

## Example: DOE Phase I SBIR/STTR Commercialization Plan

*[DOE General Comments: The information you provide in an SBIR/STTR Phase I commercialization plan will vary greatly with technology and application. For those delivering modifications of existing technology into an existing market, you will know much more about your potential customers and competitors. For those developing new technologies into emerging markets, the market information will be more challenging to obtain or estimate. Below is an example (not a template) provided as guidance on the types of information that you should provide. **The Phase I commercialization plan must not exceed 4 pages in length.**]*

### Project Title: Novel Separator Technology for Lithium Ion Battery Systems

ABC LLC estimates cumulative sales revenues of \$\_\_\_ and cumulative licensing revenues of \$\_\_\_ during the first 10 years of commercialization.

#### 1. Market Opportunity

*[DOE General Comments: Describe the product or service that you plan to bring to market and also describe your competitive advantage or value proposition to the customer. Please note you do not need to go into detail about the technology in your commercialization plan; that information should already be provided in the project narrative of your Phase I proposal.]*

ABC LLC will deliver a novel separator technology to be used in lithium ion batteries. The competitive advantage of our product is that it will deliver improved safety (preventing thermal runaway during battery failure) at a lower manufactured cost compared with existing separator technology. Our competitive advantage is achieved by implementing a novel optical pore formation method in conjunction with a nano-structured polymer film that operates at high speed on a roll-to-roll process.

There is already a sizeable market for lithium ion batteries of \$\_\_\_\_\_B/year which is expected to grow significantly with the increase of hybrid vehicles. Our improved safety feature is expected to be of interest primarily to the automotive market where large battery packs can pose a significant safety risk in case of accidental failure. Our primary customers would be battery manufacturers supplying cells to the automotive industry: \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_. However, we expect also to work closely with domestic automotive manufacturers \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ to validate our claimed safety benefits. We anticipate that we would capture about % of the lithium ion separator market of approximately meter squared/year. We expect to ramp up sales revenue of approximately \$ \_\_\_\_\_/year based on an anticipated selling price of \_\_\_\_\_\$/meter squared.

During Phase I, we plan to validate these assumptions by participating in the DOE Phase Shift I program and by working with a subcontractor funded through the TABA program.

The established separator vendors for the lithium ion battery market are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_. All vendors aggressively market their products internationally. Although battery separator material may be perceived as a commodity, there are important differences in safety, product thickness, mechanical properties, wettability, and pore size distribution that are important to different battery manufacturers. Also because qualifying a new battery separator requires a significant investment on the part of the battery manufacturer, adoption of a new separator technology will not occur unless there is a significant cost or performance benefit. Our competitive advantage with respect to both cost and safety performance will allow us to penetrate this established market.

*[DOE General Comments: Describe your customers, anticipated sales to those customers, and your competitors. Note that in this case two different types of customer are listed: the lithium ion battery manufacturer and the automotive manufacturer who is the end-use customer. In many*

*markets you may need to work with both customers. Working with the end-use customer ensures that there is pull for your technology through their supply chain. You will work with your customers to insure you meet their price, specifications, and quality requirements. Even in a Phase I proposal you should know these customers by name, if this is an existing market. By the time you submit a Phase II proposal you should have contacted appropriate customer technical personnel to get initial feedback on potential adoption of your technology. DOE provides Phase I awardees with the opportunity to participate in a customer discovery program (Phase Shift I) and TABA programs that will deepen your understanding of your market opportunity. Explain how your team plans to leverage these programs. If your team does not plan to participate, explain what steps will be taken to glean this knowledge.*

*You should try to be realistic in your assessment of potential sales and not assume widespread and immediate adoption of your technology by the entire customer base. Your competitors are also busy developing new technology that they are not publicly disclosing and may erode your competitive advantage. You should also have a brief explanation of the basis of your revenue forecast. In this case the revenue estimate is based on the total sales of separator in meter squared and the anticipated selling price.*

*Your competitor summary should list the important existing or emerging competitors. You may also wish to describe any barriers to entry that you may encounter. In this case, one barrier that is described is the significant investment made by the battery manufacturer to produce a large number of batteries for safety and performance testing before they adopt a new separator. In other markets there may be regulatory or other barriers that may limit or slow adoption of new products.*

## **2. Company/Team**

*[DOE General Comments: You should describe the capabilities of your team specifically as they relate to the commercialization of your technology; there is no need to repeat their technical qualifications which are covered adequately elsewhere in your application.*

*The relevant commercialization capabilities of your team will depend on your commercialization path. In this case the company will work with a manufacturing partner with experience relevant to that path as described. If you are pursuing other approaches such as in-house manufacturing or licensing, then experience in those areas would be most relevant. If you are starting out with no personnel with commercialization experience, you should describe what your plans are to add this capability (new personnel, consultants, contractors, etc.) in the future. ]*

Our team at present is a start-up company with only two staff. The President, Dr. /Mr. / Ms. \_\_\_\_\_ has 18 years experience in developing and commercializing new polymer materials and has extensive industry contacts for manufacturing of polymer films. She/he has successfully commercialized two polymer film innovations in the past 10 years relating to adhesive films for the automotive industry and the experience of building technical and business relationships surrounding new product introduction. The CTO, Dr. /Mr. /Ms. \_\_\_\_\_ is a materials scientist with 10 years of experience in developing nanostructured materials, but has no commercialization experience.

We do not plan to manufacture the separator material at our firm. We plan to partner with film converters such as Conversion, LTD and Separation, Inc. who are able to provide both pilot and large scale manufacturing capabilities. The President has had extensive experience working with these and similar firms. We plan to bring in technical staff from these companies as consultants during or development phase to insure a smooth transition to manufacturing. As we enter the pilot manufacturing phase, we plan to add staff to address product quality working with both the converter and the customer.

Our President, Dr. /Mr. /Ms. \_\_\_\_\_ will perform our business development activities to build relationships with automotive companies and lithium ion battery manufacturers. We will use these contacts to gauge interest in our technology and later to evaluate and qualify our materials.

### 3. Intellectual Property

*[DOE General Comments: You should describe both the state of the intellectual property that exists in your intended market and plans to protect your intellectual property. In this particular case there is extensive patent literature with some important existing patents. There are probably significant amount of intellectual property protected by trade secret as well. The applicant has reviewed the existing patent literature and finds that their approach is novel and not covered by prior art. Note that patenting is not required for all markets and there will be other markets where trade secrets or copyrights will prove sufficient. ]*

There are an extensive number of patents for battery separator technology and specifically in the area of separators for lithium ion batteries. These separators have also been engineered to have safety features to mitigate the effects of abusive conditions. Important patents in this area include U.S. \_\_\_\_\_ assigned to \_\_\_\_\_ and U.S. \_\_\_\_\_ assigned to \_\_\_\_\_ which disclose methods to use multilayer films with different thermal properties to limit thermal runaway in batteries.

We have reviewed the existing patent literature and believe that our method is novel and substantially different from existing approaches. Our method avoids the more time-consuming (and costly) biaxial stretching and annealing process used to manufacture separators today and provides a novel method of closing the separator pores at elevated temperature. Because the films could be reverse engineered based on analysis of our separator material, we believe that we will be unable to protect our method by trade secrets and so they must be protected by patents. Because of the large domestic and international market for this technology, we plan to file both domestic and foreign patent applications for our inventions when we have reduced them to practice.

### 4. Revenue Forecast

ABC LLC estimates sales revenues of \$ \_\_\_\_\_ and licensing revenues of \$ \_\_\_\_\_ during the first 10 years of commercialization.

*[DOE General Comments: The revenue forecast statement above is mandatory in a Phase I application.*

*A revenue forecast is requested so we can understand the size of the market you plan to address. We ask for the revenue during the first 10 years of commercialization because in some cases, certain companies may begin commercialization immediately after their Phase II award, in other cases commercialization may not start for many years beyond the Phase II grant.*

*A recent National Academy of Sciences study of the DOE SBIR program found that a third of DOE Phase II SBIR/STTR awardees stop working on their technology after their Phase II award because they discover the market for their technology is too small. To address this issue, DOE provides Phase I awardees with commercialization support programs to deepen your understanding of your market opportunity. Make sure you explain how your team will make use of these programs and/or what will be done to glean this knowledge if your team opts out of participating. We realize that you will need to make some estimates at this stage to arrive at a revenue forecast, especially for emerging markets, but we would like you to go through this exercise and provide the basis for your forecast in your discussion of the market opportunity.]*