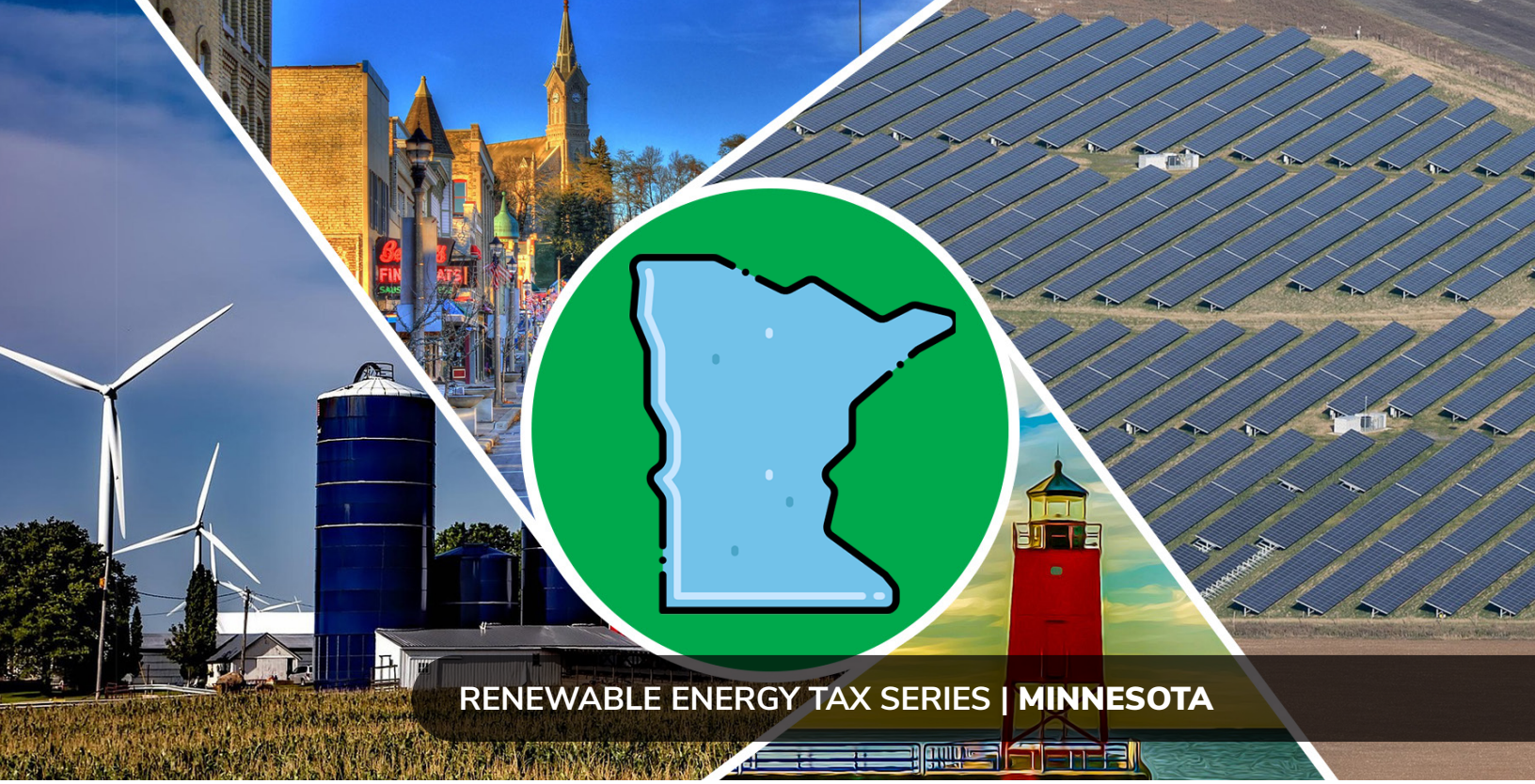

Local Property Tax Impacts of Large-Scale Wind and Solar Projects

Contact Center for Empowering Communities, University of Michigan

About the Series

This state-specific series explores one key question: How do property taxes from large-scale wind and solar projects impact local government budgets?

Renewable energy projects can boost rural economies and fund community priorities, but assessing their tax impacts is often difficult. This series aims to provide stakeholders with clear, detailed, and accurate information.

This material is for informational purposes only and is not intended as legal advice.

Renewable energy projects are expanding nationwide as governments and industries respond to climate change and advancing technology. This growth is expected to continue for projects of all sizes, especially utility-scale developments that power thousands of homes by feeding electricity directly to the grid. Spanning thousands of acres, these large projects are most often built in rural places and frequently on agricultural land.

Like other properties, these projects pay taxes to local government units, including towns, schools, libraries, and others. Energy property taxes are usually much higher than farmland taxes, though the size of the difference depends on state tax laws. Large-scale wind and solar projects are typically taxed in one of two ways: ad valorem (based on land and equipment value, taxed at local rates) or as a Payment in Lieu of Taxes or PILOT (often a flat rate tied to the project's electricity production capacity).

State policymakers determine which tax system applies and how it is implemented, balancing the trade-offs between lower taxes to attract developers and higher taxes to benefit host communities. These policies—from the broad structures to the tiny details—shape the size and distribution of tax payments over a project's 20- to 40-year lifespan. Sometimes units like counties and schools may be affected differently, and some local residents may benefit more than others. Policymakers must also plan for decommissioning to prevent "boom/bust" revenue cycles that can occur when major taxpayers enter and exit. With many of these policies newly established, state and local officials are still learning their applications and impacts.

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Overview: Wind and Solar Property Taxes in Minnesota

In Minnesota, wind and solar projects pay property taxes based on both land value and energy production. Land is classified according to its primary use—typically agriculture or energy production—and taxed at local rates accordingly. In addition, projects pay a production tax per **megawatt-hour** (MWh) of electricity generated annually.

- **Land tax:** Wind and solar projects continue to pay property taxes on the land they occupy, though sometimes the classification of the land changes. Land directly under solar panels is usually considered as commercial and taxed at a higher rate than agricultural land. In contrast, land around wind turbines typically retains its agricultural classification and lower **tax rate**.
- **Production tax:** Instead of paying personal property taxes on equipment, projects pay $1.20 per MWh of electricity produced each year. Annual production varies depending on factors such as local conditions (e.g., wind or sunlight levels), energy demand (e.g., grid power needs), and specific project requirements (e.g., maintenance, adverse conditions, compliance).

Example 1: 100 MW Solar Project in Nobles County, Minnesota

Table 1 shows estimated annual tax revenue from a hypothetical 700-acre, 100 MW solar project in Grand Prairie Township, Nobles County, in the Ellsworth School District. The land, valued at $8.4 million, is reclassified from agricultural to commercial. The production tax assumes the project generates approximately 192,720 MWh annually.

Table 1. Annual net impact and distribution for a 100 MW solar project in Grand Prairie Township, Nobles County.

	New Production Tax Revenue	Net Land Property Tax Revenue	Year 1 total tax impact
County	$185,000	$195,000	**$380,000**
Township	$46,000	$73,000	**$119,000**
School district	$0	$169,000	**$169,000**
Total net tax revenue	**$231,000**	**$437,000**	**$668,000**

Example 2: 100 MW Wind Project in Nobles County, Minnesota

Table 2 shows estimated annual tax revenue from a hypothetical 100 MW wind project in Grand Prairie Township, Nobles County, in the Ellsworth School District. We assume unchanged land tax classification so no change in revenue. The production tax assumes approximately 416,100 MWh of annual energy generation.

Table 2. Annual net impact and distribution for a 100 MW wind project in Nobles County.

	New Production Tax Revenue	Net Land Property Tax Revenue	Year 1 total tax impact
County	$399,000	$0	**$399,000**
Township	$100,000	$0	**$100,000**
School district	$0	$0	**$0**
Total net tax revenue	**$499,000**	**$0**	**$499,000**

Property tax laws vary by state. While states often use similar terms, their applied definitions can differ from place to place. Below, these shared terms are defined according to Minnesota's tax system.

Property Tax 101

- **Ad valorem:** A tax based on the value of the item being taxed.
- **Assessed value:** The value of a property set by a government for the purpose of taxation.
- **Capacity factor:** The likely production of an energy system's maximum output.[1]
- **Levy:** The total amount of property tax revenue that a taxing authority is authorized to collect in a given year.
- **Market value:** The price at which a property is most likely to be sold in the current real estate market.
- **Megawatt-hour:**[2] Measurement for the amount of electricity produced over a period of one hour.
- **Nameplate capacity:** The capacity of the energy project or maximum power output under ideal conditions.
- **Payment in Lieu of Taxes (PILOT):** Payments made by tax-exempt companies or organizations as a substitute for property taxes.
- **Personal property:** Moveable items, not permanently affixed to or part of the real estate, like solar panels.
- **Real property:** Land and permanent improvements to land, such as buildings.
- **Taxing district:** A geographic area with a distinct set of overlapping taxing units. The total taxing district rate is determined by adding each of the overlapping units' tax rates.
- **Tax liability:** The amount of taxes owed by a property owner to a government unit.
- **Tax rate:** A percentage at which a property owner is taxed on the value of their property.
- **Taxing unit:** Any government unit that imposes property taxes, such as counties, towns, school districts, and special districts.

Adapted from Lincoln Institute of Land Policy Property Tax Glossary.

Carleton College, MN. (Canva)

Minnesota: Key Concepts

- **Tax capacity and class rate:** Minnesota's process for determining property **tax liability** uses different terms than the typical **ad valorem** system, but the outcome is similar. A property's **taxable market value** is its **market value** after any relevant property exclusions or deferral programs.[3] The **class rate**, which depends on property type, is a standard adjustment to the taxable market value to determine its **net tax capacity**.[4] This is then multiplied by the local unit tax rate to determine the project's **tax liability**.

  Taxable Market Value x Class Rate = Net Tax Capacity[5]

  Net Tax Capacity x Local Tax Rate = Tax Liability

Table 3. Tax capacity and class rate example.

Typical system	Market Value	×	Adjustment	=	Taxable Value	×	Tax Rate	=	Tax Liability
Example	$200,000		50%		$100,00		0.4%		$400
Minnesota	Taxable Value Market	×	Class Rate	=	Net Tax Capacity	×	Tax Rate	=	Tax Liability
Example	$200,000		0.5%		$1,000		40%		$400

To set tax rates, local **taxing units** determine how much property tax revenue is needed for a given year using the following formula: Total Proposed Local Budget - Non-Property Tax Revenue = **Local Tax Levy**.[6]

Deeper Dive: Minnesota Property Tax Assessment Guidelines

Real Property

Land classification: County assessors are responsible for classifying land according to its primary use. The property classifications relevant to rural renewable energy projects are 2a/2b non-homestead agriculture land (commercial farming, wooded, or vacant rural land) and 3a commercial, industrial, and utility property.[7] Property under wind turbines is classified as if the land was never converted, based on its most probable use, likely agricultural.[8] Solar projects are classified as 3a property when all systems on the property total more than one MW in **nameplate capacity**. If the property is not primarily used for solar energy production, it is classified without regard to the project.

Determining tax capacity: Local assessors determine a property's taxable **market value** and property type. Non-homestead agricultural land has a 1% class rate. The class rate for commercial property has two tiers. The first $150,000 of market value is set at 1.5%, while remaining value is 2%. Table 4 provides an example.

Table 4. Real Property Tax Treatment for Agricultural and Commercial Land with $200,000 Taxable Market Value.[9]

Land Classification	Class Rate	Net Tax Capacity for $200,000 Taxable Market Value	Tax Liability for 40% Tax Rate
2a or 2b non-homestead agriculture property	1.0%	$200,000 x 1.0% = **$2,000**	$2,000 x 40%= **$500**
3a utility property	1.5% for first $150,000 2.0% for remaining value	$150,000 x 1.5% = $2,250 $50,000 x 2% = $1,000 **$2,250 + $1,000 = $3,250**	$3,250 x 40% = **$1,300**

Production Taxes

Payments in Lieu of Taxes: Instead of equipment property taxes, wind and solar projects with a **nameplate capacity** of greater than one MW pay $1.20 per **megawatt-hour** of production. Production-based revenue is collected and distributed by the counties, with 80% retained by the county and 20% distributed to the city or township where the project is located.[10] Project owners submit an Energy Production Report to the Department of Revenue to determine payments.[11] Planners can use **capacity factors** to estimate a project's likely production, though it varies.[12]

Developers of new or existing wind projects are permitted to negotiate an alternative annual **payment in lieu** of the wind energy production tax with host counties, towns, and cities. Payments may be based on project capacity or other factors. To date, few jurisdictions have entered into such negotiations.[13,14]

Energy production report late penalties: Wind and solar developers are required to submit an energy production report to the state by January 15 of the current tax year. Minnesota penalizes late filing by automatically applying a production rate of 30% of the **nameplate capacity** for solar energy systems and 60% for wind energy systems. These rates are up to double typical estimates for production rates of wind and solar projects, greatly increasing **tax liability**.

Discussion of Impacts

Production Tax Revenue Variation

Since energy project taxation is based on the amount of electricity produced each year, there is variation in the amount of tax revenue generated. This variation exists year-over-year for any given project (for example, if there is extended downtime for maintenance), as well as across regions within Minnesota. Some regions have wind and/or solar resources superior to others, enabling them to generate more renewable electricity and, subsequently, more tax revenue.

Distribution of Benefits

Production tax revenue is split between the county (80%) and city or township (20%). As such, county budgets stand to gain significant revenue, townships benefit modestly, and school districts do not benefit from production taxes. When **real property** tax classification changes from agricultural to commercial for solar projects, school district revenues will rise along with townships and counties. Unit **tax rates** vary depending on where the property is located.

Differences Between Solar and Wind Project Tax Revenue

Large-scale solar projects generate new **real property** tax revenue from their reclassification as commercial property. Wind projects, however, remain classified as agricultural land and do not generate any net real property revenue. Conversely, wind typically operates at a higher **capacity factor** than solar, leading to more production tax revenue. In certain instances, counties and townships could generate more total tax revenue from a highly productive wind farm than from a solar farm, though this revenue is likely to be spread across more jurisdictions since wind projects are more dispersed. As school districts do not get a share of the production tax, their budgets would be unaffected by a wind project as the land classification under wind turbines does not change.

Agricultural Property Tax Deferral Programs

There are two property tax deferral programs in Minnesota that allow qualifying agricultural and rural vacant lands to pay a lesser annual property tax: Green Acres Property Tax Deferral and Rural Preserve Property Tax Deferral. The deferred taxes are recouped upon the property's removal from the program when its classification changes, as is the case for large-scale solar projects. In these instances, if the land is sold to the developer, then the developer is responsible for paying the deferred taxes. If the land is leased to the developer, then the landowner is responsible for paying these deferred taxes.

OBSERVATIONS ON IMPACTS ACROSS STATES

- **Closer neighbors benefit more:** Because projects pay taxes to overlapping **taxing units** (e.g., county, township, and school), those living nearest—who use all these public services—see the greatest economic impact.
- **Less populous areas benefit more:** Since tax benefits are distributed within the project's **taxing units**, counties and townships with fewer residents receive a higher per-person benefit.
- **Tax revenue becomes more concentrated:** A large taxpayer like a wind or solar farm shifts the tax base, increasing reliance on a single source. When the project is decommissioned, local units may struggle to replace the lost revenue.
- **Wind project revenue is more dispersed:** Wind farms retain most farmland, converting only 0.5 to 1 acre per turbine constructed. With turbines spread over many more acres than solar panels, less agricultural tax revenue is lost and benefits are shared across more **taxing units**.

Calculation Steps

This example calculates the total tax impacts when 700 acres of agricultural land is converted to a 100 MW solar project in the Township of Grand Prairie, Nobles County. While projects typically span multiple jurisdictions, this example assumes a single taxing district to simplify calculations. Year 1 tax data is from 2025. This calculation uses effective tax rates, which factor in deferrals and exclusions to provide a more accurate estimate of unit tax revenue. Numbers are rounded.

Step 1: Calculate Annual Production Tax

A. Determine megawatt-hour based payments.

- Project capacity: 100 MW
- Total hours in one year: 8760 hours
- Solar capacity factor (Nobles County): Estimated 22.0%
- Solar tax rate (≥ 1 MW): $1.20/MWh

100 x 8760 x 22% x $1.20 = $231,000

B. Determine distribution between county and township.

- Share of production tax to county: 80%
- Share of production tax to township or city: 20%

$231,000 x 0.8 = $185,000 to county

$231,000 x 0.2 = $46,000 to township

Step 2: Calculate Year 1 Real Property Project Tax Payments

A. Estimate land value.

- Project area: 700 acres
- Average market value (Nobles County, 2024): $12,000/acre

700 x $12,000 = $8.4 million

B. Determine Year 1 real property project tax payments.

- Commercial effective tax rate (Nobles County): 2.58%
- Commercial effective tax rate (Town of Grand Prairie): 1.11%
- Commercial effective tax rate (Ellsworth School District): 2.23%

2.58% x $8.4 million = $217,000 to county

1.11% x $8.4 million = $93,000 to township

2.23% x $8.4 million = $187,000 to school district

Step 3: Subtract Previous Agricultural Tax Payments

A. Estimate farmland land value.

- Project area: 700 acres
- Average market value (Nobles County, 2024): $12,000/acre

700 x $12,000 = $8.4 million

B. Determine previous farmland tax payments.

- Agricultural homestead effective tax rate (Nobles County): 0.25%
- Agricultural homestead effective tax rate (Town of Grand Prairie): 0.22%
- Agricultural homestead effective tax rate (Ellsworth School District): 0.22%

0.25% x $8.4 million = $22,000 to county

0.22% x $8.4 million = $18,000 to township

0.22% x $8.4 million = $18,000 to school district

Step 4: Calculate 1 Year Property Tax Impacts and Distribution

	Year 1 Project Tax Payments	County	Town	Schools
Production tax	$231,000	$185,000	$46,000	$0
New real property tax	$497,000	$217,000	$93,000	$187,000
Previous agricultural property tax	($61,000)	($22,000)	($18,000)	($18,000)
Total Year 1 net impact	$667,000	$380,000	$121,000	$169,000

Step 5: Determine Total Tax Impacts and Distribution over Project Lifetime

A. Include supplemental tax revenue tools

- Contact the jurisdiction to find out if economic development agreements, tax abatements, or other considerations apply.

B. Extend calculations to other taxing units and years

- Use our published calculator for complete multi-year analysis across all units.

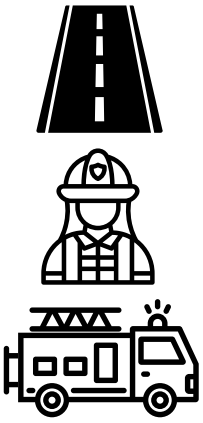
Step 6: Translate to Possible Uses of Tax Revenue

A. Use Table 5 to find cost estimates for common expenditures that are funded by local property tax revenue.

Table 5. Cost Estimates for Uses of Tax Revenue.

Expenditures	Estimated Cost
Highway and Bridge Construction	~$41,462 per lane-mile (2022)[17]
Roadway Maintenance	$12,492 per lane-mile (2022)[18]
Firefighters	~$64,518 total (salary + benefits)[19]
Fire Trucks or Apparatus	**Varies:** Regular Fire Truck: $900K-1.3M each[20] Electric Fire Truck: $1.85M each[21]
Public School Teachers	~$97,056 total (salary + benefits)[22]
Librarians	$93,900 total (salary + benefits)[23]
School Building Improvements	**Varies by district:** Aitkin $59.4M (replacement); Badger $5.3M (repairs/accessibility)[24]

B. Calculate benefits based on net tax revenue in Step 4.[16]



Expenditures	Year 1 Net Tax Revenue (Non-PILT)	Total Possible Benefit in Year 1
Roadway Maintenance	County: $380,000	~115 miles
Firefighters	Township: $121,000	~.1 full-time firefighter salaries
Fire Trucks	Township: $169,000	~1.7 cost of a regular fire truck

CALCULATIONS FOR LARGE-SCALE WIND PROJECTS

To calculate total impacts for a 100 MW wind project, update the **capacity factor** value in Step 1. Wind energy tends to have a higher capacity factor, which increases the amount of electricity generated compared to a solar project. Since there is no change in the underlying **real property**, skip Steps 2 and 3.

CALCULATIONS FOR MULTIPLE TAXING DISTRICTS[15]

If the wind or solar farm stretches across more than one county/city/township, its production tax revenue will be split among each **taxing district**. For solar projects, the production tax is allocated based on how much of the solar project, measured in installed capacity, is in each jurisdiction. For wind projects, the tax is allocated based on how many wind turbines are in each jurisdiction.

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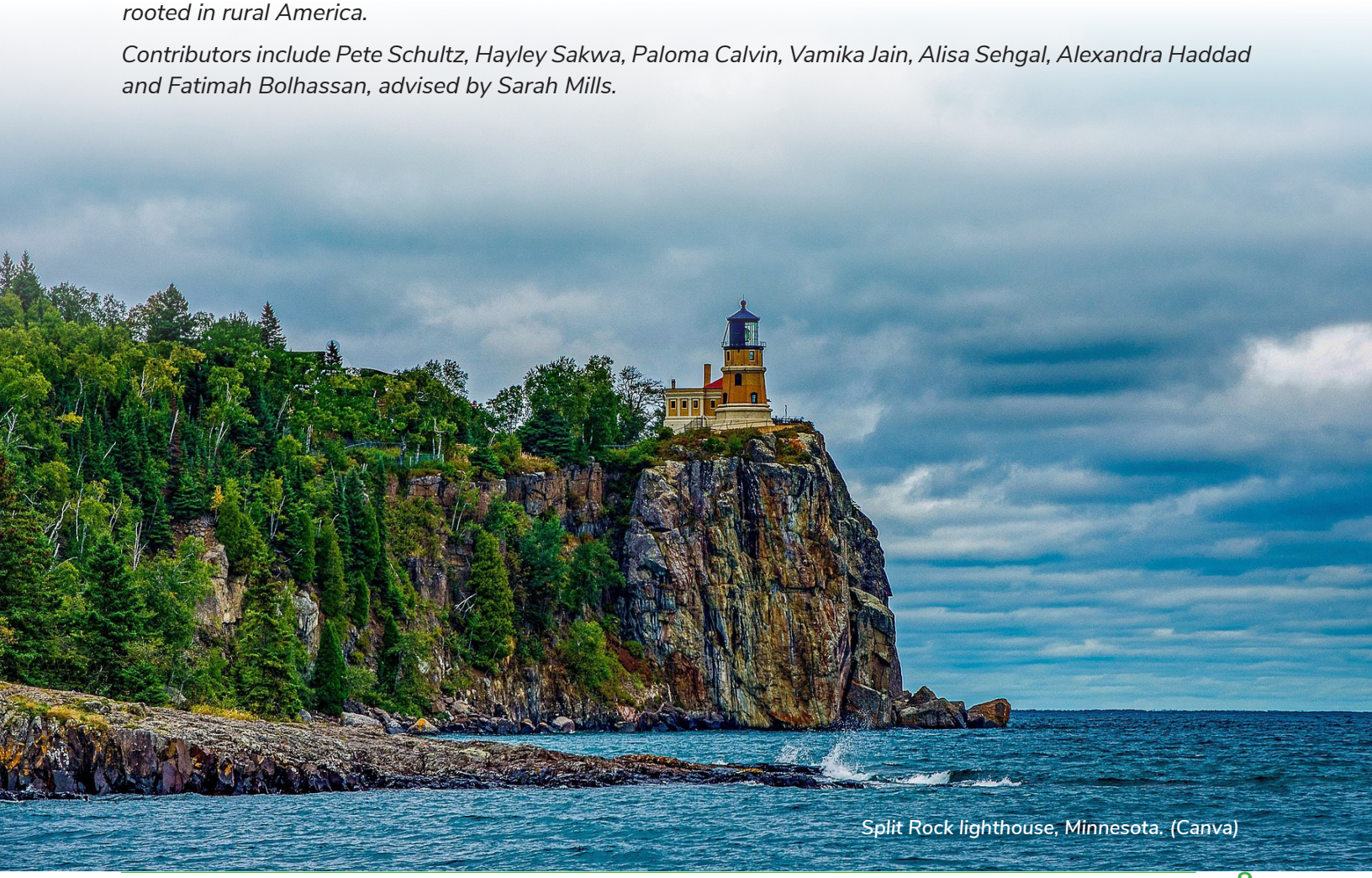

Split Rock lighthouse, Minnesota. (Canva)

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