Summary of Public Comments on the July 2014 Draft of
the *Next Generation Science Standards Systems Implementation Plan for California*
(Date Prepared: August 28, 2014)
California Department of Education

Comments received at ngss@cde.ca.gov from July 25 to August 25, 2014. An additional one hundred comments were received that address various aspects of the CA NGSS. These do not pertain to the NGSS Systems Implementation Plan

Due to the high number of public comments, only those related to the Next Generation Science Standards System Implementation Plan for California are included in the table below. Only the portions of the comments related to the Plan are shown in the table. The comment number references the comment number in the "All Public Comments" document.

Comment #	Source (Name, Organization)	Comments	Section
8	Retter St.John, JFK High School, Sacramento, CA	The implementation timeline does not appear to be well defined in terms of the implementation phases: awareness, transition and actual implementation. Is it possible to clarify the beginning and end of each phase by year?	Timeline
9	Sujatha Raghu	Start the implementation first with elementary grades 1 and 2 in the year 2015-16., 2. Add grade the following year and continue in that vein., Please start bottom up and implement gradually. The problem with all grades simultaneously adopting the standards are going to lead to learning gaps for students. Teachers will have time to adapt, get professional development and be well prepared to get students learning and doing the assessments in a meaningful manner.	Timeline

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10	Alice Robertson	I recommend a gradual implementation of the NGSS, starting with younger grades and working their way up as students build meaningful foundations. For example, start with implementation in grades K-2. The following year, add grade 3. After that, add grade 4. This way, students will not develop holes in their scientific skills and understanding as a result of the transition. As an expedited compromise, add grades 3 and 4 the same year. While significant gaps in student knowledge may not be as apparent in the younger years, they become huge barriers to student development and confidence in the later years of schooling. A full implementation applied to middle and high school science classes, especially using the integrated model rather than the subject based model, leaves significant gaps in student exposure to knowledge, skills, and learning experiences. Since the integrated model is a spiral model, it must be implemented gradually - year by year as students age. The only alternative is to ask students to add to foundations that they haven't built yet.	Timeline

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115	Stephen Blake, Children Now	The rudimentary timeline provided on page 6 would be more useful to educators, policymakers, parents, and stakeholders if it were substantially expanded to provide more detailed timeframes and milestones that foster the reader's ability to track this expansive enterprise and the integration of its parts. For example, designating 2015-2018 for "Implementation of NGSS" does little to support LEA's planning of the activities they will need to conduct in order to incrementally or fully implement within that four-year band. All stakeholders would benefit from having a more explicit timeline for development, field testing, and rollout of the science assessment. This will allow them to better integrate their assessment-related activities with their instructional and materials implementation activities.	Timeline
117	Jessica L. Sawko, Executive Director, California Science Teachers Association	The plan is difficult to comprehend in terms of timeline, what tasks will happen when, what needs to come first, and what tasks are dependent upon completion of another task. Each component has awareness/transition/implementation phases, which are temporally dependent, and activities across the three primary groups of CDE, LEAs, and Support Providers are also temporally dependent for some elements. It is hard to get a good sense of the full scope of each element within and across each guiding strategy, each of which may have a different time frame. At minimum years (e.g. 2014/2015) should be added to tasks and tasks should be coded and cross referenced in some way so that it is easier to see the connections between the tasks.	Timeline

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126	Suzanne Goldstein, Chris Roe, California Stem Learning Network	The current timeline appears to delay launch of the awareness phase until fall of 2015. While we wholeheartedly agree that the plan timeline should include an adequate transition phase that ensures teachers are provided with training and instructional materials before new assessment and accountability requirements are fully implemented, we think that many awareness and transition activities need to begin this year in order to be ready for full implementation by 2018. The rigid format of the plan document further inhibits this type of graduated implementation by implying uniformity to the timeline in all areas rather than helping to clarify how the elements build on each other and where investments should be most focused at each stage. We would like to see more specific timelines and progress milestones identified throughout the plan.	Timeline
129	Suzanne Caffrey, Legislative Associate Kimberly Rodriguez, Legislative Associate, Association of California School Administrators	Overall, the NGSS Plan is thorough and addresses the important issues of professional development, instructional materials and assessments from both the state and local perspective. Our members are excited about the implementation of NGSS. As such, they have high expectations regarding its impact on expanding and deepening students' science knowledge. With this in mind, they have concerns regarding the projected timeline with respect to the availability of instructional materials, professional development, and assessments. Specifically, they are concerned there will not be sufficient time for "direct instruction" on NGSS prior to the administration of a high stakes assessment. This concern is consistent with the Common Core State Standards (CCSS) implementation timeline. Our members are currently working furiously at the local level to manage CCSS and the English Language Development standards implementation. We ask the Science Leadership Team to consider all of these issues as it moves forward in discussing an implementation timeline.	Timeline

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102	Don Whisman, San Diego Unified School District	* Overall use the PEM format with the 8 guiding strategies is effective.	Introduction to PEM table format
126	Suzanne Goldstein, Chris Roe, California Stem Learning Network	With this plan, the state has the opportunity to present a compelling vision for the transformation of science teaching and learning at all levels. Unfortunately, the current structure of the document presented as a Program Elements Matrix (PEM), obscures the truly strategic and innovative aspects of the proposed activities. We recommend the plan be presented in a less rigid format that reduces repetition, and that an Executive Summary be added, in order to make clearer the largest and most strategic aspects of the work and to better convey the interrelationships among many of the proposed strategies and elements. In addition, we are concerned about the timeline and lack of specific progress milestones in the plan.	Introduction to PEM table format
3	Michael Boykin	"…in order to meet the requirements of the NGSS is the equal balance between the disciplines of Life Science, Physical Science, and Earth and Space Science. Currently, all high schools in the state will have little difficulty transitioning to new expectations in Life and Physical. However, we do not have 1/3 of science teachers trained in Earth and Space Science. It may be useful to perform a statewide survey of all current science teachers to understand the extent of this deficit."	Strategy 1
6	Craig Strang, Associate Director, Lawrence Hall of Science, University of California	In the Professional Learning Element, there is language in the Introduction section that implies that the Administrator Professional Learning will be focused on Site Administrators (principals?). I just want to clarify that Planning for the implementation of CA NGSS must include district administrators/leaders from the Superintendent on down, including those involved in district governance as well as those involved in Curriculum and Instruction. While we don't really think of providing PL	Strategy 1

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	Berkeley	"workshops" for superintendents and associate superintendents, they must be provided with consulting support and technical assistance that allows them to see science as an integral and essential component of the success of their school system.	
77	Susan Pritchard, Washington Middle School, La Habra, California	"High quality professional learning opportunities for educators is ALWAYS needed … and as a state-wide involved STEM educator, I applaud this as the first strategy. I would add, though, that WITHOUT HIGHLY QUALIFIED TEACHERS IN THE MIDDLE SCHOOLS WHO ACTUALLY HAVE A SCIENCE CREDENTIAL, the professional development will most likely be inefficient in educating equitably the vast number of middle school teachers who are currently teaching science in the Middle School Level WITHOUT PROPER CREDENTIALLING IN SCIENCE.	Strategy 1
94	Valerie Joyner, M.A. Science Education, Retired Elementary Teacher and Elementary Science Education Consultant	"1. The most critical aspect of NGSS roll out for California's primary and intermediate teachers will be to have on-going intensive professional development starting long before implementation is expected in the classroom. Elementary teachers will need a thorough understanding of the NGSS document and all of its over-arching components: Disciplinary Core Ideas, Practices, Crosscutting Concepts, Performance Expectations, Evidence Statements, and the like. Each one of these topics, along with new instructional practices and strategies, is a course in and of itself, not merely a 1 hour workshop. These components and strategies are not easily understood or simple to bring into application in their classrooms. 2. This on-going and intensive professional development will be costly. It is therefore extremely important that significant money be allocated to insure that all elementary teachers be given all necessary training in a timely manner.	Strategy 1

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115	Stephen Blake, Children Now	The NGSS Plan describes a “State Leadership Collaborative” (in Strategy 1) to meet on a bi-annual basis. We believe it may be appropriate to establish this or a similar body to more continuously address the many complications that will arise, and advise policymakers on them, as implementation progresses. The focus of this Strategy matrix is the professional development of current teachers via training of teacher leaders and administrative leaders, and the subsequent delivery of professional development by those leaders, at the local level. We think this is a practical primary focus, given that the vast majority of science teachers are already in the classroom and at present little capacity exists to retrain them in NGSS-based science instruction. At the same time, many external (non-LEA or county-office based) providers of in-service professional development – such as the Subject Matter Projects or providers of induction programs – comprise an important part of the teacher education landscape. While their role is referenced in isolation on page 26, we recommend that their involvement, as partners and as entities that may have knowledge or best practices that could inform others, be incorporated throughout the many elements of Strategy 1. In this same vein, we are concerned about the capacity of local districts to build out effective, well-trained professional learning communities with expertise in CA-NGSS instruction. Achieving this may require more than one or two teacher leaders trained externally; it may require externally trained district teams, augmented with sufficient resources and support when they return home to reshape local professional practice. Shifting instructional practice through effective professional development will be critical to successful CA-NGSS implementation, and this will entail a sea change for science teachers. At the same time, this is one area that benefits particularly strongly from initial CCSS implementation	Strategy 1

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		planning and activity. The philosophical and instructional shifts necessary to teach based on our newest standards – emphasizing depth of understanding, critical thinking, and conceptual learning over memorization of facts – have already begun in schools through CCSS. Administrators and teacher leaders already understand and are incorporating these new approaches, and importantly, whole school cultures are aware of the shifts that are taking place. This likely means, at minimum, that the awareness phase activities will require less effort than the NGSS Plan suggests. This Strategy is silent on the many needs of pre-service training for teachers, and we strongly recommend adding key guidance for the California Commission on Teacher Credentialing, as well as for institutions of higher education and others that provide pre-service education. This guidance would be relevant not only to those entities: LEAs using the NGSS Plan for guidance should have these revised strategies at the forefront of their thinking, as well. At minimum, the Commission will need to revise its subject matter and credentialing standards, as well as teacher performance expectations, and support delivery programs in transitioning to these standards; eliminate specialized credentials that cannot support NGSS; modify administrative program standards to accommodate support of transition to NGSS; and revise CSET examinations. Institutions (including districts with internship programs) will need to comprehensively modify the content of their credentialing programs in incorporate NGSS content and the new methods needed to be able to effectively convey the learning principles and techniques that comprise NGSS. In conjunction with this, we recommend the inclusion of guidance for districts regarding appropriate considerations for hiring practices that	

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		will promote effective transition to an NGSS based science education in each district. Strategy 1 suggests (page 19) that LEAs seek opportunities for the recognition of their exemplary practices in NGSS-based professional development. Similarly, it recommends (page 21) that each LEA "researches and employs" existing resources in preparing educators. We further suggest the establishment of a statewide repository of *vetted* best practices – including any newly recognized exemplary programs – to facilitate other districts' readily learning from the most effective practices. (If this is the intent of the NGSS digital center, that is insufficiently detailed.) This Strategy focuses on the involvement of the Association of California School Administrators (ACSA) and the California School Boards Association (CSBA) in developing various aspects of administrator professional learning. We appreciate the importance and expertise of these two preeminent leadership organizations, and at the same time recommend the inclusion of a wider set of participants, including those from the private sector, with expertise in the development and training of administrators. Finally, on page 17 of this strategy, the NGSS Plan suggests that the CDE should "provide expanded opportunities for teachers to participate… [in] professional learning opportunities" and "…develops and implements administrator training…" While we agree that these are important functions to be carried out within the scaffolding, we believe that the delivery of training to educators is not, and has never been, a CDE role. Professional development strategies must include pre-service training and should be expanded beyond the current focus on training local	

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		teacher leaders.	
117	Jessica L. Sawko, Executive Director, California Science Teachers Association	The plan fails to address the critical component of teacher preparation. CSTA strongly urges CDE to add an 8th element to guiding strategy #1 to address teacher preparation and credentialing. Addressing the needs of teacher preparation program re-tooling and updating credentialing requirements is critical to achieving the strategy of ensuring that every student has access to teachers who are prepared to teach to the levels of rigor and depth required by the CA NGSS. CSTA recognizes that teacher preparation program requirements and credentialing are the purview of the CTC. This does not mean that they should not be a part of the state's plan for implementation. Inclusion of this critical element will allow readers and implementers of the plan can see the full scope of work to be done to successfully implement the new standards.	Strategy 1
126	Suzanne Goldstein, Chris Roe, California Stem Learning Network	*Teacher preparation:* As CSLNet has set forth in its publication *STEM Can Lead the Way: Rethinking Teacher Preparation and Policy*, significant reforms are needed to the state's teacher preparation system in order to develop a teacher workforce that is prepared for the shifts in content and pedagogy that both the Common Core and NGSS require. While this NGSS implementation plan was not intended to set forth a strategy for such reforms, we do think that the plan should take more explicit steps to ensure linkage between the plan and the work of the state's Commission on Teacher Credentialing (CTC), the California State University system and other institutions of higher education that prepare educators. To that end, we recommend that the plan include convening a panel to report to the CTC on changes in preparation and credentialing that are needed to support and align with the NGSS implementation plan.	Strategy 1

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129	Suzanne Caffrey, Legislative Associate Kimberly Rodriguez, Legislative Advocate, Association of California School Administrators	ACSA is impressed with the attention the NGSS Plan pays to professional development for both teachers and administrators. As with CCSS implementation, professional development plays a critical role in ensuring quality instruction is provided to students. We would suggest that higher education institutions be included as an integral part to the professional development portions of the plan. Higher Education institutions prepare our future certificated employees, including administrators, and the earlier they become part of the NGSS implementation process the better. There is a role for these institutions to play in terms of supporting professional development and implementation of NGSS. Therefore, we suggest these institutions be included in the next draft of the plan.	Strategy 1
6	Craig Strang, Associate Director, Lawrence Hall of Science, University of California	In the Instructional Resources Element, there are several references to an impending statewide curriculum adoption. Is this the case? Trish Williams has indicated that California will not go through an adoption process, but rather will "endorse" materials. If this is the case, I think the distinction is important. Districts/LEAs do not have to wait the several years until the state endorses materials. If they have the capacity, they can begin now to review and acquire materials.	Strategy 2
77	Susan Pritchard, Washington Middle School, La Habra, California	Aligned instructional resources designed to meet the DIVERSE needs of all students is an excellent second strategy. Keep in mind that “diverse” is quite an “open-ended” descriptor in that there are such huge differences among the needs of our students, our future. Within this strategy, specific areas of concern seek answers to what amount of funding will be available to districts for: English Language Learners, Special Needs Students, GATE qualifying learners, and most importantly … for all students in terms of the vast amount, of both consumable and non-consumable materials, as well as the appropriate technology which enhances the learning NECESSARY TO ADEQUATELY AND	Strategy 2

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		EQUITABLY IMPLEMENT THE NGSS?	
79	Laura Dax Honda Fourth Grade Teacher	"It is law that all future textbooks will incorporate the EP&Cs and the EP&Cs align perfectly with the NGSS philosophy and approach to teaching."	Strategy 2
94	Valerie Joyner	Science instruction must be moved to the forefront of all student curriculum. It can no longer be thought of as an add-on, if a teacher has time for it. We are educating students to be 21st century thinkers and workers, whose jobs and lives will be depend on being scientifically literate every single day. Science must be taught to every student, every day, every year, starting from the first day of kindergarten!	Strategy 2
102	Don Whisman, San Diego Unified School District	Strategy 2- Emphasize time for science K-12, especially for grades K-6 (page 32). Suggestions of how to integrate NGSS with CCSS effectively would be a great tool for all teachers, especially elementary teachers who are strapped for time to fit science in.	Strategy 2
114	Lisa Hegdahl	As a teacher that relies on strong science education at the younger grades in order for my students to be successful, language in the implementation plan that more strongly calls for science for every student at every grade level is needed. Simply calling for the teaching of Science at every grade level will not make it happen, however. K-5 teachers will need quality, accessible professional development that will fit in with the demands they are already encountering with Common Core. They will need lesson sequences that are classroom ready and the training to implement them. In addition, the professional development will need to be on-going. NGSS training cannot be one stop shopping. It will take	Strategy 2

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		much time and effort to become comfortable with and knowledgeable about the standards and how to teach them. This is great opportunity for all of us who have an interest in high quality science education to implement the NGSS in a thoughtful, comprehensive way. I appreciate the time and effort that went into the authoring of the document and I am looking forward to seeing the shifts away from the old Science content standards to the NGSS.	
115	Stephen Blake, Children Now	We believe the layout of this Strategy is sound, and particularly commend CDE for its attention to equity in the development of instructional resources that will serve all students. We are concerned that the proposed State role in the Implementation phase for Promoting Equity is limited to reviewing state needs, evaluating resources, etc. We believe there is an appropriate function for a state, or state-designated entity to survey the effectiveness of districts' selection and use of materials in ways that promote equitable instruction. As stated above, a key aspect of all of California's newest standards is the integration of subjects students will learn. However, this Strategy is described as if science materials are developed independently. We know CA-NGSS would have certain science instruction presented in carefully constructive narrative form, consistent with *and teaching to* English Language Arts standards, and other science instruction is based in mathematical formulae and problems, consistent with CCSS for Mathematics. Teachers should have ready access to science materials that are integrated to ELA and math standards, and should be made aware of ELA and math materials that incorporate science content. This strategy places California as working fundamentally in isolation. We recommend an explicit recommendation that connects our state's efforts more directly to those in other states – both to draw on what they learn and to contribute to others'	Strategy 2

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		awareness of and access to quality materials. Correction: On page 31, under “Investigate and Select Instructional Materials”, it appears that the “Transition” and “Implementation” entries have been reversed. The state should evaluate the quality of materials and practices it shares online.	
77	Susan Pritchard, Washington Middle School, La Habra, California	Assessment is huge and I was honored and privileged to be chosen by ETS to attend the first of two-day Stakeholder Sessions in Sacramento this past July... Our students deserve the best, and providing mandated minimum teaching times at least attempts to level the playing field for our students, our future. The assessments, both formative and summative, should be used to advise best practices so educators can constantly hone their craft and do a better job of facilitating, questioning, encouraging, and promoting the collaboration, creativity, communication, and critical thinking of our students, our future.	Strategy 3
102	Don Whisman, San Diego Unified School District	Strategy 3- Stress the need for both formative and summative assessment tools that reflect all 3 dimensions of the performance expectations making sure to include the practices with the DCIs.	Strategy 3
105	*Jonathan Osborne* *Ray Pecheone* *Helen Quinn* *Susan Schultz*	“Our comment to section 3 on Assessment… Rather, any teaching and learning experience is a product of three factors – pedagogy, curriculum ***and*** assessment. In looking at the plan, we feel that the role and importance of assessment is a critical factor to achieving the successful implementation of NGSS in California. However, this role is underemphasized and undervalued in the draft plan.” California’s adoption of the Next Generation Science Standards (NGSS)	Strategy 3

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	Linda Darling Hammond *Richard Shavelson*	provides a significant opportunity to improve the quality of California science and engineering education. The new standards — with their emphasis on both what we know and how we know — have the potential to offer an education in science and engineering that is rigorous, challenging and engaging for young people. Creating effective learning experiences, however, requires assessment that is aligned with learning goals, curriculum and instructional practices. Indeed, evidence suggests that teachers understand the intentions of the curriculum not from the standards but from the exemplar items and tasks developed to support assessment(Au, 2007; Hannaway & Hamilton, 2008; Stecher & Barron, 2001) – particularly in an era when the outcomes of assessment are 'high stakes'. Thus, quality assessments are a fundamental conduit for communicating the changes demanded in curriculum and instruction. Consequently, the success of NGSS will be critically dependent on the production of high-quality exemplar tasks and items that communicate the intent and meaning of the NGSS framework. Indeed, the experts responsible for the National Research Council (NRC) report on assessing the NGSS argued that: > Achieving the goals of the framework and NGSS will require an approach in which classroom assessment receives precedence. This change means focusing resources on the development and validation of high-quality materials to use as part of classroom teaching, learning, and assessment, complemented with a focus on developing the capacity of teachers to integrate assessments into instruction and to interpret the results to guide their teaching decisions.	

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		Pellegrino, Wilson, Koenig, & Beatty, 2013) (p. 6-7) The basic principle of the NRC report is that measuring the performance expectations described in the NGSS will require assessments that are significantly different from those in current use. The NRC proposed that an assessment system should be composed of assessments designed both to support classroom teaching and learning, and to meet the need for formative and summative assessments. Such assessments require tasks which assess not just content knowledge but also student competency with specific scientific practices and their understanding of the cross cutting themes in science. That is, any task must transcend just the assessment of content which, to date, has been the overwhelming focus of the California tests. In addition, the competencies assessed by NGSS will require items that go beyond simple multiple choice to use items and tasks which assess, for instance, students' ability to develop and evaluate evidence to test a hypothesis, analyze an argument from evidence, carry out and manipulate and control variables in an experiment, critique representations, link one idea to another and construct explanations. This will require new and innovative modes of assessment. Hence, it is not just a case of tweaking existing assessments or reproducing items/tasks that were developed off of existing test specifications or blueprints. We do not feel that the draft plan has adequately recognized the nature of the challenge and the investment that must be made in assessment. For instance, the plan places great emphasis on the development of formative assessment tools and training teachers to use such items. We fully support formative assessment and welcome the view that many of the tools will be digital as only such tools can provide the rapid and timely feedback to the teacher which is such a key factor in improving the quality of instruction (Hattie, 2008). As Hattie argues "When teachers	

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		seek, or at least are open to, feedback from students as to what students know, what they understand, where they make errors, when they have misconceptions, when they are not engaged—then teaching and learning can be synchronized and powerful. Feedback to teachers helps make learning visible." However, we do not think that digital tools can do all that is necessary to assess students' performance of the 8 scientific practices which are a key feature of the NGSS. There need also to be hands-on tasks that assess students' ability to conduct investigations, organize and evaluate data, and explain what the data mean. Tasks must assess students' ability to communicate and engage in evidence-based argument in science. To the best of our knowledge and expertise, such tasks that support and assess these skills are rare, especially in a digital form. Thus we feel that report has underestimated considerably the nature of the challenge to "identify and develop sample digital CA NGSS formative assessments, tools including samples of student work, performance task scoring rubrics, and other resources" (p. 35). And without a set or sample of high-quality items, it is unlikely that the professional development for formative assessment will have sufficient value. However, it is summative assessment that is a central concern to us as the outcomes of the implementation will be greatly dependent on the nature of the items and tasks that are used for summative assessment. Not only teachers but also parents will read the intentions of the curriculum from such items. There are two major points that we would wish to make. First, all research evidence points to the fact that short, summative tests have poor test-retest reliability and limited validity (Black & Wiliam, 2005).	

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		Essentially that means that making judgments about student and teacher performance on the basis of such tests is questionable. More reliable assessments with better validity depend on a portfolio of tasks, some of which are extended and some of which require teacher assessment. To those who would argue that teachers cannot be trusted to assess their own student performance – that is employ embedded assessments for summative purposes--we would point to Canada, Singapore, Hong Kong, and Australia, as well as the International Baccalaureate program, where such systems of assessment have been used for many years. Teachers undertake a process of group moderation to ensure that any of their assessments are appropriately judged (Butler, 1995). Second, the summative assessments that are needed to test the NGSS need to go well beyond what currently exists; items will be different and the "sit down" component of the test will also need to be computer based. To date, assessments in science have relied on multiple-choice items which predominantly make only low-level cognitive demands of recall and comprehension of domain-specific content knowledge. Not only does the NGSS require students to engage in higher order cognitive tasks of analysis, critique and evaluation, it also requires tests to assess knowledge of procedures and their epistemic justification, and of student ability to *undertake a set of 8 scientific practices*. To our knowledge, only the more recent PISA and NAEP tests have begun to test such knowledge. Tests of this nature cannot be produced overnight and will require extensive work and support of test developers and researchers. Work needs to begin now on developing models of what such assessments might be and how they might be implemented with the longer-term goal of achieving an improved test in 3 years time. This "on demand" portion of the test will need to be augmented with classroom-based performance assessments that measure students'	

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		abilities to design, conduct, observe, analyze, and communicate about inquiries if the NGSS are to be assessed. It is our view, that the plan needs to give much more emphasis to the crucial role of assessment in implementing any new curriculum framework, the resource and time that needs to be devoted to its attainment, and the nature of the challenge that the new curriculum framework poses for assessment development.	
114	Lisa Hegdahl	While many of the plan's components have a statement about evaluating effectiveness, getting feedback, etc., I believe that this is a critical part of all the tasks. For example, in the CDE section under Implementation for Development of Formative Assessment tools, there is no mention of re-evaluating the tools at this juncture to see if they are still in line with the needs of educators and in line with the spirit of NGSS. Much can change from the Awareness Phase to the Implementation Phase in our understanding of the Standards as well as in the understanding of the most affective ways to evaluate the learning. The plan should reflect those inevitable learnings.	Strategy 3
115	Stephen Blake, Children Now	This strategy is very forward-looking, since new science assessments will follow other implementation activities; therefore, this section is understandably limited in content. But to give meaningful guidance to policymakers and educators, we believe a bit more substance is necessary here. Furthermore, we think that the guiding principles and criteria used to evaluate available assessments and the development of new assessments should be aligned to the criteria used for similar assessments under CCSS. This will ensure the same values are used for a high quality assessment system for both NGSS and CCSS. Additionally, we believe the NGSS Plan for this Strategy should respond	Strategy 3

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		to lessons learned from CCSS implementation. Thus, CDE should, at minimum, establish not just a “training guide”, but appropriate standards for what constitutes effective training on the use of formative and summative assessments to support their various purposes. We also think it appropriate to establish a monitoring function for quality and effectiveness. Absent that, the potential benefits from NGSS-aligned assessments to teachers and students are at the mercy of a “buyer beware” approach to an external support providers’ market of training. As a general scaffolding we have two concerns, both pertaining to a state, or statewide, role: 1. As has been the case with the developing assessments for CCSS, we believe it is critical that the process of developing CA-NGSS aligned assessments incorporate a robust engagement of stakeholders, and recommend that the matrix explicitly express this. 2. The element “Development of Statewide Science Assessment System” does not explicitly indicate the necessary alignment to federal guidelines. For assessments, the plan should integrate development with CCSS assessments, provide a clear timeline, and ensure effective training for their administration and use.	
119	Babcock et al	Strategy 3 recommends that “Support providers assist the LEAs with review of analysis of student data from statewide summative assessments to inform and revise curriculum, instruction, and local assessments.” We are wondering what body will authorize or empower the support providers to help make those revisions? We also wonder	Strategy 3

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		what metrics will be used to measure success as the implementation plan is rolled out; right now much of the evaluation plan as presented in the Appendix is more of a checklist that something was done rather than a true assessment of the impact of the action items. True assessment is the only way to inform and refine the process.	
77	Susan Pritchard, Washington Middle School, La Habra, California	My comment on this fourth guiding strategy: Collaboration with all members of the community is extremely beneficial in enhancing student learned outcomes. I applaud the committee for this inclusion. More funding for more community STEM Celebrations are needed. We must provide more opportunities to involve everyone in STEM … this is the vision and it can be achieved.	Strategy 4
94	Valerie Joyner	It is also imperative that parents, business, industry, and community members understand NGSS and its associated learning opportunities for today's students. I am often surprised to find today, that many members of the general public do not know about, and/or understand NGSS. There is a need for increased public awareness and relations.	Strategy 4
115	Stephen Blake, Children Now	We commend the NGSS Plan for its recognition of the critical importance of engaging parents and guardians, and ensuring effective integration between both early learning experiences and expanded learning opportunities and the core K-12 science experience children will encounter. Under the state activities for Products and Tools (page 41) we recommend that the NGSS Plan text more explicitly state the intent to include program materials; current text may be interpreted to read as if it focuses on awareness and communication for parents/guardians, rather than also supporting program changes in early childhood and expanding learning settings that will integrate with CA-NGSS aligned instruction in the traditional K-12	Strategy 4

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		settings. Under Support Provider activities, the top-line entries for "Communication" appear to more appropriately belong under the "Products and Tools" or "Professional Learning" headings. In addition, there may be other entities more appropriate than CDE for leading some of these collaborations. For example, early childhood support providers might more effectively collaborate with the state's First5 Commission to determine best practices, plans, tools, and roles.	
117	Jessica L. Sawko, Executive Director, California Science Teachers Association	The element of Communication in Strategy 4 is a welcome one. This element should be further expanded and made clear that the Awareness, Transition, and Implementation phases of the Communication element should precede full classroom and assessment implementation. We know from CCSS implementation that the public messaging campaign is critical. NGSS messaging needs to be on the front end rather than response. Parents and the community at large need to see the value of NGSS and support it.	Strategy 4
102	Don Whisman, San Diego Unified School District	Strategy 5- In discussing Postsecondary Communities a component addressing teacher preparation should be added. This plan should address developing coursework/ professional learning for aspiring teachers of science (including all elementary teachers) to promote their understanding of NGSS and develop their ability to effectively implement NGSS and its 3 dimensions to provide access and quality instruction for all students. This may also be included in Strategy 1.	Strategy 5
115	Stephen Blake, Children Now	We particularly commend the NGSS Plan's recommendation to collaboratively develop a recommended state pathway and articulated transition plans to promote all students having the opportunity to pursue college and careers in STEM fields. We know that a lack of knowledge of the requirements leads to countless kids – even those with high	Strategy 5

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		academic performance – being shut out of opportunities. There are benefits to isolating the participation of postsecondary and business communities into a discrete matrix for the purpose of promoting integration that is focused on student readiness for success in college and careers. It may be as a result of this, however, that the great benefits our research universities and community colleges can provide the NGSS implementation enterprise in other facets of the NGSS Plan have been lost. Higher education enterprises are rarely mentioned in the other 7 Strategies, even when the development of new or analysis of existing research is mentioned; we believe that should be corrected throughout. The past five years have seen particularly rich development in the integration of college and career readiness, through Linked Learning, course evaluation by our universities, the inclusion of career readiness in our accountability system, and other enterprises. We believe that the focus on CTE Standards cited on page 47 may be too limiting to achieve the goal of college and career readiness that we all seek to attain for children. This section also should include other indicators of collage and career readiness. The many elements of the NGSS Plan will require significant financial resources to carry out. In numerous sections, the matrix refers to the identification and pursuit of “resource opportunities”; often, these references strongly imply grant monies.	
126	Suzanne Goldstein, Chris Roe, California Stem Learning Network	*Post-secondary, business and community partnerships:* The plan makes an important statement about the need and opportunity for higher education, business and community groups to collaborate with K-12 educators to support NGSS implementation. However, it appears to be missing a broader understanding of the truly substantial role these	Strategy 5

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		partners could play in developing and delivering new approaches to teaching and learning. While much of this collaboration will take place and be tailored to local circumstances, the state plan should recognize the need for the development of infrastructure within the K-12 delivery system, from creation of collaborative policymaking bodies to establishing district and school-based partnership coordinators, to ensure implementation activities fully leverage the resources and expertise of the external partners.	
77	Susan Pritchard, Washington Middle School, La Habra, California	*"...*the state can offer more incentives to businesses to share and support K-12 education. In addition, the state could offer tuition pay-back for graduates who offer support for K-12 education in specifically state-defined opportunities."	Strategy 6
115	Stephen Blake, Children Now	We think that the creation of a CA-NGSS digital center can be of great benefit to educators, policymakers, parents, and other stakeholders. As cited above, we believe two conditions must be met to gain the greatest benefit from this resource: The various information resources, tools, products, materials, and programs posted to the center must be effectively and validly vetted according to transparent metrics. Absent this process, those who seek to use the center would gain little beyond looking things up on the internet. The state/CDE matrix for this Strategy does not explicitly mention metrics or a process for the analysis/valuation of the quality and effectiveness of resources it would upload to the center (there is post-use feedback). On page 56, the LEA Strategy 6 activities refer to "NGSS resource allocation" under "Disseminate Resources". This could easily be confused by readers to mean the allocation of targeted funds, so we recommend modifying the language accordingly.	Strategy 6

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126	Suzanne Goldstein, Chris Roe, California Stem Learning Network	*Exemplary models and practices:* In many areas, the plan calls on CDE to take the lead in developing and disseminating tools and training materials to assist districts and teachers in identifying and implementing model programs and practices. We agree that this is a central role for the CDE and we support the plan's call in Strategy 6 for an NGSS Digital Center to disseminate resources. We believe, however, that the plan must go further in indicating how the necessary teaching and learning resources will be developed on a more accelerated timetable through more specific investments in CDE staffing and by leveraging the expertise of partner organizations. The plan contains essential strategies for the development of professional learning, instructional resources, and assessments. CSLNet strongly agrees with the intention to expand professional learning supports and to develop tools for formative as well as summative assessment. For this implementation process to succeed, our classroom teachers must be well-supported at the front end and their needs must be central to all elements of the plan. We are therefore concerned that the proposed plan does not indicate the full scale of the effort and resources that will be required, particularly at the local level. As we know from the implementation of Common Core, effective implementation will require the investment of billions of dollars – whether new monies or targeted monies from existing funds. Some estimate of the scope and scale of implementation costs should be included to assist policymakers and partners in understanding the investments required. Without such clarification, the current language may be read by many LEAs as indicating that their ability to implement NGSS is dependent on their own fundraising success.	Strategy 6
129	Suzanne Caffrey, Legislative	The NGSS Plan is comprehensive in terms of the level of instructional detail; however, it is lacking in highlighting the resources needed to	

Comment #	Source (Name, Organization)	Comments	Section
	Associate Kimberly Rodriguez, Legislative Advocate, Association of California School Administrators	ensure quality implementation of NGSS. For example, many school districts will require significant upgrades to their science laboratories, including equipment, to ensure quality implementation of NGSS. Likewise, districts will need to purchase instructional materials for students and develop quality professional development for their staffs. Each of these actions is necessary to ensure comprehensive instruction of NGSS to students and they require adequate resources to complete them. ACSA requests in the next iteration of the NGSS Plan address the need for more resources.	
115	Stephen Blake, Children Now	This Strategy sets forth a communications plan for ensuring greater awareness and understanding of CA-NGSS and its implementation. Here we see another example where the NGSS Plan does not acknowledge the vast efforts of the CDE and others with regards to CCSS communications. Failing to do so misses an opportunity to build upon the awareness and understanding accomplished through that prior/ongoing work and potentially leads to confusion among the general public who may not understand how NGSS and CCSS together represent an important shift in how students are taught. An additional communication need will be that of LEAs and Support Providers seeking clarification or assistance from the state regarding any of the activities, goals, collaborations, or strategies cited. It would be beneficial here, and throughout the document, if the NGSS Plan delineated the division within CDE that would have principal responsibility for oversight and support of each of the Strategies, elements, and/or activities.	Strategy 7
126	Suzanne Goldstein, Chris Roe, California	*Communications:* We heartily endorse the inclusion of Strategy 7 and its call for a system of communications. Given that communications are woven into nearly all other areas of the plan,	Strategy 7

Comment #	Source (Name, Organization)	Comments	Section
	Stem Learning Network	we think this is a crucial set of activities for early implementation and where external partners could play a leading role.	
77	Susan Pritchard, Washington Middle School, La Habra, California	Coalitions are often helpful, but also easy to lose momentum themselves. An umbrella of support is needed and the state would be wise to choose local districts as official branches for dissemination of information AS PARTNERS WITH THE COUNTY DEPTARMTENTS OF EDUCATION.	Strategy 8
119	Babcock et al	The plan mentions several new initiatives, including new types of collaboratives, pathway models, the creation of the NGSS digital center, and others. While these are exciting initiatives, we urge the CDE to consider the funding of in-the-classroom resources to implement NGSS as a higher priority than the creation of a new layer of expensive centralized processes and strategies. In an ideal world, enough funds will be raised to cover both needs, but direct classroom support is essential and cannot be skimped.	Strategy 8
126	Suzanne Goldstein, Chris Roe, California Stem Learning Network	As previously stated, the plan does an excellent job of identifying the range of stakeholders and roles to be played in carrying out the implementation process. Unfortunately, outside of the Professional Learning strategy, the plan does not specify how the ongoing implementation effort will be led to continue and foster collaborative leadership, monitor progress and make continuous improvements to the plan as more detailed workplans and resources are identified. To this end, we recommend the following: 1. Building on the existing Strategic Leadership Team (SLT), create an ongoing, multistakeholder leadership group with responsibility for oversight of the plan implementation, including development of more detailed workplans in key areas, annual monitoring of progress towards identified milestones and continuous improvement of the plan in	Strategy 8

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		response to lessons learned from the field. 2. Identify within the plan document which entities within and/or external to CDE will take ownership for implementation of each element of the plan, and identify a senior leader within CDE to serve as the "point person" to coordinate the implementation work within CDE as well as be a liaison to districts and partners in the field.	
	Craig Strang, Associate Director, Lawrence Hall of Science, University of California	In the Resources section, I would like to see the following added: State Department of Ed Resources CA Environmental Literacy Principles and Concepts Report/Recommendations of the California Environmental Literacy Task Force (completed in December 2014) National Resources Ocean Literacy: The Essential Principles and Fundamental Concepts of Ocean Sciences for Learners of All Ages www.oceanliteracy.net The Ocean Literacy Scope and Sequence for Grades K-12 www.oceanliteracy.net Climate Literacy: The Essential Principles of Climate Science cpo.noaa.gov/OutreachandEducation/ClimateLiteracy.aspx Organizations, Initiatives and Web Based Resources BaySci: A Partnership for Bay Area Science Education (Lawrence Hall of Science, Exploratorium, Inverness Research) www.baysci.org"	Appendix B

Comment #	Source (Name, Organization)	Comments	Section
6	Craig Strang, Associate Director, Lawrence Hall of Science, University of California	Systems Integration: The plan presents the implementation of CA NGSS as if the implementation of science stands alone and is self-contained. I think the plan needs to explicitly, directly and urgently address the integral and convergent relationship between NGSS and Common Core ELA, Common Core Math, California Environmental Literacy Principles and California ELD Standards. The plan should call out the need to coordinate the synergistic and simultaneous implementation of all these content areas. If this is not made explicit, I fear that a) the true spirit of CCSS and NGSS (helping learners to develop thinking and meaning making skills across domains) will never be reached; and most importantly, b) the implementation of science will be once again relegated to the far too small box of time, attention and resources left over after language arts and math are fully addressed. There is one mention of the need to coordinate across disciplines in the Professional Learning Element, but this needs to be much more prominent and more robust, and more fully developed throughout the plan. Systems integration across disciplines could be addressed through Coalition Building and Messaging, but again, I think some careful thought needs to go into addressing this throughout the plan.	General Comments
11	Maria Chiara Simani, Ph.D., California Science Project Department of Physics and Astronomy University of California Riverside, CA	The "only" BIG comment I have regarding this document is the possibility to make it an online interactive document. Maybe with searchable features. For example, in order to see the role of the three main stakeholder groups, you need to flip through pages and correlate the elements in the various tables. Using online techniques, it may be possible to select an element within a strategy and see how the mutual support of each stakeholder may be integrated to achieve that element.	General Comments

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		Beyond integrations within the same strategy, it may be useful to highlight connections among elements in different strategies. This approach would really allow educators to see the plan as a system of implementation, and not as a set of activities that need to happen. Finally, as the plan is being implemented, links regarding the status of each element within the timeline and resources may be added. As a recommendation, this online tool for NGSS implementation should be sponsored by Achieve as pilot program for nationwide implementation of NGSS. They have expertise in developing online searchable databases and have already some of the resources indicated in strategies 6, 7, and 8 as part of their implementation guidebook.	
64	Kay Antunez de Mayolo	1. The California Board of Education approved Environmental Principles and Concepts (EP&Cs) need to be explicitly addressed and cited in the plan. 2. There needs to be teacher and administrator professional learning regarding the EP&Cs in all NGSS efforts. 3. Future textbook adoptions will be required to incorporate the EP&Cs - therefore the adoption trainings need to also address the EP&Cs. 4. It should also be noted that the EP&Cs align with the approach of the NGSS that is, by using systems thinking and linking crosscutting concepts.	General Commnets

Comment #	Source (Name, Organization)	Comments	Section
71	David R. Stronck, Ph.D. Department of Teacher Education California State University, East Bay	Many teachers will need new resources and training to be able to implement these standards. Please recommend adequate funding to provide motivating and valuable science instruction.	General Comments
72	Glenn Benham Los Osos High School Rancho Cucamonga, CA	The University of California's refusal to accept Earth Science classes as "D" level laboratory science courses for admittance (even though individual astronomy and geology classes have approved as D level) is preventing college bound students from getting high quality Earth science classes. I understand the traditional view that biology, chemistry and physics are the gate keepers to UC admittance, but with the increased value put on Earth Science by NGSS, it seems that the UC system is mired in its antiquated NCLB-like thinking. How do we implement NGSS standards when counselors will not put college bound students into classes that will not help them get into a UC, and the UCs do not accept Earth Science classes as other than a science elective? If the state is to move forward with successful implementation of NGSS, it needs to make some change in the acceptance policy for the UC system (or we can get used to sending our students that are excited about astronomy and geology to other states like Nevada and Arizona for college).	General Comments
77	Susan Pritchard, Washington Middle School, La Habra, CA	How will the implementation plan ADDRESS THE ALWAYS EVOLVING USE OF TECHNOLOGY … IT IS CHANGING MONTHLY SOMETIMES … AND THE DIVERSE TECHNOLOGICAL DIVIDE THAT STILL EXISTS AMONG OUR SCHOOLS IN THIS GREAT STATE OF	General Comments

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		CALIFORNIA? In addition, the districts do have control of the funding and how it is spent, within the plan they submit to the state yearly. However, perhaps funding, or at least a specific minimum percentage of funding, for STEM would be quite useful to leveling the field for all of our students throughout the state. When the now-defunct Eisenhower Funding was targeted to Science, the districts spent more equitably on science instruction … something to consider.	
80	Dr. Raquel Pinderhughes Urban Studies and Planning and Environmental Studies San Francisco State University	First, as others have pointed out, the implementation plan needs to explicitly cite and address the state's statutory commitment to teaching California's approved environmental principles and concepts (EP&Cs). Ensuring that environmental educators have access to innovative approaches, strategies, and instructional materials that are relevant, interesting, and effective for students who are struggling in school is crucial, both for individuals and society as a whole.	General Comments

Comment #	Source (Name, Organization)	Comments	Section
91	Susan Gomez Zwiep, CSU Long Beach	1. The plan emphasizes the importance of science K-12 for all students. CA NGSS has the potential to elevate the level of success for all students due to its focus on big ideas and application to real world settings. However, this requires articulation of various stakeholders and teachers across K-12. The plan acknowledges this and has appropriate steps to ensure its success. 2. The plan includes roles for the major partners in K12 Science Education: school districts, CDE, professional development providers (like CA Science Project) and IHE's. These are the players who impact K-12 Science Education in our state and I applaud the acknowledgement and use of each entity in the plan. 3. The structure of the plan (awareness, transition and implementation) is logical and allows clear stepping points for each strategy. We have lived under the old Science Standards for such a longtime that there is an entire generation of young teachers who were students under the old standards and have never taught anything else. More veteran teaches will also need to support to implement these new standards with fidelity and integrated with CCSS. A great deal of support and professional development is going to be necessary to implement these standards. This plan acknowledges and prepares for this. I fully support the CA NGSS Implementation plan."	General Comments
92	David Harris, Project Director Escondido STEM Initiative (ESI), Escondido Union School District	This email is to add my support to the CA NGSS Implementation plan. I have reviewed the plan and found it to be well thought out and matches what our district and teachers need to implement the new CA NGSS. I appreciated the use of local PD providers to help provide the support my teachers will need to learn and implement the new standards as well as the inclusion of preservice teachers in the plan. We will be hiring a	General Comments

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		number of new teachers each year and we want them to be prepared to teach NGSS when we do.	
93	Jill Grace, Science Teacher, Palos Verdes Intermediate School, Palos Verdes Peninsula Unified School District and California Science Teachers Association Middle School Director	I would first like to thank the CDE and the Science Leadership Team for the development of the draft Next Generation Science Standards Systems Implementation Plan for California. I would like to stress that it must be a priority to provide adequate resources at all levels of the plan, from the CDE to the local support providers, for the roll out of NGSS to be successful. Teachers will need a tremendous amount of professional development support both with respect to acquisition of content as well as pedagogical shifts that NGSS will require. This support will be needed from TK through grade 12 as well as teacher preparation programs at the college level. I would also like to emphasize the need to provide extra support to our elementary school colleagues, as the success of NGSS will lie with quality student exposure at a young age. It should be emphasized that in addition to teacher professional development, administrator training along with parent support and communication are also essential for NGSS to be successful and should be a major emphasis in the plan. NGSS must be a high priority for the State of California. Science is a vehicle to support the important changes called for in Common Core, thereby supporting the math and literacy development of students. The world and job market are rapidly changing with scientific and technological innovations are at the forefront of economic growth. It is therefore essential that California invest in science education. I urge you to take the time to ensure that the implementation plan reflects all of this.	General Comments

Comment #	Source (Name, Organization)	Comments	Section
94	Valerie Joyner, M.A. Science Education, Retired Elementary Teacher Elementary, Science Education Consultant	Along with professional development comes the need for quality NGSS aligned curriculum. Gone are the days when students will be studying science by topic, now Disciplinary Core Ideas. California must dictate to curriculum developers that all NGSS components be incorporated into all science curriculum and be assured that all California students will leave each grade level with the ability to apply the science information, practices, crosscutting concepts, engineering tasks, and the like, they have learned. Students must leave each grade level thinking and acting like scientists, that is the power of NGSS and a successful implementation plan. California must take the lead with the Next Generation Science Standards and provide all of the necessary time, resources, and materials necessary to assure that every teacher in California is well prepared and committed to everyday science instruction. This will not be an overnight process, but rather a decades long commitment. A commitment that will benefit the entire state of California.	General Comments
107	Bonnie J. Brunkhorst, Ph.D., California State University, San Bernardino	1. Daily science instruction , K-12 is essential (Time to teach science every day) 2. Resources for teaching science (materials of science for learning science (can't learn science without the materials of science. Direct experiences, just as you can't learn to swim without a swimming pool.) 3. Professional development identified by the teachers of science. 4. Time for professional development, 5. Funding for NGSS professional development at science teaching conferences. 6. Required Earth Sciences courses and testing at 9th grade.	General Comments

Comment #	Source (Name, Organization)	Comments	Section
113	Bryan Ehlers, CalRecycle	. . . I urge you to explicitly reference California's approved environmental principles and concepts (EP&Cs) in the final NGSS implementation plan. Public Resources Code Section 71301 required the EP&C's to be developed as part of the creation of the EEI Curriculum, and it mandates their inclusion in future textbook adoptions, including for science. The EP&Cs are already a part of the criteria for the development of the next California Science Curriculum Framework, and teachers will undoubtedly be confronted with teaching them in the very near future (if they are not already voluntarily implementing the EEI Curriculum). Explicitly identifying the EP&Cs as a part of professional learning and instructional materials identified in the NGSS plan would capitalize on the opportunity the new standards present to support a fundamental shift in teaching practices statewide (consistent with statutory intent), and it would help to prevent the confusion that would otherwise ensue when educators are confronted with new NGSS-aligned textbooks that introduce the EP&Cs in a couple of years from now. . . .	General Comments
114	Lisa Hegdahl	LEAs, CDE, and Support Providers are named specifically as playing a crucial role in the implementation process. The plan clearly shows that implementation of the NGSS will take time. As a full-time science teacher, it is comforting to know that I am not expected to implement *today*. At the Implementation phase, many parts have a statement about evaluating effectiveness, getting feedback, etc.	General Comments

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115	Stephen Blake, Children Now	We at Children Now are excited about the extraordinary potential California's new NGSS-based science standards (hereafter, "CANGSS") have for improving the quality of education children receive, for impacting their success in continued education and careers, and for enhancing their opportunities in life. The CANGSS' focus on depth of understanding, relevant hands-on experience, and the integration of concepts, disciplines, and even subjects will enrich children's learning and promote the educational gains our state has been working toward since embarking on standards-based education two decades ago. We commend State Superintendent of Public Instruction Tom Torlakson for undertaking the development of the Next Generation Science Standards Implementation Plan for California (hereafter, NGSS Plan) to	General Comments

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		assist our state's policymakers and educators in systematically actualizing the CA-NGSS for every student. We also are grateful for having had the opportunity to participate on the Science Leadership Team that provided input into the development of this plan. As stated in its introduction, the NGSS Plan is not a comprehensive action plan; rather, we see it as establishing a scaffold onto which others can build specific strategies and activities in their respective arenas to realize the promise of CA-NGSS for improving all children's science education. The pages that follow document a number of substantive issues we would call to the attention of CDE and the Board. However, the following bullets highlight our most pressing concerns, which we hope would be addressed prior to the Board's consideration of the NGSS Plan at its September and November meetings: The NGSS Plan should integrate with CCSS implementation plans and activities and build on their successes; and learn from their challenges. Details of the scope, timing, and resource needs are insufficient. An ongoing presence should be established to guide continued implementation. This document, having been developed by the CDE, is strongly focused on CDE (or the CDE supported Board) as being representative of "the state". There are many state-level roles, functions, or needs that may not be best fulfilled by CDE, and those should be more explicitly spelled out. These may include roles of the Commission on Teacher Credentialing and other bodies, or generic processes that a service provider might carry out to the benefit of all districts and schools.	

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		Integration is the key underpinning of CA-NGSS, which focus on concepts and practices that cross grade levels, disciplines and themes. Moreover, CA-NGSS is substantially integrated with new standards in other *subjects*, particularly those based on the Common Core State Standards (CCSS). For example, science learning modules are coordinated, by grade level, with mathematics instruction students would be expected to have received or be receiving simultaneously. Yet, the NGSS Plan effectively fails to acknowledge CCSS generally. Furthermore, the NGSS Plan does not acknowledge the CCSS Implementation Plan, which has been guiding state and local activities for the past two years. Rather, the NGSS Plan reads as if it is built from scratch, when in fact many of its elements or activities do or should constitute the application of a CCSS Plan activity to a third subject area: science. As we move into actual implementation of CA-NGSS, we would do well to learn from recent experience with CCSS. Similarly, many of the activities cited within the matrix are not integrated with, or necessarily informed by, activities that are taking place across the nation. California could learn from other states, as well as national consortia working on implementation of NGSS and CCSS. As we know from the implementation of CCSS, effective implementation will require the investment of billions of dollars – whether new monies or targeted monies from existing funds. This should be acknowledged – ideally some estimate of the scope and scale of investment would be provided – and if CDE is committed to pursuing state resources, as it did for CCSS, we believe that commitment should be stated. Otherwise, the current language may be read by many LEAs as indicating that their ability to implement CA-NGSS is dependent on their	

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		own fundraising success. The relational timing of some of the activities in the matrix is not always clear: the “transition” activity of one entity may follow the “implementation” activity of another, whereas the matrix may read to many as if there is an awareness phase (e.g., this year), followed by a transition phase (e.g., 2015), followed by implementation. Some narrative early in the document explaining when phases are aligned within the matrix and when they are not may be useful. While we recognize the utility of a scaffold at this level of complexity and appreciate the rapid timeframe on which CDE worked to develop this NGSS Plan, the matrix contains very little information regarding how LEAs or Support Providers might accomplish the objectives set forth. It would be useful to provide greater guidance in many instances. It is with this in mind that we believe that in addition to the scaffolding of this NGSS Plan, ongoing guidance will be needed as state and local policymakers and educators, as well as the vast network of Support Providers and partners, progressively develop action plans and engage in the actual implementation activities that will bring successful science education to our children. There is much work ahead to ensure the effective implementation of California’s new NGSS based science standards, and much is at stake for our doing so well. Children Now appreciates the important start the NGSS Implementation Plan provides and stands ready to assist state and local policymakers and practitioners in realizing the great potential of CA-NGSS and all our new educational standards in elevating the opportunities and success of all California’s children.	

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117	Jessica L. Sawko, Executive Director, California Science Teachers Association	This letter and the list of suggested edits included represents the collective voice of CSTA and its members. It has been 15 years since California has had new science standards. Implementing CA-NGSS is going to require substantial effort from a wide range of stakeholders, led by the state. As with Common Core, NGSS requires a significant educational retooling and this will be a major undertaking at all levels of our educational system. CA-NGSS will require substantial investment in professional learning, new instructional strategies and practices, courage and support to teach in a manner which expects high levels of student engagement by all students, administrative support, buy-in and understanding of how science instruction will look with CA-NGSS, effective communication with parents and the community, and a commitment to teach science to every child, every day of every year. This first draft of the plan offers a good deal that we like that addresses several of the critical components outlined above; however, we have suggestions we offer below and attached that will go a long way in improving the document. Putting together a comprehensive state plan is a complex and daunting task with many interrelated components. The suggestions below will, we believe, help clarify the plan. The plan fails to adequately represent the costs associated with realizing the plan that will be borne by LEAs and Support Providers. By only indicated with an asterisk those items that will cost CDE money, there is a significant lack of acknowledgement of the costs of this plan for LEAs and Support Providers. To date, many LEAs and Support Providers have donated, and continue to donate their time, resources, and expertise to bring California to where it is today in terms of NGSS review, adoption, and early implementation work. This donation of time and expertise	General Comments

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		needs to be recognized by the state. Additionally, this donation may not be sustainable, and the state's plan needs to acknowledge that elements and activities borne by LEAs and Support Providers do come at a cost as to more fully portray the cost of plan implementation. This more accurate portrayal will be critical for potential funders, both the state and private funders, to comprehend the financial resources that will be required to successfully implement CA-NGSS. The plan fails to recognize and address the incredible change that needs to take place, and the incredible lift it will be, to ensure that a high quality science education is available every day of every year to every student. The lack of science education in California at the elementary level is well documented and known (see WestEd's *High Hopes, Few Opportunities: The Status of Elementary Science Education in California*). The state implementation plan should directly address this issue by focusing specific strategies, elements, and tasks to address this problem, including accountability measures (in addition to those associated with assessment), teacher preparation and credentialing, inservice teacher professional learning, adequate resources and equipment, and adequate time for science during the school day. While some of these aspects are addressed within the plan, they are not specifically targeted toward elementary. What California students need at the elementary level differs somewhat from what it needs at the secondary level, and this difference should be acknowledged and addressed in the plan. While every young child approaches their world as a scientist that interest seems to wane over time – our goal must be to keep that interest and enthusiasm alive if our state is to make innovative contributions to science for our nation and the world. The plan portrays implementation has having an end point. In our view, many of the activities need to be ongoing in order to maintain a high-	

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		quality science education system. Achieve, and the work of other states, seem to be missing from this plan. We have heard time and again how much Achieve is intending to invest in a successful implementation of NGSS in California, however they are mentioned only once in the plan (outside of the listing of available resources and references). Support for teachers is critical to the success of NGSS. The support needs to come from CDE, LEAs especially, and Support Providers. This support needs to be early, often, and on-going. We need teachers who are prepared to teach science with the same excitement that reflects this profession. Just as important as our recommendations for improvement are our recognition of what we like and what should be maintained as the plan is modified before final presentation to the State Board of Education in November. 1. We are excited to see that the coalition building within the science education community is formalized in the plan. As mentioned previously, to date, key science education stakeholders have volunteered considerable time and effort to jointly develop and disseminate information and professional learning opportunities to support awareness around NGSS. The state, regional and local leadership teams being forged in this plan will keep that work moving forward. 2. The inclusion of both teachers and administrators in the professional learning guiding strategy is critical to successful CA-NGSS implementation. No educational reform can be successful without the support of teachers, and in order to have the support of teachers, they	

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		must be provided with the tools and information to be successful. Many administrators are focused solely on Common Core implementation, getting administrators onboard to support CA-NGSS implementation and their teachers, is mission critical. 3. The comprehensive NGSS Digital Center can be an invaluable resource for teachers, parents, community and other stakeholders. Not only can this serve as a repository for excellent NGSS instructional resources, it can serve as the hub for timely information, messaging, professional learning opportunities and the like. 4. The Early Implementation Initiative promises to be very useful in informing the needs for professional learning, instructional materials and support, and logistical and communication challenges that must be overcome in order to realize successful implementation. The ongoing support of CDE, LEAs, and Support Providers is critical to the initiative's success and the dissemination of lessons learned. 5. In every element in Strategy 4 (and in several other strategies and elements) every instance - Communication, Products and Tools, Professional Learning, and Resources - evaluation of how the plan was progressing was explicitly part of the Implementation Phase. Evaluation is critical to the plan's success.	

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118	Nate Ivy	Comment #1 Ensure that prior legislation -AB1548 Pavley (EEI)- is faithfully considered while developing NGSS implementation. Among other things, AB1548 calls for "The State Board of Education and the department [to] revise, as necessary, the framework in science to include the necessary elements to teach environmental education, including, but not limited to, all of the following topics: Integrated waste management. Energy conservation. Water conservation and pollution prevention. Air resources. Integrated pest management. Toxic materials. Wildlife conservation and forestry." Attending to AB 1548 while developing NGSS Implementation in California will add assurance that Environmental Education is appropriately present in California Science classrooms.	General Comments
119	Elizabeth C. Babcock, *Chief Public Engagement Officer and Roberts Dean of Education* Meg Burke, *Director of Teacher and Youth Education*	We are pleased that the support providers are recognized as a valuable member of the NGSS implementation stakeholders, and that we are expected to play a prominent role in the successful implementation of NGSS. However, details are missing to explain how the support providers will be convened; it is a given that efforts like this do not self-organize. Presumably, local and regional STEM networks and pre-existing collaboratives would represent a good starting point for this work, rather than trying to create whole new networks from scratch. It would also be helpful if the plan included examples of possible structures and incentives that would encourage the involvement and collaboration of support providers. We appreciate the important and critical role CDE must and should play	General Comments

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	Katie Levedahl, *Assistant Director of Youth Programs* Ben Lavender, *Senior Manager of Teacher Professional Development* Sarah Soule, *Senior Manager of Teacher Professional Development* Emily Harris, *Teacher Educator and Instructional Coach* Amelia Rosenman, *Teacher Educator and Instructional Coach* Laura Herszenhorn, *Manager of*	in a successful implementation of NGSS. However, we are concerned that the plan relies too heavily on a centralized model for the rollout, with too many steps requiring CDE approval. For example, sharing success and scaling up toolkits for implementation relies on the creation of an "NGSS digital center," including oversight by CDE of what gets posted to this portal. We are all familiar with other examples of centralized platforms that have not caught on with the intended audiences, or that quickly become outdated. What are the models of success on which the "NGSS digital center" will be built? What connection will this center have with other existing portals and online resource hubs overseen by CDE or others? Perhaps a less centralized approach, instead of relying on regional hubs might be more efficient and have a higher likelihood of sustainability and effective utilization. A second example of the overly centralized approach is the reliance on CDE to teach/train stakeholders on NGSS. The plan emphasizes the importance of involving and keeping stakeholders such as corporations and businesses apprised of the progress of NGSS implementation. This is terrific, since they represent critical partners. But no mention is made of encouraging and building a process for getting input from these partners on what they see as the critical implementation steps to ensure a science-ready workforce. The implementation plan could be more explicit about structures facilitating this kind of two-way dialogue. Successful implementation of the NGSS is going to require true partnerships among all of the stakeholders, and true partners have two-way communications, and each partner needs to have the opportunity to not only provide input but also affect outcomes. The NGSS Implementation Plan shares many similarities in approach and design to the Common Core Implementation plan. What lessons from the implementation of Common Core have been incorporated into this plan? Highlighting these lessons learned will help alleviate concerns	

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	Science Action Clubs Rochelle Urban, *Manager of Student Education* Kathryn Danielson, *Teacher Education Specialist* Renny Talianchich, *Education Specialist* Cindy Valencia, *Education Specialist*	and worries on the part of stakeholder groups, and will also demonstrate an adaptive management approach that will be welcomed by the stakeholders involved. The implementation plan emphasizes the importance of collaborations and partnerships with stakeholders and support providers. This is terrific. We would recommend that the plan encourage the leveraging of existing collaboratives, rather than spearheading new ones – except where a new collaborative represents a particular innovation or fills a gap in partnerships. Strategy 3 recommends that "Support providers assist the LEAs with review of analysis of student data from statewide summative assessments to inform and revise curriculum, instruction, and local assessments." We are wondering what body will authorize or empower the support providers to help make those revisions? We also wonder what metrics will be used to measure success as the implementation plan is rolled out; right now much of the evaluation plan as presented in the Appendix is more of a checklist that something was done rather than a true assessment of the impact of the action items. True assessment is the only way to inform and refine the process. Lastly, we urge the CDE to ensure that the Environmental Literacy Principles already adopted by the State are fully incorporated into the State's NGSS implementation strategy. The more the implementation framework can ensure collaboration with organizations that can facilitate this incorporation, the better.	
120	Brian M. Rivas, Director of Policy	As a research, policy, practice and advocacy organization, The Education Trust-West writes to respond to the July 2014 draft of	General Comments

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	and Government Relations The Education Trust-West	California's Next Generation Science Standards (NGSS) Implementation Plan. First we want to acknowledge that adopting NGSS moves us in the right direction toward ensuring that all of our students across the state have access to rigorous content standards across four disciplines (physical science, life science, earth science and space science) across the grade levels. Too many of our students – but especially our low-income, African-American, Latino students, and English learners -- have had inadequate opportunities to engage in science, math, and engineering content that promotes Science Technology Engineering and Math (STEM) literacy, and prepares them for success in college and future careers in STEM. We appreciate the intent of the NGSS Implementation plan and the opportunity to participate on the Science Leadership Team that provided input into the development of this plan. The eight key strategies identified for NGSS implementation hold promise for putting us on track to ensure *every* student has access to the resources, quality teaching and other conditions of learning to meaningfully develop their knowledge and skills in research-based science teaching and learning, but will require significant work to do so. In reviewing the CDE plans for implementing the various strategies, as well as recommendations for LEAs and support providers, we offer the following feedback and recommendations. **Place greater emphasis on equity and access.** We appreciate the draft Plan's attention to equitable access to instructional resources (p. 30-32), and the need to ensure all students get access to grade-level science content, including English learners who are specifically referenced a few	

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		times throughout the document1. Making sure all students' differentiated needs are met is one of the greatest challenges in our schools and districts. And while the plan calls for ensuring that appropriate materials are available for students "beyond specific labels" (p. 29), equity goes beyond a student's access to instructional materials and must include expectations and instructional strategies that assess and address students' 1 p. 17 re: professional learning, p. 22 re: current professional learning modules illustrating how to support ELs in science, pp. 31-33 re: instructional materials, and p. 34 re: assessment 2 differentiated learning needs. We recommend that the NGSS Implementation Plan does more to emphasize equity and access – from descriptions of Professional Learning Modules to ensuring LEAs engage and support all of their students in rigorous science curriculum. **Acknowledge and emphasize the connections between NGSS and CCSS.** While the NGSS are distinct from the Common Core State Standards (CCSS) and are not included in the CCSS initiative, the standards developed by the National Science Teachers Association, National Research Center, American Association for the Advancement of Science, and Achieve, Inc. are aligned in many ways with the Common Core English language arts/literacy standards and mathematics standards. Teachers and school leaders have been learning the key instructional shifts demanded of CCSS-ELA and CCSS-Math and many of them have taken steps to make sure those shifts are reflected in their classrooms. And this foundation is an important consideration for how NGSS can be introduced to teachers and school leaders. Because California is one of eleven states which has adopted all three sets of standards, California's NGSS Implementation Plan ought to reflect opportunities for the California Department of Education (CDE), local education agencies	

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		(LEAs), support providers and other stakeholders to reinforce the shifts in learning called out by California adopted CCSS and NGSS. This is particularly important as educators are both individually and collectively responsible for ensuring students have access to the standards and coherent instruction that helps them make connections across content areas. Furthermore, NGSS-aligned materials will not, nor should exist in a vacuum apart from CCSS-aligned materials – something the draft Plan does not address. Teachers will need to access and develop instructional materials that skillfully integrate standards across multiple subjects: science, math and English language arts. **Incorporate lessons learned from CCSS implementation efforts**. One lesson we have learned from the CCSS rollout across the state is that phases of implementation: awareness, transition, and implementation are not as clear-cut nor linear as the NGSS Implementation Plan framework implies. It would be helpful for the NGSS Implementation Plan to both acknowledge and represent the phases in a way that reflects that reality, and a visual graphic portraying the work beyond the Program Element Matrics (PEMs) framework – which is unwieldy at times – could potentially help with that. In addition, we learned that various state consortia were helpful in the CCSS rollout across the country, and California should leverage state consortia opportunities to support the NGSS implementation plan work – something not described in the current draft Plan. Another lesson is that the length of time it takes the state to develop a framework, approve instructional materials, and determine assessments requires LEAs to begin implementing NGSS without key components in place. More acknowledgement of and greater supports for the LEAs as they work in the transition phase would be helpful. For example, the CDE could provide examples of strong LEA NGSS implementation plans for	

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		2014-2017, along with examples of high quality professional development to support those plans. Accelerating the timeline would also be helpful. **Align the NGSS Implementation Plan with other initiatives.** The current draft NGSS Implementation Plan does not take federal assessment guidelines into account, nor does it suggest that efforts to assess effective science teaching sits within a broader context of effective instruction. At the very least, 3 educators would benefit from an explicit effort to ensure coherence in what students, teachers, and school leaders are expected to know and do. **Spell out how details of the implementation plan will be further developed.** While the draft NGSS Implementation Plan identifies several important strategies and activities, it does not attempt to be a comprehensive action plan. Given that, more specificity for *how* the Plan will be built-out to a level of sufficient detail is critical. For example, how ought the CDE engage with stakeholder groups to determine their needs? How will stakeholders provide input on the assessment development and what is the timeline for completing key benchmarks toward a robust set of science assessments? How will the California Commission on Teacher Credentialing (CCTC) revise its subject matter and credentialing standards to align with NGSS? How will the CDE vet resources for the digital repository? How will teacher preparation programs best (re)organize to ensure their teacher candidates are well prepared to teach to California adopted NGSS standards? The implementation of NGSS in California will also require significant resources which are not sufficiently identified or quantified in the plan. We recommend establishing a group representing a broad set of statewide leaders beyond the CDE to develop more detailed plans and monitor their implementation. It's possible that the "State Leadership Collaborative" could fulfill this role if it met on a regular basis beyond	

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		what is currently stipulated in the Plan, or that a different entity is formed to carry out that function. **Commit to more authentic community, post-secondary, and business engagement.** While the draft Plan outlines opportunities for parents/guardians, early childhood and expanded learning providers, as well as stakeholders within institutions of higher education and the business world to engage with NGSS implementation efforts, the plan does not reflect a holistic approach to engaging these key partners that could maximize their contributions. Instead, the draft Plan appears to relegate stakeholders to particular areas of input. We recommend the draft Plan be amended to reflect a less constrained framework for stakeholder input. We thank you for your leadership in getting this critical work underway, along with the opportunity to offer recommendations to continue this valuable work.	
124	Craig Rusbult	For the process of implementation, some ideas from CSLNet seem useful. Very briefly, these are: streamline to emphasize high-priority strategies; explain connections with Common Core implementation in CA, and with NGSS work in other states; build productive collaborations between stakeholders, including educators (in k12 & college), business and community groups. And one way to improve NGSS itself -- especially its Scientific and Engineering Practices -- is to **write a supplementary glossary** that will clarify definitions-of-terms and intentions-for-terms, to minimize problems that could occur if terms are interpreted in ways that are too loose or too rigid. Although it would require careful thinking (but that's usually beneficial) the actual writing of a useful glossary could be fairly quick without a lot of	General Comments

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		extra work. And it could be done now without changing NGSS because a glossary would be supplemental, not part of NGSS.	
126	Suzanne Goldstein, Chris Roe California STEM Learning Network	CSLNet strongly supports implementation of the Next Generation Science Standards (NGSS). California students ranked 45th or lower among all states in science proficiency according to the most recently available National Assessment of Educational Progress data. More troubling, enormous equity gaps exist, with African-American and Latino students, who comprise the majority of California's public school population, achieving an average of 8-11% proficiency in science versus 39-41% for white students. As technology becomes fundamental to daily life, and with STEM jobs growing nearly twice as fast as non-STEM jobs, improving science and STEM education is essential to increasing college and career opportunity for all our students. CSLNet agrees with the implementation plan's purpose to transform science education in California. We especially applaud the plan's calls for new strategies to invest in professional learning and instructional leadership for teachers and administrators and its attention to public communications and to collaboration with informal education providers, business and community groups. In all of these areas, CSLNet intends to support the plan by leveraging our capability to convene, communicate with and build partnerships among stakeholders from all sectors and regions of California. At the same time, we believe that this first draft of the implementation plan does need further development. The scope of the task before us is	General Comments

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		large and the implementation plan does need to be more explicit about how the state will maximize innovative and collaborative approaches that will allow us to learn from the best instructional models and link to successful system-building efforts already underway within and beyond California. Moreover, the scale of resources that will be needed for this work over many years requires that we have more robust strategies to maximize efficiency and ensure coordination among all stakeholders. We also recommend creating a more flexible presentation, perhaps through an online platform, that would allow readers to sort and view the plan by stakeholder group, strategy or element. More importantly, the plan needs to give more focus to building capacity in the following areas that are currently underdeveloped in the state and that are critical to the success of NGSS. 1. *Elementary science education*: One of the most important and promising aspects of the NGSS is its attention to deepening science instruction in the elementary grades. Unfortunately, recent years have seen little improvement in the low amount of time devoted to science in California elementary schools. In addition, research indicates that most elementary teachers feel underprepared to teach science.1 Given the scale of work that will be needed to build statewide capacity at the elementary school level, we think the plan needs to articulate more specifically how various elements of the plan will be coordinated to ensure a robust effort at the elementary level. 2. *Engineering design:* Another highlight of the NGSS is its full integration of engineering design into science instruction. This will be a new aspect of teaching and learning for most schools in California and therefore requires a dedicated strategy to prepare teachers and develop new curricular resources. This strategy must be closely connected, but	

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		not limited to, the state's existing Career Technical Education (CTE) system. Revisions to the plan should make more explicit how engineering will be addressed across major elements of the implementation plan, especially in the development of professional learning and instructional resources. Of equally high importance, the plan should make more explicit how the NGSS implementation activities will learn from and connect to related successful efforts already underway as part of Common Core implementation. The near absence of reference to the CCSS is troubling. The plan should also indicate how California will leverage work being done by other states on NGSS-aligned curriculum, instructional resources, assessments and other implementation components. The formation of a national learning network for NGSS is underway and the plan should indicate how the CDE in particular will find efficiencies by utilizing resources developed by other states and/or collaborate with others in the design of new resources.	
130	Will Parish, Ten Strands	I want to register my support for the Next Generation Science Standards (NGSS) final implementation plan to make specific reference to California's legislated (AB 1548, the EEI) environmental principles and concepts (EP&Cs) that were developed pursuant to PRC Sec.71301. Including the EP&Cs into the revision of the California Science Curriculum Framework, while also including them in the NGSS rollout, would be consistent with the goals of the Framework revision. In addition, including the EP&Cs as part of the NGSS rollout would dovetail nicely alongside the wave of interest in the Education and the Environment (EEI) Model Curriculum that we are seeing across the state.	Multiple Strategies