What is Carbon TIME? Carbon: Transformations in Matter and Energy (Carbon TIME) is a set of teaching units for middle and high school science classes focusing on processes that transform matter and energy in organisms, ecosystems, and global systems: combustion, photosynthesis, cellular respiration, digestion, and biosynthesis. Students use these cellular and chemical processes to explain the functioning of organisms – plants, animals, decomposers - as well as ecological and global carbon cycling.

Carbon TIME units: There are six units. Systems and Scale is the foundational unit, exploring matter and energy through combustion. Plants, Animals, and Decomposers examine matter and energy in individual organisms. Ecosystems and Human Energy Systems focus on carbon and energy at larger scales. Each unit requires about three weeks of classroom time.

Carbon TIME resources: Our online units are designed around a clear Instructional Model. Formative assessments, hands-on investigations supported by videos, molecular modeling activities, and animations of carbon-transforming processes and carbon cycling are included. Tools are provided to elicit and develop student thinking.

The citizenship connection: Carbon TIME units prepare students to be productive and well-informed citizens as they make decisions about their personal health and consumption and as they consider public issues associated with our carbon footprints and climate change.

The NGSS connection: The Next Generation Science Standards will require new approaches to science teaching that are rigorous and responsive: engaging students actively in science and engineering practices and providing students with specific targeted coaching. All Carbon TIME units, lessons, and activities are aligned with NGSS practices, crosscutting concepts, and disciplinary core ideas.

How do we know students are learning? Results from our pre/post assessments tell us that after three Carbon TIME units, middle school students (highest red bar) and high school students (highest green bar) show higher learning gains than students who didn’t study Carbon TIME (blue bars), including college students (highest blue bar). All six Carbon TIME units come with pre/post assessments and instructional materials for all activities.
The Michigan connection:

Michigan science teachers and school districts are looking for curriculum, coordinated professional development, and support in transitioning to the new Michigan Science Standards and goals for 3-Dimensional science teaching and learning.

*Carbon TIME* provides you with

- **FREE**, research-based middle and high school science curriculum:
  - 6 complete units, fully aligned to NGSS/MSS
  - Student-facing materials to elicit initial ideas, develop models, make evidence-based arguments, and write scientifically-correct explanations
  - An Instructional Model that supports teaching with cross-cutting concepts and science and engineering practices

- **FREE**, research-based, online assessments:
  - Overall and unit-specific pre- and post-tests
  - Formative assessment and grading supports for teachers

*Carbon TIME* implementation is best supported through collegial networks participating in coordinated professional development.

Please contact us about developing networks like this at your building or district level.

contact us: envlit@msu.edu

carbontime.bscs.org