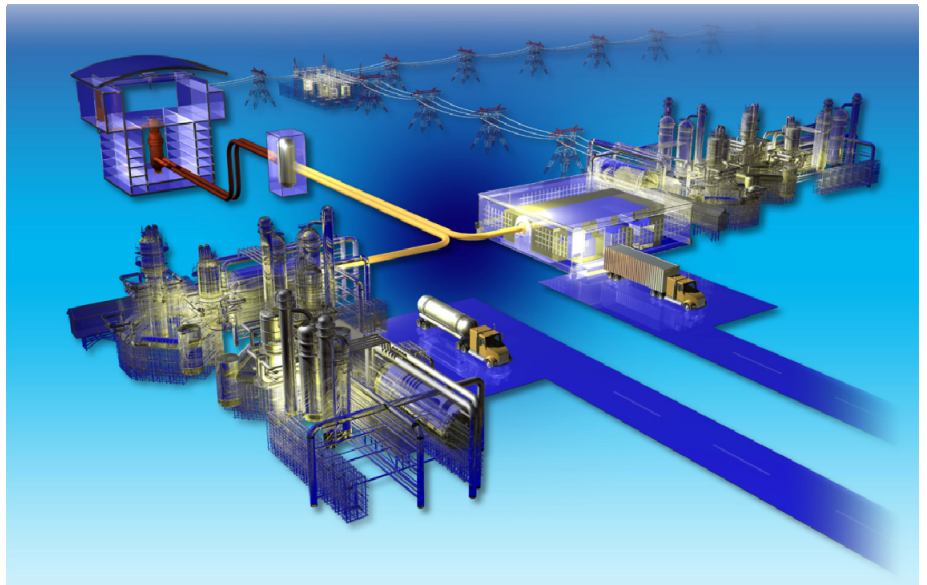


Summary of Differences in Approach to Executing the NGNP Project

August 2010

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August 2010

**Idaho National Laboratory
Next Generation Nuclear Plant Project
Idaho Falls, Idaho 83415**

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Next Generation Nuclear Plant Project

**Summary of Differences in Approach to Executing the
NGNP Project**

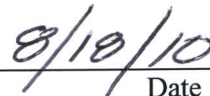
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August 2010

Approved by:



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Date

ABSTRACT

Differences exist between the DOE strategy for NGNP Project completion and that of the NGNP Industry Alliance. This document presents the significant differences and suggests that both parties engage in detailed discussions to reach agreement on an acceptable path forward.

CONTENTS

ABSTRACT.....	v
1. INTRODUCTION.....	1
2. SUMMARY OF DIFFERENCES.....	1
3. EXPANDED COST SHARE COMPARISON.....	3
4. CONCLUSION.....	7
5. REFERENCES.....	8

FIGURES

Figure 1. DOE strategy, scope, and cost share from Report to Congress, April 2010.....	5
Figure 2. Alliance Project Implementation Strategy, November 30, 2009.....	6

TABLES

Table 1. Summary of specific differences in the approaches to operating the NGNP Project.	2
Table 2. Proposed public and private sector cost shares.....	4
Table 3. A comparison of the Government and Private Sector Cost Shares for the DOE Cost Estimate, Schedule and Strategy presented in the April 2010 Report to Congress with the cost estimate, cost share provisions and schedule in the NGNP Alliance Project Implementation Strategy submitted to Secretary Chu November 30, 2009.	4

Summary of Differences in Approach to Executing the NGNP Project

1. INTRODUCTION

In the April 2010 Department of Energy (DOE) Report to Congress¹ on the status of the Next Generation Nuclear Plant (NGNP) Project a cost estimate, cost share provisions and milestone schedule were presented for completing the Project. On November 30, 2009 the NGNP Industry Alliance, Ltd.^a submitted a proposed Project Implementation Strategy to DOE Secretary Chu that also included cost estimates, cost share provisions, and a milestone schedule for completing the Project.² The Alliance strategy was emphasized in a subsequent letter to Secretary Chu in June 2010.³ Although the DOE and Alliance submittals have the objective of initiating operation of a first-of-a-kind (FOAK) reactor module(s) by 2021 as required by the 2005 Energy Policy Act⁴ (EPAAct) there are significant differences in the detailed strategies proposed to achieve the objective.

2. SUMMARY OF DIFFERENCES

The major differences between the DOE strategy for project completion and that of the NGNP Industry Alliance are four fold:

- Decision making framework, including the authority for making the decisions:
 - The DOE strategy includes a recommendation to the Secretary whether to proceed. This recommendation will be partially informed by a review of the Nuclear Energy Advisory Council (NEAC). If the Project is to proceed, the DOE will initiate a competitive process to initiate Phase 2 of the Project in June 2011 with a decision to down-select one high temperature gas-cooled reactor (HTGR) design in Sep 2011.
 - The Alliance proposes to jointly develop with the DOE the functional & performance requirements for the HTGR plants based on end user needs and to continue with the several stages of design development and licensing as jointly decided by DOE and the Alliance for two reactor concepts – one based on a pebble bed reactor concept and one on the prismatic block reactor concept. Decisions on which design work to complete and which Combined License Applications (COLAs) will be prepared for the FOAK plant(s) would be determined by Owners of the plants in mid-2011 and decisions to construct by the future Owners and End Users in mid-2017.
- Schedule to proceed:
 - The DOE expects a cooperative agreement with a supplier in 2011 with COLA preparation September 2011 to September 2013. It is noted that the current DOE planning for design development does not support this schedule.
 - The Alliance proposes establishing the public-private partnership in the 4th Quarter of 2010, initiating full design activities and continuing licensing activities in parallel with forming the partnership, preparing Early Site Permit (ESP) applications starting in October 2010 and preparing COLAs for two sites starting mid-2011 to 2014.

^a The NGNP Industry Alliance Limited is an industry consortium formed with the assistance of the Idaho National Laboratory as directed by EPAAct 2005 and the Battelle Energy Alliance contract with DOE. The Alliance members include energy end-users representing the petrochemical and petroleum industries, a nuclear owner/operator, nuclear system suppliers, a nuclear fuel and equipment vendor, and an architect-engineer/constructor.

- Scope of project:
 - DOE expects to down-select to one design in September 2011
 - The Alliance carries two designs through preparation of COLAs in mid-2014 with the Owners deciding whether to construct one or two plants in early 2017.
- Cost share model:
 - DOE cost share is 50/50 overall each year for all scope except applied research and development
 - The objective of the proposed Alliance cost share is a 50/50 cumulative overall cost split with the government share primarily through preliminary design and during the licensing stages. The private sector would fund all construction and operating costs. A more detailed comparison of cost sharing is presented in Section 3 of this paper.

The above is summarized in Table 1.

Table 1. Summary of specific differences in the approaches to operating the NGNP Project.

Summary Differences	DOE April 2010 Report to Congress	NGNP Industry Alliance Project Execution Strategy
Decision making framework, including decision authority	<p>NEAC recommendation to Secretary of Energy on proceeding to Phase 2 of EAct 2005 NGNP Project (Dec 2010)</p> <p>Secretary of Energy announcement on path forward to Phase 2 (Jan 2011)</p> <p>DOE initiates competitive process for Phase 2 award (Jan 2011)</p> <p>DOE decides down-select to one HTGR design and awards cost-shared, cooperative agreement for final design and licensing (Sep 2011)</p>	<p>Functional and performance requirements jointly determined by DOE and Alliance based on needs of customers/end-users (1st Qtr 2011)</p> <p>Plant designs to fulfill requirements determined by nuclear system suppliers (ongoing)</p> <p>Proceeding with various stages of the Project jointly decided by the DOE and the Alliance based on design/licensing maturity and economic viability assessment (ongoing)</p> <p>DOE and Alliance select sites for which ESP applications will be prepared (late 2010)</p> <p>Design(s) for which design work will be completed, COLAs prepared and FOAK plants potentially constructed determined by the owner(s) (Mid-2011), whether to construct, and the sites jointly decided by the owner(s) and the end-user(s) (early 2017)</p>
Schedule to proceed	<p>Cooperative agreement awarded (Sep 2011)</p> <p>Complete conceptual design [Note: Cooperative agreement from Sep-09 FOA scope does not complete conceptual design]. Prepare COLA (Sep 30, 2011-Sep 30, 2013). [Note: Design is not sufficiently mature to initiate COLA at this time using DOE sequence of activities]</p>	<p>Public-private partnership formed via Technology Investment Agreement (4th Qtr 2010)</p> <p>Design and licensing activities continue in parallel with forming public-private partnership</p> <p>Prepare ESP applications (initiate Oct 2010)</p> <p>Prepare COLAs for two sites (mid 2011-2014)</p>
Scope of NGNP project	Down-select to one design in Sep 2011	<p>Complete conceptual design, preliminary design and partial final design for two designs to support two COLAs (mid-2014)</p> <p>Complete ESP applications for up to four sites (mid-2013)</p>

		Decide whether to construct one or two FOAK plants (early 2017)
Cost Share Model	50/50 cost share, each year for all scope except applied research and development	50/50 cost share overall; government cost share primarily up front with private sector independently constructing FOAK

3. EXPANDED COST SHARE COMPARISON

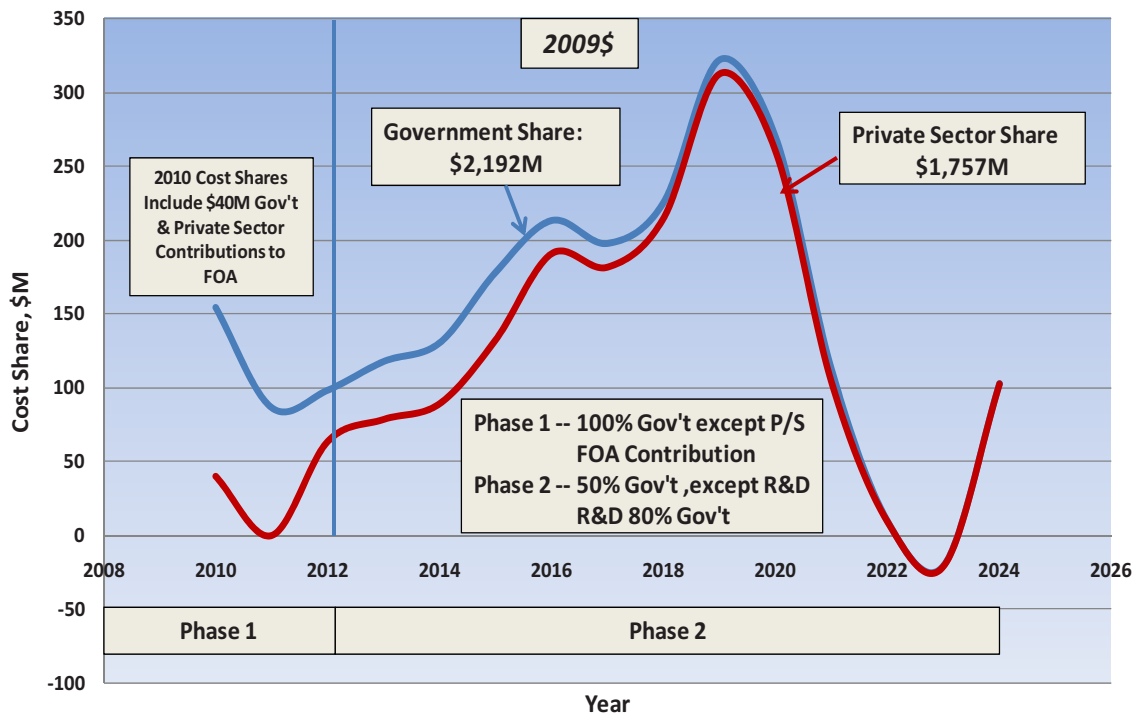
The results of analyses performed to compare the costs to the government and the private sector for each element of the NGNP Project is summarized in Table 2 with greater detail shown in Table 3. Figures 1 and 2 show the cost shares for each case by year and more detailed results of the analyses. In all cases, the results are shown in 2009\$.

Table 2. Proposed public and private sector cost shares.

One First-of-a-Kind Reactor Module				Two First-of-a-Kind Reactor Modules	
DOE Report to Congress		NGNP Industry Alliance PIS		NGNP Industry Alliance PIS	
Gov't Share, \$M	Private Sector Share	Gov't Share	Private Sector Share	Gov't Share	Private Sector Share
\$2,192M	\$1,757M	\$1,633M	\$2,645M	\$1,732M	\$4,950M

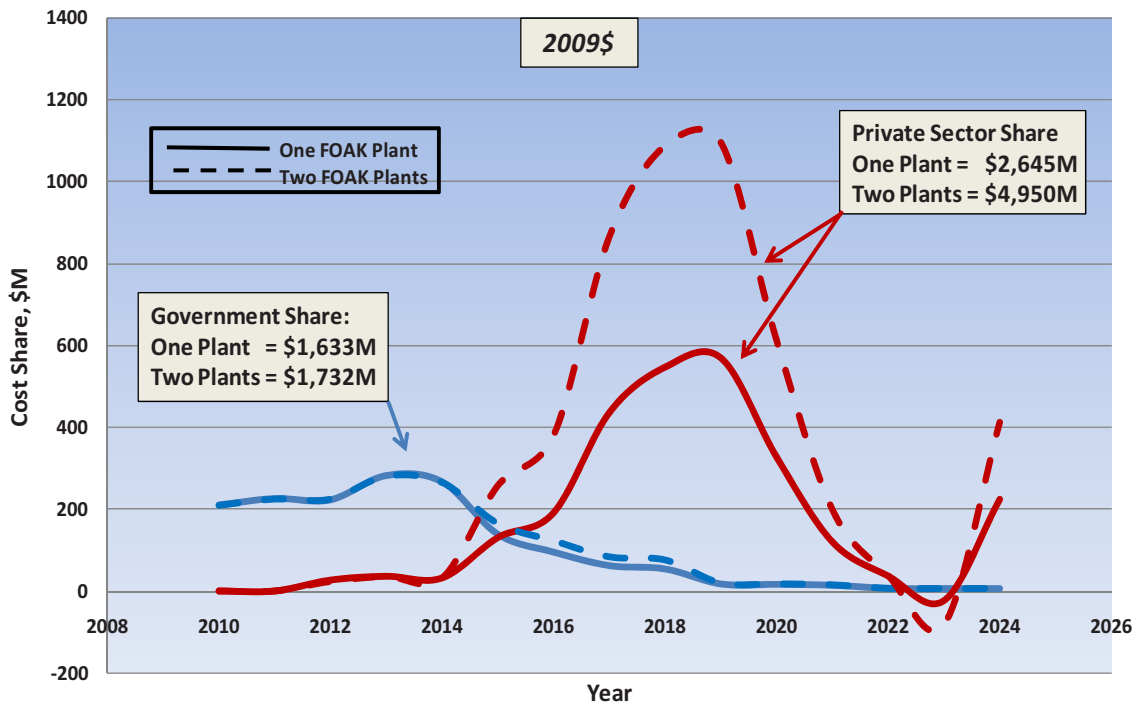
Table 3. A comparison of the Government and Private Sector Cost Shares for the DOE Cost Estimate, Schedule and Strategy presented in the April 2010 Report to Congress with the cost estimate, cost share provisions and schedule in the NGNP Alliance Project Implementation Strategy submitted to Secretary Chu November 30, 2009.

Item	DOE Response to Congress						Alliance Project Implementation Plan Letter to Secretary Chu 11/20/09											
	One FOAK						One FOAK						Two FOAK					
	2009\$			Inflated\$			2009\$			Inflated\$			2009\$			Inflated\$		
	Total	Gov't Share	Private Sector Share	Total	Gov't Share	Private Sector Share	Total	Gov't Share	Private Sector Share	Total	Gov't Share	Private Sector Share	Total	Gov't Share	Private Sector Share	Total	Gov't Share	Private Sector Share
Project Management / Owners' Cost	279	148	131	357	187	169	311	167	145	384	192	192	434	193	241	549	225	323
Research & Development	517	438	79	609	513	96	533	533	0	628	628	0	533	533	0	628	628	0
Design #1 -- thru Final	686	354	332	845	433	411	582	252	330	700	279	421	582	252	330	700	279	421
Design #2 -- thru Preliminary	40	20	20	40	20	20	286	247	39	318	273	45	579	250	330	697	276	421
Licensing	277	145	131	340	178	163	413	220	194	542	257	285	464	289	175	598	346	251
Procurement	1,099	550	550	1,483	742	742	1,099	0	1,099	1,476	0	1,476	2,198	0	2,198	2,951	0	2,951
Construction Labor	628	314	314	890	445	445	628	0	628	855	0	855	1,256	0	1,256	1,711	0	1,711
Startup Testing	54	27	27	79	40	40	51	0	51	74	0	74	102	0	102	148	0	148
Initial Operations (first three years)	422	211	211	676	338	338	422	0	422	676	0	676	845	0	845	1,353	0	1,353
Proposed Component Test Facility	0	0	0	0	0	0	4	4	0	4	4	0	4	4	0	4	4	0
Income	-264	-132	-132	-416	-208	-208	-264	0	-264	-416	0	-416	-527	0	-527	-833	0	-833
Hydrogen Process Development	210	117	93	258	141	117	210	210	0	258	258	0	210	210	0	258	258	0
Totals	3,949	2,192	1,757	5,161	2,829	2,332	4,278	1,633	2,645	5,500	1,891	3,609	6,681	1,732	4,950	8,765	2,017	6,748



NGNP Project Summary of Cost-to-Complete 2010-2024 by Project Element with Government & Private Sector Cost Shares (2009\$, based on DOE Cost estimate, strategy and cost share provisions in April 2010 Report to Congress)							
Item	Phase 1 (2010-2011)		Phase 2 (2012-2024)		Total	Total Gov't Share	Total Private Sector Share
	Total	Gov't Share	Total	Gov't Share			
Project Management (2009\$)	17	17	262	131	279	148	131
Research & Development (2009\$)	124	124	393	314	517	438	79
Selected Plant Design (2009\$)	61	41	625	312	686	354	332
Non-Selected Plant Design -- thru FOA (2009\$)	40	20	0	0	40	20	20
Licensing (2009\$)	14	14	262	131	277	145	131
Procurement (2009\$)	0	0	1,099	550	1,099	550	550
Construction Labor (2009\$)	0	0	628	314	628	314	314
S/U Test (2009\$)	0	0	54	27	54	27	27
Initial Operations (2009\$)	0	0	422	211	422	211	211
Proposed Component Test Facility (2009\$)	0	0	0	0	0	0	0
Income during Initial Operations (2009\$)	0	0	-264	-132	-264	-132	-132
Process Heat Application (2009\$)	23	23	187	93	210	117	93
Totals	280	240	3,669	1,952	3,949	2,192	1,757

Figure 1. DOE strategy, scope, and cost share from Report to Congress, April 2010.



NGNP Project Summary of Cost-to-Complete 2010-2024 by Project Element with Government & Private Sector Cost Shares (2009\$, One First-of-a-Kind plant based on Alliance Project Implementation Plan Submitted to Secretary Chu 11/30/09)							
Item	Phase 1 (2010-2014)		Phase 2 (2015-2024)		Total	Total Gov't Share	Total Private Sector Share
	Total	Gov't Share	Total	Gov't Share			
Project Management / Owners' Cost (2009\$)	139	121	1/2	46	311	16/	145
Research & Development (2009\$)	331	331	203	203	533	533	0
First Design Total -- thru Final (2009\$)	288	252	293	0	582	252	330
Second Design Total -- thru Preliminary (2009\$)	286	247	0	0	286	247	39
Licensing Total (2009\$)	141	141	273	79	413	223	194
Procurement (2009\$)	0	0	1,099	0	1,099	0	1,099
Construction Labor (2009\$)	0	0	628	0	628	0	628
S/U Test & Init Ops Total (2009\$)	0	0	51	0	51	0	51
Operations Total (2009\$)	0	0	422	0	422	0	422
Proposed Component Test Facility ² (2009\$)	4	4	0	0	4	4	0
Total Income (2009\$)	0	0	-264	0	-264	0	-264
Hydrogen Plant Total (2009\$)	110	110	100	100	210	210	0
Totals	1,299	1,205	2,978	428	4,278	1,633	2,645

NGNP Project Summary of Cost-to-Complete 2010-2024 by Project Element with Government & Private Sector Cost Shares (2009\$, Two First-of-a-Kind plants based on Alliance Project Implementation Plan Submitted to Secretary Chu 11/30/09)							
Item	Phase 1 (2010-2014)		Phase 2 (2015-2024)		Total	Total Gov't Share	Total Private Sector Share
	Total	Gov't Share	Total	Gov't Share			
Project Management / Owners' Cost (2009\$)	138	120	296	73	434	193	241
Research & Development (2009\$)	331	331	203	203	533	533	0
First Design Total -- thru Final (2009\$)	288	252	293	0	582	252	330
Second Design Total -- thru Final (2009\$)	286	250	293	0	579	250	330
Licensing Total (2009\$)	136	136	328	153	464	289	175
Procurement (2009\$)	0	0	2,198	0	2,198	0	2,198
Construction Labor (2009\$)	0	0	1,256	0	1,256	0	1,256
S/U Test & Init Ops Total (2009\$)	0	0	102	0	102	0	102
Operations Total (2009\$)	0	0	845	0	845	0	845
Proposed Component Test Facility(2009\$)	4	4	0	0	4	4	0
Total Income (2009\$)	0	0	-527	0	-527	0	-527
Hydrogen Plant Total (2009\$)	110	110	100	100	210	210	0
Totals	1,293	1,203	5,388	529	6,681	1,732	4,950

Figure 2. Alliance Project Implementation Strategy, November 30, 2009.

The tables and figures show the government share is lower by ~\$500M (2009\$) for both of the Alliance strategies when compared with the DOE strategy. This stems from the fact that procurement and construction of the reactor module(s) constitute the largest percentage of Project costs and the Alliance strategy assumes that the private sector will fund all of these costs. This effect is shown in Figures 1 and 2, which show plots of the cost per annum for the Project and the tables associated with these plots. The plots in Figure 2 show that for the Alliance proposed strategy, the government portion of the cost share drops significantly relative to the private sector cost share as the Project progresses into construction and operation in the latter phases of the Project. This is not the case for the DOE strategy as shown in the plots of Figure 1.

4. CONCLUSION

These summary differences are not a comprehensive description of the results of a detailed gap analysis, but rather are those differences that warrant discussion in meetings between DOE executives and the private sector represented by the Alliance. In practical fact, the full range and content of the differences will not be understood until such time as detailed discussions are undertaken between the DOE and the Alliance to develop a mutually agreed-to path forward.

5. REFERENCES

1. DOE Report to Congress, April 2010
2. Project Implementation Strategy: NNGNP Alliance, "Implementation Strategy for the Next Generation Nuclear Plant Project," Letter Report, November 30, 2009.
3. NNGNP Industry Alliance, Letter F.L. Moore to Secretary S. Chu, "Next Generation Nuclear Plant (NNGNP) Project Forming a Public Private Partnership for Its Execution", June 29, 2010
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