greenhouses" Fact Sheet](#). For info specific to Maine see [UMAINE Cooperative Extension Season Extension Bulletin](#) and the [Sustainable Year Round Agriculture Program Final report](#).

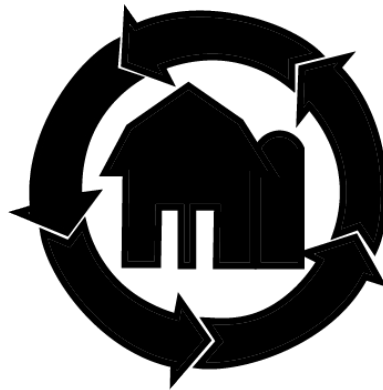
We recommend all beginning farmers and professionals from other industries who are interested in supporting Maine's farm sector familiarize themselves with the [Maine Farm Resource Network \(MFRN\)](#)

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