

Our first grant for the development of *Carbon: Transformations in Matter and Energy (Carbon TIME)* is reaching its conclusion after three years of pilot testing. Pilot versions of the units are available now, and final versions will be available in Spring 2015.

**What is Carbon TIME?** *Carbon TIME* is a set of teaching units focusing on processes that transform carbon: combustion, photosynthesis, cellular respiration, digestion, and biosynthesis. Students use these cellular and chemical processes to explain the functioning organisms – plants, animals, decomposers - as well as ecological and global carbon cycling.

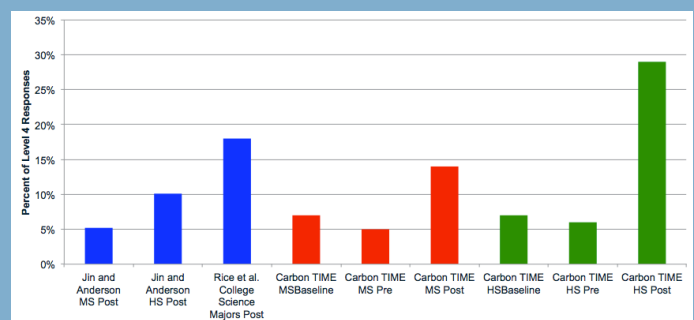
**Carbon TIME Units** include *Systems and Scale, Plants, Animals, Decomposers, Ecosystems, and Human Energy Systems*. The first four units examine matter and energy at an organismal scale, and *Ecosystems and Human Energy Systems* focus on carbon and energy at a large scale.

**Carbon TIME resources include:** online formative assessments, hands-on investigations supported by videos, molecular modeling activities, animations and simulations of carbon-transforming processes and carbon cycling, posters, and graphic organizers.

**The NGSS Connection:** All *Carbon TIME* units, lessons, and activities are aligned with the Next Generation Science

Standards and Science and Engineering Practices. All units focus on the Crosscutting Concept *Energy and Matter: Flows, Cycles, and Conservation*.

**How do we know students are learning?** Results from our pre/post assessments tell us that after three units of *Carbon TIME*, 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.



If you are interested in participating or if you have any questions please email our project manager Staci Sharp ([sharpst5@msu.edu](mailto:sharpst5@msu.edu)).

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# Carbon TIME

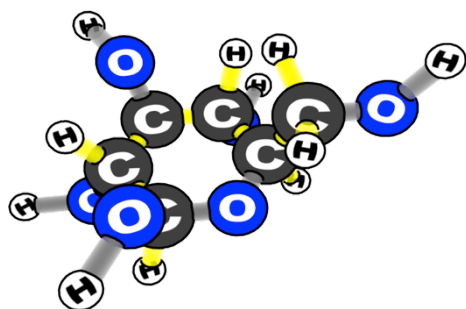
## Teaching Opportunities for 2014-2015

**Good news:** We are happy to report that we have received a new grant from the National Science Foundation to continue working on this project through 2019. Our work will include revising and expanding the *Carbon TIME* units to include case studies and decision-making lessons, creating an online professional development course, and creating local support networks for teachers using *Carbon TIME*. During the 2014-2015 school year we will have several opportunities for teachers to participate in planning and data collection for *Carbon TIME*.



### Teaching revised *Carbon TIME* units

Draft versions of our revised units are going onto the National Geographic website now. We hope to find teachers who are interested in teaching at least three of the revised units and providing pretest, posttest, and unit test data. Participating teachers will receive a \$200 mini-grant for supplies and a \$300 payment as compensation for their time and effort.



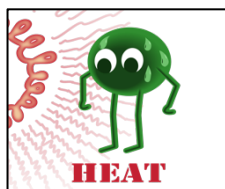
### Interviews about teaching *Carbon TIME*

We would like to conduct telephone interviews with teachers who are teaching *Carbon TIME* units this year or have taught those units in the past. We will be especially interested in getting your views on the challenges of teaching for teachers and students and comments on particular lessons or examples of student work. Participating teachers will receive \$100 for two 45-minute interviews.



### Teaching *Carbon TIME* with coaching and data collection

We will be seeking a small number of teachers with whom we can work closely, including both teachers teaching *Carbon TIME* for the first time and teachers who have taught *Carbon TIME* before. These teachers will receive personal visits from a *Carbon TIME* staff member who will coach and assist them with problems that arise, as well as interviewing them about their teaching, videotaping selected lessons, and interviewing focus students. Participating teachers will receive a payment of \$2000 for the additional work involved in this intense process.



### Other opportunities

There will also be other opportunities available, including:

- Piloting new assessment items and interview questions
- Piloting new activities focusing on sustainability, media literacy, and decision making
- Development of videos for our new online course
- Responding to ideas and pilot versions of the online course that we will be developing with National Geographic for *Carbon TIME*.