TABLE 2: *Alignment with NGSS Performance Expectations*

This table shows the connections of the Smart Greenhouse curriculum to the NGSS standards. Teachers should use this table when making connections between traditional STEM subject areas as well as connections between the Smart Greenhouse curriculum and traditional science standards.

Band	Disc.	Relevant Performance Expectations (bold means more computing)
MS	**PS**	MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.* **MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.**
MS	**LS**	MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*
MS	**ETS**	MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.**
HS	**PS**	HS-PS3-4. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). **HS-PS4-2. Evaluate questions about the advantages of using digital transmission and storage of information.**
HS	**LS**	**HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.** HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*
HS	**ESS**	HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.* **HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.***
HS	**ETS**	HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. **HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.**

Note. An asterisk (*) denotes a performance expectation that "integrates traditional science content with engineering through a practice or disciplinary core idea" (NGSS Lead States 2013, p. 70).