STRATEGIC VEHICLE RESEARCH AND INNOVATION (FFI)

Applying for and reporting FFI projects

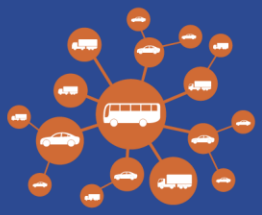
March 2019

ENERGY AND THE ENVIRONMENT

ROAD SAFETY AND AUTOMATED VEHICLES

ELECTRONICS, SOFTWARE AND COMMUNICATIONS

SUSTAINABLE PRODUCTION



EFFICIENT AND CONNECTED TRANSPORT SYSTEMS

FFI Strategic Vehicle Research and Innovation

VINNOVA Swedish Energy Agency TRAFIKVERKET SWEDISH TRANSPORT ADMINISTRATION

FKG VOLVO SCANIA VOLVO

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1 What is the partnership programme Strategic Vehicle Research and Innovation – FFI?

This document describes the background to — and the application process for — the Strategic Vehicle Research and Innovation Initiative (FFI) for all sub-programmes and strategic initiatives.

1.1 Background

In 2009, the Swedish government and the Swedish automotive industry signed an agreement to jointly finance research, innovation and development activities with a primary focus on the overall topics "climate and environment" and "security". There was already a good history of successful cooperation between the parties. The initiative grew out of developments within the road transport system and the Swedish automotive industry, which are of great importance for Swedish growth. It involves a pooling of research and innovation in line with social, national and industrial objectives.

All FFI projects must have a clear object within the areas of climate and the environment and/or safety, but should also have a competition-promoting perspective. Priority is placed on participation by the suppliers.

The Swedish government is represented by Vinnova, the Swedish Transport Administration and the Swedish Energy Agency. Partners with the automotive industry are AB Volvo, Volvo Cars, Scania and the Trade Association for Scandinavian Suppliers to the Automotive Industry (FKG).

1.2 Organization

FFI is led by a board whose members represent all of the stakeholders and has an independent chairman. The initiative is conducted through five sub-programmes and through strategic initiatives. A responsible authority has been designated for each specific programme (Vinnova, the Swedish Energy Agency and the Swedish Transport Administration).

Sub-programmes and the responsible authorities:

- Energy and the environment (E&M), Swedish Energy Agency
- Road Safety and automated vehicles (TS&AF), the Swedish Transport Administration
- Electronics, software and communications (EMK), Vinnova
- Sustainable production (HP), Vinnova
- Efficient and connected transport systems (EUTS), Vinnova

Our sub-programmes are also led by a board whose members represent all of the stakeholders and with an independent chairman. The programme committee is responsible for sub-programme strategy and provides recommendations to the responsible authority about which applications to approve. All applications that meet the formal requirements are considered and judged by independent quality controllers before the programme committee makes its recommendation to the responsible authority, which in turn makes the formal decision. The administrative work within each programme committee is headed by a programme manager from the authorities.

Each strategic initiative is administered by one of the five programme areas that are appointed by FFI's Board. The responsible programme committee makes a recommendation about applications received to the responsible authority, which makes the formal decision.

Ongoing strategic initiatives[1]:
Systems- of- Systems in citites (SoSSUM) EUTS

Strategic initiatives, not open for new applications

- Electrical roads, EUTS
- Automated vehicles, TS&AF
- Enabling electronics, EMK
- Electromobility, E&M
- Integrated Vehicle and Infrastructure Development within the FFI – FIFFI
- Big data (EUTS)
- Complex regulation (EMK)
- Automotive Security and Privacy – cyber security (EMK)
- Machine Learning, EMK
- Bicycles and other vehicles in a safe and smart cooperation for a sustainable future (TS&AF)

See also Figure 1 for a schematic representation of FFI's organisation. For a more comprehensive overview of FFI, please see Vinnova's website.

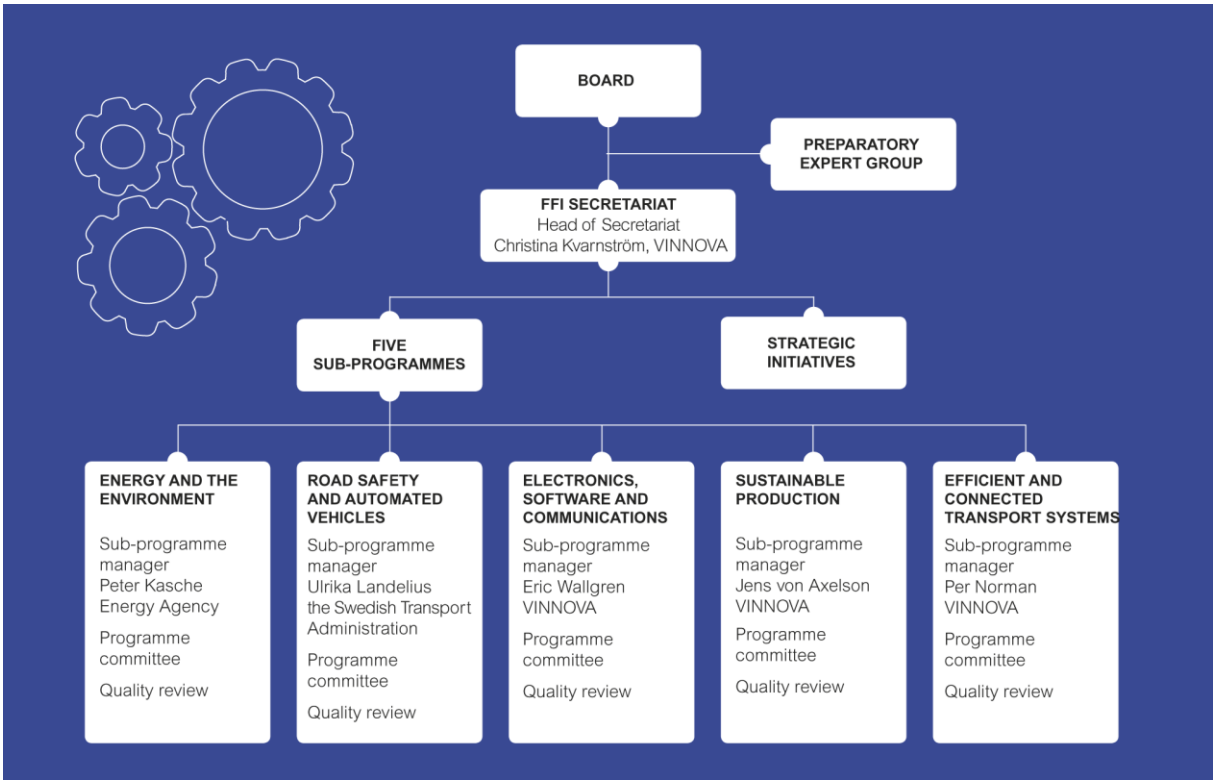

Figure 1. Schematic representation of FFI's organisation.

1.3 General requirements and objectives

Programme committees are responsible for sub-programmes and strategic initiatives fully complying with the requirements described in the partnership agreement[2] between the Swedish government and the automotive industry. An individual project does not need to meet all of the requirements, but each project application is assessed by how well it adheres to one or more of the requirements within FFI.

[1] *Relevant information is available at: http://www.Vinnova.se/sv/ffi/FFI---strategiska-satsningar/*
[2] *Ref. no. 2009-00163 and 2013-02775.*

Sub-programmes and projects must, within the overall topics of climate and the environment, and safety, clearly contribute to:

- Sweden approaching its vision of zero casualties and fatalities in traffic.
- meeting its goal of a fossil fuel-free fleet of vehicles.
- protecting the Swedish automotive industry's competitiveness and jobs in the long term — and preferably also in the short term — through increased research and innovation capacity.
- the development of internationally connected and competitive research and innovation environments in which, among others, academia, research institutes and industry work hand in hand.
- promoting international research and innovation activities, for which the conditions for and participation in EU framework programmes (as well as other international research and innovation collaboration) are carefully evaluated.

In addition, the activities of all sub-programmes must be carried out so that the following aspects are reached:

- that independent quality review is possible.
- that annual renewal of approximately 25 per cent of the project stock within each sub-programme is made possible.
- that consideration is given, as far as possible, to the internal budgetary and planning processes of the parties of agreement, which include indicative information about each programme's scope for the various parties.
- that long-term and potentially radical projects are stimulated.
- that the involvement of small and medium-sized enterprises, sub-contractors and cross-industry collaboration are stimulated.
- that collaboration between the automotive and other industries, universities, colleges and institutes is encouraged.
- that collaboration between the parties of agreement is stimulated.
  that project proposals are requested from third parties, especially from universities, colleges and institutes.

1.4 Roadmaps and strategic investments

Each sub-programme has a separate roadmap that specifically links the sub-programme to FFI's overall objectives and shows the challenges, research areas and priority sub-areas. The five road maps are published on FFI's website[3].

A less comprehensive programme description of the respective strategic investment is posted on FFI's website.

1.5 Follow-up

Sub-programmes, strategic initiatives and the programme as a whole will be followed up annually by employing a number of indicators. Follow-up is based partly on a summary of the information submitted by the individual projects (applications and status reports) and via a questionnaire to the project managers. Each programme committee and the FFI board will analyse all of this and implement any changes requested.

[3] http://www.Vinnova.se/sv/ffi/

2 Applying

The following is a brief description of the process from concept to the project conclusion. This process is common to all sub-programmes and strategic initiatives within FFI. The figure below shows the various stages of a project's "life cycle".

Figure 2. Project generation, the decision-making process and project implementation

2.1 Who can apply?

An application is normally sent by the stakeholder (coordinator) who is responsible for managing the project. All projects that receive financial support from a specific programme must be relevant to the automotive industry and be based on the sub-programme's roadmap, on the call for applications' description, or on the call for applications within a strategic initiative (see section 1.2).

2.2 What you can apply for

The public funding can be awarded to parts of the project's total eligible costs, from which the various project partners can be granted various levels of support. Permitted levels of funding are shown in Vinnova Regulation (2015: 0208) concerning government funding for research, development and innovation, and the Swedish Energy Agency Regulation (2015:) concerning state funding for research, development and innovation in the energy sector.

The aggregate total level of funding for the programme may amount to a maximum of 50 per cent. Each individual project must have **at least 25 per cent** commercial funding.

2.3 A complete application

A complete application consists of four parts:

- Electronic application via the application portal at Vinnova (www.Vinnova.se) or the Swedish Energy Agency (www.energimyndigheten.se)
- Budget form
- Project description and an abridged version for feasibility studies
- CVs of the project manager and other key project personnel

The designated templates for the above must be used.

PLEASE NOTE: These documents are subject to continuous updating. It is, therefore, important to download relevant documents and templates in conjunction with any new application (Vinnova.se/FFI).

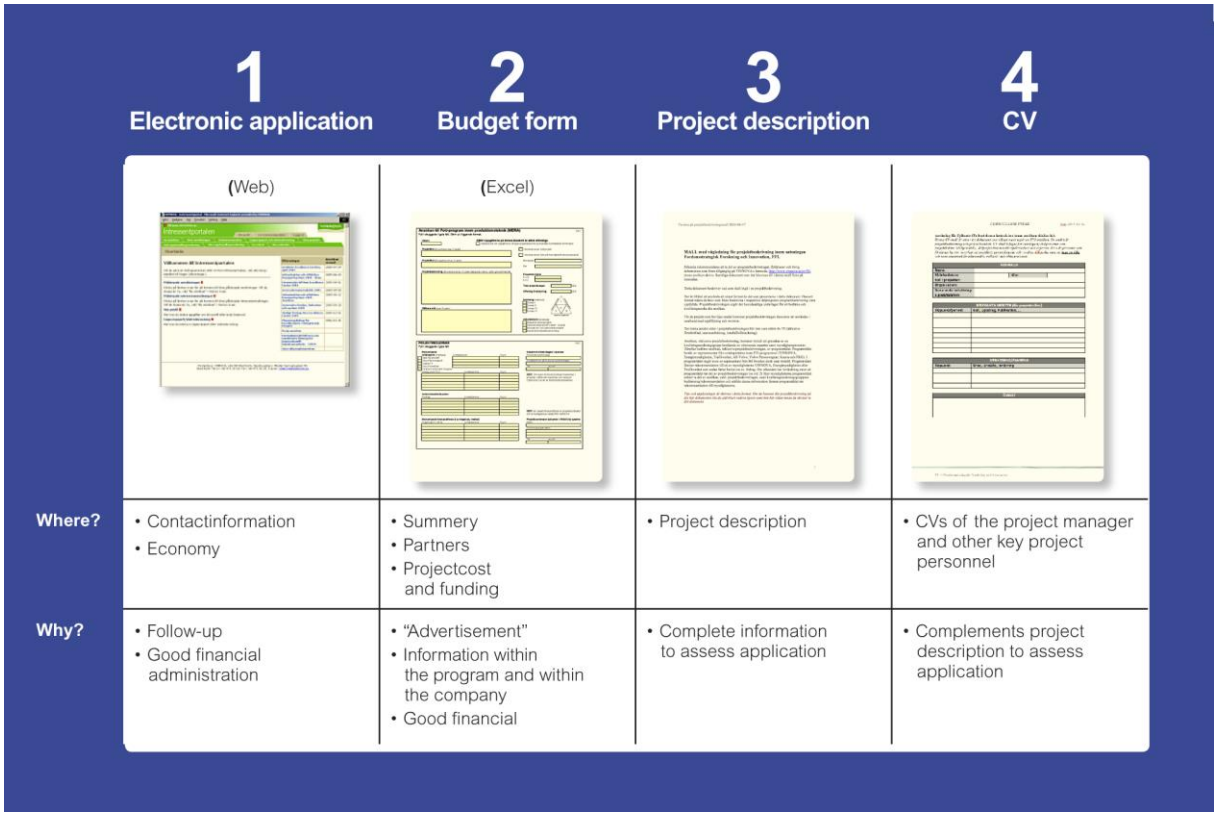

Figure 3. The application dDocuments that together form a complete application.

The project description forms the main basis for assessment and quality review of the application. The project forms and CV represent supplementary information. If necessary, the responsible authority may request additional documentation.

The project description also forms the basis for monitoring and auditing the programme during its lifetime. It is, therefore, important that the project description is informative and clear. To achieve an appropriate evaluation and quality review, it is important for all information requested in the project description to be provided by the applicant. Project descriptions should preferably be written in Swedish or, exceptionally, in English in accordance with the current templates on the FFI website (www.Vinnova.se/ffi). The templates state the maximum number of pages. If a longer project description is required, applicants must contact the programme management to obtain an exemption for a longer project description. If such an exemption is not given, the excess pages will not be considered in the project description.

The complete project application can be submitted on an ongoing basis through Vinnova's[4] and the Swedish Energy Agency's application portals, but are usually reconciled at the three closing dates each year. See Vinnova.se/ffi for exact dates. Timing of decisions may vary depending on the work of the quality review group and the meeting frequency of the programme committee.

2.4 Project period

Applications may only be granted for a maximum of four years at the time of the decision. If a continuation application is necessary, it will be treated as a completely new project proposal and there must be results presented before a decision is taken concerning a continuation of a project.

2.5 Pre-study

A pre-study can primarily be submitted by colleges, universities, institutes or SME's that conducts their own R&D. Estimated project periods should be from 6 to 9 months. The maximum funding that will be granted is SEK 500,000. The same application procedure is used as that for regular projects but a special template for the project description should be used.

2.6 Classification according to Technology Readiness Level

The project application must specify the project's technology readiness level at the project start and project completion. The description should be provided in both words and numbers. If several technologies are intended to be developed in the project, the different parts can be specified separately.

Normally, projects within FFI are financed according to the TRL scale from 2 to 7. TRL jumps greater than 3 should be explained. Appendix 2 includes a document describing the automotive industry's view of development levels according to the TRL (Technology Readiness Level) scale and a corresponding MRL (Manufacturing Readiness Level) scale. One of these should be used as a reference in the project description.

[4] Vinnova processes applications relating to the Transport Administration sub-programmes.

3 Eligible costs within FFI

To be an eligible costs, the cost must meet the requirements below. The cost:

- is to be actual and auditable, which means that it must have occurred and be found in the project partner's accounts. Costs may not be estimated. This means, for example, that a project partner that does not take a salary cannot count and receive a grant for the estimated cost. This is because the cost is not an actual salary cost that can be found in the project partner's accounts.
- is to be borne by the project partner, which means that the project partners can only charge their own costs.
- has occurred in the project and during the project period, as stated in the grant decision. Costs incurred before or after the project dates stated in the decision are therefore not eligible.
- are to be determined in accordance with generally accepted accounting principles.
- are to be booked by the project partner reporting the cost.
- are to be reasonable and incurred solely for the implementation of the project, which means that the cost is to be reasonable, proportionate and necessary for the implementation of the activities of the project. Only the part of the costs attributable to the project is eligible.
- Project costs should be distinguishable from the organisation's other transactions in the accounts.

The cost is to be included in one of the following types of costs:

Personnel and salaries

<table>
<tr><td colspan="2">Companies</td></tr>
<tr><td>Vinnova Direct personnel costs, such as salaries, are to be reported under this category. The costs must be actual and may not exceed SEK 950 per hour (including a max. of 30 % indirect costs). Salaries for consultants are to be reported under consultancy costs.</td><td>For applications to the Swedish Energy Agency, salary costs excluding indirect costs are eligible Direct personnel costs, such as salaries, are to be reported under this category. The costs must be actual and may not exceed SEK 950 per hour (excluding a max. of 30 % indirect costs). Salaries for consultants are to be reported under consultancy costs.</td></tr>
<tr><td colspan="2">Research institutes</td></tr>
<tr><td>For applications to Vinnova, salary costs and indirect costs may be included in accordance with special agreements between the RISE Group and Vinnova. For institutes that do not have an agreement with Vinnova, the same rules apply as for companies.</td><td>For applications to the Swedish Energy Agency, Institutes with non-economic activities may add indirect costs of not more than 30% on their eligible staff costs (salary + non-wage labour costs). The costs must be actual and may not exceed SEK 950 per hour, including indirect costs.</td></tr>
<tr><td colspan="2">Higher education institutions</td></tr>
<tr><td colspan="2">Personnel and salary costs for participation from higher education institutions may be include with full cost coverage. However, indirect costs should be reported separately.</td></tr>
</table>

- **Indirect costs**

Indirect costs (overhead) are general cost that cannot be directly linked to the project but can be related to the implementation such as computers, facilities etc.

Equipment

If expensive equipment, tools and so on are procured for project implementation, as a rule, the rental principle will be used. An example is the costs of wind tunnel tests.

Only directly related equipment costs may be included. Depreciation rules in accordance with generally accepted accounting principles apply and any residual value is to be deducted from eligible costs.

Consultancy costs, licenses etc.

Costs for consultants are to be reported separately and not as personnel/salary costs.

Total direct costs

Material costs may be included in the cost data only if they are clearly project-specific.

For instruments, less expensive equipment and buildings, depreciation costs are eligible. These costs are only eligible to the extent and during the time they are included in the project. This means that if they are only used for a certain percentage and for a certain amount of time in the project, the cost is eligible only for the corresponding amount of time. For more information, see Vinnova's eligible costs guide (Guide för stödberättigade kostnader) (www.Vinnova.se).

Travel

Travel expenses are an *Additional direct cost*, but reported separately in the FFI budget form.

Indirect costs

Higher education institutions may charge indirect costs according to the full cost principle that they apply.

Institutes and other organisations may include salary costs including overhead for a maximum of SEK 950 per hour. Indirect costs are to be reported separately.

AstaZero

This type of cost refers to the cost of renting the AstaZero test track and is intended to help follow up utilisation of the facility within FFI projects.

4 Review and decision

Projects that are to be funded under the programme must meet certain specified requirements. These involve partly formal requirements and partly that the project will contribute to the goals that are set for each specific programme or strategic initiative.

4.1 Formal requirements

The following formal requirements must be met if an application is to be processed by the programme committee and quality review group:

- The project application must be complete on submission.
- It must be permissible to fund the proposed activities and they must not conflict with the applicable Swedish regulations or EU regulations.
- The project funding must adhere to the rules for state funding in accordance with SFS 2008:7625 (Vinnova) or SFS 2008:761 (Swedish Energy Agency).

4.2 Assessments and decisions

Quality reviewers are independent external individuals who have been given the task of confidentially assessing project proposals based on the programme's assessment criteria and roadmap[6]. Representatives for the application are invited to the quality review meeting and given the opportunity to make a brief presentation of their proposals. At the same time, quality reviewers have the opportunity to ask clarifying questions about the project design and content.
Each application is reviewed by the quality review group for:

- Programme board
- The quality of the project proposal
- Feasibility
- Utilisation

The reviewers then make a recommendation about the decision to the relevant programme committee. The decision recommendation on funding is taken by consensus of the programme committee. In case of disagreement, the matter is referred to FFI's Board for a decision. The recommendation of the programme committee is based on the publicly available information in the application, a written opinion from the quality review group and any comments from FFI's secretariat.

Decisions about project applications are made by the executive authority — Vinnova and the Swedish Energy Agency, respectively. The Swedish Transport Administration's decisions are implemented by Vinnova.

4.3 General and special terms and conditions for approved projects

Vinnova

For Vinnova's decisions for the Strategic Vehicle Research and Innovation (FFI) programme, "Vinnova's General Terms and Conditions for Grants - 2017" applies, as well as the special terms and conditions set out below. Additional special terms and conditions may also be imposed for individual projects and will be specified in Vinnova's decision. Instructions in programme descriptions must also be considered.

1. Reporting and follow-up

1.1. Reporting and follow-up are to be in accordance with decisions, templates and special instructions available on the FFI website www.Vinnova.se/ffi.
1.2. The project is to be represented at the seminars or programme conferences that Vinnova and FFI organise and invite participants to during the project period. Expenses for participation in such

[5] *See for example: http://www.Vinnova.se/sv/Ansoka-och-rapportera/Regler-och-villkor/Vinnovas-villkor-for-bidrag/*
[6] *Roadmaps for each sub-programme are available at: http://www.Vinnova.se/sv/ffi/FFI-PROGRAM/*

seminars/programme conference are eligible costs. Upon request, the coordinator of the project is to provide Vinnova and FFI with graphics and text material for project catalogues, annual reports and the like.

2. Eligible costs
Instead of §6.1, fifth and eighth paragraphs of Vinnova's General Terms and Conditions, eligible personnel costs for a project partner that is not a higher education institution may be estimated at no more than SEK 950 per hour, including indirect costs (overhead). As such, additional charges for indirect costs may not be made.

Research institutes within the RISE may, when they participate in their non-commercial operations, include staffing costs and may charge indirect costs according to the full cost principle that they apply and that is approved by Vinnova. As such, the funding cap for personnel costs does not apply.

3. Indicating the project was funded by the FFI programme
The following replaces §7.3 in Vinnova's General Terms and Conditions for Grants
Information about the project and each publication of project results must indicate that the work was conducted with support from the Strategic Vehicle Research and Innovation Programme (FFI).

Energimyndigheten
Corresponding conditions also apply to projects approved by the Swedish Energy Agency.

4.4 Information on the classification of projects in relation to state funding rules

When assessing project proposals, a determination is made on which rules for state funding apply for each party. These rules also determine what level of funding is possible. FFI primarily supports Industrial Research and Experimental Development. The assessment is essentially based on the TRL classification, the forms for utilisation and implementation (methodology). The FFI programme standard for funding a project is 50 per cent in funding of Industrial Research and 25 per cent support for Experimental Development. The following definitions are specified in the regulations (GBER 651/2014):

"Industrial research: planned research or critical analysis, which aims to acquire new knowledge and new skills to develop new products, processes or services, or to significantly improve existing products, processes or services. This includes the creation of components that form parts of complex systems and may include the construction of prototypes in the laboratory environment or in an environment with simulated interfaces to existing systems and pilot operations, if necessary for industrial research, especially for general technology validation."

Experimental development: to acquire, combine, shape and use existing scientific, technical, business and other relevant knowledge and skills with the aim of developing new or improved products, processes or services. This may also include, for example, activities aimed at conceptual definitions, planning and documentation of new products, processes or services.

There can be reason to deviate from this standard for both projects and for participating parties, and the general rules for state funding apply to individual parties. For example, higher funding is possible for small and medium-sized enterprises. For more information, see https://www.Vinnova.se/sok-finansiering/regler-for-finansiering/statligt-stod/

5 Project start and reporting during the project period

As described earlier, a competent authority is designated for each specific programme. The Swedish Transport Administration's decisions are implemented through Vinnova.

Sub-programmes and the responsible authorities:

- Energy and the environment (E&M), Swedish Energy Agency
- Road Safety and automated vehicles (TS&AF), the Swedish Transport Administration
- Electronics, software and communications (EMK), Vinnova
- Sustainable production (HP), Vinnova
- Efficient and connected transport systems (EUTS), Vinnova

5.1 Starting approved projects

Vinnova-approved projects

Decisions will be announced by the respective authorities and sent electronically to the coordinator. Detailed instructions are attached to the decision notification. The Baseline report must be submitted for the project to move forward. This represents the approval of the decision by the individual parties in the project consortium. In connection with this, the form "Project Parties' approval" must be signed by the authorised person (authorised signatory/director) at the different project partners. These are collected and retained by the project coordinator. Copies are sent electronically as attachments to the Baseline report.

Swedish Energy Agency-approved projects

The decision and annexed terms and conditions are sent to the project owner some weeks after the decision has been made by the Swedish Energy Agency. The annexed terms and conditions must be signed by the authorised signatory and the project manager, and returned to the Swedish Energy Agency. Before the first payment is made, the project manager must also inform the Swedish Energy Agency that a signed project agreement has been signed by all of the project partners.

5.2 Status report

Vinnova-approved projects

The decision also states when status and final reports should be submitted[7]. These should be regarded as reconciliation of the project's progress in terms of both finance and results. No later than in connection with the first status report, a project agreement[8] must be signed between the parties, which as a whole regulates the activities of the parties, their rights to project results and non-conformance management. The date for signature of all parties is stated in the first status report.

Swedish Energy Agency-approved projects

Templates for progress and financial reports are available on the Agency's website:
http://www.energimyndigheten.se/Forskning/Sok-stod-for-forskning-och-teknikutveckling/Rapportering-med-blanketter/

5.3 Final report

Vinnova-approved projects

A complete final report consists of a form, "Final Report to Vinnova," that is completed in the Vinnova eServices portal and a number of documents to be submitted electronically.

1. Final report for Vinnova *completed in the eServices portal*	– A form that is completed on the Vinnova eServices portal. More detailed instructions can be found at Vinnova.se/ffi. – Data to be entered: a) Brief project summary, the project's aims and objectives, implementation and results, and expected impacts.

[7] *See: http://www.Vinnova.se/sv/ffi/Ansoka-och-rapportera/*
[8] *See also Vinnova's general terms and conditions and FFI's specific conditions.*

	b) Financial statement c) Follow-up questions that will be used for follow-up and assessment by the FFI programme.
Public final report *submitted electronically*	– An important part of the programme is to also disseminate results and information to stakeholders outside the programme, and the public report forms a natural part of this work. The report will be published at http://www.Vinnova.se/sv/ffi/Projekt/ but can also be used in publications that are about the programme. – There are templates that must be used for the public report, in Swedish and English. The coordinator chooses the language to write in. The templates are available at http://www.Vinnova.se/sv/ffi/Att-soka-finansiering/.
3. Any annexes *are attached electronically*	– If the project wishes to make any type of additions and/or clarifications that it does not wish to have included in the public report, it can attach a separate document that is marked "not for public release".
Auditor's certificate *attached electronically*	– When a recipient (thus not the entire project) receives SEK three million or more in funding from FFI, an auditor's certificate from a chartered or certified accountant must be attached to the final report electronically (the original is retained by the recipient of the funding). For local and regional authorities, government agencies, universities and colleges, an Auditor's certificate from their internal auditor can be accepted. There must be one certificate to each funding recipient. The final report cannot be approved without an audit certificate. – Even if a project party does not receive funding of SEK three million or more, Vinnova can still request an auditor's certificate and that may be requested at a different time from the final report. – For funding awarded before 1 January 2013, the auditor's certificate must be issued when the funding amounts to SEK 5 million or more per project. – The auditor's certificate must show: • that the accounted costs of the project are taken from the Funding recipient's accounts during the disposition time. • that the costs are verified (proven). • the funding recipient's accounting procedures are designed in accordance with Swedish GAAP (General terms and conditions, section 8.2).

Swedish Energy Agency-approved projects

1. Technical Final Report	– uploaded through the Agency's E-portal, Ekanalen. – Use FFI's final public report template, available at http://www.Vinnova.se/sv/ffi/Att-soka-finansiering/
2. Financial report	– Must be signed by an authorised signatory and the project manager and sent in writing to the Swedish Energy Agency. – The template can be downloaded from http://www.energimyndigheten.se/Forskning/Sok-stod-for-forskning-och-teknikutveckling/Rapportering-med-blanketter/
Auditor's certificate	There is no requirement for auditor's certificates for projects approved by the Swedish Energy Agency.

5.4 Non-conformances during the project

In the event of major non-conformances that threaten the progress of the project's plan and its results, the administrator in charge must be contacted immediately.

5.5 Payment of government funding

Vinnova-approved projects

Payment of government funding is made when baseline and status reports, respectively are submitted and approved according to the approved payment schedule.

Swedish Energy Agency-approved projects

The first payment of government funding is made when the terms and conditions annex has been submitted and the project manager has reported that a project agreement has been created between the project partners. Annual payments will then be made in accordance with the payment schedule in the decision as long as the established implementation plan is being adhered to.

5.6 Unused funds by parties are to be repaid

Repayment of funding is to occur if the project is completed and all paid funding has not been used, i.e. the total project cost was lower than budgeted. This means that the project manager coordinates any surplus from the funding recipient and pays in the surplus to Vinnova. Any redistribution between the project's parties must be approved by Vinnova before repayment occurs.

6 Secretariat and programme management

The FFI secretariat is located at Vinnova.

Postal address: Vinnova, SE-101 58 Stockholm
Office address: Vinnova, Mäster Samuelsgatan 56, Stockholm
Tel. switchboard: 08-473 30 00
The following persons are contact persons at the secretariat:

Programme manager/ Head of Secretariat	Christina Kvarnström	+46 (0)8-473 31 28	Christina.kvarnstrom@Vinnova.se
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Annex 1 Assessment criteria for reviewing FFI applications

* criteria used only for assessment of feasibility studies

Scale 1-4 is used for rating:

1 = very low
2 = low
3 = good
4 = Very good

1. Programme delivery: Assessment of how well the project proposal will contribute to the objectives of the sub-programme.

- * How well are the project proposals considered to contribute to the objectives and programme areas of the sub-programme or the strategic objective of the project?
    - * Is it relevant to solve one or more of the problems/needs defined by the project in order to achieve the objectives set out in the sub-programme's roadmap?
    - Is it clearly described which problem(s)/need(s) that the project wants to solve and their extent?
    - Is the project expected to help solve the problem or to meet the need?
- To what extent does the proposal address identified skills gap? (applies to FFI Sustainable Production and FFI Electronics, Software and Communications)
- Assessment of how well the project proposal will contribute to the objectives and principles of the sub-programme.
    a) Does the project contribute to improving research and innovation capacity in Sweden and thus ensuring the competitiveness of the automotive industry?
    b) Does the project contribute to developing internationally connected and competitive research and innovation environments in which academia, research institutes, industry and others work hand in hand?
- To what extent are the following promoted:
    a) Participation by SMEs and/or suppliers?
    b) Intra-industry collaboration?
    c) Collaboration between industry and/or higher education institutions?
    d) Collaboration between OEMs?

2. Feasibility is defined as "how the project has been designed to achieve its expected results and impact goals"

- * Are project time and budget reasonable for the problems to be solved?
- * How well does the project plan describe activities, work packages, milestones, division of responsibilities, specific project objectives, and plans for measuring performance?
    a) Are there concrete and measurable objectives?
    b) Does the project plan's work package describe the activities related to milestones, actors and resources in a clear way?

- Are the specified TRL levels in the application correct? If not, describe why?
- * How are project participants' potential and ability at implementing the project and achieving project objectives assessed with regard to the composition of the project team and the skills and resources of the participants?

3. Quality

- * Is there an international state of the art in the field and how does the project see itself in relation to this state of the art?
- * Are the project's originality and novelty within the current application area described?
- * Are the method and approach used in the project described (scientific excellence/clear hypotheses and test methods when relevant)?

4. Utility: defined as "the significance of the results and impact if the project is successful"

- * What is the strategy for the utilisation and dissemination of project results?
    a) Benefit to society (new products, shops etc.)?
    b) * To increase knowledge in the field (for academia and education)?
    c) * For transfer to other advanced R&D projects?
    d) For transfer to other product development projects?
    e) launch on the market?
    f) to be used in studies/regulations/evaluating permits/political decisions?
- Are there links with other internal or external projects that can accelerate the introduction of new solutions or help the project to be more effective?
- Is there a description of how the proposed project can lead to the emergency of new knowledge or that existing knowledge is implemented in a new context?

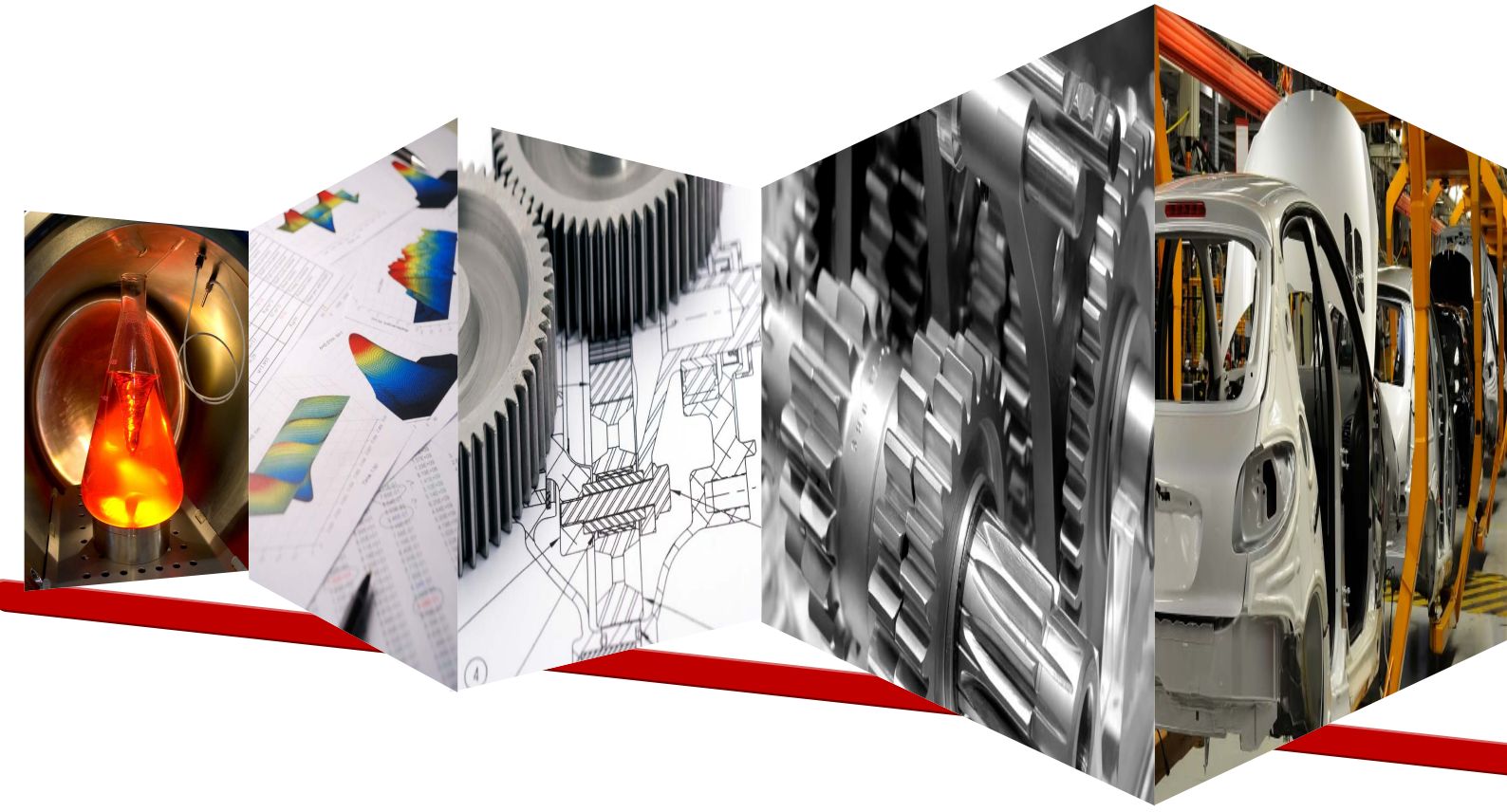
5. Gender

- The potential of the project results to contribute to increased gender equality
- How well is the team composed with regards to gender distribution, and distribution of power and influence between men and women?
- How well have gender aspects been integrated into the project plan?

Bilaga 2 Automotive Technology and Manufacturing Readiness Levels

Automotive Technology and Manufacturing Readiness Levels

A guide to recognised stages of development within the Automotive Industry



automotive council UK

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LowCVP low carbon vehicle partnership

SMMT DRIVING THE MOTOR INDUSTRY

Technology Strategy Board Driving Innovation

Foreword

Good, clear communication firms the ground for exploring new ventures, common areas of interest and establishing new relationships. Within engineering sectors, communication is paramount to achieving high quality products and using resources most efficiently and effectively.

There is an ongoing need for greater cooperation, joint exploration of new designs and acquisition of evolutionary and revolutionary products in order to rebuild the strengths of the UK's Automotive Sector. This set of 'readiness' levels assists the sector by providing specific, identifiable stages of maturity, from early stages of research through to supply chain entry.

I hope you will join others in implementing this framework for technology development, using it as a basis for further planning and communication, and gaining further benefit from its use.

Professor Richard Parry-Jones CBE
Co-Chairman of the Automotive Council

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This guide has been created by the Low Carbon Vehicle Partnership in association with the Automotive Council.
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SMMT DRIVING THE MOTOR INDUSTRY
Technology Strategy Board Driving Innovation

Introduction to Technology and Manufacturing Readiness Levels (TRLs and MRLs)

A recurring issue to developers and adopters of new technologies is how to successfully communicate their accomplished or expected stages of technology development and readiness for manufacture. This set of Automotive TRLs and MRLs aims to help facilitate this dialogue and in doing so help with technology commercialisation, development work with new partners, planning supplier engagement and bringing new capabilities to market, through common understanding. Readiness levels provide common terms to define technology from concept to commercial production and through to disposal, and have a proven effectiveness from the aerospace and defence sectors. Independently, readiness levels can also assist with self-assessment, monitoring progress and planning goals and actions.

Benefits

- Emergent supply chain companies have a framework through which they can better understand the engagement needs of TIer1s/VMs.
- VMs, Tier1s and funding agencies are presented with clear definitions for present and targeting levels of development status.
- A framework can be used to provide clearer direction regarding engagement of the most appropriate public sector support.
- Angels/VC investor interenst can be strategically aligned to product requirements.
- Self assessment provides guidance on next steps (trials, certification etc) relevant to Level and signposts sources of support.
- Sector-wide assessments and initiatives have a common framework to build upon.

These are a few of the benefits that are realised through common understanding.

Application to Integrated Assemblies and Roadmaps

When components are brought together and integrated, their individual TRL and MRL contribute to the readiness of the overall assembly. Integrated systems may contain components with different levels of readiness, influencing the status of the assembly overall. The use of readiness levels in such cases can highlight areas for focus and prioritisation in order to make best progress.

When considered with a timeframe in mind, readiness levels help depict the development path or time to implement next generation technologies or derivatives with respect to established products, similar to technology roadmaps and highlighting strengths and weaknesses in proposed or emerging systems.

Readiness levels also offer the ability to assess complete systems at a high level, the electrification of transport for example, and to focus in on contributing components, such as battery technologies or infrastructure integration.

Relationship between Technology Readiness and Manufacturing Readiness Level

The table which follows details ten stages of maturity for a product to:

- deliver its function (Technology Readiness)
- be produced (Manufacturing Readiness)

These levels are staggered in the table since advancing technological capability logically progresses ahead of manufacture. For each Technology Readiness Level the corresponding Manufacturing Readiness Level is that which is usual. It should be noted however that some technologies can deviate from these levels.

Automotive Technology and Manufacturing Readiness Levels

TRL	Technology Readiness	MRL	Manufacturing Readiness
1	• Basic Principles have been observed and reported. • Scientific research undertaken. • Scientific research is beginning to be translated into applied research and development. • Paper studies and scientific experiments have taken place. • Performance has been predicted.		
2	• Speculative applications have been identified. • Exploration into key principles is ongoing. • Application specific simulations or experiments have been undertaken. • Performance predictions have been refined.		• A high level assessment of manufacturing opportunities has been made.
3	• Analytical and experimental assessments have identified critical functionality and/or characteristics. • Analytical and laboratory studies have physically validated predictions of separate elements of the technology or components that are not yet integrated or representative. • Performance investigation using analytical experimentation and/or simulations is underway.	1	• Basic Manufacturing Implications have been identified. • Materials for manufacturing have been characterised and assessed.
4	• The technology component and/or basic subsystem have been validated in the laboratory or test house environment. • The basic concept has been observed in other industry sectors (e.g. Space, Aerospace). • Requirements and interactions with relevant vehicle systems have been determined.	2	• Manufacturing concepts and feasibility have been determined and processes have been identified. • Producibility assessments are underway and include advanced design for manufacturing considerations.
5	• The technology component and/or basic subsystem have been validated in relevant environment, potentially through a mule or adapted current production vehicle. • Basic technological components are integrated with reasonably realistic supporting elements so that the technology can be tested with equipment that can simulate and validate all system specifications within a laboratory, test house or test track setting with integrated components • Design rules have been established. • Performance results demonstrate the viability of the technology and confidence to select it for new vehicle programme consideration.	3	• A manufacturing proof-of-concept has been developed • Analytical or laboratory experiments validate paper studies. • Experimental hardware or processes have been created, but are not yet integrated or representative. • Materials and/or processes have been characterised for manufacturability and availability. • Initial manufacturing cost projections have been made. • Supply chain requirements have been determined.

6	• A model or prototype of the technology system or subsystem has been demonstrated as part of a vehicle that can simulate and validate all system specifications within a test house, test track or similar operational environment. • Performance results validate the technology's viability for a specific vehicle class.	**4**	• Capability exists to produce the technology in a laboratory or prototype environment. • Series production requirements, such as in manufacturing technology development, have been identified. • Processes to ensure manufacturability, producibility and quality are in place and are sufficient to produce demonstrators. • Manufacturing risks have been identified for prototype build. • Cost drivers have been confirmed. • Design concepts have been optimised for production. • APQP processes have been scoped and are initiated.
7	• Multiple prototypes have been demonstrated in an operational, on-vehicle environment. • The technology performs as required. • Limit testing and ultimate performance characteristics are now determined. • The technology is suitable to be incorporated into specific vehicle platform development programmes.	**5**	• Capability exists to produce prototype components in a production relevant environment. • Critical technologies and components have been identified. • Prototype materials, tooling and test equipment, as well as personnel skills have been demonstrated with components in a production relevant environment. • FMEA and DFMA have been initiated.
8	• Test and demonstration phases have been completed to customer's satisfaction. • The technology has been proven to work in its final form and under expected conditions. • Performance has been validated, and confirmed.	**6**	• Capability exists to produce integrated system or subsystem in a production relevant environment. • The majority of manufacturing processes have been defined and characterised. • Preliminary design of critical components has been completed. • Prototype materials, tooling and test equipment, as well as personnel skills have been demonstrated on subsystems/ systems in a production relevant environment. • Detailed cost analyses include design trades. • Cost targets are allocated and approved as viable. • Producibility considerations are shaping system development plans. • Long lead and key supply chain elements have been identified.
9	• The actual technology system has been qualified through operational experience. • The technology has been applied in its final form and under real-world conditions. • Real-world performance of the technology is a success. • The vehicle or product has been launched into the market place. • Scaled up/down technology is in development for other classes of vehicle.	**7**	• Capability exists to produce systems, subsystems or components in a production representative environment. • Material specifications are approved. • Materials are available to meet planned pilot line build schedule. • Pilot line capability has been demonstrated including run at rate capability. • Unit cost reduction efforts are underway. • Supply chain and supplier Quality Assurances have been assessed. • Long lead procurement plans are in place. • Production tooling and test equipment design & development has been initiated • FMEA and DFMA have been completed.

		8	• Initial production is underway • Manufacturing and quality processes and procedures have been proven in production environment. • An early supply chain is established and stable. • Manufacturing processes have been validated.
		9	• Full/volume rate production capability has been demonstrated. • Major system design features are stable and proven in test and evaluation. • Materials are available to meet planned rate production schedules. • Manufacturing processes and procedures are established and controlled to three-sigma or some other appropriate quality level to meet design characteristic tolerances in a low rate production environment. • Manufacturing control processes are validated. • Actual cost model has been developed for full rate production.
10	• The technology is successfully in service in multiple application forms, vehicle platforms and geographic regions. In-service and life-time warranty data is available, confirming actual market life, time performance and reliability	**10**	• Full Rate Production is demonstrated • Lean production practices are in place and continuous process improvements are on-going. • Engineering/design changes are limited to quality and cost improvements. • System, components or other items are in rate production and meet all engineering, performance, quality and reliability requirements. • All materials, manufacturing processes and procedures, inspection and test equipment are in production and controlled to six-sigma or some other appropriate quality level. • Unit costs are at target levels and are applicable to multiple markets. • The manufacturing capability is globally deployable.

Examples

Below are two examples of levels applied to automotive technologies.

Composite Structures for mass market automotive applications

TRL	Technology Readiness	MRL	Manufacturing Readiness
8	• Test and demonstration phases have been completed to customer's satisfaction. • The technology has been proven to work in its final form and under expected conditions. • Performance has been validated, and confirmed.	**4**	• Capability exists to produce the technology in a laboratory or prototype environment. • Series production requirements, such as in manufacturing technology development, have been identified. • Processes to ensure manufacturability, producibility and quality are in place and are sufficient to produce demonstrators. • Manufacturing risks have been identified for prototype build. • Cost drivers have been confirmed. • Design concepts have been optimised for production. • APQP processes have been scoped and are initiated.

ABS for multiple vehicle class, automotive applications

TRL	Technology Readiness	MRL	Manufacturing Readiness
10	• The technology is successfully in service in multiple application forms, vehicle platforms and geographic regions. In-service and life-time warranty data is available, confirming actual market life, time performance and reliability	**10**	• Full Rate Production is demonstrated • Lean production practices are in place and continuous process improvements are on-going. • Engineering/design changes are limited to quality and cost improvements. • System, components or other items are in rate production and meet all engineering, performance, quality and reliability requirements. • All materials, manufacturing processes and procedures, inspection and test equipment are in production and controlled to six-sigma or some other appropriate quality level. • Unit costs are at target levels and are applicable to multiple markets. • The manufacturing capability is globally deployable.