Assessing Social and Economic Effects of Marine Energy: Tools and Recommendations

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Mikaela Freeman, Debbie Rose, Marley Kaplan
Pacific Northwest National Laboratory

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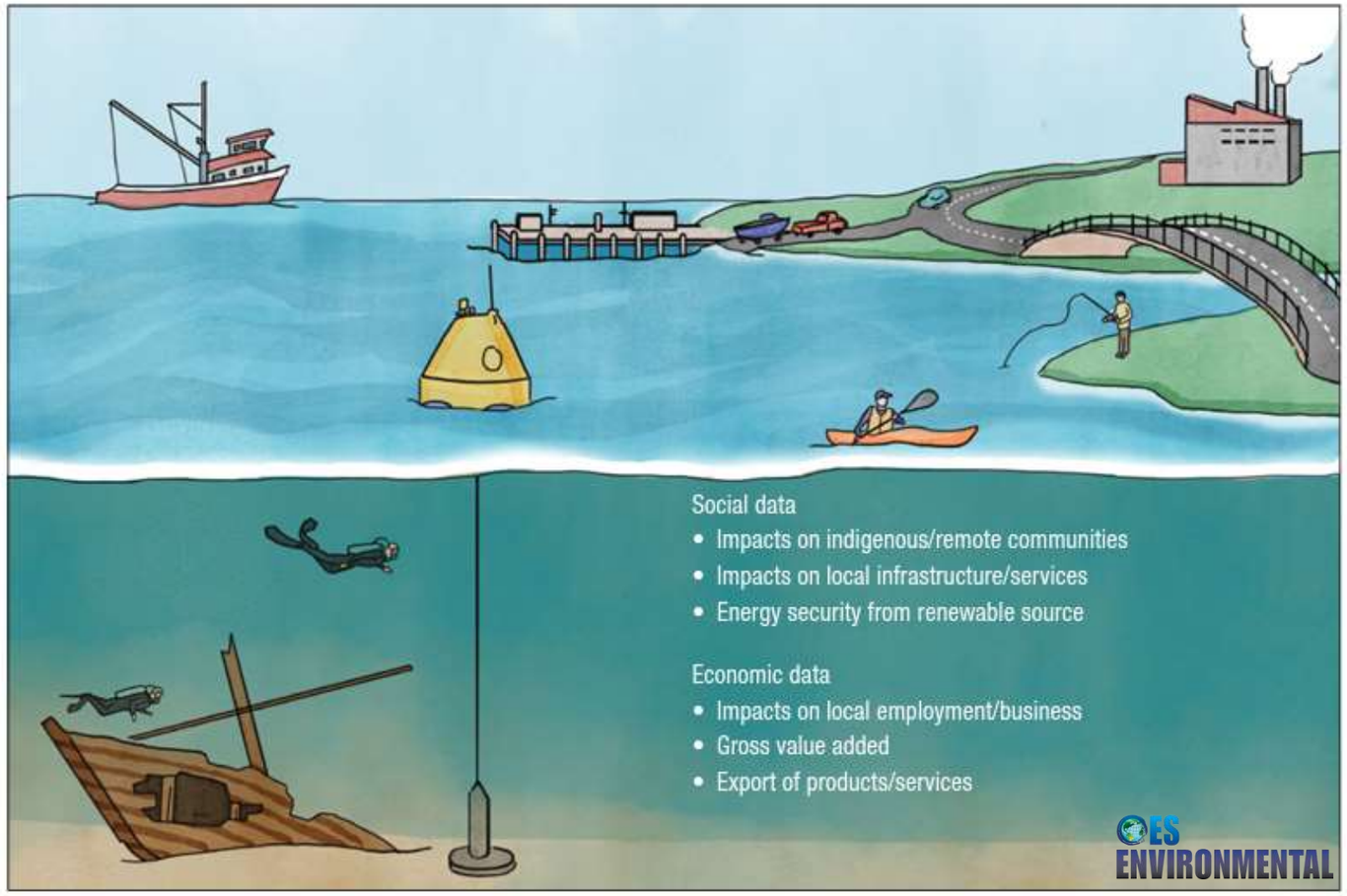
Social and Economic Data for Marine Energy

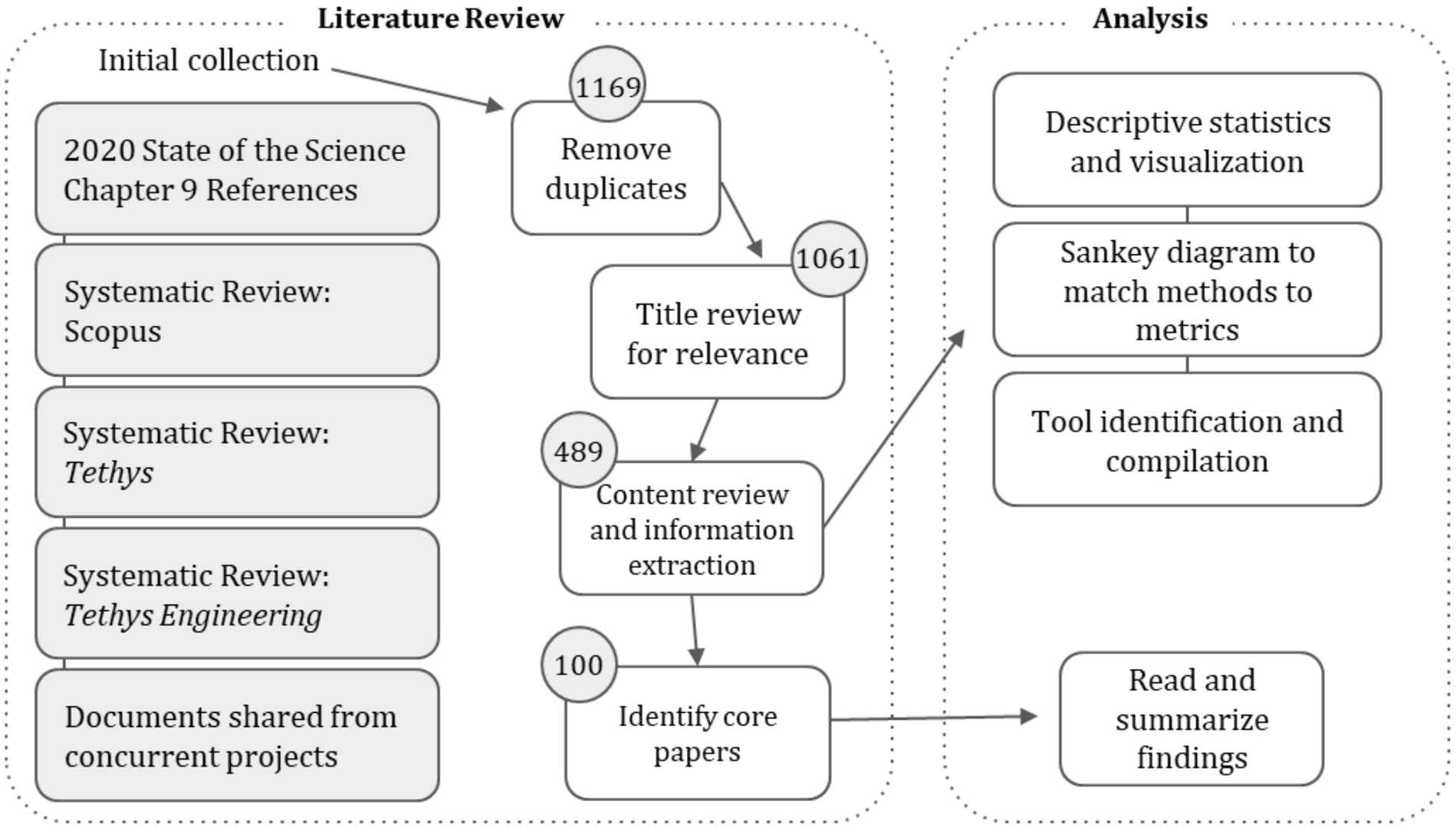


- Need for data collection in consenting, with emphasis on impacts
- Builds on OES-Environmental's efforts: data collection, good management practices
- Deployment Readiness Framework: develop toolkit

Objectives

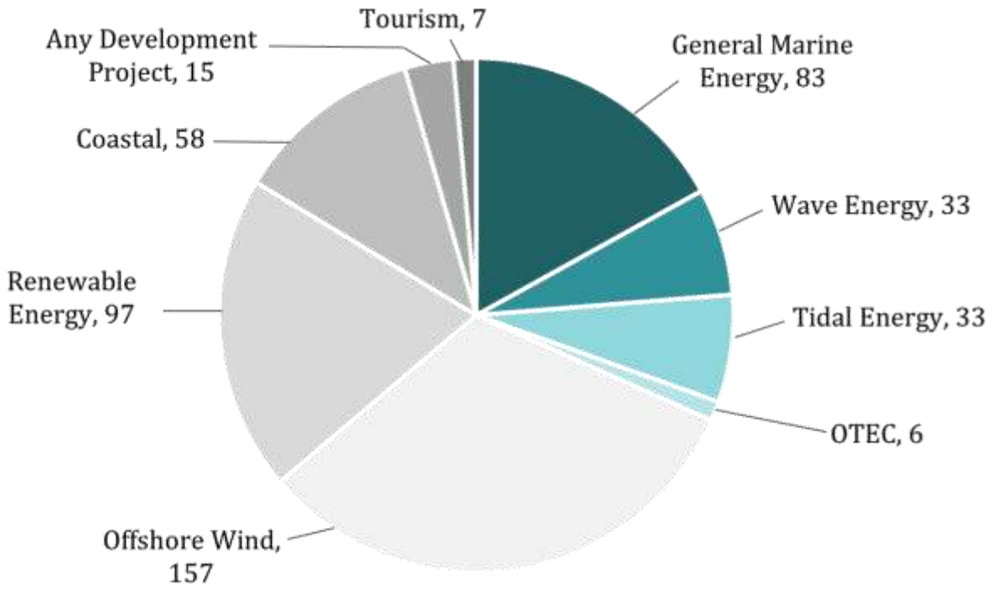
- Allow for easy access to information on social and economic data, how to collect it (baseline and impacts), with examples
- Provide social science background (definitions) for a traditionally technical audience
- Guide data collection efforts with a template

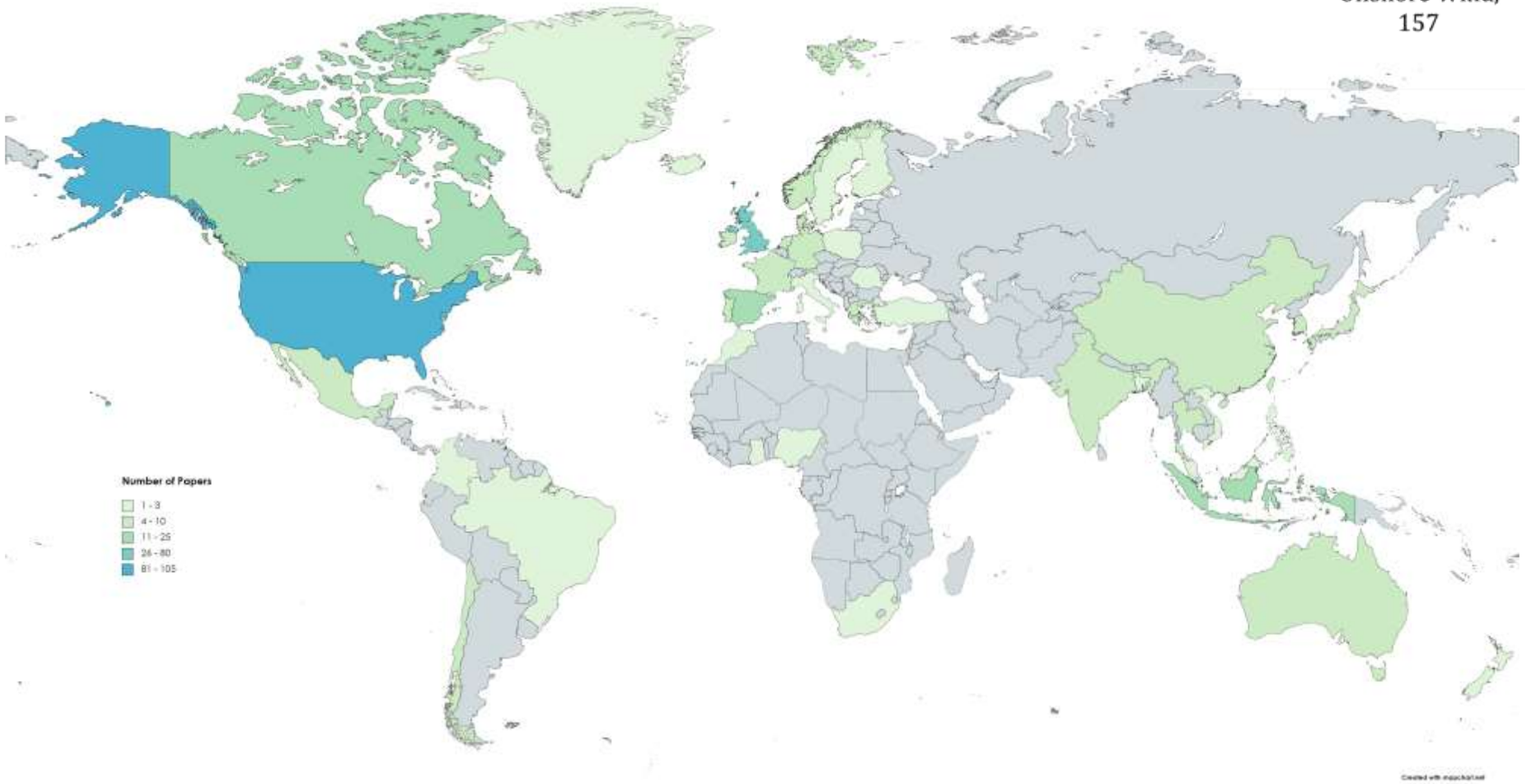
Methods


Literature Review
Initial collection
2020 State of the Science Chapter 9 References
Systematic Review: Scopus
Systematic Review: *Tethys*
Systematic Review: *Tethys Engineering*
Documents shared from concurrent projects
1169
Remove duplicates
1061
Title review for relevance
489
Content review and information extraction
100
Identify core papers
Analysis
Descriptive statistics and visualization
Sankey diagram to match methods to metrics
Tool identification and compilation
Read and summarize findings

Available Literature

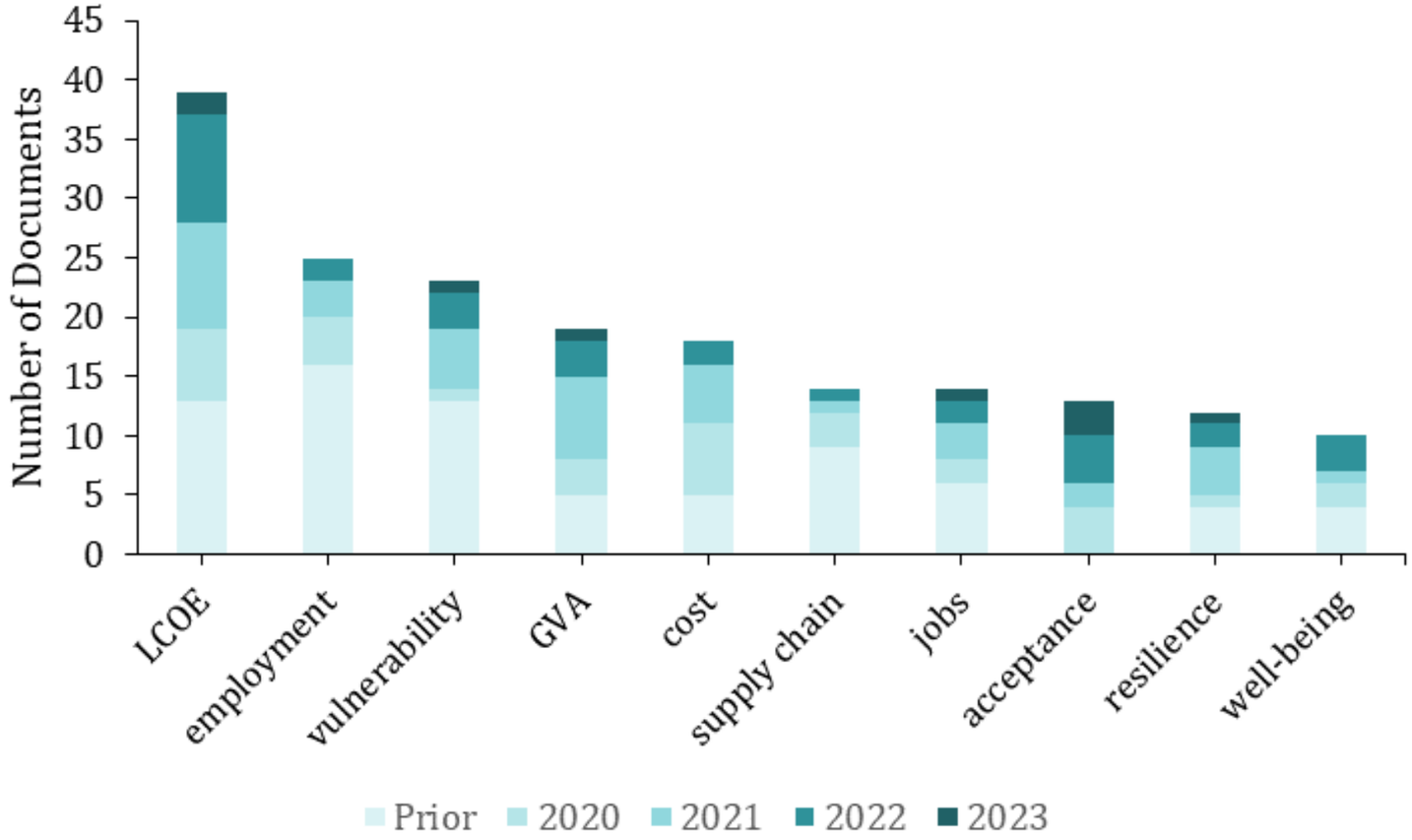
- 489 journal articles and reports
- 44 countries, primarily United States and United Kingdom





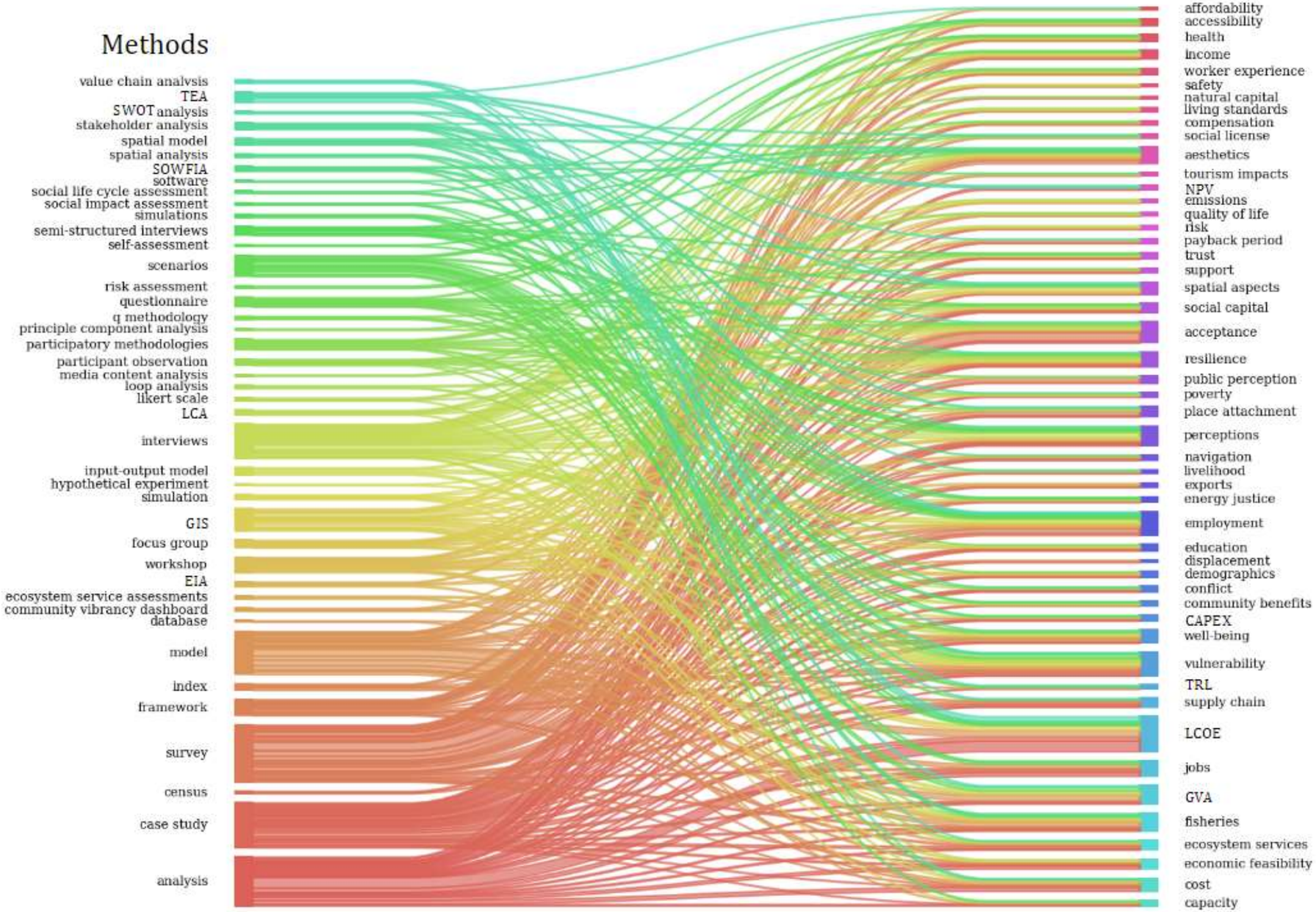
Results: Metrics

- 558 unique metrics were identified
- Top Metrics



LCOE = levelized cost of energy
GVA = gross value added

Results: Methods



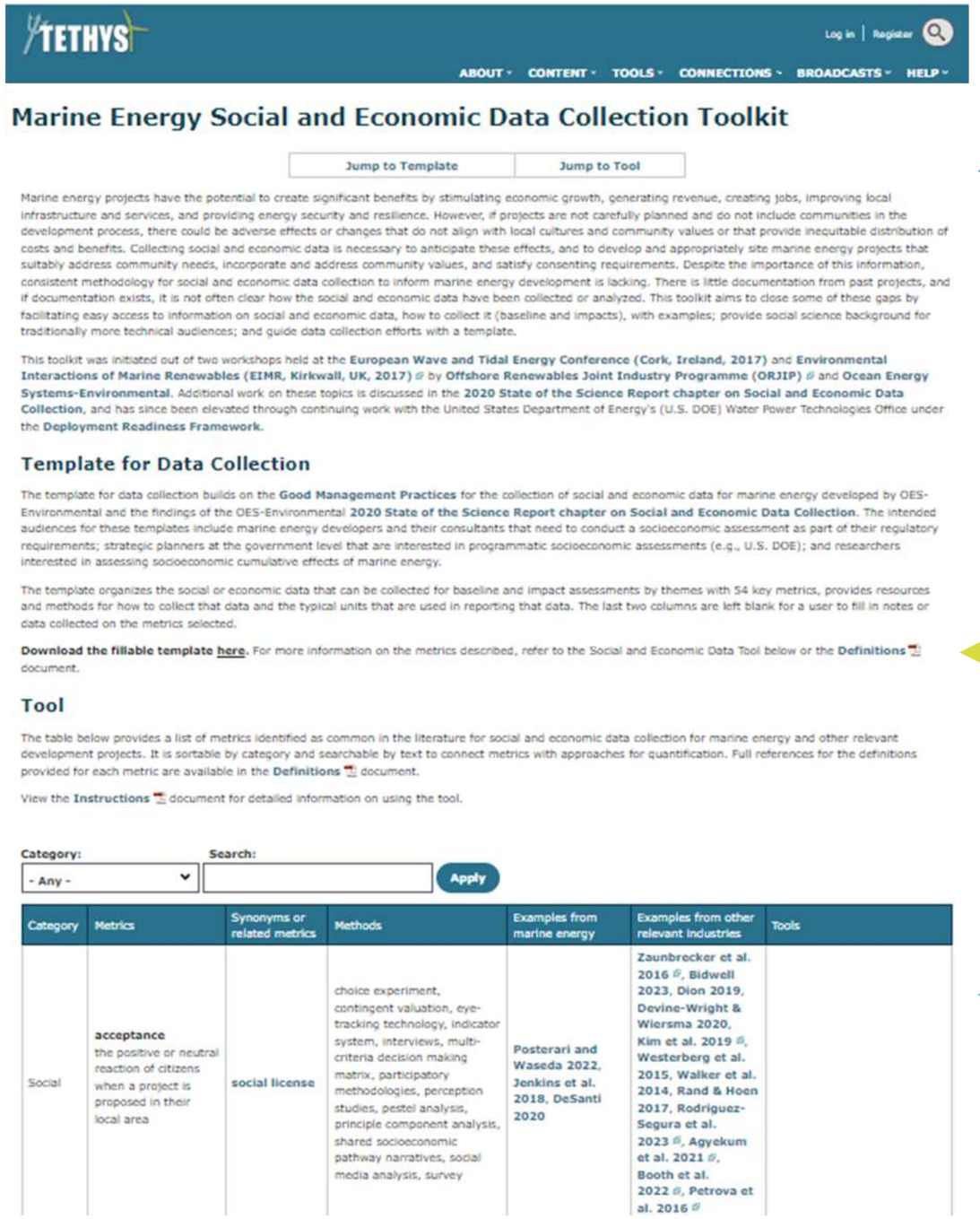
Findings

- For marine energy, current focus on methods or metrics around feasibility, planning, siting, or technology performance, not social or economic effects
- Ample literature to learn from other industries (fisheries, offshore wind) for anticipating and assessing social and economic effects
- Stakeholder engagement early and often in the planning phase is needed to:
  - Identify potential effects of concern,
  - Site appropriately around co-users of a space,
  - Develop mitigation, and
  - Plan for equitable distribution of benefits

Toolkit Development

Template for Data Collection

In development



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ABOUT CONTENT TOOLS CONNECTIONS BROADCASTS HELP

Marine Energy Social and Economic Data Collection Toolkit

Jump to Template | Jump to Tool

Marine energy projects have the potential to create significant benefits by stimulating economic growth, generating revenue, creating jobs, improving local infrastructure and services, and providing energy security and resilience. However, if projects are not carefully planned and do not include communities in the development process, there could be adverse effects or changes that do not align with local cultures and community values or that provide inequitable distribution of costs and benefits. Collecting social and economic data is necessary to anticipate these effects, and to develop and appropriately site marine energy projects that suitably address community needs, incorporate and address community values, and satisfy consenting requirements. Despite the importance of this information, consistent methodology for social and economic data collection to inform marine energy development is lacking. There is little documentation from past projects, and if documentation exists, it is not often clear how the social and economic data have been collected or analyzed. This toolkit aims to close some of these gaps by facilitating easy access to information on social and economic data, how to collect it (baseline and impacts), with examples; provide social science background for traditionally more technical audiences; and guide data collection efforts with a template.

This toolkit was initiated out of two workshops held at the **European Wave and Tidal Energy Conference (Cork, Ireland, 2017)** and **Environmental Interactions of Marine Renewables (EIMR, Kirkwall, UK, 2017)** by **Offshore Renewables Joint Industry Programme (ORJIP)** and **Ocean Energy Systems-Environmental**. Additional work on these topics is discussed in the **2020 State of the Science Report chapter on Social and Economic Data Collection**, and has since been elevated through continuing work with the United States Department of Energy's (U.S. DOE) Water Power Technologies Office under the **Deployment Readiness Framework**.

Template for Data Collection

The template for data collection builds on the **Good Management Practices** for the collection of social and economic data for marine energy developed by OES-Environmental and the findings of the OES-Environmental **2020 State of the Science Report chapter on Social and Economic Data Collection**. The intended audiences for these templates include marine energy developers and their consultants that need to conduct a socioeconomic assessment as part of their regulatory requirements; strategic planners at the government level that are interested in programmatic socioeconomic assessments (e.g., U.S. DOE); and researchers interested in assessing socioeconomic cumulative effects of marine energy.

The template organizes the social or economic data that can be collected for baseline and impact assessments by themes with 54 key metrics, provides resources and methods for how to collect that data and the typical units that are used in reporting that data. The last two columns are left blank for a user to fill in notes or data collected on the metrics selected.

Download the fillable template here. For more information on the metrics described, refer to the Social and Economic Data Tool below or the **Definitions** document.

Tool

The table below provides a list of metrics identified as common in the literature for social and economic data collection for marine energy and other relevant development projects. It is sortable by category and searchable by text to connect metrics with approaches for quantification. Full references for the definitions provided for each metric are available in the **Definitions** document.

View the **Instructions** document for detailed information on using the tool.

Category: - Any - Search: Apply

Category	Metrics	Synonyms or related metrics	Methods	Examples from marine energy	Examples from other relevant industries	Tools
Social	**acceptance** the positive or neutral reaction of citizens when a project is proposed in their local area	**social license**	choice experiment, contingent valuation, eye-tracking technology, indicator system, interviews, multi-criteria decision making matrix, participatory methodologies, perception studies, pestel analysis, principle component analysis, shared socioeconomic pathway narratives, social media analysis, survey	**Posterari and Waseda 2022, Jenkins et al. 2018, DeSanti 2020**	**Zaunbrecker et al. 2016, Bidwell 2023, Dion 2019, Devine-Wright & Wiersma 2020, Kim et al. 2019, Westerberg et al. 2015, Walker et al. 2014, Rand & Hoen 2017, Rodriguez-Segura et al. 2023, Agyekum et al. 2021, Booth et al. 2022, Petrova et al. 2016**	

Background

Definitions of Common Metrics

Methods and Tools to Collect Data for Common Metrics

Methods and Tools to Collect Data for Common Metrics

- Searchable table connecting common social and economic metrics from the literature with approaches for quantification

Category: - Any -

Search: Apply

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Economic	**capacity** a non-static aspect describing the human, technical, economic, or social resources available in a community to participate	adaptation resilience	case study, comprehensive vulnerability framework, economic analysis, focus group, fuzzy logic model, geospatial analysis, industry research, interviews, observations, participatory methodologies, scenarios, social capital analysis, structural equation modeling, survey	Marine Energy Wales 2020, Kazimierczuk et al. 2023	Tull et al. 2016	AEDG Community Metric Explorer

Template for Data Collection

- Includes good management practices
- Template with metrics, resources, typical units, and blank columns for users to complete

	Type of Data/Information	Methods + Resources	Typical Units and Scale of Collection	Findings for Project	
				Baseline Data	Monitoring Data
	Social/Cultural Context and Communities				
Social	• Adaptation	Adaptation is an aspect of a community's capacity and can be assessed using community based scenario planning (Bennett et al., 2016) and participatory action research (Sumardjo et al. 2019). It is often assessed in the context of climate change resilience.	Unitless, described based on the ability of a person or people to change; how easy or difficult different paths are. Adaptation attributes could be available at a strategic level, though additional information and conversations with communities will need to be had to determine adaptation at a project level.		
Social	• Behaviors	Community behaviors can be assessed using surveys (Community Toolbox Section 7) at regular intervals to collect data relevant to project acceptance, renewable energy technology adoption, or participation (Klein and Coffey 2016).	Behaviors can be measured through the decisions that a person makes. Individual or community behavior data is typically collected at the project level.		
	Employment and Wages				
Economic	• Employment	Existing employment information is often available in public census data. Employment effects can be measured using a coupled Techno-economic Input-Output Model that considers project design, operation, and costs, location of the project, and device information to project the total gross added value and number of created jobs (Draycott et al. 2018).	Total job years per project phase. Employment data is often collected at a strategic level, though planning and monitoring may be done at the project level.		
Economic	• Income	Information on income can be found through public census data or within interviews and surveys to a community. A stated preference approach can be used to understand how income level may impact perceptions of the effects of renewable energy projects (Dalton et al. 2020).	Annual pre- or post-tax household income, annual salary ranges. Income data for specific jobs or communities is often collected at a strategic level, though planning and monitoring may be done at the project level.		

Next Steps

- Receive expert review for Toolkit, and specifically Template
  - https://tethys.pnnl.gov/marine-energy-social-economic-data-collection-toolkit

- Release the tool publicly in mid-2024
  - Webinar via Tethys/OES-Environmental
  - Featured in OES-Environmental 2024 State of the Science report – Social and Economic Effects of MRE chapter

Thank you!

Mikaela Freeman
mikaela.freeman@pnnl.gov

Debbie Rose
deborah.rose@pnnl.gov

Marley Kaplan
marley.Kaplan@pnnl.gov